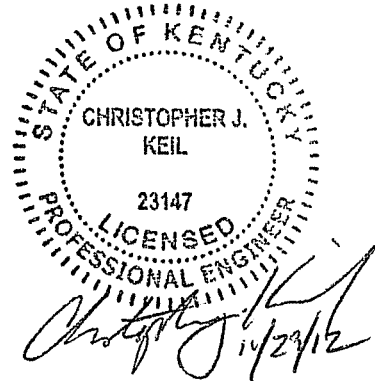
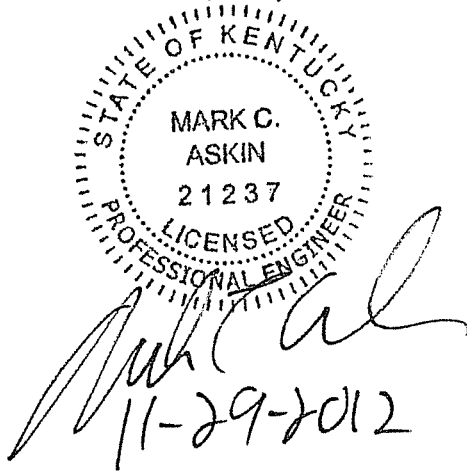
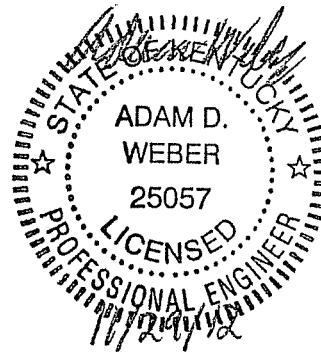
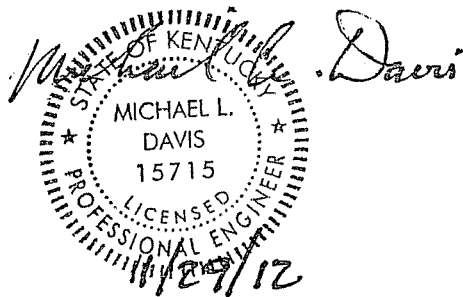


PLAN HOLDER: \_\_\_\_\_

Set No.: \_\_\_\_\_

## PROJECT MANUAL

### COUNTYWIDE UNDERSERVED PROJECT WATER DISTRIBUTION AND WATER TREATMENT PLANT UPGRADES CONTRACTS 1-2012 AND 2-2012 CARROLLTON UTILITIES



Prepared by:

STRAND ASSOCIATES, INC.®  
325 West Main Street, Suite 710  
Louisville, KY 40202  
[www.strand.com](http://www.strand.com)

November 2012



**Professional**

**Engineering**

**Services**

Countywide  
Underserved  
Project—Water  
Distribution and  
Water Treatment  
Plant Upgrades

Contracts 1-2012  
and 2-2012

**Project Manual**

Carrollton Utilities, KY

November 2012



**SA**  
**STRAND**  
ASSOCIATES



DRAFT-(01.03.2013)

PLAN HOLDER: \_\_\_\_\_

Set No.: \_\_\_\_\_

PROJECT MANUAL

COUNTYWIDE UNDERSERVED PROJECT  
WATER DISTRIBUTION AND WATER TREATMENT PLANT UPGRADES  
CONTRACTS 1-2012 AND 2-2012  
CARROLLTON UTILITIES

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November 2012



# DRAFT-(01.03.2013)

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DRAFT-(01.03.2013)

**BIDDING AND CONTRACTING REQUIREMENTS**

SECTION 00100

ADVERTISEMENT TO BID

COUNTYWIDE UNDERSERVED PROJECT  
WATER DISTRIBUTION AND WATER TREATMENT PLANT UPGRADES  
CONTRACTS 1-2012 AND 2-2012  
CARROLLTON UTILITIES

Carrollton Utilities will receive sealed Bids for its Countywide Underserved Project until \_\_\_\_\_ a.m. p.m., local time, \_\_\_\_\_, at which time the Bids will be publicly opened and read aloud.

The Work includes the installation of approximately 38,890 linear feet of new water main extensions, a transmission main, and two pump stations (Contract 1-2012), and installation of a new pump and water softening system at the Carrollton Utilities Water Treatment Plant with associated appurtenances and controls (Contract 2-2012).

Bids are to be addressed to the Carrollton Utilities, 225 Sixth Street, Carrollton, KY 41088 and shall be marked "Sealed Bid-Countywide Underserved Project-Contracts 1-2012 and 2-2012."

Complete digital project bidding documents are available at [www.strand.com](http://www.strand.com) or at [www.questcdn.com](http://www.questcdn.com). Download the digital plan documents for \${\_\_\_\_\_} by inputting Quest project number {\_\_\_\_\_} on the website's Project Search page. Please contact QuestCDN.com at (952) 233-1632 or [info@questcdn.com](mailto:info@questcdn.com) for assistance in free membership registration, downloading, and working with this digital project information.

Bidding Documents may be reviewed and paper copies may be obtained from the Issuing Office which is Strand Associates, Inc.<sup>®</sup>, 325 West Main Street, Suite 710, Louisville, Kentucky 40202, (502) 583-7020. A nonrefundable fee of \${\_\_\_\_\_} will be required (shipping and handling fees included). Overnight mailing of Bidding Documents will not be provided.

All Bidders submitting a sealed Bid shall obtain the Bidding Documents from QuestCDN.com or from Strand Associates, Inc.<sup>®</sup>

Bidders who submit a Bid must be a Plan Holder of record at the Issuing Office. Bids from Bidders who are not on the Plan Holders List may be returned as not being responsive.

Plan Holders are requested to provide an e-mail address if they wish to receive addenda and other information electronically. Plan Holders are requested to designate whether they are a prime contractor, subcontractor, or supplier if they want this information posted on the project Plan Holders List.

Bidders shall comply with all provisions of KRS Chapter 337 with respect to labor wage rates and with Federal Davis-Bacon Wage Rates. Not less than the higher prevailing hourly rate of wages shall be paid for Work under the Contract.

Carrollton Utilities reserves the right to reject any or all Bids, to waive any technicality, and to accept any Bid which it deems advantageous. All Bids shall remain subject to acceptance for 85 days after the time set for receiving Bids.

Contract award shall be made based on the lowest responsive and responsible Bid.

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

All Bidders must comply with all Federal, State, and local Equal Employment Opportunity laws and regulations which prohibit discrimination in employment regarding race, creed, color, sex, or national origin.

All taxes are the responsibility of the successful Bidder unless specifically exempted in the Bidding Documents.

Bidder's attention is called to the fact that any Contract awarded under this Advertisement to Bid is expected to be funded in part by a loan from the Kentucky Infrastructure Authority (KIA) State Revolving Fund (SRF). The Bidder shall comply with the Supplemental General Conditions of the Clean Water State Revolving Fund and the Drinking Water State Revolving Fund (Water and Wastewater).

Bidders shall comply with 40 CFR 31.36 which includes but is not limited to the following: (1) the President's Executive Order 11246 (Equal Employment Opportunity) as amended, which prohibits discrimination in employment regarding race, creed, color, sex, or national origin, (2) Title VI of the Civil Rights Act of 1964, (3) the Anti-Kickback Act, and (4) the Contract Work Hours Standards Act.

CONTRACTOR and its Subcontractors shall comply with 41 CFR 60-4, in regard to affirmative action, to ensure equal opportunity to females and minorities and will apply the timetables and goals set forth in 41 CFR 60-4, if applicable to the area of the Project. Bidder shall make positive efforts to use small, minority, women-owned, and disadvantaged businesses.

The Strand Associates, Inc.<sup>®</sup> project manager is Chris Keil, P.E. and can be contacted at Strand Associates, Inc.<sup>®</sup>, 325 West Main Street, Suite 710, Louisville, Kentucky 40202, (502) 583-7020 regarding the project.

Published by the authority of the Carrollton Utilities  
{Official's Name, Title\_\_\_\_\_}

Dated at {OWNER or Municipality\_\_\_\_\_,  
{State\_\_\_\_\_}  
{Date(s)\_\_\_\_\_}

END OF SECTION

# DRAFT-(01.03.2013)

## SECTION 00200

### INSTRUCTIONS TO BIDDERS

- A. These Instructions to Bidders establish requirements for Bidding and Award of Contract.
- B. These articles are not necessarily numbered consecutively.
- C. Table of Contents

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#### ARTICLE 1-DEFINED TERMS

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

- A. 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

2.01 Complete sets of the Bidding Documents may be obtained digitally or by paper copy as stated in the Advertisement to Bid.

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

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

2.04 Drawings and specifications for the project are being offered to Bidders in both paper copy and electronic form (.pdf format). Such Bidder must have Adobe Reader 6.0 or later to access the electronic files. Paper copies will be used for Contract execution.

## 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 other such data as may be called for below.

3.02 Bidder must be prepared to submit evidence of Bidder's qualifications to do business in the state where the Project is located prior to award of the Contract.

3.03 In accordance with KRS 45A.395, prospective Bidder shall provide OWNER with a sworn statement made under penalty of perjury that it has not knowingly violated any provision of the campaign finance laws of the Commonwealth and that the award of a Contract to Bidder will not violate any provision of the campaign finance laws of the Commonwealth.

3.04 Bidders shall submit the documentation, if any, listed in Paragraph 7.01 of the Bid Form (Section 00400).

3.05 Bidder is advised to carefully review those portions of the Bidding Documents requiring Bidder's representations and certifications.

3.06 The successful Bidder must provide proof of a business license to work within the Carrollton and Carroll, Trimble, and Henry Counties.

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

### 4.01 Subsurface and Physical Conditions

A. The Supplementary Conditions identify, if any,

1. Those reports known to OWNER of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Bidding Documents.

2. Those drawings known to OWNER of physical conditions relating to existing surface and subsurface structures at the Site (except Underground Facilities).

B. Copies of reports and drawings referenced in Paragraph 4.01.A, which are not included with the Bidding Documents, will be made available by OWNER to any Bidder on request. Reports and

drawings, whether included in the Bidding Documents or not, are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 4.02 of the General Conditions has been identified and established in Paragraph 4.02 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

## 4.02 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 are based upon information and data furnished to OWNER and ENGINEER by owners of such Underground Facilities, including OWNER, or others.

## 4.03 Hazardous Environmental Condition

A. The Supplementary Conditions identify, if any, those reports and drawings known to OWNER relating to a Hazardous Environmental Condition identified at the Site.

B. Copies of reports and drawings referenced in Paragraph 4.03.A 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" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in Paragraph 4.06 of the General Conditions.

4.05 On request in advance and after submittal of Bidder's evidence of insurance coverage meeting the requirements designated in the General and Supplementary Conditions, OWNER will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.

## 4.06 OWNER-Related Items

A. Paragraph 6.13.C of the General Conditions indicates that if an OWNER safety program exists, it will be noted in the Supplementary Conditions.

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

A. examine 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, and 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 relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions, containing reliable "technical data," and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph 4.06 of the Supplementary Conditions as containing reliable "technical data";

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

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 required, and in accordance with the other terms and conditions of the Bidding Documents;

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

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

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

4.08 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 the 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-PREBID CONFERENCE

5.01 A prebid conference will not be held for the Project.

## ARTICLE 6--SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. Easements 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 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 Issuing Office as having received the Bidding Documents.

7.02 All requests for interpretation must be received at least 7 days prior to the day set for receiving Bids. Addenda will be mailed not later than 5 days prior to the day set for receiving Bids. Failure of any Bidder to receive any such Addendum or interpretation shall not relieve such Bidder from any obligations under the Bid as submitted. All Addenda so issued shall become part of the Contract Documents.

