12-440

# Horne Engineering, Inc.

216 SOUTH MAIN STREET • NICHOLASVILLE, KENTUCKY 40356 • (859)885-9441 • FAX (859)885-5160

**ENGINEERS • LAND SURVEYORS • PLANNERS** 

email@ horneeng.com

October 16, 2012

Mr. Jeff Derouen

Executive Director

Kentucky Public Service commission

RECEIVED

0CT 1 4 2012

PO Box 615

Frankfort, Kentucky 40602

PUBLIC SERVICE COMMISSION

Re:

Jessamine-South Elkhorn Water District - Kentucky Public Service Commission Application for a CPCN and approval of financing for a Water System Improvements Project

Dear Mr. Derouen:

Enclosed please find two (2) copies of plans and specifications for the reference project in response to the submittal by Mr. W. Randall Jones of the CPCN application for Jessamine-South Elkhorn Water District.

Should you have any questions and/or comments, please contact me at (859) 885-9441.

Sincerely,

HORNE ENGINEERING, INC.

John G. Horne, PE, PLS

President

JGH/jt enc.

cc:

Board of Commissioners

W. Randall Jones Kristen Millard Glenn T. Smith Engr/3569

Engr/3976

Corr.

# CASE NO: 2012-00470

Jessamine-South Elkhorn Water District

# **CONTAINS**

LARGE OR OVERSIZED

MAP(S)

RECEIVED ON: October 19, 2012

# Jessamine South Elkhorn Water District 802 South Main Street Nicholasville, Kentucky 40356

L. Nicholas Strong - Chairman
George Dale Robinson
John Blackford
James Hall
Jerry Haws
Glenn "Tom" Smith, Manager

\*\*\*\*\*

CONTRACT DOCUMENTS FOR:

# CATNIP HILL PIKE 1.0 MG ELEVATED STORAGE TANK, PROJECT # 3569 JESSAMINE COUNTY, KY

WX21113016 PROJECT # 3569 GRANT ID - 229N-2008

\*\*\*\*\*

Prepared by:
HORNE ENGINEERING, INC.
216 South Main Street
Nicholasville, Kentucky 40356
(859) 885-9441
email@horneeng.com

December 2010

#### CONTRACT DOCUMENTS

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## **APPENDICES**

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Appendix 2 Notice of Intent (NOI) Form

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## ADVERTISEMENTS FOR BIDS BID DATE July 10, 2012

## CATNIP HILL PIKE 1.0 MG ELEVATED STORAGE TANK, PROJECT #3569 JESSAMINE-SOUTH ELKHORN WATER DISTRICT JESSAMINE COUNTY, KENTUCKY

Sealed proposals for the following work will be received by the JESSAMINE-SOUTH ELKHORN WATER DISTRICT at the JESSAMINE-SOUTH ELKHORN WATER DISTRICT Office, 802 South Main Street, PO Box 731, Nicholasville, KY 40356 until 2:00 P.M. EDT, TUESDAY, JULY 10, 2012 for furnishing labor, equipment, materials and performing all work as set forth in this Advertisement for Bids, General Conditions, Specifications and/or Drawings prepared by Horne Engineering, Inc., 216 South Main Street, Nicholasville, KY 40356. (859) 885-9441.

Immediately following the scheduled closing time for the reception of bids, all proposals which have been submitted in accordance with these conditions will be publicly opened and read aloud.

The work to be bid upon is described as follows:

#### CATNIP HILL PIKE 1.0 MG ELEVATED STORAGE TANK, PROJECT #3569

Construction of a one-million (1,000,000) gallon capacity, torus bottom, steel, elevated water storage tank and appurtenances located in the Northwestern Service Area for the Jessamine – South Elkhorn Water District, Jessamine County, Kentucky. The work shall be completed in 300 days.

A PRE-BID CONFERENCE WILL BE HELD IN THE JESSAMINE-SOUTH ELKHORN WATER DISTRICT OFFICE, 802 SOUTH MAIN STREET, NICHOLASVILLE, KENTUCKY ON WEDNESDAY, JUNE 27, 2012 AT 1:00 P.M., EDT. PROSPECTIVE BIDDERS ARE ENCOURAGED TO ATTEND.

Drawings, Specifications and Contract Documents may be examined at the following places:

Jessamine-South Elkhorn Water District 802 South Main Street

Nicholasville, KY 40356

ABC/Reed of Lexington Planroom

2020 Liberty Road Lexington, KY 40505

Builder's Exchange of Louisville 2300 Meadow Drive, Suite 100

Louisville, KY 40218

Horne Engineering, Inc. 216 South Main Street Nicholasville, KY 40356

ACG/McGraw-Hill Planroom 950 Contract Street, Suite 100

Lexington, KY 40505

ACG/McGraw-Hill Planroom

2106 Plantside Drive Louisville, KY 40299

A bid copy shall be obtained from Lynn Imaging, 328 Old East Vine Street, Lexington, KY 40507, (859) 255-1021 upon payment of a non-refundable reproduction cost of \$150.00 plus shipping. BIDDER MUST BE A PLAN HOLDER ON RECORD WITH LYNN IMAGING. After award of a contract, the General Contractor will be furnished, without charge, a reasonable number of plans and specifications

needed to prosecute the work. Subcontractors, manufacturers and suppliers shall obtain plans and specifications from the General Contractor or purchase direct.

Sealed proposal for the Contract shall be clearly marked on the outside of the container as follows:

"Sealed proposal for Jessamine-South Elkhorn Water District CATNIP HILL PIKE 1.0 MG ELEVATED STORAGE TANK, PROJECT #3569." NOT TO BE OPENED UNTIL 2:00 P.M. EDT, JULY 10, 2012. The Owner reserves the right to hold the bid for up to ninety (90) days before award. Time allowed for completion of the Project is 300 consecutive calendar days.

If forwarded by mail, the sealed envelope containing the proposal must be enclosed in another envelope and mailed to Jessamine-South Elkhorn Water District Office, PO Box 731, Nicholasville, KY 40356 allowing sufficient time for such mailing to reach this address prior to the scheduled closing time for the receipt of proposals.

Bids shall be accompanied by a certified check or bid bond payable to the Jessamine-South Elkhorn Water District in an amount of not less than five (5%) percent of the total bid. No bidder may withdraw his bid for a period of ninety (90) days after the date bids are opened. He may however, withdraw his bid at any time prior to the time and date scheduled for opening of same or any authorized postponement therof.

The Jessamine-South Elkhorn Water District reserves the right to reject any and all bids, and to waive all formalities and any bid that is obviously unbalanced may be rejected. Further, the owner reserves the right to reduce the totality of the contract at the owner's sole and unfettered opinion, if same is required to bring the project within the scope of available funds. Bidder shall make no demands for extra compensation, should owner reduce project.

Bidders must comply with the President's Executive Order Nos., 11246 and 11375, which prohibits discrimination in employment regarding race, creed, color, sex, or national origin.

Bidders must comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, Section 3 Segregated Facilities, Section 109 and the Contract Work Hours Standard Act.

Bidders must certify that they do not, and will not, maintain or provide for their employee any facilities that are segregated on the basis of race, color, creed or national origin, and that the Contractor/Subcontractor will comply with 41 CFR 60-4, in regard to affirmative action, to insure equal opportunity to females and minorities and will apply the time tables and goal set forth in 41 CFR 60-4.

Bidder is to provide a statement indicating, or to take all steps necessary to prove that the bidder has made positive efforts to use small, minority, women owned and disadvantaged businesses.

Federal law prohibits discrimination on the grounds of race, color, national origin, religion, age, handicap, and sex in this project. Minority firms are particularly encouraged to participate.

This contract is being funded in part with KIA monies.

[s] L. Nicholas Strong, Chairman Jessamine South Elkhorn Water District

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#### **ARTICLE 1 - DEFINED TERMS**

- 1.01 Terms used in these Instructions to Bidders will have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
  - A. Issuing Office--The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

#### **ARTICLE 2 - COPIES OF BIDDING DOCUMENTS**

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

#### **ARTICLE 3 - QUALIFICATIONS OF BIDDERS**

3.01 To demonstrate Bidder's qualifications to perform the Work, within five days of Owner's request, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be called for below.

#### ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

#### 4.01 Underground Facilities

A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others. The plans do not provide warranty of underground utilities. Contractor should contact existing utility providers to verify location of utilities.

#### 4.02 Hazardous Environmental Condition

- A. The Supplementary Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that ENGINEER has used in preparing the Bidding Documents.
- B. Copies of reports and drawings referenced in paragraph 4.03.A, if any, will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in paragraph 4.06 of the General Conditions has been identified and established in paragraph 4.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" if any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.
- 4.03 It is responsibility of each Bidder before submitting a Bid to:
  - A. Fxamine and carefully study the Bidding Documents, the other related data identified in the Bidding Documents, and any Addenda;
  - B. Visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
  - C. Become familiar with and satisfy Bidder as to all Federal, State, and local Laws and Regulations that may affect cost, progress, or performance of the Work;
  - D. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and (2) reports and drawings of Hazardous Environmental Conditions at the Site which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions;
  - E. Obtain and carefully study (or accept consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;
  - F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times 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. Correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;
- 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; and
- J. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.
- 4.04 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

#### ARTICLE 5 - PRE-BID CONFERENCE

A pre-Bid conference will be held at 1:00 pm, Wednesday, June 27, 2012 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 6 - SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. Easement for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

#### 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 mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than five 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, or change the Bidding Documents as deemed advisable by Owner or Engineer.

#### **ARTICLE 8 - BID SECURITY**

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 % of Bidder's maximum Bid price and in the form of a certified check or a Bid bond issued by a surety meeting the requirements of the General Conditions.
- 8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award,

whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 91 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.

8.03 Bid security of other Bidders whom OWNER believes do not have a reasonable chance of receiving the award will be returned 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 ready for final payment are set forth in the Agreement.

#### ARTICLE 10 -LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages are set forth in the Agreement.

#### ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or "or-equal" materials and equipment as defined in paragraph 6.05 of the General Conditions, or those substitute materials and equipment approved by the Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or "or-equal" item. Request for Engineer's clarification of materials and equipment considered "or-equal" prior to the Effective Date of the Agreement must be received by the Engineer at least 5 days prior to the date for receipt of Bids. No item of material or equipment will be considered by Engineer as a 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. Each request shall conform to the requirements of paragraph 6.05 of the General Conditions. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed substitute 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.

#### ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. 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, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, without an increase in the Bid.
- 12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest responsible Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or

entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner and Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer.

- 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 twenty-five (25%) percent.

#### **ARTICLE 13 - PREPARATION OF BID**

- 13.01 The Bid form is included with the Bidding Documents. Additional copies may be obtained from Engineer.
- All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid From. A Bid price shall be indicated for each {section, Bid item, alternative, adjustment unit price item, and unit price item} listed therein, or the words "No Bid," "No Change," or "Not Applicable" entered.
- 13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. If required by State where work is to be performed, the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporation business address and state of incorporation shall be provided on the Bid Form.
- 13.04 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 business address of the partnership shall be provided on the Bid Form.
- 13.05 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 business address of the firm must be provided on the Bid Form.
- 13.06 A Bid by an individual shall show the Bidder's name and business address.
- 13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid form. The business address of the joint venture must be provided on the Bid Form.
- 13.08 All names shall be typed or printed in ink below the signatures.
- 13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers and dates of which shall be filled in on the Bid form.
- 13.10 The address and telephone number for communication regarding the Bid shall be shown.
- 13.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the Contract. Bidder's state contractor license number for the state of the Project, if any, shall also be shown on the Bid Form.

#### ARTICLE 14 - BASIS OF BID; COMPARISON OF BIDS

#### 14.01 Unit Price

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.
- B. The total of all bid prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with paragraph 11.03 of the General Conditions.

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

#### ARTICLE 15 - SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and the Bid bond form. The unbound copy of the Bid Form is to be completed and submitted with all the attachments.
- A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement for Bids and shall be enclosed in an opaque sealed envelope plainly marked 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 envelope plainly marked on the outside with the notation "BID ENCLOSED." When using the mail or other delivery system, the Bidder is totally responsible for the mail or other delivery system delivering the Bid at the place and prior to the time indicated in the Advertisement for Bid. A mailed Bid shall be addressed to Owner at address in advertisement.

#### ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

- 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.
- 16.02 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 or negotiated, that Bidder will be disqualified from further bidding on the Work. This provision to withdraw a Bid without forfeiting the Bid security does not apply to Bidder's errors in judgment in preparing the Bid.

#### **ARTICLE 17 - OPENING OF BIDS**

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

#### ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form.

#### ARTICLE 19 - EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, non-responsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be non-responsible. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.
- 19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

- 19.03 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- 19.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the contract Documents.
- 19.06 If the Contract is to be awarded, Owner will award the Contract to the responsible Bidder whose Bid, conforming with all the material terms and conditions of the Instructions to Bidders, is lowest, price and other factors considered.

#### ARTICLE 20 - CONTRACT SECURITY AND INSURANCE

20.01 General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by such bonds.

#### **ARTICLE 21 - SIGNING OF AGREEMENT**

- 21.01 When Owner gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.
- 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) or other public agencies.
- 21.03 If applicable, concurrence by RUS in the award of the Contract is required before the Contract is effective.

#### **ARTICLE 22 - SALES AND USE TAXES**

22.01 OWNER is not exempt from Kentucky State sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall be included in the Bid. Refer to paragraph 6.10 of the Supplementary Conditions for additional information.

#### ARTICLE 23 - DISADVANTAGED BUSINESS ENTERPRISE AND MINORITY REQUIREMENT

23.01 CONTRACTOR is to determine if this applies to this project and take all necessary steps to comply.

#### ARTICLE 24 - BIDDER MUST BE PLAN HOLDER OF RECORD

Any person(s) or firm submitting a bid for the work shall be a plan holder of record from the entity issuing the bid documents and plans. Bids must be submitted on the Bid Form furnished. Facsimile forms will not be accepted. Person's bid submitted without registrations shall be subject to the Owner's rejection at the Owner's sole and unfettered opinion.

# UNIT PRICE BID SCHEDULE CATNIP HILL PIKE 1.0 MG ELEVATED STORAGE TANK, PROJECT #3569 JESSAMINE SOUTH ELKHORN WATER DISTRICT JESSAMINE COUNTY, KENTUCKY

Proposal of
(hereinafter called "BIDDER", organized and existing under the laws of the State of doing business as *, to the JESSAMINE
doing business as *, to the <b>JESSAMINE</b> SOUTH ELKHORN WATER DISTRICT, (herein after called "OWNER").
In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all work for the construction of <u>CATNIP HILL PIKE 1.0 MG ELEVATED STORAGE TANK, PROJECT #3569</u> project in strict accordance with the Contract Documents, within the time set forth therein, and at the unit prices stated below.
By submission of this bid, each BIDDER certifies, and in the case of a joint bid each party thereto certifies as to its own organization, that this bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this bid with any other BIDDER or with any competitor.
BIDDER hereby agrees to commence work under this contract on or before a date to be specified in the Notice to Proceed and to fully complete the project within <u>300</u> consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of \$_500.00 for each consecutive calendar day that the work remains incomplete after the expiration date of the contract.
BIDDER acknowledges receipt of the following Addenda:
Addendum No Addendum No Addendum No Addendum No
The BIDDER hereby proposes to furnish and do all that is required by the contract to which this refers for the construction of all work listed at the unit prices shown for each bid item on the following Unit Bid Schedule. (The Unit Bid Schedule attached, lists the various divisions of construction contemplated in the Plans and Specifications, together with and estimate of the units of each. With these units as the basis, the BIDDER will extend each item, using the cost he inserts in the unit column. Any total cost found inconsistent with the unit cost when the bids are examined will be deemed in error and corrected to agree with the unit cost which shall be considered correct).
*Insert "a corporation", "a partnership", or "an individual" as applicable:
The undersigned BIDDER does hereby declare and stipulate that this proposal is made in pursuance

of and subject to all terms and conditions of the Instructions to Bidders, the General Conditions, the Construction Contract, the Technical Specifications, Supplementary Conditions and the Plans pertaining to the work to be done, all of which have been examined by the undersigned.

Accompanying this proposal is a certified check or standard bid bond in the amount of 5% of the total Bid in accordance with the Instructions to Bidders.

The undersigned BIDDER agrees to execute the contract and Performance and Payment Bond for the amount of the total of this bid within fifteen(15)calendar days from the date when the written Notice of Award of the contract is delivered to him at the address given in this proposal. The name and phone number of the corporate surety with which the BIDDER proposes to furnish the specified Performance and Payment Bond is as follows:

Name:	Phone No	•

All the various phases of work enumerated in the Technical Specifications with their individual jobs and overhead, whether specifically mentioned, included by implication or appurtenant thereto, are to be performed by the Contractor under one of the items listed in the Bid Schedule, irrespective of whether it is named in same list.

Payment for work performed will be in accordance with the Bid Schedule, subject to changes as provided for the Construction Contract.

The BIDDER understands that the OWNER reserves the right to reject any or all bids and to waive any informalities in the bidding.

The OWNER reserves the right to reject any and all bids and to waive all formalities and any bid that is obviously unbalanced may be rejected. Further, the OWNER reserves the right to reduce the totality of the contract by removal of line segments, selected at the owner's sole and unfettered opinion, if same is required to bring the project within the scope of available funds. BIDDER shall make no demands for extra compensation, should owner reduce project.

The BIDDER agrees that this bid shall be good and may not be withdrawn for a period of ninety (90) calendar days after the scheduled closing time for receiving bids.

Bids shall include sales tax and all other applicable taxes and fees.

(Unit Price Bid Sheet Summary Attached)

# BID SHEET SUMMARY 1.0 MG ELEVATED WATER STORAGE TANK, PROJECT #3569 Jessamine County, Kentucky January 1, 2011

Item #	Description of Work	Unit	Quantity	Unit	t Bid	Total Cost
1	1.0 MG Elevated Water Storage Tank To include: 1.0 MG Elevated Torus Bottom Multi-Column Tank, Tank Foundation, Tank Painting, Testing, and Chlorinating Tank	LS	1	\$		\$
2	8' Perimeter Fence	LF	780	\$		\$
3	16' Wide Double Gate	ΈA	1	\$	-	\$
4	Telemetry	LS	1	\$	-	\$
5	Storm Sewer Manhole w/ Beehive Grate	EA	2	\$	-	\$
6	18" ADS Storm Pipe	LF	240	\$		\$
7	12" D.I. Watermain	LF	100	\$	-	\$
8	Fire Hydrant Assembly	EA	1	\$	-	\$
9	Watermain Tie-in 3-12"Valves and Tee	EA	1	\$	*	\$ -
10	Transducer Pit	LS	1	\$	-	\$
11	2" Electric Conduit	LF	280	\$	180-	<u> </u>
12	Paved Access Road and Parking Lot	LS	1	\$	•	\$
13	Eastern White Pine	EA	9	\$		\$
14	Cotoneaster	EA	16	\$	_	\$
15	Regrade/Seed	LS	1	\$		-
Nrite out	in words, Total Project Bid All Lines:			TOTAL PRO	OJECT BID	<u>-</u>
						Dollars
and		Cent	ts			
scope of Note: Q cost show or remov	ny tasks or materials required to complete the protection the work and shall be included in the contractor's uantities shown hereon are for information purpown hereon, with field measured quantities in placel of any item shown, hereon.  The Owner reserves the right to hold bids for a perfection of the protection of t	s bid as incid ses only. Co e and accep	ental to the p ontractor shall ted. Bidder sl	roject. satisfy hims nall make no	self of the qua	antities. Payment will be made on unit
	Il excavation is unclassified.	,	, ,			
vote: A	il excavation is unclassined.					
Company	<i>y</i> :		Signe	d:		
\ddress:			Printe Name			
			Titl	e:		
			Dat	o.,		

## **BID BOND**

SIDDE	R (Name and Address):				
URET	TY (Name and Address of Principa	ıl Place of Bu	siness):		
WNE	R (Name and Address):				
	d Due Date: scription <i>(Project Name and Inclu</i>	de Location):	:		
Da	nd Number: te <i>(Not earlier than Bid due date)</i> : nal sum			\$	
re					
re		(Words)			(Figures)
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urety a		bound hereb		t to the terms set forth below, c	. •
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urety and Bondid Bondidder' y:	and Bidder, intending to be legally and to be duly executed by an authorized and Corporate Seal  Signature  Print Name  Title	bound hereborized officer, (Seal)	SURET Surety's By:	t to the terms set forth below, or representative.  Y S Name and Corporate Seal  Signature (Attach Power of A  Print Name  Title  Signature  Title	lo each cause (Seal) Attorney)

Page 1 of 2

- 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 Bid due date without Surety's written consent.
- 6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
- 7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
- 8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
- 9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
- 10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
- 11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

# STATEMENT OF QUALIFICATIONS FORM FOR

# CATNIP HILL PIKE 1.0 MG ELEVATED STORAGE TANK, PROJECT #3569 JESSAMINE-SOUTH ELKHORN WATER DISTRICT JESSAMINE COUNTY, KENTUCKY

ORGANIZATION & SIZE			
Company Name			and the second distribution of the second distri
Location of Main Office			
Address			and work the second
Company Official			
Title			
Cell Phone#			
	BUSINESS STRU	CTURE:	
Sole Proprietor Limited Liability C Other (Explain)	-	IncorporatedPartnership	
	SIZE:		
Number of Employ	rees, as of	Full Part-time	
INSURANCE & LIABILITY PI  Name of Insurance Agency	ROTECTION		
<u> </u>		Phone	
BONDING			
Name of Bonding Company			
Contact Person		Phone	· · · · · · · · · · · · · · · · · · ·

NOTE: Apparent Low Bidder will be required to provide financial statement.

#### **COMPANY WORK HISTORY**

Respondent shall submit description and statement of their history relative to the following categories. Years experience shall be for the present company and all prior companies, which respondent had a position of control. Continue on a separate sheet(s) if necessary.

Tank Construction:	years experience.

## CURRENT PROJECTS UNDER CONSTRUCTION

Project Name & Description	Contract Completion Date	Percentage of Completion	Contract Amount

# PREVIOUS PROJECTS

Project Name & Description	Date Completed	Contract Amount

# PERSONNEL WORK EXPERIENCE

Name	Age
Total Years Experience	Years with this Company
Describe work experience and qualit	fications:
Name	Age
Total Years Experience	Years with this Company
Describe work experience and qualif	ications:
Name	Age
	Years with this Company
	ications:
Name	Age
	Years with this Company

# SUBCONTRACTOR LISTING

List name, contact person, address and phone number of all subcontractors to be used on this project for all the following segments of work.

TELEMETRY:		
Name & Contact Person	Address	Phone Number
STORM PIPING:	_	
Name & Contact Person	Address	Phone Number
SITE WORK / ACCESS ROAD:		
Name & Contact Person	Address	Phone Number
ACCESS ROAD:		
Name & Contact Person	Address	Phone Number
LANDSCAPE/SEEDING:		
Name & Contact Person	Address	Phone Number
OTHER (Specify):		
Name & Contact Person	Address	Phone Number

## **EQUIPMENT AVAILABLE**

Below, list the equipment which you will be able to provide for anticipated work for the District. Indicate whether equipment is owned or leased. Only long-term lease equipment should be listed. Short term or monthly rentals do not qualify.

Name/Description		Model #	Age	Owned or Leased
		· · · · · · · · · · · · · · · · · · ·		
		:		
				L
0.1				
Submitted By:				
Name	Title			
Company Name				

Q:\ProjectDir\Jsewd\WO3569\Contract Docs\BidderSOQ.wpd

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

#### COMPLIANCE STATEMENT

This statement relates to a proposed contract with
JESSAMINE SOUTH ELKHORN WATER DISTRICT
(Name of borrower or grantee)
who expects to finance the contract with assistance from either the Rural Housing Service (RHS), Rural Business-Cooperative Service (RBS), or the Rural Utilities Service (RUS) or their successor agencies, United States Department of Agriculture (whether by a loan, grant, loan insurance, guarantee, or other form of financial assistance). I am the undersigned bidder or prospective contractor, I represent that:
1.   I have, have not, participated in a previous contract or subcontract subject to Executive 11246 (regarding equal employment opportunity) or a preceding similar Executive Order.
2. If I have participated in such a contract or subcontract,  I have,  have not, filed all compliance reports that have been required to file in connection with the contract or subcontract.
If the proposed contract is for \$50,000 or more and I have 50 or more employees, I also represent that:
3.   I have, have not previously had contracts subject to the written affirmative action programs requirements of the Secretary of Labor.
4. If I have participated in such a contract or subcontract,  I have, have not developed and placed on file at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor.
I understand that if I have failed to file any compliance reports that have been required of me, I am not eligible and will not be eligible to have my bid considered or to enter into the proposed contract unless and until I make an arrangement regarding such reports that is satisfactory to either the RHS, RBS or RUS, or to the office where the reports are required to be filed.

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

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays the valid OMB control number. The valid OMB control number for this information collection is 0575-0018. The time required to complete this information collection is estimated to average 10 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

# 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 o	offers is prescribed in 18 U.S.C. 1001.
Date	
	(Signature of Bidder or Prospective Contractor)
Address (including Zip Code)	

#### 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)	-

## NOTICE OF AWARD-

To:	
(Contractor)	
(Address)	
PROJECT DESCRIPTION:	
CATNIP HILL PIKE 1.0 MG	ELEVATED STORAGE TANK, PROJECT #3569
The OWNER has considered the BID submitted Advertisement for Bids dated	d by you for the above described WORK in response to its
You are hereby notified that your BID has been account	cepted for the project in the amount of \$
	ders to execute the Agreement and furnish the required t BOND and certificates of insurance within fifteen (15) days AWARD.
said OWNER will be entitled to consider all your	said BONDS within fifteer (15) days from the date of this Notice, rights arising out of the OWNER's acceptance of your BID as the OWNER. will be entitled to such other rights as may be
You are required to return an acknowledged copy of	of this NOTICE OF AWARD to the OWNER.
Dated thisday of	JESSAMINE SOUTH ELKHORN WATER DISTRICT
	(Owner)
	By
ACCEPTANCE OF NOTICE OF AWARD Receipt of the above NOTICE OF AWARD is hereby acknowledged.	Title
(Contractor)	
this, theday of, 20 <u>12</u>	
Ву	
Title	
Employer Fed ID#	

# -NOTICE TO PROCEED-

To:			
	(Contractor)	Total Control of the	
EP APP LANGE METALES IN TRACE STATE	(Address)	* Name Constitution of the	
		CONTRACTOR TO THE PROPERTY OF	
PROJECT DE	SCRIPTION:		
CA	TNIP HILL PIKE	.0 MG ELEVAT	ED STORAGE TANK, PROJECT #3569
the Agreement complete the W	dated	, 20 <u>12</u> , on or be _consecutive caler	fied to commence WORK in accordance with a store, 2012, and you are to a dar days, thereafter. The date of completion
Dated this	day of	, 20 <u>12</u> ,	
		<u>JESSAMIN</u>	E SOUTH ELKHORN WATER DISTRICT (Owner)
		Ву	у
		Ti	itle:
ACCEPTANC	E OF NOTICE TO	PROCEED	
Receipt of the a is hereby ackno	bove NOTICE TO I	PROCEED	
(	(Contractor)	***************************************	
this, theo	lay of	20 <u>12</u>	
By			
Title		****	
Employer Fed ID	#		

# **AGREEMENT**

THIS .	AGREEMENT is by and between <b>JESSAMINE-SOUTH ELKHORN WATER DISTRICT</b> ("Owner") and
	("Contractor")
Owner	and Contractor, in consideration of the mutual covenants hereinafter set forth, agree as follows:
ARTI	CLE 1 WORK
1.01	Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:
	CATNIP HILL PIKE 1.0 MG ELEVATED STORAGE TANK, PROJECT #3569
ARTI	CLE 2 – THE PROJECT
2.01	The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:
	Construction of a one million (1,000,000) gallon capacity, torus bottom, steel, elevated water storage tank and appurtenances located in the Northwestern Service Area for the Jessamine – South Elkhorn Water District, Jessamine County, Kentucky. The work shall be completed in 300 days.
ARTI	CLE 3 – ENGINEER
3.01	The Project has been designed by <u>Horne Engineering</u> , <u>Inc.</u> , <u>216 S. Main Street</u> , <u>Nicholasville</u> , <u>KY 40356 (859) 885-9441</u> (Engineer), who is 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.
ARTIC	CLE 4 – CONTRACT TIME
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	Days to Achieve Substantial Completion and Final Payment
	A. The Work will be substantially completed as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within 300 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 of this Agreement and that Owner will suffer financial

loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the

Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$500.00 for each day that expires after the time specified in Paragraph 4.02 for Completion.

#### ARTICLE 5 - CONTRACT PRICE

- 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:
  - A. As provided in Paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer as provided in Paragraph 9.07 of the General Conditions. Unit prices have been computed as provided in Paragraph 11.03 of the General Conditions.

#### **ARTICLE 6 – PAYMENT PROCEDURES**

- 6.01 Submittal and Processing of Payments
  - A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.
- 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 <a href="20th">20th</a> day of each month during performance of the Work as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, 'n the event there is no schedule of values, as provided in the General Requirements:
    - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions:
      - a. 90 percent of Work completed (with the balance being retainage); and
      - b. 90 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
    - 2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions.

#### 6.03 Final Payment

A. Upon receipt of the final Application for Payment accompanied by Engineer's recommendation of payment in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay Contractor as provided in Paragraph 14.07 of the General Conditions the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages.

#### ARTICLE 7 - INTEREST

7.01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the maximum legal rate.

#### ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Agreement Contractor makes the following representations:
  - A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.
  - B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
  - C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
  - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions, if any, at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in Paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions as provided in Paragraph 4.06 of the General Conditions.
  - E. Contractor has obtained and carefully studied (or assumes responsibility for doing so) all, if any, examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.
  - F. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
  - 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 correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
  - I. 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.
  - J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

#### 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.
  - 3. Payment bond.
  - 4. Other bonds.
    - a. Bid bond.
  - 5. General Conditions (pages 00710-1 to 00710-55, inclusive).
  - 6. Additional Conditions
    - a. Special Conditions (pages 1 to 18, inclusive).
    - b. Supplementary (pages 1 to 10, inclusive).
  - 7. Specifications as listed in the table of contents of the Project Manual.
    - a. Technical Specifications as listed in the table of contents: Technical Specifications
  - 8. Drawings consisting of <u>7</u> sheets with each sheet bearing the following general title: <u>Construction Plans</u>
    <u>Jessamine-South Elkhorn Water District Catnip Hill Pike 1.0 MG Elevated Storage Tank, Jessamine County, Kentucky.</u>
  - 9. Addenda (None).
  - 10. Exhibits to this Agreement (enumerated as follows):
    - a. Contractor's Bid (pages <u>BS-1</u> to <u>BS-3</u>, inclusive).
    - b. Documentation submitted by Contractor prior to Notice of Award (None).
    - c. Standard Details (pages SD-1 to SD-19, inclusive)
    - d. Appendix 1. Prevailing Wage Rates, Jessamine County;
      - 2. Notice of Intent (NOI) Form
      - 3. Report of Geotechnical Exploration
  - 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.

- 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 Paragraph 3.04 of 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. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.
- 10.03 Successors and Assigns
  - A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.
- 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 Other Provisions

This Agreement is dated \_\_\_\_day of \_\_\_\_\_, 2012. This Agreement shall not be effective unless and until Agency's designated representative concurs, if required. Otherwise, to be effective date shown herein. CONTRACTOR OWNER: JESSAMINE-SOUTH ELKHORN WATER DISTRICT -By: By: Title: Chairman Title: Attest: Attest: Title: Secretary Title: Address for giving notices: Address for giving notices: 802 S. Main Street, PO Box 731 Nicholasville, KY 40356 Agent for service of process: (If Contractor is a corporation or a partnership, attach evidence of authority to sign.)

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in four copies. One counterpart each has been delivered to Owner, Contractor, Engineer, and Agency. All portions of the Contract Documents have been signed, initialed, or

identified by Owner and Contractor or identified by Engineer on their behalf.

# PAYMENT BOND

CONTI	RACTOR (Name and Address):	SURE Busine	TY (Name, and Address of Principal Pla ess):	ce of
OWNE	ER (Name and Address):			
Ar	RACT fective Date of Agreement: mount: escription (Name and Location):			
Da <i>Ag</i> An	ond Number:  ate (Not earlier than Effective Date of greement):  mount:  odifications to this Bond Form:			
•		•	subject to the terms set forth below, do e	ach
cause th	and Contractor, intending to be legally be nis Payment Bond to be duly executed by RACTOR AS PRINCIPAL	•	ed officer, agent, or representative.	ach
cause the	nis Payment Bond to be duly executed by	an authorize SURE	ed officer, agent, or representative.	
CONT	nis Payment Bond to be duly executed by  RACTOR AS PRINCIPAL  (Seal	an authorize SURE	ed officer, agent, or representative.	
CONT	RACTOR AS PRINCIPAL  (Seal ractor's Name and Corporate Seal	y an authorize SURE  Sure	rd officer, agent, or representative.  TY  ty's Name and Corporate Seal	
CONT	RACTOR AS PRINCIPAL  (Seal ractor's Name and Corporate Seal	y an authorize SURE  Sure	And officer, agent, or representative.  TTY  Atty's Name and Corporate Seal  Signature (Attach Power of Attorney)	
cause the	RACTOR AS PRINCIPAL  (Seal ractor's Name and Corporate Seal  Signature  Print Name	y an authorize SURE  Sure	And officer, agent, or representative.  TTY  Aty's Name and Corporate Seal  Signature (Attach Power of Attorney)  Print Name	(Seal

- 1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
- 2. With respect to Owner, this obligation shall be null and void if Contractor:
  - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and
  - 2.2 Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.
- 3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.
- 4. Surety shall have no obligation to Claimants under this Bond until:
  - 4.1 Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
  - 4.2 Claimants who do not have a direct contract with Contractor:
    - 1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
    - 2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
    - 3. Not having been paid within the above 30 days, have sent a written notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.
- 5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.
- 6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:
  - 6.1 Send an answer to that Claimant, with a copy to Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
  - 6.2 Pay or arrange for payment of any undisputed amounts.
- 7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.
- 8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.

- 9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
- 10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.
- 11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
- 12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.
- 13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.
- 14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

#### 15. Definitions

- 15.1 Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
- 15.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 15.3 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (Name, Address, and Telephone)

Surety Agency or Broker:

Owner's Representative (Engineer or other):

# PERFORMANCE BOND

CONTRA	ACTOR (Name and Address):	SURETY (Nam	e, and Address of Principal Place of Business
WNER	(Name and Address):		
Amo	tive Date of Agreement:		
Date	Number: (Not earlier than Effective Date of ement):		
Amo Mod	fications to this Bond Form:  d Contractor, intending to be legally be		oject to the terms set forth below, do each cau
Amo Mod urety and is Perfo	fications to this Bond Form:  d Contractor, intending to be legally be remance Bond to be duly executed by ACTOR AS PRINCIPAL	an authorized of SURE	icer, agent, or representative. ΓΥ
Amo Modi	fications to this Bond Form: d Contractor, intending to be legally became Bond to be duly executed by ACTOR AS PRINCIPAL	SURE Sure	icer, agent, or representative.
Amo Modi	fications to this Bond Form:  d Contractor, intending to be legally be remance Bond to be duly executed by ACTOR AS PRINCIPAL	an authorized of SURE	icer, agent, or representative. ΓΥ
Amo Modi	fications to this Bond Form:  d Contractor, intending to be legally be remance Bond to be duly executed by ACTOR AS PRINCIPAL.  tor's Name and Corporate Seal	SURE Sure	icer, agent, or representative. ΓΥ y's Name and Corporate Seal
Amo Modi	fications to this Bond Form:  d Contractor, intending to be legally brance Bond to be duly executed by  ACTOR AS PRINCIPAL  tor's Name and Corporate Seal  Signature	SURE Sure	icer, agent, or representative.  ΓΥ  y's Name and Corporate Seal  Signature (Attach Power of Attorney)
Amo Modiserety and is Perfo ONTRA Contrac By:	d Contractor, intending to be legally by the remance Bond to be duly executed by ACTOR AS PRINCIPAL (Stor's Name and Corporate Seal  Signature  Print Name	SURE Sure	icer, agent, or representative.  ΓΥ  y's Name and Corporate Seal  Signature (Attach Power of Attorney)  Print Name
Amo Modis Perfo ONTRA Contrac By:	d Contractor, intending to be legally by the remance Bond to be duly executed by ACTOR AS PRINCIPAL (Stor's Name and Corporate Seal  Signature  Print Name	SURE Sures Seal) By:	icer, agent, or representative.  ΓΥ  y's Name and Corporate Seal  Signature (Attach Power of Attorney)  Print Name
Amo Mod urety and is Perfo ONTRA	d Contractor, intending to be legally by the remance Bond to be duly executed by ACTOR AS PRINCIPAL  tor's Name and Corporate Seal  Signature  Print Name  Title	SURE Sures Seal) By:	ricer, agent, or representative.  TY  y's Name and Corporate Seal  Signature (Attach Power of Attorney)  Print Name  Title

Page 1 of 3

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

- 1. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.
- 2. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
  - 2.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
  - 2.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and
  - 2.3 Owner has agreed to pay the Balance of the Contract Price to:
    - 1. Surety in accordance with the terms of the Contract; or
    - 2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.
- 3. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:
  - 3.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
  - 3.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
  - 3.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
  - 3.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
    - 1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
    - 2. Deny liability in whole or in part and notify Owner citing reasons therefor.
- 4. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.
- 5. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

- 5.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
- 5.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
- 5.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.
- 6. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.
- 7. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.
- 8. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located, and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
- 9. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.
- 10. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

#### 11. Definitions.

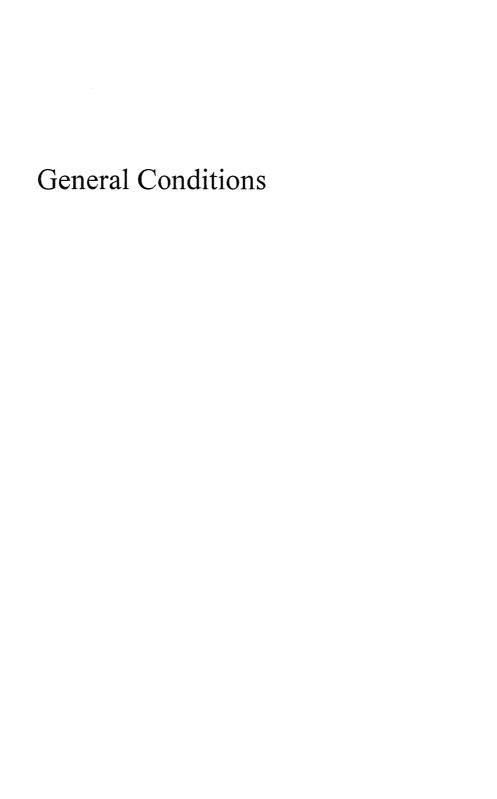
- 11.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
- 11.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 11.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
- 11.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – (*Name, Address and Telephone*) Surety Agency or Broker:

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

	CONTRACT CHANGE ORD	ER	Order No.
			Date:
			State: KY
Contract For:	CATNIP HILL PIKE 1.0 MG ELEVATED STORAGE	TANK, PROJECT #3569	County: Jessamine
Owner:	Jessamine-South Elkhorn Water District		Project # 3569
То			
You are hereby	(Contractor) y requested to comply with the following changes from the contract	plans and specification:	
	Description of Changes	DECREASE	INCREASE
(Supplementa	al Plans and Specifications Attached - When Noted)	in Contract Price	In Contract Price
	TOTALS		
	NET CHANGE IN CONTRACT PRICE		
JUSTIFICATIO	r		
		Original Cont	ract Price
		\$ <u> </u>	t is the contract of the contr
The Contract Total	including previous Change Orders is:		, , , , , , , , , , , , , , , , , , , ,
	moraling provided Grange Gradiens.	and 00/100 Dollars	\$
		and our roo Donars	Ψ
The amount of the	Contract will be (Increased) By The Sum Of:		
		and 00/100 Dollars	\$
The Contract Total	Including this and previous Change Orders Will Be:		
		and 00/100 Dollars	\$
The Contract Period	d Provided for Completion Will Be Increased by days		
This document will	become a supplement to the contract and all provisions will apply h	ereto.	(Date)
Requested:			
	Jessamine-South Elkhorn Water District		(Date)
Recommended:			
	Horne Engineering, Inc.		(Date)
Accepted:	Contractor	***************************************	(D-1-)
	Contractor		(Date)
	This information will be used as a record of any changes to	the original construction contract	

						ESTIMATE NO.		
PERIODICAL ESTIMATE FOR PARTIAL PAYMENT			PAYMENT		PERIOD OF ESTIMATE		IATE	
						From 00/00/00		00
Project No.		OWNE	R:			CONTRAC	CTOR:	
3569	Jes	ssamine-South Elkh	orn Water Disti	rict				
					MATE			
	1. Original Cont	ract	*************				\$0.00	
		rs(No's None						
3. Revised Contract (1 + 2)								
* 4. Work Completed(Page 2)			*********	******************	4)_	\$0.00		
* 5. Stored Materials (Page 3)			**************		5)	\$0.00		
	6. Subtotal (4 +	5)			******************	6) _	\$0.00	
	7. Retainage ( _	10_%)		• • • • • • • • • • • • • • • • • • • •		7)_	\$0.00	
	8. Net earned (	6-7)		**********		8)_	\$0.00	
	9. Previous Pay	ments(Est. No. )	~~~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	**********	< + < + < < < < < < < < < < < < < < < <	9)_	9) \$0.00	
	10. Amount Due	This Estimate (8-9)		*********		10)_	\$0.00	
	* Detailed break	down attached						
	Chana	o Ordos		IGE ORDER SU	MMARY		Total	Amount
	No.	e Order Date	Approval Date		Description	ŀ	Additions	Amount Deductions
			**************************************		W W W W W W W W			***************************************
					* .	TOTALS	\$0.00	\$0.00
						NET CHANGE	\$	0.00
		CONTRACT TIME				COMPLETIC		**************************************
Notice to	Original	Change Order	Revised	Remaining	Original	Revised	•	On Schedule
Proceed	(Days)	(Days)	(Days)	(Days)	Date	Date	Date	YES
	<u>+</u>							NO L
AFFIDAVIT BY	CONTRACTOR							
STATE OF				COUNTY	OF			
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					and states that he is	——————————————————————————————————————		
	NTRACTOR for:				<del></del>	,		
ESTIMATE, exce acceptable stored performance of the that the current p	ept as noted hereinafter as d onsite),(2) for all work, lance the CONTRACT for which ayment on this PAY ESTI	es that the WORK covered s exceptions, the CONTRA abor, and services performs the OWNER, the OWNER' IMATE is now due and pays	CTOR has paid in full or ed, and (3) for all know S property, or the CON	or has otherwise satis vn indebtedness and o	fied all obligations (1) for o claims against the CONTF	equipment and materials RACTOR for damages ar	(whether incorporate ising in any manner	ed into the WORK or in connection with the
EXCEPTIONS:		nal sheets, if necessary.	If required by the O	MANER the CONT	PACTOR shall furnish	a hand actinfactors to	the OWNER for a	sob oversties)
•				WINER, the CONTI	RACTOR SHall luthish	a bond satisfactory to	THE OWNER TO E	acii exception)
THIS affidavit is	s directed to the	, by	and through its					
Contractor	*New Section Control of Control o	Necessary (1997)	h	SUBSCR	IBED and sworn to bef	ore me by		WT WHITE WALLE - STATE OF THE S
Ву	A			on this		day of		
Title	<u></u>	Date		***	NOTA DV DUDE IO		OFAL	Amount
	DV 044415D0				NOTARY PUBLIC		SEAL	
APPROVED	BY OWNERS :			CONSU	LTING ENGINEER	ł		
Owner	Jessamine South E	Ikhorn Water District		inspected	rsigned certifies that be and to the best of the ct and the work has be	ir knowledge and belie	ef, the quantities s	hown in this estimate
 By				C/M	Horne Engine			
		Date				<del></del>		
Title		_ Date		By	MATERIAL PROPERTY OF THE PROPE			
				Title			Date	



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## GENERAL CONDITIONS

#### ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

#### 1.01 Defined Terms

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
  - 1. Addenda Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
  - 2. Agency The Federal or state agency named as such in the Agreement.
  - 3. Agreement The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
  - 4. 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 and/or Engineer.
  - 5. Asbestos Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
  - 6. Bid The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
  - 7. Bidder The individual or entity who submits a Bid directly to Owner.
  - 8. Bidding Documents The Bidding Requirements and the proposed Contract Documents (including all Addenda).
  - 9. Bidding Requirements The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.
  - 10. Change Order A document recommended by Engineer which is signed by Contractor and Owner and Agency and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
  - 11. Claim A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
  - 12. *Contract* The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
  - 13. Contract Documents Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
  - 14. Contract Price The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

- 15. Contract Times The number of days or the dates stated in the Agreement to complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
- 16. Contractor The individual or entity with whom Owner has entered into the Agreement.
- 17. Cost of the Work See Paragraph 11.01.A for definition.
- 18. *Drawings* That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
- 19. Effective Date of the Agreement The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
- 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 which does not involve a change in the Contract Price or the Contract Times.
- 22. *General Requirements* Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.
- 23. *Hazardous Environmental Condition* The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.
- 24. *Hazardous Waste* The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
- 25. Laws and Regulations; Laws or Regulations Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
- 26. Liens Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
- 27. *Milestone* A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
- 28. *Notice of Award* The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
- 29. *Notice to Proceed* A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
- 30. Owner The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
- 31. *PCBs* Polychlorinated biphenyls.
- 32. *Petroleum* Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
- 33. *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.

- 34. *Project* The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
- 35. *Project Manual* The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
- 36. Radioactive Material Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
- 37. Related Entity An officer, director, partner, employee, agent, consultant, or subcontractor.
- 38. *Resident Project Representative* The authorized representative of Engineer who may be assigned to the Site or any part thereof.
- 39. Samples Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
- 40. Schedule of Submittals A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
- 41. 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.
- 42. *Shop Drawings* All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
- 43. *Site* Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
- 44. Specifications That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
- 45. Subcontractor An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
- 46. 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.
- 47. Successful Bidder The Bidder submitting a responsive Bid to whom Owner makes an award.
- 48. Supplementary Conditions That part of the Contract Documents which amends or supplements these General Conditions.
- 49. 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 any Subcontractor.
- 50. *Underground Facilities* All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey

electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

- 51. Unit Price Work Work to be paid for on the basis of unit prices.
- 52. Work The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
- 53. Work Change Directive A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and Agency upon recommendation of the Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

#### 1.02 Terminology

- A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following 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 requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

#### C. Day

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

## D. Defective

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

#### E. Furnish, Install, Perform, Provide

- 1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
- 2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
- 3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
- 4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

#### ARTICLE 2 - PRELIMINARY MATTERS

- 2.01 Delivery of Bonds and Evidence of Insurance
  - A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
  - B. Evidence of Insurance: Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.
- 2.02 Copies of Documents
  - A. Owner shall furnish to Contractor up to six printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.
- 2.03 Commencement of Contract Times; Notice to Proceed
  - A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement.
- 2.04 Starting the Work
  - A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.
- 2.05 Before Starting Construction
  - A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
    - 1. a preliminary Progress Schedule;
    - 2. a preliminary Schedule of Submittals; and

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

#### 2.06 Preconstruction Conference

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, Agency, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

#### 2.07 Initial Acceptance of Schedules

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
  - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
  - 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
  - 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

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

#### 3.01 Intent

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

## 3.02 Reference Standards

- A. Standards, Specifications, Codes, Laws, and Regulations
  - 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
  - 2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants,

agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, or Engineer, or any of their Related Entities, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

## 3.03 Reporting and Resolving Discrepancies

## A. Reporting Discrepancies

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

#### B. Resolving Discrepancies

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

## 3.04 Amending and Supplementing Contract Documents

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
  - 1. A Field Order;
  - 2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3) or
  - 3. Engineer's written interpretation or clarification.

#### 3.05 Reuse of Documents

A. Contractor and any Subcontractor or Supplier shall not:

- 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or
- 2. reuse any of 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 adaption by Engineer.
- B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

#### 3.06 Electronic Data

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

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

## 4.01 Availability of Lands

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

#### 4.02 Subsurface and Physical Conditions

- A. Reports and Drawings: The Supplementary Conditions identify:
  - 1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

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

## 4.03 Differing Subsurface or Physical Conditions

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

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

- B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.
- C. Possible Price and Times Adjustments
  - 1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
    - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
    - b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
  - 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

- a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
- the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment;
- c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
- 3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

#### 4.04 Underground Facilities

- A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
  - 1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and
  - 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
    - a. reviewing and checking all such information and data,
    - b. locating all Underground Facilities shown or indicated in the Contract Documents,
    - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and
    - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

## B. Not Shown or Indicated

- 1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- 2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of

or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

## 4.05 Reference Points

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

#### 4.06 Hazardous Environmental Condition at Site

- A. Reports and Drawings: Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.
- B. Limited Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:
  - 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
  - other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings;
  - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06. H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

#### ARTICLE 5 - BONDS AND INSURANCE

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

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

#### 5.03 Certificates of Insurance

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

## 5.04 Contractor's Liability Insurance

- A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
  - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
  - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
  - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
  - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
    - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
    - b. by any other person for any other reason;
  - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
  - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
  - with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
  - 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
  - 3. include completed operations insurance;

- 4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
- 5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
- 6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
- 7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.
  - a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

#### 5.05 Owner's Liability Insurance

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

#### 5.06 Property Insurance

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

- B. Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

#### 5.07 Waiver of Rights

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, 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 Contractor as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:
  - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
  - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Contractor and made payable to Contractor as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Contractor shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof.
- B. Contractor as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Contractor's exercise of this power. If such objection be made, Contractor as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Contractor as fiduciary shall give bond for the proper performance of such duties.
- 5.09 Acceptance of Bonds and Insurance; Option to Replace
  - A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.
- 5.10 Partial Utilization, Acknowledgment of Property Insurer
  - A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

## ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

- 6.01 Supervision and Superintendence
  - A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
  - B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

## 6.02 Labor; Working Hours

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

## 6.03 Services, Materials, and Equipment

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

#### 6.04 Progress Schedule

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

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

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

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

#### 2. Substitute Items

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

- 4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. Engineer's Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. Special Guarantee: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. Engineer's Cost Reimbursement: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.
- 6.06 Concerning Subcontractors, Suppliers, and Others
  - A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
  - B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
  - C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
    - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor

- 2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

## 6.07 Patent Fees and Royalties

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

## 6.08 Permits

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

## 6.09 Laws and Regulations

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

- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

#### 6.10 Taxes

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

#### 6.11 Use of Site and Other Areas

- A. Limitation on Use of Site and Other Areas
  - Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of
    workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site
    and other areas with construction equipment or other materials or equipment. Contractor shall assume full
    responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or
    areas resulting from the performance of the Work.
  - 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
  - 3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.
- B. Removal of Debris During Performance of the Work: During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. Cleaning: Prior to Substantial Completion of the Work, Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. Loading Structures: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

#### 6.12 Record Documents

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

#### 6.13 Safety and Protection

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
  - 1. all persons on the Site or who may be affected by the Work;
  - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
  - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or, 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).
- D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

## 6.14 Safety Representative

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

## 6.15 Hazard Communication Programs

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

## 6.16 Emergencies

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written

notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

## 6.17 Shop Drawings and Samples

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

## 1. Shop Drawings

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

## 2. Samples

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

#### C. Submittal Procedures

- 1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:
  - a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
  - b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
  - c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
  - d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
- 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
- 3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

#### D. Engineer's Review

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

#### E. Resubmittal Procedures

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

#### 6.18 Continuing the Work

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

## 6.19 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
  - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
  - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
  - 1. observations by Engineer;
  - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
  - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

- 4. use or occupancy of the Work or any part thereof by Owner;
- 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
- 6. any inspection, test, or approval by others; or
- 7. any correction of defective Work by Owner.

## 6.20 Indemnification

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

## 6.21 Delegation of Professional Design Services

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

- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

#### ARTICLE 7 - OTHER WORK AT THE SITE

#### 7.01 Related Work at Site

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

## 7.02 Coordination

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

# 7.03 Legal Relationships

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

# ARTICLE 8 - OWNER'S RESPONSIBILITIES

- 8.01 Communications to Contractor
  - A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.
- 8.02 Replacement of Engineer
  - A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.
- 8.03 Furnish Data
  - A. Owner shall promptly furnish the data required of Owner under the Contract Documents.
- 8.04 Pay When Due
  - A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.
- 8.05 Lands and Easements; Reports and Tests
  - A. Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.
- 8.06 Insurance
  - A. Owner's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.
- 8.07 Change Orders
  - A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.
- 8.08 Inspections, Tests, and Approvals
  - A. Owner's responsibility in respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- 8.10 Undisclosed Hazardous Environmental Condition
  - A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.
- 8.11 Evidence of Financial Arrangements
  - A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

# ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

- 9.01 Owner's Representative
  - A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer.
- 9.02 Visits to Site
  - A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
  - B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.
- 9.03 Project Representative
  - A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

# 9.04 Authorized Variations in Work

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

# 9.05 Rejecting Defective Work

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

# 9.06 Shop Drawings, Change Orders and Payments

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

# 9.07 Determinations for Unit Price Work

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

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

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

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

# ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

- 10.01 Authorized Changes in the Work
  - A. Without invalidating the Contract and without notice to any surety, Owner may, subject to written approval by Agency at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
  - B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.
- 10.02 Unauthorized Changes in the Work
  - A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.B.
- 10.03 Execution of Change Orders
  - A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
    - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
    - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

# 10.04 Notification to Surety

A. If notice 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) is required by the provisions of any bond to be given to a surety, the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

# 10.05 Claims

- A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. Engineer's Action: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
  - 1. deny the Claim in whole or in part,
  - 2. approve the Claim, or
  - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

# ARTICLE 11 - COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

# 11.01 Cost of the Work

- A. Costs Included: The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.
  - 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 at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
  - 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
  - 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
  - 4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
  - 5. Supplemental costs including the following:
    - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
    - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
    - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressages, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.
- B. Costs Excluded: The term Cost of the Work shall not include any of the following items:
  - 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 11.01.A.1 or
    specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the
    Contractor's fee.
  - 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
  - 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
  - 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
  - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01,B.
- C. Contractor's Fee: When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

# 11.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

# B. Cash Allowances

- 1. Contractor agrees that:
  - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
  - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

# C. Contingency Allowance

- 1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

# 11.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
  - 1. the Bid price of a particular item of Unit Price Work amounts to more than 5 percent of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and
  - 2. there is no corresponding adjustment with respect to any other item of Work; and
  - 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

# ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

# 12.01 Change of Contract Price

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
  - 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
  - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
  - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:
  - 1. a mutually acceptable fixed fee; or
  - 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
    - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
    - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
    - 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 Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
    - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
    - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
    - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

# 12.02 Change of Contract Times

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

# 12.03 Delays

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.B.
  - 1. delays caused by or within the control of Contractor; or
- D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

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

# 13.01 Notice of Defects

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

## 13.02 Access to Work

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

# 13.03 Tests and Inspections

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

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

# 13.04 Uncovering Work

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

# 13.05 Owner May Stop the Work

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

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

# 13.07 Correction Period

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
  - 1. repair such defective land or areas; or
  - 2. correct such defective Work; or
  - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
  - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

# 13.08 Acceptance of Defective Work

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and

determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

# 13.09 Owner May Correct Defective Work

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

# ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

# 14.01 Schedule of Values

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

# 14.02 Progress Payments

# A. Applications for Payments

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the

materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

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

# B. Review of Applications

- 1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
- 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site 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, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and
  - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
- 3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
  - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
  - b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
- 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
  - a. to supervise, direct, or control the Work, or
  - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
  - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
  - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

- e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any
- 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
  - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
  - b. the Contract Price has been reduced by Change Orders;
  - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
  - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

# C. Payment Becomes Due

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

# D. Reduction in Payment

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

# 14.03 Contractor's Warranty of Title

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

# 14.04 Substantial Completion

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Agency, Contractor, and Engineer shall make a prefinal inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

# 14.05 Partial Utilization

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

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

# 14.06 Final Inspection

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

# 14.07 Final Payment

# A. Application for Payment

- 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
- 2. The final Application for Payment shall be accompanied (except as previously delivered) by:
  - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;
  - b. consent of the surety, if any, to final payment;
  - c. a list of all Claims against Owner that Contractor believes are unsettled; and
  - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
- 3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

# B. Engineer's Review of Application and Acceptance

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

# C. Payment Becomes Due

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

# 14.08 Final Completion Delayed

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

# 14.09 Waiver of Claims

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

# ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

# 15.01 Owner May Suspend Work

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

# 15.02 Owner May Terminate for Cause

- A. The occurrence of any one or more of the following events will justify termination for cause:
  - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
  - 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
  - 3. Contractor's disregard of the authority of Engineer; or
  - 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
  - 1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),
  - 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and
  - 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B, and 15.02.C.