7.03 Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

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

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

## ARTICLE 8--BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to OWNER in an amount of 5 percent of the Bidder's maximum Bid price and in the form of a cashier's, certified, or bank check or a Bid Bond (on form attached) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 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. 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 the Bidder will be forfeited.

8.03 Bid security of Bidders will be retained unless requested to be returned and will not be returned until after Contract has been awarded or until the Bid hold period expires.

## ARTICLE 9--CONTRACT TIMES

9.01 The numbers 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 (or incorporated therein by reference to the attached Bid Form).

## ARTICLE 10--LIQUIDATED DAMAGES

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



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

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without evaluation of possible substitute or "or equal" items. Whenever it is specified or described in the Bidding Documents that an Equipment Alternative listed in the Lump Sum Base Bid or that a substitute or "or equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be evaluated by ENGINEER until after the Effective Date of the Agreement.

## 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, individuals, or entities if requested by OWNER. If OWNER or ENGINEER, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity may, before the Notice of Award is given, request the apparent successful Bidder to submit an acceptable 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 Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for the forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity listed and against which OWNER or ENGINEER makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06.B of the General Conditions.

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

12.04 In contracts where the Contract Price is on the basis of cost-of-the-work plus a fee, the apparent successful Bidder, prior to the Notice of Award, shall identify in writing to OWNER those portions of the work that such Bidder proposes to subcontract and after the Notice of Award may only subcontract other portions of the work with OWNER's written consent.

## ARTICLE 13-BID

13.01 The Bid Form is included with the Bidding Documents.

13.02 All blanks on the Bid Form must be completed by printing in ink or by typewriter and the Bid signed in ink. A Bid price shall be indicated for each section, Bid item, alternative, adjustment unit price item or unit price item listed therein, or the words "No Bid," "No Change," or "Not Applicable" entered. Erasures or alterations shall be initialed in ink by the person signing the Bid Form.

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

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 official address of the partnership shall be shown.

13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member, if the LLC is member-managed, or by a manager, if manager-managed, and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.

13.06 A Bid by an individual shall show the Bidder's name and official 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 official address of the joint venture shall be shown.

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

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

13.10 Postal and e-mail addresses and telephone number for communications 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 Bidder shall covenant in writing 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.

13.12 All Bids shall be signed in the presence of and be notarized by a Notary Public or other Officer authorized to administer oaths.

13.13 Bidder shall identify whether the Bidder is a resident or nonresident bidder per KRS 45A.490 to 45A.494 and KAR 5:400. If Bidder is claiming it is a "resident bidder" as defined in KRS 45A.942(2), the Bidder shall so indicate in the Bid and complete the Notarized Affidavit attached to the Bid that affirms it meets the criteria to be considered a "resident bidder". If requested by OWNER, Bidder shall provide documentation proving such "resident bidder" status. Failure to do so will result in the disqualification of the Bidder or in Contract termination.

13.14 If Bidder is a "nonresident bidder" as defined by KRS 45A.494(3), it shall so indicate in the Bid and provide its certificate of authority to transact business in the Commonwealth as filed with the Commonwealth of Kentucky, Secretary of State. The location of the principal office identified therein will be deemed by OWNER as the state of residency for that Bidder. If the Bidder is not required by law to obtain said certificate, the state of residency for that Bidder will be deemed to be that which is identified in its mailing address as provided in its Bid.

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

### 14.01 Lump Sum

A. Bids for Contract 2-2012 shall be submitted on a lump sum basis as set forth in the Bid Form.

## 14.02 Unit Price

A. Bids for Contract 1-2012 shall be submitted on a unit price basis for each item of Work listed in the Bid schedule.

B. The total of all estimated prices will be determined as 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.

14.03 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–SUBMISSION OF BIDS

15.01 Bids will be received according to the following list of divisions and sections of the Specifications and all other provisions of the Bidding Documents:

Contract 1–2012 shall include Divisions 0, 1, 2 (except Section 02600), 3 (except Section 03350), 5, 9, 11 (except Sections 11211, 11250, and 11940), 16, (except Sections 16859 and 16930) and 20.

Contract 2–2012 shall include Divisions 0, 1, 2 (except Section 02831) 3, 5, 9, 11 (except Section 11306), 15, and 16.

15.02 Bidder is furnished one copy of the Bidding Documents with one separate unbound copy of the Bid Forms and the Bid Bond. The Bidding Documents may be retained by Bidder. The unbound copy of the Bid Forms is to be completed and submitted with the Bid security along with any data required by the Bidding Documents to be attached to and made a condition of the Bid. Additional copies may be obtained from the Issuing Office.

15.03 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Advertisement or Invitation to Bid and shall be enclosed in an opaque sealed envelope, plainly marked with the Project title (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 the 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." A mailed Bid shall be addressed to place indicated in the Advertisement or Invitation to Bid. No relief will be provided for a mailed Bid not being received by the prescribed time. No Bid will be considered which is received after the time set for receiving Bids.

## ARTICLE 16–MODIFICATION AND WITHDRAWAL OF BIDS

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time set for receiving Bids.

## ARTICLE 17–OPENING OF BIDS

17.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and, unless obviously nonresponsive, read aloud publicly. An abstract of the amounts of the base

bids and major alternatives and components, if any, will be made available to Bidders after the opening of Bids.

## ARTICLE 18-BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

## ARTICLE 19-AWARD OF CONTRACT

19.01 OWNER reserves without limitation the right to reject any or all Bids, to waive any and all informalities not involving price, time or changes in the work and to negotiate Contract terms with the Successful Bidder; and the right to accept or reject all incomplete, nonconforming, nonresponsive, unbalanced, obscure, or conditional Bids, or Bids which contain additions not called for, erasures, alterations, or irregularities of any kind, or which do not comply with the Instructions to Bidders. OWNER reserves the right to reject the Bid of any Bidder if OWNER believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by OWNER. OWNER further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be nonresponsive.

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 alternatives, unit prices, and other data as may be requested in the Bid Form or prior to the Notice of Award.

19.04 In evaluating Bids, 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. OWNER also may consider the operating costs, maintenance requirements, performance data, and guarantees of major items of materials and equipment proposed for incorporation in the work when such data is required to be submitted prior to the Notice of Award.

19.05.1 OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any Bid and 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 to OWNER's satisfaction within the prescribed time. Bidder shall furnish to OWNER all such information and data for this purpose as OWNER may request. OWNER reserves the right to reject any Bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy OWNER that such Bidder is properly qualified to carry out the obligations of the Contract Documents and to complete the work contemplated therein.

19.05.2 OWNER shall be satisfied that Bidder involved (1) maintains a permanent place of business, (2) has adequate plant and equipment to do the work properly and expeditiously, (3) has a suitable financial status to meet obligations incident to the work, (4) has appropriate technical experience, and (5) can submit a satisfactory performance record.

19.06.1 If a Contract is to be awarded, it will be awarded to the responsive and responsible



Bidder with the lowest Bid whose evaluation by OWNER indicates to OWNER that the award will be in the best interests of the Project.

19.06.2 Once all responsive and responsible Bidders have been determined and ranked, the residency of each Bidder will be identified. A preference equal to the preference given to or required by the state of the highest evaluated "nonresident bidders" will then be given to all responsive and responsible "resident bidders". The bids will then be rescored and re-ranked to account for any applicable preferences to determine lowest responsive and responsible Bidder. In awarding a contract, "resident bidders" shall only receive preference against "nonresident bidders" residing in a state that gives a preference to bidders from that state. The preference will not be applied against "nonresident bidders" residing in states that do not give preference against Kentucky bidders. If a preference evaluation results in a tie between a "resident bidder" and a "nonresident bidder", preference will be given to the "resident bidder". The application of this regulation will not result in a "nonresident bidder" receiving preference over another "nonresident bidder".

19.07 If a Contract is to be awarded, OWNER will give the successful Bidder a Notice of Award within 60 days after the time set for opening Bids.

## ARTICLE 20-CONTRACT SECURITY AND INSURANCE

20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth OWNER's requirements as to performance and payment bonds and insurances. When the Successful Bidder delivers the executed Agreement to OWNER, it must be accompanied by the required performance and payment bonds and insurances.

## 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 all 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 ENGINEER with the required Bonds and insurances. Within 10 days after receipt of properly executed documents and Bonds and insurances which meet all requirements of the Contract Documents, ENGINEER will deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

## ARTICLE 22-RETAINAGE

22.01 Provisions concerning retainage are set forth in the Agreement.

## ARTICLE 23-WAGE RATE DETERMINATION

23.01 A Kentucky and Davis-Bacon Federal wage rate determinations will be inserted as a part of the Bidding Documents and/or will be on file at the office of OWNER. Bidder shall inspect the wage rate determination and shall incorporate its requirements into their Bid. See the General Requirements for additional requirements.

23.02 See Section 01060 of the General Requirements for additional information.

## ARTICLE 24-PERFORMANCE BOND FOR WAGE RATES

24.01 Successful Bidders, whether a corporation, partnership, or individual, who has not been doing business in the State of Kentucky for five consecutive years, shall comply with KRS 337.200.

## ARTICLE 25--LICENSES, FEES, AND TAXES

25.01 The Bid shall include all taxes in effect at the time the Bid is submitted, unless specifically exempted in the Bidding Documents. No change will be allowed for taxes from which OWNER is exempt. Bidders who are uncertain as to what items are subject to tax, or who require further explanation or clarification, are requested to contact the State of Kentucky Revenue Cabinet. Refer to the Supplementary Conditions SC-6.10 for additional information on taxes.

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

25.03 Successful Bidder must provide proof of having all such licenses or fees at or before the signing of the Contract.

## ARTICLE 26--KICKBACK STATUTES

26.01 Bidders shall comply with Kentucky Statute KRS 45A.455 Prohibitions Against Conflicts of Interests, Gratuities, and Kickbacks. See Supplementary Conditions 6.09.

## ARTICLE 27--OTHER BID REQUIREMENTS

27.01 Bidders shall complete the following documents attached to the Bid:

Campaign Finance Disclosure  
Labor Law Disclosure

## ARTICLE 28--LAWS, ORDINANCES, AND REGULATIONS

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

## ARTICLE 29--INSURANCE

29.01 Before execution of Contract by OWNER, the successful Bidder shall furnish OWNER a certificate or certificates issued by or on behalf of insurers or a self-insurance program or group self insurance program, qualified to do business in the Commonwealth of Kentucky under KRS Chapter 304 or KRS Chapter 342, certifying that the successful Bidder complies with the Worker's Compensation laws of Kentucky and is insured or indemnified against public liability claims which may arise out of the performance of the Work under the proposed Contract.

## ARTICLE 30--EEO REQUIREMENTS

30.01 OWNER is an equal opportunity employer. Bidder must be able to satisfactorily demonstrate to OWNER that it conforms to all Federal, state, and local EEO statutes. See Supplementary Conditions 6.09 for additional information.

## ARTICLE 31--CONTRACT FOR REQUIREMENT PROCUREMENT

31.01 OWNER as "Buyer" will execute Contract 3-2012 with a "Seller" for the procurement of goods and Special Services to be installed in Contract 2-2012. The

materials and equipment provided for in the procurement contract are to be furnished and delivered to the Site by the "Seller" for installation by CONTRACTOR. The terms of the procurement contract are as set forth in the General Requirements. CONTRACTOR will assume responsibility for the goods and Special Services when delivered and coordinate with the "Seller".