# 15.03 Owner May Terminate For Convenience

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

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

# ARTICLE 16 – DISPUTE RESOLUTION (ARTICLE 16 – DISPUTE RESOLUTION AND SC-1601 METHODS AND PROCEDURES ARE BOTH DELETED, IN THEIR ENTIRETY, FROM THIS PROJECT)

# 16.01 Methods and Procedures

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

# **ARTICLE 17 – MISCELLANEOUS**

# 17.01 Giving Notice

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
  - 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or
  - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

# 17.02 Computation of Times

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

### 17.03 Cumulative Remedies

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

# 17.04 Survival of Obligations

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

# 17.05 Controlling Law

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

# 17.06 Headings

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

# ARTICLE 18 - FEDERAL REQUIREMENTS

# 18.01 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.

# 18.02 Contract Approval

- A. Owner and Contractor will furnish Owner's attorney such evidence as required so that Owner's attorney can complete and execute the following "Certificate of Owner's Attorney" (Exhibit GC-A) 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 (if applicable).

# 18.03 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.
- B. 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.

### 18.04 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 18.04.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.

# 18.05 Audit and Access to Records

A. For all negotiated contracts and negotiated modifications (except those of \$10,000 or less), Owner, Agency, the Comptroller General, 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 Contract, for the purpose of making audits, examinations, excerpts and transcriptions. Contractor shall maintain all required records for three years after final payment is made and all other pending matters are closed.

# 18.06 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.

# 18.07 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.

# 18.08 Clean Air and Pollution Control Acts

A. If this Contract exceeds \$100,000, Contractor shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 USC 7401 *et seq.*) and the Federal Water Pollution Control Act as amended (33 USC 1251 *et seq.*). Contractor will report violations to the Agency and the Regional Office of the EPA.

# 18.09 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.

# 18.10 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.

# 18.11 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 USC 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.

# 18.12 Environmental Requirements

- A. When constructing a project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental constraints:
  - 1. Wetlands When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.
  - 2. 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 delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.
  - 3. Historic Preservation Any excavation by Contractor that uncovers an historical or archaeological artifact 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).
4.	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

# **EXHIBIT GC-A**

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# **Supplementary Conditions**

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

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

# SC-4.06 Hazardous Environmental Conditions

SC-4.06 Delete Paragraphs 4.06.A and 4.06.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-5.04 Contractor's Liability Insurance

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

- C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:
  - 1. Workers' Compensation, and related coverages under Paragraphs 5.04.A.1 and A.2 of the General Conditions:

a. State:

**Statutory** 

b. Applicable Federal:

**Statutory** 

c. Employer's Liability:

\$1,000,000

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

a. General Aggregate

\$1,000,000

b. Products - Completed Operations Aggregate

\$1,000,000

c. Personal and Advertising

**Injury** 

\$1,000,000

d. Each Occurrence (Bodily Injury and Property Damage)

\$1,000,000

- e. Property Damage liability insurance will provide Explosion, Collapse, and Under-ground coverages where applicable.
- f. Excess or Umbrella Liability

**Each Occurrence** 

\$2,000,000

(with no aggregate except products completed operations)

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

a. Bodily Injury:

Each person

\$1,000,000

b. Each Accident

\$1,000,000

c. Property Damage:

**Each Accident** 

\$1,000,000

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

a. Bodily Injury:

Each person

\$1,000,000

Each Accident

\$1,000,000

b. Property Damage:

Each Accident

\$1,000,000

5. Jessamine South Elkhorn Water District and Horne Engineering, Inc. to be included on policy as additional insured.

# SC-5.06 Property Insurance

- SC-5.06.A. Delete Paragraph 5.06.A in its entirety and insert the following in its place:
  - A. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. Contractor shall be responsible for any deductible or self-insured retention. This insurance shall:
    - 1. include the interests of Owner, Contractor, Subcontractors, Engineer, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or loss payee;
    - 2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by these Supplementary Conditions.
    - 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
    - 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
    - 5. allow for partial utilization of the Work by Owner;
    - 6. include testing and startup;
    - 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and

Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued; and

8. comply with the requirements of Paragraph 5.06.C of the General Conditions.

# SC-5.06 Delete Paragraph 5.06.B and replace with the following:

B. Contractor shall purchase and maintain equipment breakdown insurance and additional property insurance, and any other additional property insurance required by Laws and Regulations, which insurance will include the interest of Owner, Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

# SC-6.06 Concerning Subcontractors, Suppliers, and Others

# SC-6.06 Add a new paragraph immediately after Paragraph 6.06.G:

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

# SC-6.17 Shop Drawings and Samples

Reviews of multiple resubmissions of Shop Drawings and other submittals may increase Project costs. To mitigate this, the following language may be used:

# SC-6.17 Add the following new paragraphs immediately after Paragraph 6.17.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 change of 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-9.03 Project Representative

- SC-9.03 Add the following new paragraphs immediately after Paragraph 9.03.A:
  - B. The Resident Project Representative (RPR) will be Engineer's employee or agent at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions. RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall:
    - 1. 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.
    - 2. 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.

# 3. Liaison:

- a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, assist in providing information regarding the 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.
- 4. 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.
- 5. Shop Drawings and Samples:
  - a. Record date of receipt of Samples and approved Shop Drawings.

- b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
- 6. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
- 7. 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 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.
- 8. Inspections, Tests, and System Startups:
  - 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.

# 9. Records:

a. 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.

b. Maintain records for use in preparing Project documentation.

# 10. 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, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition.
- 11. Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
- 12. 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 Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

# 13. Completion:

- a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of lists of items to be completed or corrected.
- b. Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied.

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, Suppliers, or Contractor's superintendent.
- 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 unless such advice or directions are specifically required by the Contract Documents.
- 5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
- 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-11.03 *Unit Price Work*

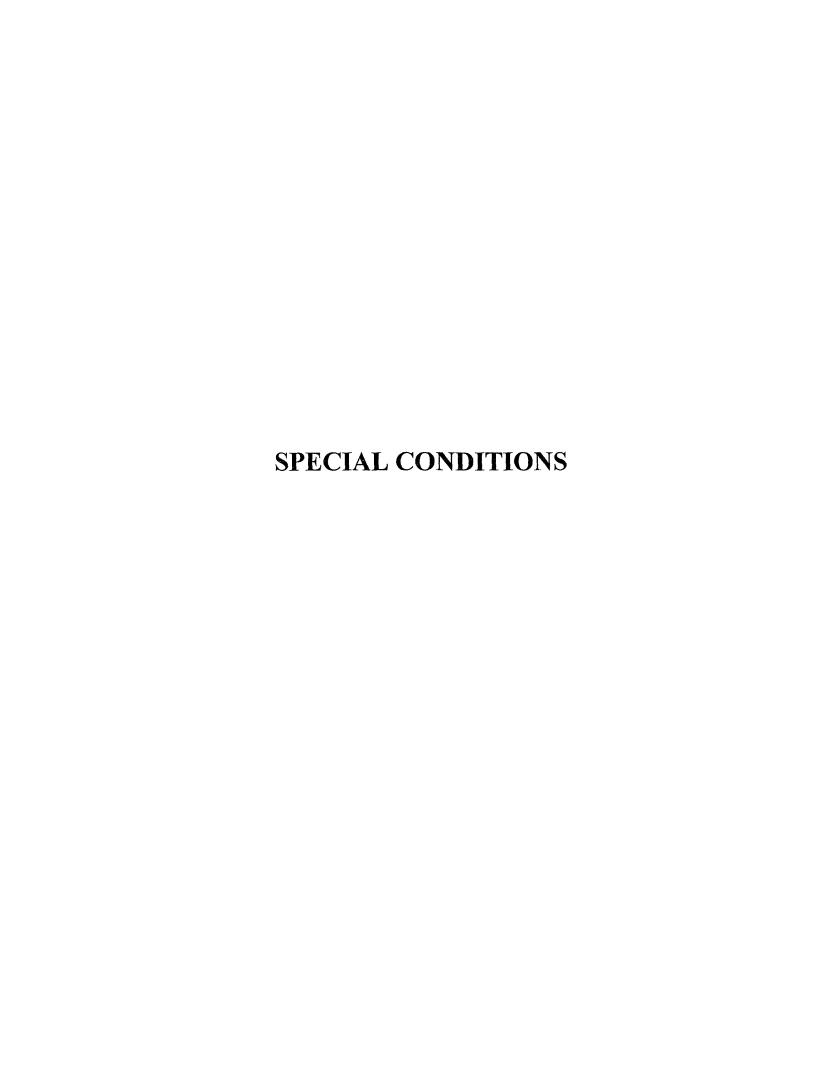
- SC-11.03.D Delete Paragraph 11.03.D in its entirety and insert the following in its place:
  - D. The unit price of an item of Unit Price Work shall be subject to reevaluation and adjustment under the following conditions:
    - 1. if the Bid price of a particular item of Unit Price Work amounts to 15 percent or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by

- Contractor differs by more than <u>50</u> percent from the estimated quantity of such item indicated in the Agreement; and
- 2. if there is no corresponding adjustment with respect to any other item of Work; and
- 3. if Contractor believes that Contractor has incurred additional expense as a result thereof or if Owner believes that the quantity variation entitles Owner to an adjustment in the unit price, either Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

# SC-16.01 Methods and Procedure

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

- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
  - 1. elects in writing to demand arbitration of the Claim, pursuant to Paragraph SC-16.02; or
  - 2. agrees with the other party to submit the Claim to another dispute resolution process.



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# 1. INTERPRETATION OF CONTRACT DOCUMENTS

If any person contemplating the submission of a bid for the proposed contract is in doubt as to the true meaning of any part of the plans, specifications or other proposed contract documents, he should submit a written request for the interpretation thereof to Horne Engineering, Inc., 216 South Main Street, Nicholasville, Kentucky 40356. The request must be received at least five days prior to the date fixed for the opening of bids. Any interpretation of the contract documents will be made only by addenda duly issued to each person receiving a set of such documents. The **OWNER** will not be responsible for explanations or interpretations of proposed documents, except as issued in accordance herewith.

# 2. **DISCREPANCY IN BID PRICE**

In case of discrepancy, in the proposal, between the bid price in words and in figures, the price in words will control. In case of unit price bids, the unit price will control instead of the extension and the corrected extension(s) will control the total bid price.

# 3. **QUANTITIES, APPROXIMATE ONLY**

Quantities listed on bid forms for unit price items are approximate only, and are not necessarily final quantities; however, they will be used in comparing bids. In actual construction, the estimated quantities may be reduced or increased without incurring obligation to the **OWNER** other than the amounts produced by the actual quantities installed at the unit price bid.

#### 4. UNIT PRICES ON LUMP SUM CONTRACTS

The **OWNER** reserves the right to reject any or all of the unit prices for extra work set forth in the Form of Proposal for lump sum contracts, in the event that such prices are considered excessive or unreasonable, in which case the award of the contract will be contingent upon successful negotiation of prices for the unit price items.

# 5. THE METHOD OF BIDDING

The work under this Contract shall be bid by unit price and/or lump sum items as specified and shown in the Unit Price Bid Sheet Summary.

The base bid shall be for material indicated on the proposal. If a form for bidding alternate materials is included in the proposal, the **CONTRACTOR** shall completely fill in this form. The **OWNER** reserves the right to use any alternates or substitute items included on the bid form in the award of contracts.

The Contract shall be bid in full in original on the Form of Proposal provided.

The OWNER reserves the right, should financing consideration require and/or allow, to delete or add physical units onto any unit price or lump sum items.

#### 6. LABOR REGULATIONS AND MINIMUM WAGE RATES

Special attention is directed to - Labor Standards and Wage Rates. All contractors and subcontractors on the work shall be required to comply with all applicable provisions of the standards.

The **CONTRACTOR** shall be required to pay not less than the minimum wage rates as and if set forth in Wage Rates, of these specifications or in an addendum to the specifications. The stipulated wage rates represent prevailing minimum rates and shall not be construed to mean that the **CONTRACTOR** may not have to pay higher rates to secure labor. In matter of conflict between the federal and state rates, the higher shall apply.

The **CONTRACTOR** shall be in compliance with OSHA (P.L. 91-596) and the Contract Work Hours and Safety Standards Act (P.L. 91-54)

# 7. AWARD OF CONTRACT

- a. The award of the Contract is contingent upon securing an acceptable bid which will fall within the amount of funds available for the construction of the project. Acceptable shall be determined by the owner.
- b. Each Contract shall be awarded to the lowest responsible bidder as soon as practicable after the opening of bids. In determining the lowest responsible bidder, the following but not limited to elements will be considered: If the bidder involved maintains a permanent place of business; if he has adequate plant equipment to perform the work properly and expeditiously; if he has a suitable financial status to meet obligations incidental to the work; if he has appropriate technical experience; and, if he has a satisfactory performance bond.
- c. Any or all bids may be rejected or informalities in bids may be waived, at the option and at the sole and unfettered opinion of the **OWNER**.
- d. The bid of the **CONTRACTOR** will not be considered for award if:
  - i. The bid is qualified in a manner deemed by the **OWNER** and/or the **ENGINEER** as unfair to other bidders.
  - ii. The bid is so qualified as to reserve to the **CONTRACTOR** the right of acceptance or rejection after the bids are opened.
  - iii. The bid is qualified in an ambiguous or a contradictory manner.

#### 8. PERFORMANCE AND PAYMENT BOND

The **CONTRACTOR** shall furnish a performance and payment bond (forms included in these specifications) issued by an approved bonding company in an amount at least equal to one hundred percent (100%) of the Contract price as security for the faithful performance of this Contract and for the payment of all persons performing labor and furnishing materials in connection with this Contract, to run for one (1) year from the date of final acceptance of the work, unless a longer period is specified. Attorneys-in-Fact who sign bid bonds or contract bonds must file with each bond a certificate copy of their power of attorney certificate. Such bonds and certificates must not be dated prior to the bid date or effective contract date and must be either signed or countersigned by a resident agent in the state where the Contract is to be bid or performed.

# 9. COPIES OF PLANS AND SPECIFICATIONS TO BE FURNISHED

Unless otherwise provided in the Special Conditions, the **ENGINEER** will furnish to the **CONTRACTOR**, free of charge, all copies of plans and specifications reasonably necessary as determined by **ENGINEER**, for the execution of the work.

#### 10. SAMPLES

The **CONTRACTOR** shall furnish for approval all samples as specified or requested. The work shall be in accordance with approved samples.

# 11. MATERIALS AND EQUIPMENT

Unless otherwise specified, all materials shall be new and both workmanship and materials shall be of good quality. The **CONTRACTOR** shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

Approval of manufacturer's shop drawings of materials and equipment shall not mean final acceptance, but they shall be subject to inspection and test on delivery and installation. The **CONTRACTOR** shall repair, replace or adjust any materials or equipment found defective or not operating properly, due to improper materials, workmanship, and adjustment on his part, for a period of one year after completion and acceptance of his work.

The use of second hand and/or salvaged materials will not be permitted unless specifically provided for in the technical specifications. Materials and equipment shall be new when turned over to the **OWNER**.

## 12. MEASUREMENTS

All contractors furnishing materials and equipment for this Contract shall obtain exact dimensions at the site. Scale or figure dimensions on the drawings and details show the correct size under ideal conditions and shall not under any circumstances, be so construed as to relieve the **CONTRACTOR** from responsibility for taking measurements at the site and furnishing materials or equipment of the correct size.

# 13. SPECIFIC BRANDS MAKES OR MANUFACTURER

Where a specific manufacturer or equipment is specified as being the base bid item, the **CONTRACTOR** must use the installed price of that manufacturer's item in compiling his base bid. In addition, he will show his installed price of this base bid item in the Listing of Major Equipment Items appended to the Form of Proposal, opposite the named manufacturer for the specified equipment described therein. Where more than one manufacturer is listed in the specifications as being suppliers of a particular make of equipment, such manufacturer will be listed under the above mentioned Major Equipment Items Listing, and bidding contractors are encouraged to bid such listed manufacturer's offering. In such case, the installed price of this manufacturer's offering will be shown in the Major Equipment Items Listing, opposite the manufacturer's name for the specific item. Products of manufacturers other than those listed will be considered, provided their names are written in by the bidding contractor and he shows the installed price thereof in the same manner as for the named manufacturers.

Where specific brands, makes or manufacturers are named in the specifications or on the plans without the "or equal" clause, and none are specified as being the base bid item, the base bid shall be based only on the one or more named brands, the **CONTRACTOR** will be responsible for and shall include in such substitute bid the cost of any redesign and/or construction cost necessary for fitting in the substitute equipment. He shall also be held responsible for the conformance of all such substitute bid equipment with the provision of the plans and specifications, and the acceptance of such equipment by the **OWNER** shall in no manner affect the **CONTRACTOR'S** guarantee.

Only major equipment listed and quoted on the Form of Proposal (and for which the technical data, performance curves, descriptive material, major dimensions, etc., as required by the detailed specifications, is submitted in two copies, with the bid) will be considered in the final determination of the equipment to be furnished and installed.

For purpose of continuity and maintenance, the District has established the following as single-source items for construction:

Meters: Sensus SR

Fire Hydrants: Mueller Super Centurion 250, Model A 423

Air Release: Val-matic Model 38.5

# 14. CLAIMS FOR EXTRA COST

If the **CONTRACTOR** claims that any instructions by writing, verbal, drawings or otherwise involved extra cost under this Contract, he shall give the **OWNER** written notice thereof within forty-eight hours after the receipt of such instructions, and in any event before proceeding to execute the work, except in emergency endangering life or property, and the procedure shall then be as provided for in the article entitled "CHANGES IN THE WORK". No such claim shall be valid unless so made.

# 15. DEDUCTIONS FOR UNCOMPLETED AND/OR UNCORRECTED WORK

When portions of unit price items have not been completed, such as testing, sterilizing, clean-up, and/or corrections, amounts deemed appropriate by the Engineer shall be deducted from said items, in current or subsequent pay estimates.

If the **ENGINEER** and the **OWNER** deem it inexpedient to correct work injured or not done in accordance with the Contract, an equitable deduction from the contract price shall be made therefor. Cost of such work shall be determined by the **ENGINEER**.

# 16. CORRECTION OF WORK BEFORE FINAL PAYMENT

The **CONTRACTOR** shall promptly remove from the premises all materials and work condemned by the **OWNER** and/or **ENGINEER** as failing to conform to the Contract.

If the CONTRACTOR does not remove such condemned work and materials within a reasonable time, fixed by written notice, the OWNER may remove them and may store the material at the expense of the CONTRACTOR. If the CONTRACTOR does not pay the expenses of such removal within ten (10) days time thereafter, the OWNER may, upon ten (10) days written notice, sell such materials at auction or at private sale and shall account for the net proceeds thereof after deducting all the costs and expense that should have been borne by the CONTRACTOR. Any remaining deficit of cost shall be deducted from monies due the CONTRACTOR, or if not sufficient, a claim made with the Surety Bond.

#### 17. CORRECTION OF WORK AFTER FINAL PAYMENT

Neither the final certificate, nor final payment, nor any provisions in the Contract Documents shall relieve the **CONTRACTOR** of responsibility for faulty materials or workmanship and, unless otherwise specified, he shall remedy any defects due thereto and pay for any damage to other work resulting therefrom, which shall appear within a period of one (1) year from the date of final acceptance of the work by the **OWNER**. The **OWNER** shall give notice of observed defects with reasonable promptness. If replacements are not made within ten (10) days after notice is given of such defects in workmanship, or thirty (30) days in case of materials, then the **OWNER** shall have the right to make replacements and charge cost of same to the **CONTRACTOR** or his bondsman.

# 18. THE OWNER'S RIGHT TO DO WORK

If the **CONTRACTOR** should neglect to prosecute the work properly or fail to perform any provision of this Contract, the **OWNER**, in accordance with the General Conditions, after ten (10) days written notice to the **CONTRACTOR**, may without prejudice to any other remedy he may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the **CONTRACTOR**.

# 19. STORED MATERIALS IN APPLICATION FOR PAYMENT

Only durable materials and equipment properly stored and protected of over five (\$500) hundred dollars in value per unit, shall be included in materials stored in partial payment estimates. The exception being for pipe. **CONTRACTOR** shall furnish proof of insurance for damages, theft and loss for 100% value of materials stored, with Owner designated as loss payee.

Payment by the **OWNER** to the **CONTRACTOR** shall not be deemed or implied as transfer of title or ownership of the materials from **CONTRACTOR** to **OWNER**. In fact, title, ownership, and full and complete responsibility of <u>ALL</u> material remains in and with the **CONTRACTOR**.

The payment of stored materials is simply a courtesy advancement by the **OWNER**, and any and all remaining stored material upon completion of the project shall be and belong to the **CONTRACTOR** and any payment advancement credited back to the **OWNER**.

If materials and equipment delivered (stored or incorporated in work) and ninety percent (90%) was paid for by the **OWNER** to **CONTRACTOR** on previous partial payment estimates are not paid to the supplier by the **CONTRACTOR** then an equal amount of the sum not paid may be deducted from the amount due on a subsequent payment estimate.

# 20. CERTIFICATES OF PAYMENT

No certificate of payment issued nor payment made to the **CONTRACTOR**, nor partial or entire use or occupancy of the work by the **OWNER**, shall be an acceptance of any work or materials not in accordance with this Contract and shall not release the **CONTRACTOR** or his Sureties from any obligations under this Contract or the Performance and Payment Bond. The making and acceptance of the final payment shall constitute a waiver of all claims by the **OWNER**, other than those arising from unsettled liens, from faulty work appearing after final payment or from requirements of the plans and specifications.

The acceptance by the **CONTRACTOR** of final payment shall be and shall operate as a release to the **OWNER** of all claims and all liability to the **CONTRACTOR** for all things done or furnished in connection with this work or for any act and neglect of the **OWNER** and others relating to or arising from this work.

#### 21. SUBCONTRACTORS

The **CONTRACTOR** shall, at the time he submits his proposal for the Contract, notify the **OWNER** in writing of the names of subcontractors proposed for the work, and shall not employ any subcontractor without the prior written approval of the **OWNER**.

The **CONTRACTOR** agrees that he is as fully responsible to the **OWNER** for the acts and omissions of his subcontractors and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

Nothing contained in the Contract Documents shall create any contractual relation between any subcontractor and the **OWNER**.

No part of this Contract shall be sublet without the prior written approval of the **OWNER** or his duly authorized representative. The **CONTRACTOR** shall not sublet in totality a sum greater than 25% of the total contract price.

# 22. RELATIONS OF CONTRACTOR AND SUBCONTRACTOR

The **CONTRACTOR** agrees to bind every subcontractor, and every subcontractor agrees to be bound by the terms of the Agreement, the General Conditions, the Plans and Specifications as far as applicable to his work, including the following provision of this article, unless specifically noted to the contrary in a subcontract approved in writing as adequate by the **OWNER** or the **ENGINEER**.

The **SUBCONTRACTOR** agrees:

- 1. To be bound to the **CONTRACTOR** by the terms of the Agreement, General Conditions, Plans and Specifications, and to assume toward him all the obligations and responsibilities that he, by those documents, assumes toward the **OWNER**.
- 2. To submit to the **CONTRACTOR** applications for payment in such reasonable time as to enable the **CONTRACTOR** to apply for payment as set forth in these Contract Documents.
- 3. To make all claims for extras, for extensions of time and for damages for delays or otherwise, to the **CONTRACTOR** in the manner provided in the General Conditions for like claims by the **CONTRACTOR** upon the **OWNER**, except that the time for making claims for extra cost is one (1) week.

# The **CONTRACTOR** agrees:

- 4. To be bound to the subcontractor by all the obligations that the **OWNER** assumes to the **CONTRACTOR** under the Agreement, General Conditions, Plans and Specifications, and by all provisions thereof affording remedies and redress to the **CONTRACTOR** from the **OWNER**.
- 5. To pay the subcontractor, upon the payment of certificate, if issued under the schedule of values described in these Contract Documents, the amount allowed to the **CONTRACTOR** on account of the subcontractor's work to the extent of the subcontractor's interest therein.
- 6. To pay the subcontractor, upon the payment of certificates, if issued otherwise than is in (e), so that at all times his total payments shall be as large in proportion to the value of the work done by him as the total amount certified to the **CONTRACTOR** is to the value of the work done by him.
- 7. To pay the subcontractor to such extent as may be provided by the Contract Documents or the subcontract, if either of these provides for earlier or larger payments than the above.
- 8. To pay the subcontractor on demand for his work or materials as far as executed and fixed in place, less the retainage percentage, at the time the certificate should be issued, even though the **ENGINEER** fails to issue if for any cause not the fault of the **CONTRACTOR**.
- 9. To pay the subcontractor a just share of any insurance money received by him, the **CONTRACTOR**, under these Contract Documents.

- 10. To make no demand for liquidated damages or penalty for delay in any sum in excess of such amount as may be specifically named in the subcontract.
- 11. That no claim for services rendered, or materials furnished by the **CONTRACTOR** to the subcontractor, shall be valid unless written notice thereof is given by the **CONTRACTOR** to the subcontractor during the first ten (10) days of the calendar month following that in which the claim originated.
- 12. To give the subcontractor any opportunity to be present and submit evidence in any arbitration involving his rights.
- 13. To name as arbitrator, under arbitration proceedings as provided in the Contract Documents the person nominated by the subcontractor, if the sole cause of dispute is the work, materials, rights or responsibilities of the subcontractor; or, if of the subcontractor and any other subcontractor jointly, to name as such arbitrator the person upon whom they agree.

# The **CONTRACTOR** and **SUBCONTRACTOR** agree that:

14. In the matter of mediation, their rights and obligations and all procedure shall be analogous to those set forth in this Contract.

Nothing in this article shall create any obligation on the part of the **OWNER** to pay or see to payment of any sums to any subcontractor.

# 23. <u>USE OF PREMISES</u>

The CONTRACTOR shall confine his apparatus, the storage of materials and the operations of his workmen to limits indicated by law, ordinances, permits or directions of the OWNER and shall not unreasonably encumber the premises with his materials.

# 24. CLEANING UP

The **CONTRACTOR** shall at all times and concurrently keep the premises free from accumulations of waste material, rubbish, weeds, brush or other debris caused by his employees or the work. At the completion of the work, the **CONTRACTOR** shall remove any and all waste materials, rubbish and debris from and about the premises, as well as all tools, scaffolding, construction equipment, machinery and surplus materials, and shall leave the site in a clean and usable condition, satisfactory to the **OWNER**, unless more

exactly specified. In case of dispute, the **OWNER** may remove the debris and charge the cost to the **CONTRACTOR(s)**.

The **CONTRACTOR** shall direct his forces to clean up streets, sidewalks, drainage channels, or private property affected by his construction operations, daily or more often, when the **OWNER** judges that such clean up is needed.

The Contract shall not be considered complete until all construction structures, equipment, waste materials, rubbish and debris resulting from the construction are cleaned from the site of the work. All damage to existing paving, grounds, and structures caused by the **CONTRACTOR's** operation must be repaired or the **OWNER** compensated for such damage before the Contract will be considered complete.

# 25. CONTRACTOR'S UNDERSTANDING

It is understood and agreed that the CONTRACTOR has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work under this Contract. No verbal agreement or conversation with any officer, agent or employee of the OWNER or Engineer, either before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained.

# 26. PERSONAL LIABILITY OF PUBLIC OFFICIALS

In carrying out any of the provisions of the Contract or in exercising any power or authority granted to him thereby, there shall be no personal liability upon the **ENGINEER** or the **OWNER's** other representatives or employees, it being understood that in such matters they act as the agents and representatives of the **OWNER**.

# 27. WORK REASONABLY INFERRED BUT NOT PARTICULARLY DELINEATED OR SPECIFIED

The CONTRACTOR shall make a thorough examination of the site and study all plans and specifications and all conditions relating to the erection of the work, and if any materials or labor are evidently necessary for the proper and complete execution of the work, which are not specifically mentioned and included in the plans and specifications, although reasonably inferred therefrom, unless eliminated by special mention, or if any error or inconsistency appears therein, or in the event of a doubt arising as to the true intent and meaning of the plans and specifications, he shall notify the ENGINEER at least five (5) days in

advance of date fixed for opening of bids. The **ENGINEER** will then issue an addendum containing the proper information to all contractors, to assure fair competition. Failure of **CONTRACTOR** to make a timely request as herein specified, shall be a fact of estoppel regarding any subsequent claim.

# 28. **DISCREPANCIES**

Anything called for in the specifications and not shown on the plans, or shown on the plans and not called for in the specifications, shall be included in the **CONTRACTOR's** work as if included in both.

In case of discrepancies between the various parts of the plans and the specifications, the detailed plans and specifications shall take precedence over the general plan layouts or elevations and general specifications. Detailed specifications shall take precedence over all other documents. Specifically the more stringent and most favorable to the **OWNER** shall apply.

# 29. CARE OF THE WORK

The **CONTRACTOR** shall have charge of the premises and work under construction, until completion and final acceptance of the work under the Contract, except as noted otherwise in these Contract Documents. However, the **OWNER** shall have right of possession and operation, where applicable.

The **CONTRACTOR** shall be responsible for all injury to work in process of construction, and for all property or materials stored on the premises that may be injured or stolen while the work is in his care and he shall make good all such damage or loss without expense to the **OWNER**.

# 30. DAMAGE TO EQUIPMENT STORED AND/OR IN PLACE PRIOR TO INITIAL OPERATION

Any equipment damaged or which has been subjected to possible damage by reason of inundation, improper storage and/or protection during the construction period of a project, shall be handled as follows:

- a. Be replaced with new equipment.
- b. With approval of the **OWNER**, be returned to the manufacturer of the equipment, or his authorized repair agency, for inspection and repair, provided however, that such repair after inspection will place the equipment in new condition, and restore the manufacturer's guarantee the same as for new equipment.

This is particularly applicable to, but not limited to, electric motors, motor controls, meters and gauges, and equipment with bearings.

# 31. <u>CONFLICT WITH OR DAMAGE TO EXISTING UTILITIES AND</u> FACILITIES

Insofar as location data is available to the **ENGINEERS**, existing underground utilities (such as water lines, sewer lines, gas lines, telephone conduits, etc.) are located on the Drawings. Due, however, to the approximate nature of much of this data, the location of any particular facility cannot be certified to be correct. Specifically, the locations and elevations shown are approximate only, and should be considered schematic in nature.

Before proceeding with the work, the **CONTRACTOR** shall confer with all public or private companies, agencies or departments that own and operate utilities in the vicinity of the construction work. The purpose of the conference, or conferences, shall be to notify said companies, agencies, or departments of the proposed construction schedule, verify the location of, and possible interference with the existing utilities that are or are not shown on the plans, arrange for necessary suspension of service, and make arrangements to locate and avoid interference with all utilities (including house connections) that are not shown on the plans. The **CONTRACTOR** may make arrangements for the said utility companies, agencies or departments to locate and uncover their own utilities; however, the **CONTRACTOR** shall bear the entire responsibility and cost for locating and avoiding or repairing damage to said existing utilities.

Repair to existing utilities and facilities damaged by the **CONTRACTOR's** construction forces shall be considered as a part of the Contract and shall be considered incidental to the contract.

There are and **CONTRACTOR** shall anticipate conflicts with existing septic tanks and subsurface leach and drain fields. Although effort has been made to identify same on the plans, the **CONTRACTOR** is hereby notified that the information, if shown, cannot be considered accurate and/or complete. Also, **CONTRACTOR** is hereby specifically notified that there are unidentified and located septic drain fields that can be expected to be within the construction area.

The **CONTRACTOR** shall be responsible at no extra cost to identify facilities and septic drain fields, avoid conflict, and construct the water main in such a manner as to meet applicable regulations.

Where the existing utilities must be disturbed during construction under this Contract, their operation and functions shall be maintained by the **CONTRACTOR** to such a degree that service to customers will be interrupted for minimum time periods only. Such disturbances and any maintenance use of these lines shall constitute no cost to the **OWNER**. The

UTILITY shall be notified of interruptions in sufficient time to prepare for them. and shall agree to the hour, date and duration of them before they are undertaken. Where the existing utilities must be interrupted, **CONTRACTOR** shall have all materials to complete the work on the job site before the interruption begins.

Should shut-downs in services be in excess of the time of duration agreed upon, and such excessive shut-down time be due to the **CONTRACTOR**'s negligence, faulty work and/or inability to perform, then and in that event, the **CONTRACTOR** shall be held liable to the UTILITY and **OWNER** for any and all damages that may accrue to the **OWNER**, by reason of such excessive shut-down periods.

Upon damage to existing facilities, they shall be repaired immediately and tested to insure proper operation. **CONTRACTOR** shall notify all utility users of impending interruption of service and shall be responsible for all damages resulting from same. Payment for necessary disconnection, reconnection, and damage repairs of utility services shall be included as part of the **CONTRACTOR's** bid and no extra compensation will be made for same.

# 32. WORK ON PRIVATE PROPERTY

In work performed on "private property" (property other than that belonging to the **OWNER**), the **CONTRACTOR** shall confine his equipment, the storage of materials and the operation of his workmen to the limits indicated on the Drawings, or to lands and rights-of-way provided for the project by the **OWNER**, and shall take every precaution to avoid damage to the private property owner's buildings, grounds and facilities.

Fences, hedges, shrubs, etc. within the construction limits shall be carefully removed, reserved and replaced when the construction is completed. Where ditches or excavations cross lawns, the **CONTRACTOR** shall promptly backfill and compact the trench backfill and take all necessary steps (ie: seed, mulch, water, topsoil replacement, and/or sodding, etc) to ensure an acceptable replacement of equal or better quality within four (4) weeks of the trench excavation. Failure of **CONTRACTOR** to meet this requirement or furnish written acceptance and/or waiver by the property owner shall be grounds for the **OWNER** to deduct cost (as determined by **OWNER**) from monies due contractor and have work completed. Grassed areas, other than lawns, shall be graded, fertilized and seeded when construction is completed and in accordance with the requirements of these specifications. When construction is completed, the private property owner's facilities and grounds shall be restored to as good or better condition than found as quickly as possible, as determined by the **OWNER**, at the **CONTRACTOR's** expense.

**CONTRACTOR** shall bore all asphalt/concrete driveways, entrance walls,

and/or landscaping. No open cuts will occur on this project. Boring cost is considered incidental to this project.

Foundations, adjacent to where an excavation is to be made below the bottom of the foundation, shall be supported by shoring, bracing or underpinning as long as the excavation shall remain open, and the **CONTRACTOR** shall be held strictly responsible for any damage to said foundation. No excavation shall occur within six (6) feet of edge of metal of any highway, unless so specifically direct by the Engineer.

Highway rights-of-way, railroad rights-of-way, public parks, school yards and other such properties shall be considered "private properties" for the purpose of this Article.

# 33. COORDINATION BETWEEN CONTRACTORS

Wherever other work is simultaneously in progress under other contracts for construction at this site, all contractors performing work under these Contract Documents shall lay out their work and locate temporary buildings and equipment set-ups in such a manner as not to cause interference or delay to other work at the site of this construction. To this end, contractors shall confer with and secure written approval from the **OWNER** or his duly authorized representative for the location or any temporary structure or plant set-up. Such approval shall not relieve the **CONTRACTOR** from responsibility for interference with or delay to work of others.

# 34. ACCESS TO WORK

The representatives of the supporting Federal agencies and the officials of state and local government shall have access to the work wherever it is in preparation or progress; and the **CONTRACTOR** shall provide proper facilities for such access and inspection when requested.

# 35. CONCURRENCE OF PARTICIPATING STATE AGENCIES

When an agency (or agencies) of the State or Federal Government is providing funds for the project, administrative procedures usually require their approval for contract award, interim financing procedures, subcontractors, contractor and subcontractor payrolls, contract change orders involving monetary changes or adjustment of completion dates, and final payment under the construction contract (s). Action by the **OWNER** without such approvals may be cause for withholding of funds by the agency (agencies). It is, therefore, necessary for the **CONTRACTOR** to submit payroll records, requests for change orders and payment estimates as early and as completely as possible to insure that the **OWNER** may obtain agency approval before making payments therefore under the Contract.

# 36. LAWS AND REGULATIONS

The bidder's attention is directed to the fact that all applicable state laws, municipal ordinances and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the Contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full.

The **CONTRACTOR** shall abide by all local and state laws or ordinances to the extent that such regulations do not conflict with Federal laws or regulations. The law of the place of building shall govern the construction of this Contract.

# 37. SIGNS

Project signs are a requirement of this project and shall be completed and furnished by the CONTRACTOR per specifications and/or requirements of **ENGINEER**. There will be a requirement of two (2) signs for this project. These signs are to be located per direction of the Engineer, and shop drawings are to be submitted and approved before placement.

#### 38. EXCAVATION

All excavation for this project shall be considered unclassified. Any reference to rock or sounding showing the plans are for design purposes only and are not to be construed or utilized by the **CONTRACTORS** for any purpose. Each perspective bidder shall make his own determination as to subsurface condition both as to rock and underground utilities, and as to working requirements. **CONTRACTOR** is cautioned that rock excavation will require undercutting and bedding as per specifications and details. In addition, trench or excavated material having rock fragments greater than six (6) inches in any dimension will not be allowed as trench backfill. The **CONTRACTOR** is cautioned to salvage usable soil material before beginning rock excavation and to utilize same for trench backfill and work area cover up.

# 39. AS-BUILT DRAWINGS

The **CONTRACTOR** shall maintain a set of plans titled "Project As-Builts". That as-built record shall document and report on the daily progress of each item of work. As-builts shall include ample measurements representing line depth and horizontal locations relative to permanent markers. Methods and means of recording are subject to approval of the **ENGINEER**. This record shall be the basis of quantity approval for periodical payment. Failure of the **CONTRACTOR** to maintain adequate documentation and records and submission of same with his periodical payment shall be basis for refusal to process payment request. Until such time that as-built drawings and video

documentation are supplied, the processing of periodical payments may be denied and may not recommence until such time that adequate and approved documentation has been furnished.

# 40. PERMITS

Included herein and where applicable are various permits pertaining to stream and state highways. This **CONTRACTOR** is instructed that all necessary construction and compliance as contained and/or as required in those permits shall be adhered to and provided for. Any deviation from same shall be basis for instruction of removal and/or any other necessary corrective matters that need to be completed. Any liability occurring to the OWNER because of failure of the **CONTRACTOR** to follow permit requirements shall be indemnified by the **CONTRACTOR**.

# 41. CHLORINATION AND PRESSURE TESTING

The CONTRACTOR is to complete chlorination and pressure testing as outlined in specifications. He is hereby notified that the testing length shall be between vaives unless agreed to in advance by the ENGINEEK. In addition, the CONTRACTOR is to furnish at a minimum two (2) four-inch battery operated 24 hour pressure recorder in the pressure range of 0-300 psi Model PW 461 as manufactured by Dickerson or approved equal. These are to be maintained by the CONTRACTOR and furnished with adequate charts to complete the testing procedure. All necessary adaptors required for the installation of the pressure recorder which are to be maintained throughout the 24 hour test period shall be furnished and all adaptors and recorders given to the OWNER upon completion of the project. All waterlines this project will be required to hold a minimum of 200 psi for 24 hours, with an allowable leakage of 10 gallons per inch diameter, per mile

In addition, the CONTRACTOR is to furnish separate chlorine test kits for high concentration and normal concentration as manufactured by Hach or approved equal. Upon completion of the project said test kits along with sufficient testing reagents are to be given to the **OWNER**.

# 42. WATER FOR FLUSHING AND TESTING

The **CONTRACTOR** is to pay for all water used in the testing, flushing and construction of the lines. The water volume will be calculated by the **ENGINEER** and the **CONTRACTOR** shall reimburse the **OWNER** at the rate of \$8.00/1000 gallons.

# 43. TRENCHING AND LAYING

The **CONTRACTOR** is cautioned that if they anticipate utilization of a trenching machine for this project that the minimum trench width shall be as detailed on the detail sheet. That is, the machine shall be capable of excavating a trench width that sufficient is to allow the trench backfill to fully encompass the installed pipe and sufficient width to allow for personnel to lay and install the pipe in the trench with a minimum trench width being the pipe OD plus twelve (12") inches. Also, excavated material shall be of sufficient size to allow for trench backfill. In no case will the requirement for rock free bedding and initial twelve (12) inch backfill over pipes be violated. The maximum dimension of any rock fragment or excavated material to be utilized for trench backfill above the initial one (1) foot rock free backfill cushion shall not exceed 6" in any direction.

Pipe shall be lowered by hand into the trench and shall be joined together in the trench. Dropping pipe into the trench and/or joining of the pipe above ground and sliding it into the trench will not be permitted. The CONTRACTOR shall station a workman with the backfill operation to monitor all backfill.

# 44. ARCHAEOLOGICAL MATERIALS

If any previously unrecorded archaeological materials are encountered during construction activities, the Kentucky Heritage Council (KHC) should be notified immediately at (502) 564-6662. If human skeletal material is discovered, construction activities shall cease, and the KHC, the local coroner, and the local law enforcement agency must be notified as described in KRS 72.020.

# 45 PLAN HOLDER

Any entity wishing to bid on this project must be a Plan Holder of Record with the agency providing copies of the bid documents, specifications, and plans.

#### 46 PRECONSTRUCTION VIDEO

No work may begin on the project until the pre-construction video DVDs are submitted and approved by the **OWNER'S** engineer. Specific videoing details are listed in the Technical Specifications.

#### 47 CONSTRUCTION CONTINUITY

**CONTRACTOR** may only be working on a maximum of two (2) lines at a time and may not begin construction on another waterline until testing is completed on a line, that is under construction.

# 48 SPECIFICATION HIERARCHY

The hierarchy of applicability and precedence of authority of the various sections of specifications, are:

- A. Instruction to Bidders
- B. Special Conditions
- C. Supplementary Conditions
- D. General Conditions
- E. Standard Details
- F. Technical Specifications

# **49 TIE-IN**

The waterline "tie-in" will be a pay item. The gate valves and tee necessary for the tie-in are included in this pay item. The pipe, DI sleeves, etc., are to be considered incidental.

This Contractor shall furnish all materials required for the tie-in and the District's Maintenance Contractor shall furnish labor and equipment and complete the actual tie-in. This Contractor shall include an allowance cost of \$1,500.00 for this work and shall pay the District's Maintenance Contractor direct. This \$1,500.00 allowance shall be included in the Contractor's unit price for tie-in.

#### 50 SURFACE WATER PERMIT

Approximately 4-6 weeks before chlorinating, a letter shall be sent by the Contractor to:

Brenda Taylor Surface Water Permit Branch 14 Reilly Road Frankfort, KY 40601

The letter shall outline Contractor's testing, disinfecting, and discharge procedures. A copy of the letter and response shall be provided to Engineer before any testing and/or chlorinating takes place.



# DIVISION 0 CONTRACTOR REQUIREMENTS

#### SECTION 00700

#### **GENERAL CONDITIONS**

#### PART 1 - GENERAL

#### 1.01 PURPOSE

- A. The purpose of this document is to provide information and guidance to contractors in the construction of water facilities that shall be owned or connected to Jessamine South Elkhorn Water District. This document shall be adhered to in its entirety.
- B. See Division 1 for additional general requirements.

#### 1.02 DEFINITIONS

OWNER: Jessamine South Elkhorn Water District.

CONTRACTOR: Any developers, contractors, or other entity constructing water

line extensions or appurtenances to be owned by Jessamine

South Elkhorn Water District.

ENGINEER: Horne Engineering, Inc.

#### 1.03 OBLIGATION OF THE CONTRACTOR

The Contractor shall perform and complete the work to the satisfaction of the OWNER and in accordance with these specifications. The CONTRACTOR shall conduct his work to minimize interference with public and private business and traffic. The CONTRACTOR shall, at his own expense wherever necessary or required, provide barricades, flagmen, maintain lights, and take other precautions as may be necessary to protect life, property, adjacent building and structures. The CONTRACTOR shall be liable for all damages and injuries received or sustained by any person, persons or property in consequence of any neglect in safeguarding the work or by any act of neglect or misconduct by the CONTRACTOR or agents of the CONTRACTOR, subcontractors, employees or workmen.

The CONTRACTOR shall be responsible to contact all utilities to ascertain whether or not any utilities are present in the proposed pipeline area. Further, the CONTRACTOR shall be responsible to take all steps necessary to protect all utilities from damage. Should damage occur, the CONTRACTOR shall immediately take steps to minimize disruption and shall cause all necessary repairs to be made. Further, the CONTRACTOR shall indemnify the OWNER of any and all liabilities and legal action to so defend.

#### 1.04 COOPERATION

Cooperation with the OWNER concerning construction activities is required.

#### 1.05 DEFECTIVE MATERIAL AND WORKMANSHIP

Material not in accordance with this document or defective work may be rejected by the ENGINEER or OWNER. Failure by the OWNER to reject defective work shall not be construed as an acceptance of same.

#### 1.06 NOTIFICATION

The CONTRACTOR shall give the OWNER or OWNER'S representative a minimum of 24 hours notice before starting construction.

#### 1.07 INSPECTION

The OWNER or OWNER'S representative shall be present during construction. In addition to periodic inspection, a final inspection will be made by the OWNER or OWNER'S representative. A punchlist inspection shall be conducted and the final inspection will be made prior to acceptance of any facilities and only after all construction is complete. As part of the final inspection, the OWNER shall be provided a complete set of "As-built" plans. All vaults, valve boxes, meter pits and the like shall be cleaned of dirt, mud, and other foreign matter. The CONTRACTOR shall provide the labor as required to complete the punchlist prior to final inspection. Access to the construction site and construction records shall be provided at all times to inspectors.

#### 1.08 EXISTING UTILITIES

Special precautions shall be taken by the CONTRACTOR to avoid damage to existing overhead and underground utilities.

Where existing utilities and appurtenant structures, either underground or aboveground, are encountered, they shall not be disturbed unless necessary. In such case, the utilities shall be replaced in as good or better condition than found and the utility company shall be notified prior to disturbance.

The CONTRACTOR or his representatives, shall bear the entire responsibility for locating, avoiding, and repairing damaged existing utilities.

#### 1.09 CONFLICTING UTILITIES

All buried, potentially conflicting, utility lines or other facilities shall be exposed to determine requirements for maintaining required clearances prior to excavation. Where clearances cannot be obtained by minor vertical adjustments in planned grades, the CONTRACTOR shall notify the OWNER or OWNER's representative prior to proceeding.

#### 1.10 WATER MAIN, GRAVITY SEWER AND FORCE MAIN CLEARANCE

A. Water mains shall be separated by a minimum horizonal distance of ten feet when constructed parallel to gravity sewers or sewage force mains. For gravity sewers, approval may be granted on a case-by-case basis by the Kentucky Division of Water where such a clearance is not practical. In this case, the waterline must be located a minimum of 18" above the top of the sewer pipe and

on undisturbed trench bottom. This deviation is not allowed for force mains.

B. Water mains crossing sewers or force mains shall have an out-to-out vertical clearance of 18" and a full length of water pipe shall be located to maximize joint distance from the sewer or force main. Where it is impractical to obtain such clearance, approval may be granted on a case-by-case basis if the water main is encased for a distance of ten feet either side of the force line and has a minimum clearance of six inches. Encasement may be PVC pipe and shall be approved by the ENGINEER.

#### 1.11 SAFETY AND SUPERVISION OF WORK

- A. The CONTRACTOR shall have total responsibility for safety on the construction site, including maintaining safe work procedures and methods. At no time will the ENGINEER or OWNER assume such responsibility, nor shall they direct or supervise the CONTRACTOR's personnel, subcontractors, or suppliers.
- B. Inspection services provided by the OWNER are to monitor that the work is completed in conformance with the drawing and specifications. The inspector's presence in no way relieves the CONTRACTOR of safety and supervision responsibilities; nor conformity with drawings and specifications; or making the OWNER or ENGINEER as insurer of the CONTRACTOR'S performance.

# 1.12 PERMITS, EASEMENTS, AND RIGHTS-OF-WAY

The CONTRACTOR shall make application for, obtain, and pay fees for all licenses, permits, easements, and rights-of-way, including railroad permits (where applicable). The CONTRACTOR shall be required to comply with all State and municipal ordinances, laws and/or codes which may apply to same.

#### 1.13 CONTRACTOR'S CERTIFICATION

A. The CONTRACTOR shall provide written certification, upon completion of project construction, that all work was completed in accordance with drawings and specifications, subject to OWNER'S approval and acceptance.

#### 1.14 WARRANTY

The CONTRACTOR shall warrant the material and workmanship for a period of one year from the date of acceptance by the OWNER. The performance and payment bond shall remain in full force and original value to ensure compliance with warranty requirements.

- END OF SECTION -

# DIVISION 1 GENERAL REQUIREMENTS

#### **SECTION 01300**

#### **SUBMITTALS**

#### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

Shop drawings, descriptive literature, product data and samples (when samples are specifically requested) for all manufactured or fabricated items shall be submitted by the CONTRACTOR to the ENGINEER for examination and review in the form and in the manner required by the ENGINEER. All submittals shall be furnished in at least six (6) copies and shall be checked and reviewed by the CONTRACTOR shall indicate his approval before submission to the ENGINEER. The review of such Drawings by the ENGINEER shall not be construed as a complete check, but will indicate only that the general method of construction and detailing is satisfactory. Review of such Drawings will not relieve the CONTRACTOR of the responsibility for any errors which may exist as the CONTRACTOR shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all Work.

#### 1.02 RELATED SECTIONS

A. General Conditions

#### 1.03 DEFINITIONS

A. The term "submittals" shall mean Shop Drawings, manufacturer's drawings, catalog sheets, brochures, descriptive literature, diagrams, schedules, calculations, material lists, performance charts, test reports, office and field samples, and items of similar nature which are normally submitted for the ENGINEER's review for conformance with the design concept and compliance with the Contract Documents.

#### 1.04 GENERAL CONDITIONS

- A. Review by the ENGINEER of Shop Drawings or submittals of material and equipment shall not relieve the CONTRACTOR from the responsibilities of furnishing same of proper dimension, size, quality, quantity, material and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. Review shall not relieve the CONTRACTOR from responsibility for errors of any kind of the Shop Drawings. Review is intended only to assure conformance with the design concept of the project and compliance with the information given in the Contract Documents.
- B. Review of Shop Drawings shall not be construed as releasing the CONTRACTOR from the responsibility of complying with the Specifications.

#### 1.05 GENERAL REQUIREMENTS FOR SUBMITTALS

A. Shop Drawings:

- 1. Shop drawings shall be prepared by a qualified detailer. Details shall be identified by reference to sheet and detail numbers shown on Contract Drawings. Where applicable, show fabrication, layout, setting, and erection details.
- 2. Shop Drawings are defined as original Drawings prepared by the CONTRACTOR, subcontractors, suppliers, or distributors performing Work under this Contract. Shop Drawings illustrate some portion of the Work and show fabrication, layout, setting, or erection details of equipment, materials, and components. The CONTRACTOR shall, except as otherwise noted, have prepared the number of review copies required for his distribution plus three (3) which will be retained by the ENGINEER. Shop Drawings shall be folded to an approximate size of 8 ½ " x 11" and in such a manner that the title block will be located in the lower right-hand corner of the exposed surface.
- 3. Shop Drawing Submittals: Includes, but not limited to the following categories where applicable:

PVC Pipe
PE Tubing
Gate Valves
Gate Valve Box
Fire Hydrant
Copper Setter
Corp Stop
Meter box
Meter Box Lid
Compression Fitting

Stainless Steel All-thread Duc-Lug Air Release Assembly

1" Ball Valve
1" Brass Nipple & Street ell
Sensus SR Meter

Meter Lock
Pipe Saddles

"U" Branch

Concrete Mix Design

PRV Valve

Reduce Pressure Backflow

Double Check Valve

Concrete Vault Access Hatch Fencing

Gates Altitude Va

Altitude Valves Telemetry

Special Equipment
Ductile Iron Pipe
Ductile Iron Fittings
Ductile Iron Sleeve
Meter Test Results

Casing Pipe
Casing Spacers
Casing End Seals

Fiberglass Valve Marker

- B. Product data shall include manufacturer's standard schematic drawings modified to delete information, which is not applicable to the project, and shall be supplemented to provide additional information applicable to the project. Each copy of descriptive literature shall be clearly marked to identify pertinent information as it applies to the project.
- C. Where samples are required, they shall be adequate to illustrate materials, equipment, or workmanship, and to establish standards by which completed Work is judged. Provide sufficient size and quantity to clearly illustrate functional characteristics of product and material, with integrally related parts and attachment devices, along with a full range of color samples.

- D. All submittals shall be referenced to the applicable item, section and division of the Specifications, and to the applicable Drawing(s) or Drawing schedule(s).
- E. The CONTRACTOR shall review and check submittals, and shall indicate his review by initials and date.
- F. If the submittals deviate from the Contract Drawing and/or Specifications, the CONTRACTOR shall advise the ENGINEER, in letter of transmittals of the deviation and the reasons therefore. All changes shall be clearly marked on the submittal with a bold red mark. Any additional costs for modifications shall be borne by the CONTRACTOR.
- G. In the event the ENGINEER does not specifically reject the use of material or equipment at variance to that which is shown on the Drawings or specified, the CONTRACTOR shall, at no additional expense to the OWNER, and using methods reviewed by the ENGINEER, make any changes to structures, piping controls, electrical work, mechanical work, etc., that may be necessary to accommodate this equipment or material. Should equipment other than that on which Design Drawings are based be accepted by the ENGINEER, Shop Drawings shall be submitted detailing all modification Work and equipment changes made necessary by the substituted item.
- H. Additional information on particular items, such as Special Drawings, schedules, calculations, performance curves, and material details, shall be provided when specifically requested in the Technical Specifications.
- I. Submittals for all electrically operated items (including instrumentation and controls) shall include complete wiring diagrams showing leads, runs, number of wires, wire size, color coding, all terminations and connections, and coordination with related equipment.
- J. Equipment Shop Drawings shall indicate all factory or shop paint coatings applied by suppliers, manufacturers, and fabricators; the CONTRACTOR shall be responsible for insuring the compatibility of such coating with the field-applied paint products and systems.
- Fastener specifications of manufacturer shall be indicated on Equipment Shop Drawings.
- Where manufacturer's brand names are given in the Specifications for building and construction materials and products, such as grout, bonding compounds, curing compounds, masonry cleaners, waterproofing solutions, and similar products, the CONTRACTOR shall submit names and descriptive literature f such materials and products he proposes to use in the Contract.
- M. No material shall be fabricated or shipped unless the applicable Drawings or submittals have been reviewed by the ENGINEER and returned to the CONTRACTOR.
- N. All bulletins, brochures, instructions, parts lists, and warranties packaged with and accompanying material and products delivered to and installed in the project

shall be saved and transmitted to the OWNER through the ENGINEER.

## 1.06 CONTRACTOR RESPONSIBILITIES

- A. Verify field measurements, field construction criteria, catalog numbers and similar data.
- B. Coordinate each submittal with requirements of Work and of Contract Documents.
- C. Notify ENGINEER, in writing at time of submission, of deviation in submittal from requirements of Specifications and Drawings.
- D. Begin no work, and have no material or products fabricated or shipped which require submittal review until return of submittals with ENGINEER's stamp and initials or signature indicating review.

- END OF SECTION -

#### SECTION 01720

#### PROJECT RECORD DOCUMENTS

#### PART 1 - GENERAL

#### 1.01 RELATED SECTIONS

A. Section 01300 - Submittals.

#### 1.02 MAINTENANCE OF DOCUMENTS

- A. Maintain at jobsite, one copy of:
  - 1. Contract Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Reviewed Shop Drawings.
  - 5. Change Orders.
  - 6. Other modifications to Contract.
- B. Store documents in approved location, apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- D. Maintain documents in clean, dry, legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all time for inspection by ENGINEER and OWNER.

#### 1.03 MARKING DEVICES

Provide colored pencil or felt-tip marking pen for all marking.

# 1.04 RECORDING

- A. Label each document "PROJECT RECORD" on 2-inch high printed letters.
- B. Keep record documents current.
- C. Do not permanently conceal any work until required information has been

recorded.

- D. Contract Drawings: legibly mark to record actual construction:
  - 1. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
  - 2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
  - 3. Field changes of dimension and detail.
  - 4. Changes made by Change Order of field order.
  - 5. Details not on original Contract Drawings.
- E. Specifications and Addenda: legibly mark up each section to record:
  - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actual installed.
  - 2. Changes made by Change Order or field order.
  - Other matters not originally specified.

#### 1.05 SUBMITTAL

- A. At completion of project, deliver record documents to ENGINEER.
- B. Accompanying submittal with transmittal letter, in duplicate, containing:
  - 1. Date.
  - 2. Project title and Contract number.
  - CONTRACTOR's name and address.
  - 4. Title and sheet number of each record document.
  - 5. Certification that each document as submitted is complete and accurate.
  - 6. Signature of CONTRACTOR or his authorized representative.

- END OF SECTION -

#### **SECTION 01725**

#### VIDEO TAPING

#### 1.01 GENERAL DESCRIPTION

1.01.1 This Section covers the provision for the CONTRACTOR to provide all labor materials, equipment, services and perform all operations necessary to furnish to the OWNER and ENGINEER a complete, color audio-video record of the surface features within the proposed construction's zone of influence. This record shall include, but not be limited to, all audio-video tape storage cases, tape logs and indexes. The purpose of this coverage shall be to accurately document the pre-construction condition of these features within the project area.

#### 1.02 MATERIALS

#### 1.02.1 General

The total audio-video recording system and the procedures employed in its use shall be such as to produce a finished product that will fulfill the technical requirements of the project,. As well as those more subjective requirements of high quality audio and video production. The video portion of the recording shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls, or any other form of picture imperfection the audio portion of the recording shall reproduce the commentary of the camera operator with proper volume, clarity and be free from distortion. Recording speed shall be compatible for playback in SP mode.

The recording system shall utilize EIA standard video and NTSC compatible color (American TV Standard), and shall utilize digital technology.

# 1.02.2 Video Tape

The video tape furnished to the owner shall be ½", high energy extended still frame capable, color, VHS video cassettes. The video cassettes shall be new and thus shall not have been used for any previous recording. The CONTRACTOR may provide the ENGINEER a copy of the recording in a digital format upon approval by the ENGINEER.

#### 1.02.3 Video Tape Playback Compatibility

The recorded video tapes shall be compatible for playback with any American TV Standard VHS videocassette player, or DVD player if approved.

#### 1.03 EXECUTION

#### 1.03.1 Video Content

1.03.1.1 General

The recording shall contain coverage of all surface features located within the constructions's zone of influence. The construction's zone of influence shall be defined (1) as the area within the permanent and temporary easements, and areas adjacent to these easements which may be affected by routine construction operations; and (2) by the direction of the ENGINEER and/or owner. The surface features within the construction's zone of influence shall include, but not be limited to, all roadways, pavements, curbs, driveways, sidewalks, culverts, headwalls, retaining walls, buildings, landscaping, trees, shrubbery, residences, and fences. Of particular concern shall be the existence or non-existence of any faults, fractures or defects prior to construction.

#### 1.03.1.2 Streets

Where construction will extend in or adjacent to a street, the full width of the construction's zone of influence including the street right-of-way shall be recorded, unless otherwise authorized by the ENGINEER. The term street shall be understood to mean a highway, road, street, avenue, boulevard, land, circle, alley, etc.

#### 1.03.1.3 Easements

Where construction will extend through easement areas, the permanent and temporary easements and all other adjacent areas lying within the construction's zone of influence shall be recorded. The term easement shall be understood to mean all areas not defined as streets.

## 1.03.2 Alpha-Numeric Displays

All video recordings must, by electronic means, display continuously and simultaneously generated, transparent, alpha-numeric information to include the following:

1.03.2.1 Video Tape Index, Number, Project Title and General Project Location

Each video tape shall begin with a single, multi-line, alpha-numeric display indicating the video tape index number, project title and general location of the project.

# 1.03.2.2 Time and Date

During the entire duration of the recordings, the time (in hours, minutes and seconds separated by colons) and date(consisting of month, day and year separated by slashes) of recording must appear in the upper left-hand corner of the picture.

#### 1.03.2.3 Name and Side of Street or Easement

During the entire duration of the recordings, the name and side of the street or easement being recorded must appear across the bottom of

#### 1.03.2.4 Camera Position

During the entire duration of the recordings, the position of the camera, accurately referenced and displayed in terms of the construction's engineering stationing, shall be displayed (in standard stationing format) in the lower left-had corner of the picture. Where no stationing appears on the engineering plans, and appropriate stationing system acceptable to the ENGINEER and owner, shall be established and utilized.

#### 1.03.3 Audio Content

Accompanying the video recording of each video tape shall be corresponding and simultaneously recorded audio. This audio recording, exclusively containing the commentary of the camera operator, shall assist in the maintenance of view orientation and in any needed identification, differentiation, clarification or objective description of the structures being shown in the video portion of the recording. The audio recording also shall be free from any conversations between the camera operator and the other production technicians.

# 1.03.4 Video Tape Indexing

# 1.03.4.1 Video Tape Identification

All video tapes and their vinyl storage cases shall be properly identified by video tape index number, project title, and general project location.

# 1.03.4.2 Video Tape Logs

Displayed on the storage case of each video tape shall be a log of that video tape's contents. That log shall describe the various segments of coverage contained on that video tape in terms of the names and sides of the streets or easements, coverage beginning and endpoints, directions of coverage and video tape player counter numbers.

#### 1.03.4.3 Cumulative Index

A cumulative alphabetical index correlating the various segments of coverage to their corresponding video tapes shall be supplied to the owner and ENGINEER.

#### 1.03.5 Procedural Requirements

#### 1.03.5.1 General

The following procedures shall be implemented in the production of preconstruction color audio-video tape documentation. Above all, the documentation shall be executed in a conscientious and professional manner to assure the end product's maximum usefulness to the owner and ENGINEER.

#### 1.03.5.2 Time of Execution

a. Recording Schedule - The recording schedule shall be performed

prior to the placement of any construction materials or equipment on the proposed construction site.

- b. Visibility All recordings shall be performed during times of good visibility. No recording shall be done during periods of significant precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recordings, and to projuce bright, sharp video recordings of those subjects.
- c. In areas requiring clearing and grubbing, the CONTRACTOR shall video the area prior to, and a separate recording subsequent to clearing and grubbing.

# 1.03.5.3 Coverage Continuity

The recording shall commence at beginning Station of each line, and run continuously interrupted to its end. If hand held walking is necessary, it shall be done to insure a complete uninterrupted record.

# 1.03.5.4 Coverage Rates

The average rate of travel during a particular segment of coverage (e.g. coverage of one side of a street) shall be indirectly proportional to the number, size and value of the surface features within that construction area's zone of influence. The following table, which characterizes typical areas and sets the maximum average rates of travel in those areas, shall be used to establish approximate limits on actual average rates of travel:

	Area	Typically Characterized By	Avg. Rate Max
a.	High Density (e.g. developed subdivisions)	Hard Surface Streets, Curbs, Drives & Sidewalks; 50 Ft. Lots; Very Few Empty Lots	30 Ft./Min.
b.	Med. Density (e.g.) Partially developed	Gravel Roads, Hard & Soft Surface Drives, no Sidewalks, Culverts & Headwalls, 100 Ft. Lots; Few Empty Lots	60 Ft./Min.
C.	Low Density (e.g. suburban or woods house, fringe	Gravel Roads, Small Fields	90 Ft./Min
d.	Extra Low Density (e.g. rural	Gravel Roads, Large fields, Sparse Number of Houses	120 Ft/Min

#### 1.03.6 Camera positioning and Stability

a. Camera Height and Stability - When conventional wheeled vehicles are used as conveyances for the recording system, the distance between the camera lens and the ground shall not be more that 12

- feet. The camera shall be firmly mounted, such that transport of the camera during the recording process will not an unsteady picture.
- b. Camera Control Camera pan, tilt, zoom-in, zoom-out rates shall be sufficiently controlled such that recorded objects will be clearly viewed during video tape playback. In addition, all other camera and recording system controls, such as lens focus and aperture, video level pedestal.

# 1.04 COORDINATION

1.04.1 The CONTRACTOR shall coordination the video tape recording with the construction schedule so that portions of the construction that will be recorded firs. Construction shall not begin in an area until acceptable video tapes have been delivered to the owner and ENGINEER.

# 1.05 VIDEO TAPE DELIVERY

1.05.1 The CONTRACTOR shall deliver the video tape recordings to the owner and ENGINEER upon their completion as a whole, or upon request by the owner or ENGINEER, deliver specific video tape recordings to the owner and end ENGINEER upon their completion. Upon delivery and acceptance of the video tapes, transfer of ownership of those video tapes shall be made to the owner.

# 1.06 UNACCEPTABLE DOCUMENTATION

- 1.06.1 The owner or ENGINEER shall have the authority to reject all or any portion of the video tape documentation not conforming to specifications. Those rejected portions shall be redone by the CONTRACTOR at no additional cost to the OWNER.
- 1.06.2 The CONTRACTOR shall complete a trial video survey of a line segment and present to the ENGINEER for review of means, method, processes, and acceptability. Any deficiencies shall be corrected with subsequent videos.

# **OPERATION AND MAINTENANCE DATA**

#### PART 1 - GENERAL

# 1.01 WORK INCLUDED

- A. Compile product data and related information appropriate for OWNER's maintenance and operation of equipment furnished under the Contract. Prepare operation and maintenance data as specified.
- B. Instruct OWNER's personnel in the maintenance and operation of equipment and systems as outlined herein.
- C. In addition to maintenance and operations data, the manufacturer's printed recommended installation practice shall also be included. If not part of the operations and maintenance manual, separate written installation instructions shall be provided, serving to assist the CONTRACTOR in equipment installation.

# 1.02 RELATED REQUIREMENTS

- A. Section 01300 Submittals.
- B. General Conditions.

# 1.03 OPERATION AND MAINTENANCE MANUAL

- A. Every piece of equipment furnished and installed shall be provided with complete operation and maintenance manual. These shall be detailed in instructions to the OWNER'S personnel. They shall be attractively bound for the OWNER'S records.
- B. The manuals shall be submitted to the ENGINEER for review as to adequacy and completeness and upon acceptance, provide six (6) copies each.

# 1.04 FORMS OF SUBMITTALS

A. Prepare data in the form of an instructional manual for use by OWNER'S personnel.

# B. Format:

- 1. Paper size: 8 ½ " x 11".
- 2. Data: Manufacturer's printed data, or neatly typewritten.
- Drawings:
  - (a) Provide reinforced punched binder tab, bind with text.

- (b) Fold large drawings to the size of the data pages where feasible.
- (c) For flow or piping diagrams that cannot be detailed on the standard size drawings, a larger, appropriate size drawing may be submitted.
- Provide tab sheet for each separate product, or each piece of operating equipment.
  - (a) Provide typed description of product, and major component parts of equipment.
  - (b) Provide indexed tabs.
- Cover: Identify each volume with types or printed title "OPERATIONS AND MAINTENANCE MANUAL". List:
  - (a) Title of project.
  - (b) Identify separate equipment as applicable.
  - (c) Identify general subject matter covered in the manual.

# C. Binders:

- 1. Commercial quality, durable and cleanable, 3-hole, post type binders with adequate capacity and with oil and moisture resistant hard covers.
- 2. When multiple binders are used, correlate that data into related consistent grouping.
- 3. Labeled on the front cover and spline of each binder shall be the name of the Plant, the CONTRACTOR, Number and Volume Number.

# 1.05 CONTENT OF MANUAL

- A. Neatly typewritten table of contents for each volume, arranged in systematic order.
  - CONTRACTOR, name of responsible principal, address and telephone number.
  - 2. A list of each equipment required to be included, indexed to the content of the volume.
  - 3. List, with each equipment, the name, address and telephone number of:
    - (a) Supplier of equipment.
    - (b) Subcontractor or installer.
    - (c) Maintenance contractor, as appropriate.

- (d) Identify the area of responsibility of each.
- (e) Local source of supply parts and replacement.
- 4. Identify each product by product name and other identifying symbols as set forth in Contract Documents.

# B. Equipment Data:

- 1. Include only those sheets which are pertinent to the specific equipment; references to other sizes and type or models of similar equipment shall be deleted or lined out.
- Annotate each sheet to:
  - (a) Clearly identify the specific equipment or part installed.
  - (b) Clearly identify the data applicable to the installation.
  - (c) Provide a parts list for all new equipment items, with catalog numbers and other data necessary for ordering replacement parts.
  - (d) Delete references to inapplicable information.

# C. Drawings:

- 1. Supplement equipment data with drawings as necessary to clearly illustrate:
  - (a) Relations of component parts of equipment and systems.
  - (b) Control and flow diagrams.
- 2. Coordinate drawings with information in project record documents to assure correct illustrations of completed installation.
- Do not use project record documents as maintenance drawings.
- D. Written text, as required to supplement equipment data for th particular installation:
  - 1. Organize in a consistent format under separate headings for different procedures.
  - 2. Provide a logical sequence of instruction for each procedure.
- E. Copy of each warranty, bond, and service contract issued: Provide information sheet for OWNER'S personnel.
  - 1. Proper procedures in the event of failure.
  - 2. Instances which might affect the validity of warranties or bonds.

F. These manuals shall be delivered to the ENGINEER at the same time that the equipment to which it pertains is delivered to the site. The manuals must be approved by the ENGINEER before final payment on the equipment is made.

# 1.06 MAINTENANCE AND LUBRICATION SCHEDULES

A. The CONTRACTOR'S attention is directed to the General Conditions and Section 01300 for all requirements relative to the submission of Shop Drawings for the mechanical equipment. For all mechanical and electrical equipment furnished, the CONTRACTOR shall provide a list including the equipment name, address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained. In addition, a maintenance and lubrication schedule for each piece of equipment shall be submitted along with Shop Drawings. Submission shall be in six (6) copies. The lubrication schedule shall include the types of lubricant required for each scheduled item.

# WARRANTIES AND BONDS

# PART 1 - GENERAL

# 1.01 WORK INCLUDED

- A. Compile specified warranties and bonds.
- B. Compile specified service and maintenance contracts.
- C. Co-execute submittals when required.
- D. Review submittals to verify compliance with Contract Documents.

# 1.02 RELATED REQUIREMENTS (AS APPLICABLE)

- A. Warranty bond.
- B. Performance and payment bonds.
- C. Guaranty.
- D. General warranty of construction.
- E. Warranties and bonds required for specific products: as listed in other Specification sections.

# 1.03 WARRANTY BOND

Warranty bond shall be issued upon acceptance by OWNER

# 1.04 WARRANTY BONDS OR CORPORATE GUARANTEES IN LIEU OF EXPERIENCE RECORD

- A. When specifically requested in the products and installation general provisions of a Specification section for a particular piece of equipment of product, a record of five (5) years of successful full-scale operation shall be from existing facilities utilizing the equipment or product specified, in an application similar to the application intended for this project.
- B. The manufacturer shall certify in writing to the CONTRACTOR that it has the required record of successful full-scale operation. This certification shall be submitted by the CONTRACTOR with his construction materials and/or equipment data list. In the event the manufacturer cannot provide the five (5)

year certification of experience to the CONTRACTOR, the CONTRACTOR shall furnish within thirty (30) days after the notice of award, a warranty bond of corporation guarantee from the equipment manufacturer written in the name of the CONTRACTOR and acceptable to the OWNER. The warranty bond or corporate guarantee shall be kept in fore for five (5) years from the date of substantial completion of the Contract, less the number of years of experience the manufacturer may be able to certify to the ENGINEER. As a minimum, the bond or guarantee shall be in force for one (1) year after the date of substantial completion of the Contract. The warranty bond shall be written in an amount equivalent to the manufacturer's quotation, the CONTRACTOR'S installation cost plus 100 per cent (100%). The warranty bond or corporate quarantee will assure the OWNER that, in the judgement of the ENGINEER, the equipment does not perform its specified function, the CONTRACTOR shall remove the equipment and install equipment that will perform the specified function and the work by the CONTRACTOR shall be paid for by the warranty bond or corporate guarantee.

# 1.05 SUBMITTALS REQUIREMENTS

- A. Assemble warranties, bonds, and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Furnish two(2) original signed copies.
- C. Table of Contents: neatly typed, in orderly sequence. Provide complete information for each item:
  - 1. Product, equipment, or Work item.
  - 2. Manufacturer name, address and telephone number
  - 3. Supplier name, address and telephone number.
  - 4. CONTRACTOR name, address and telephone numb
  - 5. Scope.
  - 6. Date of beginning of warranty, bond, or service and maintenance contract.
  - 7. Duration of warranty, bond, or service and maintenance contract.
  - 8. Provide information for OWNER'S personnel:
    - (a) Proper procedure in case of failure.
    - (b) Instances that might affect the validity of warranty or bond.

#### 1.06 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:

- 1. Size 8 ½ " x 11", punch sheets for 3-ringed binder: fold larger sheets to fit into binders.
- Cover: identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
  - (a) Title of the project.
  - (b) Date of project.
  - (c) CONTRACTOR name, address and telephone number.
- C. Binders: commercial quality, 3-ring, with durable and cleanable plastic covers.

# 1.07 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during progress of construction: submit documents within ten (10) days after inspection and acceptance.
- B. Otherwise, make submittals within ten (100 days after date of substantial completion, prior to final request for payment.
- C. For items of work, where acceptance is delayed materially beyond the date if substantial completion, provide updated submittal within ten (10) days after acceptance, listing the date of acceptance as the start of the warranty period.

# 1.08 SUBMITTALS REQUIRED

Submit warranties, bonds, and service and maintenance contracts as specified in the respective sections of the Specifications. Additionally, the CONTRACTOR shall warrant the entire Contract, including all concrete, paving, building, plumbing, HVAC, mechanical and electrical equipment to be free from defects in design and installation for one (1) year from the date of startup. In the event a component fails to perform as specified or is proven defective in service during the warranty period, the CONTRACTOR shall repair the defect without cost to the OWNER.

# SPARE PARTS AND MAINTENANCE MATERIALS

# PART 1 - GENERAL

# 1.01 WORK INCLUDED

A. Spare parts and maintenance materials for routine maintenance and minor repairs shall be provided for indicated equipment items as specified in the respective technical sections of these Specifications.

# PART 2 - PRODUCTS

# 2.01 SPARE PARTS

B.

1.	(Project specific and shall be determined by OWNER)
2.	1
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Name, address and telephone number of the manufacturer of

Name of the unit for which the part is intended.

C.

1.

2.

3.

equipment.

Name of the spare part.

- 4. Name address and telephone number of the supplier of the spare part.
- 5. Manufacturer's catalogue and part number.
- 6. Precautionary information.
- 7. Any other identifying information deemed appropriate.
- D. All spare parts for a single equipment item shall be crated together in containers suitable for handling with hoisting equipment and designed for prolonged storage and stenciled to identify contents.
- E. Where oil or grease lubricated equipment is concerned, sufficient oil or grease of types recommended by the equipment manufacturer shall be supplied for one (1) years's operations.

# PART 3 - EXECUTION

#### 3.01 SPARE PARTS

A. The CONTRACTOR shall furnish and deliver the spare parts to the OWNER at such time as the OWNER may direct but prior to Contract expiration date. Furnish to the ENGINEER for record purposes a list of spare parts delivered to the OWNER.

# 3.02 LUBRICATION

A. THE CONTRACTOR shall make suitable provision for the proper lubrication of all equipment furnished under this Contract. Accessible grease fittings shall be provided where required. A supply of oil, grease, and other lubricants of proper quality, as recommended by the manufacturer of the equipment, shall be furnished. Lubricants shall be furnished in there original, unopened containers in sufficient quantity for initial fillings and for at least one (1) year of operation.

# **DIVISION 2 SITE WORK**

# **EXCAVATING, BACKFILLING, AND COMPACTING FOR UTILITIES**

#### **PART I - GENERAL**

#### 1.01 SUMMARY

- A. Excavating of trenches.
- B. Bedding of pipe.
- C. Backfilling trenches.

# 1.02 RELATED SECTIONS

A. Section 02610 - Pipe and Fillings. PART 2-PRODUCTS

# **PART 2 - PRODUCTS**

# 2.01 BEDDING AND BACKFILLING STONE

- A. Crushed Stone material shall conform to the Kentucky Bureau of Highways Standard Specifications.
- B. Bedding Stone: No. 9, No. 57 Crushed Stone or limestone sand.
- C. Backfill Stone: No. 9, No. 57 Crushed Stone as specified hereinafter.

# **PART 3- EXECUTION**

# 3.01 GENERAL REQUIREMENTS

- A. Trenching may be accomplished by means of a backhoe, trenching machine or by hand depending on the construction area. At the Contractor's option, trenching by a trenching machine or by backhoe is acceptable except as noted below:
  - 1. Where the pipe line parallels a state highway and is being installed within the limits of the shoulder, a trenching machine must be used.
  - Where the pipe line is being constructed close to other utilities, structures, building, or large trees, and it is reasonable to anticipate possible damage from the use of a backhoe, then trenching shall be made by hand methods.
- B. Clearing All trees, stumps, bushes, shrubbery, abandoned concrete or masonry structures and other obstacles within the limits of the trench shall be removed by the Contractor and disposed of in a manner satisfactory to the land owner or engineer and in accordance with federal, state, and local regulations.

- C. Bracing and Sheeting In areas of unstable soils, bracing and sheeting shall be provided to adequately protect the workers during pipe line installation.
  - I. All requirements of the Occupational Safety and Health Act (OSHA) shall be met during trenching and backfill operations.
  - 2. When sheeting and bracing are required, the trench width shall not be less than specified herein. As backfill is placed, the sheeting shall be withdrawn in increments not exceeding one (1) foot and the void left by the withdrawn sheeting shall be filled and compacted.
  - 3. The Engineer will not be responsible for determining requirements for bracing or sheeting.
- D. Excavated materials shall be piled in a manner that will not endanger the Work and will avoid obstructing driveways and sidewalks. Gutters shall be kept clear or other satisfactory provisions made for street drainage.
- E. No trenching for water line installation shall take place until all final site regrade work for roads, driveways, storm water channels, etc., has been completed.

# 3.02 TRENCHING

# A. General:

- The Contractor shall perform all excavation of every description and of whatever substances encountered, including clearing over the pipe line route. All excavations for the pipe line shall be open-cut except at paved city and county roads, state and federal highways, railroads and blacktop or concrete driveways which shall be bored unless otherwise approved by Engineer. Banks of excavations shall be kept as nearly vertical as possible.
- 2. Trench widths at the top of the pipe shall not be less than or greater than that given in the following table:

ALLOWABLE TRENCH WIDTHS				
Pipe Diameter (inches)	Minimum Width ( inches)	Maximum Width (inches)		
4&less 6 8 10 12 14 16 18 20	16 18 20 22 24 26 28 30 32	28 30 32 34 36 38 40 42 44		

# B. Trench Depth:

- I. The trench shall be excavated to a depth sufficient to provide 36 inches of cover over the pipe in non-traffic areas and 36 inches in traffic areas. In addition, excavation shall be carried to a minimum of six (6) inches below pipe grade in rock, either solid or floating.
- 2. When it is necessary to install a pipe line below a roadway ditch, it shall be provided with a minimum of 36 inches of cover unless otherwise approved by Engineer.
- C. All excavation will be unclassified. Unclassified excavation shall include all material encountered during excavation of trench to proper depth and width. It includes the removal of all shale, limestone, hardpan, soil, pavements, and solid rock and any other material which may be encountered in the trench.
- D. Blasting for excavation will be permitted only when proper precautions are taken for the protection of persons and property. Any damage caused by the blasting shall be repaired by the Contractor at his expense. The Contractor's methods of blasting and procedure shall conform to federal, state, and local laws and municipal ordinances. The Engineer will not be responsible, nor direct in any way, blasting practices of the Contractor.

# 3.03 WATER PIPE BEDDING

- A. The trench shall be excavated to a depth to allow a minimum of 36 inches cover over the top of the pipe.
- B. Bedding material, in earth excavation areas, may be earth free from rocks, debris, or other foreign material may be used.
- C. Bedding material, in rock excavation or vehicular traffic (including driveways) areas, shall be No. 9 or No. 57 Crushed Stone. The trench shall be overexcavated six (6) inches and filled with No. 9 or No. 57 Crushed Stone prior to laying pipe. In no case shall pipe be laid on solid or blasted rock.
- D. Bedding material shall be placed from bottom of pipe in earth excavation, and from six (6) inches below bottom of pipe in rock excavation, to the centerline (springline) of the pipe. Bedding shall be compacted in layers not to exceed six (6) inches.
- E. When the subgrade is found to be unstable or to include ashes, cinders, refuse, mud, organic material, or other unsuitable material, such material shall be removed to the depth ordered by the Engineer and replaced under the directions of the Engineer with clean, stable backfill material. When the bottom of the trench or the subgrade is found to consist of material that is unstable to such a degree that, in the judgement of the Engineer it cannot be removed, a foundation for the pipe and/or appurtenance shall be constructed using piling, timber, concrete, or other materials at the direction of the Engineer.

# 3.04 WATER PIPE BACKFILLING

# A. Initial backfill:

- 1. Initial backfill is defined as the material placed from the centerline (springline) of the pipe to 12 inches above the top of the pipe.
- 2. Initial backfill, in earth excavation areas, earth free from rocks, debris, or other foreign materials may be used.
- 3. Initial backfill, in rock excavation or vehicular traffic (including driveways) areas shall be No. 9 or No. 57 Crushed Stone.

# B. Final backfill:

- 1. Final backfill is defined as the material placed from a point 12 inches above the top of the pipe to the original surface.
- 2. Final backfill, in earth excavation areas, shall be free from rocks, debris, or other foreign materials.
- 3. Final backfill, in rock excavation shall be excavated material free of large stones or rock fragments. No stone or fragment shall exceed six (6") inches in any dimension..
- 4. Final backfill, in vehicular traffic (including driveways) areas shall be No. 9 or No. 57 Crushed Stone or compacted DGA up to the subgrade of vehicular traffic surface courses.

# **CRUSHED STONE PAVING**

# **PART 1 - GENERAL**

# 1.01 SUMMARY

Crushed stone paving course, compacted.

# 1.02 REFERENCES

ASTM 033 - Aggregate for Concrete.

# 1.03 TESTS

Gradation of stone material will be performed in accordance with ASTM 033.

#### **PART 2- PRODUCTS**

# 2.01 MATERIALS

Crushed stone shall conform to ASTM C33, Type Dense Grade Aggregate (DGA), Type No. 57, Type No.2, and No. 610.

# **PART 3- EXECUTION**

#### 3.01 FIELD QUALITY CONTROL

- Verify compacted subgrade.
- B. Verify gradients and elevations of base are correct.
- C. Beginning of installation means acceptance of existing conditions.

# 3.02 PLACING AND COMPACTING STONE PAVING

- A. Spread stone material over prepared base to a total compacted thickness of 8 inches or as noted on the plans.
- B. Stone shall be placed in two 4-inch lifts. The bottom lift shall be No. 2 stone, graded and compacted. The top lift shall be DGA placed and compacted to a total thickness as indicated.
- C. Level surfaces to elevations and gradients indicated.
- D. Adequately compact placed stone materials.
- E. Add water to assist compaction. With an excess water condition, rework topping and aerate to reduce moisture content.
- F. DGA material shall be machine pugged at the quarry, meeting moisture and gradation requirement of the Department of Highways.

# **ASPHALTIC CONCRETE PAVING**

# **PART 1 - GENERAL**

# 1.01 SUMMARY

- A. Provide asphalt concrete paving for following applications and prepared subbase and compacted base.
  - 1. Roads.
  - Parking areas.
  - Driveways.
  - 4. Walkways.
  - 5. Curbs.
- B. Provide striping for parking, roadway, and handicapped markings.

# 1.02 SUBMITTALS

Submit to Engineer product data and test reports for approval.

# 1.03 QUALITY ASSURANCE

Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

# **PART 2- PRODUCTS**

# 2.01 MATERIALS

- A. Prime coat: Cut-back asphalt.
- B. Tack coat: Emulsified asphalt.
- C. Asphalt cement: AASHTO M226 and as required by local authorities.
- D. Aggregate: Crushed stone.
- E. Traffic paint: Quick-drying chlorinated-rubber alkyd type, color as approved.
- F. Wheelstops: Precast concrete of uniform color and texture with steel stakes.

# **PART 3- EXECUTION**

# 3.01 NEW PAVEMENT INSTALLATION

A. Asphalt/aggregate Mixture: Comply with local Kentucky Department of Highways Standard Specifications for Highways and Bridges. Class as required by loading and use.

- B. Remove loose material from compacted subbase. Proof roll and check for areas requiring additional compaction. Report unsatisfactory conditions in writing.
- C. Apply prime coat to prepared subbase. Apply tack coat to previous laid work and adjacent in-place concrete surfaces.
- D. Place asphalt concrete at minimum temperature of 225° F in strips not less than 10 feet wide overlapping previous strips. Complete entire base course beginning surface course.
- E. Construct curbs to dimensions indicated or if not indicated to standard shapes. Provide tack coat between curb and pavement.
- F. Begin rolling when pavement can withstand weight of roller. Roll while still hot to obtain maximum density and to eliminate roller marks.
- C. Provide four (4) inch lane and striping paint in uniform, straight lines. Provide wheelstops where indicated and securely dowel into pavement. Protect work from traffic and damage.
- H. Test in-place asphalt work for thickness and smoothness. Remove and replace defective work and patch to eliminate evidence of patching. Provide the following minimum thickness and smoothness unless otherwise greater thickness is required on the Drawings:
  - 1. Subbase course: 4-inch No. 2 stone and 4-inch DGA.
  - 2. Base course: 2-1/2-inch.
  - 3. Surface course: 1-1/2-inch
  - 4. Surface course smoothness: Plus or minus 1/8-inch in 10 feet. No ponding of water is acceptable.

# 3.02 REPLACEMENT PAVEMENT FOR UTILITIES

- A. Sections of pavement shall be replaced as required to install the pipelines. Disturbed pavement shall be constructed to original lines and grades as detailed on the Drawings and in such manner as to leave all surfaces in fully as good or better condition than that which existed prior to these operations.
- B. Prior to trenching, the pavement shall be scored or cut to straight edges along each side of the proposed trench to avoid unnecessary damage to the remainder of the paving. Edges of the existing pavement shall be recut and trimmed as necessary to square, straight edges after the pipe has been installed and prior to placement of the concrete trench cap.
- C. Trenches shall be backfilled with No. 9 Crushed Stone up to the concrete cap.
- D. Asphalt surface course shall be one course construction in accordance with applicable provisions of the Kentucky Department of Highways Standard Specifications, Section 402.

1. Placement and compaction of surface course shall be in accordance with Section 402 of the Kentucky Department of Highways Standard Specifications. Minimum surface course thickness after compaction shall be two (2) inches.

#### PORTLAND CEMENT CONCRETE PAVING

# PART I - GENERAL

# 1.01 SUMMARY

- A. Provide Portland cement concrete paving at following locations and prepared subbase and compacted base.
  - 1. Driveways and vehicular entrances.
  - 2. Walkways.
  - Curbs.

#### 1.02 SUBMITTALS

Submit to Engineer product data, mix design, mock-ups, and test reports for approval.

# 1.03 QUALITY ASSURANCE

Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

# **PART 2- PRODUCTS**

# 2.01 MATERIALS

- A. Concrete mix design: Conform to specific mixes in Section 03300 as required for sidewalks, curbs, and vehicular ways.
- B. Exposed aggregate paving:
  - 1. Aggregate to match approved sample.
  - Retarder.
- C. Reinforcing: 6 x 6, 1.9 x 1.9 welded flat wire mesh and ASTM A36 deformed steel bars.
- D. Joints: Preformed joint fillers/sealers.
- E. Finish:
  - 1. Paving: Fine bristled stiff broom.
  - 2. Exposed aggregate finish: Match approved sample.
  - 3. Imprinting: Tools and hardeners by Bomanite Corp.
  - 4. Curbs: Steel form finish, sponge float.

- F. Minimum Thickness Replacement to match existing or minimum, whichever is greater.
  - 1. Driveways 6 inches.
  - 2. Vehicular entrances 8 inches.
  - 3. Roads 12 inches.
  - 4. Walkways 4 inches.
  - 5. Curbs 6 inches.

# **PART 3- EXECUTION**

# 3.01 INSTALLATION

- A. Proof roll subbase and check for unstable areas. Report unsatisfactory conditions in writing. Correct any soft or unstable areas.
- B. Comply with concrete section for concrete mix, testing, placement, joints, tolerances, curing, repairs, and protection.

# **SECTION 02525** FLOWABLE FILL

# **PART 1 - GENERAL**

# 1.01 SUMMARY

Provide flowable fill at location and placement as per note and detain of construction plan.

# 1.02 SUBMITTALS

Submit to Engineer product data, mix design and test report as per applicable requirement of Standard Specifications for Road and Bridge Construction, Kentucky Transportation Cabinet, Department of Highways, current edition

# 1.03 QUALITY ASSURANCE

Comply with testing and reporting procedures of the specification standards stated in 1.02. Use experienced installers, deliver, handle and store materials in accordance with Section 1.02 specification requirements.

#### **PART 2 - PRODUCTS**

# 2.01 MATERIALS

- A. Mix design: conform to Section 601 Concrete and paragraph 601.03.03.B.5(a) of Standard Specifications for Road and Bridge Construction, Kentucky Transportation Cabinet, Department of Highways, current edition.
- B. Fly Ash meeting requirements of said specification.
- C. Depth place material at location and depth as indicated on plans that is to comply with the following requirement.

Embankment area - The surface of the placed flowable fill shall be at original ground surface, less depth of anticipated stripping.

Excavated area - The surface of the placed flowable fill shall be at subgrade level.

# **PART 3 - EXECUTION**

# 3.01 INSTALLATION

- A. Placement of flowable fill shall be in accord with Section 601.03.09(c) of the Standard Specifications for Road and Bridge Construction, Kentucky Transportation Cabinet, Department of Highways, current edition.
- B. Prior to placement of flowable fill, contractor shall level #9 stone bedding and conduct placement in such manner as to prevent surging or displacement of bedding material.
- C. Contractor shall take any and all necessary steps to remove bleed water from trench, such as: excavating bleed ditches, sump pit and pumping, controlled placement, etc.
- D. Payment will be based on volume of job delivered tickets of material in place and accepted. Waste, overfilling, unacceptable material and other situations resulting in unacceptable placement will not be paid.

# PRECAST CONCRETE VAULT

# **PART 1 - GENERAL**

# 1.01 SUMMARY

Contractor shall furnish all materials, labor, and equipment to install precast concrete vault as shown on drawings or specified herein.

#### 1.02 RELATED SECTIONS

- A. Section 02225 Excavating, Backfilling, and Compacting for Utilities.
- B. Section 02610 Pipe and Fittings.
- C. Section 02642 Water Valves and Accessories.

# **PART 2 - PRODUCTS**

#### 2.01 PRECAST CONCRETE VALVE VAULT

- A. Dimensions: Inside dimensions as shown on drawings.
- B. Concrete Strength: Type I, 4000 psi at 28 days (85% strength prior to handling).
- C. Wall Slabs: Minimum six (6) inches thick, minimum square inches of steel per vertical foot of wall shall be 0.0025 times the longest vault wall dimension, in inches, with strength to support H20 traffic loading.
- D. Top and Bottom Slabs:
  - 1. H20 traffic loading per vault manufacturer; but in no case shall top and bottom slabs be less than eight (8) inches thick and have minimum #4 rebar placed on 6-inch centers, each way.
  - 2. Non-traffic loading Minimum top and bottom slab thickness of eight (8) inches with #4 rebar placed on 12-inch centers, each way.
- E. Steel Reinforcement: Minimum steel reinforcement shall be as noted in Articles C and D of this paragraph (2.01). Minimum yield strength of reinforcement shall be 60,000 psi. Steel reinforcement shall have two (2) inch clearance to slab edge.
- F. Conformance: Concrete shall conform to ACI 301. Reinforcement shall conform to ASTM A615, A616, orA617.
- C. Manufacturer: Cloud Precast or approved equal.

# 2.02 ACCESS HATCH

Access hatch shall be the size indicated and installed in the top slab of the valve vault at the locations shown on the drawings. Frames and covers shall be fabricated of aluminum. Fasteners shall be stainless steel. Covers shall be provided with lifting handle and safety latch to hold the cover in the 90° open position with safety grate. Locking

hasps shall be provided. Covers shall be of the checkered plate design. Access frame and cover shall be Model KD as manufactured by the Bilco Company, New Haven, CT, or approved equal. Frame and cover shall be located at sidewall centered over steps.

# 2.03 STEPS

Polypropylene (rebar reinforced) steps shall be cast-in-place in the vault wall beneath the hatch. Rebar reinforcement shall extend a minimum of 1-3/8 inches beyond slab's steel mat.

# 2.04 DRAIN

The vault shall be manufactured with a four inch diameter floor drain located in the low corner fitted with a metal grate cover. Vault shall be installed to drain to low corner at a maximum pitch of 1/8 inch/foot. The drain shall be piped to daylight or dry well. Drains piped to daylight shall be equipped with rodent screen and flap closure.

Where location makes drain installation impracticable a sump pit and pump shall be utilized.

# 2.05 PIPES AND VALVES

Pipe is specified in Section 02610. Valves are specified in Section 02642.

# **PART 3- EXECUTION**

# 3.01 INSTALLATION

Vault shall be handled and installed in accordance with manufacturer's recommendations.

#### **MANHOLES**

# **PART 1 - GENERAL**

#### 1.01 SUMMARY

The Contractor shall furnish all labor, material, and equipment necessary to construct manholes for sanitary and/or storm sewers, including steps, frames, and covers, together with all appurtenances as shown and detailed on the Drawings and specified herein. Manhole materials shall be precast concrete as noted on the Drawings.

# 1.02 RELATED SECTIONS

- Section 02225 Excavating, Backfilling, and Compacting for Utilities.
- B. Section 03300 Cast-in-Place Concrete.

#### 1.03 DEFINITIONS

- A. Standard Manhole: A standard manhole is defined as any manhole that is greater than 4 feet in depth, as measured from the invert of the manhole base at its center to the top (rim) of the manhole cover.
- B. Shallow Manhole: A shallow manhole is defined as any manhole that is 4 feet or less in Jepth, as measured in the preceding sentence.

# **PART 2- PRODUCTS**

# 2.01 CONCRETE MANHOLES - GENERAL

- A. Manholes shall conform in shape, size, dimensions, materials, and other respects as shown on the Drawings or specified herein.
- B. All concrete manholes shall have precast reinforced concrete developed bases. No other type of base will be allowed. Invert channels shall be factory constructed when the base is made. Sloping invert channels shall be constructed whenever the difference between the inlet and outlet elevation is 2 feet or less.
- C. The concrete manhole walls (barrels and cones) shall be precast concrete sections. The top of the cone shall be built of reinforced concrete adjustment rings to permit adjustment of the frame to meet the finished surface. Minimum strength of the concrete for the precast sections shall be 4,000 psi at the time of shipment.
- D. For concrete manholes, the inverts of the developed bases shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent, within the manhole, to the centerlines of adjoining pipelines.
- E. For concrete manholes, the cast-iron frames and covers shall be the standard frame and cover as indicated on the Drawings and specified herein.

F. Manholes shall be manufactured by Cloud Precast, or approved equal.

# 2.02 PRECAST CONCRETE SECTIONS

- A. Precast concrete sections and appurtenances shall conform to the ASTM Standard Specifications for Precast Reinforced Concrete Manhole Sections, Designation C478, latest revision, with the following exceptions and additional requirements.
- B. The base section shall be monolithic for 4-foot diameter manholes. Manholes with diameter of 5 feet or larger shall have base slab.
- C. The wall sections shall be not less than 5 inches thick.
- Type II cement shall be used except as otherwise permitted.
- E. Joints between sections shall be made watertight through the use of rubber 0-ring gaskets or rubber profile gaskets such as Forsheda 138. Gaskets shall conform to the ASTM Standard C-443, latest revision. Rope mastic or butyl mastic sealant shall be installed per manufacturer's direction.
- F. Butyl mastic sealant shall be installed between the concrete cone section, any cast iron adjusting sections or rings, and cast iron frame.

# 2.03 CONCRETE MANHOLE - FRAMES AND COVERS

- A. The Contractor shall furnish all cast iron manhole frames and covers conforming to the Drawings or as specified herein.
- B. The castings shall be of good quality, strong, tough, evengrained cast iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be machined to prevent rocking of covers.
- C. All casting shall be thoroughly cleaned and subject to a careful hammer inspection.
- D. Castings shall be at least Class 25 conforming to the ASTM Standard Specifications for Gray Iron Casting, Designation A48, latest revision.
- E. Unless otherwise specified, manhole covers shall be 22-3/4 inches in diameter, weighing not less than 350 pounds per frame and cover. Manhole covers shall set neatly in the rings, with contact edges machined for even bearings and tops flush with ring edge. They shall have sufficient corrugations to prevent slipperiness. The covers shall have two (2) pick holes about 1-1/4 inches wide and 1/2 inches deep with 3/8-inch undercut all around. Covers shall not be perforated. Frames and covers shall be J.R. Hoe and Sons, Mc-350, or approved equal.
- F. All covers shall be marked, in the center in large letters "SANITARY SEWER" or "STORM SEWER", as applicable.

# 2.04 MANHOLE STEPS (CONCRETE MANHOLES)

Manholes steps shall be the polypropylene plastic type reinforced with a 1/2" diameter deformed steel rod. The step shall be 10-3/4" wide and extend 5-3/4" from the manhole wall. Steps shall line up over the downstream invert of the manhole. The steps shall be embedded into the manhole wall a minimum of 3-3/8 inches. Steps shall be uniformly spaced at 12-inch to 16-inch intervals.

# **PART 3- EXECUTION**

# 3.01 FABRICATION - PRECAST SECTIONS

- A. Manhole sections shall contain manhole steps accurately positioned and embedded in the concrete when the section is cast.
- B. Sections shall be cured in an enclosed curing area and shall attain a strength of 4,000 psi prior to shipment.
- C. No more than two (2) lift holes or inserts may be cast or drilled in each section.
- D. Flat slab tops shall have a minimum thickness of 6 inches and reinforcement in accordance with ASTM C478.
- E. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the precast sections.
- F. Acceptance of the sections will be on the basis of material tests and inspection of the completed product and test cylinders if requested by the Engineer.
- C. Cones shall be precast sections of similar construction.

# 3.02 SETTING PRECAST MANHOLE SECTIONS

- A. Precast-reinforced concrete manhole sections shall be set so as to be vertical and with sections and steps in true alignment.
- B. Rubber gaskets, rope mastic or butyl mastic sealant shall be installed in all manhole joints in accordance with the manufacturer's recommendations.
- C. All holes in sections used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose or concrete grout.

#### 3.03 ADJUSTING MANHOLE FRAMES AND COVERS TO GRADE

- A. Except where shown on the Drawings, the top of the precast concrete eccentric cone of a standard manhole or the top of the flat slab of a shallow manhole shall terminate 4 inches below existing grade in an unpaved non-traffic area except in a residential yard and 13 inches below existing grade in a paved or unpaved traffic area and in a residential yard. The remainder of the manhole shall be adjusted to the required grade as described hereinafter in paragraphs B and C of this article.
- B. When a manhole is located in an unpaved non-traffic area other than in a residential yard, the frame and cover shall be adjusted to an elevation 3 inches to 5 inches above the existing grade at the center of the cover. If field changes have

resulted in the installed manhole invert elevation to be lower than the invert elevation shown on the Drawings, the adjustment to an elevation of 3 inches to 5 inches above existing grade shall be accomplished by the use of precast concrete or cast iron adjusting rings. If field changes have resulted in the completed manhole invert to be greater than the invert shown on the Drawings and the cover higher than 5 inches above existing grade, then the top of the eccentric cone, when used, or the top of the barrel section, when used, shall be trimmed down so that the manhole cover, after installation, is no greater than 5 inches above existing grade at the center of the cover. The area around the adjusted frame and cover shall be filled with the required material, sloping it away from the cover at a grade of 1 inch per foot.

- C. When a manhole is located in a bituminous, concrete, or crushed stone traffic area, or in a residential yard, the frame and cover shall be adjusted to the grade of the surrounding area by the use of precast concrete or cast iron adjusting rings. The adjusted cover shall conform to the elevation and slope of the surrounding area. If field changes have resulted in the installed manhole invert elevation to be so much higher than the invert elevation shown on the Drawings that the top of the eccentric cone, when used, or the top of the flat slab, when used, is less than the thickness of the frame and cover 7 inches from the grade of the surrounding area, then the top of the cone or barrel section shall be trimmed down enough to permit the cover, after installation, to conform to the elevation and slope of the surrounding area. After installation, the inside and outside surfaces of the precast concrete adjusting rings shall receive a waterproofing bitumastic coating.
  - 1. The Contractor shall coordinate elevations of manhole covers in paved streets with the Owner. If resurfacing of the street in which sewers are laid is expected within two (2) months, covers shall be set 1-1/2 inches above the existing pavement surface in anticipation of the resurfacing operations.

# 3.04 ADJUSTING SECTIONS

Only clean adjusting sections shall be used. Each adjusting section shall be laid in a bead of butyl mastic sealant and shall be thoroughly bonded. Adjustment shall be restricted to two rings or 12".

# 3.05 SETTING MANHOLE FRAMES AND COVERS

- A. Manhole frames shall be set with the tops conforming to the required elevations set forth hereinbefore. Frames shall be set concentric with the top of the concrete and in a full bead of butyl mastic sealant so that the space between the top of the masonry and the bottom flange of the frame shall be completely watertight.
- B. Manhole covers shall be left in place in the frames at all times, except when personnel is actually in the manhole.

#### PIPE AND FITTINGS

#### **PART 1 - GENERAL**

# 1.01 SUMMARY

- A. The Contractor shall furnish all labor, material, and equipment necessary to install water piping and appurtenances as shown on the drawings and specified herein.
- B. This section describes several types of pipe which may or may not apply to the current project. Selected pipe materials will be identified on the drawings.

# 1.02 RELATED SECTIONS

- A. Section 02225 Excavating, Backfilling, and Compacting for Utilities.
- B. Section 02642 Water Valves and Accessories.
- C. Section 02630 Casing Pipe.
- D. Section 02675 Disinfection of Water Distribution Systems.

# 1.03 DELIVERY, STORAGE, AND HANDLING

- A. Pipe and accessories shall be unloaded at the point of delivery, hauled to, and distributed at the site of the project by Contractor in such a manner to avoid damage to the materials. Whether moved by hand, skidways, or hoists, materials shall not be dropped or bumped against pipe or accessories already on the ground or against any other object.
- B. In distributing material at the construction site, each piece shall be unloaded as near the installation point as possible.
- C. Pipe shall be handled in such a manner as to avoid damage to the ends. When such damaged pipe cannot be repaired to the Engineer's satisfaction, it shall be replaced at the Contractor's expense. The interior of all pipe and accessories shall be kept free from dirt and foreign matter at all times. The interior of all pipe and accessories shall be checked for dirt and debris and, if necessary, thoroughly cleaned before use in the project.

# **PART 2- PRODUCTS**

# 2.01 DUCTILE IRON PIPE AND FITTINGS

- A. Scope: This article covers the design and manufacture of ductile iron centrifugally cast in metal molds and ductile iron fittings.
- B. Specific Requirements: Ductile iron pipe shall be furnished cement lined unless otherwise noted on the drawings or in other sections of these specifications. Ductile iron pipe shall be furnished with rubber gasket push-on joints except as may otherwise be noted on the drawings or in difficult working areas and approval of the Engineer.

- 1. Pressure class shall be 350 psi for pipe sizes 20 inches or smaller and pressure class 250 psi for pipe sizes larger than 20 inches for mechanical and push-on joint pipe.
- 2. Thickness design of ductile iron shall conform in all aspects to the requirements of ANSI/AWWA C150/A 21.50 latest revision.
- 3. Manufacture and testing of ductile iron pipe shall conform in all aspects to the requirements of ANSI/AWWA C151/A 21.51 latest revisions.
- 4. Cement mortar lining with bituminous seal coat shall conform to the requirements of ANSI/AWWA C104/A 21.4, latest revision for cement-mortar lining for ductile iron pipe, gray iron pipe, and fittings for water. Bituminous outside coating shall be in accordance with ANSI/AWWA C151/A 21.51 for pipe and ANSI/AWWA CI 10/A 21.10 for fittings.
- 5. Fittings and gaskets for mechanical and push-on joint ductile and cast iron pipe shall conform to the latest revisions of ANSI/AWWA 0110/A 21.10 for mechanical and push-on joint fittings, ANSI/AWWA C111/A 21.11 for gaskets, and ANSI/AWWA CI 53/A 21.53 for mechanical and push-on joint compact fittings. Mechanical and push-on joint fittings shall have pressure class rating of 350 psi for sizes 20 inches and smaller and 250 psi for sizes larger than 20 inches.
- 6. All ductile and cast iron fittings shall be ductile iron grade 80-60-03 in accordance with ASTM A339-55.
- 7. Flanged ductile iron pipe shall conform to the latest revisions of ANSI/AWWA C115/A 21.15. Bolt pattern of flange shall be in accordance with ANSI/AWWA C115/A 21.15 (which is equivalent to ASME/ANSI B16.1, Class 125 flange bolt pattern). Pipe shall have pressure class 250 rating. Gaskets shall be synthetic rubber ring gaskets with a thickness of 1/8 inch. Nuts and bolts shall be in accordance with ASME/ANSI B18.2.1, ASMEJANSI B18.2.2, ASMEJANSI B1.1, and ASTM A307.
- 8. Flanged fittings shall conform to the latest revisions of ANSI/AWWA C110/A 21.10 or ANSI/AWWA CI 53/A 21.53 (compact fittings). Gaskets shall be in accordance with ANSI/AWWA 0111/A 21.11. Fittings shall have pressure class rating of 250 psi. Bolt pattern of flange shall be in accordance with ANSI/AWWA 0115/A 21.15 (which is equivalent to ASME/ANSI B16.1, class 125 flange bolt pattern).
- Restrained joint pipe and fittings shall be a boltless system equal to "Field-Lok" restraining gaskets or "TRFLEX Joint" as manufactured by U.S. Pipe & Foundry Company.
- 10. Ball and socket restrained joint pipe and fittings shall be a boltless system equal to USIFLEX manufactured by U.S. Pipe & Foundry Company or FLEX-LOK manufactured by American Pipe Company. Pipe shall have a working pressure rating of 250 psi and have a maximum joint deflection of 15°. Nominal laying lengths shall be in range of 18 feet 6 inches to 20 feet 6 inches.
- 11. Manufacturers: Pipe shall be as manufactured by U.S. Pipe & Foundry Company, Clow, American Cast Iron Pipe Company, or equal.

12. Marking: Pipe or fitting shall have the ANSI/AWWA standard, pressure (or thickness) class, diameter, DI or ductile noted, manufacturer, and country and year where cast on the outside of the body.

# 2.02 CAST AND DUCTILE IRON PIPE AND FITTINGS

- A. Scope: This article covers the design and manufacture of cast iron pipe centrifugally cast in metal molds and cast iron fittings for pipe sizes two inch (2") through sixty inch (60").
- B. Specific Requirements: Cast iron pipe shall be centrifugally cast in metal molds and shall be furnished cement lined unless otherwise noted on the drawings or in other sections of the specifications. Cast iron pipe shall be furnished with rubbergasket push-on joints except as may otherwise be noted on the drawings or in difficult working areas and approval of the Engineer.
  - 1. Thickness class shall be class 50 for all pipe sizes.
  - 2. Thickness design of cast iron shall conform in all aspects to the requirements of ANSI-AWWA 0101 latest revision.
  - Manufacture and testing of cast iron pipe centrifugally cast in metal molds shall comply with the requirements of the National Standard Institute and American Waterworks Association designation A21.6/AWWA 0106 latest revisions.
  - 4. Cement mortar lining with bituminous seal coat shall conform to the requirements of ANSI/AWWA 0104/A 21.4, latest revision for cement-mortar lining for ductile iron pipe, gray iron pipe, and fittings for water. Bituminous outside coating shall be in accordance with ANSI/AWWA 0151/A 21.51 for pipe and ANSI/AWWA 0110/A 21.10 for fittings.
  - 5. Fittings and gaskets for mechanical and push-on joint ductile and cast iron pipe shall conform to the latest revisions of ANSI/AWWA 0110/A 21.10 for mechanical and push-on joint fittings, ANSI/AWWA 0111/A 21.11 for gaskets, and ANSI/AWWA 0153/A 21.53 for mechanical and push-on joint compact fittings. Mechanical and push-on joint fittings shall have pressure class rating of 350 psi for sizes 20 inches and smaller and 250 psi for sizes larger than 20 inches.
  - 6. All ductile and cast iron fittings shall be ductile iron grade 80-60-03 in accordance with ASTM A339-55.
  - 7. Cast iron pipe and fittings should only be used when specifically noted on the drawings or ductile iron is not available in certain sizes.

# 2.03 PVC (POLYVINYL CHLORIDE) PIPE

A. Scope: This article covers the design and manufacture of PVC 1120 manufactured of CLASS 12454-B or CLASS 12454-C (cell classification) resin

- material with a hydrostatic-design-basis (HDB) rating of 4,000psi at 73.4 degree F (23 degree C).
- B. Specific Requirements: PVC pressure pipe shall be furnished, constructed of materials and to the specifications of this section. The types of PVC pipe permitted for use on the project will be as noted on the drawings. The selected pipe will be designated either as PVC (ASTM) or PVC (AWWA) followed by an appropriate pressure rating or dimension ratio (DR or SDR).