31.02 Bidder may examine the Contract Documents for the Procurement of Goods and Special Services at the Issuing Office.

## ARTICLE 32--FUNDING

32.01 The Work is expected to be funded in part through the Kentucky Infrastructure Authority State (KIA) Clean Water State Revolving Fund and Drinking Water State Revolving Fund. Supplemental General Conditions for this KIA funding are attached to the Bid. This procurement shall be subject to regulations contained in 40 CFR Part 31.36 or with Kentucky Division of Water Procurement Guidance. To this end Bidder as Bidder, as Successful Bidder, and as CONTRACTOR shall comply with and help OWNER comply with the following:

1. As CONTRACTOR comply with the requirements of Attachment No. 1 SRF Special Provisions.
2. As Bidder and CONTRACTOR, comply with and assist OWNER in complying with Attachment No. 2 40 CFR 31.36 Procurement Requirements including procurement standards, taking affirmative steps to procure small, minority, female business and labor surplus area firm participation, a preference for domestic construction materials, conformance with the Contract Work Hours Act, and providing documents for KIA review.
3. As Bidder, comply with and assist OWNER in complying with Attachment No. 3, which includes methods of awarding state contracts.
4. As Bidder and CONTRACTOR, comply with Attachment No. 4 Equal Employment Opportunity under Executive Order 11246 including meeting goal requirements. Bidder shall take positive efforts to use minority and female businesses.
5. As Bidder and as CONTRACTOR, comply with Attachment No. 5 Equal Employment Opportunity Construction Contract Specifications under Executive Order 11246 including taking affirmative action to insure equal opportunity to females and minorities. Bidder shall make positive efforts to use female and minority businesses.
6. As CONTRACTOR, comply with Attachment No. 6 Equal Employment Opportunity Goals.
7. As the low, responsive, responsible Bidder, provide with Attachment No. 7 Check List of Equal Employment Opportunity Documentation to OWNER within 10 days after Bid opening.
8. As CONTRACTOR, comply with Attachment No. 8 including completing the Employer Information Report of Title VII of the Civil Rights Act OF 1964.
9. As CONTRACTOR comply with Attachment No. 9 Labor Standard Provisions.
10. As Bidder, comply with and sign Attachment No. 10 Certification regarding Debarment, Suspension, and other Responsibility Matters.
11. As CONTRACTOR, comply with and sign and have Subcontractors sign

Attachment No. 11 Certification regarding Lobbying.

12. As Bidder and as CONTRACTOR, comply and assist OWNER in complying with Attachment No. 12 EPA Disadvantaged Business Enterprise Program including employing the six good faith efforts, completing forms, and making positive efforts to use disadvantaged businesses.

13. As CONTRACTOR, comply with Attachment No. 13 Disadvantaged Business Enterprise (DBE) Negotiated Rates.

14. As Bidder and as CONTRACTOR, comply with Attachment No. 14 Bonds and Insurance.

15. As CONTRACTOR, comply with Attachment No. 15 Outlay Management and complete form.

16. As CONTRACTOR, comply with Attachment No. 16 and complete Notice of Intent Form.

17. As Bidder and as CONTRACTOR, comply with Attachment No. 17 Davis-Bacon Wage Rate Requirements.

18. As Bidder and as CONTRACTOR, comply with Attachment No. 18 Wage Rate Requirements under Fiscal Year Appropriations.

END OF SECTION

## BID

COUNTYWIDE UNDERSERVED PROJECT  
WATER DISTRIBUTION AND WATER TREATMENT PLANT UPGRADES  
CONTRACTS 1-2012 AND 2-2012  
CARROLLTON UTILITIES

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ARTICLE 1-BID RECIPIENT

1.01 Bids to be received until \_\_\_\_\_ {A.M. P.M.} local time, {date\_\_\_\_\_}.

1.02 This Bid is submitted to: Carrollton Utilities  
225 Sixth Street  
Carrollton, KY 41088

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

ARTICLE 2-BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 85 days after the Bid opening or for such longer period of time that Bidder may agree to in writing upon request of OWNER.

2.02 Bidder will sign and deliver the required number of counterparts of the Agreement with the bonds, insurance certificates and other documents required by the Bidding Requirements within 15 days after the date of OWNER's Notice of Award.

ARTICLE 3-BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda (list addenda by addendum number and date), receipt of all which is hereby acknowledged:

Date:

Addendum Number:

_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

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

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures if any, at the Site (except Underground Facilities) which have been identified in SC-4.02, as containing reliable "technical data" and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the site that have been identified in SC-4.06 as containing reliable "technical data."

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

F. Based on the information and observations referred to in Paragraph 3.01.E above, Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times required and in accordance with the other terms and conditions of the Bidding Documents.

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

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

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance of the Work for which this Bid is submitted.

## ARTICLE 4-FURTHER REPRESENTATIONS

4.01 Bidder certifies that:

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

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

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

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

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

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

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

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

## ARTICLE 5-BASIS OF BID

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

The following abbreviations may be used in this Bid:

CIP	-	Complete in Place	LF	-	Linear Foot
CY	-	Cubic Yard	LS	-	Lump Sum
DI	-	Ductile Iron	LT	-	Left
DIA	-	Diameter	MBF	-	Thousand Board Feet
EA	-	Each	MH	-	Manhole
EST	-	Estimate(d)	RCP	-	Reinforced Concrete Pipe
EXCL	-	Excluding	RT	-	Right
FT	-	Feet	SF	-	Square Foot
GAL	-	Gallon	STA	-	Station
HERCP	-	Horizontal Elliptical RCP	SY	-	Square Yard
HRS	-	Hours	T	-	Ton
IN	-	Inch	VLF	-	Vertical Linear Foot
INCL	-	Including	W/	-	With
LBS	-	Pounds	W/O	-	Without

**BIDDERS SHOULD NOT ADD ANY CONDITIONS OR QUALIFYING STATEMENTS TO THIS BID OR THE BID MAY BE DECLARED IRREGULAR AS NOT BEING RESPONSIVE TO THE INSTRUCTIONS TO BIDDERS.**

# DRAFT-(01.03.2013)

## BID

### COUNTYWIDE UNDERSERVED PROJECT WATER DISTRIBUTION UPGRADES CONTRACT 1-2012 CARROLLTON UTILITIES

The following prices per item shall be for furnishing and installing the various items of material and work as specified and shown on the Drawings. Bidder agrees to perform the Work as shown on the Drawings and described in the Specifications for the following listed prices. Bidder acknowledges that unit prices have been computed in accordance with Paragraph 11.03.B of the General Conditions. Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

NOTE: A price must be bid for each item in the Bid, even though the estimated quantity is zero. Unbalanced or unreasonable unit prices may cause rejection of the Bid. All words and numbers shall be in ink.

Item No.	Description	Quantity	Unit	Unit Cost	Extension
<b>Line "A" Painters Ridge Water Line Extension</b>					
1.	4 IN high density polyethylene (HDPE) water main, furnishing, trenching, laying, and backfilling, INCL all associated tees, adapters, restraint devices, concrete backing, reducers, and bends (unclassified excavation).	3,290	LF	\$	\$
2.	3 IN PVC SDR 13.5 pipe, furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	2,440	LF	\$	\$
3.	3 IN PVC SDR 17 pipe, furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	530	LF	\$	\$
4.	3 IN PVC SDR 21 Class 200 pipe, furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	620	LF	\$	\$
5.	Tie-in to existing water mains, INCL tapping saddle and tapping gate valve, furnishing and installation, INCL unclassified excavation.	2	EA	\$	\$
6.	3 IN C.I. AWWA N.R.S. gate valve and box, CIP.	2	EA		
7.	3 IN blowoff hydrant for all size water mains, INCL gate valve, gate valve box, restraints, tees, and all appurtenances, CIP, according to drawing detail.	1	EA		
8.	Stream crossing with 8 IN PVC SDR 35 cover pipe and concrete cap, INCL furnishing, material, and labor.	80	LF		
9.	Special creek crossing meter box per details, INCL valve, valve box, service tubing, corporation stops, meter, meter box, etc. and furnishing, material, and labor.	1	EA		



# DRAFT-(01.03.2013)

Item No.	Description	Quantity	Unit	Unit Cost	Extension
10.	Stream crossing with crushed stone, INCL furnishing, material, and labor.	70	LF		
11.	Crushed rock on trench surface at roadway crossings, streets, and driveways.	30	LF		
12.	Asphalt patch at roadway crossing, driveway/parking lot crossing, INCL asphalt, rock in trench, cutting, furnishing and installation.	160	LF		
13.	Cleanup and restoration, INCL furnishing, material, and labor.	6,880	LF		
<b>Line "B" Kendall Road Water Line Extension</b>					
14.	3 IN PVC SDR 21 Class 200 pipe, furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	4,500	LF		
15.	Tie-in to existing water mains INCL tapping saddle, tapping gate valve, etc. furnishing and installation, INCL unclassified excavation.	1	EA		
16.	3 IN C.I. AWWA N.R.S. gate valve and box, CIP.	2	EA		
17.	3 IN blowoff hydrant for all size water mains, INCL gate valve, gate valve box, restraints, tees, and all appurtenances, CIP, according to detail.	1	EA		
18.	3/4 IN service pipe, furnishing, trenching, laying, and backfilling where required. Unit cost INCL moving existing water meter to new location, connecting exiting meter to service line, connecting service line to proposed main INCL all appurtenances, saddles, etc.	100	LF		
19.	Crushed rock on trench surface at roadway crossings, streets, and driveways.	30	LF		
20.	Asphalt patch at roadway crossing, driveway/parking lot crossing, INCL asphalt, rock in trench, cutting, furnishing and installation.	30	LF		
21.	Cleanup and restoration, INCL furnishing, material, and labor.	4,500	LF		
<b>Line "C" Millers Branch Water Line Extension</b>					
22.	3 IN PVC SDR 21 Class 200 pipe, furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	2,575	LF		
23.	Tie-in to existing water mains INCL tapping saddle, tapping gate valve, etc. furnishing and installation, INCL unclassified excavation.	1	EA		
24.	3 IN C.I. AWWA N.R.S. gate valve and box, CIP.	2	EA		
25.	3 IN blowoff hydrant for all size water mains INCL gate valve, gate valve box, restraints, tees, and all appurtenances, CIP, according to detail.	1	EA		
26.	Stream crossing with 8 IN PVC SDR 35 cover pipe and concrete cap, INCL furnishing, material, and labor.	75	LF		

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Item No.	Description	Quantity	Unit	Unit Cost	Extension
27.	3/4 IN service pipe, furnishing, trenching, laying, and backfilling where required. Unit cost INCL moving existing water meter to new location, connecting exiting meter to service line, connecting service line to proposed main INCL all appurtenances, saddles, etc.	100	LF		
28.	Special creek crossing meter box according to detail, INCL valve, valve box, service tubing, corporation stops, meter, meter box, etc. and furnishing, material, and labor.	2	EA		
29.	Stream crossing with crushed stone, INCL furnishing, material, and labor.	35	LF		
30.	Crushed rock on trench surface at roadway crossings, streets, and driveways.	100	LF		
31.	Cleanup and restoration, INCL furnishing, material, and labor.	2,575	LF		
<b>Line "D" Hardy Creek Water Line Extension</b>					
32.	3 IN PVC SDR 21 Class 200 pipe, furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	2,450	LF		
33.	Tie-in to existing water mains INCL tapping saddle, tapping gate valve, etc. furnishing and installation INCL unclassified excavation.	1	EA		
34.	3 IN C.I. AWWA N.R.S. gate valve and box, CIP.	2	EA		
35.	3 IN blowoff hydrant for all size water mains INCL gate valve, gate valve box, restraints, tees, and all appurtenances, CIP, according to detail.	1	EA		
36.	Stream crossing with 8 IN PVC SDR 35 cover pipe and concrete cap INCL furnishing, material, and labor.	40	LF		
37.	Special creek crossing meter box according to detail INCL valve, valve box, service tubing, corporation stops, meter, meter box, etc. and furnishing, material, and labor.	1	EA		
38.	Crushed rock on trench surface at roadway crossings, streets, and driveways.	150	LF		
39.	Cleanup and restoration, INCL furnishing, material, and labor.	2,450	LF		
<b>Line "E" US 42/KY 36 Water Main Extension</b>					
40.	6 IN PVC SDR 21 Class 200 pipe furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	9,575	LF		
41.	6 DIP pipe furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	2,500	LF		