# 1. PVC (ASTM) Pipe:

- a. PVC (ASTM) pipe shall be designed, manufactured, and tested to conform with the latest revision of ASTM D-2241, ASTM D-1784, and ASTM D-2672.
- Rubber gasketed joints shall conform to ASTM D-3139. The gaskets for the PVC pipe joint shall conform to ASTM F-477 and D-1869. Gaskets shall be integral bell joints with rubber O-ring seals.
- PVC (ASTM) pipe shall be furnished as SDR 17 for 250 psi or SDR 21 for 200 psi.

# 2. PVC (AWWA) Pipe:

- PVC (AWWA) pipe shall be designed, manufactured, and tested to conform with the latest revision of AWWA 0900 for pipes sizes 12 inches and smaller and AWWA 0905 for pipes sizes 14 inches and larger.
- b. Pipe shall have cast iron pipe equivalent ODs.
- c. Rubber gasketed joints shall conform to ASTM D-3139. The gaskets for the PVC pipe joint shall conform to ASTM F-477 and D-1869.
- d. PVC (AWWA) pipe shall be furnished as SDR 18 and 14 for Class 150 psi and 200 psi, respectively.
- C. Rubber gasket joints shall provide adequate expansion to allow for a 50° change in temperature on one length of pipe. Lubrication for rubber connected couplings shall be water soluble, non-toxic, be non-objectionable in taste and odor and have no deteriorating affect on the PVC or rubber gaskets and shall be as supplied by the pipe manufacturer.
- D. Standard laying lengths shall be 20 feet ± for all sizes. At least 95 percent of the total footage of pipe of any class and size shall be furnished in standard lengths, the remaining 5 percent in random lengths. Random lengths shall not be less than 10 feet long. Each standard and random length of pipe shall be tested to four times the class pressure of the pipe for a minimum of five (5) seconds. The integral bell shall be tested with the pipe.
- E. PVC Pipe shall be NSF approved for potable water service and manufactured in accordance with ASTM standards.
- F. All pipe and couplings shall bear identification markings that will remain legible during normal handling, storage, and installation, which have been applied in a

manner what will not reduce the strength of the pipe or the coupling or otherwise damage them. Pipe and coupling markings shall include the nominal size and OD base, material code designation, dimension ratio number, ASTM or AWWA Pressure Class, ASTM or AWWA designation number for this standard, manufacturer~s name or trademark seal (mark) of the testing agency that verified the suitability of the pipe material for potable-water service. Each marking shall be applied at intervals of not more than five (5) feet for the pipe and shall be marked on each coupling.

G. Fittings shall be ductile iron in accordance with Article 2.01 of this section. No PVC fittings are allowed.

# **PART 3- EXECUTION**

# 3.01 LAYING DEPTHS

Water pipe shall be laid with a minimum cover of 36 inches unless otherwise noted on drawings.

# 3.02 PIPE SPACING

Water mains shall be laid at least 10 feet horizontally from any existing or proposed sewer. A sewer is defined as any conduit conveying fluids other than potable water. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot separation, this office may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. This deviation will not be allowed for force mains.

Water mains crossing 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 sewer. This shall be the case where the water main is either above or below the sewer. At crossings, one full length of the water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.

# 3.03 THRUST BLOCKING

- A. Concrete: Concrete thrust blocking shall be installed as shown on drawings.
- B. Hydrants:

The bowl of each hydrant shall be well braced against a sufficient area of unexcavated earth at the end of the trench with concrete blocking, and it shall be tied to the pipe as shown on drawings.

1. Thrust restraint design pressure shall be equal to the test pressure.

#### C. Fittings:

All plugs, caps, tees, and bends shall be restrained and shall also be provided with thrust blocking and shall be rodded to each other.

# D. Restraint Materials:

Thrust Blocking: Vertical and horizontal blocking shall be made of concrete having a compressive strength of not less than 3,500 psi after 28 days. Blocking shall be placed between solid ground and the fitting to be anchored; the area of bearing on the pipe and on the ground in each instance shall be that shown or directed by the Engineer. The blocking shall, unless otherwise shown or directed, be located to contain the resultant thrust force and allow the pipe and fitting joints to be accessible for repair.

# E. Rod Materials:

All thread rod shall be commercial grade stainless steel Grade 304SS, using stainless steel nuts and flat washers. All thread rod shall be affixed to fitting via ductile lug such as manufactured by Central Castings Corporation.

#### 3.04 PIPE INSTALLATION

- A. Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be lowered carefully into the trench by means of a derrick, ropes, or other suitable tools or equipment, in such a mariner as to prevent damage to water line materials and protective coatings and linings. Under no circumstances shall water line materials be dropped or dumped into the trench. The trench should be dewatered prior to installation of the pipe.
- B. The Contractor shall secure from the manufacturer an installation guide for the pipe being used. The Contractor shall in all cases adhere to the recommended installation procedures of the manufacturer except where those given herein are more stringent. The more stringent requirements shall be met.
  - Examination of Material All pipe fittings, valves, hydrants, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer who may prescribe corrective repairs or reject the materials.
  - Pipe Ends All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign material before the pipe is laid.
  - 3. Pipe Cleanliness Foreign material shall be prevented from entering the pipe while it is being placed in the trench. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe.
  - 4. Pipe Placement As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material. All jointing of pipe shall occur in the trench. In no case shall the pipe be jointed on the ground and lowered into the trench.

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- 5. Pipe Plugs At times when pipe laying is not in progress, the open ends of pipe shall be closed by a water tight plug or other means approved by the Engineer. The plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe floatation should the trench fill with water.
- C. All dead-end lines must be provided with a fire hydrant or a blow-off assembly per plan and/or detail.
- D. At high points in water mains where air can accumulate, provisions shall be made to remove the air by means of automatic air relief valves.
- E. Water lines within a 200 foot radius of oil or gasoline lines, underground storage tanks, petroleum storage tanks or pumping stations shall be constructed of ductile iron pipe. Pipe joint materials which are resistant to permeation of the petroleum products shall be used within the 200 foot radius.

# F. Underwater crossing:

For underwater crossings for water surface greater than 15 feet in width, the following shall be provided:

- The pipe shall be of special construction, per stream encasement detail.
- 2. 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.
- 3. Stream meter assembly shall be installed at indicated gate valve as shown per detail.

# 3.05 JOINT ASSEMBLY

# A. Push-On Joints:

Push-on joints are to be assembled as follows:

- 1. Thoroughly clean the groove and bell socket and insert the gasket, making sure that it faces the proper direction and that it is correctly seated.
- 2. After cleaning dirt or foreign material from the plain end, apply lubricant in accordance with the pipe manufacturer's recommendations.
- 3. Be sure that the plain end is beveled; square or sharp edges may damage or dislodge the gasket and cause a leak. When pipe is cut in the field, bevel the plain end with a heavy file or grinder to remove all sharp edges. Push the plain end into the bell of the pipe. Keep the joint straight while pushing. Make deflection after the joint is assembled.
- 4. Small pipe can be pushed into the bell socket with a long bar. Large pipe requires additional power, such as a jack or lever puller. The supplier may provide a jack or lever pullers. A timber header shall be used between the

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pipe and jack to prevent damage to the pipe. Homing by backhoe bucket shall not be used unless approved by Engineer.

#### B. Mechanical Joints:

Mechanical joints are to be assembled as follows:

- 1. Wipe clean the socket and plain end. The plain end, socket, and gasket should be washed with a soap solution to improve gasket seating.
- 2. Place the gland on the plain end with the lip extension toward the plain end, followed by the gasket with the narrow edge of the gasket toward the plain end of the pipe.
- 3. Insert the pipe into the socket and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly.
- 4. Push the gland toward the bell and center it around the pipe with the gland lip against the gasket.
- 5. Align bolt holes and insert bolts with bolt heads behind the bell flange, and tighten opposite nuts to keep the gland square with the socket. Make deflection after joint assembly but before tightening the bolts.
- 6. Tighten the nuts in accordance with the manufacturer's recommendation and the following table:

MECHANICAL JOINTS - BOLT TORQUES			
Bolt Diameter	Torque		
(inches)	(feet - pound)		
5/8	45-60		
3/4	75-90		
1	86-100		
1-1/4	105-120		

# 3.06 PIPE CUTTING

Cutting of pipe for the insertion of valves, fittings or closure pieces shall be done in a neat workmanlike manner without creating damage to the pipe, linings, or coatings and in strict accordance to manufacturer's recommendation.

# 3.07 ASBESTOS CONCRETE MAIN TAPPING

During the process of tapping the asbestos concrete main, the contractor shall conform to OSHA regulations governing the handling of hazardous waste. Pieces of asbestos concrete resulting from the tap shall be double bagged, placed in a rigid container, and disposed of in an approved landfill.

A. After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure test. In addition, a leakage test shall be conducted and may be concurrent with the pressure test.

### B. Pressure Test:

- 1. Test pressure shall be equal to the pipe classification, i.e; class 200 equals a test pressure of 200 psi. The testing shall be conducted for an uninterrupted continuous period of twenty (24) four hours.
- 2. Each valved section of pipe shall be filled with water slowly and the specified test pressure, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer.
- 3. Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the Contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged, or left in place at the discretion of the Engineer.
- 4. All exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damage or defective pipe, fittings, or valves that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory to the Engineer.
- 5. The watermain as constructed shall be tested between valved sections, but in no case shall the length of test section exceed 3500 feet. If so, the contractor at no additional to the Owner, shall install an inline valve in order to reduce the test section to 3500' or less.
- 6. The Contractor shall furnish for the pressure testing a battery operated chart pressure gauge fitted with a continuous 24-hour, 4" diameter pressure recording chart. Such recording device shall be attached to the test section at a place and method approved by Engineer and shall remain in place and protected throughout the test period.
- 7. Pressure and leakage test shall not be commenced until all installations, (i.e; fire hydrants, meter services, air-release assemblies, etc.) have been completed. All appurtenances shall be active and subject to the pressure/leakages tests.

### C. Leakage Test:

1. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to re-establish the specified test pressure at the end of a twenty (24) four hour period after the air in the pipeline has been expelled and the pipe has been filled with water.

2. The pipe may be tested concurrently with the disinfection. No pipe installation will be accepted if the leakage is greater than that allowed in the following formula:

 $L = [S \div 5280] \times D \times 10$ 

Where:

L = the allowable leakage (gallons)

S = length of pipe tested ()feet

D = nominal diameter of the pipe (inches)

- 3. When hydrants are in the test section, the test shall be made against the closed hydrant, with the hydrant gate-valve open
- 4. Acceptance shall be determined on the basis of allowable leakage. If any pipe has leakage greater than allowed, the Contractor shall, at his own expense, locate and repair the defective material until the leakage is within the specified allowance.
- 5. All visible leaks are to be repaired regardless of the amount of leakage.
- 6. All appurtenances, such as meter services, air-release assemblies, stream meters, PRV vaults, etc. shall be opened and subjected to the pressure/leakage test.

- END OF SECTION -

#### SECTION 02630 CASING PIPE

#### PART 1 - GENERAL

#### 1.01 GENERAL

Contractor shall provide all labor, materials, and equipment to construct, complete and in place, the casing pipe at the locations shown on the drawings.

### 1.02 RELATED SECTIONS

- A. Section 02225 Excavating, Backfilling, and Compacting for Utilities.
- B. Section 02610 Pipe and Fittings.

# **PART 2- PRODUCTS**

### 2.01 STEEL CASING PIPE

- A. Casing pipe shall be steel (unless otherwise shown on the drawings), plain end, conforming to AWWA Specification C-200, latest revision. Steel for casing pipe shall have a minimum yield strength of 35,000 psi. Casing pipe shall neither be coated or wrapped. The inside diameter of the casing pipe shall be a minimum of 4 inches greater than the outside diameter of the carrier pipe joint or coupling. Used petroleum pipe will not be acceptable.
- B. The minimum wall thickness shall be in accordance with the following table:

STEEL CASING PIPE WALL THICKNESS				
Casing Diameter (inches)	Minimum Wall Thickness Under Railroads (inches)	Minimum Wall Thickness All Other Uses (inches)		
16 and under	0.250	0.250		
18	0.281	0.281		
20 and 22	0.312	0.281		
24	0.344	0.312		
26	0.375	0.344		
28	0.406	0.375		
30	0.438	0.406		
32	0.469	0.438		
34and36	0.500	0.469		

# 2.02 PIPELINE SPACERS

- A. Pipeline spacers and accessories such as nuts and bolts shall be constructed of polyethylene and/or stainless steel. Other materials will not be accepted.
- B. Carrier pipes installed inside casing pipes shall be centered throughout the length of casing pipe. Centering shall be accomplished by the installation of polyethylene pipeline spacers attached to the carrier pipe in such a manner as to prevent the dislodgement of the spacers as the carrier pipe is pulled or pushed through the casing pipe. Spacers shall be of such dimensions to provide: full supportive load capacity of the pipe and contents; of such thickness to allow installation and/or removal of the pipe; and to allow no greater than 1/2 inch movement of the carrier pipe within the cover pipe after carrier pipe is installed.
- C. Spacers shall be located immediately behind each bell and at a maximum spacing distance as follow:

Carrier Pipe Diameter (inches)	Maximum Spacing (feet)	
2-2-1/2	4	
3-8	6	
10-26	8	
28	9	
30	8	

D. The materials and spacing to be used shall be accepted by the Engineer prior to installation. The polyethylene pipeline spacers shall be manufactured by Pipeline Seal and Insulator, Inc. (PSI), Raci Spacers, Inc., Advanced Products & Systems, Inc., or approved equal. Installation shall be in accordance with manufacturer's recommendations.

#### 2.03 SEALING

After installation of the carrier pipe within the casing pipe, the ends of the casing shall be sealed in the following manner. An Ethylene Propylene Diene Monomer (EPDM) elastomeric membrane shall be wrapped around the end of the casing pipe in three layers and securely bound to the casing and the carrier pipe barrel with stainless steel bands. The EPDM membrane shall be 0.045 inches thick and have a tear resistance of 125 pounds/inches. The membrane shall be manufactured by Carlisle Tire & Rubber Company, Firestone Industrial Products Company, or an approved equal.

#### **PART 3- EXECUTION**

#### 3.01 BORE AND JACK

- A. Where designated on the drawings, crossings beneath state maintained roads, railroads, or other surfaces shall not be disturbed and are to be installed by boring and jacking of steel casing pipe followed by installation of the carrier pipe within the casing pipe. The Contractor shall provide a jacking pit, bore through the earth, and/or rock, jack the casing pipe into proper line and grade and then install the carrier pipe within the casing pipe.
- B. The approach trench shall be large enough to accommodate one section of casing pipe, the jacks and blocking. The Contractor shall furnish and use adequate equipment to maintain the line and grade.
- C. In no case shall the bore pit or exit ditch face be closer than six (6') feet from any pavement surface.

#### 3.02 OPEN CUT

Where designated on drawings, the Contractor shall open the trench under the direction of the Engineer and install the casing pipe and complete the bedding, backfilling, and paved surface restoration as specified elsewhere herein, or as shown by details.

#### 3.03 DAMAGE

The cost of repairing damage which is caused by boring or open cutting the trench under a highway or railroad shall be borne by the Contractor.

- END OF SECTION -

#### **SECTION 02642**

#### WATER VALVES AND ACCESSORIES

#### PART 1 — GENERAL

#### 1.01 SUMMARY

The Contractor shall furnish all labor, material, and equipment necessary to install valves together with all appurtenances as shown and detailed on the drawings and specified herein.

### 1.02 RELATED SECTIONS

- A. Section 02225 Excavating, Backfilling, and Compacting for Utilities.
- B. Section 02610- Pipe and Fittings.

# 1.03 SUBMITTALS

- A. Complete shop drawings of all valves and appurtenances shall be submitted to the Engineer in accordance with the requirements of Section 01300.
- B. The manufacturer shall turnish the Engineer two (2) copies of an affidavit stating that the valve and all materials used in its construction conform to the applicable requirements of the latest revision of the applicable AWWA Standard, and that all tests specified therein have been performed and that all test requirements have been met.
- C. The Engineer shall be furnished two (2) copies of affidavit that the 'Valve Protection Testing' has been done and that all test requirements have been met.
- D. The Engineer shall be furnished with two (2) copies of affidavit that inspection, testing, and rejection are in accordance with the latest revision of the applicable AWWA Standard.

### **PART 2— PRODUCTS**

#### 2.01 GATE VALVES

- A. All gate valves shall be of the resilient seat type in accordance with the latest revision of AWWA C509 Standard. The valve body, bonnet, and gate castings shall be ductile iron. The valve shall have a non-rising stem (NRS), fully bronze mounted with 0-ring seals. Valve body and bonnet, inside and out, shall be fully coated with fusion bonded epoxy coating in accordance with AWWA C550 Standard. Valves shall have a rated working pressure of 200 psi.
- B. Gate valves for buried service shall be furnished with mechanical joint end connections, unless otherwise shown on the drawings or specified herein. The end connection shall be suitable to receive ductile iron or PVC pipe.

- C. Gate valves for meter pits, pump stations, stream crossing meters or other installations as shown on the drawings shall be furnished with flanged joint and connections, outside screw and yoke and handwheel operator. The gate valve shall have the direction of opening cast on the rim of the handwheel and provided with chain and lock.
- D. All gate valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working pressure cast on the body of the valve.
- E. Buried service gate valves shall be provided with a 2-inch square operating nut and shall be opened by turning to the left (counterclockwise). For valves having a burial depth in excess of 48", the valve shall be equipped with an extension such that the operating nut is 24" below the lid of the gate-valve box.
- F. Buried service gate valves shall be installed in a vertical position with valve box as detailed on the drawings. They shall be set vertically and properly adjusted so that the cover will be in the same plane as the finished surface of the ground or street.
- G. Valves shall be those manufactured by Mueller, M & H Valve Company, American, or approved equal.

### 2.02 CHECK VALVES

- A. General: Check valves shall be all iron body bronze mounted, rull opening swing type. Valve clapper shall swing completely clear of the waterway when valve is full open, permitting a "full flow" through the valve equal to the nominal pipe diameter. They shall comply with AWWA Standard 0-508 latest revision. The valves shall be M & H Valve Company, Anniston, AL, Valve Type 159-Lever Weight, or approved equal.
- B. Rating: Check valves shall be rated at 200 psi water working pressure, 350 psi hydrostatic test for structural soundness (2-inch through 12-inch) and 150 psi water working pressure and 300 psi hydrostatic test (sizes 14-inch through 30-inch). Seat tightness at rated working pressure shall be in accordance with valves shown in AWWA Standard 0509 for gate valves and fully conform to AWWA C508.
- C. End Configurations: Check valves shall be furnished with 125-pound ANSI flanges ends with accessories.
- D. Materials: All cast iron shall conform to ASTM A126 Class B. Castings shall be clean and sound without defects that will impair their service. No plugging or welding of such defects will be allowed. Clappers shall be all bronze for sizes through 4-inch and cast iron, neoprene faced for sizes 6-inch and larger. Hinge pins shall be 18-8 stainless steel rotating in bronze plugs. Bolts shall be electro-zinc plated steel with hex heads and hex nuts in accordance with ASTM A307 and A563, respectively.
- E. Design: Check valves shall be constructed to permit top entry for complete removal of internal components without removing the valve from the line. Glands shall be 0-rings, 2-inch to 12-inch sizes and conventional in 14-inch to 30-inch

sizes. Check valves shall be equipped with adjustable outside lever and weight to accomplish faster closing and to minimize slamming effect. All valves 14-inch and larger shall have extended hinge pins for future addition of levers and springs required. Valves shall be suitable for installation in either horizontal or vertical position.

- F. Painting: The inside and outside of all valves, together with the working parts except bronze and machined surfaces, shall be coated in accordance with the latest revision of AWWA 0550 Standard.
- G. Marking: Marking shall be in accordance with AWWA 0508 and shall include size, working pressure, and cast arrow to indicate direction of flow, name of manufacturer, and year of manufacture.

#### 2.03 SILENT CHECK VALVES

- A. Silent check valves 3 inches and larger shall be iron body, bronze mounted with a stainless steel spring and Buna-N-Resilient seating. The valves shall be APCO Series 600 globe style or approved equal. The valve plug shall be brass and center guided at both ends with a through integral shaft and spring loaded.
- B. Valves shall be designed for a water working pressure of 200 psi.
- C. The seat and plug shall be replaceable manually in the field.
- D. The flow area through the valve body shall be equal to or greater than the cross-sectional area of the equivalent pipe length.
- E. Valves shall be capable of operating in either a horizontal or vertical position.

#### 2.04 ELECTRIC CHECK VALVE

A. Operation: The pump control valve shall minimize pump starting and stopping surges by placing the pump "on line" and taking it "off line" slowly. The controls shall consist of adjustable independent opening and closing speed control valves, a cam operated limit switch, a three-way solenoid valve with a manual operator, and a two-way solenoid valve for power failure quick closure.

# B. Design:

- 1. The pump control valve shall be flanged globe body, fully bronze mounted, external pilot operated, with free floating piston (operated without springs diaphragm, or levers), single seat with seat bore equal to size of valve.
- 2. The minimum travel of the piston shall be equal to 25 percent of the diameter of the seat and for true alignment (to correct lateral thrust and stem binding) the piston shall be guided above and below the seat a distance equal to no less than 75 percent of the diameter of the seat. The piston shall be cushioned and so designed as to insure positive closure.
- 3. The piston shall carry a contoured cushion device that will cause a gradual change in flow area as the valve approaches the seat. This cushion device

- must move with the piston to minimize head loss when the valve is fully opened.
- 4. The valve shall be packed with resilient seating to insure tight closure and prevent metal to metal friction and seating; furnished with indicator rod, to show position of opening of the piston, and pet-cocks for attachment to valve body for receiving gauges for testing purposes.
- 5. The design shall be such that repairs and dismantling internally of main valve may be made without its removal from the line.
- 6. The installation shall incorporate the emergency close (or power-failure quick close) feature. This uses a second solenoid pilot valve to bypass the normal slow closing speed control valve on power outage to close the valve quickly (but still at a controlled rate).

# C. Physical and Chemical Properties:

- The 125-pound and 250-pound flanged assemblies shall conform to A.S.A. standards for flange thickness and drilling and wall thickness of body and caps. The valve shall be constructed of first class grey iron free from cold shuts, defective or spongy spots, and conforming to ASTM Specification A-126 Class B.
- 2. The bronze parts shall conform to ASTM specification B-62.
- D. Test: The test before shipment may be witnessed by a representative of the Engineer for simulated field conditions and a cold hydrostatic test of at least 100 percent above the maximum pressure for which the valve is to operate.
- E. Painting: All iron castings shall be coated on all sides with fusion bonded epoxy coating in accordance with AWWA 0550 Standard.
- F. Manufacturer: The valve shall be Model 42 WARS Pump Control Valve as manufactured by the Ross Valve Mfg. Co., Inc., or approved equal.

#### 2.05 BUTTERFLY VALVES (NON-BURIED)

- A. For Valves 4-inch or Larger: The butterfly valves shall be DeZurik AWWA C504 series (or approvable equal), lug style, resilient seat, cast iron body and disk, stainless steel seating edge (ring) arid shaft, Chloroprene seat, class 150B, and furnished with a manual handwheel actuator.
- B. For Valves 3-inch or Smaller: The butterfly valves shall be DeZurik BGS series (or approvable equal), lug style, resilient seat, cast iron body and EPDM seat, stainless steel seat ring and shaft, ductile iron nickel plated disc, class 150, and furnished with a manual lever actuator.
- C. Valves shall be fully coated, inside and out, with fusion bonded epoxy in accordance with the latest revision of AWWA 0550 Standard.

# 2.06 BUTTERFLY VALVES (BURIED)

For Valves 4-inch through 24-inch: The butterfly valve shall be DeZurik or M&H Valve Company AWWA C504 series (or approvable equal), mechanical joint, resilient seat, cast iron body and disk, stainless steel shaft and seating edge (ring), Chloroprene seat, Class 150B, cast iron housing with 2-inch operator nut in vertical position for use with a valve box. The valve shall be fully coated, inside and out, with fusion bonded epoxy in accordance with the latest revision of AWWA C550 Standard

### 2.07 TAPPING VALVES

- A. All tapping valves shall be of the resilient seat, gate valve type in accordance with the latest revision of AWWA C509 Standard. The valve body, bonnet, and gate castings shall be cast iron. The valve shall have a non-rising stem (NRS), fully bronze mounted with 0-ring seals. Valve body and bonnet, inside and out, shall be fully coated with fusion bonded epoxy coating in accordance with AWWA C550 Standard. Valves shall have a rated working pressure of 200 psi.
- B. Valve shall be furnished with ANSI B16.1 flanged end with centering ring on tapping side. Outlet side shall be mechanical joint. All valves through 12 inches shall mate all sleeves through 12-inch outlet regardless of manufacturer.
- C. All cast iron shall conform to ASTM A126, Class B. Castings shall be clean and sound without defects that will impair their service. No plugging or welding of such defects will be allowed. Bolts shall be electric-zinc plated steel with hex heads and hex nuts in accordance with ASTM A-307 and A-563.
- D. Stems shall be manganese bronze having a minimum tensile strength of 60,000 psi, a minimum yield of 20,000 psi. NRS stem collars shall be cast integral with them and machined to size. The housing for the valve stem collar shall be machined. All thrust bearing shall be incorporated as required, to optimize operating torques. NRS valves shall be furnished with two (2) o-ring stem seals located above the thrust collar and one (1) below. O-rings shall be set in grooves in the stem. The o-ring grooves shall not be less than the root diameter of the stem threads.

Gates for valve shall be totally encapsulated in rubber, be field replaceable and provide a dual seal on the mating body seat. Valve shall be capable of installation in any position with rated sealing in both directions. Rubber sets of specially compounded SBR materials shall be utilized and be capable of sealing even under conditions of normal wear. The valve body shall have integral guide engaging lugs in the gate in a tongue-and-groove manner, supporting the gate throughout the entire open/close travel.

- E. Tapping valves shall be capable of making taps by using any cutter not less than 1/4-inch smaller than nominal pipe size.
- F. All tapping valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working pressure cast on the body of the valve.
- G. Tapping valves shall be provided with a 2-inch square operating nut and shall be opened by turning to the left counterclockwise.

- H. Tapping valves shall be installed in a vertical position with valve box as detailed on the drawings. They shall be set vertically and properly adjusted so that the cover will be in the same plane as the finished surface of the ground or street.
- I. Valves shall be those manufactured by Mueller, M & H Valve Company, American, or approved equal

# 2.08 AIR RELEASE VALVES

- A. The air release valves shall be the size noted on the drawings and equal to Valmatic Model 38.5 as manufactured by Valmatic Valve and Manufacturing Corp.
- B. The valves shall be in accordance with ANSI/AWWA C512.
- C. The valves shall be of the type that automatically exhausts large quantities of air during the filling of a system and allows air to re-enter during draining or when a vacuum occurs. Valves shall be constructed of cast iron body and cover, stainless trim, and float with a Buna-N seat for positive seating.
- D The baffle shall be ductile iron and shall protect float from direct impact of air and water. The seat shall slip fit into the baffle or cover and lock in place without any distortion. The float and baffle assembly shall be shrouded with a water diffuser. The float shall be stainless steel center guided for positive seating and be rated at 1,000 psi non-shock service.
- E. The discharge orifice shall be fitted with a double-acting throttle device to regulate and restrict air venting.
- F. All parts of the valves and the operating mechanisms shall be made of non-corrodible materials.
- 2.09 COMBINATION PRESSURE REDUCING/PRESSURE SUSTAINING VALVE (PRV/PSV)
  - A. The valve shall maintain a constant downstream pressure regardless of fluctuations in demand. When the upstream pressure lowers to a pre-set minimum the valve shall throttle to maintain a constant inlet pressure.
  - B. The valve shall be a hydraulically operated, diaphragm-actuated, globe pattern valve. It shall contain a resilient, synthetic rubber disc, having a rectangular cross-section, contained on three and one-half sides by a disc retainer and forming a tight seal against a single renewable seat. The diaphragm assembly containing a valve stem shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. This 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 diaphragm shall consist of nylon fabric bonded with synthetic rubber and shall not be used as a seating surface. Packing glands and/or stuffing boxes are not permitted, and there shall be no pistons operating the valve or pilot controls. All necessary repairs shall be possible without removing valve from the line.
  - C. The pressure reducing pilot control shall be a direct-acting, adjustable, spring-loaded, normally open diaphragm valve, which closes when downstream pressure exceeds the spring setting. The pressure sustaining pilot control shall be a direct-

acting, adjustable, spring-loaded, normally closed diaphragm valve which opens when upstream pressure exceeds the spring setting.

- D. Valve shall have a cast iron body with bronze trim.
- E. Pressure reducing range shall be 30 psi to 300 psi and pressure sustaining range shall be 20 psi to 200 psi.
- F. Valve shall be fully coated with fusion bonded epoxy in accordance with AWWA C550 Standard.
- G. The valve shall be similar to a Model 92G-01 Combination Pressure Reducing, Pressure Sustaining Valve (globe style) as manufactured by Cla-Val Co.

# 2.10 PRESSURE SUSTAINING VALVE (PSV)

- A. The valve shall maintain a constant downstream pressure regardless of fluctuations in demand. When the upstream pressure lowers to a pre-set minimum the valve shall throttle to maintain a constant inlet pressure.
- B. The valve shall be a hydraulically operated, diaphragm-actuated, globe pattern valve. It shall contain a resilient, synthetic rubber disc, having a rectangular cross-section, contained on three and one-half sides by a disc retainer and forming a tight seal against a single renewable seat. The diaphragm assembly containing a valve stem shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. This 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 diaphragm shall consist of nylon fabric bonded with synthetic rubber and shall not be used as a seating surface. Packing glands and/or stuffing boxes are not permitted, and there shall be no pistons operating the valve or pilot controls. All necessary repairs shall be possible without removing valve from the line.
- C. The pressure sustaining pilot control shall be a direct-acting, adjustable, spring-loaded, normally closed diaphragm valve which opens when upstream pressure exceeds the spring setting.
- D. Valve shall have a cast iron body with bronze trim.
- E. Pressure sustaining range shall be 20 psi to 200 psi.
- F. Valve shall be fully coated with fusion bonded epoxy in accordance with AWWA C550 Standard.
- G. The valve shall be similar to a Model 730 Pressure Sustaining Valve (globe style) as manufactured by Bermad.

# 2.11 PRESSURE REDUCING VALVE (PRV)

A. The valve shall automatically reduce a higher inlet pressure to a steady lower downstream pressure regardless of changing flow rate and/or varying inlet

pressure. The main valve and pilot valve shall close drip-tight when downstream pressure exceeds the pressure setting of the control pilot.

- B. The valve shall include a check feature that will close the valve when pressure reversal occurs. The closing of valve shall be accomplished by transmitting downstream pressure to the main valve cover chamber.
- C. The valve shall be a hydraulically operated, diaphragm-actuated, globe pattern valve. It shall contain a resilient, synthetic rubber disc, having a rectangular cross-section, contained on three and one-half sides by a disc retainer and forming a tight seal against a single renewable seat. The diaphragm assembly containing a valve stem shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. This 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 diaphragm shall consist of nylon fabric bonded with synthetic rubber and shall not be used as a seating surface. Packing glands and/or stuffing boxes are not permitted, and there shall be no pistons operating the valve or pilot controls. All necessary repairs shall be possible without removing valve from the line.
- D. The pressure reducing pilot control shall be a direct-acting, adjustable, spring-loaded, normally open diaphragm valve, which closes when downstream pressure exceeds the spring setting.
- E. Valve shall have a cast iron body with bronze trim.
- F. Upstream adjustment range shall be 20 psi to 300 psi and downstream adjustment range 30 psi to 300 psi.
- G. Valve shall be fully coated with fusion bonded epoxy in accordance with AWWA C550 Standard.
- H. The valve shall be similar to a Model 90G-01 Pressure Reducing Valve (globe style) as manufactured by Cla-Val Co.

# 2.12 ELECTRIC CONTROL VALVE

- A. Operation: The electric control valve shall operate independent of valve differential pressure. The double-chambered diaphragm actuator always has full differential pressure to develop maximum power and immediate reaction. Upper control chamber operates on 3-way control principle. A 3-way solenoid valve alternately applies upstream pressure to tightly close the main valve and vent pressure to the atmosphere to open widely the main valve. Main valve shall be normally open. Solenoid valve shall close main valve when energized.
- B. Design: The main valve shall consist of a wide, Y-pattern body, hydrodynamically designed with semi-straight flow; a double-chambered diaphragm actuator, hydraulically operated. The body shall have a single removable seat with full-flow opening, free of bottom stem guide, and a resilient seat for drip-tight closing. The valve diaphragm actuator contains two defined control chambers that can be removed as one distinct assembly. The actuator includes the separating partition. Valve shall be rated for 175 psi working pressure.

- C. Materials: Main valve and actuator shall be cast iron in accordance with ASTM A126, Class B. Main valve trim and pilot control system shall be cast bronze or brass in accordance with ASTM B62 or ASTM B21, respectively. Diaphragm shall be nylon reinforced neoprene and seals shall be Buna-N.
- D. Electrical: Solenoid valve shall be 120 volt, single phase, NEMA 4 enclosed with heavy duty coil with class H insulation.
- E. Accessories: Electric control valve shall be equipped with a large control filter, a v-port throttling plug, a valve position indicator, and a mechanical closure and flow adjuster.
- F. Painting: Main valve shall be fully coated on all sides with fusion bonded epoxy in accordance with AWWA C550 Standard.
- G. Marking: Main valve marking shall include size, working pressure, flow direction, name of manufacturer, and year of manufacture.
- H. Manufacturer: The electric control valve shall be Model 710 as manufactured by Bermad, or approved equal.

# 2.13 SURGE ARRESTOR VALVES

#### A. Function:

- 1. The surge arrestor valve shall open quickly at a predetermined overpressure to dissipate surge and close slowly after restoration of normal pressure. Plus, open quickly at a pre-determined under-pressure setting, remain open for a suitable time period to dissipate surge, and then slowly close. Plus, open quickly on electrical power failure, remain open for a suitable time period to dissipate surge and then slowly close.
- 2. Needle valves shall be furnished to provide independent and adjustable control of the main valve opening and closing speed.
- 3. The valve shall be completely piped ready for installation.

# B. Description:

- 1. The main valve shall operate on the differential piston principle such that the area on the underside of the piston is no less than the pipe area, and the area on the upper surface of the piston is of a greater area than the underside of the piston.
- 2. The valve piston shall be guided on its outside diameter by long stroke stationary Vee ports which shall be downstream of the seating surface to

- minimize the consequences of throttling. Throttling shall be done by the valve Vee ports and not the valve seating surfaces.
- 3. The valve shall be capable of operating in any position and shall incorporate only one flanged cover at the valve top from which all internal parts shall be accessible. There shall be no stems, stem guides, or spokes within the waterway. There shall be no springs to assist the valve operation.

#### C. Construction:

- 1. The valve body shall be of cast iron ASTM A-126 with flanges conforming to the latest ANSI Standards. The valve shall be extra heavy construction throughout. The valve interior trim shall be bronze B-62 as well as the main valve operation.
- 2. The valve seals shall be easily renewable while no diaphragm shall be permitted within the main valve body.
- 3. All controls and piping shall be of non-corrosive construction.
- 4. A visual valve position indicator shall be provided for observing the valve position at any time.
- D. Manufacturer: The valve shall be Model 735 as manufactured by Bermad, Model 6700-D (globe) or 6600-D (angle) as Manufactured by Golden Anderson, or approvable equal.

#### 2.14 ALTITUDE VALVES

- A. Single Acting (one direction):
  - 1. Function: The single acting altitude valve shall be a one-way valve of the delayed opening, non-throttling type that controls the high and low water level in a standpipe as shown on the drawings. The valve shall assume either a fully open or fully closed position and shall be able to control a water level change of a minimum of five (5) feet and a maximum of 50 feet between closing and opening points. Opening and closing points shall be adjustable.
  - 2. Description: The altitude valve shall be a hydraulically operated, pilot controlled, diaphragm type globe valve. The valve shall be single seated and shall have a resilient disc for tight closure. Small changes in storage tank level shall cause an immediate action of the pilot control. The control system shall consist of a main valve and pilot valve to control the reservoir level. The opening and closing rates of the valve shall be adjustable to prevent surges and line shock. The valve shall be provided complete with all piping and appurtenances necessary for operation, including a valve position indicator, a pilot valve strainer, and a 3/4-inch minimum brass or copper pressure sensing line. The entire valve and control assembly shall be readily accessible and easily removable, and its design shall be such that repairs to the main valve can be made without its removal from the line.

- Construction: Valve body and trim shall be bronze or cast-iron conforming to ASTM B62, ASTM B61, or ASTM A126 Class B, respectively. Ends shall be Class 125 according to ANSI B16.1 and flanged. The valve shall be Class 125 with a pressure rating of 175 psi. All iron castings shall be fully coated on all sides with fusion bonded epoxy in accordance with AWWA 0550 Standard.
- 4. Manufacturer: Altitude valve shall be model 30R-AWR, figure 29A, as manufactured by Ross Valve Manufacturing Company; Model 210-3 as manufactured by CLA-VAL Company; or equal

# B. Double Acting (two directions):

- 1. Function: The double acting altitude valve shall be a two-way valve of the delayed opening, non-throttling type that controls the high water level in a tank as shown on the drawings. The valve shall assume either a fully open or fully closed position and shall be able to control a water level change of a minimum of five (5) feet and a maximum of 50 feet between closing and opening points. The closing point shall be adjustable and the opening point shall be non-adjustable and activates when the distribution pressure drops one (1) to four (4) feet below the closing point.
- 2. Description: The altitude valve shall be a hydraulically operated, pilot controlled, diaphragm type globe valve. The valve shall be single seated and shall have a resilient disc for tight closure. Small changes in storage tank level shall cause an immediate action of the pilot control. The control system shall consist of a main valve and pilot valve to control the reservoir level. The opening and closing rates of the valve shall be adjustable to prevent surges and line shock. The valve shall be provided complete with all piping and appurtenances necessary for operation, including a valve position indicator, a pilot valve strainer, and a 3/4-inch minimum brass or copper pressure sensing line. The valve shall have a factory installed "vacuum break" line on the control circuit. The entire valve and control assembly shall be readily accessible and easily removable, and its design shall be such that repairs to the main valve can be made without its removal from the line.
- 3. Construction: Valve body and trim shall be bronze or cast-iron conforming to ASTM B62, ASTM B61, or ASTM A126 Class B, respectively. Ends shall be Class 125, according to ANSI B16.1 and flanged. The valve shall be Class 125 with a pressure rating of 175 psi. All iron castings shall be fully coated on all sides with fusion bonded epoxy in accordance with AWWA C550 Standard.
- Manufacturer: Altitude valve shall be model 40R-DAWR, figure 33A, as manufactured by Ross Valve Manufacturing Company; Model 210-02 as manufactured by CLA-VAL Company; or equal.

#### 2.15 VALVE BOXES

- A. Each buried stop and valve shall be provided with a suitable valve box. Boxes shall be of the adjustable, telescoping, heavy-pattern type with the lower and upper parts of cast iron. They shall be so designed and constructed as to prevent the direct transmission of traffic loads to the pipe or valve.
- B. The upper or sliding section of the box shall be provided with a flange having sufficient bearing area to prevent undue settlement. The lower section of the box shall be designed to enclose the operating nut and stuffing box of the valve and rest on the valve bonnet.
- C. The boxes shall be adjustable through at least six (6) inches vertically without reduction of the lap between sections to less than four (4) inches.
- D. The inside diameter of boxes for valves shall be at least 4-1/2 inches, and the lengths shall be as necessary for the depths of the valves or stops with which the boxes are to be used.
- E. Covers for valves shall be close fitting and substantially dirt-tight and marked "WATER."
- F. The top of the cover shall be flush with the top of the box rim.
- G. Valve boxes shall be manufactured by Muller, Accer Cast, Inc., or approved equal.

### 2.16 TAPPING SLEEVES

- A. Tapping sleeves shall be cast iron and capable of containing pressure within the full volume of the sleeve. Sleeve shall be mechanical joint suitable for use with ductile iron or PVC pipe.
- B. Sleeve shall be rated at 200 psi working pressure through 12-inch size and 150 psi for sleeves 14-inch through 24-inch.
- C. Flanged throat section of mechanical joint sleeves through 12-inch size shall conform to MSS SP6O Standard. For throat sections larger than 12 inches, flanged section shall mate valves of same manufacture as sleeves.
- D. All cast iron shall conform to ASTM A126, Class B. Castings shall be cleaned and sound without defects that will impair their service. No plugging or welding of such defects will be allowed. Bolts, nuts, and gaskets shall be in accordance with mechanical joint requirements of AWWA 0111.
- E. Tapping sleeves shall be capable of withstanding their rated pressure without leakage past the side gaskets and end gaskets of the sleeve. Sleeves shall be supplied with split end gaskets and two-piece glands. Side flange rubber gaskets shall butt against the rubber end gaskets to make a watertight seal. Side and end bolts shall be of a T-head design. The throat flange shall be designed to center the tapping valve to the sleeve. Tapping sleeve shall be equipped with a test plug.
- F. Tapping sleeves shall be fully coated with fusion bonded epoxy coating in accordance with AWWA 0550 Standard.

- G. Sleeves shall be marked with the name of the manufacturer and size (run x branch).
- Н. Tapping sleeve shall be manufactured by Mueller, M & H Valve Company, or approved equal.

#### 2.17 COMPOUND WATER METER

A. Master meter shall be a compound meter in the size noted on the drawings.

B. Meter shall be in accordance with AWWA 0702.

C. Meter shall meet the following specifications:

Typical Operating Range

1-700 GPM

(100%±1.5%)

Low Flow Registration

1/2 GPM

Maximum Continuous Flow

500 GPM

Pressure Loss at Maximum

Continuous Flow

6 PSI at 500 GPM

Pressure Loss at Crossover

6 PSI

Minimum Crossover Accuracy

95%

Maximum Operating Pressure

150 PSI

Maximum Operating Temperature

120°F

Meter Flanges

Round flanges, Class 150

Register

Straight reading, single register, sealed magnetic drive standard. Remote reading

units optional.

Total Flow

100,000,000 gallons

Registration

100 gallons/sweep hand revolution

Low Flow

10,000,000 gallons

Registration

10 gallons/sweep hand revolution

Housing

Cast bronze

Nose Cone and Straightening Vanes Thermoplastic

Rotor Thermoplastic

Rotor and Valve Casing Thermoplastic

Rotor Spindle, Bearing,

and Endstone

Ceramic

Measuring Chamber and Disc

Thermoplastic

High Flow Valve

Thermoplastic

High Flow Swing Weight

Cast bronze

Triggers

Stainless steel

Magnets

Ceramic and alnico

Register Lens

Glass/thermoplastic

Register Housing and Cover

Thermoplastic

Trim

Stainless steel

D. Meter shall be equal to the Recordall as manufactured by Badger Meter or Neptune Tru/Flo as manufactured by Schlumberger !ndustries.

# 2.18 TURBINE WATER METER

### A. General:

- 1. The turbine type water meters provided for the project shall be of single manufacturer. The meter manufacturer shall have a minimum of five (5) years of experience in the design and manufacture of turbine water meters of equal size and quality to those specified.
- Water meter shall meet or exceed the latest requirements of AWWA 0701 for Class II turbine type, magnetic drive, flanged meter tube with 150 psi working pressure.
- 3. Water meters provided for this project shall be Neptune as manufactured by Schlumberger Industries or approved equal.

# B. Components:

Meter tube shall be flanged cast bronze. The internal and external of the meter tube and meter head shall be free of any casting flaws or sharp corners or burrs. The meter tube shall have manufacturer's name, meter size, AWWA Class II, and flow arrow cast into both sides. Meter tubes shall offer minimum obstruction to the flow. Four-inch and 6-inch meters shall be furnished with 1-inch NPT coupling on outlet side.

- 2. Meter head shall be connected to the tube by means of gasket sealed connection with stainless steel bolts. The meter shall be designed for easy removal of water wetted parts from the tube for inspection or repair without having to remove the complete tube. Water wetted meter components that are permanently attached to the tube or meter head will not be accepted. The meter head shall incorporate a sealed stainless steel flow adjusting vane for recalibration. The vane shall be set at the factory, capped, and sealed to prevent unauthorized adjustment.
- 3. Measuring chamber shall be removable from the meter head. The drive mechanism shall be directly coupled to the rotor by mean of gears. The gearbox shall be integral with the outlet housing and shall be designed to facilitate easy replacement of gears.
- 4. Rotor shall be permanently attached to the rotor shaft and shall rotate on an axis that is parallel to the direction of the water flow through the pipe. The rotor shall be resistant to normal corrosion and deformity due to high flow velocities, and shall be directly coupled to the gear train.
- 5. Bearings for the rotor shaft dual out-board graphite bearings, position to provide uniform loading of the rotor. Dual thrust bearings shall handle flows in both forward and reverse directions. All bearings must be field replaceable.
- 6. Totalizer shall be a six-digit, straight reading type with a 3-inch diameter, 100 division dial, and center sweep test hand to permit timing for an accurate determination of flow rate. The totalizer shall be equipped with a leak detector hand to indicate very low flow. The totalizer shall read in units of gallons per day and shall be magnetically driven and equipped with change gears to facilitate easy change of registration without removing pressure from the line. The totalizer shall be encased in an o-ring sealed bonnet made of cast bronze.
- C. Quality Control: Volumetric testing of all meters must be performed and approved prior to shipment. The complete head assembly must be accurately tested in the same pipe size and same tube that the meter will be mounted in. The test shall be minimum, intermediate, and maximum AWWA flow ranges of the meter. The amount of water used to conduct the test must be left on the totalizer. Prior to shipping, a tag shall be attached to the meter showing the totalizer reading after the test. A copy of the certified accuracy test record must be furnished to the Owner at no charge.

# 2.19 ULTRASONIC FLOW METER (FOR POTABLE WATER)

- A. The flowmeter shall be of the ultrasonic clamp on, transit-time and provide indicating, totalizing, and transmitting of liquid flow rate in full pipes.
  - 1. The operational specifications shall be accuracy +/- 0.5 percent of velocity or +/- 0.05 FPS.
- B. The meter shall operate on the following pipe materials: carbon steel, stainless steel, mortar-lined ductile iron, copper, aluminum, cast iron, FRP, ASB, and PVC.
  - 1. The meter shall be programmable for use on all pipe schedules and

- diameters one (1) inch through 90 inches using the same hardware and electronics.
- 2. The instrument shall be of the Auto Zero type. There will be no requirement to stop or alter flow during installation.
- 3. The ultrasonic flowmeter shall measure flow rates in clean liquids with a velocity span of +/- 0 to 50 feet per second in pipe sizes of one (1) to 90 inches.
- C. The meter shall have four (4) outputs which can be programmed for signal loss, reverse flow, totalizer pulses, or over scale functions.
- D. The electronics shall be provided in a NEMA-4X enclosure with viewing window for reading indicators with door closed.
- E. The 4-20 mA output shall be proportional to flow rate. The maximum, resistive load shall be 600 OHMS and current limited.
- F. The meter shall have a 4-20 mA input for display locally in scalable units of measure.
- C. Unit to have a built-in microprocessor to provide capability for:
  - 1. Adapting instrument hardware to existing piping and flow conditions.
  - 2. Automatically calculating transducer spacing.
  - 3. Programming the scale factor.
  - 4. Programming the low flow cut-off.
  - 5. Selecting English or Metric units.
  - 6. Automatic speed of sound calculation of measured fluid.
  - 7. Bi-directional totalization with selectable resolution.
  - 8. Displaying, in percent, 4-20 mA inputs from external sources.
  - 9. Flow output selection in GPM, GPH, MOD, and FPS (or metric equivalent).
  - 10. Adjustable damping from 1 to 99 seconds.
  - 11. LCD indication or flow diagnostics to include a "fault' status.
  - 12. Section of zero functions:
    - a. Auto zero under flow conditions.
    - b. Set zero when flow can be stopped.
    - c. Zero operate for fast response.
  - 13. Storage of data for up to eight pipes with recall capability.
- H. The transmitter shall be wall mounted in meter vault.
- I. A remote flow rate indicator/totalizer terminal shall be provided. It shall be panel mounted in the MTU located in the laboratory. (The MTU is provided as part of Specification Section 13400). A 4-20 mA analog output signal proportional to the flow rate shall be included for connection to the remote flow indicator/totalizer.
- J. The flowmeter shall be equal to TYME-FLYTE ISTT by POLYSONICS.

#### 2.20 STRAINER FOR METERS

Strainer for meters shall be installed upstream of meter at location shown on the drawings. In no case shall there be less than a minimum of five (5) pipe diameters of straight unobstructed pipe upstream of strainer. Strainer body and cover shall be bronze in sizes 2-inch through 6-inch and cast iron in sizes 8-inch and 10-inch. Strainer plate and cover bolts shall be stainless steel. Strainer shall be rated for 150 psi working pressure and be equal to the Neptune Turbine Strainer manufactured by Schlumberger Industries.

#### 2.21 FLEXIBLE JOINT

Flexible joint shall be in size as shown on the drawings and equal to the Standard Spool Type Expansion Joint manufactured by Metraflex Company. Flexible joint carcass shall be 2 arch and constructed by Chlorobutyl and polyester with bias-ply tire cord reinforcement and rated for working pressure shown in table. Flexible joint shall have integral rubber flange with ductile iron retaining ring. Flexible joint shall have 3 control rods. Flanges shall be 150-pound strength.

Joint Size (Inches)	Joint Length (inches)		Pressure Rating (psi)		Gusset Plate	Rod Diameter	
	1-Arch	2-Arch	2-Rods	3-Rods	Thickness (inches)	(inches)	
2	6	10	200	200	3/8	5/8	
21/2	6	10	200	200	3/8	5/8	
3	6	10	200	200	3/8	5/8	
4	6	10	200	200	3/8	5/8	
5	6	10	200	200	3/8	5/8	
6	6	10	140	200	1/2	5/8	
8	6	10	140	190	1/2	3/4	
10	8	12	140	190	3/4	7/8	
12	8	12	140	190	3/4	1	
14	8	12	85	130	3/4	1	
16	8	12	65	110	3/4	11/8	
18	8	12	65	110	3/4	11/8	
20	8	12	65	110	3/4	11/8	
24	10	14	65	100	1	11/4	

### 2.22 COUPLING ADAPTER

A. The pipe couplings shall be of a gasketed, sleeve-type with diameter to properly fit the pipe. Each coupling shall consist of one (1) steel middle ring of thickness and length specified, two (2) steel followers, two (2) rubber-compounded wedge section gaskets and sufficient track-head steel bolts to properly compress the gaskets. Field joints shall be made with this type of coupling. The middle ring and followers of the

coupling shall be true circular sections free from irregularities, flat spots, or surface defects. They shall be formed from mill sections with the follower-ring section of such design as to provide confinement of the gasket. After welding, they shall be tested by cold expanding a minimum of one (1) percent beyond the yield point. The coupling bolts shall be of the elliptic-neck, track-head design with rolled threads. Couplings shall have longitudinal restraint with locking pins. The manufacturer shall supply information as to the recommended torque to which the bolts shall be tightened. All bolt holes in the followers shall be oval for greater strength. The gaskets of the coupling shall be composed of a crude or synthetic rubber base compounded with other products to produce a material which will not deteriorate from age, from heat, or exposure to air under normal storage conditions. It shall also possess the quality of resilience and ability to resist cold flow of the material so that the joint will remain sealed and tight indefinitely when subjected to shock, vibration, pulsation, and temperature or other adjustments of the pipe line. The couplings shall be assembled on the job in a manner to insure permanently tight joints under all reasonable conditions of expansion, contraction, shifting and settlement, unavoidable variations in trench gradient, etc.

- B. Nuts and bolts shall be in accordance with AWWA C111.
- C. Couplings shall be shop primed and field painted in accordance with Division 9 (or one coat of coal tar epoxy if not specified in Division 9).
- D. Compression couplings shall be equal to Style 38 manufactured by Dresser. Flanged couplings shall have flanges in accordance with AWWA C207 and be equal to Style 128 manufactured by Dresser.

#### 2.23 PRESSURE GAUGES

- A. Pressure gauges shall have cast brass cases with bourdon tubes and precision rotary movements of bronze, nickel, or other material suitable to the environment in which they will be located. Dials shall be 4-1/2 inches in diameter with a pressure range of 0 to 300 psi. Provide female quick coupler for connection to corporation stop. Each gauge shall be provided with snuffer.
- B. Corporation stops shall be similar to Ford Products and shall have iron pipe threads with pack joint connection outlets. Provide male quick coupler for attachment of pressure gauge.

#### 2.24 FIBERGLASS LINE MARKER

#### A. General:

1. Design: The continuous fiberglass reinforced composite line marker (CUM375) shall be a single piece marker capable of simple, permanent

installation by one person using a manual driving tool. The CUM-375 upon proper installation shall resist displacement from wind and vehicle impact forces. The CUM-375 shall be of a constant flat "T" cross-sectional design with reinforcing support ribs incorporated longitudinally along each edge to provide sheeting protection and structural rigidity. The bottom end of the marker shall be pointed for ease of ground penetration.

- 2. Material: The CUM-375 marker shall be constructed of a durable, UV resistant, continuous glass fiber and marble reinforced, thermosetting composite material which is resistant to impact, ozone, and hydrocarbons within a service temperature range of -40° F to +140° F.
- Workmanship: The CUM-375 marker shall exhibit good workmanship and shall be free of burns, discoloration, cracks, bulges, or other objectionable marks which would adversely affect the marker's performance or serviceability.
- 4. Marking: Each CUM-375 shall be permanently marked "Water Valve Below" or "Water Main Below" and include "Before Digging Call 859-881-0589". The letters shall be a minimum of two (2) inches in height. A black line shall be stamped horizontally across the front of the marker near the bottom to indicate proper burial depth as shown in the standard detail.
- B. Physical and Mechanical Requirements:
  - 1. Dimensions: The CUM-375 marker shall conform to the shape and overall dimensions shown in the standard detail.
  - 2. Mechanical Properties: The CUM-375 shall have the minimum mechanical properties as follows:

Property	ASTM Test Method	Minimum Value
Ultimate Tensile Strength	D-638	50,000 psi
Ultimate Compressive Strength	D-638	45,000 psi
Specific Gravity	D-792	1.7
Weight % Glass Reinforcement	D-2584	50%
Barcol Hardness	D-2583	47

 Color Fastness: The CUM-375 shall be pigmented throughout the entire cross-section so as to produce a uniform color which is an integral part of the material. Ultraviolet resistant materials shall be incorporated in the construction to inhibit fading or cracking of the delineator upon field exposure. 4. Vehicle Impact Resistance: The Carsonite CUM-375 marker shall be capable of self-erecting and remain functional after being subjected to a series of ten head on impacts by a typical passenger sedan at 35 miles per hour. The CUM-375 shall retain a minimum of 60 percent of its sheeting.

# C. Reflectors:

- 1. The reflector shall be of impact resistant, pressure sensitive retro-reflective sheeting which shall be subject to approval by the Engineer. The sheeting shall be grade "High Intensity" and of appropriate color to meet MUTCD requirements.
- 2. Mounting: The retro-reflective sheeting shall consist of a minimum of a 3-inch wide strip placed a maximum of two (2) inches from the top of the post unless otherwise specified.