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Item No.	Description	Quantity	Unit	Unit Cost	Extension
42.	4 IN PVC SDR 21 Class 200 pipe furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	60	LF		
43.	Tie-in to existing water mains, INCL 6-IN by 6-IN MJ tapping saddle, 6 IN tapping gate valve and box, etc. furnishing and installation, INCL unclassified excavation.	1	EA		
44.	Tie-in to existing water mains, INCL 4-IN by 4-IN MJ tapping saddle, 4 IN tapping gate valve and box, etc. furnishing and installation INCL unclassified excavation.	1	EA		
45.	Tie-in to existing water mains, INCL 6-IN by 3-IN MJ tapping saddle, 6 IN tapping gate valve and box, etc. furnishing and installation INCL unclassified excavation.	1	EA		
46.	Tie-in to existing water mains, cut into existing 4 IN main with 6-IN by 4-IN cross, etc. furnishing and installation INCL unclassified excavation.	1	EA		
47.	6 IN C.I. AWWA N.R.S. gate valve and box, CIP.	7	EA		
48.	4 IN C.I. AWWA N.R.S. gate valve and box, CIP.	2	EA		
49.	6 IN blowoff hydrant for all size water mains INCL gate valve, gate valve box, restraints, tees, and all appurtenances, CIP, according to detail.	1	EA		
50.	Automatic air release valve assembly and box, CIP, according to detail.	1	EA		
51.	Stream crossing with 12 IN PVC SDR 35 cover pipe and concrete cap INCL furnishing, material, and labor.	30	LF		
52.	Special creek crossing meter box according to details INCL valve, valve box, service tubing, corporation stops, meter, meter box, etc. and furnishing, material, and labor.	2	EA		
53.	Stream crossing with 16 IN HDPE directional drill and 8 IN HDPE water main, furnishing, trenching, laying, and backfilling INCL all associated tees, adapters, restraint devices, concrete backing, reducers, bends, etc. (unclassified excavation).	300	LF		
54.	12 IN steel cover pipe, furnishing and installing, trenching under state maintained roads INCL unclassified boring and/or jacking (water pipe not INCL).	150	LF		
55.	Crushed rock on trench surface at roadway crossings, streets, and driveways.	230	LF		
56.	Asphalt patch at roadway crossing, driveway/parking lot crossing INCL asphalt, rock in trench, cutting, furnishing and installation.	100	LF		
57.	Cleanup and restoration INCL furnishing, material, and labor.	12,435	LF		

Item No.	Description	Quantity	Unit	Unit Cost	Extension
<b>Line "F" Mound Hill Water Line Extension</b>					
58.	3 IN PVC SDR 21 Class 200 pipe furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	1,500	LF		
59.	Tie-in to existing water mains INCL tapping saddle, tapping gate valve, etc. furnishing and installation INCL unclassified excavation.	2	EA		
60.	8 IN steel cover pipe, furnishing and installing, trenching under state maintained roads INCL unclassified boring and/or jacking (water pipe not INCL).	30	LF		
61.	3/4-IN service pipe, furnishing, trenching, laying, and backfilling where required. Unit cost INCL connecting exiting meter to service line, connecting service line to proposed main INCL all appurtenances and saddles, etc.	200	LF		
62.	Crushed rock on trench surface at roadway crossings, streets, and driveways.	100	LF		
63.	Cleanup and restoration INCL furnishing, material, and labor.	1,500	LF		
<b>Line "G" Gilgal Road Water Main Replacement</b>					
64.	4 IN DIP furnishing, trenching, laying and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	2,410	LF		
65.	4 IN PVC DR 14 pipe furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	1,770	LF		
66.	4 IN PVC DR 18 pipe furnishing, trenching, laying, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	1,820	LF		
67.	Tie-in to existing water mains INCL tapping saddle, tapping gate valve, etc. furnishing and installation INCL unclassified excavation.	1	EA		
68.	4 IN C.I. AWWA N.R.S. gate valve and box, CIP.	2	EA		
69.	Stream crossing with crushed stone, INCL furnishing, material, and labor.	90	LF		
70.	10 IN steel cover pipe, furnishing and installing, trenching under state maintained roads INCL unclassified boring and/or jacking (water pipe not INCL).	30	LF		
71.	3/4 IN service pipe, furnishing, trenching, laying, and backfilling where required. Unit cost INCL connecting exiting meter to service line, connecting service line to proposed main INCL all appurtenances, saddles, etc.	500	EA		
72.	Crushed rock on trench surface at roadway crossings, streets, and driveways.	100	LF		

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Item No.	Description	Quantity	Unit	Unit Cost	Extension
73.	Asphalt patch at roadway crossing, driveway/parking lot crossing INCL asphalt, rock in trench, cutting, furnishing and installation.	20	LF		
74.	Cleanup and restoration, INCL furnishing, material, and labor.	6,000	EA		
<b>Line "H" Nora Lane Water Line Extension</b>					
75.	3 IN PVC SDR 21 Class 200 pipe, furnishing, trenching, laying and backfilling INCL all associated tees, reducers, and bends (unclassified excavation).	2,550	LF		
76.	Tie-in to existing water mains INCL tapping saddle, tapping gate valve, etc. furnishing and installation, INCL unclassified excavation.	1	EA		
77.	3 IN blowoff hydrant for all size water mains INCL gate valve, gate valve box, restraints, tees, and all appurtenances, CIP, according to detail.	1	EA		
78.	8 IN steel cover pipe, furnishing and installing, trenching under state maintained roads INCL unclassified boring and/or jacking (water pipe not INCL).	30	LF		
79.	3/4 IN service pipe, furnishing, trenching, laying, and backfilling where required. Unit cost INCL moving existing water meter to new location, connecting exiting meter to service line, connecting service line to proposed main INCL all appurtenances, saddles, etc.	100	LF		
80.	Crushed rock on trench surface at roadway crossings, streets, and driveways.	20	LF		
81.	Cleanup and restoration, INCL furnishing, material, and labor.	2,550	EA		
<b>Kings Ridge Road Booster Pump Station</b>					
82.	PS INCL furnishing, trenching, laying, building, foundation, telemetry system, electrical, variable frequency drives, access road, drainage, grading, 18 IN corrugated metal pipe, all taps into existing mains, line work, and backfilling INCL all associated tees, reducers, and bends (unclassified excavation) as noted on drawing sheets 13, 21, and 22.	1	EA		
<b>Gilgal Road Booster Pump Station</b>					
83.	PS includes furnishing, trenching, laying, building, foundation, telemetry system, electrical, VFD's, access road, drainage, grading, all taps into existing mains, line work, and backfilling, including all associated tees, reducers, and bends (unclassified excavation) as noted on drawing sheets 13, 21, and 22.	1	EA		

COMPUTED TOTAL BID CONTRACT 1-2012 (ITEMS 1 THROUGH 83)

Dollars \$ \_\_\_\_\_

(Words) (Numbers)

# DRAFT-(01.03.2013)

BID

COUNTYWIDE UNDERSERVED PROJECT  
WATER TREATMENT PLANT UPGRADES  
CONTRACT 2-2012  
CARROLLTON UTILITIES

LUMP SUM BID:

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
(Words) (Numbers)

# DRAFT-(01.03.2013)

## BID

### COUNTYWIDE UNDERSERVED PROJECT WATER DISTRIBUTION AND WATER TREATMENT PLANT UPGRADES CONTRACTS 1-2012 AND 2-2012 CARROLLTON UTILITIES

Separate Contracts may be awarded for Contracts 1-2012 and 2-2012.

Alternatively, Bidders may submit a Bid for the entire Work. Should any Bidder elect to offer such Bid(s), the Bid(s) will be considered in determining successful Bidder(s).

Bidder shall, if it desires, provide a Combined Total Lump Sum Bid for the multiple Contract listed.

#### MULTIPLE CONTRACT NUMBERS AND NAMES:

\_\_\_\_\_ Contract 1-2012: Water Distribution Upgrades \_\_\_\_\_

\_\_\_\_\_ Contract 2-2012: Water Treatment Plant Upgrades \_\_\_\_\_

#### COMBINED TOTAL LUMP SUM BID:

\_\_\_\_\_ Dollars \$ \_\_\_\_\_  
(Words) (Numbers)

## ARTICLE 6-TIME OF COMPLETION

6.01 For Contract 1-2012, Bidder agrees that the Work will be substantially complete within 150 calendar days after the date when the Contract Time commences to run as provided in Paragraph 2.03 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 14.07.B of the General Conditions within 180 calendar days after the date when the Contract Time commences to run.

6.02 For Contract 2-2012, Bidder agrees that the Work will be substantially complete within 210 calendar days after the date when the Contract Time commences to run as provided in Paragraph 2.03 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 14.07.B of the General Conditions within 240 calendar days after the date when the Contract Time commences to run.

6.03 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the Contract Times.

## ARTICLE 7-ATTACHMENTS TO THIS BID

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

A. Required Bid security in the form of \_\_\_\_\_ in the  
(Bond or Certified Check)  
amount of \_\_\_\_\_ Dollars  
(\$ \_\_\_\_\_) as required by the Instructions to Bidders.

B. Check the paragraph below that applies and provide the Organization Number, if applicable.

1. \_\_\_\_\_ Bidder is a "resident bidder" as defined in KRS 45A.494(2) of Kentucky's "resident bidder" reciprocal preference statute and submits with this Bid a properly executed and notarized Affidavit that affirms Bidder meets the "resident bidder criteria". Such Affidavit is hereby incorporated and made part of this Bid.

2. \_\_\_\_\_ Bidder is a "nonresident bidder" as defined in KRS 45A.493(3) of Kentucky's "resident bidder" reciprocal preference statute and the state of residency for the purposes of this administrative regulation shall be its principal office as identified in the Bidder's Certificate of Authority to transact business in Kentucky as filed with the Secretary of State of the Commonwealth of Kentucky, or if represents and covenants that it is not required to obtain a Certificate of Authority to transact business in the Commonwealth of Kentucky, its mailing address is:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. Bidder's Organization Number from the Secretary of State of the Commonwealth of Kentucky is \_\_\_\_\_ [if applicable] and Bidder is qualified to transact business in the Commonwealth or Bidder hereby covenants it will obtain such qualifications prior to award of Contract.



- C. Statement pursuant to Labor Law Disclosure (KRS 45A.343).
- D. Campaign Finance Disclosure (KRS 45A.395).
- E. Statement pursuant to (KRS 45A.395).
- F. Conflict of Interest (KRS 45A.455).

G. Supplemental General Conditions for Clean Water State Revolving Fund and Drinking Water State Revolving Fund (Drinking Water and Wastewater).

ARTICLE 8-DEFINED TERMS

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

ARTICLE 9-COMMUNICATIONS

9.01 Communications concerning this Bid shall be addressed to the address of Bidder indicated below:

Name: \_\_\_\_\_

Street: \_\_\_\_\_

City, State, Zip Code: \_\_\_\_\_

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

E-mail address: \_\_\_\_\_

ARTICLE 10-BID SUBMITTAL

Submitted on \_\_\_\_\_

State Contractor License Number \_\_\_\_\_ (if applicable).