#### 2.25 FIRE HYDRANTS

- A. The fire hydrant shall be Mueller Super Centurion 250, Model A-423, 5 1/4" main valve opening, with two (2) hose nozzles and one (1) pumper nozzle. (No Substitutions)
- B. Specified burial depth for the fire hydrant assembly shall be 3' 6', resulting in a cover of 36" over pipe.
- C. Hydrant shall be rodded to gate valve and mainline tee as per detail.
- D. Contractor shall take care to provide adequate weep sump and ensure that weep holes are not plugged. Any hydrant not exhibiting rapid barrel water draw down, shall be removed and properly installed.
- E. After installation is complete, contractor shall check oil level in bonnet and adjust as necessary, using manufacturer supplied oil.
- F. Upon completion of testing and flushing, the hydrant assembly that is exposed above ground shall receive tow (2) coats of Sherwin-William KEM-400 Urethane Enamel, Fire Hydrant Red F75KY-R008 12252, applied as per manufacturer.

# PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Valves shall be installed as staked out, with the approval of the Engineer in the positions indicated on the drawings consistent with conveniences of operating the handwheel or wrench. All valves shall be carefully erected and supported in their respective positions free from all distortion and strain on appurtenances during handling and installation.
- B. All material shall be carefully inspected for defects in workmanship and material, all debris and foreign material cleaned out of valve openings and seats, all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness.

- C. Valves and other equipment which do not operate easily or are otherwise defective shall be repaired or replaced at the Contractor's expense.
- D. Valves shall not be installed with stems below the horizontal.
- E. Valves shall be set plumb and supported adequately in conformance with the instructions of the manufacturer. Valves mounted on the face of concrete shall be shimmed vertically and grouted in place. Valves in the control piping shall be installed so as to be easily accessible.
- F. Where chain wheels are provided for remote operation of valves, two (2) S-shaped hooks shall be provided for each valve to enable the chains to be hooked so as not to interfere with personnel traffic.
- G. Valves shall be provided with extension stems where required for convenience of operation. Extension stems shall be provided for valves installed underground and elsewhere so that the operating wrench does not exceed six (5") feet in length and the operating nut is not greater than 24" below the gate-valve box lid.
- H. A permanent type gasket of uniform thickness shall be provided between flanges of valves and sluice gates and their wall thimble.

Wall thimbles shall be accurately set in the concrete walls so that the gates can be mounted in their respective positions without distortion or strain.

J. Floorstand operators and stem guides shall be set so that the stems shall run smoothly in true alignment. Guides shall be anchored firmly to the walls. Distances from the centerlines of gates to the operating level or base of floorstand shall be checked by the Contractor and adjusted if necessary to suit the actual conditions of installation.

# 3.02 PAINTING

- A. Valves shall be factory primed and fully coated, inside and out, with fusion bonded epoxy in accordance with the latest revision of AWWA 0550 Standard, if valve is available in this coating.
- B. Other painting is specified in Division 9.

- END OF SECTION -

#### **SECTION 02665**

#### DOMESTIC WATER SYSTEMS

#### **PART 1 - GENERAL**

#### 1.01 SUMMARY

Contractor shall furnish all labor, materials, and equipment to install water service piping and appurtenances, including tapping saddle, corporation stop, meter, meter setter, meter box with lid, pressure reducing valve (PRV) (if required), and service line as shown on drawings and specified herein.

#### 1.02 RELATED SECTIONS

- A. Section 02225 Excavating, Backfilling, and Compacting for Utilities.
- B. Section 02610 Pipe and Fittings.
- C. Section 02675 Disinfection of Water Distribution Systems.

#### **PART 2- PRODUCTS**

#### 2.01 METERS

- A. Meters shall be 5/8 inch by 3/4 inch unless noted otherwise on the drawings. Meters shall be first-line quality of the manufacturer. The latest requirements of the AWWA Specifications 0-700 shall be complied with, except in cases of conflict with these Specifications. Make of meter offered must have been manufactured and marketed in the U.S. for at least five (5) years or more.
- B. Main Cases The main case shall be high grade waterworks bronze, with hinged, single lid cover and raised characters cast on them to indicated the direction of flow. Each meter must have the manufacturer's serial number stamped on the lid. They must have a working pressure of 150 psi. Standard cast iron frost bottom meters shall be furnished. Non-ferrous strainers shall be provided which fit tightly against the main case.
- C. Measuring Chambers The measuring chamber shall be of 85-5-5-5 bronze alloy composition and stainless steel or monel trimmed. The chamber shall be of the two piece design, equipped with a disc made of hard rubber and as near to the specific gravity of water as possible. Discs shall be of the three piece design of the thrust roller type.
- D. Registers The register shall be straight reading U.S. gallon type. The register unit shall be completely encased and hermetically sealed, and driven by permanent magnets. There shall be a test index circle, divided into 100 equal parts, and shall have a red center sweep test hand. Registers shall be guaranteed by the manufacturer for a period of at least fifteen (15) years.
- E. Manufacturers Meters shall be, Sensus SR. (No substitution)

#### 2.02 METER COPPER SETTERS

Meter setters shall be copper setter, riser type, horizontal inlet and outlet multipurpose coupling for copper pipe. They shall be 5/8-inch by 3/4-inch single or tandem or size as indicated, Ford or Mueller with ASSE dual check and brace eye, or equal.

# 2.03 PRESSURE REDUCING VALVE (IF REQUIRED)

- A. Pressure reducing valves for water service shall be single seated for dead-end or continuous service. Size 3/4-inch shall have bronze bodies with screwed ends. The cup packing and valve seat shall be of high grade leather; the diaphragm of nylon-inserted neoprene. Valve shall have bronze strainer. The valves shall be Mueller H-900b, Wilkins #600, Watts Regulator Series US #35130, or approved equal.
- B. Each valve shall have an adjustable pressure range of 60-125 psi and is to be set at 90 psi. These regulators shall be installed on the inlet side of the service meter using tandem coppersetter. Burying of the PRV or installing in separate meter box will not be permitted.

#### 2.04 POLYETHYLENE SERVICE LINE

- A. Polyethylene flexible pipe for sizes 3/4-inch through 1-inch water service piping shall be PE 3408, SDR-9, OD Base for 200 psi working pressure at 73.4° F, meeting latest edition of ASTM Specification D 2737 for material. Pipe shall be copper tubing sizes (CTS).
- B. Pipe shall meet all applicable provisions of the Commercial Standards and shall bear the National Sanitation Foundation (NSF) seal of approval.
- C. Fittings shall be standard bronze fittings in copper tubing sizes and manufactured by Ford or Mueller.

### 2.05 COPPER SERVICE LINE

- A. Copper service pipe shall be seamless copper tubing for water service, Type K meeting the latest edition of ASTM Specification B88.
- B. Fittings shall be standard bronze fittings in copper tubing sizes and manufactured by Ford or Mueller.

### 2.06 METER BOX

- A. Meter box shall be a polyvinyl chloride (PVC) or polyethylene (PE) box 18 inches in diameter x 24 inches deep (inside dimensions) and include a cast iron meter pit cover. The box shall be able to withstand 1,200 pounds compression. The box shall be used for both single and tandem setters. The meter box shall be equal to the MS Meter Box by Mid-States Plastics.
- B. The cast iron meter pit cover shall be equal to the 18-inch meter box cover, Model 32-H, as manufactured by Ford, or approved equal.

#### 2.07 SADDLES

Saddles shall be brass equal to the Ford S70 Series or Mueller H13000 Series.

#### 2.08 CORPORATION STOP

- A. Corporation stops shall be used with copper pipe (or polyethylene service pipe in copper pipe sizes) with flare type connections to connect to saddle around pipe. Stops shall be Mueller Model H-1500, Ford F-1000 or approved equal.
- B. Corporation stops shall be factory tested to 200 psi to be compatible with the pipes in which they are installed.

# 2.09 CURB STOP (IF REQUIRED)

- A. Ball Curb Valve: Ball curb valve shall be used with copper service pipe with compression type connections. Ball curb valve shall be installed at location shown on customer service connection detail in the drawings. Ball curb valve shall be equal to Mueller 300, Model B-25209.
- B. Curb Box: Curb box shall be cast iron with lid (including locking nut) marked "water." Curb box shall be slide type and installed over the ball curb valve. Curb box shall be equal to Tyler 6505 Series, Item 92-D.

#### **PART 3- EXECUTION**

#### 3.01 TESTING OF METERS

Contractor shall provide copies of certified tests by manufacturer of all meters provided in project.

# 3.02 INSTALLATION OF METER SETTINGS

Meter settings shall include meter box and lid, meter, coppersetter, corporation stop, plus service line and adapter on the customer's side of meter. (This latter item is to prevent the customer or his plumber from disarranging or loosening the meter after the Contractor has already set the meter in its proper position.) Meter shall be set as close to the right-of-way fence as practicable inside the right-of way. No meter shall be set outside the right-of-way unless prior approval has been obtained from the Engineer or his representative. Meters shall be set in a workmanlike manner with backfill neatly compacted in place. In yards, pastures and other grassed areas, top of meter box will be 1/2 inch above grade. Upon completion of successful testing, contractor shall install meter and lock service with lock seal studs part no. 93210140.

# 3.03 INSTALLATION OF PRESSURE REDUCING VALVES

Pressure reducing valves will be installed for individual meter settings where shown on drawings. Installation shall be by tandem setter per detail drawing.

#### 3.04 INSTALLATION OF SERVICE LINES

A. Service Lines <u>Not</u> Crossing a Road:

Service line shall be installed at locations shown on drawings and at a minimum depth of 30 inches.

B. Service Lines Crossing a Road:

Service line shall be jacked or pushed under paved roads and driveways. Open-cut may be used on all unpaved roads and driveways. In all cases the service line shall have a minimum cover of 30 inches. All backfill in paved areas shall be full depth crushed stone.

C. When noted on the drawings, the service line crossings shall be threaded through a steel or PVC casing pipe which shall be jacked or pushed under paved surfaces.

# 3.05 RELOCATION AND RECONNECTION OF EXISTING METERS

Where indicated on the plans, new water meters shall be installed in close proximity to existing water meters. The location of the new water meter shall be approved in the field by both the owner and ENGINEER. Before any reconnecting takes place, the new water meter will have to be pressure tested simultaneously with the new waterline.

Upon passing pressure and Bac-T testing, the CONTRACTOR shall cut the customer's service line on the residence side of the existing water meter and connect service line, using the necessary couplings to reconnect. The old water meter, setter, box and lid shall be removed; the corp stop will be located then shut off.

# 3.06 INSPECTION AND TESTING

All service connection shall be pressure tested simultaneously with the watermain to demonstrate their conformance with the specified operational capabilities and any deficiencies shall be corrected, device replaced or otherwise made acceptable to the Engineer.

- END OF SECTION -

#### **SECTION 02675**

#### DISINFECTION OF WATER DISTRIBUTION SYSTEMS

#### **PART 1 - GENERAL**

# 1.01 STERILIZATION

#### A. General:

It is the intent of this section to present essential procedures for disinfecting new and repaired water mains. The section is simultaneously patterned after AWWA C651. The basic procedure comprises:

- 1. Preventing contaminating materials from entering the water mains during construction or repair and removing by flushing materials that may have entered the water main.
- 2. Disinfecting any residual contamination that may remain.
- 3. Determining the bacteriologic quality by laboratory test after disinfection.

# B. Preventive Measures During Construction:

1. Precautions shall be taken to protect pipe interiors, fittings, and valves against contamination. Pipe delivered for construction shall be strung so as to minimize entrance of foreign material. When pipe laying is not in progress, as for example, at the close of the day's WORK, all openings in the pipeline shall be closed by water tight plugs. Joints of all pipe in the trench shall be completed before WORK is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is dry.

If dirt, that, in the opinion of the ENGINEER, will not be removed by the flushing operation (Article 1.01-C.) enters the pipe, the interior of the pipe shall be cleaned and swabbed as necessary, with a five percent (5%) hypochlorite disinfecting solution.

2. Packing Materials and Joints - No contaminated material or any material capable of supporting prolific growth of micro-organisms shall be used for sealing joints. Packing material shall be handled in such a manner as to avoid contamination. Where applicable, packing materials must conform to AWWA standards. Packing material for cast iron pipe must conform to AWWA C600. Yarning or packing material shall consist of molded or tubular rubber rings, or treated paper. Materials such as jute or hemp shall not be used. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water. It shall be delivered to the job in enclosed containers and shall be kept clean.

# C. Preliminary Flushing:

No site for flushing should be chosen unless it has been determined that drainage is adequate at the site. The main shall be flushed prior to disinfection, except when the tablet or granular methods are used (Articles 1.01 -E.3. and 1.01 -E.4.). It is required that the flushing velocity be 2.5 ft/sec. or greater. The rate of flow required to produce this velocity in various diameters is shown in the following table:

REQUIRED OPENINGS TO FLUSH PIPELINES (40-psi Residual Pressure)					
Flow Required to Produce 2.5 ft/sec.		Minimum Outlet Size			
		Eluching	Hydrant Nozzle		
Pipe Size (in)	Flow Rate (gpm)	Flushing Pipe Size (in)	Number	Size (in)	
4	100	1	1	2½	
6	220	1½	1	2½	
8	390	2	1	2½	
10	610	3	1	2½	
12	880	3	2	2½	
14	1,200	4	2	2½	
16	1,565	4	2	2½	
18	1,980	6	2	21/2	

#### D. Form of Chlorine for Disinfection:

The most common forms of chlorine used in the disinfecting solutions are liquid chlorine (gas at atmospheric pressure), calcium hypochlorite tablets, calcium hypochlorite granules, and sodium hypochlorite solutions.

1. Liquid Chlorine Use - Liquid chlorine shall be used only when suitable equipment is available and only under the direct supervision of a person familiar with the physiological, chemical, and physical properties of this element and who is properly trained and equipped to handle any emergency that may arise. Introduction of chlorine gas directly from the supply cylinder is unsafe and shall not be permitted.

Note: The preferred equipment consists of a solution fed chlorinator in combination with a booster pump for injecting the chlorine gas water mixture into the main to be disinfected. Direct feed chlorinators are not recommended because their use is limited to situations where the water pressure is lower than the chlorine cylinder pressure.

# 2. Hypochlorites

a. Calcium Hypochlorite - Calcium hypochlorite contains seventy percent (70%) available chlorine by weight. It is either tabular or granular in form. The tablets, 6-8 to the ounce, are designed to dissolve slowly in water. Calcium hypochlorite is packaged in containers of various types and sizes ranging from small plastic bottles to 100 pound drums. A chlorine-water solution is prepared by dissolving the granules in water in the proportion requisite for the desired concentration.

b. Sodium Hypochlorite - Sodium hypochlorite is supplied in strengths from five and one-quarter percent (5.25%) to sixteen percent (16%) available chlorine. It is packaged in liquid form in glass, rubber, or plastic containers ranging in size from one (1) quart bottles to five (5) gallon carboys. It may also be purchased in bulk for delivery by tank truck.

The chlorine water solution is prepared by adding hypochlorite to water. Product deterioration must be reckoned with in computing the quantity of sodium hypochlorite required for the desired concentration.

# E. Methods of Chlorine Application:

Upon completion of construction, disinfection shall be strictly in accordance with the procedure designated in the State Regulations, which reads as follows:

"A water distribution system, including storage distribution tanks, repaired portions of existing systems, or all extensions to existing systems, shall be thoroughly disinfected before being placed into service. A water distribution system shall disinfect with chlorine or chlorine compounds, in amounts as to produce a concentration of at least fifty (50) ppm and a residual of at least twenty-five (25) ppm at the end of twenty-four (24) hours and the disinfection shall be followed by a thorough flushing."

- 1. Continuous Feed Method This method is suitable for general application.
  - a. Water from the existing distribution system or other approved sources of supply shall be made to flow at a constant, measured rate into the newly laid pipe line. The water shall receive a dose of chlorine, also fed at a constant, measured rate. The two rates shall be proportioned so that the chorine concentration in the water in the pipe is maintained at a minimum of 50 mg/L available chlorine. To assure that this concentration is maintained, the chlorine residual should be measured at regular intervals in accordance with the procedures described in the current edition of Standard Methods and AWWA M12--Simplified Procedures for Water Examination.

Note: In the absence of a meter, the rate may be determined either by placing a pitot gauge at the discharge or by measuring the time to fill a container of known volume.

Solutions of one percent (1%) chlorine may be prepared with sodium hypochlorite or calcium hypochlorite. The latter solution requires approximately one (1) pound of calcium hypochlorite in eight and five-tenths (8.5) gallons of water. The following table gives the amount of chlorine residual required for each 100 feet of pipe of various diameters:

CHLORINE REQUIRED TO PRODUCE 50 mg/L CONCENTRATION IN 100 FT. OF PIPE (By Diameter)				
Pipe Size (in)	ze 100 Percent Chlorine 1 Percent Chlori (lb) Solutions (gal)			
4	0.027	0.33		
6	0.061 0.73			
8	0.108	1.3		
10	0.170	2.04		
12	0.240	2.88		

- b. During the application of the chlorine, valves shall be manipulated to prevent the treatment dosage from flowing back into the line supplying the water. Chlorine application shall not cease until the entire main is filled with the chlorine solution. The chlorinated water shall be retained in the main for at least twenty-four (24) hours during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. At the end of this twenty-four (24) hour period, the treated water shall contain no less than 25 mg/L chlorine throughout the length of the main.
- 2. Slug Method This method is suitable for use with mains of large diameter (greater than 12" diameter) for which, because of the volumes of water involved, the continuous feed method is not practical.
  - a. Water from the existing distribution system or other approved source of supply shall be made to flow at a constant, measured rate (see Article 1.01-E.1.a.) into the newly laid pipe line. The water shall receive a dose of chlorine also fed at a constant, measured rate. The two rates shall be proportioned so that the concentration in the water entering the pipe line is maintained at no less than 300 mg/L. The chlorine shall be applied continuously and for a sufficient period to develop a solid column or "slug" of chlorinated water that will, as it passes along the line, expose all interior surfaces to a concentration of at least 300 mg/L for at least three (3) hours. The application shall be checked at a tap near the upstream end of the line by chlorine residual measurements.
  - b. As the chlorinated water flows past tees and crosses, related valves and hydrants shall be operated as to disinfect appurtenances.
- 3. Tablet Method Tablet disinfection is best suited to short extension (up to 500 feet) and smaller diameter mains (up to 12 inches). Because the preliminary flushing step must be eliminated, this method shall be used only when scrupulous cleanliness has been exercised. It shall not be used if trench water or foreign material has entered the main or if the water is below 5 degrees C (41 degrees Fahrenheit). This method may only be used at the express written consent of the Engineer, prior to the beginning of construction.

a. Placement of Tablets - Tablets are placed in each section of pipe and also in hydrants, hydrant branches, and other appurtenances. They shall be attached by an adhesive, except for the tablets placed in hydrants and in the joints between the pipe sections. All the tablets within the main must be at the top of the main. If the tablets are fastened before the pipe section is placed in the trench, their position should be marked on the section to assure that there will be no rotation. When placing tablets in joints, they are either crushed and placed on the inside annular space, or, if the type of assembly does not permit, they are rubbed like chalk on the butt ends of the sections to coat them with calcium hypochlorite.

The adhesive may be Permatex No. 1 or any alternative approved by the ENGINEER of the purchaser. There shall be no adhesive on the tablet except on the broad side next to the surface to which the tablet is attached. The following table gives the number of hypochlorite tablets required for various pipe diameters and lengths:

NUMBER OF 5G HYPOCHLORITE TABLETS REQUIRED FOR DOSE OF 50 mg/L						
Length	Pipe Diameter					
of Pipe (ft)	2	4	6	8	10	12
13 or less 18 20 30 40	1 1 1 1	1 1 1 2 2	2 2 2 3 4	2 3 3 5 6	3 5 5 7 9	5 6 7 10 14

b. Filling and Contact - When installation has been completed, the main shall be filled with water at a velocity of less than 1 foot per second. This water shall remain in the pipe for at least twenty-four (24) hours.

Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water.

- 4. Granule Method Granular disinfection may only be used in the same instances when tablets disinfection can be used; that is, it may be used if the pipes and appurtenances are kept clean and dry during construction.
  - a. Placement of Granules Granules of calcium hypochlorite shall be placed during construction at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-ft intervals.

Note: These granules cannot be used on solvent-welded plastic or on screwed-joint pipe because of the danger of fire or explosion from the reaction of the joint compounds with the calcium hypochlorite. The following table gives the ounces of hypochlorite granules required for various pipe diameters:

OUNCES OF CALCIUM HYPOCHLORITE GRANULES TO BE PLACED AT BEGINNINGS OF MAIN AND AT 500-ft INTERVALS			
Pipe Diameter (in.)	Calcium Hypochlorite Granules (oz.)		
4	0.5		
6	1.0		
8	2.0		
12	4.0		

b. Filling and Contact - When installation has been completed, the main shall be filled with water at a velocity of less than 1 foot per second. This water shall remain in the pipe for at least twenty-four (24) hours. If the water temperature is less than 41° F (5° C) the water shall remain in the pipe for at least forty-eight (48) hours.

Valves shall be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water.

# F. Final Flushing:

After the applicable retention period, the heavily chlorinated water shall be flushed from the main until the chlorine concentration in the water is no higher than that generally prevailing in the system, or less than 1 mg/L. Chlorine residual determination shall be made to ascertain that the heavily chlorinated water has been removed from the pipe line.

# G. Bacteriologic Tests:

New or repaired water distribution lines shall not be placed into service until bacteriological samples taken at the points specified in 401 KAR 8:150 section 4(2) are examined and are shown to be negative following disinfection. Bacteriologic test sampling and testing to be conducted by the District with cost borne by the contractor.

 After final flushing, and before the water main is placed in service, a sample or samples shall be collected from the end of the line and tested for bacteriologic quality and shall show the absence of coliform organisms. If the number and frequency of samples is not prescribed by the public health authority having jurisdiction, at least one sample shall be collected from chlorinated supplies where a chlorine residual is maintained throughout the new main. From unchlorinated supplies at least two samples shall be collected at least twenty-four (24) hours apart.

- 2. Samples for bacteriologic analysis shall be collected in sterile bottles treated with sodium thiosulphate. No hose or fire hydrant shall be used in collection of samples. A suggested sampling tap consists of a standard corporation cock installed in the main with a copper tube gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed, and retained for future use.
- H. Repetition of Procedure If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained. The tablet method cannot be used in these subsequent disinfections. When the bacteriological sample tests indicate that disinfection has been effective, the main may be placed in service.
- I. Procedure After Cutting Into or Repairing Existing Mains The procedures outlined in the Article apply primarily when mains are wholly or partially dewatered. Leaks or breaks that are repaired with clamping devices while the mains remain full of water under pressure present little danger of contamination and require no disinfection.
  - Trench "Treatment" When an old line is opened, either by accident or by design, the excavation will likely be wet and may be badly contaminated from nearby sewers. Liberal quantities of hypochlorite applied to open trench areas will lessen the danger from such pollution. Tablets have the advantage in such a situation because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation.
  - 2. Main Disinfection The following procedure is considered as a minimum that may be used.
    - a. Swabbing with Hypochiorite Solution The interior of all pipe and fittings used in making the repair (particularly couplings and tapping sleeves) shall be swabbed with five percent (5%) hypochlorite solution before they are installed.
    - b. Flushing Thorough flushing is the most practical means of removing contamination introduced during repairs. If valving and hydrant locations permit, flushing from both directions is recommended. Flushing shall be started as soon as the repairs are completed and continued until discolored water is eliminated.
    - c. Slug Method Where practicable, in addition to the above procedures, a section main in which the break is located shall be isolated, all service connections shut off, and the section flushed and chlorinated as described in Article 2.5.2, except that the dose may be increased to as much as 500 mg/L, and the contact time reduced to as little as one-half (1/2) hour. After chlorination, flushing shall be resumed and continued until discolored water is eliminated.

- Sampling Bacteriologic samples shall be taken after repairs to provide a record by which the effectiveness of the procedures used can be determined. If the direction of flow is unknown, samples shall be taken on each side of the main break.
- J. Residual Disinfection A minimum free chlorine residual of 0.2 ppm must be maintained throughout the distribution system. If this residual cannot be maintained, booster chlorination facilities must be provided. If chloramination is used, a minimum combined residual of 0.5 ppm must be maintained throughout the distribution system.
- K. Chlorine Storage The chlorine storage room shall be provided with separate switches for the fan and lights located outside. The ventilating fan is to be installed near floor level, with a capacity of one complete air change per minute. Panic hardware shall also be provided on chlorine room doors.

# 1.02 NOTIFICATION AND REPORTING

- A. Contractor shall notify OWNER so they can contact radio station to announce boil water advisory for affected service area until lab results show safe water.
- B. Contractor shall prepare report within 48 hours of break that includes time, location, chlorine residuals, lab results, etc. OWNER shall maintain reports in file.
- C. If repairs cause water to be off more than 8 hours, Contractor must notify the OWNER so they can contact Division of Water.
- D. Contractor shall notify OWNER if loss of service exceeds 4 hours, and/or affects 10% of OWNER's customers, or 500 customers, whichever is less, so that OWNER can contact the Public Service Commission.

- END OF SECTION -

# **SECTION 02835**

### CHAIN LINK FENCES AND GATES

# **PART 1 - GENERAL**

### 1.01 SUMMARY

- A. The Contractor shall furnish and erect the chain link fence and gates as indicated on the drawings and as herein specified.
- B. The chain link fence shall have a top rail and bottom tension wire, and three (3) strands of barbed wire projecting outward at the top.
- C. The chain link fence materials and installation shall meet or exceed the standards of the Chain Link Fence Manufacturers Institute, New York, NY, except as otherwise specified in this Section. Fence materials shall meet or exceed Federal Specification RR-F-191H/GEN for fencing, wire, and post metal (gates, chain link fence fabric, and accessories), and shall conform to the ASTM Standard Specifications hereinafter noted.
- D. Fence framework, fabric, and accessories.
- E. Excavation for post bases.
- F. Concrete anchorage for posts and center drop for gates.
- C. Manual gates and related hardware.

### 1.02 RELATED SECTIONS

Section 03300 - Cast-in-Place Concrete.

### 1.03 REFERENCES

- A. ANSI/ASTM A123: Zinc (hot galvanized) coating of products fabricated from rolled, pressed, and forged steel shapes, plates, bars, and strips.
- B. ANSI/ASTM F567: Installation of chain link fence.
- C. ASTM A120: Pipe, steel, black and hot-dipped zinc-coated (galvanized) welded and seamless, for ordinary uses.
- D. ASTM C94: Ready-mix concrete.
- E. FS RR-F-191: Fencing, wire, post, and metal.

# 1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in commercial quality chain link fencing with two (2) years of experience.
- B. Installation: ANSI/ASTM F567.

### 1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Include plan layout, grid, spacing of components, gates, accessories, fittings, hardware, anchorages, and schedule of components.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.

### **PART 2-PRODUCTS**

# 2.01 MATERIALS

- A. All ferrous metal fittings, posts, fence, and gate framework, and all accessories shall be galvanized with a heavy coating of 2.0 ounces pure zinc spelter per square foot of surface area to be coated using the hot-dip process. Thinner zinc coatings and electro-galvanizing will not be used as a substitute for the specified hot-dip galvanized finish.
- B. All fabrication and welding shall be done before hot-dip galvanizing. All welding shall conform to the American Welding Society standards.
- C. The chain link fence fabric shall be galvanized steel chain link fabric conforming to ASTM Standard Specification for zinc-coated steel chain link fence fabric, Designation A392-74, with Class 2 zinc coating (2.0 ounces of zinc per square foot of uncoated wire surface). The fabric shall be woven in 2-inch mesh from No. 9 gage wire in a 7-foot width with barbed salvages top and bottom.
- D. The barbed wire shall be galvanized steel barbed wire consisting of two (2) strands of twisted No. 12 1/2-gage wires with 4-point barbs spaced 3 inches apart and conforming to ASTM Standard Specification of zinc-coated (galvanized) steel barbed wire, Designation A121-77, with Class 3 zinc coating (minimum of 0.80 ounces of zinc per square foot of uncoated wire surface for No. 12 1/2-gage wire).
- E. The tension wire shall be No. 7 gage coil spring steel wire with galvanized finish having minimum of 0.80 ounces of zinc coating per square foot of uncoated wire surface.
- F. Tie wires for fastening fence fabric to line posts and rails shall be not less than No. 6 gage aluminum wire.
- G. Line posts shall be 2-3/8 inches outside diameter steel pipe weighing not less than 3.65 pounds per foot, or 1-7/8 inches high carbon steel H-beams weighing not less than 2.70 pounds per foot.
- H. End, corner, and pull posts shall be 2-7/8 inches outside diameter steel pipe weighing not less than 5.79 pounds per foot, or 2-1/2 inches square steel tube weighing not less than 5.14 pounds per foot, or 3-1/2 inches roll-formed, steel corner section weighing not less than 5.14 pounds per foot.
- I. Gate posts for gate leaves up to and including 6-foot wide, shall be 2-7/8 inches outside diameter steel pipe weighing not less than 5.79 pounds per foot or 3-1/2 inches by 3-1/2 inches roll-formed, steel corner section weighing not less than 5.14 pounds per foot.

- J. Gate posts for gate leaves over 6 feet wide, including 13 feet wide, shall be 4 inches outside diameter steel pipe weighing not less than 9.10 pounds per foot.
- K. Top railings and railing for top, middle, and bottom braces between terminal posts and adjacent line posts shall be 1-5/8 inch outside diameter steel pipe weighing not less than 2.27 pounds per foot, or 1-5/8 inches by 1-1/4 inches, 14 gage roll-form section.
- L. Diagonal truss braces between terminal and adjacent line posts and for gate framework shall be 3/8-inch diameter steel rod.
- M. Barbed wire support arms shall project outward from the top of the posts at 45 degrees and shall be capable of withstanding a 200-pound downward pull on the outermost end of arm, without failure. The arms shall have provision for the attachment of three (3) strands of evenly spaced barbed wire. Arms shall be integral with post top weather caps having holes for the passage of the top rail at intermediate posts.
- N. Fittings shall be heavy duty malleable iron or pressed steel of suitable size to produce strong construction.
- O. Stretcher bars for attaching fabric to terminal posts such as end, corner, pull, or gate posts and gate frames shall be flat bars with minimum cross-section dimensions of not less than 1/4-inch by 3/4-inch. The stretcher bars shall be the full height of the fabric and shall be secured with bar bands of not less than 11 gage sheet steel, spaced approximately 15 inches on centers and bolted with 3/8-inch diameter bolts.
- P. Gate framework shall be 1-7/8 inches outside diameter steel pipe weighing not less than 2.72 pounds per foot.
- Q. If bolted or riveted corner fittings are not used, the gate frame shall be hot-dip galvanized after welding.
- R. Gate hinges shall be of heavy pattern of adequate strength for the gate size, with large bearing surfaces for clamping or bolting in position.
- S. The gates shall be provided with a suitable latch accessible from both sides and with provision for padlocking.
- T. Double leaf swing gates shall have a center bolt, center stop, and automatic backstops to hold leaves in open position.
- U. Gate padlocks shall have laminated plate cases, hardened steel shackles, and keyed cylinders. Padlocks shall be No. 5 manufactured by Master Lock Company. The padlocks shall be furnished with two (2) keys each and keyed on the project master key system.

# 2.02 CONCRETE MIX

Concrete shall be in accordance with Division 3.

### 2.03 FINISHES

- A. Galvanized: ANSI/ASTM A123; 1.8 ounce per square foot coating.
- B. Accessories: Same finishing as framing and fabric.

### **PART 3- EXECUTION**

### 3.01 INSTALLATION

- A. The fence and gates shall be erected by skilled mechanics.
- B. Post spacing shall be uniform with maximum spacing of 10 feet in fences erected along straight lines. All posts shall be placed plumb and centered in the concrete foundation.
- C. Post foundations in earth shall be concrete cylinders with a minimum diameter of 12 inches, crowned two (2") inches at grade to shed water, and shall not be less than 36 inches deep in the ground. Posts shall be set in the full depth of the concrete foundations except for last 3 inches of concrete under the posts.
- D. If foundation holes are excavated in peat or other unstable soil, the Engineer shall be notified for determination of suitable construction precautions.
- E. If solid rock is encountered without overburden of soil, posts shall be set into the rock a minimum depth of 12 inches for line posts and 18 inches for terminal posts. Post holes shall be at least one (1) inch greater in diameter than the post, and the grout shall be thoroughly worked into the hole so as not to leave voids, and shall be crowned at the top to shed water. Where solid rock is covered by an overburden, the total setting depths shall not exceed the depths required for setting in earth, and the posts shall be grouted into the rock as described.
- F. Any change in direction of the fence line of 20 degrees or more shall be considered corners. Pull posts shall be used at any abrupt change in grade.
- G. Maximum area of unbraced fence shall not exceed 1,500 square feet.
- H. Terminal posts shall be braced to adjacent posts with horizontal brace rails and diagonal truss rods brought to proper tension so that posts are plumb. Diagonal truss rods shall be affixed to post by bands and "J" fitting. Bending of truss rod into end of horizontal pipe will not be permitted.
  - There shall be no loose connections or sloppy fits in the fence framework. The fence framework shall withstand all wind and other forces due to the weather.
- J. Fabric shall be stretched taut and tied to posts, rails, and tension wires with the bottom edge following the finished grade not more than two (2) inches above the grade. The fabric shall be installed on the security side (outside) of the fence and shall be anchored to the framework so that the fabric remains in tension after pulling force is released. The fabric shall be attached to line posts with ties spaced at not more than 15-inch intervals and to rails and braces at no more than 24-inch intervals. The fabric shall be attached to the tension wire with hog ring ties on 24-inch centers.

- K. Three (3) strands of barbed wire shall be installed on each extension arm of the line fence at the top of each gate. The wires shall be pulled taut and fastened at each support.
- L. Gates shall be installed plumb, level, and secure for the full width of the opening and the hardware adjusted for smooth operation. Provide concrete center drop to foundation depth and drop rod retainers at center of double gate openings.

- END OF SECTION -

### **SECTION 02935**

# **SEEDING AND SODDING**

# PART 1 — GENERAL

### 1.01 GENERAL

The Contractor shall furnish all labor, materials, and equipment to regrade construction areas to original contours or regrade contours shown on drawings, fertilize and lime, seed or sod, and return all disturbed areas to their original or regrade contour and condition.

### PART 2— PRODUCTS

### 2.01 LIME AND FERTILIZER

Two (2) tons of agricultural limestone per acre and one-half (0.5) tons per acre of fertilizer with a 20-20-20 analysis shall be uniformly applied and incorporated into soil.

### 2.02 SEED

A mixture of fifty percent (50%) turf fescue, forty percent (40%) perennial rye and ten percent (10%) annual shall be sowed at the rate of three hundred (300) pounds per acre. The seed shall have a minimum of ninety percent (90%) germination and a maximum of one percent (1%) weeds.

# 2.03 SOD

Sod shall be thirty percent (30%) to fifty percent (50%) bluegrass and fifty percent (50%) to seventy percent (70%) Falcon Fescue.

### **PART 3— EXECUTION**

### 3.01 FINAL GRADING

- A. Upon completion of backfill, the construction area shall be regraded roughly to original or regrade contours. The top six (6) inches of the regrade must be free from rocks and other deleterious material. All rock shall be picked up and disposed of at a designated place approved by Owner.
- B. Any and all settled areas must be brought to grade and restored to as near original conditions as possible prior to final acceptance of the project by the Owner.

# 3.02 SEEDING AND SODDING

A. Preparation of Seed Bed - Where the area to be seeded is not sufficiently pulverized to provide a good seedbed, the seedbed will be prepared by pulverizing the soil to a depth of four (4) inches with a disk harrow, drag harrow, spike toothed harrow or similar tool immediately prior to seeding. The area to be seeded shall be graded to a uniform surface and all rock and debris removed. Lime and fertilizer shall be applied prior to preparing seed bed and incorporated into the soil.

- B. Seeding The seed shall be raked or cultipacted into the ground to a depth of no greater than 1/4-inch.
- C. Mulching All seeded areas shall be covered with a straw mulch placed to a uniform depth of 1-1/2 inches loose.
- D. Sodding The sod bed shall be prepared, fertilized and limed similar to those areas to be seeded. Then the sod shall be placed in accordance with Section 528.3.4 of the Standard Specifications for Road and Bridge Construction of the Kentucky Department of Transportation.
- E. Maintenance Contractor is to take all necessary steps, watering, weeding, etc., as required to maintain the seed and/or sodded areas so as to ensure an acceptable stand of grass at the end of one year. Any areas not meeting acceptability at any time during the warranty, shall be redone.

- END OF SECTION -

# DIVISION 3 CONCRETE

### **SECTION 03300**

### **CAST-IN-PLACE CONCRETE**

### **PART 1 - GENERAL**

# 1.01 SECTION INCLUDES

- A. Cast-in-place concrete.
- B. Floors and slabs on grade.
- C. Control, expansion, and contraction joint devices associated with concrete work, including joint sealants.
- D. Equipment pads, thrust blocks, and miscellaneous.

# 1.02 RELATED SECTIONS

A. Section 02520 - Portland Cement Concrete Paving.

# 1.03 REFERENCES

- A. ACI 301 Structural Concrete for Buildings.
- B. ACI 302 Guide for Concrete Floor and Slab Construction.
- C. ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
- D. ACI 305R Hot Weather Concreting.
- E. ACI 306R Cold Weather Concreting.
- F. ACI 308 Standard Practice for Curing Concrete.
- G. ACI 318 Building Code Requirements for Reinforced Concrete.
- H. ASTM C33 Concrete Aggregates.
- ASTM C94 Ready-Mixed Concrete.
- J. ASTM C150 Portland Cement.
- K. ASTM C260 Air Entraining Admixtures for Concrete.
- L. ASTM C494 Chemical Admixtures for Concrete.
- M. ASTM C618 Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

- N. ASTM 0948 Test Method for Dry and Wet Bulk Density, Water Absorption and Apparent Porosity of Thin Sections of Glass-Fiber-Reinforced Concrete.
- O. ASTM D994 Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- P. ASTM D11 90 Concrete Joint Sealer, Hot-Poured Elastic Type.
- Q. ASTM D1751 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- P. ASTM DI 752 Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

### 1.04 DEFINITIONS

- A. BEAM: A horizontal structural member, usually set between columns or other vertical components.
- B. COLUMN: A vertical structural member, transferring loads from beams and other horizontal components to the building foundations.
- C. CONSTRUCTION JOINT: A joint where two successive placements of concrete meet; where reinforcement is not interrupted.
- D. CONTRACTION (CONTROL) JOINT: A formed, sawed, or tooled groove in concrete to create a weakened plane to encourage shrinkage or movement cracking to occur at the joint.
- E. EXPANSION JOINT: A separation joint between two concrete components of the structure, to allow differential movement where expansion is likely to exceed contraction. This joint continues through the building structure.
- F. FORMWORK: Temporary wood, steel, or prefabricated glass fiber falsework used to contain wet concrete until final set commences.
- C. FORM TIES: Metal tension anchors to space formwork and maintain dimensional stability during placement of wet concrete.
- H. GRADE BEAM: A horizontal structural member, usually spanning between vertical pile or caisson foundations or spread footings.
- I. GROUT (NON SHRINK GROUT): A cementious or epoxy based mix used to fill the gap created between bearing components or baseplates and the building foundation or other supporting element.
- U. JOINT FILLER: A compressible material placed in concrete control joints, usually at the perimeter of slabs on grade. This material is compressible and expandable to fill the joint space under joint movement conditions.
- K. ONE WAY SLAB: A floor or roof slab that transfers loads in one direction only and requires structural support only at opposing bearing edges.

- L. PILE CAP: A concrete pad, usually square or rectangular in shape, placed over the top of a pile or caisson foundation, to transfer loads from the building structural frame to the foundation.
- M. REINFORCEMENT: Usually deformed steel bars or wire mesh placed within wet concrete to increase tensile strength of the structural concrete member and to assist in resisting shrinkage cracking.
- N. RETAINING WALL: A structural vertical exterior concrete wall, unrestrained at the top, used to retain soil or other material of dissimilar elevation.
- 0. STIRRUP: A formed device of reinforcing steel bar, shaped to a square or rectangular hoop, used to tie bar reinforcement into a cage configuration, for purposes of resisting buckling of the concrete member.
- P. STRUT: A structural member used to restrict other structural components from movement.
- Q. TIES: A soft annealed steel wire used to bind bar reinforcement, placed perpendicular to each other.
- R. THRUST BLOCK: A subgrade concrete structure placed surrounding large water main elbows and tees to resist movement of the pipe caused by water hammer.
- S. VAPOR RETARDER: A sheet material placed under interior slabs on grade to arrest the movement of moisture within a building enclosure assembly.

### 1.05 SUBMITTALS FOR REVIEW

- A. Section 01300 Submittals: Procedures for submittals.
- B. Product Data: Provide data for proprietary materials and items, including forming accessories, admixtures, patching compounds, preformed joints, curing compounds, and others if requested by Engineer.
- C. Shop drawings for reinforcing detailing and fabrication.
- D. Laboratory test reports for concrete materials and mix design test.
- E. Material certificates in lieu of material laboratory test reports when permitted by Engineer.

## 1.06 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Place concrete in accordance with ACI 304.
- C. Acquire cement and aggregate from same source for all work.

- D. Conform to ACI 305R when concreting during hot weather.
- E. Conform to ACI 306R when concreting during cold weather.

### **PART 2- PRODUCTS**

# 2.01 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I Normal.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and not detrimental to concrete.

### 2 02 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical: ASTM C494; Type A Water Reducing, Type D Water Reducing and Retarding, Type E Water Reducing and Accelerating, Type F Water Reducing, High Range, and Type C Water Reducing, High Range, and Retarding.
- C. Fly Ash: ASTM C618, Type F.

# 2.03 ACCESSORIES

- A. Bonding Agent: Polymer resin emulsion, Polyvinyl Acetate, Latex emulsion, or two-component modified epoxy resin.
- B. Vapor Retarder: 8 mil thick clear polyethylene film.
- 0. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

# 2.04 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler: ASTM D1752; Closed cell polyvinyl chloride or molded vinyl foam, resiliency recovery of 95 percent if not compressed more than 50 percent of original thickness. Asphalt impregnated fiberboard may be used with Engineer's approval.
- B. Construction Joint Devices: Integral galvanized steel, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at six (6) inches, ribbed steel spikes with tongue to fit top screed edge.
- C. Sealant: Cold applied two part liquid neoprene. Use concrete color.

### 2.05 CONCRETE PROPORTIONING AND DESIGNING MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch

method, use an independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

- 1. Do not use the same testing agency for field quality control testing.
- 2. Limit use of fly ash to not exceed 25 percent of cement content by weight.
- B. Submit written reports to Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed by Engineer.
- C. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:
  - 1. 4000 psi, 28-day compressive strength; water-cement ratio, 0.44 maximum (non air-entrained), 0.35 maximum (air-entrained).
  - 2. 3500 psi, 28-day compressive strength; water-cement ratio, 0.58 maximum (non air-entrained), 0.46 maximum (air-entrained).
  - 3. 2500 psi, (Lean concrete, if used) 28-day compressive strength; water-cement ratio, 0.67 maximum.
- D. Water-Cement Ratio: Provide concrete for following conditions with maximum water-cement (WIG) ratios as follows:
  - 1. Subjected to freezing and thawing: W/C 0.45.
  - 2. Subjected to deicers/watertight: W/C 0.40.
  - 3. Subjected to brackish water, salt spray, or deicers: W/C 0.40.
- E. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
  - 1. Ramps, slabs, and sloping surfaces: Not more than three (3) inches.
  - 2. Reinforced foundation system: Not less than one (1) inch and not more than three (3) inches.
  - 3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than eight (8) inches after adding admixture to site-verified 2-to-3-inch slump concrete.
  - 4. Other concrete: Not more than four(4) inches.
- F. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in work.

# 2.06 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (superplasticized) in concrete, as required, for placement and workability.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50°F (10°C).

- C. Use high-range water-reducing admixture in pumped concrete, architectural concrete, concrete required to be watertight, and concrete with water-cement ratios below 0.50
- D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in a concrete at point of placement having total air content with a tolerance of plus or minus 1½ percent within the following limits:
  - 1. Concrete structures and slabs exposed to freezing and thawing; deicers, chemicals, or hydraulic pressure:
    - a. 4.5 percent (moderate exposure); 5.5 percent (severe exposure) for 1 ½ inch maximum aggregate.
    - b. 4.5 percent (moderate exposure); 6.0 percent (severe exposure) for 1-inch maximum aggregate.
    - c. 5.0 percent (moderate exposure); 6.0 percent (severe exposure) for 3/4-inch maximum aggregate.
    - d. 5.5 percent (moderate exposure); 7.0 percent (severe exposure) for ½ -inch maximum aggregate.
  - 2. Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 to 4 percent.
- E. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

### **PART 3- EXECUTION**

### 3.01 EXAMINATION

- A. Verify site conditions.
- B. Verify requirements for concrete cover over reinforcement. Where not shown, use minimum as specified in ACI 318.
- C. Verify that anchors, plates, reinforcements, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

### 3.02 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

# 3.03 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304.
- B. Notify Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, and formed construction and contraction joints are not disturbed during concrete placement.
- D. Install vapor retarder under interior slabs on grade only where space is inhabited. Lap joints minimum six (6) inches and seal watertight by taping edges and ends.
- E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum six (6) inches and seal watertight.
- F. Separate slabs on grade from vertical surfaces with 1/4 to 3/8 inch joint filler.
- C. Extend joint filler from bottom of slab to within about 1/4 inch of finished slab surface. Conform to Section 07900 for finish joint sealer requirements.
- H. Install preformed metal tongue and groove joint devices, if used, in accordance with manufacturer's instructions.
- Apply sealants in joint devices in accordance with Section 07900.
- J. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- K. Place concrete continuously between predetermined expansion, control, and construction joints.
- L. Do not interrupt successive placement; do not permit cold joints to occur.
- M. Saw cut control joints within 24 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.
- N. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 feet.

### 3.04 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish as scheduled in this Section. Other formed concrete surfaces to be left exposed to get rough form finish (see ACI 301).
- B. Finish concrete floor surfaces in accordance with ACI 301.
- C. Steel trowel surfaces of building slabs which are to be exposed.
- D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 minimum, but not less than indicated on drawings.

# 3.05 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure concrete in accordance with ACI 301 and ACI 308. Cure concrete for seven (7) days minimum after placement.

# 3.06 FIELD QUALITY CONTROL

- A. Provide free access to work and cooperate with appointed firm.
- B. Submit proposed mix design of each class of concrete to testing firm and Engineer for review prior to commencement of work.
- C. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- D. Four concrete test cylinders will be taken for every 75 or less cubic yards of each class of concrete placed. Each day of concrete placement shall constitute a test period for taking of cylinders.
- E. One additional test cylinder will be taken, cured on job site under same conditions as concrete it represents.
- F. One slump test will be taken for each set of test cylinders taken.
- G. The Contractor shall retain a testing laboratory, subject to approval by Engineer, to conduct 7, 14, and 28 day breaks of cylinders. Copies of test breaks for each cylinder shall be furnished to the Engineer.

### 3.07 PATCHING

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C Patch imperfections in accordance with ACI 301.

### 3.08 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details dimensions, tolerances, or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Engineer.
- C. Do not patch, fill, tough-up, repair or replace exposed concrete except upon express direction of Engineer for each individual area.

# 3.09 SCHEDULE - CONCRETE TYPES AND FINISHES

- A. Below grade footings: 3500 psi.
- B. Thrust blocks: 3500 psi.
- C. All other concretes: 4000 psi
- D. Finishes:
  - 1. Formed surfaces:
    - a. Not exposed: Remove fins and repair obvious defects.
    - b. Exposed to view: Patch tie holes and defects, and remove fins. Give smooth rubbed finish.
  - 2. Unformed surfaces:
    - a. All surfaces to have floated finish unless noted.
    - b. Troweled finish: Building floor slabs and similar structures.
    - c. Broom finish: All exposed floor areas, sidewalks, and steps subject to foot traffic and likely to be wet should have a broom finish.

- END OF SECTION -

# DIVISION 04 MULTI-COLUMN ELEVATED WATER STORAGE TANK

# **SECTION 04000**

### MULTI-COLUMN ELEVATED WATER STORAGE TANK

# PART 1. GENERAL

## 1.01. Description

The contractor shall furnish, erect, paint and sterilize a new 1,000,000 gallon capacity, torus bottom style welded steel elevated water storage tank. The tank is to be complete with all accessories specified herein, and is to be erected on a foundation to be designed and constructed by the tank contractor. The tank site is located off of Catnip Hill Pike in northwestern Jessamine County.

# 1.02. Scope

The Contractor shall be responsible for all labor, materials and equipment necessary for the design, fabrication, construction, painting, disinfection and testing of an elevated, welded carbon steel water storage tank supported by a series of supporting columns and cross bracing. This style of tank is commonly referred to as a "Multi-Column" Tank. Design and construction of the Elevated Tank shall conform to all requirements of AWWA D100 Standard for Welded Carbon Steel Tanks for Water Storage, except as modified by the requirements of these contract documents.

# 1.03. Experience

The design and construction of the "Multi-Column" elevated water storage tank shall only be undertaken by a Contractor with a minimum of ten (10) years experience with elevated tank construction. The Contractor must be able to demonstrate experience through the design and construction of at least ten (10) "Multi-Column" elevated water tanks. The Contractor shall not subcontract the design or erection of the steel tank and supporting tower.

# 1.04. Standard Specifications

All work on the water storage tank shall fully conform to the requirements of the latest published editions of the following Standard Specifications:

- A. AWWA (American Water Works Association) D100 Standard for Welded Carbon Steel Tanks for Water Storage.
- B. AWWA D102 Standard for Painting Steel Water Storage Tanks.
- C. AWWA C652 Standard for Disinfection of Water Storage Facilities.
- D. AWS (American Welding Society) D1.1
- E. NSF (National Sanitation Foundation) 61 Materials in contact with Potable Water.
- F. Steel Structures Painting Council Manual Volume 1 Good Painting Practice.

- G. Steel Structures Painting Council Manual Volume 2 Systems and Specifications.
- H. ACI 318 Building Code Requirements for Reinforced Concrete
- I. ACI 301 Standard Specification for Structural Concrete

# 1.05. Tank Details

The elevated tank shall be all-welded construction of the most economical design. All members of structural steel or of reinforced concrete shall be designed to safely withstand the maximum stresses to which they may be subjected during erection and operation.

- A. The minimum operating capacity of the storage tank will be 1,000,000 US gallons.
- B. The capacity of the tank, low water level to high water level, shall be contained within a maximum operating head range of 38'9".
- C. The height of the tank, top of foundation to high water level, shall be 148.68 feet.
- D. Top of foundation elevation shall be 1,023.00 feet

# 1.06. Working Drawings

After contract award and prior to construction, the Contractor shall provide engineering drawings and design calculations for the elevated steel tank and the foundation. Drawings shall show the size and location of all structural components and the foundations along with reinforcement details, the required strength and grade of all materials, and the size and arrangement of principle piping and equipment. The design coefficients and resultant loads for snow, wind and seismic forces, and the methods of analysis shall be documented. All submitted plans shall be stamped by a Professional Engineer registered in Kentucky.

# PART 2. DESIGN

# 2.01. General

The structural design of the elevated storage tank shall conform to the following design standards (latest edition) except as modified or clarified as follows:

- A. Foundations AWWA D100 and ACI 318 Building Code Requirements for reinforced concrete.
- B. Steel Tank AWWA D100
- C. Steel Tank Painting AWWA D102

# 2.02. LOADS

### A. Seismic Load

Seismic Design shall be performed in accordance with Section 13 of AWWA D100-05.

### B. Wind Load

Wind pressure shall be determined in accordance with AWWA D100-05, Section 3.1.4.

# C. Snow Load

Snow load shall be determined in accordance with AWWA D100-05.

# 2.03. Foundation

A Geotechnical investigation has been carried out at the site and a copy of the report is included with the Contract Documents.

# 2.04. Steel Tank

### A. General

The materials, design, fabrication, erection, welding, testing and inspection of the steel tank shall be in accordance with the applicable sections of AWWA D100 except as modified in this document.

### B. Minimum Plate Thickness

The minimum thickness for any part of the structure shall be 3/16 inch for parts not in contact with water and 1/4 inch for parts in contact with water. All portions of the tank including the roof shall be of watertight construction.

### PART 3. CONSTRUCTION

# 3.01. Concrete Foundation

The foundation shall be designed and constructed to safely and permanently support the structure. The concrete foundation shall be constructed in accordance with ACI 301.

# 3.02. Steel Tank Construction

### A. General

The erection of the steel tank shall comply with the requirements of Section 10 of AWWA D100 except as modified by these documents.

# B. Welding

All shop and field welding shall conform to AWS and AWWA D100, Section 10. The contractor shall ensure welders or welding operators are qualified in accordance with ASME Section IX or ANSI/AWS B2.1.

### C. Fabrication

All fabrication and shop assembly shall conform to the requirements of AWWA D100, Section 9, Shop Fabrication.

### D. Erection

Plates subjected to stress by the weight or pressure of the contained liquid shall be assembled and welded in such a manner that the proper curvature of the plates in both directions is maintained. Plates shall be assembled and welded together by a procedure that will result in a minimum of distortion from weld shrinkage.

# E. Inspection and Testing

Inspection of shop and field welds shall be in accordance with AWWA D100, Section 11, Inspection and Testing. All inspection shall be performed prior to interior and exterior field painting. Radiographic inspection shall be performed by an independent testing agency with all costs included in the Contractor's bid and paid by the Contractor.

# F. Roof Lap Joints

All interior lap joints shall be sealed by means of caulking or continuous seal welding. This shall include penetrations of roof accessories.

# G. Painting and Disinfection

Surface preparation and coating of all steel surfaces shall be in accordance with Section 0500 "Coating System for Steel Water Storage Tanks".

### PART 4. ACCESSORIES

# 4.01. General

The following accessories shall be provided in accordance with these specifications. All items shall be in full conformity with the current applicable OSHA safety regulations and the operating requirements of the structure.

### 4.02. Ladders

Access ladders shall be provided at the following locations:

- A. The tower ladder, which shall be caged, shall extend up one column from near the base connecting with the balcony. The first rung shall be located approximately 8 feet above top of foundation, with a locking ladder guard in this location.
- B. An outside tank ladder from the balcony to the roof hatch.

- C. An inside tank ladder from the roof hatch to the inside bottom of the tank.
- D. An inside riser ladder from the base of the riser to the bottom of the tank. Ladder side rails shall be a minimum 3/8 inch by 2 inches with a 16 inch clear spacing. Rungs shall be not less than 3/4 inch, round or square, spaced at 12 inch centers. The surface of the rungs shall be knurled, dimpled or otherwise treated to minimize slipping. Ladders shall be secured to adjacent structures by brackets located at intervals not exceeding 10 feet. Brackets shall be of sufficient length to provide a minimum distance of 7 inches from the center of the rung to the nearest permanent object behind the ladder.

### 4.03. Fall Protection

Ladders shall be equipped with a fall arrest system meeting OSHA regulations. The system shall be supplied complete with safety harnesses, locking mechanisms, and accessories for two persons. The tank Contractor shall also furnish a full body safety harness with a shock cord to the Engineer at start of project.