# DRAFT-(01.03.2013)

If Bidder is:

## An Individual

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

By: \_\_\_\_\_  
(Individual's signature)

Doing business as: \_\_\_\_\_  
Business address: \_\_\_\_\_

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

E-mail address: \_\_\_\_\_

## A Partnership

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

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

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

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

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

E-mail address: \_\_\_\_\_

## A Corporation

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

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

Type (General Business, Professional, Service, Limited Liability): \_\_\_\_\_

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

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

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

Attest \_\_\_\_\_  
(Signature of Corporate Secretary)

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

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

E-mail address: \_\_\_\_\_

Date of Qualification to do business in (State where the Project is located) is \_\_\_\_\_

Sworn and subscribed to before me this  
\_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_

Notary Public or Other Officer  
Authorized to Administer Oaths.  
My Commission expires: \_\_\_\_\_

# DRAFT-(01.03.2013)

*A Limited Liability Company* (Note: If member-managed, an authorized member must sign; if manager-managed, the authorized manager must sign. Attach evidence of authority to sign on behalf of LLC).

\_\_\_\_\_  
(Fill in complete name of LLC)

State of Formation: \_\_\_\_\_

By: \_\_\_\_\_  
(Signature)

\_\_\_\_\_, [Member] [Manager]  
(Print Name)

Business Address: \_\_\_\_\_

Telephone.: \_\_\_\_\_

Email: \_\_\_\_\_

Fax: \_\_\_\_\_

# DRAFT-(01.03.2013)

## A Joint Venture

Name of Joint Venture: \_\_\_\_\_

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

By: \_\_\_\_\_  
(Signature of first joint venture partner -- attach evidence of authority to sign)

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

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

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

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

E-mail address: \_\_\_\_\_

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

By: \_\_\_\_\_  
(Signature of second joint venture partner -- attach evidence of authority to sign)

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

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

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

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

E-mail address: \_\_\_\_\_

Phone No., Fax No., and postal and E-mail address for receipt of official communications:

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

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

Sworn and subscribed to before me this  
\_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_

Notary Public or Other Officer  
Authorized to Administer Oaths.  
My Commission expires: \_\_\_\_\_

END OF SECTION

# DRAFT-(01.03.2013)

SECTION 00430

## 5% BID BOND

BIDDER (Name and Address):

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

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OWNER (Name and Address):

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BID:

BID DUE DATE: \_\_\_\_\_

PROJECT (Brief Description Including Location):

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BOND:

BOND NUMBER: \_\_\_\_\_

DATE: (Not later than Bid Due Date): \_\_\_\_\_

PENAL SUM: \_\_\_\_\_

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

### SURETY

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

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

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

### BIDDER

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

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

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

Above addresses are to be used for giving required notice.

# DRAFT-(01.03.2013)

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 penal sum is the extent of Surety's liability.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
  - 3.1 OWNER accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
  - 3.2 All Bids are rejected by OWNER, or
  - 3.3 OWNER fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from OWNER, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by OWNER and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Bidder and Surety, and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notice 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 prepaid, 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 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 the Bond conflicts with any applicable provision of any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

END OF SECTION

## STATEMENT REQUIRED PURSUANT TO KRS 45A.343

The undersigned, as a duly authorized officer of \_\_\_\_\_  
hereinafter called the company, pursuant to KRS 45A.343 states;

1. To the best of my knowledge, information and belief, the company has not been finally determined to have violated any of the provisions of KRS Chapters 136, 139, 141, 337, 338, 341, or 342 that apply to it within the five year period preceding this statement.
2. The company acknowledges that it will be required to be in compliance with those provisions of KRS Chapters 136, 139, 141, 337, 338, 341 and 342 that apply to it for the duration of the Contract to be entered into with Owner.
3. The company acknowledges that if it fails to reveal any final determination of violation of KRS Chapters 136, 139, 141, 337, 338, 341, or 342, or to comply with the applicable provision of those statutes for the duration of the aforesaid Contract, such shall be grounds for Owner to:
  - a. Cancel its contract with the company, and,
  - b. Disqualify the company from eligibility for future contracts awarded by Owner for a period of two years.

This the \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
(Company Name)

By: \_\_\_\_\_  
(Typed or printed name)

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

**45A.395      Determination of responsibility – Right of nondisclosure.**

- (1) A written determination of responsibility of a bidder or offeror shall be made, based on a reasonable inquiry conducted by the local public agency. The unreasonable failure of a bidder or offeror to promptly supply information upon request may be grounds for a determination of nonresponsibility of such bidder or offeror.
- (2) A written determination of responsibility of a bidder or offeror shall not be made until the bidder or offeror provides the local public agency with a sworn statement made under penalty of perjury that he has not knowingly violated any provision of the campaign finance laws of the Commonwealth and that the award of a contract to the bidder or offeror will not violate any provisions of the campaign finance laws of the Commonwealth. “Knowingly” means, with respect to conduct or circumstances described by a statute defining an offense, that a person is aware or should have been aware that his conduct is of that nature or that the circumstance exists.
- (3) Except as otherwise provided by law, information furnished by a bidder or offeror pursuant to this section may not be disclosed outside of the local public agency without prior written consent of bidder or offeror.

**Effective:** July 14, 1992

**History:** Amended 1992 Ky. Acts ch. 288, sec. 19.



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## STATEMENT REQUIRED PURSUANT TO KRS 45A.395

The provisions of KRS 45A.395 required that any bidder or offeror submit a sworn statement in conformity with such statute as a prerequisite to a determination that such bidder or offeror is a responsible bidder.

The undersigned, individually and as the \_\_\_\_\_  
(Office or Title)

of \_\_\_\_\_  
(Bidder or Offeror)

states under penalty of perjury that neither he (she), nor, to the best of his (her) knowledge, anyone acting on behalf of Bidder or Offeror, has knowingly violated any provision of the campaign finance laws of the Commonwealth of Kentucky and that the award of a contract to the Bidder or Offeror will not violate any provision of the campaign finance laws of the Commonwealth. "Knowingly" means, with respect to conduct or to a circumstance described by a statute defining an offense, that a person is aware or should have been aware that his conduct is of that nature or that the circumstance exists.

This the \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
(Company Name)

By: \_\_\_\_\_  
(Typed or Printed Name)

\_\_\_\_\_  
(Signature)

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

Contract: \_\_\_\_\_

## REQUIRED AFFIDAVIT FOR BIDDERS CLAIMING KENTUCKY RESIDENT BIDDER STATUS

### FOR BIDS AND CONTRACTS IN GENERAL:

Bidder hereby swears and affirms under penalty of perjury that, in accordance with KRS 45A.494(2), Bidder is an individual, partnership, association, corporation, or other business entity that, on the date the Contract was first advertised or announced as available for bidding, Bidder:

1. Is authorized to transact business in the Commonwealth of Kentucky, and
2. Has for one year prior to and through the date of advertisement:
  - a. Filed Kentucky corporate income taxes,
  - b. Made payments to the Kentucky unemployment insurance fund established in KRS 341.490, and
  - c. Maintained a Kentucky workers' compensation policy in effect.

OWNER reserves the right to request documentation supporting a Bidder's claim of resident bidder status. Failure to provide such documentation upon request shall result in disqualification of the Bidder or contract termination.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title (if signing on behalf of an entity)

\_\_\_\_\_  
Date

Company Name \_\_\_\_\_

Address \_\_\_\_\_

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

Subscribed and sworn to before me by \_\_\_\_\_  
Affiant Title

of \_\_\_\_\_, this \_\_\_\_\_ day of \_\_\_\_\_, 201\_\_.  
Company Name

\_\_\_\_\_  
Notary Public

[Seal of Notary]

My commission expires: \_\_\_\_\_

## **45A.455 Conflict of interest–Gratuities and kickbacks–Use of confidential information.**

- (1) It shall be a breach of ethical standards for any employee with procurement authority to participate directly in any proceeding or application; request for ruling or other determination; claim or controversy; or other particular matter pertaining to any contract, or subcontract, and any solicitation or proposal therefor, in which to his knowledge:
  - a. He, or any member of his immediate family has a financial interest therein; or
  - b. A business or organization in which he or any member of his immediate family has a financial interest as an officer, director, trustee, partner, or employee, is a party; or
  - c. Any other person, business, or organization with whom he or any member of his immediate family is negotiating or has an arrangement concerning prospective employment is a party. Direct or indirect participation shall include but not be limited to involvement through decision, approval, disapproval, recommendation, preparation of any part of a purchase request, influencing the content of any specification or purchase standard, rendering of advice, investigation, auditing, or in any other advisory capacity.
- (2) It shall be a breach of ethical standards for any person to offer, give, or agree to give any employee or former employee, or for any employee or former employee to solicit, demand, accept, or agree to accept from another person, a gratuity or an offer of employment, in connection with any decision, approval, disapproval, recommendation, preparation of any part of a purchase request, influencing the content of any specification or purchase standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any proceeding or application, request for ruling or other determination, claim or controversy, or other particular matter, pertaining to any contract or subcontract and any solicitation or proposal therefor.
- (3) It is a breach of ethical standards for any payment, gratuity, or offer of employment to be made by or on behalf of a subcontractor under a contract to the prime contractor or higher tier subcontractor or any person associated therewith, as an inducement for the award of a subcontract or order.
- (4) The prohibition against conflicts of interest and gratuities and kickbacks shall be conspicuously set forth in every local public agency written contract and solicitation therefor.
- (5) It shall be a breach of ethical standards for any public employee or former employee knowingly to use confidential information for his actual or anticipated personal gain, or the actual or anticipated personal gain of any other person.

## SECTION 00520

### AGREEMENT

---

THIS AGREEMENT is by and between \_\_\_\_\_  
(hereinafter called OWNER) and \_\_\_\_\_  
(hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants set forth herein, agree as follows:

#### Article 1. WORK

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

#### Article 2. THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

#### Article 3. ENGINEER

3.01 The Project has been designed by Strand Associates, Inc.<sup>®</sup> (hereinafter called 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 completion of the Work in accordance with the Contract Documents.

#### Article 4. CONTRACT TIMES

##### 4.01 Time of the Essence

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

##### 4.02 Dates for Substantial Completion and Final Payment

A. For Contract 1-2012 the Work will be substantially complete within 150 calendar days after the date when the Contract Time commences to run as provided in Paragraph 2.03 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 14.07.B of the General Conditions within 180 calendar days after the date when the Contract Time commences to run.

B. For Contract 2-2012, Bidder agrees that the Work will be substantially complete within 210 calendar days after the date when the Contract Time commences to run as provided in Paragraph 2.03 of the General Conditions, and will be completed and ready for final payment in

accordance with Paragraph 14.07.B of the General Conditions within 240 calendar days after the date when the Contract Time commences 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 that does not result in adjustment of the Contract Times pursuant to Section 12.03 of the General Conditions (but not as a penalty), CONTRACTOR shall pay to OWNER the following daily charge:

Original Contract Amount		Daily Charge
From More Than	To and Including	Calendar Day
\$	\$ 100,000	\$ 500
100,000	500,000	800
500,000	1,000,000	1,000
1,000,000	3,000,000	1,200
3,000,000	5,000,000	1,500
5,000,000		2,000

The above liquidated damages shall be applied separately to each of the substantial and final completion dates as shown in Paragraph 4.02.

## Article 5. CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds as follows:

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

B. All specific cash allowances are included in the Contract Price and have been computed in accordance with Paragraph 11.02 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 as established at the preconstruction conference 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 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, in the event there is no schedule of values, as provided in the General Requirements:

1. Prior to Substantial Completion, OWNER will retain an amount equal to 10% of each progress payment application until 50% of the Work has been completed. At 50% completion, further progress payment applications shall be paid in full to the CONTRACTOR and no additional amounts will be retained unless the ENGINEER certifies to the OWNER that the job is not proceeding satisfactorily. Amounts previously retained shall not be paid to the CONTRACTOR until substantial completion of the Work. At 50% completion of the Work, or any time thereafter when the character and progress of the Work is not satisfactory to OWNER on recommendation of ENGINEER, additional amounts may be retained, but in no event shall the total retainage be more than 10% of the value of the work completed.

2. Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 98% of the Work completed, less such amounts as ENGINEER shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 100% of ENGINEER's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

## 6.03 Final Payment

A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said Paragraph 14.07.

## Article 7. HIERARCHY

7.01 In resolving inconsistencies among two or more sections of the Contract Documents, precedence shall be given in the following order:

- |          |                          |
|----------|--------------------------|
| First:   | WRITTEN AMENDMENTS       |
| Second:  | AGREEMENT                |
| Third:   | CHANGE ORDERS            |
| Fourth:  | ADDENDA                  |
| Fifth:   | SUPPLEMENTARY CONDITIONS |
| Sixth:   | GENERAL CONDITIONS       |
| Seventh: | SPECIFICATIONS           |
| Eighth:  | DRAWINGS                 |

Figure dimensions (numerical) on Drawings shall take precedence over dimensions measured utilizing a scale.

## 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 (1) all 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 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 accepts consequences of 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 that may affect the 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 Contract 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 00520-1 through 00520-\_\_\_\_\_, inclusive);





12. The following may be delivered or issued on or after the Effective Date of the Agreement:

- a. Notice to Proceed (pages { } to { }, inclusive);
- b. Work Change Directives (not attached to this Agreement);
- c. Change Order(s) (not attached to this Agreement).

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, monies that may become due and monies 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 of 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 Nonwaiver

A. No provision of the Contract Documents will be deemed waived by reason of one party failing to enforce the provision on one or more occasions. Any such waiver must be in writing.

### 10.06 Integration

A. The parties' entire agreement is contained in the Contract Documents, and the provisions of the Contract Documents supersede all prior discussions or writings between the parties.

# DRAFT-(01.03.2013)

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR, and ENGINEER. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or identified by ENGINEER on their behalf.

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

OWNER

\_\_\_\_\_

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

ATTEST:

By:

\_\_\_\_\_

Signature and Title

Address for Giving Notices:

Name:

\_\_\_\_\_

Street:

\_\_\_\_\_

City, State, Zip Code:

\_\_\_\_\_

Phone:

\_\_\_\_\_

Facsimile:

\_\_\_\_\_

E-mail:

\_\_\_\_\_

Designated Representative:

\_\_\_\_\_

# DRAFT-(01.03.2013)

CONTRACTOR \_\_\_\_\_

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

ATTEST:

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

Address for Giving Notices:

Name: \_\_\_\_\_

Street: \_\_\_\_\_

City, State, Zip Code: \_\_\_\_\_

Phone: \_\_\_\_\_

Facsimile: \_\_\_\_\_

E-mail: \_\_\_\_\_

Designated Representative: \_\_\_\_\_

License No.: \_\_\_\_\_

(Where applicable)

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

# DRAFT-(01.03.2013)

## INSTRUCTIONS FOR EXECUTING CONTRACT

The full name and business address of CONTRACTOR should be inserted and the Agreement should be signed with CONTRACTOR's official signature. Please have the name of the signing party printed under all signatures to the Agreement.

If CONTRACTOR is operating as a partnership, each partner should sign the Agreement. If the Agreement is not signed by each partner, there should be attached to the Agreement a duly authenticated power of attorney evidencing the signer's (signers') authority to sign such Agreement for and on behalf of the partnership.

If CONTRACTOR is an individual, the trade name (if CONTRACTOR is operating under a trade name) should be indicated in the Agreement and the Agreement should be signed by such individual. If signed by other than CONTRACTOR, there should be attached to the Agreement a duly authenticated power of attorney evidencing the signer's authority to execute such Agreement for and on behalf of CONTRACTOR.

If CONTRACTOR is operating as a limited liability company, and it is member-managed, each member should sign the Agreement, or an authorized member should sign. If the LLC is manager-managed, an authorized manager should sign. If the Agreement is not signed by each member, there should be attached to the Agreement a duly authenticated power of attorney evidencing the signer's (signers') authority to sign such Agreement for and on behalf of the LLC.

If CONTRACTOR is a corporation, the Secretary of the corporation should sign the certificate below. If the Agreement itself is signed by the Secretary of the corporation, the certificate below should be executed by some other officer of the corporation, under the corporate seal. In lieu of the following certificate, there may be attached to the Agreement copies of so much of the records of the corporation which will show the official character and authority of the officers signing, duly certified by the Secretary or Assistant Secretary under the corporate seal to be true copies.

I, \_\_\_\_\_, certify that I am the \_\_\_\_\_  
(Print Name) (Title of Officer Signing Certificate)

of the corporation named as CONTRACTOR herein above; that \_\_\_\_\_,  
(Print Name of Officer Signing Agreement)

who signed the foregoing Agreement on behalf of CONTRACTOR was then

\_\_\_\_\_ of said corporation; that said Agreement was duly signed  
(Title of Officer Signing Agreement)

for and on behalf of said Corporation by authority of its governing body, and is within the scope of its corporate powers.

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

END OF SECTION

# DRAFT-(01.03.2013)

SECTION 00550

## NOTICE TO PROCEED

Dated \_\_\_\_\_

TO: \_\_\_\_\_  
(CONTRACTOR)

ADDRESS: \_\_\_\_\_  
\_\_\_\_\_

PROJECT: \_\_\_\_\_

OWNER'S CONTRACT NO. \_\_\_\_\_

CONTRACT FOR \_\_\_\_\_

\_\_\_\_\_  
(Insert name of Contract as it appears in the Bidding Documents)

You are notified that the Contract Time under the above Contract will commence to run on \_\_\_\_\_, \_\_\_\_\_. On or before that date, you are to start performing your obligations under the Contract Documents.

Before you may start any work at the site, Paragraph 2.01.B. of the General Conditions provides that you must deliver to OWNER (with copies to ENGINEER and other identified additional insureds) certificates of insurance, copies of endorsements, and other evidence of insurance which you are required to purchase and maintain in accordance with the Contract Documents.

Also before you may start any work at the site, you must \_\_\_\_\_

\_\_\_\_\_  
(Add Other Requirements)

**CARROLLTON UTILITIES**

(OWNER)

By: \_\_\_\_\_  
(Authorized Signature)

\_\_\_\_\_  
(Title)

END OF SECTION

Section 00550-1

5104.003/1-2012 and 2-2012

## EROSION CONTROL CERTIFICATION

Dated \_\_\_\_\_

TO OWNER: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PROJECT: \_\_\_\_\_

OWNER'S CONTRACT NO. \_\_\_\_\_

CONTRACT FOR \_\_\_\_\_

I certify under penalty of law that I understand the terms and conditions of the General National Pollutant Discharge Elimination System (NPDES) Permit that authorizes the stormwater discharges associated with industrial activities from the construction site and as may be detailed in the Contract Documents.

I agree to indemnify and hold OWNER harmless from any claims, demands, suits, causes of action, settlements, fines, or judgments and the costs of litigation, including, but not limited to, reasonable attorneys fees and costs of investigation and arising from a condition, obligation, or requirement assumed or to be performed by CONTRACTOR for storm water pollution and erosion control.

Fines and other costs incurred against OWNER for CONTRACTOR's failure to provide the required erosion control practices will be paid by CONTRACTOR.

\_\_\_\_\_  
(CONTRACTOR)

By: \_\_\_\_\_  
(Authorized Signature)

\_\_\_\_\_  
(Title)

END OF SECTION

SECTION 00600  
**DRAFT-(01.03.2013)**  
PERFORMANCE BOND

CONTRACTOR (*Name and Address*): SURETY (*Name, and Address of Principal Place of Business*):

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

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

OWNER (*Name and Address*):

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

**CONSTRUCTION CONTRACT**

Effective Date of Agreement: \_\_\_\_\_

Amount: \_\_\_\_\_

Description (*Name and Location*): \_\_\_\_\_

**BOND**

Bond Number: \_\_\_\_\_

Date (*Not earlier than Effective Date of Agreement of the Construction Contract*): \_\_\_\_\_

Amount: \_\_\_\_\_

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

**CONTRACTOR AS PRINCIPAL**

**SURETY**

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

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

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

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

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

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

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

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

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:
  - 3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
  - 3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
  - 3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
  - 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
  - 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;
  - 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
  - 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
    - 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
    - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.



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

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

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

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

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

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

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

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

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

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

#### 14. Definitions

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

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

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

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

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

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

# DRAFT-SECTION 00600-(01.03.2013)

## PAYMENT BOND

CONTRACTOR (Name and Address):

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

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

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

OWNER (Name and Address):

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

### CONSTRUCTION CONTRACT

Effective Date of Agreement: \_\_\_\_\_

Amount: \_\_\_\_\_

Description (Name and Location): \_\_\_\_\_

### BOND

Bond Number: \_\_\_\_\_

Date (Not earlier than Effective Date of Agreement of the Construction Contract): \_\_\_\_\_

Amount: \_\_\_\_\_

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

CONTRACTOR AS PRINCIPAL

SURETY

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

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

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

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

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

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

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

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

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

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

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

END OF SECTION

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

## STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

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**STANDARD GENERAL CONDITIONS OF THE**  
**CONSTRUCTION CONTRACT**

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## ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

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

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

## 1.02 *Terminology*

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

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

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

### C. *Day:*

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

### D. *Defective:*

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

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

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

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

**ARTICLE 2 – PRELIMINARY MATTERS**

2.01 *Delivery of Bonds and Evidence of Insurance*

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

2.02 *Copies of Documents*

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

2.03 *Commencement of Contract Times; Notice to Proceed*

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



## 2.04 *Starting the Work*

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

## 2.05 *Before Starting Construction*

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

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

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

## 2.07 *Initial Acceptance of Schedules*

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

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

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

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

#### 3.01 *Intent*

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

#### 3.02 *Reference Standards*

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

## 3.03 *Reporting and Resolving Discrepancies*

### A. *Reporting Discrepancies:*

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

### B. *Resolving Discrepancies:*

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

## 3.04 *Amending and Supplementing Contract Documents*

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

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

## 3.05 *Reuse of Documents*

### A. Contractor and any Subcontractor or Supplier shall not:

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

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

## 3.06 *Electronic Data*

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

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

**4.01**    *Availability of Lands*

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

**4.02**    *Subsurface and Physical Conditions*

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

## 4.03 *Differing Subsurface or Physical Conditions*

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

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

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

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

C. *Possible Price and Times Adjustments:*

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

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

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

#### 4.04 *Underground Facilities*

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

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

B. *Not Shown or Indicated:*

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

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

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

#### 4.05 *Reference Points*

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

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

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



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

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

## ARTICLE 5 – BONDS AND INSURANCE

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

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

### 5.02 *Licensed Sureties and Insurers*

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

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

5.03 *Certificates of Insurance*

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

5.04 *Contractor's Insurance*

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

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

## 5.05 *Owner's Liability Insurance*

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

## 5.06 *Property Insurance*

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

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

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

## 5.07 *Waiver of Rights*

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

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

## 5.08 *Receipt and Application of Insurance Proceeds*

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

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

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

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

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

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

**ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES**

6.01 *Supervision and Superintendence*

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

6.02 *Labor; Working Hours*

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

6.03 *Services, Materials, and Equipment*

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



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

## 6.04 *Progress Schedule*

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

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

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

- 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
  - 3) it has a proven record of performance and availability of responsive service.
- b. Contractor certifies that, if approved and incorporated into the Work:
- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
  - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
2. *Substitute Items:*
- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
  - b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
  - c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
  - d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
    - 1) shall certify that the proposed substitute item will:
      - a) perform adequately the functions and achieve the results called for by the general design,
      - b) be similar in substance to that specified, and
      - c) be suited to the same use as that specified;
    - 2) will state:
      - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
      - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