# 4.04. Balcony

The tank shall be equipped with a balcony not less than 36" wide with a handrail not less than 42" high. The floor shall be perforated for drainage.

### 4.05. OPENINGS

### A. Roof Hatches

Provide two access hatches on the roof of the tank. One hatch shall be 30 inch diameter and allow access from the roof to the interior of the tank. The hatch will be hinged and equipped with a hasp for locking. The hatch cover shall have a 2 inch downward edge. The second hatch will be 24 inch diameter and flanged with a removable cover so constructed that an exhaust fan may be connected for ventilation during painting operations. The openings shall have a minimum 4 inch curb.

## B. Tank Vent

The tank vent should be centrally located on the tank roof above the maximum weir crest elevation. The tank vent shall have an intake and relief capacity sufficiently large that excessive pressure or vacuum will not develop during maximum flow rate. The vent shall be designed, constructed and screened so as to prevent the ingress of wind driven debris, insects, birds and animals. The vent shall be designed to operate when frosted over or otherwise clogged. The screens or relief material shall not be damaged by the occurrence and shall return automatically to operating position after the blockage is cleared.

# C. Riser Manhole

A minimum 18 x 24 inch elliptical access manhole shall be provided approximately 3 feet above the base of the wet riser. The hatch shall open inward.

### 4.06. Riser

The diameter of the wet riser shall be not less than 6 feet.

# 4.07. Piping

# A. Inlet/Outlet Piping

The vertical combined inlet/outlet pipe connection to the bottom of the riser shall be a 12 inch standard weight carbon steel pipe with appropriate transition to a ductile iron base elbow of the same diameter. The vertical pipe shall extend up into the riser one foot above the riser base.

### B. Overflow

The 12 inch steel overflow pipe shall have a minimum wall thickness of 1/4". A suitable weir shall be provided inside the tank with the crest located at High Water Level. The overflow shall be routed from the weir to closely match the roof contour and extend down.

### 4.08. Identification Plate

A tank identification plate shall be mounted on the tank riser pipe above the access manhole. The identification plate shall be corrosion resistant and contain the following information.

- A. Tank Contractor
- B. Contractor's Project Or File Number
- C. Tank Capacity
- D. Tank Diameter
- E. Height To High Water Level
- F. Overflow Elevation
- G. Date Erected

### PART 5. Guarantee

# 5.01. General

The tank Contractor shall guarantee all work for a period of one year from the contract closeout date. Performance and payment bond shall remain in effect, until released by owner, to ensure compliance with warranty.

# -END OF SECTION-

# DIVISION 05 TANK PAINTING SPECIFICATIONS

# SECTION 05000

# TANK PAINTING SPECIFICATIONS

### PART 1 - GENERAL

### 1.01 DESCRIPTION

A. Coat the new steel potable water storage tank constructed as part of this contract.

### 1.02 QUALITY ASSURANCE

- A. All materials specified herein are manufactured by the Tnemec Co., Inc., North Kansas City, Missouri, or equal. These products are specified to establish standards of quality and are approved for use on this project.
- B. Equivalent materials of other manufacturers may be substituted on approval of the Engineer. Requests for substitution shall include manufacturer's literature for each product, giving the name, generic type, descriptive information and evidence of satisfactory past performance. Submittals shall include the performance data as certified by a qualified testing laboratory.
- C. Bidders desiring to use coatings other than those specified shall submit their proposal in writing to the Engineer prior to surface preparation or application. Substitutions which decrease the dry film thickness, the number of coats applied, change the generic type of coating or fail to meet the performance criteria of the specified materials will not be approved. Prime and finish coats of all surfaces shall be furnished by the same manufacturer.
- D. All materials shall be compatible with the service intended. No products shall be used that may have ingredients which might react detrimentally with adjacent fluids or gases. All materials intended for use on the interior of the tank shall be included on the National Sanitation Foundation list of drinking water system components and be approved by the Kentucky Division of Water for such use.
- E. All field applied primers and intermediate coats shall be provided to insure compatibility of total coating systems and of the same manufacturer as the finish coats for each system as specified. Provide barrier coats over incompatible primers or remove and reprime as required. No thinner or solvents other than those approved by the coating manufacturer shall be used.

# 1.03 COATINGS

A. Epoxy-Polyamide - The coating shall meet or exceed all of the following test results, Federal and/or ASTM standards using the associated test:

Test: Abrasion

Method: Federal Test Method Standard No. 141, Method 6192 CS-17 Wheel

1,000 grams load

Requirement: No more than 130mg.loss after1,000 cycles

Test:

Adhesion

Method:

Elcometer Adhesion Tester (0-1000 psi) Not less than 800 psi pull, average 3 trials

Test:

Fresh Water

Method:

Coating system applied to sandblasted steel panels, cured for seven (7)

days at 77° F and immersed tap water 77°F

Requirement:

Requirement:

No blistering, cracking softening or delamination of film after eighteen (18)

months

Test:

Hardness

Method:

ASTM3363-74(pencil)

Requirement:

Must pass 6H

Test:

Impact

Method:

**ASTM G-14-72** 

Requirement:

No less than 140 in./lb. average

B. Aliphatic Polyurethane - The coating shall meet or exceed all of the following test results, Federal and/or ASTM Standards using the associated test:

Test:

Abrasion

Method:

ASTM D 4060; CS-17 Wheel 1,000 grams load No more than 95 mg. loss after 1,000 cycles

Test:

Adhesion

Method:

Elcometer Adhesion Tester (0-1000 psi) Coating system applied to

sandblasted steel panels and cured a minimum of thirty (30) days at 77° F

Requirement:

Requirement:

Not less than a rating of 5, average of 3 tests

C. Urethane Zinc-Rich Primer - The coating shall meet or exceed all of the following test results, Federal and/or ASTM standards using the associated test:

Test:

Abrasion

Method:

ASTM D 4541; Coating applied to sandblasted steel panels and cured

fourteen(14) days at 77° F/50% R.H.

System:

90-8 One-coat 90-97 Tnemec-Zinc

Requirement:

Not less than 800 psi pull, average 3 trials

### 1.04 SUBMITTALS

- A. Submittals shall be as specified in the General Conditions.
- B. Submit the following:
  - Coating manufacturer's certificate for each coating proposed for use attesting that the coatings meet the specifications in this section and are proper for the proposed application.
  - 2. Coating manufacturer's specifications and data sheets and application instructions for each coating proposed for use on the interior and exterior of the tank including the coating for the logo.
  - 3. Color chart for Engineer's selection of colors.

4. Certificate of compliance to each product performance requirement.

# 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. The Contractor shall be responsible for the delivery, storage and handling of coating products.
- B. Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label.
- C. Provide labels on each container with the following information:
  - 1. Name or title of material;
  - 2. Manufacturer's stock number;
  - 3. Manufacturer's name:
  - 4. Contents by volume, for major pigment and vehicle constituents;
  - 5. Expiration date after which the material should not be used;
  - 6. Thinning instructions; and
  - 7. Application instructions.
- D. Store coating products in sealed and labeled containers. Properly store coatings to prevent degradation of the coating products. Do not use coating products which have been damaged during storage, which have not been applied prior to the applicable expiration date, or which do not otherwise comply with the specifications. Promptly remove damaged coating products from the job site.
- E. Restrict storage to coating materials and related equipment. Store materials in an area protected in accordance with NFPA Bulletin No. 101.
- F. Product delivery, storage and handling shall meet the requirements of safety, health and fire regulations. Remove used rags from the job site and take all necessary steps to prevent spontaneous combustion.

### 1.06 JOB CONDITIONS

- A. The contractor shall ascertain that job conditions are suitable for the application of coatings.
- B. Do not apply coatings when the surrounding air temperature, measured in the shade, is below 50° F. Do not apply coatings when the temperature of the surface to be coated is below 50°F. Do not apply coatings when the relative humidity exceeds 85%. Do not apply coatings in extreme heat. Do not apply coatings in dust or smoke-laden air.
- C. Take all precautions necessary to prevent damage of adjoining properties due to coating work. The Contractor shall be solely liable for such damage.
- D. Conduct all operations in a clean and sanitary manner. No nuisance shall be committed in a tank; the workmen shall either use proper waste receptacles or leave the tank whenever necessity arises.

E. The Contractor shall not operate valves or controls in the existing waterworks. The Owner will operate all existing valves, hydrants, blowoffs and controls.

### PART 2 - PRODUCTS

# 2.01 INTERIOR COATINGS

The interior coatings shall be as follows:

COAT	COATING TYPE	TNEMEC SERIES	DFT
Primer	Zinc-Rich Moisture Cured Urethane Primer	94H20 Hydro-Zinc	2.5-3.5 mils
Intermediate	Polyamidamine Epoxy	N140-1225 Pota-Pox Plus	4.0-6.0 mils
Finish	Polyamidamine Epoxy	N140-15BL Pota-Pox Plus	s 4.0-6.0 mils

# 2.02 EXTERIOR COATINGS

The exterior coatings shall be as follows:

COAT	COATING TYPE	TNEMEC SERIES	DFT
Primer	Zinc-Rich Moisture Cured Urethane Primer	94H20 Hydro-Zinc	2.5-3.5 mils
Intermediate	Polyamidamine Epoxy	N69	2.0-3.0 mils
Finish	Polyfunctional Hybrid Urethane	740 Endura-Shield UVX	2.5-4.0 mils

### 2.03 SIGN

The legend "JESSAMINE SOUTH ELKHORN WATER DISTRICT" shall be painted on two sides of the tank, in lettering size and style appropriate for visibility, and as approved by Engineer. Themec Series 700 HydroFlon or equivalent applied at 2.0-3.0 dry mils per coat

### 2.04 COLORS

- A. Vary the color of alternate coats to provide a contrast.
- B. Finish color of tank exterior and tank signs shall be per direction of the Engineer.

### PART 3 - EXECUTION

### 3.01 INSPECTION

A. The Engineer or an outside inspection service representing the Engineer will make inspections shown in this Article. Additional inspections will be made if required. It shall be the responsibility of the Contractor to request an inspection by at least the end of the second day preceding the inspection day. Should the Engineer be summoned to inspect a complete phase of construction and find the work incomplete and, therefore, not ready for inspection, the contractor shall bear the cost of inspection. It is not the intent to charge the contractor for an inspection if discrepancies are found in the complete phase of construction as long as the discrepancies do not necessitate additional inspection trips.

# B. The following inspections will be made:

 After uncoated surfaces in the interior of a tank have been blasted and before coatings are applied, the coated surface on the exterior of a tank, tower, and appurtenances shall be blasted and primed immediately; however, if the inspector removes field primed, over blasted or shop primed areas and finds evidence of improper blasting and cleaning, the inspector may order all questionable coatings removed by blasting and the cleaned areas reprimed at no cost to the Owner;

- 2. After all coating work has been completed; at this time, the total required mil thickness, lack of holidays", and aesthetic acceptability will be checked by the Engineer.
- 3. A first anniversary inspection shall be made at approximately one year's time after the painting has been completed to determine whether any repair work is necessary. The owner shall establish the date for the inspection and shall notify the Contractor at least 30 days in advance. If an inspection has not been established within 13 months after final acceptance of the painting work by the owner, the first anniversary inspection shall be considered to be waived. The Owner shall drain the tank, and the Contractor shall provide all lighting, ventilation and other equipment necessary to complete the inspection.

Any location where coats of paint have peeled off, bubbled or cracked and any location where rusting is evident shall be considered to be a failure of the paint system. The Contractor shall make repairs at no cost to the Owner at all points where failures are observed by removing the deteriorated coating, cleaning the surface and recoating with the same paint system. If the areas of failures exceeds 25 percent of the area of a portion of the tank surface, then for that portion, the entire paint system shall be removed and repainted. For purposes of determining the need for complete repainting, the inside roof, shell and floor and the outside roof, shell, floor, legs, ladders, and catwalk shall be considered separately.

The Contractor shall prepare and deliver to the owner an inspection report covering the first anniversary inspection, setting forth the number and type of failure observed, the percentage of the surface area where failure has occurred, and the names of the persons making the inspection. Color photographs illustrating each type of failure shall be included in the report.

- C. The contractor shall furnish the following for purpose of inspection by the engineer:
  - Pictorial surface preparation standards as provided by the steel structures Paint Council (SSPC - Vis 1) or the American society for Testing and Materials (ASTM D2200);
  - 2. Wet film thickness measurement gauge;
  - 3. Dry film thickness measurement gauge;
  - 4. certified thickness calibration standards;
  - 5. Steel temperature gauges;
  - 6. Wet bulb and dry bulb temperature-measuring equipment and psychometric tables;
  - 7. Low-voltage wet sponge instrument; and
  - 8. "Tooke" gauge.

Additionally, the Contractor shall provide any necessary rigging to facilitate the inspection of all tank areas. Proper coordination with the Engineer is intended to prevent extensive re-rigging by the Contractor. Therefore, it is the responsibility of the Contractor to keep the Engineer fully informed on the status of the painting operation.

### 3.02 EXTERIOR COATING SYSTEM

## A. Shop Coating

- 1. Abrasive blast clean all surfaces in accordance with Steel structures Painting council Specification SSPC-SP 6 Commercial Blast. Commercial Blast is defined as the removal of at least two-thirds of all visible rust, mill scale, paint and other foreign matter from each square inch of surface.
- 2. Apply one coat Tnemec Series 94H20 Hydro Zinc to a dry film thickness between 2.5 3.5 mils.

# B. Field Coating

- Following erection, spot clean all rusted abraded areas in accordance with SSPC-SP 6 Commercial Blast. Feather all edges of existing primer or remove any loose or lifted primer. Clean all exterior metal surfaces before applying subsequent field coats.
- 2. Apply Tnemec Series 94H20 Hydro Zinc on the blasted areas to a dry film thickness of 2.5 3.5 mils.
- 3. Apply one intermediate Coat of Tnemec Series N69 to a dry film thickness 2.0 3.0 mils.
- 4. Apply one finish coat of Tnemec Series 740 Endura Shield UVX to a dry film thickness of 2.5 4.0 mils.
- C. The total dry film thickness of the exterior coating system shall not be less than 7.0 mils.

# 3.03 INTERIOR COATING SYSTEM

### A. Shop Coating

- Abrasive blast clean all surfaces in accordance with steel structures Painting Council Specifications SSPC-SP 10 Near White Metal Blast. Near White Metal Blast is defined as the removal of 95% of all visible rust, mill scale, paint and other foreign matter from each square inch of surface by compressed air nozzle blasting.
- 2. Apply one coat Tnemec Series 94H20 Hydro Zinc Primer to a dry film thickness between 3.0 5.0 mils.

# B. Field Coating

- Following erection, spot clean all rusted abraded areas in accordance with SSPC-SP 10 Near white Metal Blast. Feather all edged of existing primer to remove any loose of lifted primer. Clean all interior surfaces before applying subsequent field finish coat.
- 2. Apply Tnemec Series 94H20 Hydro Zinc Primer on the blasted areas to a dry thickness of 2.5 3.5 mils.
- 3. Apply intermediate coat Tnemec Series 140-1255 Pota-Pox to a dry film thickness of 4.0-6.0 mils.

- Apply one finish coat of Tnemec Series 20-AA90 Pota Pox White to a dry film thickness of 4.0 - 6.0 mils.
- C. The total dry film thickness of the interior coating system shall not be less than 11.0 mils.

### 3.04 COATING PROCEDURES

- A. All coating work shall meet the requirements of the coating manufacturer.
- B. All surfaces to be coated shall be in the proper condition to receive the specified coatings before any coatings are applied. Do not sandblast any more surface than can be primed within the same working day that the sandblasting is done. Round off all sharp edges and rough welds. Remove all burrs and weld spatter, remove oil, grease and heavy deposits of surface contaminates by solvent or detergent Cleaning. All surfaces shall be clean, dry and free of any dirt, dust, grease, oils, salts, and other deleterious substances before coatings are applied.
- C. Whatever metal is cleaned during a working day shall be coated with primer on the same working day.
- D. Coat all interior and exterior weld seams surfaces by the brush method on field prime coat field intermediate coats.
- E. Coatings shall be applied in such a manner to produce as uniform a thickness of coat and as complete a coverage as possible, free of lap marks.
- F. Each coat shall have air drying period of at least 24 hours.
- G. The dry film thickness specified shall be obtained. Additional coats shall be applied at the Contractor's expense, if required to achieve the specified dry film thickness.
- H. Only good, clean brushed and equipment shall be used. Clean all brushes, rollers, buckets and spray equipment at the end of each coating period.
- I. Do not start filling the coated tank with water before the coatings have properly dried or cured. The minimum drying or curing time allowed shall be not less than seven days at 75°

-END OF SECTION-

# **DIVISION 06**

SCADA
SUPERVISORY CONTROL AND DATA ACQUISTION SYSTEM

# **SECTION 06000**

# SCADA-SUPERVISORY CONTROL AND DATA ACQUISTION SYSTEM

PART 1 - GENERAL

### 1.01 PROJECT DESCRIPTION

# A. Description of Work

The work to be accomplished under this section shall consist of furnishing the equipment necessary for a complete automatic control and monitoring system to function as specified herein and as shown on the drawings. The system integrator's shall furnish a completely integrated all solid-state radio telemetry base Supervisory Control and Data Acquisition (SCADA) system. It shall be the system integrator's responsibility to supply a system that is compatible with existing equipment, new equipment supplied by others as part of this contract, and equipment supplied in other contracts. The complete system shall be designed, fabricated, programmed, tested, started up, and warranted by a single supplier to insure a single source of responsibility.

# B. Scope of Work

This section covers a radio telemetry based SCADA and Instrumentation System to include:

(1) 1,000,000 Gallon Elevated Tower Remote Unit (RTU), and upgrades to the existing Central Terminal Unit with software upgrades to the existing Operator Display Console HMI software.

# C. Contractor Shall Supply

- 1. All equipment required in other sections of the specifications.
- 2. All labor for installation and start-up of the system.

# D. System Integrator Shall Supply:

- 1. Engineering submittal and shop drawings prior to installation.
- 2. All the paper work and fees necessary to obtain a FCC radio license in the name of the Owner.
- 3. All ancillary equipment, hardware, software, and appurtenances needed for proper installation and operation of equipment.
- 4. All user licenses and fees for software supplied in this system with licenses in the name of the owner.

- 5. Provide spare parts and maintenance tools as described below.
- 6. Operation and maintenance manuals as detailed below.
- 7. All start-up labor and services.
- 8. All operator training.

# E. Owner Shall Supply:

- 1. Access and easements as needed for all sites.
- 2. 120VAC power at all sites.

# F. Tank Contractor Shall Supply:

- 1. Pressure sensing taps for all sensing points in the system.
- 2. Meter pits for sensing tank levels or line pressures in the system.

#### 1.02 QUALITY ASSURANCE

#### A. Manufacturer's Qualifications

The system specified herein shall be the product of a manufacturer who can demonstrate at least ten (10) years of satisfactory experience in furnishing and installing comparable radio based telemetry/control systems for water and wastewater installations. the manufacturer of this system shall maintain a 24-hour available inventory of all replaceable modules to assure the Owner of prompt maintenance service and a single source of responsibility. The manufacture and shall certify this to the Engineer in writing at the time of bidder pre-qualification.

# B. Pre-bid Approval

The Base Bid approved systems integrator for this project is:

Micro-Comm, Inc. Tel 913-390-4500 15895 S. Plfumm Rd Fax 913-390-4550

Olathe, KS 66066

Local Representative: Roger Schmidt, 859-657-6118

Other integrators desiring to bid this project as "alternate" integrators must seek pre-bid approval by providing a submittal (14) days prior to the bid date. Submissions that fail to include a complete submittal as detailed shall be deemed unresponsive. The Consulting Engineer and the Owner shall be the sole judge as to whether the alternate equipment is considered an approved equal. Approval of an alternate system by the Engineer will not relieve the alternate system of strict adherence to these specifications. The pre-bid

- 1. An installation list with the names and phone numbers of both the Owner and Consulting Engineer for at least ten projects of similar size and complexity.
- 2. A "statement of compliance" detailing paragraph by paragraph the bidders compliance to these specifications.
- 3. Block diagrams for the various sites in the proposed system showing the selected pieces of hardware equipment to be used.
- 4. Sample electrical drawings for typical sites proposed in this contract.
- 5. A product performance data sheet shall be included for each hardware component in the system (i.e. antennas, radios, coaxial cables & arrestors, programmable controllers, power supplies, time delays and relays, and the various sensors required) and each software component (programming & configuration software and operator display console software).
- 6. Radio path study for each radio path in the system. Bidders shall satisfy themselves that the necessary radio frequency(s) can be obtained. The radio path study provided by each bidder shall utilize either:
  - a. Computer generated techniques utilizing a USGS 3 second terrain database to plot the path profiles for each radio path with elevation samples at not more that 200 foot increments.
  - b. Actual field measurements to showing the necessary antenna heights, transmitter power, and antenna gains required to insure a 20db fade margin as detailed in Section 2.02 of these specifications. The a physical path analysis shall be made using temporary equipment installations and a radio communications analyzer to measure actual path margins. The bidder shall include in his bid, all the calculations used to extrapolate the measured data. The bidder is expected to obtain the necessary temporary FCC license for the study.
- 7. Communications diagram for the entire system showing normal CTU-RTU communications paths and Peer-to-Peer back-up communications paths.

# C. Approval Agencies

The control system and its components shall comply will all applicable requirements of the following:

- 1. Electrical Code Compliance (National & Local)
- 2. UL 508A
- 3. NEMA Compliance

- 4. IEEE Compliance
- EIA Compliance
- 6. FCC Compliance

# 1.03 SUBMITTALS:

- A. Complete submittal shall be provided to the engineer for approval prior to equipment fabrication. The submittal data shall include the following:
  - Product Data Provide product data sheets for each instrument and component supplied in the system. The data sheets shall show the component name as used on reference drawings, manufacturer's model number or other product designator, input and output characteristics, scale or ranges selected, electrical or mechanical requirements, and materials compatibility.
  - 2. Shop Drawings Provide drawings for each panel showing the wiring diagrams for control circuits and interconnections of all components. The drawings shall include wiring diagrams for all remote devices connected to the panel.
  - Panel Layout Drawings A front panel and sub-panel layout shall be included as part of each control panel drawing. Components shall be clearly labeled on the drawing.
  - 4. Installation Drawings Typical installation drawings applicable to each site in the system shall be included.
  - Operator Interface Software The submittal shall include a generic but detailed technical description of the Operator's Interface Software as proposed for this system including:
    - a. Sample text screens and menus
    - b. Sample graphics screens
    - c. Sample report logs and printed graph

# 1.04 MAINTENANCE INFORMATION

# A. Maintenance Data Manuals

Submit maintenance manuals and "as built" drawings on all items supplied with the system. The manuals and drawings are to be bound into one or more books as needed. In addition to "as built" engineering submittal data and drawings, the manual shall include trouble shooting guides and maintenance and calibration data for all adjustable items.

# 1.05 JOB CONDITIONS

- A. All instruments and equipment shall be designed to operate under the environmental conditions where they are to perform their service. The equipment shall be designed to handle lightning and transient voltages as normal environmental hazards. The environmental conditions are as follows:
  - 1. Outdoor The equipment will be exposed to direct sunlight, dust, rain, snow, ambient temperatures from -20 to +120 degrees F, relative humidity of 10 to 100 percent, and other natural outdoor conditions. The installations shall be hardened to with stand normal vandalism.
  - 2. Indoor The equipment will be capable of operating in ambient temperatures of +32 to +130 degrees F and relative humidity of 20 to 100 percent.

# 1.06 DELIVERY, STORAGE, & HANDLING

A. All items shall be stored in a dry sheltered place, not exposed to the outside elements, until ready for installation. All items shall be handled with appropriate care to avoid damage during transport and installation.

# 1.07 SEQUENCING & SCHEDULING

#### A. Coordination

The Systems Integrator shall coordinate with other electrical and mechanical work including wires/cables, raceways, electrical boxes and fittings, controls supplied by others, and existing controls, to properly interface installation and commissioning of the control system.

# B. Sequence

Sequence installation and start-up work with other trades to minimize downtime and to minimize the possibility of damage and soiling during the remainder of the construction period.

# 1.08 DISTRIBUTED CONTROL OPERATION

# A. General

The control system shall use "Programmable Logic Controllers" (PLCs) at all locations in the system as detailed later in these specifications. Each site in the system shall have a unique digital address. The Central Processing Units (CPUs) and Input/Output (I/O) cards used in each of the PLCs shall all be identical, fully interchangeable with out reprogramming by the operator. The PLCs shall be "self-initializing" and "self restoring" so that operator intervention is not required after power interruptions, transients from lightning storms, or component changes.

The system shall be composed of a Central Terminal Unit (CTU) that monitors and or controls the operation of multiple Remote Terminal Units (RTUs). The CTU shall be composed of a PLC (as described above) and one or more Operator Display Consoles

(ODCs) with Human-Machine-Interface (HMI) software to display, alarm, record, all data received and for operator input for changes to the system.

The control system shall be capable of implementing multiple modes of communications in a single system to include: radio, leased phone-line, dial-up phone-line, high speed data highway, fiber optic, and Ethernet communications as details in these specifications. The individual sites in the system shall simultaneously support both Master-Slave and Peer-to-Peer communications as needed implement the distributed control features listed in these specifications.

# B. Distributed Control Software Features

The system shall be a "distributed control" type system that simultaneously provides for the features of both "supervisory control" (i.e. centralize control of RTUs from the CTU) and "distributed control" (i.e. RTU self initiated control using local inputs and peer-to-peer communications with other RTUs) in to a single unified control system. The control system shall simultaneously support both Master-Slave (ie CTU to RTU) and Peer-to-Peer (i.e. RTU to RTU) communications to provide completely automatic control with no single point of system wide failure in either the PLC system or the communications system. The systems integrator shall implement redundant communications paths between RTUs to maintain automatic control in the event of CTU or system wide communications failure.

The control algorithms shall have the ability to integrate both hardware and software operator inputs (i.e. ODC setpoints and selector switch inputs) along with hardware inputs at the remote sites (i.e. remote Hand/Off/Auto selector switches, etc.) in to a unified cohesive automatic control system. As data is received, changes, or lost (i.e. a loss of signal from a RTU or CTU), the Central Unit control logic shall automatically adjust the controlling algorithm to the new situation.

In general the RTUs shall receive and store control parameter commands as inputted by the operator from both the CTU or the RTU. These inputs shall be displayed at both the CTU and RTU. Distributed control shall provide for fully automatic by the RTU based on the pre-programmed control algorithm, operator inputs received from the CTU, operator inputs received from the RTU front panel display, data received from other RTUs, and local inputs monitored at the RTU. For example, the RTU shall based on operator inputs automatically control the operation of pumps or valves based on level data received from other RTUs and local pressure, flow, and discrete inputs monitored at the RTU. Pump call/run/fail status shall be reported to the CTU for centralize display, alarming, and recording. The RTU distributed control algorithm shall handle the daily pump call/run/fail, automatic alternation, automatic transfer on fail, high discharge cut-off, low suction cut-off, low & high flow cut-ff and basic tank fill or demand supply operations at the pump station for RTUs as detailed for each RTU.

Supervisory control shall automatically or manually provide for the CTU to be able to override or modify the automatic operation of RTUs based on a pre-programmed control algorithm. For example, the CTU shall be able to automatically turn on or off pumps at RTUs or change RTU operational parameters as needed to satisfy "system" wide requirements such as peak load shedding for power or water distribution management during peak demand periods.

The control system shall provide for multiple levels of control such that a single point of

failure shall not render the control system in-operative:

- 1. In the event of a ODC failure, the PLC at the shall continue to poll all of the RTUs to collect data and provide supervisory control.
- 2. In the event of PLC failure at the CTU, the individual RTUs shall continue to provide fully automatic control using last stored operator inputs and peer-to-peer communications with other RTUs for control data as needed.
- 3. In the event of peer-to-peer communications failure between RTUs, the controlling RTUs (ie sites with pumps, valves, etc) shall continue to provide automatic control based on locally sensed pressures and flows.
- 4. In the event of complete failure of local RTU at a booster station (or similar site), the failure shall cause a "system normal" lamp and relay to be de-energized to automatically re-engage any existing back-up control system (such as pressure switches, float switches, etc.) to maintain automatic control.

The system shall automatically revert to the next higher level of control as communications or equipment failures are repaired.

# C. Standard Control Software Features

The supplied software shall not be a one-of-a-kind system, but rather a comprehensively designed software platform that provides a number of built in features that monitor local & remote inputs combined with standard software algorithms to provide an integrated system as follows:

- Monitor local Hand/Off/Automatic (HOA) selector switch positions (i.e. on existing pump control panels) and integrate the switch position in to the control logic such that a HOA in HAND or OFF shall be considered by the control system as 'unavailable".
- 2. Provide for High Discharge Cut-off and Low Suction Cut-off control of pumps from locally entered setpoints at RTUs equipped with suction and discharge pressure transmitters and/or from existing pressure switches.
- 3. Provide automatic Pressure/Flow pump staging operation of pumps of different sizes (including variable speed pumps) from local discharge pressure and discharge flow inputs in a closed-loop system. The pumps shall be up-staged on decreasing discharge pressure and down-staged on decreasing flow rate. The control shall include PID (Proportional Integral Derivative) loop control of variable speed pumps mixed with constant speed pumps for the various stages required.
- 4. Provide "Compound Loop" PID control of final devices (i.e. chemical feeders) from multiple inputs (i.e. flow rate and a chemical process analyzer, such as chlorine residual).

# 1.09 RADIO CHANNEL DATA OPERATION

#### A. General

The control system shall be specifically designed for radio channel data communications. The core of the system shall be over FCC licensed radio frequency spectrum intended for SCADA and remote control purposes. The systems integrator shall be responsible of obtaining the necessary FCC licenses for one or more frequencies as needed to establish both supervisory and distributed control.

All of the equipment required for operation of the system shall be directly owned by the Owner and included as part of this contract. Systems using third party repeaters, trunking masters, or leased equipment will not be allowed. The Systems Integrator shall select radio equipment as detailed below to insure reliable operation and be able to implement all software features listed in this specification whether currently required or described as a "shall be capable" feature.

The overall system design and operation shall provide a 20db pad over the minimum required for operation on all primary data paths (primary paths may include data relays) to insure a 98% reliability of communications. Remote site communications for distributed peer-to-peer communications shall provide 30db of pad to insure operation under all weather conditions and provide a 99.9% communications reliability. The 20db and 30db pad requirements and FCC rule compliance shall be demonstrated (at no additional cost) to the Engineer at his request. The testing shall be accomplished using an IFR AM/FM 1000S communications analyzer or equal equipment.

# B. Communications

The CTU-RTU supervisory communications and RTU-RTU distributed control communications system shall operate in a half-duplex mode over a single "licensed" radio frequency using "point-to-point" communication techniques. The RTUs shall monitor for the channel to avoid data collisions with other RTUs during peer-to-peer communications. The system shall be capable of sharing the radio channel with other radio telemetry system.

To facilitate system layout and future expansion all RTUs shall under the direction of the CTU be able to implement store-and-forward communications to relay data and commands to and from other RTUs as required to establish the desired path. Should the assigned relay site for a distant remote be inoperative, the Central Unit shall automatically choose another remote site to access the distant remote. Any RTU shall be able to provide automatic antenna switching as part of their relaying operations.

All data transmitted shall be in digital word form using FSK (frequency shift keying) transmission. All transmissions shall include the address of the sender and the receiver, and be subject to check sum, parity, and framing error checks, to insure a minimum data reliability of 1 error in 1,000,000,000 bits. Any transmissions that fail the data checking will be retried until correct. No data correction methods will be allowed. A plug-in RS232C data port shall be provided at all locations in the system to allow the use of a standard data terminal to view data exchanges between the sites and to

provide a means of extensive de-bugging.

The system shall provide a complete data update at least once every (2) minutes with some functions updating faster as required by local system conditions.

# C. Radio Channel Operation

The system shall be capable of operation on the narrow band splinter frequencies of the Private Land Mobile Radio Services within the Federal Communications Commissions (FCC) rules and regulations regarding these telemetry channels. The manufacture shall guarantee operation under co-channel conditions with other radio systems without interference to this system. FSK tones, data baud rates, transmitter output power, transmitter deviation, antenna gain, and antenna height shall be chosen to comply with the FCC requirements Part 90 - Subpart 90.35 and 90.238 for the Industrial/Business frequency pools. The radio system shall specifically meet the operating requirement that the sum of the highest FSK frequency and the amount of deviation shall not exceed 1.7 kHz for 3F2 emission (or 2.8 kHz for 6F2 emission) as detailed by the FCC for the specific frequency assigned.

CTUs and RTUs shall be capable of automatically switching antennas and/or radios (including radios on different frequencies) during CTU-RTU, RTU-RTU, and store & forward communications. The antenna/radio switching at remote units shall automatically default back to RTU-CTU paths if communications are lost with the CTU.

# D. FCC Licensing

The system manufacturer/supplier shall be responsible for collecting all information, generating all paper work, and paying all fees required obtaining a license on behalf of the Owner.

# PART 2 - PRODUCTS

# 2.01 PROGRAMMABLE LOGIC CONTROLLERS & LOCAL I/O EQUIPMENT

# A. General

Industrial Programmable Logic Controllers (PLCs) shall be used at all locations. The PLCs shall have an operational range of 0-60degC and 5-95% relative humidity. The PLCs shall all be from the same family of controllers, scalable from very small to very large applications, and programmed from identical programming software used for all processors. The PLCs shall be readily available on and directly purchasable online from the manufacture's WEB page. The PLCs shall be Allen-Bradley CompactLogix or Micro-Comm M1550 Series controllers.

The software at all locations shall be stored in a user removable non-volatile CompactFlash or similar type ROM memory that can be exchanged under power, used to upgrade sites in the field, and store historical data (local trends, accumulators, etc) for retrieval locally or by the central unit. The memory modules shall store all site specific logic and configurations including communication parameters, control algorithms, analog input/output scaling, PID control parameters. The module shall be

programmed via the CPU and without the use of external adapters. The PLCs shall include "watch-dog" circuitry and be "self-initializing" without operator intervention. In the event that the program or configuration data is corrupted, the CPU shall reload the program and configuration data from the EEPROM memory module.

The PLCs shall be fully online programmable while the PLC continues to communicate with the rest of the system and performs its assigned control tasks. The PLCs shall support "fill-in-the-blank" type configuration for basic operation and to set-up common features such as COM port set-up, peer-to-peer data collections, local back-up control set points, input and output setup, output on/off time delay settings, front panel display setup, etc. The PLC shall also support a process script language or ladder logic type programming for site-specific customizations including special input and output manipulations, local sequential control, math functions, and PID control as follows:

1. Relay (Bit) Type - Examine if ON, Examine if OFF

2. Timer & Counter - Timer ON, Timer OFF, Timer DONE

3. Compare Functions - Equal, Not Equal, Greater Than, Less Than, etc

4. Math Functions - Add, Subtract, Multiply, Divide, Square Root

5. Scaling Functions - Scale & Scale with Parameters

6. Logical Functions - AND, OR, & NOT

7. Program Control - Jump & Skip Next functions

8. PID - PID with compound loop input

The PLC programming software shall be written for the 32 bit interface of Windows XP. The supplier shall provide a licensed copy of the PLC configuration and programming software along with the necessary communications cables to the owner. Training on the use of the software shall be provided as part of the system training.

# B. Construction

The PLC shall use modular construction. The base unit shall be composed of the power supply, CPU, communications modules, and basic inputs and outputs (I/O). The unit shall have expandable inputs and outputs using a "rack-less" DIN rail mount design and capable of supporting local I/O (via an integrated high-performance serial I/O bus) and remote I/O via a industrial serial bus. All terminations shall use removable, NEMA-style "finger-safe" terminal blocks so that individual modules may be removed with out disturbing adjacent modules.

The PLC shall be capable of being powered from AC, DC, or solar sources. DC and solar powered PLCs shall have an integral battery charging circuit that protects the external battery from over and under voltage conditions and provides automatic charging of the battery after power failures. The back-up power supply shall be either 12VDC with 24VDC DC/DC converter or 24VDC with a 12VDC DC/DC converter to run the 12VDC radio and 24VDC to power external sensors from a single battery source.

Series tapped 24VDC batteries for 12VDC will not be allowed. Back-up batteries shall be rechargeable sealed lead-acid type batteries as manufactured by PowerSonic or equal. The back-up battery shall provide for 24 hours of back-up operation at water tower remote units and 3 hours at all other sites.

The PLC shall have a minimum of two (2) communications ports. The first shall be used primarily for CTU-RTU and RTU-RTU communications. It shall support baud rates of 110-19,200 baud and have a plug-in standard 25pin or 9pin sub-D connector that provides a full RS232 interface and radio modem interface. The second communications port shall provide programming, operator front panel interface, multiple PLC interconnect and other local communications. It shall support baud rates of 110-19,200 baud and have a 9-pin sub-D interface. The communications ports shall include LED's to show the status of all control lines. The PLC shall also optionally support Ethernet communications as detailed in the specifications.

The PLC shall utilize a rack-less design and provide for sufficient installed and configured spare inputs and outputs (I/O) to meet the site requirements as detailed and provide for 25% spares of each type. The unit shall have a minimum of (4) discrete (relay) outputs, (8) discrete inputs (DI), (4) analog inputs (AI), and (2) analog outputs (AO). The analog inputs shall provide for sensor excitation with separate fuses for each input. The fuses may be the self-resetting type. All input and output connections to the PLC shall be via Nema "finger-safe" plug-in terminal blocks.

The PLC shall support both local and remote I/O. Input/Output cards shall be mounted on a DIN rail channel. The PLC inputs, outputs, and operator interface shall be as follows:

- 1. DISCRETE OUTPUTS The discrete outputs shall be isolated relay outputs rated at 5.0A continuous @ 240VAC. LEDs on the front of the PLC base unit or expansion module shall indicate the status of each output point. Interposing relays shall be provided if the voltage or current of the external load on a contact exceed the 5.0A 240VAC ratings. Each output shall be provided with operator settable software ON and OFF time delays.
- DISCRETE INPUTS The discrete inputs shall be optically isolated and provide for 24VDC excitation to remote sensors and switches. Each input shall be separately fused or current limited such that accidental grounding shall not render the other inputs non-functional. LEDs on the front of the input module shall indicate the status of each input point.
- 3. ANALOG INPUTS The analog inputs shall provide filtered and scalable analog to digital conversion of input signals. The analog inputs shall be switch selectable from 0-5VDC to 0-20mADC and provide a minimum of 0.3% resolution and 0.5% accuracy over the temperature range of 0-70degrees C. The PLC shall provide separately fused 24VDC excitations to the remote sensors.
- 4. ANALOG OUTPUTS The analog outputs shall provide a 4-20mA isolated signal to other panels and devices as specified.
- 5. PULSE INPUTS The high-speed counter/pulse inputs shall provide for pulse rates up to 1 KHz direct from flow meter transmitter heads without interposing equipment. The pulse input shall include fused 12VDC excitation to the meter transmitters.

- POWER SUPPLY Each PLC assembly shall include an integral power supply. Power supplies shall be designed for 12VDC or 24VDC input power and suitable for use in battery back-up operations. DC/DC converters shall be required to insure that both the 12VDC and 24VDC are regulated separately from the common source.
- 7. KEYPAD & DISPLAY UNIT The optional keypad & display unit shall have a 4x20 back-lighted LCD display to display the status of all local inputs and the tank level of the associated control water tower level. The 5x5 keypad shall provide for operator input of set points and timer settings. The operator interface shall be menu driven and provide for dedicated keys for cursor position and input functions. The operator interface shall provide for up to 50 screens of data display. The keypad & display unit shall be supplied and mounted on the front of the PLC enclosure if detailed in the specific PLC I/O requirement list. The keypad & display unit shall maintain the Nema 4 rating of the PLC enclosure.
- 8. GRAPHICAL TOUCH-SCREEN DISPLAY UNIT The optional Graphical Touch-Screen display unit shall have an 6" diagonal (3.5" x 4.5") back-lighted 256-color TFT LCD display with resolution of at least VGA (640x480 pixels) resolution. The display shall have a resistive touch-screen with a touch accuracy of 2mm. The operator interface shall be graphical and provide for display of all data monitored and operator input of setpoints and operating commands. The Graphical Touch-screen unit shall be supplied and mounted on the front of the PLC enclosure if detailed in the specific PLC I/O requirement list. The unit shall maintain the Nema 4 rating of the PLC enclosure.

# C. Enclosures

The remote unit enclosures for indoor mounting shall meet all the requirements for NEMA Type 12 enclosures. The enclosures body shall be made of a minimum 14 gauge steel with continuously welded seems and be furnished with external mounting feet. The enclosure door shall be made of a minimum 16 gauge steel with have a 14 gauge steel hinge. Enclosures larger than 16x14 shall have a rolled lip on 3 sides of the door for added strength. The door opening shall have a rolled edge on 4 sides to protect the door gasket. The door gasket shall be heavy neoprene and attached to the door with oil resistant adhesive. Sub-panels shall be 14-gauge steel for 16x14 enclosures and 12 gauge for larger enclosures. The enclosure finish shall be gray polyester powder coating inside and out over phosphatized surfaces. The subpanels shall be finished in white. Nema 12 enclosures shall be Hoffman "CH" or "CONCEPT" wall mount enclosures.

Remote site installations requiring equipment to be mounted outside shall have a double box enclosure with the remote unit enclosure mounted inside a lockable NEMA 3R enclosure. The double enclosure shall be required to control vandalism, provide complete weather protection, reduce the heating effects of the sun, and prolong the life of the equipment. The NEMA 3R enclosure shall be constructed of 14 gauge galvanized steel, with a drip shield top and seems free sides front and back, and a stainless steel hinge pin. The enclosure finish shall be gray polyester powder coating inside and out over phosphatized surfaces. The NEMA 3R enclosure shall be Hoffman

#### Bulletin A-3.

The remote unit enclosures mounted in damp corrosive areas (such as concrete meter vaults) shall be NEMA Type 4X rated enclosures. The enclosures shall be made of molded fiberglass polyester and be furnished with external mounting feet. The door shall have a seamless foam-in-place gasket and corrosion-resistant hinge pin and bails. Sub-panels shall be 14-gauge steel for 16x14 enclosures and 12 gauge for larger enclosures. The enclosure finish shall be a light gray inside and out. The subpanels shall be finished in white. Nema 4X enclosures shall be Hoffman "Fiberglass Hinged Cover".

Refer to Appendix for specific enclosure requirements.

# D. Front Panel Hardware Displays

As detailed in the appendix, the PLC units may include front panel displays of the specified inputs and outputs. The indicator lamps, pushbuttons, and selector switches used in the system shall be IP65 oiltight/waterproof/corrosion resistant rated. The indicators use slide or bayonet based colored LED light sources. The lenses shall be acrylic and color matched to the LED color. The lamps shall have translucent marking plates for legends and be constructed such that the acrylic lens covers the legends for dust and water protection. The pushbutton and selector switch operators shall be Nema 600V rated with contacts rated for 6A @ 120VAC inductive. The contact blocks shall be stackable and snap-fit with screw terminals for termination.

Refer to Appendix for specific front panel display requirements.

# E. Local Control Functions

In general the PLC shall be programmed to provide generic control functions as detailed earlier and to work in concert with the CTU. The integrator shall be responsible to meet with the owner and the engineer to develop the automatic control strategy required for the system.

Refer to Appendix for special input and output control requirements.

# 2.02 RADIO TRANSCEIVERS & ACCESSORIES

#### A. General

The radio transceivers shall be standard "un-modified" radios that can be tuned, aligned, and repaired at any two-way radio shop. Interface to external data modems shall be through the front panel microphone jack. The radios shall be synthesized and fully field programmable and include a built-in time-out timer to disable the transmitter after 0-60seconds. The units shall be tuned to FCC specifications for the specific frequency assigned. The radio equipment shall be FCC type approved and the system capable of operation on the 3KHz of 6KHz narrow band splinter frequencies (154 or 173MHz) in the Industrial/Business radio service, or UHF.

# B. VHF Radio Transceiver (154 MHz or 173 MHz)

The system manufacturer shall supply a 5-watt VHF radio transceiver to insure a high level of quality and reliability. The radios shall be adjustable to 4 watts output power as may be required by the FCC for ERP (Effective Radiated Power) restrictions. All connections to the radio shall be plug-in. The VHF radio transceiver shall have the following specifications:

# Transmitter:

RF output power 25 watts minimum (adjustable to 4)

Spurs & Harmonics 16 dBm (25uW) (or -50dBc)

Frequency stability ±0.00025% (-30 to +60 degrees C)

Emission 6F2 (2.5 kHz DEV max)

or 3F2 (1.2 kHz DEV max)

FM hum and noise -40 dB

#### Receiver:

Sensitivity 0.35uV @ 12 dB SINAD

(.5uV @ 20db quieting)

Selectivity -65 dB Spurious image rejection -50 dB Inter-modulation -65 dB

Frequency stability ±0.00025% (-30 to +60 degrees C)

Receive bandwidth ±0.00025% (-30 to +60 degrees C)

the transmitter

The radio transceivers shall be a Motorola Radius CM200 or a Microwave Data Systems 1710.

# C. UHF Radio Transceiver (450 MHz)

If the system supplier can demonstrate to the satisfaction of the Engineer that no VHF (154-173 MHz) frequency can be obtained, an UHF (450-470 MHz) frequency may be used. The UHF shall operate under Part 90.35 and 90.238 for secondary fixed operations. The system will still be required to operate with point-to-point operation within the FCC rules and regulations and provide the same RF path margins as detailed in these specifications. Existing Frequency is 456.250MHz.

The UHF radios must meet or exceed the requirements set forth in these specifications for VHF radios, except that the radio output power must be adjustable to 2 watts as needed to meet FCC requirements. The radios shall be tuned to operate in 6KHz of bandwidth to meet the proposed FCC standards for 2005. Antennas shall provide a minimum 10db of gain.

The radio transceivers shall be Motorola Radius CM200 or Microwave Data Systems 4710. No changes to the contract amount will be made for a change to UHF operation.

# D. Antenna & Coaxial Cable

<sup>\*</sup> The receiver bandwidth shall be reduced to match the transmit bandwidth of the transmitter and provide a minimum adjacent channel rejection of -50db.

The radio antennas at all locations shall be a five element Yagi, constructed with 3/8" diameter solid aluminum rod elements and 1-1/16" diameter aluminum pipe element support with a type N coaxial connector. The antenna shall have a minimum 8.0db forward gain with a 20.0db front-to-back ratio. The antenna shall be wind rated for a 100-MPH wind speed. The VHF antennas shall be MC-Yagi, Decibel Products DB292, or Celwave PD390S. The UHF antennas shall be MC-Yagi or Celwave PD688S.

Antennas shall be cabled to the transmitter enclosure connection by a RG/8U type low loss (less than 1.8db per 100ft @ 100MHz) coaxial cable with cellular polyethylene (foam) dielectric. The coaxial cable shall have a braided copper shield coverage of 97% and a long life weather resistant polyvinyl chloride jacket. The antenna coaxial cable connection shall be a constant impedance weatherproof Type N connector, taped with a weather resistant electrical tape to insure a lifetime watertight assembly. The coaxial cable shall be Belden 8214 or 9913 cable.

# E. Antenna Lightning Protection

Coaxial connection to remote and central unit enclosures shall be by means of a coaxial type bulkhead lightning arrestor. The units shall be rated at 1 kilowatt with a minimum 500V and maximum 2000V-breakdown voltage. Coaxial lightning arrestors shall be a PD-593 or PolyPhaser IS-B50LN-C1.

# F. Antenna Mounting Systems

Antennas shall be mounted at a height above ground that is consistent with FCC rules and regulations and provides adequate signal fade margin as described earlier. Antennas must be a minimum of 15 feet above ground and mounted as follows:

 Water Towers: The antenna shall be mounted on the ladder or the water tower catwalk railing at a height consistent with FCC requirements. The coaxial cable shall be secured to the ladder or obstruction lighting conduit. A 3/4" rigid conduit with a weather-head shall be provided from the transmitter to the ladder on the tower.

# 2.03 INSTRUMENTATION & ACCESSORIES

# A. General

All items in the control system (electronic cards, power supplies, radios, time delays, relays, etc.) shall be of plug- in construction, make use of a plug-in wiring harness, use plug-in terminal blocks, and be interchangeable without recalibration. To insure field repair-ability by non-technical personnel, equipment that must be un-wired for replacement will not be accepted.

The following instrumentation devices and techniques shall be used as specifically called for in the RTU and CTU input/output sections of this specification.

#### B. Power Supplies

The DC power supplies shall provide  $\pm 0.1\%$  line and load regulation with  $\pm 10\%$  input variations. They shall have a temperature coefficient of  $\pm 0.02\%$  per degree C. The input/output isolation shall be 100 Mohms DC (900Volts AC) with output transient response of 50 microseconds maximum. The power supplies shall be sized to operate the remote unit equipment with or without the back-up battery in place. Power Supplies shall be a Power One Series MAP130, Sola SLS, or approved equal.

# C. Battery Back-up Operation

The remote units indicated shall be supplied with battery back-up operation. The rechargeable batteries shall be the sealed solid gelled electrolyte types, designed for float or standby service. Unless noted otherwise in the RTU descriptions, batteries shall be sized to maintain 24-hour service at water tower remotes and 8 hour service at pump stations and other remotes. The remote shall include a charging module to recharge the battery when power is resumed, maintain the charge between outages, and provide a low voltage cut-off to protect the battery from excessive discharge during prolonged outages. All discrete, analog, and pulse inputs (i.e. switch closures, pressure, level, flows, etc.) shall continue to function on battery back up. Batteries shall be Globe Gel/Cell or approved equal.

# D. Single Phase 120VAC Power Line Lightning Protection

Every site in the system shall be equipped with AC line filtering and lightning protection. The equipment shall provide 2-stage lighting/transient protection including inductive and capacitive filtering and MOV over-voltage protection.

# E. Time Delays & Relays

All hardware time delays used in the system shall be of plug-in construction with DIN rail mounted sockets and have pilot duty contacts rated for 3 amps resistive @ 240VAC (or 0.8 amps inductive) loads. The time delays shall have switch selectable ranges from .1-1c, .2-10, 1.2-60, and 12-600 seconds. The time delays shall provide a  $\pm 0.2\%$  repeat accuracy. The time delays shall have both "timing" and "timed" LED indicators. Time delays and relays shall be IDEC series GT5Y and RY4S or approved equal.

# F. Level & Pressure Transducers

Level & pressure transducers shall be of the all solid-state two-wire transmitter type with a 4-20mA output from a 10.5-24VDC excitation. The units shall be powered from the RTU power supply. The transducers shall have a combined error (linearity and hysteresis) of ±0.25% full scale and be temperature compensated to ±2.5% per 100 degrees Fahrenheit. Zero and span adjustments shall be standardized so that transducers are interchangeable without recalibration. All exposed or wetted parts shall be series 316 stainless steel, PVC, or Buna-N. The units shall be capable of a three times full scale over pressure with out damage or change of calibration.

The transducers shall be mounted at the sensing point and wired to the enclosure.

The transducers shall have a 1/4" or 1/2" NPT process pressure connection. Transducers for above ground mounting shall have a 1/2" conduit connection for cable entry. Transducers at water towers (and other outside locations) shall be mounted below grade and below frost line to prevent freezing. Below grade mounted units shall have factory signal cabling and be suitable for a minimum of 100' submerged duty.

Level transducers for clear-wells and wetwells shall be suspended in the clearwell or wetwell and supplied with sufficient factory installed cable to access a "clean/dry area" junction box. The suspension cable shall have a polyethylene jacket and internal venting to provide for atmospheric sensing of the non-process side of the diaphragm. The sensors shall have a multi-ported pressure-sensing end that protects the diaphragm while sensing the level of viscous liquids or slurries. The cable connection in wet-well applications shall have a non-fouling guard to prevent build up of foreign materials.

Pressure/Level transducers shall be Micro-Comm L5N series, Consolidated A300 Model 221GEE, or Ametek Model 57S.

# 2.04 EXISTING CENTRAL UNIT EQUIPMENT

#### A. General

The existing "Central Unit" is composed of two separate CPUs communicating over a high-speed serial data links. The existing CTU software wi!! be modified to support monitoring and control of the added RTU's.

# 2.05 MAIN OPERATOR DISPLAY CONSOLE SOFTWARE

# A. General

The software shall be 32bit compatible and capable of operating in the ODC hardware described above as well as in customer supplied Windows XP Professional/Vista Business compatible hardware similar to the unit specified above. The contractor shall supply a fully functional "developmental" version of the SCADA software (including any required software protection keys) for the first ODC as well as a separate configured "runtime" version for installation and use in a customer supplied back-up computer. The software may be modular; however the operator interface shall provide an integrated interface to all areas of the program. Demo program copies will not be allowed. The existing HMI software will be updated to the latest SCADAview 32 software as described bellow.

The software shall operate in the 32-bit Windows XP Professional/Vista Business environment. The software shall be the latest "full developmental" version of SCADAview 32 (Optional SC), Wonderware InTouch, GE-Fanuc iFIX, or Allen-Bradley RSView 32 (Optional SE). The software shall be licensed to the owner.

# B. System Back-up & Installation

The contractor shall provide a back-up copy of the installed software on a CD-ROM disk. Back-up copies of any setup or graphic files shall be on a CD-ROM. The copies

shall be kept by the Owner for emergency reloading in the event of a catastrophic failure. The contractor shall provide an easy to use installation (or re-installation) program that will automatically setup the hard drive operating system and automatically load (or reload) the software.

# C. System Capacity

At a minimum, the operating software shall be capable of accommodating 32,000 tag points as follows:

- 1. Discrete status & alarm points
- 2. Measured variables
- Accumulated variables.
- 4. Calculated status & alarm points
- 5. Calculated control points

#### D. Communications

The HMI shall have several methods for exchanging data from programmable controllers and other software programs.