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

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

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

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

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

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

## 6.07 *Patent Fees and Royalties*

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

## 6.08 *Permits*

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

6.09 *Laws and Regulations*

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

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

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

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

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

## 6.12 *Record Documents*

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

## 6.13 *Safety and Protection*

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

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

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

## 6.14 *Safety Representative*

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

## 6.15 *Hazard Communication Programs*

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

## 6.16 *Emergencies*

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



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

## 6.17 *Shop Drawings and Samples*

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

### 1. *Shop Drawings:*

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

### 2. *Samples:*

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

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

### C. *Submittal Procedures:*

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

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

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

*D. Engineer's Review:*

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

*E. Resubmittal Procedures:*

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

**6.18** *Continuing the Work*

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

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

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

## 6.20 *Indemnification*

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

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

6.21 *Delegation of Professional Design Services*

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

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

## ARTICLE 7 – OTHER WORK AT THE SITE

### 7.01 *Related Work at Site*

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

### 7.02 *Coordination*

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

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

7.03 *Legal Relationships*

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

**ARTICLE 8 – OWNER'S RESPONSIBILITIES**

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

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

8.05 *Lands and Easements; Reports and Tests*

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

8.06 *Insurance*

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

## 8.07 *Change Orders*

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

## 8.08 *Inspections, Tests, and Approvals*

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

## 8.09 *Limitations on Owner's Responsibilities*

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

## 8.10 *Undisclosed Hazardous Environmental Condition*

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

## 8.11 *Evidence of Financial Arrangements*

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

## 8.12 *Compliance with Safety Program*

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

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

### 9.01 *Owner's Representative*

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

### 9.02 *Visits to Site*

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

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

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

## 9.03 *Project Representative*

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

## 9.04 *Authorized Variations in Work*

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

## 9.05 *Rejecting Defective Work*

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



9.06 *Shop Drawings, Change Orders and Payments*

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

9.07 *Determinations for Unit Price Work*

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

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

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

9.09 *Limitations on Engineer's Authority and Responsibilities*

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

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

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

## 9.10 *Compliance with Safety Program*

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

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

### 10.01 *Authorized Changes in the Work*

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

## 10.02 *Unauthorized Changes in the Work*

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

## 10.03 *Execution of Change Orders*

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

## 10.04 *Notification to Surety*

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

## 10.05 *Claims*

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

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

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

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

### 11.01 *Cost of the Work*

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

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

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

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

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

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

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

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

## 11.02 Allowances

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

## 11.03 Unit Price Work

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

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

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

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

### 12.01 *Change of Contract Price*

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



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

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

#### 12.02 *Change of Contract Times*

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

#### 12.03 *Delays*

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

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

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

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

### **13.01 *Notice of Defects***

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

### **13.02 *Access to Work***

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

## 13.03 *Tests and Inspections*

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

## 13.04 *Uncovering Work*

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

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

13.05 *Owner May Stop the Work*

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

13.06 *Correction or Removal of Defective Work*

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

13.07 *Correction Period*

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

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

## 13.08 *Acceptance of Defective Work*

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

13.09 *Owner May Correct Defective Work*

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

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

14.01 *Schedule of Values*

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

14.02 *Progress Payments*

A. *Applications for Payments:*

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

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

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

*B. Review of Applications:*

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

involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

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

#### *C. Payment Becomes Due:*

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



## D. *Reduction in Payment:*

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

### 14.03 *Contractor's Warranty of Title*

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

### 14.04 *Substantial Completion*

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

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

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

## 14.05 *Partial Utilization*

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

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

#### 14.06 *Final Inspection*

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

#### 14.07 *Final Payment*

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

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

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

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

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

C. *Payment Becomes Due:*

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

14.08 *Final Completion Delayed*

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

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:

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

**ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION**

**15.01 *Owner May Suspend Work***

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

**15.02 *Owner May Terminate for Cause***

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

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

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

15.03 *Owner May Terminate For Convenience*

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

15.04 *Contractor May Stop Work or Terminate*

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

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

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

## ARTICLE 16 – DISPUTE RESOLUTION

### 16.01 *Methods and Procedures*

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

## ARTICLE 17 – MISCELLANEOUS

### 17.01 *Giving Notice*

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

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

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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



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

**Project Name:** Countywide Underserved Project

**Project Number:** 1-2012 and 2-2012

**DRAFT-(01.03.2013)**

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

	<u><b>Attachment No.</b></u>
<b>SRF Special Provisions</b>	<b>1</b>
<b>40 CFR 31.36 (Procurement)-grants only</b>	<b>2</b>
<b>KRS Chapter 45A-Kentucky Model Procurement Code-loans only</b>	<b>3</b>
<b>Equal Employment Opportunity (EEO) Documents:</b>	
<b>Notice of Requirement for Affirmative Action</b>	<b>4</b>
<b>Contract Specifications (Executive Order 11246)</b>	<b>5</b>
<b>EEO Goals for Region 4 Economic Areas</b>	<b>6</b>
<b>Special Notice #1 - Check List of EEO Documentation</b>	<b>7</b>
<b>Employer Information Report EEO-1 (SF 100)</b>	<b>8</b>
<b>Labor Standards Provisions for Federally Assisted Construction,     EPA Form 5720-4</b>	<b>9</b>
<b>Certifications</b>	
<b>Debarment, Suspension and Other Responsibility Matters</b>	<b>10</b>
<b>Anti-lobbying</b>	<b>11</b>
<b>Region 4 Disadvantaged Business Enterprise (DBE)</b>	<b>12</b>
<b>Negotiated Rates as of October 1, 2010</b>	<b>13</b>
<b>Bonds and Insurance</b>	<b>14</b>
<b>Outlay Management Schedule</b>	<b>15</b>
<b>Storm Water General Permit</b>	<b>16</b>
<b>Davis Bacon Requirements</b>	<b>17</b>
<b>Wage Rate Requirements under FY 2012 Appropriations</b>	<b>18</b>

## SRF SPECIAL PROVISIONS

- (a) Line crossings of all roads and streets shall be done in accordance with the Kentucky Transportation Cabinet requirements as may be set forth in the Special Conditions.
- (b) Construction is to be carried out so as to prevent by-passing of flows during construction unless a schedule has been approved by the State or EPA, whichever is applicable. Siltation and soil erosion must be minimized during construction. All construction projects with surface disturbance of more than 1 acre during the period of construction must have a KPDES Storm Water General Permit. The permit can be found at the following web address: <https://dep.gateway.ky.gov/eForms/default.aspx?FormID=7>.  
  
If you have any questions regarding the completion of this form call the Surface Water Permits Branch at (502) 564-3410.
- (c) Restore disturbed areas to original or better condition.
- (d) Use of Chemicals: All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either DOW or EPA. Use of all such chemicals and disposal of residues shall be in conformance with instructions on the manufacturer's label.
- (e) The construction of the project, including the letting of contracts in connection therewith, shall conform to the applicable requirements of state, territorial, and local laws and ordinances to the extent that such requirements do not conflict with Federal laws and this subchapter.
- (f) The owner shall provide and maintain competent and adequate supervision and inspection.
- (g) The Kentucky Infrastructure Authority and Kentucky Division of Water shall have access to the site and the project work at all times.
- (h) In the event Archaeological materials (arrowheads, stone tools, stone axes, prehistoric and historic pottery, bottles, foundations, Civil War artifacts, and other types of artifacts) are uncovered during the construction of this project, work is to immediately cease at the location and the Kentucky Heritage Council shall be contacted. The telephone number is (502) 564-7005. Construction shall commence at this location until a written release is received from the Kentucky Heritage Council. Failure to report a find could result in legal action.
- (i) This procurement will be subject to DOW Procurement Guidance including the Davis-Bacon Act.
- (j) Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.
- (k) No wastewater bypassing will occur during construction unless a schedule has been approved by the Kentucky Division of Water.
- (l) Change orders to the construction contract (if required) must be negotiated pursuant to DOW/KIA Procurement Guidance for Construction and Equipment Contracts.

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

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

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

**Sec. 31.36 Procurement.**

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

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

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

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

(i) The employee, officer or agent,

(ii) Any member of his immediate family,

(iii) His or her partner, or

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(ii) Requiring unnecessary experience and excessive bonding,

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

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

(v) Organizational conflicts of interest,

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

(vii) Any arbitrary action in the procurement process.

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

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

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

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

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

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

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

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

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

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

(B) The cost is unreasonable;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(D) A firm fixed-price contract award will be made in writing to the lowest responsive and responsible bidder. Where specified in bidding documents, factors such as discounts, transportation cost, and life

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cycle costs shall be considered in determining which bid is lowest. Payment discounts will only be used to determine the low bid when prior experience indicates that such discounts are usually taken advantage of; and

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

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

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

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

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

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

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

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

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

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

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

(C) The awarding agency authorizes noncompetitive proposals; or

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

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

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

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

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

(2) Affirmative steps shall include:

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

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

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

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

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

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

(f) Contract cost and price.

(1) Grantees and sub-grantees must perform a cost or price analysis in connection with every procurement action including contract modifications. The method and degree of analysis is dependent on the facts surrounding the particular procurement situation, but as a starting point, grantees must make independent

estimates before receiving bids or proposals. A cost analysis must be performed when the offerer is required to submit the elements of his estimated cost, e.g., under professional, consulting, and architectural engineering services contracts. A cost analysis will be necessary when adequate price competition is lacking, and for sole source procurements, including contract modifications or change orders, unless price reasonableness can be established on the basis of a catalog or market price of a commercial product sold in substantial quantities to the general public or based on prices set by law or regulation. A price analysis will be used in all other instances to determine the reasonableness of the proposed contract price.

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

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

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

(g) Awarding agency review.

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

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

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

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

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

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

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

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

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

(ii) A grantee or sub-grantee may self-certify its procurement system. Such self-certification shall not limit the awarding agency's right to survey the system. Under a self-certification procedure, awarding agencies may wish to rely on written assurances from the grantee or sub-grantee that it is complying with these standards. A grantee or sub-grantee will cite specific procedures, regulations, standards, etc., as being in compliance with these requirements and have its system available for review.

(h) Bonding requirements. For construction or facility improvement contracts or subcontracts exceeding the simplified acquisition threshold, the awarding agency may accept the bonding policy and requirements of the grantee or sub-grantee provided the awarding agency has made a determination that



the awarding agency's interest is adequately protected. If such a determination has not been made, the minimum requirements shall be as follows:

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

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

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

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

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

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

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

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

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

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

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

(8) Notice of awarding agency requirements and regulations pertaining to patent rights with respect to any discovery or invention which arises or is developed in the course of or under such contract.

(9) Awarding agency requirements and regulations pertaining to copyrights and rights in data.

(10) Access by the grantee, the sub-grantee, the Federal grantor agency, the Comptroller General of the United States, or any of their duly authorized representatives to any books, documents, papers, and records of the contractor which are directly pertinent to that specific contract for the purpose of making audit, examination, excerpts, and transcriptions.

(11) Retention of all required records for three years after grantees or sub-grantees make final payments and all other pending matters are closed.

(12) Compliance with all applicable standards, orders, or requirements issued under section 306 of the Clean Air Act (42 U.S.C. 1857(h)), section 508 of the Clean Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR part 15). (Contracts, subcontracts, and sub-grants of amounts in excess of \$100,000)

(13) Mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94-163, 89 Stat. 871).

(j) Payment to consultants.

(1) EPA will limit its participation in the salary rate (excluding overhead) paid to individual consultants retained by grantees or by a grantee's contractors or subcontractors to the maximum daily rate for a GS-18. (Grantees may, however, pay consultants more than this amount). This limitation applies to

consultation services of designated individuals with specialized skills who are paid at a daily or hourly rate. This rate does not include transportation and subsistence costs for travel performed; grantees will pay these in accordance with their normal travel reimbursement practices. (Pub. L. 99-591).