- 1. Direct
- 2. DDE Client/Server
- 3. OPC Client
- 4. ODBC
- 5. SQL Database (MySQL, MS-SQL, PostgreSQL)

# E. HMI Operational Characteristics:

In general, the HMI software shall display all received data in engineering units with appropriate generated labels, generate and print alarms, print logs, store manually entered data, update displays, and perform operator commands as required by the database. The system shall automatically generate the following system displays:

- 1. Main Menu page (with direct access to all screens and other program modules)
- 2. System Summary page listing key data points for all RTUs in the system
- 3. RTU specific display pages showing all data for each RTU in the system

Beyond the basic operating software required for SCADA operations, the software

package shall accommodate the following:

# 1. Status Point Operations:

- a. Display ODC, CTU, and RTU status functions
- b. Input/Display control database

# 2. Analog Data:

- a. Display value directly in engineering units
- b. Accept operator High & Low alarm limits and generate alarms
- c. Accept operator rate of change alarm limit and generate alarm
- d. Store data for trending displays

# 3. Flow Rate Data:

- a. Display value directly in engineering units
- b. Accept operator High & Low rate alarm limits and generate alarms
- c. Totalize flow total and display in engineering units
- d. Accept operator High/Low 24 hour total limits and alarms
- e. Store data for trending displays

# 4. Pump Control Operations:

- a. Display ODC, CTU, and RTU HAND/OFF/AUTO functions
- b. Display Pump CALL/RUN/FAIL status for each pump
- c. Input/Display control database

# 5. Alarm Point Operations:

- a. Display ODC, CTU, and RTU alarm functions
- b. Enter new alarm in data log archive and send alarm to printer
- c. Sound alarm horn until alarm is acknowledge by the operator
- d. Log alarm acknowledgment to data log and printer
- e. Log alarm clearing and send alarm clear to printer
- f. Input/Display control database

# 6. Event Point Operations:

- a. Display ODC, CTU, and RTU alarm functions
- b. Display ODC, CTU, and RTU event functions
- c. Enter new event in data log archive and send alarm to printer
- d. Log event clearing and send alarm clear to printer
- e. Input/Display control database

# 7. Historical Trending Operations:

- a. Real-time and historical trending functions
- b. Create a multi-pen trend.
- c. Ability to be shaded to compare two or more different trends
- d. Create a trend that is part of a graphic display
- e. The trends shall have a marker displaying the pen's date, time, and value

# F. Graphical Screen Display Editor

The HMI shall provide a graphics display editor for creating displays using graphic objects. The graphics display editor shall have the ability to drag and drop objects from a pre-configured graphics library, paste objects that are copied to the clipboard from another Windows application, and insert objects created by another Windows application using OLE. True OLE support is required in that it shall be possible to call up the native application that created the object being inserted and use the naïve object editing tools from within the HMI. The graphics display editor shall have tear-away toolbars and color palettes. It shall be possible to customize the color pallet. Graphics drawn with a customized color pallet shall not require the customized color pallet to be present on all runtime computers. Colors must be stored internal to the graphic files as Red, Green, Blue numbers, not pallet indexes. The graphics display editor shall have:

- 1. Context sensitive "right-mouse" support on all objects.
- 2. As a minimum the following drawing tools: Rectangle, line, ellipse, wedge, and text
- 3. As a minimum the following editing tools:

  Tag substitute, flip, rotate, resize, reshape, align, cut, paste, copy, duplicate, bring to front, send to back, space, fill, undo, redo, line, and color.
- 4. As a minimum the following viewing tools:

Zoom in, zoom out, pan, and view entire graphic.

- 5. The ability to use tag placeholders to provide a way to use one graphic display to represent a number of similar operations.
- 6. Provide tools for each of the following as a minimum:
  Numeric input, numeric display, string input, string display, label, arrow, recipe, alarm summary, tag monitor, input command line, trend, button, OLE object, and ActiveX object.
- 7. The ability to create a screen background by converting objects to wallpaper. These wallpaper objects cannot be selected or edited.
- 8. Allow the user to create libraries of graphic objects.
- 9. Allow the user to assign control to any object or grouping of objects. It shall also allow the user to drill down in a group to modify any object or object attribute without losing any object control property.
- 10. Allow control to be copied from any object to another object.
- 11. Permit the user to specify screen placement anywhere on the display.

#### PART 3 - EXECUTION

# 3.01 EQUIPMENT EXAMINATION

The control system shall be completely tested prior to shipment. The entire control system shall be "Burned In" at the factory for a period of at least 20 days. The component equipment shall be computer tested and temperature cycled at zero degrees and at fifty degrees centigrade.

# 3.02 SYSTEM START-UP

The manufacturer shall supply "Factory" personnel for start-up service as needed to insure satisfactory operation. Subsequent trips to the job site to correct defects shall be made at no charge to the Owner during the warranty period.

# 3.03 TRAINING

The system manufacturer shall supply "factory" personnel to conduct two separate on-site training sessions, totaling a minimum of three days of training.

The initial training session shall be conducted during start-up as needed until the Owner and Engineer are satisfied that the operators are comfortable with the operation and maintenance of the system. Training shall be done on site with the owner's personnel.

Three to six months after the Owner commencing system operation, the system manufacturer shall supply "factory" personnel to conduct follow-up training of the Owner's personnel. The follow-up training shall be conducted on-site and consist of reviewing the operation and maintenance of the system. The Owner shall be contacted a minimum of two weeks in advance, prior to scheduling the training session to allow proper coordination.

#### 3.04 SUBSTANTIAL COMPLETION

The Engineer will grant substantial completion only after completion of the start-up and initial training phase of the project. The Engineer shall make an inspection of the system to determine the status of completion. Substantial completion will be awarded only when the system is providing usable service to the Owner. If the system is commissioned in phases, the Contractor may request substantial completion for the completed phases.

# 3.05 WARRANTY/SUPPORT PROGRAM

The control system manufacturer shall supply a five (5) year parts and labor warranty and comprehensive support program for all items and software supplied under this section (except as noted below). Power surges and lightning damage shall be included as part of the warranty.

The warranty shall begin from the time of "substantial completion" as issued by the engineer. The manufacturer shall provide a 24-hour response to calls from the Owner. The manufacturer, at his discretion, may dispatch replacement parts to the Owner by next-day delivery service for field replacement by the Owner. Any damage to the control system caused by the actions of the Owner in attempting these field replacements shall be the sole responsibility of the manufacturer. If, during the warranty period, satisfactory field repair can not be attained by field replacement of parts by the Owner, the manufacturer shall dispatch "factory" personnel to the job site to complete repairs at no cost to the Owner.

The support program shall begin from the time of "substantial completion" as issued by the engineer. The support program shall include free updating of all software as needed and providing free phone support from the integrator throughout the warranty period.

#### PART 4 - APPENDIX: DETAILED EQUIPMENT DESCRIPTION

#### 4.01 WATER TOWER REMOTE UNIT REQUIREMENTS:

# A. Installation Requirements:

The tower transceiver shall be mounted inside a lockable, NEMA 3R enclosure as specified.

The level transducer shall be a two-wire transmitter suitable for below ground mounting as specified earlier. The level transducer shall be installed at a point below freezing in the altitude vault (if available) or in a 24" fiber meter vault with a freeze

proof lid. The pressure connection shall be equipped with a corporation stop providing a 1/4" NPT female connection for the transducer. The contractor shall run 3/4" rigid conduit from the vault or meter box to the transceiver enclosure for the transducer signal cable.

The antenna shall be as specified and mounted on the water tower at a height consistent with FCC requirements. The contractor shall provide a 3/4" rigid conduit with a weather-head from the transmitter to the ladder on the tower.

- B. Front Panel Display Requirements:
  - Keypad & Display assembly to display all inputs and output status
- C. Discrete Outputs:
  - 1. (1) System Normal (displayed on front of RTU assembly)
  - 2. (spare)
- D. Discrete Inputs:
  - 1. Power Failure
  - 2. (spare) Unauthorized Entry
- E. Analog Inputs:
  - 1. Water Tower Level (suppressed head data from new transducer)
  - 2. (spare) RTU Temp
- F. Pulse Inputs:
  - 1. (spare) Battery Voltage
- G. Specific Control Requirements:

The existing central control group for the Clays Mill Booster Pump Station will be modified to allow the new 1,000,000 gallon elevated tank level to also be used as an operator selected level control in the control group.

-END OF SECTION-

# APPENDIX • 1

Prevailing Wage Rates Jessamine County, Kentucky



Steven L. Beshear Governor

# KENTUCKY LABOR CABINET

DEPARTMENT OF WORKPLACE STANDARDS DIVISION OF EMPLOYMENT STANDARDS, APPRENTICESHIP & MEDIATION

> 1047 US Hwy 127 S - Suite 4 Frankfort, Kentucky 40601 Phone: (502) 564-3534 Fax (502) 564-2248 www.labor.ky.gov

Mark S. Brown Secretary

Michael L. Dixon Commissioner

June 11, 2012

JOHN HORNE Horne Engineering 216 S. Main St. Nicholasville KY 40356

Re: Jessamine South Elkhorn Water District, Catnip Hill Elevated Storage Tank

Advertising Date as Shown on Notification: June 14, 2012

Dear JOHN HORNE:

This office is in receipt of your written notification on the above project as required by KRS 337.510 (1).

I am enclosing a copy of the current prevailing wage determination number CR 6-023, dated May 16, 2011 for JESSAMINE County. This schedule of wages shall be attached to and made a part of the specifications for the work, printed on the bidding blanks, and made a part of the contract for the construction of the public works between the public authority and the successful bidder or bidders.

The determination number assigned to this project is based upon the advertising date contained in your notification. There may be modifications to this wage determination prior to the advertising date indicated. In addition, if the contract is not awarded within 90 days of this advertising date or if the advertising date is modified, a different set of prevailing rates of wages may be applicable. It will be the responsibility of the public authority to contact this office and verify the correct schedule of the prevailing rates of wages for use on the project. Your project number is as follows: 057-H-00099-11-6, Heavy/Highway

Sincerely.

Michael L. Dixon Commissioner

Makaul L. Dijon

# KENTUCKY LABOR CABINET PREVAILING WAGE DETERMINATION CURRENT REVISION LOCALITY NO. 023

Determination No. CR-6-023

PROJECT 057-H-00099-11-6 HEAVY/HIGHWAY

Date of Determination: May 16, 2011

JESSAMINE SOUTH ELKHORN WATER DISTRICT CATNIP HILL - 1.0 MG ELEVATED STORAGE TANK

This schedule of the prevailing rate of wages for Locality No. 023, which includes Boyle, Garrard and Jessamine Counties, has been determined in accordance with the provisions of KRS 337.505 to 337.550. This determination shall be referred to as Prevailing Wage Determination No. CR-6-023.

Apprentices shall be permitted to work as such subject to Administrative Regulations adopted by the Commission of Workplace Standards. Copies of these regulations will be furnished upon request to any interested person.

Overtime is to be computed at not less than one and one-half (1 1/2) times the indicated BASE RATE for all hours worked in excess of eight (8) per day, or in excess of forty (40) per week. However, KRS 337.540 permits an employee and employer to agree, in writing, that the employee will be compensated at a straight time base rate for hours worked in excess of eight (8) hours in any one workday, but not more than ten (10) hours worked in any one workday, if such written agreement is prior to the over eight (8) hours in a workday actually being worked, or where provided for in a collective bargaining agreement. The fringe benefit rate is to be paid for each hour worked at a straight time rate for all hours worked. Fringe benefit amounts are applicable for all hours worked except when otherwise noted. Welders will receive rate for craft in which welding is incidental.

No laborer, workman or mechanic shall be paid at a rate less than that of the General Laborer except those classified as bona fide apprentices registered with the Kentucky State Apprenticeship Supervisor unless otherwise specified in this schedule of wage rates.

NOTE: The type of construction shall be determined by applying the following definitions.

# **BUILDING CONSTRUCTION**

Building construction is the construction of sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment, or supplies. It includes all construction of such structures, the installation of utilities and the installation of equipment, both above and below grade level, as well as incidental grading, utilities and paving.

# **HIGHWAY CONSTRUCTION**

Highway construction includes the construction, alteration or repair of roads, streets, highways, runways, taxiways, alleys, trails, paths, parking areas, and other similar projects not incidental to building or heavy construction. It includes all incidental construction in conjunction with the highway construction project.

# **HEAVY CONSTRUCTION**

Heavy projects are those projects that are not properly classified as either "building" or "highway". For example, dredging projects, water and sewer line projects, dams, flood control projects, sewage treatment plants and facilities, and water treatment plants and facilities are considered heavy.

Michael L. Dixon, Commissioner Department of Workplace Standards

Kentucky Labor Cabinet

CR 6-023 2011 CLASSIFICATIONS			Page 3 of 9 BASE RATES AND FRINGE BENEFITS			
ELECTRICIANS:	BUILDING	BASE RATE FRINGE BENEFITS	\$26.36 10.04			
	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$17.00 .43			

When working from Bosum chairs, trusses, stacks, tanks, scaffolds, catwalks, radio and TV towers, structural steel-open, unprotected, unfloored raw steel, bridges, or similar hazardous locations where workmen are subject to a direct fall (except for work performed using JLG's and bucket trucks up to 75 ft.): 50' to 75' - add 25% above workman's straight time rate; over 75' - add 50% above workman's straight time rate.

LINEMEN	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$30.09 10.94
EQUIPMENT OPERATOR	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$26.90 10.31
GROUNDMEN	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$17.79 8.51
ELEVATOR CONSTRUCTORS	S:	BASE RATE FRINGE BENEFITS	\$29.00 10.88
GLAZIERS:		BASE RATE FRINGE BENEFITS	\$10.00 0.00
IRONWORKERS:		BASE RATE FRINGE BENEFITS	\$24.99 18.22

#### LABORERS/ BUILDING:

BUILDING GOUP 1: General laborers, asbestos abatement laborer, toxic waste removal laborer, water boys, tool room checker, carpenter tenders, (civil engineer helpers, rodman, grade checkers, excluding all field work performed by Engineering Firms), concrete pouring and curing, concrete forms stripping and wrecking, hand digging and backfilling of ditches, clearing of right of ways and building sites, wood sheeting and shoring, signalman for concrete bucket and general cleaning, and environmental laborer - nuclear, radiation, toxic and hazardous waste - Level D:

BUILDING

BASE RATE

\$19.06

FRINGE BENEFITS 9.04

BUILDING GROUP 2: All air tool operators, air track drills, asphalt rakers, tampers, batchers plant and scale man, chain saw, concrete saw, electric hand grinder, all electric bush and chipping hammers, flagmen, forklift operators, form setter (street or highway), metal form setters, heaters, mesh handlers on walkways, streets and roadways outside building, gunnite laborers, hand spiker, introflax burning rod, joint makers, mason tenders, multi-trade tender, pipe layers, plaster tenders, powderman helpers, power driven Georgia buggies, power posthole diggers, railroad laborers, sandblaster laborers, scow man and deck hand, signal man, sweeper and cleaner machines, vibrator operators, walk behind trenching machines, mortar mixer machines, water pumpmen, and environmental laborers - nuclear, radiation, toxic and hazardous waste - Level C:

BUILDING BASE RATE \$19.46 FRINGE BENEFITS 9.04

# LABORERS/ BUILDING: CONTINUED

BUILDING GROUP 3: Asphalt Paver Screwman, Gunnite nozzleman and gunnite nozzle machine operator, sand blaster nozzleman, concrete or grout pumpman, plaster pumpman:

BUILDING

BASE RATE

\$19.66

FRINGE BENEFITS

9.04

BUILDING GROUP 4: Powderman and blaster, and environmental laborer - nuclear, radiation, toxic and hazardous

waste - Level B:

BUILDING

BASE RATE

\$19.76

FRINGE BENEFITS

9.04

BUILDING GROUP 5: Caisson holes (6 ft. and over) pressure and free air including tools, and environmental laborernuclear, radiation, toxic and hazardous waste - Level A:

BUILDING

BASE RATE

\$20.26

FRINGE BENEFITS

9.04

BUILDING GROUP 6: Tunnel man and tunnel sand miner, cofferdam (pressure and free air), sand hog or mucker

(pressure or free air):

BUILDING

BASE RATE

\$20.56

FRINGE BENEFITS

9.04

Building Projects: Employees handling chemically treated materials which are harmful to the skin add an additional \$.25 to base rate. Any employee working on high work putting the employee 50 feet above the ground or a solid floor shall receive an additional \$.50 per hour above the base rate. Any employee working on boilers, kilns, melting tanks, furnaces, or when refractory is done using live fire, drying fires, heatups or any hot work shall receive an additional 25% premium above the base rate.

#### LABORERS/ HEAVY HIGHWAY:

HEAVY HIGHWAY GROUP 1: Aging and curing of concrete (any mode or method), asbestos abatement worker, asphalt plant laborers, asphalt laborers, batch truck dumpers, carpenter tenders, cement mason tenders, cleaning of machines, concrete laborers, demolition laborers, dredging laborers, drill helper, environmental laborer - nuclear, radiation, toxic and hazardous waste - Level D, flagmen, grade checkers, all hand digging and hand back filling, highway marker placers, landscaping laborers, mesh handlers and placers, puddler, railroad laborers, rip-rap and grouters, right of way laborers, sign, guard rail and fence installers (all types), signal men, sound barrier installer, storm and sanitary sewer laborers, swampers, truck spotters and dumpers, and wrecking of concrete forms, general cleanup;

**HEAVY & HIGHWAY** 

**BASE RATE** 

\$20.36

FRINGE BENEFITS

9.90

HEAVY HIGHWAY GROUP 2: Batter board men (sanitary and storm sewer), brickmason tenders, mortar mixer operator, scaffold builders, burner and welder, bushhammers, chain saw operator, concrete saw operators, deckhand scow man, dry cement handlers, environmental laborers - nuclear, radiation, toxic and hazardous waste - Level C. forklift operators for masonry, form setters, green concrete cutting, hand operated grouter and grinder machine operator, jack hammers, lead paint abatement, pavement breakers, paving joint machine, pipe layers-laser operators (non-metallic), plastic pipe fusion, power driven Georgia buggy or wheelbarrow, power post hole diggers, precast manhole setters, walk-behind tampers, walk-behind trenchers, sand blasters, concrete chippers, surface grinders, vibrator operators, wagon drillers:

**HEAVY & HIGHWAY** 

**BASE RATE** 

\$20.61

FRINGE BENEFITS

9.90

HEAVY HIGHWAY GROUP 3: Asphalt luteman and rakers, gunnite nozzleman, gunnite operators and mixers, grout pump operator, side rail setters, rail paved ditches, screw operators, tunnel laborers (free air), and water blasters:

**HEAVY & HIGHWAY** 

BASE RATE

\$20.66

FRINGE BENEFITS

9.90

#### LABORERS/ HEAVY HIGHWAY:

HEAVY HIGHWAY GROUP 4: Caisson workers (free air), cement finishers, environmental laborer - nuclear, radiation, toxic and hazardous waste - Levels A and B, miners and drillers (free air), tunnel blasters, and tunnel muckers (free air), directional and horizontal boring, air track drillers (all types), powderman and blasters, troxler and concrete tester if laborer is utilized:

HEAVY & HIGHWAY

BASE BATE

\$21.26

FRINGE BENEFITS 9.90

#### **MARBLE, TILE & TERRAZZO:**

Workers:	BASE RATE FRINGE BENEFITS	\$15.50 2.76
Layoutmen:	BASE RATE FRINGE BENEFITS	\$15.75 2.76
Finishers:	BASE RATE FRINGE BENEFITS	\$15.42 5.42
Setters:	BASE RATE FRINGE BENEFITS	\$22.64 6.10
MILLWRIGHTS:	BASE RATE FRINGE BENEFITS	\$23.35 14.30

# **OPERATING ENGINEERS/ BUILDING:**

BUILDING CLASS A-1: Crane, dragline, hoist (1-drum when used for stack or chimney construction or repair), hoisting engineer (2 or more drums), orangepeel bucket, overhead crane, piledriver, truck crane, tower crane, hydraulic crane:

BUILDING

BASE RATE

\$25.35

FRINGE BENEFITS 13.00

BUILDING CLASS A: Articulating Dump, Auto Patrol, Batcher Plant, Bituminous Paver, Cableway, Carrydeck Crane, Central Compressor Plant, Clamshell, Concrete Mixer (21 cu. ft. or over), Concrete Pump, Crane, Crusher Plant, Derrick, Derrick Boat, Directional Boring Machine, Ditching and Trenching Machine, Dragline, Dredge Operator, Dredge Engineer, Elevating Grader and all types of Loaders, Forklift (regardless of lift height), GPS Systems (on equipment within the classification), Hoe-Type Machine, Hoist (1 drum when used for stack or chimney construction or repair), Hoisting Engine (2 or more drums), Laser or Remote Controlled Equipment (within the classification), Locomotive, Motor Scraper, Carry-all Scoop, Bulldozer, Heavy Duty Welder, Mechanic, Orangepeel Bucket, Piledriver, Power Blade, Motor Grader, Roller (bituminous), Scarifier, Shovel, Tractor Shovel, Truck Crane, Winch Truck, Push Dozer, Highlift, All Types of Boom Cats, Self Contained Core Drill, Hopto, Tow or Push Boat, A-Frame Winch Truck, Concrete Paver, Gradeall, Hoist, Hyster, Pumpcrete, Ross Carrier, Boom, Tail Boom, Rotary Drill, Hydro Hammer, Mucking Machine, Rock Spreader attached to equipment, Scoopmobile, KeCal Loader, Tower Cranes (French, German and other types), Hydrocrane, Backfiller, Gurries, Subgrader, Tunnel Mining Machines including Moles, Shields, or similar types of Tunnel Mining Equipment:

BUILDING

BASE RATE \$24.35 FRINGE BENEFITS 13.00

Operators on cranes with boom one-hundred fifty feet (150') and over including jib, shall receive seventy-five cents (\$.75) above base rate. All cranes with piling leads will receive \$.50 above base rate regardless of boom length

#### **OPERATING ENGINEERS/ BUILDING: CONTINUED**

BUILDING CLASS B: All Air Compressors (over 900 cfm), Bituminous Mixer, Joint Sealing Machine, Concrete Mixer (under 21 cu. ft), Form Grader, Roller (rock), Tractor (50 HP and over), Bull Float, Finish Machine, Outboard Motor Boat, Flexplane, Fireman, Boom Type Tamping Machine, Truck Crane Oiler, Greaser on Grease Facilities servicing Heavy Equipment, Switchman or Brakeman, Mechanic Helper, Whirley Oiler, Self-Propelled Compactor, Tractair and Road Widening Trencher and Farm Tractor with Attachments (except backhoe, highlift and endloader), Elevator (regardless of ownership when used for hoisting any building materials), Hoisting Engineer (1 drum or buck hoist), Firebrick (masonry excluded), Well Points, Grout Pump, Throttle-Valve Man, Tugger, Electric Vibrator Compactor, and Caisson Drill Helper:

BUILDING

BASE RATE

\$20.86
FRINGE BENEFITS

BUILDING CLASS C: Bituminous Distributor, Cement Gun, Conveyor, Mud Jack, Paving Joint Machine, Roller (earth), Tamping Machine, Tractors (under 50 HP), Vibrator, Oiler, Concrete Saw, Burlap and Curing Machine, Hydro-Seeder, Power Form handling Equipment, Deckhand Steersman, Hydraulic Post Driver and Drill Helper:

BUILDING BASE RATE \$19.34 FRINGE BENEFITS 13.00

All Building Operators assigned to work below ground level are to be paid ten percent (10%) above base wage rate. This does not apply to open cut work

# **OPERATING ENGINEERS/ HEAVY HIGHWAY:**

HEAVY HIGHWAY CLASS A-1: Cableway, Carry Deck Crane, Cherry Picker, Clamshell, Crane, Derrick, Derrick Boat, Dragline, Hoist Engine (2 or more drums), Hydraulic Boom Truck, Hydrocrane, Orangepeel Bucket, Overhead Crane, Piledriver, Rough Terrain Crain, Tower Cranes (French, German and other types), Truck Crane:

HEAVY & HIGHWAY BASE RATE \$26.35 FRINGE BENEFITS 13.00

HEAVY HIGHWAY CLASS A: A-Frame Winch Truck, Auto Patrol, Backfiller, Batcher Plant, Bituminous Paver, Bituminous Transfer Machine, All types of Boom Cats, Bulldozer, Cableway, Carry-All Scoop, Carry Deck Crane, Central Compressor Plant Operator, Clamshell, Concrete Mixer (21 cu. ft. or over), Concrete Paver, Truck-Mounted Concrete Pump, Core Drills, Crane, Crusher Plant, Derrick, Derrick Boat, Ditching and Trenching Machine, Dragline, Dredge Operator, Dredge Engineer, Earth Movers, Elevating Grader and all types of Loaders, Grade-All, Gurries, Heavy Equipment Robotics Operator/Mechanic, Highlift, Hoe-Type Machine, Hoist (two or more drums), Hoisting Engine (two or more drums), Horizontal Directional Drill Operator, Hydraulic Boom Truck, Hydrocrane, Hyster, KeCal Loader, Letourneau, Locomotive, Mechanic, Mechanically Operated Laser Screed, Mechanic Welder, Mucking Machine, Motor Scraper, Orangepeel Bucket, Piledriver, Power Blade, Pumpcrete, Push Dozer, Rock Spreader attached to Equipment, All Rotary Drills, Roller (bituminous), Scarifier, Scoopmobile, Shovel, Side Boom, Subgrader, Tailboom, Telescoping Type Forklift, Tow or Push Boat, Tower Cranes (French, German and other types), Tractor Shovel, Truck Crane, Tunnel Mining Machines including Moles, Shields, or Similar types of Tunnel Mining Equipment: HEAVY & HIGHWAY

FRINGE BENEFITS 13.00

Above Heavy Highway Operators on cranes with booms one hundred fifty feet (150') and over including jib shall receive \$.50 above base rate.

# **OPERATING ENGINEERS/ HEAVY HIGHWAY: CONTINUED**

HEAVY HIGHWAY CLASS B: All Air Compressors (over 900 cu. ft. per min.), Bituminous Mixer, Boom Type Tamping Machine, Bull Float, Concrete Mixer (under 21 cu. ft.), Dredge Engineer, Electric Vibrator Compactor/Self-Propelled Compactor, Elevator (one drum or buck hoist), Elevator (regardless of ownership when used to hoist building material), Finish Machine, Firemen, Flex-Plane, Forklift (regardless of lift height), Form Grader, Hoist (one drum), Joint Sealing Machine, Mechanic Helper, Outboard Motor Boat, Power Sweeper (riding type), Roller (rock), Ross Carrier, Skid Mounted or Trailer Mounted Concrete Pumps, Switchman or Brakeman, Throttle Valve Man, Tractair and Road Widening Trencher, Tractor (50 HP and over), Truck Crane Oiler, Tugger, Welding Machine, Well Points, and Whirley Oiler:

HEAVY & HIGHWAY

BASE RATE \$22.93

FRINGE BENEFITS 13.00

HEAVY HIGHWAY CLASS B2: Greaser on Grease Facilities servicing Heavy Equipment:

HEAVY & HIGHWAY BASE RATE \$23.31

FRINGE BENEFITS 13.00

HEAVY HIGHWAY CLASS C: Bituminous Distributor, Burlap and Curing Machine, Caisson Drill and Core Drill Helper (track or skid mounted), Cement Gun, Concrete Saw, Conveyor, Deckhand Oiler, Grout Pump, Hydraulic Post Driver, Hydro Seeder, Mud Jack, Oiler, Paving Joint Machine, Power Form Handling Equipment, Pump, Roller (earth), Steermen, Tamping Machine, Tractors (under 50 H.P.) and Vibrator:

HEAVY & HIGHWAY BASE RATE \$22.67 FRINGE BENEFITS 13.00

All Heavy Highway Operators assigned to work below ground level are to be paid ten percent (10%) above base wage rate. This does not apply to open cut work.

PAINTERS:

Brush, Roller, Paperhanger, Taping & Finishing:

BUILDING BASE RATE \$12.35

FRINGE BENEFITS 2.54

Spray & Sandblast: BUILDING BASE RATE \$13.10

FRINGE BENEFITS 2.54

Building Projects: Hazardous work, add \$.50 to base rate to include boatswain chairs, safety belt work, skeleton framing steel on all construction work, or work in enclosed buildings over 35 feet in height above permanent working floor area: steam cleaning and sand blasting work, exterior high line pipe (not painted from ground, ladder or scaffolding); exterior stage work, window jack work. Special coatings, add \$.25 to base rate to include ketones, lacquers, catalyzed epoxy, chlorinated rubber & urethane.

Brush and Roller: HEAVY & HIGHWAY BASE RATE \$18.20

FRINGE BENEFITS 5.08

Drywall finishers and Plasterers:

HEAVY & HIGHWAY BASE RATE \$18.45

FRINGE BENEFITS 5.08

Spray, sandblast, power tools, waterblast and steam cleaning, brush and roller of mastics, creosotes, kwinch koate

and coal tar epoxy: HEAVY & HIGHWAY BASE RATE \$19.20

FRINGE BENEFITS 5.08

Spray of mastics, creosotes, kwinch koate and coal tar epoxy:

HEAVY & HIGHWAY BASE RATE \$20.20

FRINGE BENEFITS 5.08

**BASE RATE** 

BASE RATE FRINGE BENEFITS

FRINGE BENEFITS

\$15.53

\$15.60

5.93

5.93

BUILDING

BUILDING

Drivers, Concrete Mixer Trucks (all types, hauling on job sites only); Truck Mechanics:

# TRUCK DRIVERS/ BUILDING: CONTINUED

Drivers, Euclid and other Heavy Earth Moving Equipment and Low Boy, Winch Truck and A-Frame Truck and Monorail Truck when used to transport building materials, Forklift Truck when used inside warehouse or storage area:

BUILDING

BASE RATE

\$15.70

FRINGE BENEFITS 5.93

Building Projects: Truck Drivers who perform work on or hauling to or from any hazardous or toxic waste site, add \$4.00 to base rate of pay.

Building Projects: Truck Driver Fringe Benefits - Apply to each employee (whose name appears on the payroll that week) who has been employed a minimum of twenty (20) work days within any ninety (90) consecutive day period for that employer.

#### TRUCK DRIVERS/ HEAVY HIGHWAY:

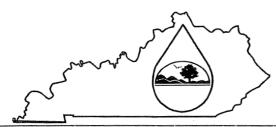
Truckhelper and warehousema			
Trackinospor and warenesseme	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$15.65 5.55
Driver, winch truck and A-Fram	e when used in transporting materials: HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$15.75 5.55
Driver, (semi-trailer or pole trail	er), driver (dump truck, tandem axle), driver of HEAVY & HIGHWAY	of distributor: BASE RATE FRINGE BENEFITS	\$15.85 5.55
Driver on mixer trucks (all types	s): HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$15.90 5.55
Truck mechanic:	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$15.95 5.55
Driver (3 tons and under), tire of	hanger and truck mechanic helper: HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$15.98 5.55
Driver on pavement breakers:	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$16.00 5.55
Driver (over 3 tons), driver (truc	k mounted rotary drill): HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$16.19 5.55
Driver, Euclid and other heavy	earth moving equipment and Low Boy: HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$16.76 5.55
Greaser on greasing facilities:	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	\$16.85 5.55

END of DOCUMENT CR-6-023 May 16, 2011

# APPENDIX - 2

Notice of Intent (NOI) Form

# **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 Opera	tor Informatio	on									
Name:						Phone	e:				
Address:						Status	s of				
						Owne	r/Opera	itor:			10
City, State, Zip C				-							
II. Facility/Site I	Location Infor	rmation									
Name:	****										
Address:											
City, State, Zip C	Code:										
County:											
Site Latitude:						ngitude					
(degrees/minutes				i	(degree	es/minut	tes/seco	nds)			
III. Site Activity			·								
MS4 Operator N											
Receiving Water											
Are there existing quantitative data?  Yes  If Yes, submit with this form.  No											
SIC or Designate	d Activity Co	de Primary									
				2nd		13	3rd		-	4 <sup>th</sup>	
If this facility is a	member of a	Group Appl	ication, en	ter Grou	p Applic	cation N	lumber:			1	
If you have other	existing KPD	ES Permits,	enter Pern	ait Numb	ers:	W					· · · · · · · · · · · · · · · · · · ·
					1						
IV. Additional In	formation Re	quired FOR	CONSTR	UCTION	ACTIV	TTIES	ONLY				
Project Start Date: Completion Date:											
Estimated Area to be disturbed (in acres):											
Is the Storm Wat	er Pollution P	revention Pl	an in					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
Compliance with State and/or Local Sediment and Erosion Yes No											
Plans?											
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.											
and imprisoning	nent for knowl	ng violations	•								
Printed or Typed	Name:										
							1				
G!					D		l				
Signature:					Date:		i				

#### 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) <u>and</u> 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 authority 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.

## APPENDIX - 3

Subsurface Geotechnical Report

## Prepared For

Jessamine South Elkhorn Water District c/o Horne Engineering, Inc. 216 South Main Street Nicholasville, Kentucky 40356

Prepared by

QORE™, Inc. 422 Codell Drive Lexington, Kentucky 40509

Report of Geotechnical Exploration for 1,000,000 GALLON WATER TANK SWITZER PROPERTY Jessamine County, Kentucky QORE Project No. 24302766 March 11, 2004

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March 11, 2004

Jessamine South Elkhorn Water District c/o Horne Engineering, Inc. 216 South Main Street Nicholasville, Kentucky 40356

Attention: Mr. John Horne, PE, PLS

Subject: Report of Geotechnical Exploration

1,000,000 GALLON WATER TANK - SWITZER PROPERTY

Jessamine County, Kentucky QORE Project No. 24302766

Dear Mr. Horne:

QORE, Inc. has completed the geotechnical exploration for your project. The purpose of this exploration was to obtain subsurface data at the site pursuant to developing site preparation and foundation recommendations for the proposed construction. We conducted this project according to our proposal No. Lex1665, dated February 26, 2004. This report explains our understanding of the project, documents our findings, and presents our conclusions and engineering recommendations. After you have reviewed our report, we recommend either a meeting or a telephone conference to discuss our recommendations.

QORE appreciates the opportunity to be of service to the Jessamine South Elkhorn Water District and Horne Engineering, Inc. We look forward to helping you through project completion. If you have any questions, please call.

Respectfully submitted,

QORE, Inc.

William J. Young, Project Engineer

Licensed Kentucky 23,434

Craig S. Lee, P.E.

Senior Geotechnical Engineer

Attachments:

Report of Geotechnical Exploration

Appendices

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## REPORT OF GEOTECHNICAL EXPLORATION 1,000,000 GALLON WATER TANK - SWITZER PROPERTY

## Jessamine County, Kentucky QORE Project No. 24302766

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## REPORT OF GEOTECHNICAL EXPLORATION 1,000,000 GALLON WATER TANK – SWITZER PROPERTY

Jessamine County, Kentucky QORE Project No. 24302766

## INTRODUCTION

QORE, Inc. conducted a geotechnical exploration for the proposed 1,000,000 Gallon Water Tank located on the Switzer Farm near the intersection of Catnip Hill Road and U.S. 68 (Harrodsburg Road) in Jessamine County, Kentucky. We provided our services according to our proposal no. Lex1665, dated February 26, 2004. The purpose of our work was to explore the subsurface soil, rock, and groundwater conditions at the location of the proposed tank and to provide recommendations for adapting the site for the proposed construction. This report explains our understanding of the project, documents our findings, and presents our conclusions and engineering recommendations.

## SITE DESCRIPTION

The proposed tank site is located on the Switzer property in a grassy farm field, on a hilltop, near the intersection of Catnip Hill Road and Rhineheimer Way in Jessamine County, Kentucky. The tank site area is relatively level, with a gentle slope to the northeast. Based on the topographic survey provided by Horne Engineering, Inc., elevations within the tank area vary by approximately one foot, and range from 1022 to 1023 feet (assumed mean sea level).

## PROJECT INFORMATION

The information provided to QORE included two topographic surveys of the possible tank site, a photocopied USGS topographic map showing the site location, and a prototype foundation plan prepared by Caldwell Tanks. The information provided indicates that the proposed tank will be an elevated 1,000,000 gallon water storage tank. The proposed design indicates eight legs with a center riser. According to the provided drawings, the legs of the tank are positioned on a 35 feet radius from the center riser, and will be situated at 45 degree angles. The prototype foundation plan provided by Caldwell Tanks indicates a bearing elevation 8½ feet below the ground surface at each leg location.

## SITE GEOLOGY

A review of the U.S.G.S. geologic quadrangle map of the *Nicholasville Quadrangle*, *Kentucky* (GQ-767, 1968) indicates the site is located near the interface of the Tanglewood Limestone

Member and the Brannon Member of the Lexington Limestone of the Middle and Upper Ordovician Geologic Ages.

The Tanglewood Limestone Member consists of Limestone and minor shale. The limestone is light gray, medium to coarse grained, and thin to thick bedded with tabular beds dominant. The limestone is also phosphatic, siliceous in part, and bioclastic. The shale is medium gray, limy, thin bedded and mostly interlaminated with shaly limestone in thin partings between limestone beds. Chert nodules and silicified limestone in some beds yield a porous, cherty residuum in moderate to light reddish orange soil.

The Brannon Member consists primarily of limestone and shale, interbedded. The limestone (50 percent) is medium to dark gray, micrograined, some medium grained, locally siliceous or cherty, and tabular bedded in beds less than ½ foot thick. The shale is medium to dark gray, locally brownish-gray, limy and thin bedded. This unit weathers to a light gray to light yellowish-brown soil.

At this site, the contact of the Tanglewood Limestone and the Brannon Member is mapped at approximate elevation 1020, with the Tanglewood Limestone generally lying at a higher elevation than the Brannon Member.

Several sinkholes are mapped approximately 1000 feet to the west and southwest of the proposed tank site. However, a review of the geologic maps of this portion of Jessamine County indicates that the mapped sinkholes lie primarily in the Grier Formation, at elevations below 1000 feet M.S.L. (mean sea level). Only four mapped sinkholes were found within the Brannon Member in this portion of the county, with the nearest occurring approximately one mile north of the project site, at or below elevation 1000. According to the provided topographic information, the surface elevations at the proposed tank site range from 22 to 23 feet above this elevation.

During our review of the USGS Quadrangle mapping, we noted a mapped wetlands within approximately 500 feet to the west of the project site. The wetlands is mapped at approximate elevation 1020, but is not mapped on the tank site. However, we have not been retained to determine the presence of, nor delineate wetlands, and our geotechnical personnel have not been trained to recognize wetland areas in the field. QORE has trained wetlands scientists on staff and can provide these services under a separate contract, if desired.

At the project site, the auger refusal elevations indicate a consistent top of non-weathered rock elevation (level rock surface), the recovered rock cores consist of shaley limestone, which is less susceptible to solutioning, and the recovered rock cores revealed high rock quality designation (RQD) and recovery (REC) percentages.

The rock cores obtained in this exploration (borings B-2 and B-6) confirm that the tank site is underlain by the Brannon Member of the Lexington Limestone. This is further evidenced by top of core elevations of approximately 1011 feet M.S.L., which corresponds with the mapped elevations of the Brannon Member on the Geologic Quadrangle map.

All areas underlain by potentially soluble rock (i.e. – limestone or dolomite) are at some risk due to sinkhole activity. The rock cores obtained in this exploration did not indicate sinkhole activity.

## **EXPLORATION METHODS**

## Field Exploration

We drilled eight borings, one at each of the proposed legs, to explore the subsurface conditions at the tank location. The provided prototype foundation plan indicated a bearing elevation 8 ½ feet below the ground surface at each leg. Therefore, no soil sampling was performed in the upper six feet (borings B-2, B-4, B-6, and B-8) to eight feet (borings B-1, B-3, B-5, and B-7), since this material will be removed during the foundation construction. Soil sampling began near the anticipated bearing elevation in order to determine the composition and quality of the sampled stratum. A project engineer from our office was on-site to observe pertinent site features and surface indications of site geology, to direct drilling operations, and to record and log the results of the soil sampling and rock coring. Horne Engineering, Inc. staked the test boring locations in the field prior to the arrival of the engineer and drilling personnel. The soil test boring elevations were interpolated to the nearest ½ foot from the provided topographic map of the area, and should be considered approximate. We numbered the borings B-1 through B-8, to correspond with leg numbering system on the provided site map. We obtained soil samples using a split-barrel sampler driven by a safety hammer system according to ASTM D1586. We also obtained rock core samples using a NX wire line core barrel, which produced cores of 17/8" diameter in two of the borings (B-2 and B-6). The stratification lines shown on the boring records represent the approximate boundaries between soil or rock types. transitions may be more gradual than shown.

Field sampling and testing procedures used by QORE are in general accordance with ASTM procedures and established geotechnical engineering practice. Appendix B contains brief descriptions of field procedures.

## **Laboratory Testing**

Recovered soil and rock samples were transported to our office for logging and laboratory testing. We performed unconfined compression tests on representative rock core samples obtained below the weathered rock zone. The tested rock core samples consisted primarily of calcareous shale with limestone partings. Since we anticipated a rock bearing foundation, laboratory testing was not performed on the recovered soil samples. Laboratory testing by QORE is in general accordance with ASTM procedures. Appendix C contains the results of our laboratory testing and brief descriptions of laboratory procedures.

## SUBSURFACE CONDITIONS

All eight borings penetrated a seven to nine inch thick layer of topsoil. The topsoil was underlain by approximately 7½ feet of orangish brown soil that was black mottled and generally moist and stiff. Standard penetration resistances ranged from 11 to 19 blows per foot (bpf), indicating a stiff to very stiff consistency soil. Below the orangish-brown soil was a thin layer (approximately one foot) of orangish-tan to tan soil that was black and light gray mottled, generally moist and very stiff. This orangish-tan to tan soil horizon extended to rock. The orangish-tan to tan soil exhibited standard penetration resistances from 22 to 50+ bpf. The inflated standard penetration test resistance N-values for the orangish-tan to tan soil can be attributed to the presence of a weathered rock layer above auger refusal. We interpreted this layer as weathered rock.

All eight soil borings encountered auger refusal, at depths ranging from 9.7 feet (at boring B-3) to 11.4 feet (at borings B-6 and B-8).

Weathered rock zones were encountered above auger refusal in all of the borings, and ranged from one foot to two feet in thickness. After auger refusal was obtained, the subsequent rock coring indicated that the upper 19 feet of the underlying bedrock is comprised of calcareous shale (60%) and limestone (40%). The calcareous shale is dark gray, and the limestone is generally gray, medium to coarse grained, crystalline and fossiliferous. The recovery of rock core (REC) varied from 96 to 100 percent. The rock quality designation (RQD) varied from 78

to 100 percent. RQD is an indicator of the quality of the bedrock bedding and structure. RQD values in the 78 to 100 percent range indicate a good to excellent rock quality. No core water was lost during the coring process in either boring.

Groundwater was not encountered in any of the soil borings at the completion of soil augering. Since water is used during core drilling, water level readings could not be obtained in borings B-2 and B-6. The borings were backfilled with soil at the completion of augering due to safety concerns. Groundwater levels fluctuate with time due to seasonal rainfall, locally heavy precipitation events, construction activities, and other site-specific factors. Therefore, future groundwater levels may be encountered within the depths explored by our borings. It is common to encounter groundwater at the soil/rock interface in areas underlain by limestone. Unconfined compression tests were performed on four representative rock core samples. These samples were selected at depths which we believe will be near the foundation bearing elevation. These tests indicated ultimate unconfined compression strengths ranging from 93 ksf to 331 ksf (kips per square foot).

## CONCLUSIONS AND RECOMMENDATIONS

## **GENERAL DISCUSSION**

Based on the subsurface conditions encountered in our borings, our analyses, and our experience, we believe the site is adaptable for construction of the proposed 1,000,000 gallon water tank. We identified one key issue that we believe will impact the proposed construction – a weathered bedrock zone above auger refusal.

We recommend that the proposed tank bear on the non-weathered calcareous shale and limestone bedrock that underlies the weathered bedrock zone. Several foundation systems are feasible for this type of project, with the most practical being spread footings or drilled shafts. Recommendations for foundation preparation and design criteria for spread footing and drilled shaft foundation systems are presented in the following paragraphs.

## EARTHWORK RECOMMENDATIONS

## Stripping

All topsoil and organic materials should be stripped in construction areas to prepare the area for construction. The stripping can be limited to the immediate construction area. Based on field observations at the time of drilling, expect stripping depths of about ¾ foot to 1 foot to penetrate the root mat into the underlying soil stratum. The removed topsoil should be spread in "landscape" areas only, outside of the construction area. Organic material should not be utilized as fill material.

## **FOUNDATION RECOMMENDATIONS**

We recommend that the proposed tank bear on the non-weathered calcareous shale and limestone bedrock that underlies the weathered bedrock zone. Recommendations for foundation preparation and design criteria for spread footing and drilled shaft foundation systems are presented in following paragraphs. The anticipated foundation bearing elevations are tabulated below.

Boring Number	Surface Elevation*	Top of Weathered Rock Elevation	Anticipated Bearing Elevation
B-1	1022	1013	1011
B-2	1022	1013	1011
B-3	1022	1013	1012
B-4	1022.5	1013.5	1012
B-5	1023	1014	1012.5
B-6	1023	1012.5	1011.5
B-7	1023	1013.5	1012
B-8	1022.5	1013	1011

<sup>\*</sup> Surface elevations were interpolated to the nearest ½ foot from the provided topographic map of the area, and should be considered approximate.

The current seismic design procedures outlined in the NEHRP (National Earthquake Hazard Reduction Program) guidelines mandate structural design loads be based on the seismic coefficients of the site. Based on the results of our exploration and the geology of the area, we recommend a site seismic classification of "B". This classification is further defined in Table 1615.1.1 in the 2002 Kentucky Building Codes Manual.

## Spread Footing Foundation Design

Support the spread footing foundations on the non-weathered bedrock zone (approximate elevations 1011 to 1012.5) that underlies the weathered bedrock zone. We recommend use of a maximum allowable bearing pressure of **60 ksf** (kips per square foot) to size spread footings supported by the non-weathered bedrock. Actual foundation embedment will be based on the lateral loads imparted by the tank to the foundation elements and should be considered by the tank foundation designer.

## Spread Footing Foundation Construction

The tank foundation excavations will be large enough to allow observation of the bearing conditions. After the foundation excavations are completed, the bearing material at each footing location should be approved by a QORE representative prior to placement of the reinforcing steel and concrete. Significant deviations from the specified or anticipated conditions should be reported to the owner's representative and to the foundation designer. The reinforcing steel should be clean and dry prior to concrete placement.

## **Drilled Shaft Foundation Design**

The drilled shafts should be sized using a maximum allowable rock bearing pressure of **60 ksf** (kips per square foot) for bearing on the non-weathered bedrock that underlies the weathered rock zone. This allowable bearing pressure is based on the assumption that the bearing material for each shaft will be observed and approved by QORE personnel. Experience indicates that excessive rock excavation and cost over-runs occur more often if a testing firm unfamiliar with the subsurface conditions and design assumptions are retained to inspect the drilled shaft excavations. Total and differential settlements of foundations bearing on competent bedrock, using the recommended bearing pressure, should be about ¼ inch or less.

## **Drilled Shaft Construction Considerations**

The following construction considerations are recommended for drilled shaft construction:

- Clean the foundation bearing area so it is nearly level or suitably benched and is free of ponded water or loose material.
- Provide a minimum drilled shaft diameter of 30 inches to reasonably enter the drilled pier excavation for cleaning, bottom preparation, and inspection.

- If groundwater is encountered during rock removal for the drilled shaft foundations, make provisions for groundwater removal from the drilled shaft excavation. Groundwater conditions at this site may require the use of special procedures to achieve a satisfactory foundation installation. If water is flowing into the drilled shaft at less than 20 gallons per minute, pumps may be used to maintain less than 2 inches of water in the drilled shaft during cleaning and inspection. After approval of the bearing surface, the pumps should be pulled and concreting commenced immediately. If more than 20 gallons per minute are flowing into the drilled shaft, the water level should be allowed to stabilize before attempting to place the concrete. For this condition, concrete placement should be accomplished using a tremie pipe, or concrete pumping equipment.
- Specify concrete slumps ranging from 4 to 7 inches for the drilled shaft construction. These slumps are recommended to fill irregularities along the sides and bottom of the drilled shaft, displace water as it is placed, and permit placement of reinforcing cages into the fluid concrete.
- Retain QORE personnel to observe foundation excavations after the bottom of the hole is leveled, cleaned of any mud or extraneous material, and dewatered.
- Install a temporary protective steel casing to prevent sidewall collapse, prevent excessive mud and water intrusion, and to allow workers to safely enter, clean and inspect the drilled shaft.
- Inspect the drilled shaft excavation after the bottom of the hole is leveled, cleaned of any mud or extraneous material, and de-watered.
- Clean the socket "face" prior to concrete placements. Cleaning will require
  hand cleaning or washing if a mud smear forms on the face of the rock. The
  geotechnical engineer should approve the rock socket surface prior to concrete
  placement.

- The protective steel casing may be extracted as the concrete is placed provided a sufficient head of concrete is maintained inside the steel casing to prevent soil or water intrusion into the newly placed concrete.
- Direct the concrete placement into the drilled shaft through a centering chute to reduce side flow or segregation.

## **Drilled Shaft Rock Excavation**

Our borings encountered weathered rock conditions. Our experience with the Brannon formation indicates the rock may weather irregularly; however, the results of this exploration indicate a relatively consistent rock surface. Actual rock embedment into the non-weathered zone must be determined by the tank foundation designer once the actual tank loads are known.

Our experience indicates general drilled shaft construction and delineation of "rock" in the excavation is greatly facilitated if suitable drilling equipment is used. We recommend the use of a drill capable of producing at least 500,000 inch-pounds of torque and 35,000 pounds of downward force. Additionally, we recommend that rock be defined as material which cannot be penetrated by a heavy-duty earth auger with hardened teeth at a rate in excess of 3 inches per minute.

## **Drilled Shaft Quality Control Requirements**

We recommend that the drilled shaft construction be observed by a QORE geotechnical engineer. The observation should address the following items:

- Top location within tolerances
- Correct plan dimensions
- Plumbness within tolerances
- Materials excavated agree with borings
- Statement of bottom cleanliness
- Construction procedure

Drilled shafts with diameters of 30 inches or greater are large enough to allow a down-hole inspection of the bearing conditions. At least one, 1½- to 2-inch diameter probe hole must be drilled at least 5 feet into the rock-bearing material for all drilled shafts. These probe holes are usually drilled with a pneumatic percussion drill. The engineer should check the probe hole using

a hooked-end steel feeler rod to assess the rock continuity. If this check indicates a discontinuous or compressible seam in the rock, the drilled shaft should be excavated deeper. Additional probe holes may be required by the geotechnical engineer to check foundations supported on marginal material. Significant deviations from the specified or anticipated conditions should be reported to the owner's representative and to the foundation designer.

## **FOLLOW-UP SERVICES**

Our services should not end with the submission of this geotechnical report. QORE should be kept involved throughout the design and construction process to maintain continuity and to verify that our recommendations are properly interpreted and implemented. To achieve this, we should review project plans and specifications with the designers to see that our recommendations are fully incorporated. We also should be retained to monitor and test the site preparation and foundation construction. If we are not allowed the opportunity to continue our involvement on this project, we cannot be held responsible for the recommendations in this report.

Site preparation and foundation construction will be a critical aspect of this project. Our familiarity with the site and with the foundation recommendations will make us a valuable part of your construction quality assurance team. In addition, a qualified engineering technician should observe and test all structural concrete and steel. Only experienced, qualified persons trained in geotechnical engineering and familiar with foundation construction should be allowed to monitor and test foundations. Normally, full-time monitoring of the site work and foundation installation is appropriate.

## **LIMITATIONS**

This report has been prepared for the exclusive use of the Jessamine South Elkhorn Water District and their designers for specific application to the project site. Our conclusions and recommendations have been prepared using generally accepted standards of geotechnical engineering practice in the Commonwealth of Kentucky. No other warranty is expressed or implied. This company is not responsible for the conclusions, opinions, or recommendations of others based on these data.

Our conclusions and recommendations are based on the design information furnished to us, the data obtained from our subsurface exploration, and our past experience. They do not reflect

variations in the subsurface conditions that are likely to exist between our borings and in unexplored areas of the site. These variations result from the variability of the soils and bedrock at this site. If such variations become apparent during construction, it will be necessary for us to re-evaluate our conclusions and recommendations based upon on-site observation of the conditions.

If the overall design or location of the 1,000,000 gallon water tank is changed, the recommendations contained in this report must not be considered valid unless our firm reviews the changes and our recommendations modified and verified in writing. When the design is finalized, we should be given the opportunity to provide the additional service of reviewing the foundation plan, grading plan, and applicable portions of the project specifications. This review will allow us to check whether these documents are consistent with the intent of our recommendations.

We recommend that the owners retain these services and that QORE be allowed to continue our involvement in the project through these phases of construction. Our firm is not responsible for interpretation of the data contained in this report by others, nor do we accept any responsibility for job site safety, which is the sole responsibility of the contractor.

## **Important Information About Your**

## Geotechnical Engineering Report-

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

## Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared solely for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. And no one—not even you—should apply the report for any purpose or project except the one originally contemplated.

## Read the full report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

## A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

• the function of the proposed structure, as when

it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse.

- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or -
- project ownership.

As a general rule, always inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.

## **Subsurface Conditions Can Change**

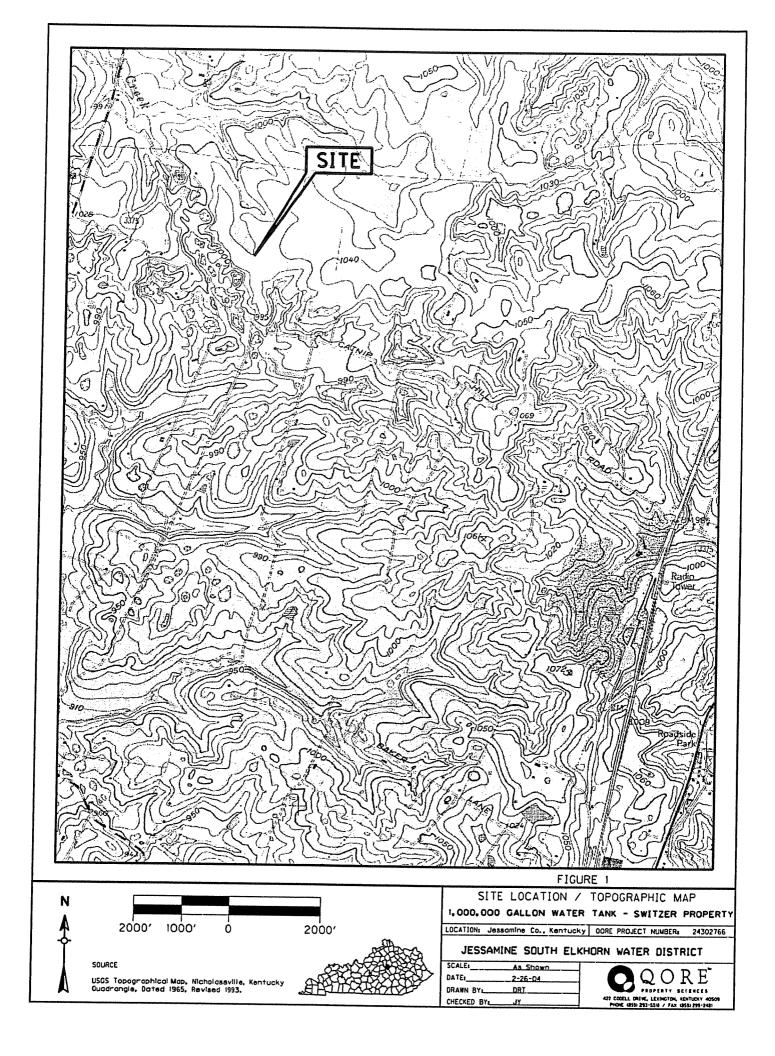
A geotechnical engineering report is based on conditions that existed at the time the study was performed. Do not rely on a geotechnical engineering report whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. Always contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

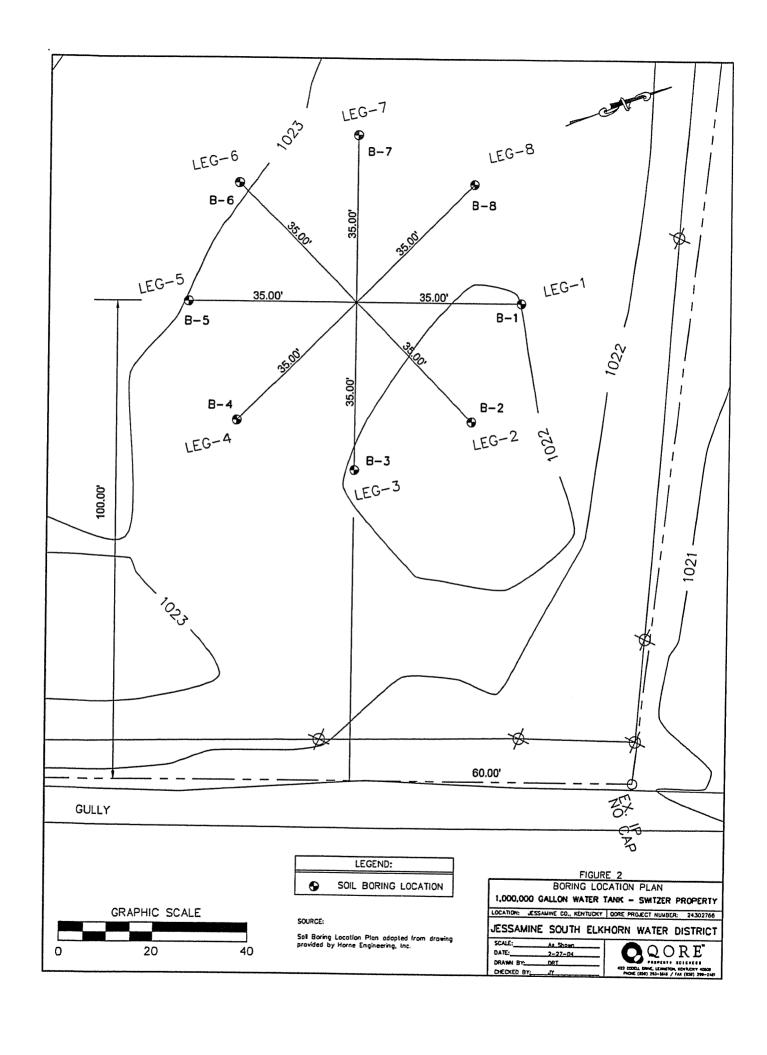
## Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

## **APPENDIX A**

Site Location / Topographic Map
Boring Location Plan





## **APPENDIX B**

**Test Boring Records** 

Field Procedures

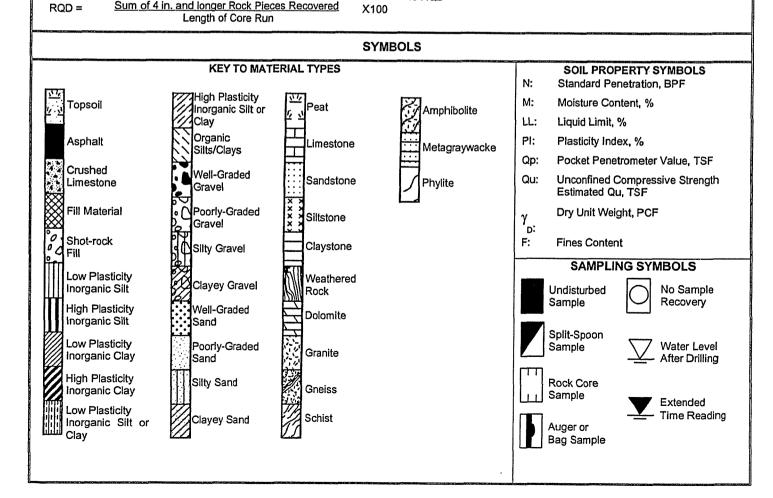
## **TEST BORING RECORD LEGEND**

	FII	NE AND COA	RSE GRAINED	SOIL INFOR	MATION					
	RAINED SOILS & GRAVELS)	1	NE GRAINED SO (SILTS & CLAYS		PARTICLE SIZE					
N	Relative Density	<u>N</u>	Consistency	Qu, KSF Estimated	Boulders	Greater than 300 mm (12 in)				
0-4	Very Loose	0-1	Very Soft	0-0.5	Cobbles	75 mm to 300 mm (3 to 12 in)				
5-10	Loose	2-4	Soft	0.5-1	Gravel	4.74 mm to 75 mm (3/16 to 3 in)				
11-20	Firm	5-8	Firm	1-2	Coarse Sand	2 mm to 4.75 mm				
21-30	Very Firm	9-15	Stiff	2-4	Medium Sand	0.425 mm to 2 mm				
31-50	Dense	16-30	Very Stiff	4-8	Fine Sand	0.075 mm to 0.425 mm				
Over 50	Very Dense	Over 31	Hard	8+	Silts & Clays	Less than 0.075 mm				

The STANDARD PENETRATION TEST as defined by ASTM D 1586 is a method to obtain a disturbed soil sample for examination and testing and to obtain relative density and consistency information. A standard 1.4-inch I.D./2-inch O.D. split-barrel sampler is driven three 6-inch increments with a 140 lb. hammer falling 30 inches. The hammer can either be of a trip, free-fall design, or actuated by a rope and cathead. The blow counts required to drive the sampler the final two increments are added together and designate the N-value defined in the above tables.

## **ROCK PROPERTIES**

1				•
RC	OCK QUALITY DESIGNATION (RQD)			ROCK HARDNESS
Percent F	RQD Quality	Very Ha	rd: Roc	ck can be broken by heavy hammer blows.
0-25	Very Poor	Hard:		ck cannot be broken by thumb pressure, but can be broken by derate hammer blows.
25-50	Poor	Moderat Hard:		all pieces can be broken off along sharp edges by considerable d thumb pressure; can be broken with light hammer blows.
50-75	Fair	Soft:		ck is coherent but breaks very easily with thumb pressure at rp edges and crumbles with firm hand pressure.
75-90	Good	Very Sot		ck disintegrates or easily compresses when touched; can be d to very hard soil.
90-100	) Excellent			
Recovery =	<u>Length of Rock Core Recovered</u> Length of Core Run	X100	63 REC NQ	Core Diameter Inches  BQ 1-7/16  NQ 1-7/8
RQD =	Sum of 4 in. and longer Rock Pieces Recovered	X100	43 RQD	HQ 2-1/2





PROJECT: 1,000,000 Gallon Water Tank - Switzer Property REPORT NO: JOB NO: 24302766 PROJECT LOCATION: Jessamine County, Kentucky **ELEVATION: 1,022.0** BORING STARTED: 2/23/2004 BORING COMPLETED: 2/23/2004 DRILLING METHOD: 4" SFA RIG TYPE: B-34 HAMMER: Safety GROUNDWATER (ft): Dry upon completion of drilling BORING DIAMETER (IN): 4 SHEET 1 OF 1 Remarks: Partly Sunny with temperatures in the 30's Prototype Foundation Plan indicated Bearing Elevation 8.5 Feet below ground surface. Sampling started at 8.0 Feet. Sample Type Recovery (in) Groundwater Lithology 8 ELEV. DEPTH Qu STANDARD PENETRATION **BLOWS** Rob MATERIAL DESCRIPTION RESISTANCE (N) (FT.) (FT.) 1022.0-1021.3-- 0 -TOPSOIL (8 inches) AUGERED TO 8.0 FEET, NO SAMPLES TAKEN. FAT CLAY (CH), orangish-brown with black mottling, moist 5 1014.0-FAT CLAY (CH), VERY STIFF, orangish-tan to 15 10 - 20 -1013.0 tan with light gray and black mottling, moist 50/.5 10 -Weathered SHALE and LIMESTONE, with clay 1010.7 AUGER REFUSAL AT 11.3 FEET. 15 20 25 CRAIG2 24302766.GPJ QOR\_CORP.GDT 3/11/04 30 35



Р	ROJECT	: 1,000	,000 Gallon Water Tank - Switze	r Property				JOF	3 NO: 243027	766	REP	REPORT NO:				
-			ION: Jessamine County, Kentuck				L		210027				<del></del>			
-	LEVATIO			BORING START	ED:	2/2:	3/20	04		BORIN	G CON	//PLETI	 ED: 2	/23/2004		
D	RILLING	METHO	D: 4" SFA	RIG TYPE: B-3	34					HAMM	HAMMER: Safety					
G	ROUND	VATER	(ft): N/A				T	ВОГ	RING DIAMET	ER (IN):	4	SHEET		OF 1		
R	emarks:	Partly 9	Sunny with temperatures in the 3	0's										<del></del>		
	<del> </del>	Prototy	pe Foundation Plan indicated Be	aring Elevation 8	3.5 Fe	et l	belo	w gr	ound surface	e. Sampl	ing sta	arted a	t 6.0	Feet.		
Groundwater	ELEV. (FT.)	DEPTH (FT.)	MATERIAL DESC	RIPTION	Lithology	Sample Type	Recovery (in)	RQD (%)	Qu	STANDA RE:	IRD PE SISTAN	NCE (N	ATION ) 40 50	/6"		
	1022.0- 1021.3- 1014.5- 1013.0- 1011.0- 992.1- 991.0-	- 5	TOPSOIL (8 inches) AUGERED TO 6.0 FEET, NO 3 TAKEN.  FAT CLAY (CH), with few chert STIFF, orangish-brown with bla moist  FAT CLAY (CH), VERY STIFF, and light gray with black mottlin Weathered SHALE and LIMES seams  AUGER REFUSAL AT 11.0 FEET  Calcareous SHALE (60%) and I (40%), medium grained, crystall fossiliferous  LIMESTONE, gray, medium to correctly considered to co	fragments, ck mottling,  orangish-tan g, moist  TONE, with clay  ET.  IMESTONE ine, gray,			13 12 100% 100% 100% 100% 100% 100% 100% 1	00%	2303 psi 651 psi				44 50	6 - 6 - 5 13 - 22 - 50/.4		
			LIMESTONE, gray, medium to coorystalline CORING TERMINATED AT 31.0	oarse grained, FEET.												



PROJ	JECT:	1,000,	000 Gallon Water Tank - Switze	r Property			T	JOB	NO: 2430276	66	REPO	RT N	O:	
			ON: Jessamine County, Kentuck											
ELEV	/ATIO	N: 1,02	2.0	BORING START	TED: 2	2/23	/200	)4		BORIN	G СОМ	PLET	ED: 2/	23/2004
DRILL	LING	METHO	D: 4" SFA	RIG TYPE: B-3				HAMM	ER: Sa	fety				
GRO	UNDW	/ATER (	(ft): Dry upon completion of drilling	9				BOR	NG DIAMETE	R (IN):	4 5	SHEET	Г 1	OF 1
Rema		-	Sunny with temperatures in the 3 pe Foundation Plan indicated Be		8.5 Fe	et b	elov	v arc	ound surface	Sampl	ina sta	rted a	it 8.0 l	=eet.
	· · · · · ·	101019	per our dation in lar maiocide De			<u>Г</u>	, G, G	r gro	ı	l	g ota			Τ
	LEV. (FT.)	DEPTH (FT.)	MATERIAL DESC	CRIPTION	Lithology	Sample Type	Recovery (in)	RQD (%)	Qu	STANDA RE	AATSIS	CE (N		/6"
10	022.0- 021.3- 014.0- 013.0- 012.3-	- 0	TOPSOIL (8 1/2 inches) AUGERED TO 8.0 FEET, NO TAKEN.  FAT CLAY (CH), with few cher orangish-brown with black mot  FAT CLAY (CH), VERY STIFF and light gray, moist Weathered SHALE and LIMES seams AUGER REFUSAL AT 9.7 FEB	t fragments, tling, moist , orangish-tan STONE, with clay			15							10 - 16 - 50/.3



PROJECT: 1,000,000 Gallon Water Tank - Switzer Property REPORT NO: JOB NO: 24302766 PROJECT LOCATION: Jessamine County, Kentucky BORING STARTED: 2/23/2004 BORING COMPLETED: 2/23/2004 **ELEVATION: 1,022.5** DRILLING METHOD: 4" SFA RIG TYPE: B-34 HAMMER: Safety GROUNDWATER (ft): Dry upon completion of drilling BORING DIAMETER (IN): 4 SHEET 1 OF 1 Remarks: Partly Sunny with temperatures in the 30's Prototype Foundation Plan indicated Bearing Elevation 8.5 Feet below ground surface. Sampling started at 6.0 Feet. Sample Type Ē Recovery Lithology 8 Qu STANDARD PENETRATION **BLOWS** ELEV. DEPTH RQD ( MATERIAL DESCRIPTION RESISTANCE (N) (FT.) (FT.) 1022.5 - 0 TOPSOIL (7 inches) 1021.8 AUGERED TO 6.0 FEET, NO SAMPLES TAKEN. FAT CLAY (CH), with few chert fragments, STIFF, orangish-brown with black mottling, 5 16 11 - 9 - 9 1015.0 FAT CLAY (CH), VERY STIFF, orangish-tan and light gray with black mottling, moist 8 - 15 -14 1013.5 50/.3 Weathered SHALE and LIMESTONE, with clay 10 1012.3 seams AUGER REFUSAL AT 10.2 FEET. 15 20 25 CRAIG2 24302766.GPJ QOR\_CORP.GDT 3/11/04 30 - 35



PROJEC	T: 1,000,000 Ga	allon Water Tank - Switze	r Property			J	JOB I	NO: 243027	66	REPC	RT NO:	
PROJEC	T LOCATION: Je	essamine County, Kentuck	ζy									
ELEVAT	ION: 1,023.0		BORING STAF	RTED: 2	2/23/	200	4		BORING	э сом	PLETED: 2	2/23/200
DRILLIN	G METHOD: 4" S	FA	RIG TYPE: B	-34					HAMME	R: Sa	fety	
GROUNI	OWATER (ft): Tr	ace at bottom of boring			***************************************	TE	BORI	NG DIAMETE	ER (IN): 4	.	SHEET 1	OF 1
Remarks	•	with temperatures in the 3 and ation Plan indicated Be		1 8.5 Fe	et be	elow	v gro	und surface	e. Samplii	ng star	rted at 8.0	Feet.
Groundwater (L.1.)	/. DEPTH (FT.)	MATERIAL DESC	CRIPTION	Lithology	Sample Type	Recovery (in)	RQD (%)	Qu		ISTAN	NETRATIO CE (N) 20 30 40	/6"
1015.0 1014.0 1012.6	FAT ( and li weat	CLAY (CH), with few cher gish-brown with black mot CLAY (CH), VERY STIFF ght gray with black mottlin hered SHALE and LIMES	t fragments, tling, moist , orangish-tan ng, moist TONE, with cla			14						11 - 1 50/.3

PROJEC	T: 1,000	,000 Gallon Water Tank - Switzer	r Property	***************************************		Т	JOB	NO: 243027	56	REPO	RT NO			
PROJEC	T LOCAT	ION: Jessamine County, Kentuck	у											
ELEVATI	ON: 1,02	23.0	BORING STARTE	D: 2	2/23	/200	)4		BORING	COMP	LETE	 D: 2/	23/2004	
DRILLING	METHO	DD: 4" SFA	RIG TYPE: B-34				·············		HAMMER: Safety					
GROUNE	WATER	(ft): N/A				T	BOR	ING DIAMETE			HEET	1	OF 1	
Remarks	_	Sunny with temperatures in the 30 per Foundation Plan indicated Be		5 Fe	et b	elov	w gro	ound surface	. Sampli	ng star	ted at	6.0 f	eet.	
Groundwater Groundwater	. DEPTH (FT.)	MATERIAL DESC	RIPTION	Lithology	Sample Type	Recovery (in)	RQD (%)	Qu	STANDAI RES	ISTAN			/6"	
1023.0 1022.3 1015.5 1011.6	- 5	TOPSOIL (8 inches) AUGERED TO 6.0 FEET, NO STAKEN.  FAT CLAY (CH), with few chert STIFF, orangish-brown with blamoist  FAT CLAY (CH), VERY STIFF, and light gray with black mottlin  Weathered SHALE and LIMES Seams AUGER REFUSAL AT 11.4 FEET Calcareous SHALE (60%) and (40%), gray, medium grained, c fossiliferous	orangish-tan g, moist  TONE, with clay  ET.  LIMESTONE rystalline,		O	18 16 10 11 197% 11 10 10 10 10 10 10 10 10 10 10 10 10	91	1717 psi 1138 psi					7 - 5 - 6 7 - 9 - 13 11 - 17 - 50/0	



JOB NO: 24302766 REPORT NO: PROJECT: 1,000,000 Gallon Water Tank - Switzer Property PROJECT LOCATION: Jessamine County, Kentucky BORING STARTED: 2/23/2004 BORING COMPLETED: 2/23/2004 ELEVATION: 1,023.0 DRILLING METHOD: 4" SFA RIG TYPE: B-34 HAMMER: Safety SHEET 1 OF 1 BORING DIAMETER (IN): 4 GROUNDWATER (ft): Dry upon completion of drilling Remarks: Partly Sunny with temperatures in the 30's Prototype Foundation Plan indicated Bearing Elevation 8.5 Feet below ground surface. Sampling started at 8.0 Feet. Sample Type Recovery (in) Lithology RQD (%) STANDARD PENETRATION **BLOWS** ELEV. DEPTH Qu MATERIAL DESCRIPTION RESISTANCE (N) /6" (FT.) (FT.) 1023.0-0 TOPSOIL (8 inches) 1022.3 AUGERED TO 8.0 FEET, NO SAMPLES TAKEN. FAT CLAY (CH), with few chert fragments, orangish-brown with black mottling, moist 5 1015.0 FAT CLAY (CH), VERY STIFF, orangish-tan 13 - 21 -18 4 and light gray with black mottling, moist 18 1013.5 Weathered SHALE and LIMESTONE, with clay 10 -50/.5 seams 1011.8 AUGER REFUSAL AT 11.2 FEET. 15 20 25 CRAIG2 24302766.GPJ QOR\_CORP.GDT 3/11/04 30 35



PROJECT: 1,000,000 Gallon Water Tank - Switzer Property JOB NO: 24302766 REPORT NO: PROJECT LOCATION: Jessamine County, Kentucky **ELEVATION: 1,022.5** BORING STARTED: 2/23/2004 BORING COMPLETED: 2/23/2004 DRILLING METHOD: 4" SFA RIG TYPE: B-34 HAMMER: Safety GROUNDWATER (ft): Dry upon completion of drilling BORING DIAMETER (IN): 4 SHEET 1 OF 1 Remarks: Partly Sunny with temperatures in the 30's Prototype Foundation Plan indicated Bearing Elevation 8.5 Feet below ground surface. Sampling started at 6.0 Feet. Sample Type Ē) Recovery Lithology RQD (%) STANDARD PENETRATION **BLOWS** ELEV. DEPTH Qu MATERIAL DESCRIPTION RESISTANCE (N) (FT.) (FT.) 1022.5 - 0 TOPSOIL (7 inches) AUGERED TO 6.0 FEET, NO SAMPLES 1021.8 TAKEN. FAT CLAY (CH), with few chert fragments, STIFF, orangish-brown with black mottling, 5 moist 18 9 - 9 - 10 1015.0 FAT CLAY (CH), VERY STIFF, orangish-tan and light gray with some black mottling, moist 17 12 - 17 -1013.0-23 2 Weathered SHALE and LIMESTONE, with clay 10 -50/.2 seams 1011.1 AUGER REFUSAL AT 11.4 FEET. 15 20 25 CRAIG2 24302766.GPJ QOR\_CORP.GDT 3/11/04 30 35

## FIELD TESTING PROCEDURES

Field Operations: The general field procedures employed by QORE Property Sciences are summarized in ASTM D 420 which is entitled \*Investigating and Sampling Soils and Rocks for Engineering Purposes.\* This recommended practice lists recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the subsurface conditions. These techniques are:

- Continuous 2-1/2 or 3-1/4 inch L.D. hollow stern augers:
- b. Wash borings using roller cone or drag bits (mud or water);
- Continuous flight augers (ASTM D 1425).

These drilling methods are not capable of penetrating through material designated as 'refusal materials.' Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravet or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

The subsurface conditions encountered during drilling are reported on a field test boring record by the driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geolechnical engineer. The engineer classifies the soils in general accordance with the procedures outlined in ASTM D 2488 and prepares the final boring records that are the basis for all evaluations and recommendations.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designating the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report. The detailed date collection methods using during this study are discussed on the following pages.

Soil Test Borings: Soil itest borings were made at the site at locations shown on the attached Boring Plan. Soil sampling and-penetration testing were performed in accordance with ASTM D 1586.

The borings were made by mechanically twisting a 5-5/8" outer diameter auger into the soil. At regular intervals, the drilling tools were removed and samples obtained with a standard 1.4 Inch l.D., 2 inch O.D., split tube sampler. The sampler was first seated 6 inches to penetrate any toose cuttings, then driven an additional foot with blows of a 140-pound harmer falling 30 inches. The number of harmer blows required to drive the sampler the final foot was recorded and is designated the "penetration resistance".

Representative portions of the samples, the solid based on glass pars and transported to the laboratory. In the laboratory, the samples were examined to verify the driller's field classifications. Test Boring Records are attached which graphically show the soil descriptions and penetration resistances.

Soil Auger Soundings: Soil auger soundings were made at the sile at the locations shown on the attached Boring Location Plan. The soundings were performed by mechanically twisting a steel auger into the soil. However, unlike the soil test borings, a smaller diameter soild stem auger was used and no spill-spoon samples were obtained. The driller provided a general description of the soil encountered by observing the soils brought to the surface by the twisting auger. The auger was advanced until refusal materials were encountered and the refusal depth was noted by the driller. The auger is then withdrawn and the depths to water or caved materials are then measured and recorded by the driller.

Soll auger soundings provide a rapid, economical method of obtaining the approximate bedrock depth, groundwater depth, and general soil conditions at locations where detailed soil lesting and sampling is not required.

Undisturbed Sampling: Spill tube samples are sultable for visual examination and classification tests but are not sufficiently intact for quantitative laboratory testing. For quantitative testing, relatively undisturbed samples are obtained by pushing sections of 3 inch O.D., 16 gauge, steel or brass tubing (Shelby tube) into the soil at the desired sampling levels. This procedure is described by ASTM D 1587. Each tube, together with the encased soil, is carefully removed from the ground, made airlight and transported to the laboratory. Locallons and depths of undisturbed samples are shown on the Test Boring Record.

Water Level Readings: Water lable readings are normally taken in conjunction with borings and are recorded on the "Test Boring Records". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of the hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The time of boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time tag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface. Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

## **APPENDIX C**

Laboratory Data

Laboratory Procedures

## SUMMARY OF LABORATORY TEST DATA

		_	<del></del>	-	T	_	т-	T-	<del></del>	 	<del></del>	 	 <del></del>	 			 		 	
CBR		5 mg/s/2																		
SPECIFIC		w.																		
%FINER NO. 200		2																		-
UNCONFINED COMPRESSIVE STRENGTH PSI			2,303	651		1,717	1,138													
UNIT WEIGHT PCF	DRY	0 27 7	147.0	142.3		150.8	148.6													
UNIT WE	WET																			
MAX. DRY DENSITY PCF /OPTIMUM MOISTURE %																				
ITS	P.I.																			
ATTERBERG LIMITS	P.L.	S.																		
lA A																				
NATURAL MOISTURE CONTENT, PERCENT																				
nscs									- Marian							•				
SAMPLE TYPE*		CORE	CORE		CORE	CORF												+		
SAMPLE DEPTH, FT.		11.5-12.0	12.5-13.0		11.6-12.1	12.5-13.0												-		
BORING NO.		B-2	B-2		B-6	B-6														

**QORE, INC.** Lexington, Kentudy Project Name: One Million Gallon Vater Tank Project Number: 24302766 Table Checked By:\_

\* SS = Split-Spoon Sample (ASTM D 1586); UD = Undisturbed Sample (ASTM D 1587); BG = Bulk Bag Sample CORE = Rock Core

## LABORATORY TESTING PROCEDURES

Soli Classification: Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our "Test Boring Records."

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary: grain size tests and plasticity tests. Using these lest results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D 2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

Compaction Tests: Compaction tests are run on representative soil samples to determine the dry density obtained by a uniform compactive effort at varying moisture contents. The results of the test are used to determine the moisture content and unit weight desired in the field for similar soils. Proper field compaction is necessary to decrease future settlements, increase the shear strength of the soil and decrease the permeability of the soil.

The two most commonly used compaction tests are the Standard Proctor test and the Modified Proctor test. They are performed in accordance with ASTM D 698 and D 1557, respectively. Generally, the Standard Proctor compaction test is run on samples from building or parking areas where small compaction equipment is anticipated. The Modified compaction test is generally performed for heavy structures, highways, and other areas where large compaction equipment is expected. In both tests a representative soil sample is placed in a mold and compacted with a compaction harmer. Both tests have four alternate methods.

Test	Method	Hammer WL/Fall	Mold Diam.	Run on Mati. Finer Than	No. of Layers	No. of Blows/Lay er
Slandard	A	5.5 lb <i>J12</i> *	4"	No. 4 sleve	3	25
D 698	В	5.5 lb./12*	4*	3/8" sieve	3	25
	С	5.5 lb./12*	<b>5</b> *	3/4* sleve	3	56

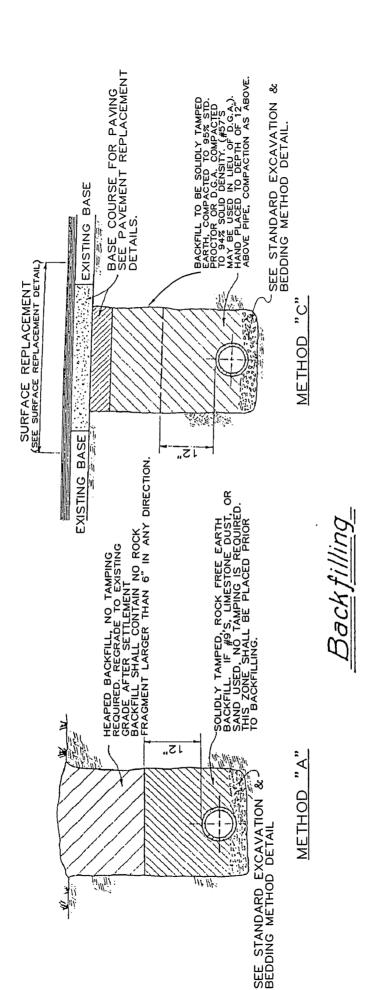
Teșt	Method	Hammer W <i>L</i> /Fall	Mold Diam.	Run on Mati. Finer Than	No. of Layers	No. of Blows/Lay er
Modified	A	10 lb/18"	4"	No. 4 sieve	5	25
ם 1557	В	10 lb/18"	4"	3/8" sleve	5	25
	С	10 lb/18"	6*	3/4" sleve	5	56

The moisture content and unit weight of each compacted sample is determined. Usually 4 to 5 such tests are run at different moisture contents. Test results are presented in the form of a dry unit weight versus moisture content curve. The compaction method used and any deviations from the recommended procedures are noted in this report.

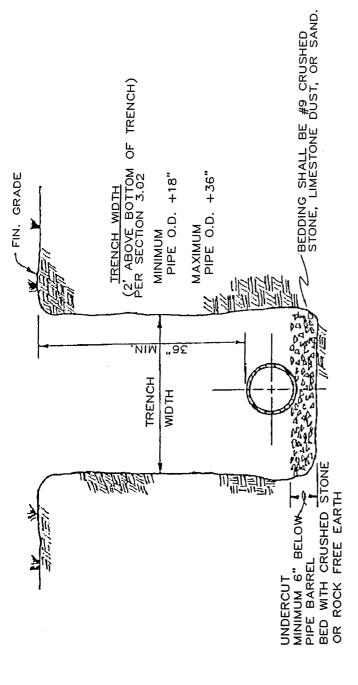
Atterberg Limits: Portions of the samples are taken for Atterberg Limits testing to determine the plasticity characteristics of the soil. The plasticity index (PI) is the range of moisture content over which the soil deforms as a plastic material. It is bracketed by the liquid limit (LL) and the plastic limit (PL). The liquid limit is the moisture content at which the soil becomes sufficiently "wet" to flow as a heavy viscous fluid. The plastic limit is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into tiny threads. The liquid limit and plastic limit are determined in accordance with ASTM D 4318.

Moisture Content: The Moisture Content is determined according to ASTM D 2216.

## STANDARD DETAILS SD-1 thru SD-17



SD-1

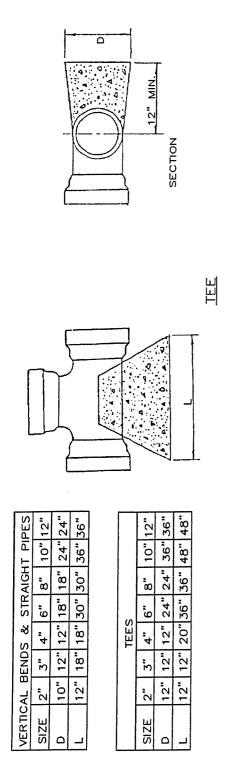


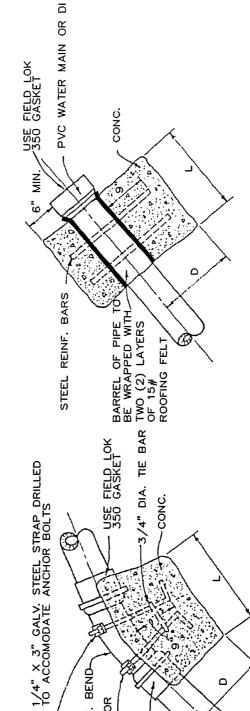
TRENCH BOTTOM SHALL PROVIDE A MINIMUM OF 6" OF UNDISTURBED SOIL, IF SOLID ROCK OR FLOATER ROCK OCCUR LESS THAN SIX INCHES THEN UNDERCUT 6" (MIN.) AND USE SOLID ROCK BEDDING PROCEDURE.

# Standard Excavation

& Badding Method

NOT TO SCALE





C.I.P. BEND

3/4" DIA. S.S. ANCHOR BOLTS, THREADED \_\_\_\_

USE FIELD LOK ~ 350 GASKET

#### VERTICAL BEND

۵

PVC OR DI PIPE

#### STRAIGHT PIPE

### Concrete Anchor Blocks

NOT TO SCALE

NOTE:

(1) DEPTH "D" MAY BE GREATER THAN SPECIFIED TO ALLOW WORKING SPACE.

(2) PIERS MUST BE PLACED AGAINST UNDISTURBED EARTH OR ROCK.

(3) TO BE USED ON GRADES EXCEDING

15% FOR 50 FEET OR MORE.

(A) ALL METAL IN CONTACT WITH SOIL TO BE STAINLESS OR NON CORROSIVE.

(B) ONE ANCHOR REQUIRED FOR EACH JOINT OF PIPE.

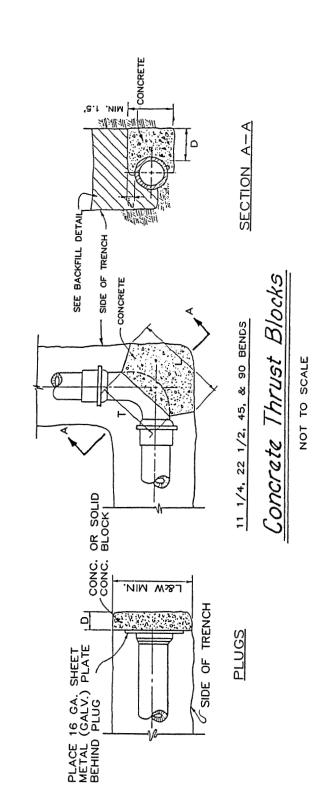
(C) CONCRETE ANCHOR TO BE KEYED INTO UNDISTURBED EARTH OR SOLID ROCK.

_			
	15"	12.	42"
	10" 12"	12" 12"	36"
	<b>.</b> 00	12"	30"
l w	9"	12"	24"
PLUGS	.4	12"	18"
	3"	12" 12" 12" 12" 12"	16"
	2"	12"	14" 16" 18" 24" 30" 36" 42"
	SIZE	D	L&W

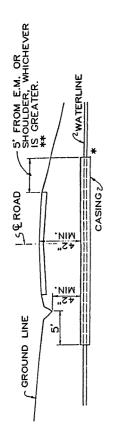
3" 4" 6" 8" 10" 12" 12" 12" 12" 12" 14" 16" 24" 30" 30" 12" 14" 16" 16" 18"		-	4,	4, 22 1/2.	/2,	& 45	5	
12" 12" 12" 12" 14" 16" 24" 30" 12" 14" 16" 16"	2,,		3,	.4	6,,		10,,	12"
16" 24" 30" 14" 16" 16"	12"		12"	12"	12"	12"	12"	12"
14" 16" 16" 18"	12" 1		4,	16"	24"	30"	30"	36"
	10" 1		2"	14"	16"	16"	18"	18"

	10" 12"	18"	48,	24"
l o	10,	18"	42"	24"
(90°)QUARTER BENDS		12"	21" 24" 27" 36" 36" 42"	14" 16" 20" 24" 24"
ER	6"	12" 12" 12"	36"	16"
JART	. <sub>7</sub> 4	12"	27"	14"
) (.	3"	12"	24"	12"
6)	2"	12"	21"	10"
	SIZE		L	⊢

NOTE:
DEPTH "D" MAY BE GREATER THAN
SPECIFIED TO ALLOW WORKING
SPACE. THRUST BLOCKS MUST BE PLACED
AGAINST UNDISTURBED EARTH OR SOLID ROCK.

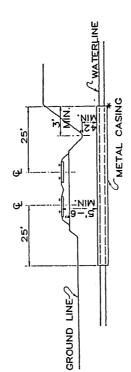


SD-4



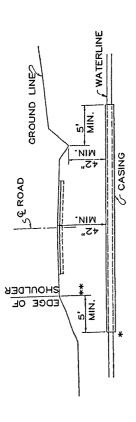
BORE & CASE OR TRENCH WITH SLEEVE W/ BACKFILL METHOD "C", PAVEMENT AS PER DETAIL.

### TYPICAL COUNTY ROAD CROSSING



NOTE: CASING PIPE TO BE INSTALLED AS PER SECTION 5.2, SPECIFICATIONS FOR PIPE LINES CONVEYING NON-FLAMMABLE SUBSTANCES OF THE A.R.E.A. MANUAL FOR RAILROAD ENGINEEERING REGARDING METHOD OF INSTALLATION & MATERIALS

### TYPICAL RAILROAD CROSSING



## TYPICAL STATE & FEDERAL ROAD CROSSING

NOTE: ALL PIPES INSTALLED IN CASINGS REQUIRE CASING INSULATORS TO BE INSTALLED AT A MINIMUM OF 3 INSULATORS PER PIPE JOINT.

\*CASING PIPE ENDS TO BE SEALED WITH NEOPRENE GASKET WITH STAINLESS STEEL BANDS.

O	CASING PIPE SIZES	E SIZES
CARRIER	GASING	WALL THICKNESS
PIPE SIZE	PIPE SIZE PIPE SIZE	1
3/4-2"	4	0.250
4	10"	0.250
9	12"	0.250
8	14"	0.250
10,,	16"	0.250
12"	18"	0.250
	TO STOCKLOTH	TO DO SE SCHOOL OF 35 DOO PS I

\*MINIMUM YIELD STRENGTH OF 35,000 P.S.I. NO ALTERNATE ALLOWED FOR RAILROAD CROSSING.

Road Casing Datails

NOTE: AIR VALVE TO BE ANCHORED AS PER DETAIL HEREON.

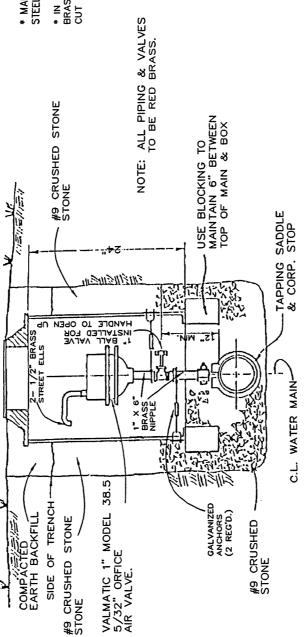
NOTE: ALL AIR RELEASE ASSEMBLIES WHICH FALL WITHIN PASTURE OR CULTIVATED FIELDS SHALL BE LOCATED UNDER OR NEAR A FENCE LINE. MAIN LINE TAP SHALL BE MADE AT HIGH POINT AND IF NECESSARY POLY TUBING LAID AT POSITIVE GRADE TO AIR RELEASE ASSEMBLY.

INSTALL TO HEIGHT, SLOPE BACKFILL TO PREVENT SURFACE DAINAGE INTO VAULT.

18" POLYETHYLENE BOX & FORD C-32 FRAME & LID

NTO VAULT.

\* MARK ANY AIR RELEASE ASSEMBLY WITH A 7' STEEL "T" POST DROVE 2.5' INTO THE GROUND. \* IN DEEPER SITUATIONS INCREASE LENGTH OF 1" BRASS NIPPLE TO EXTEND HEIGHT LOCATION OF BALL CUT OFF VALVE TO MAX 30" DEPTH.



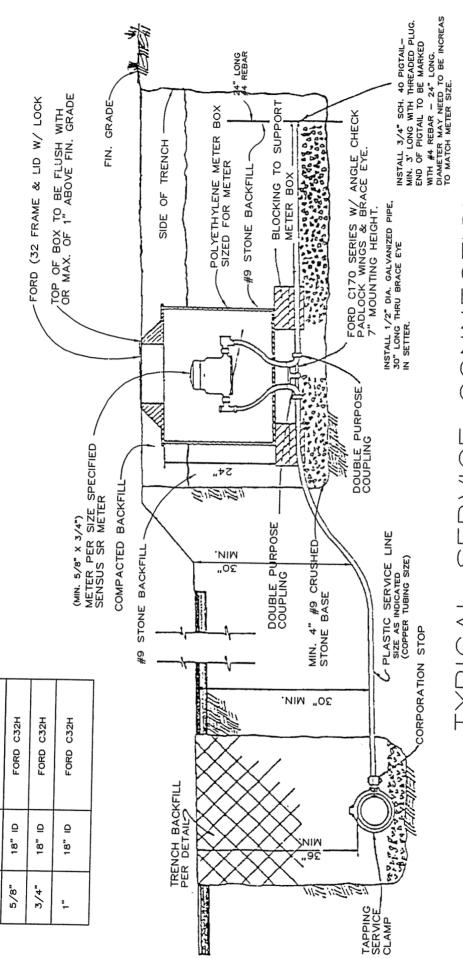
PICAL AIR VALVE SETTING NOT TO SCALE

GALVANIZED

1" WASHER & ASSEMBLY
ASSEMBLY
CALVANIZED CA

Air Valve Setting Galvinized Anchor Defal

l o sequired each installated. Not to scale



INSTALL AT METER SERVICE 6' METAL "TEE" POST PAINTED BLUE, AND DRIVEN MIN. 2.5' INTO GROUND.

METER LID

BOX DIA.

METER SIZE

# YPICAL SERVICE CONNECTION

METER TO BE INSTALLED MINIMUM 5' FROM CENTER OF MAIN AND/OR AS DIRECTED BY DISTRICT.

5/8" THRU 1" - NON-TRAFFIC BEARING

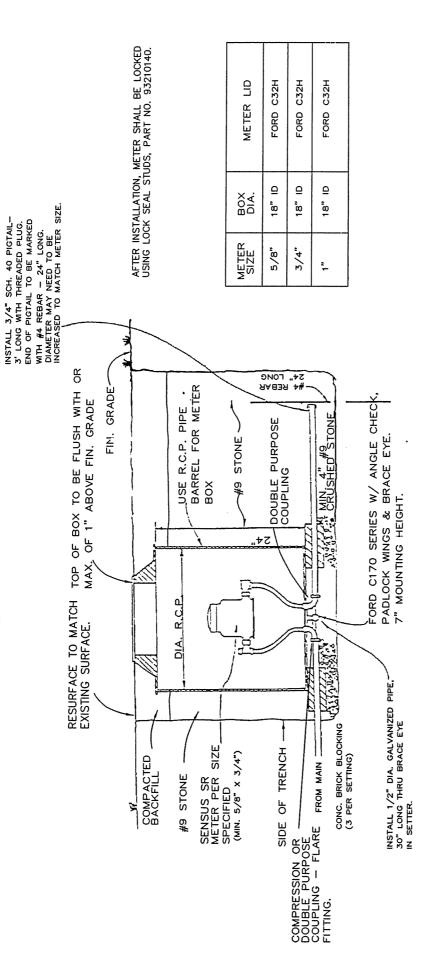
NOT TO SCALE

MARK ANY WATER METER WHICH WILL NOT BE CONNECTED WITH A 7' STEEL "T" POST DRIVEN 2.5' INTO THE GROUND.

EVERY WATER METER INSTALLED (REPLACED OR NEW) SHALL BE EQUIPPED WITH A LOCKING PIN.

UPON COMPLETION OF TESTING AND FLUSHING CONTRACTOR SHALL INSTALL METER AND LOCK SERVICE WITH LOCKING PIN.
SERIAL NUMBER AND TEST RESULTS TO BE FOREWARDED TO THE DISTRICT.

INSTALL AT METER SERVICE 6" METAL "TEE" POST PAINTED BLUE, AND DRIVEN MIN. 2.5" INTO GROUND.

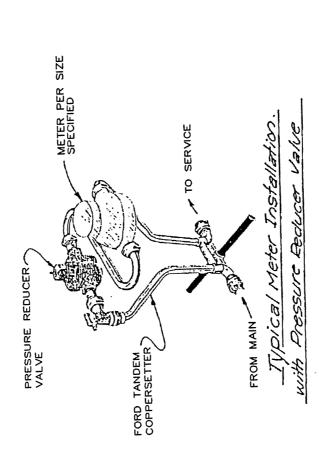


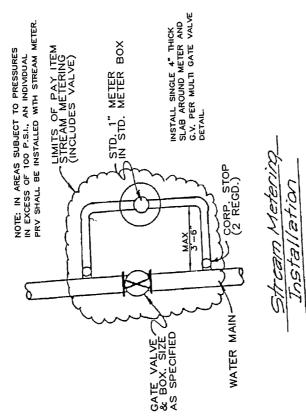
# TYPICAL METER INSTALLATION

### 5/8" THRU 1" - TRAFFIC BEARING

NOT TO SCALE

UPON COMPLETION OF TESTING AND FLUSHING CONTRACTOR SHALL INSTALL METER AND LOCK SERVICE WITH LOCKING PIN.
SERIAL NUMBER AND TEST RESULTS TO BE FOREWARDED TO THE DISTRICT.

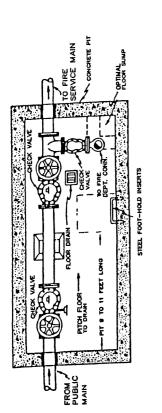




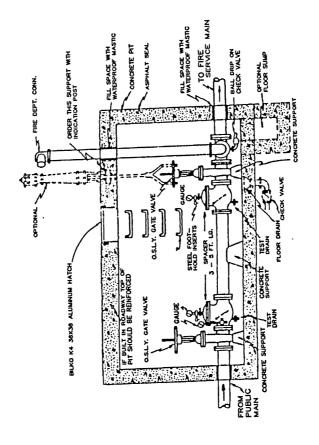
INSTALL 1" METER IN COPPERSETTER WITH CUT-OFF VALVE ON EACH SIDE. METER TO BE INSTALLED IN STANDARD METER BOX AND LID.

CONSTRUCT SINGLE 4" THICK CONCRETE RECTANGULAR SLAB WITH #4 REBAR 18"E/W TO INCLUDE METER AND GATE VALVE.

MARK ANY AIR RELEASE ASSEMBLY WITH A 7' STEEL "T" POST DROVE 2.5' INTO THE GROUND.

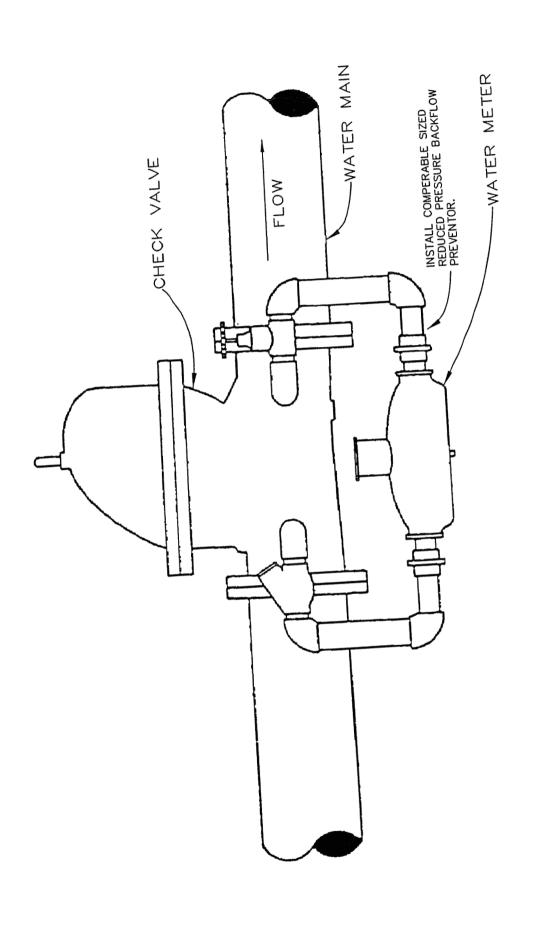


PLAN NO SCALE

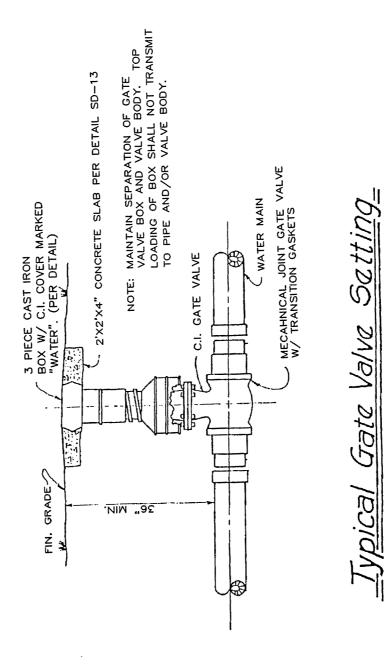


SECTION NO SCALE

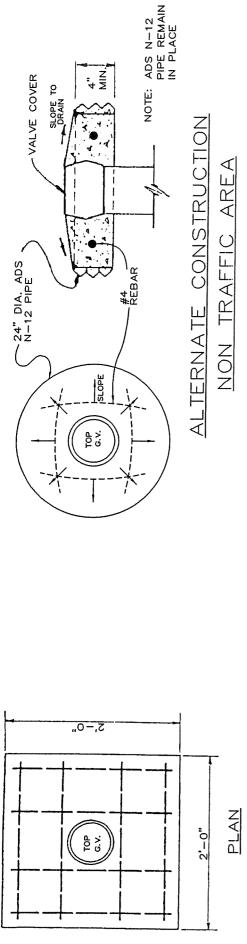
### DETECTION CHECK VALVE DOUBLE

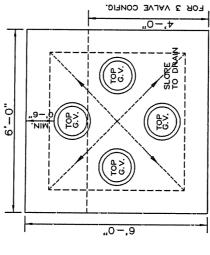


DETAIL OF DETECTION CHECK METER



NOT TO SCALE





CROSS-CONNECTIONS TYPICAL 4(3) VALVE ARRANGEMENT AT (& TEES)

NOTE: ANY VALVE LOCATED WITHIN 10' OF A FITTING IS TO BE RODDED TO THE FITTING.

NOT TO SCALE

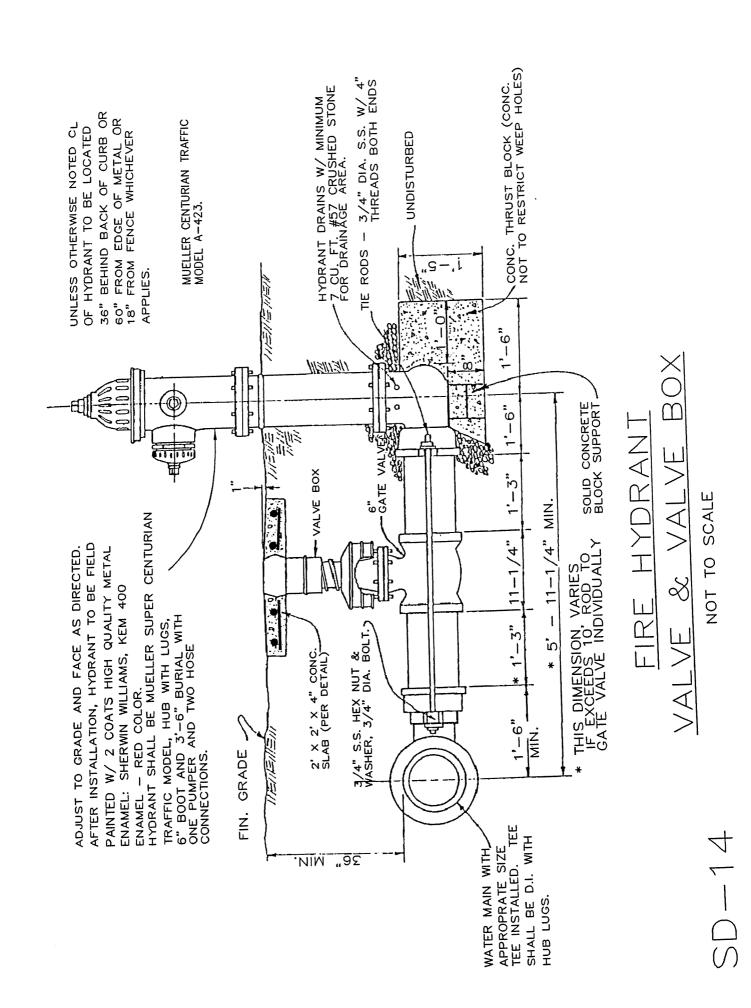
1/2" RAD. EDGES TROWEL FINISH VALVE COVER -USE 4 - #4 X22" REBARS EACH WAY 1.00 N 1/2" RAD. EDGES NOTE:

NOTES

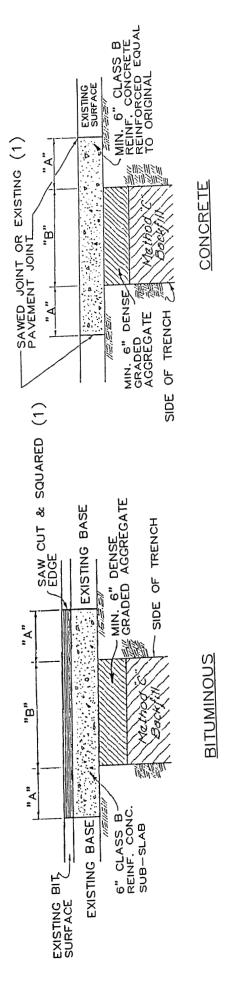
SECTION

FIRM, UNYIELDING FOUNDATION. ANY SETTLEMENT OF SLAB SHALL REQUIRE REMOVAL, COMPACTION SLAB SHALL BE POURED ON A AND REPLACEMENT.

- BACKFILL AREA UNDER GATE VALVE PAD WITH #9 STONE FROM FIRM FOUNDATION TO BOTTOM OF તં
  - VALVE BOX SHALL BE CONSTRUCTED TO LINE AND GRADE TO MATCH FINAL GRADE EITHER EXISTING OR PROPOSED GATE VALVE PAD. - EITHER OF AREA. ĸ,
- MARK EACH GATE VALVE WITH FIBERGLASS MARKER.



## HEAVY DUTY SURFACE REPLACEMENT



ROADWAY REPLACEMENT TYPE	(1)	STATE HIGHWAY		(Q)	COUNTY & ACCESS LIGHT DUTY
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	EDGES (1)				
FIG WAG	SQUARED EDGES	-	10	BASE	

SCHEDULE		MIN. PAVEMENT REPLACEMENT		40	",-e"	-	5,-0		09	
T WIDTH		m. W.		24,	101	25	36"		48,	
NEMPO		Ä. Ä.		12"	1	12"	"0"		10"	
SCHEDULE	MOMINIM	PIPE	3175	". 110117 ".	4 IHRO 12	14" THRU 18"		20" THRU 24 L	. 32	
_										

BITUMINOUS
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ASP. CONCRETE

EXISTING BASE

EXISTING BASE

MIN. 6" DENSE GRADED AGGREGATE

<u>"</u>

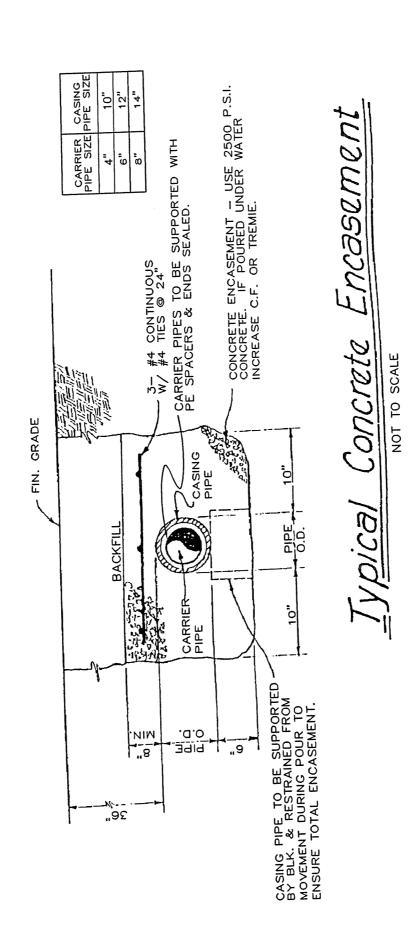
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- SIDE OF TRENCH

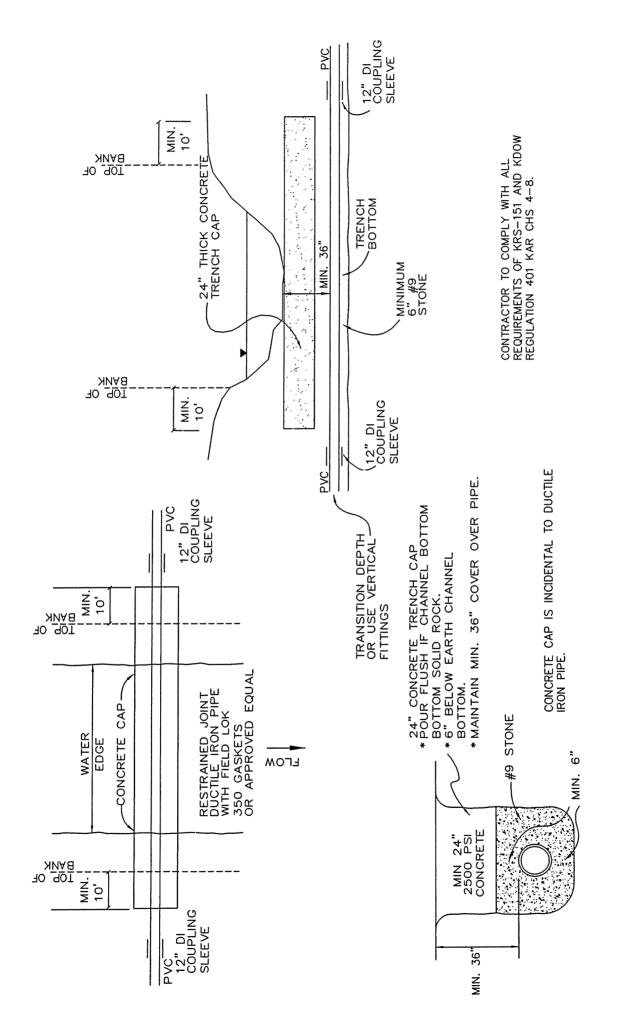
(1) DIMENSIONS SHOWN ARE MINIMUM. IF SURFACE EDGES ARE BROKEN WIDTH SHALL BE INCREASED AND EACH SIDE MAINTAINED PARALLEL.

PAVEMENT REPLACEMENT NOT TO SCALE

SD-15



SD-16



TYPICAL STREAM CROSSING

NOT TO SCALE

SD-1/