(2) Sub-agreements with firms for services which are awarded using the procurement requirements in this part are not affected by this limitation.

(k) Use of the same architect or engineer during construction.

(1) If the grantee is satisfied with the qualifications and performance of the architect or engineer who provided any or all of the facilities planning or design services for a waste-water treatment works project and wishes to retain that firm or individual during construction of the project, it may do so without further public notice and evaluation of qualifications, provided:

(i) The grantee received a facilities planning (Step 1) or design grant (Step 2), and selected the architect or engineer in accordance with EPA's procurement regulations in effect when EPA awarded the grant; or

(ii) The award official approves noncompetitive procurement under Sec. 31.36(d)(4) for reasons other than simply using the same individual or firm that provided facilities planning or design services for the project; or

(iii) The grantee attests that:

(A) The initial request for proposals clearly stated the possibility that the firm or individual selected could be awarded a sub-agreement for services during construction; and

(B) The firm or individual was selected for facilities planning or design services in accordance with procedures specified in this section.

(C) No employee, officer or agent of the grantee, any member of their immediate families, or their partners have financial or other interest in the firm selected for award; and

(D) None of the grantee's officers, employees or agents solicited or accepted gratuities, favors or anything of monetary value from contractors or other parties to sub-agreements.

(2) However, if the grantee uses the procedures in paragraph (k)(1) of this section to retain an architect or engineer, any Step 3 sub-agreements between the architect or engineer and the grantee must meet all of the other procurement provisions in Sec. 31.36.

[53 FR 8068 and 8087, Mar. 11, 1988, and amended at 53 FR 8075, Mar. 11, 1988; 60 FR 19639, 19644, Apr. 19, 1995; 66 FR 3794, Jan. 16, 2001]

**KRS Chapter 45A  
Kentucky Model Procurement Code**

**45A.075 Methods of awarding state contracts.**

Except as otherwise authorized by law, all state contracts shall be awarded by:

- (1) Competitive sealed bidding, pursuant to KRS 45A.080; or
- (2) Competitive negotiation, pursuant to KRS 45A.085 and 45A.090 or 45A.180; or
- (3) Noncompetitive negotiation, pursuant to KRS 45A.095; or
- (4) Small purchase procedures, pursuant to KRS 45A.100.

**Effective:** June 24, 2003

**History:** Amended 2003 Ky. Acts ch. 98, sec. 4, effective June 24, 2003. -- Created 1978 Ky. Acts ch. 110, sec. 16, effective January 1, 1979.

**45A.080 Competitive sealed bidding.**

(1) Contracts exceeding the amount provided by KRS 45A.100 shall be awarded by competitive sealed bidding unless it is determined in writing that this method is not practicable. Factors to be considered in determining whether competitive sealed bidding is not practicable shall include:

- (a) Whether specifications can be prepared that permit award on the basis of best value; and
- (b) The available sources, the time and place of performance, and other relevant circumstances as are appropriate for the use of competitive sealed bidding.

(2) The invitation for bids shall state that awards shall be made on the basis of best value. In any contract which is awarded under an invitation to bid which requires delivery by a specified date and imposes a penalty for late delivery, if the delivery is late, the contractor shall be given the opportunity to present evidence that the cause of the delay was beyond his control. If it is the opinion of the purchasing officer that there is sufficient justification for delayed delivery, the purchasing officer may adjust or waive any penalty that is provided for in the contract.

(3) Adequate public notice of the invitation for bids shall be given a sufficient time prior to the date set forth for the opening of bids. The notice may include posting on the Internet or publication in a newspaper or newspapers of general circulation in the state as determined by the secretary of the Finance and Administration Cabinet not less than seven (7) days before the date set for the opening of the bids. The provisions of this subsection shall also apply to price contracts and purchase contracts of state institutions of higher education.

(4) Bids shall be opened publicly at the time and place designated in the invitation for bids. At the time the bids are opened, the purchasing agency shall announce the agency's engineer's estimate, if applicable, and make it a part of the agency records pertaining to the letting of any contract for which bids were received. Each bid, together with the name of the bidder and the agency's engineer's estimate, shall be recorded and be open to public inspection. Electronic bid opening and posting of the required information for public viewing shall satisfy the requirements of this subsection.

(5) The contract shall be awarded by written notice to the responsive and responsible bidder whose bid offers the best value.

(6) Correction or withdrawal of bids shall be allowed only to the extent permitted by regulations issued by the secretary.

**Effective:** July 14, 2000

**History:** Amended 2000 Ky. Acts ch. 509, sec. 1, effective July 14, 2000. -- Amended 1998 Ky. Acts ch. 120, sec. 10, effective July 15, 1998. -- Amended 1997 (1<sup>st</sup> Extra. Sess.) Ky. Acts ch. 4, sec. 27, effective May 30, 1997. -- Amended 1996 Ky. Acts ch. 60, sec. 2, effective July 15, 1996. -- Amended 1994 Ky. Acts ch. 278, sec. 1, effective July 15, 1994. -- Amended 1982 Ky. Acts ch. 282, sec. 1, effective July 15, 1982. -- Amended 1979 (1<sup>st</sup> Extra. Sess.) Ky. Acts ch. 9, sec. 1, effective February 10, 1979. -- Created 1978 Ky. Acts ch. 110, sec. 17, effective January 1, 1979.

**45A.085 Competitive negotiation.**

(1) When, under administrative regulations promulgated by the secretary or under KRS 45A.180, the purchasing officer determines in writing that the use of competitive sealed bidding is not practicable, and except as provided in KRS 45A.095 and 45A.100, a contract may be awarded by competitive negotiation.

(2) Adequate public notice of the request for proposals shall be given in the same manner and circumstances as provided in KRS 45A.080(3).

(3) Contracts other than contracts for projects utilizing an alternative project delivery method under KRS 45A.180 may be competitively negotiated when it is determined in writing by the purchasing officer that the bids received by competitive sealed bidding either are unreasonable as to all or part of the requirements, or were not independently reached in open competition, and for which each competitive bidder has been notified of the intention to negotiate and is given reasonable opportunity to negotiate.

(4) Contracts for projects utilizing an alternative project delivery method shall be processed in accordance with KRS 45A.180.

(5) The request for proposals shall indicate the relative importance of price and other evaluation factors.

(6) Award shall be made to the responsible offerer whose proposal is determined in writing to be the most advantageous to the Commonwealth, taking into consideration price and the evaluation factors set forth in the request for proposals.

(7) Written or oral discussions shall be conducted with all responsible offerers who submit proposals determined in writing to be reasonably susceptible of being selected for award. Discussions shall not disclose any information derived from proposals submitted by competing offerers. Discussions need not be conducted:

(a) With respect to prices, where the prices are fixed by law or administrative regulation, except that consideration shall be given to competitive terms and conditions;

(b) Where time of delivery or performance will not permit discussions; or

(c) Where it can be clearly demonstrated and documented from the existence of adequate competition or prior experience with the particular supply, service, or construction item, that acceptance of an initial offer without discussion would result in fair and reasonable best value procurement, and the request for proposals notifies all offerers of the possibility that award may be made on the basis of the initial offers.

**Effective:** June 24, 2003

**History:** Amended 2003 Ky. Acts ch. 98, sec. 5, effective June 24, 2003. – Amended 1997 (1st Extra. Sess.) Ky. Acts ch. 4, sec. 28, effective May 30, 1997. – Amended 1979 (1st Extra. Sess.) Ky. Acts ch. 9, sec. 2, effective February 10, 1979. -- Created 1978 Ky. Acts ch. 110, sec. 18, effective January 1, 1979.

**45A.090 Negotiation after competitive sealed bidding when all bids exceed available funds.**

(1) In the event that all bids submitted pursuant to competitive sealed bidding under KRS 45A.080 result in bid prices in excess of the funds available for the purchase, and the chief purchasing officer determines in writing:

(a) That there are no additional funds available from any source so as to permit an award to the responsive and responsible bidder whose bid offers the best value; and

(b) The best interest of the state will not permit the delay attendant to a resolicitation under revised specifications, or for revised quantities, under competitive sealed bidding as provided in KRS 45A.080, then a negotiated award may be made as set forth in subsections (2) or (3) of this section.

(2) Where there is more than one (1) bidder, competitive negotiations pursuant to KRS 45A.085(3) shall be conducted with the three (3) (two (2) if there are only two (2)) bidders determined in writing to be the most responsive and responsible bidders, based on criteria

contained in the bid invitation. Such competitive negotiations shall be conducted under the following restrictions:

(a) If discussions pertaining to the revision of the specifications or quantities are held with any potential offerer, all other potential offerers shall be afforded an opportunity to take part in such discussions; and

(b) A request for proposals, based upon revised specifications or quantities, shall be issued as promptly as possible, shall provide for an expeditious response to the revised requirements, and shall be awarded upon the basis of best value.

(3) Where, after competitive sealed bidding, it is determined in writing that there is only one (1) responsive and responsible bidder, a noncompetitive negotiated award may be made with such bidder in accordance with KRS 45A.095.

**Effective:** June 24, 2003

**History:** Amended 2003 Ky. Acts ch. 98, sec. 6, effective June 24, 2003. – Amended 1997 (1st Extra. Sess.) Ky. Acts ch. 4, sec. 29, effective May 30, 1997. – Created 1978 Ky. Acts ch. 110, sec. 19, effective January 1, 1979.

#### **45A.095 Noncompetitive negotiation.**

(1) A contract may be made by noncompetitive negotiation only for sole source purchases, or when competition is not feasible, as determined by the purchasing officer in writing prior to award, under administrative regulations promulgated by the secretary of the Finance and Administration Cabinet or the governing boards of universities operating under KRS Chapter 164A, or when emergency conditions exist. Sole source is a situation in which there is only one (1) known capable supplier of a commodity or service, occasioned by the unique nature of the requirement, the supplier, or market conditions. Insofar as it is practical, no less than three (3) suppliers shall be solicited to submit written or oral quotations whenever it is determined that competitive sealed bidding is not feasible. Award shall be made to the supplier offering the best value. The names of the suppliers submitting quotations and the date and amount of each quotation shall be placed in the procurement file and maintained as a public record. Competitive bids may not be required:

(a) For contractual services where no competition exists, such as telephone service, electrical energy, and other public utility services;

(b) Where rates are fixed by law or ordinance;

(c) For library books;

(d) For commercial items that are purchased for resale;

(e) For interests in real property;

(f) For visiting speakers, professors, expert witnesses, and performing artists;

(g) For personal service contracts executed pursuant to KRS 45A.690 to 45A.725; and

(h) For agricultural products in accordance with KRS 45A.645.

(2) The chief procurement officer, the head of a using agency, or a person authorized in writing as the designee of either officer may make or authorize others to make emergency procurements when an emergency condition exists.

(3) An emergency condition is a situation which creates a threat or impending threat to public health, welfare, or safety such as may arise by reason of fires, floods, tornadoes, other natural or man-caused disasters, epidemics, riots, enemy attack, sabotage, explosion, power failure, energy shortages, transportation emergencies, equipment failures, state or federal legislative mandates, or similar events. The existence of the emergency condition creates an immediate and serious need for services, construction, or items of tangible personal property that cannot be met through normal procurement methods and the lack of which would seriously threaten the functioning of government, the preservation or protection of property, or the health or safety of any person.

(4) The Finance and Administration Cabinet may negotiate directly for the purchase of contractual services, supplies, materials, or equipment in bona fide emergencies regardless of estimated costs. The existence of the emergency shall be fully explained, in writing, by the head

of the agency for which the purchase is to be made. The explanation shall be approved by the secretary of the Finance and Administration Cabinet and shall include the name of the vendor receiving the contract along with any other price quotations and a written determination for selection of the vendor receiving the contract. This information shall be filed with the record of all such purchases and made available to the public. Where practical, standard specifications shall be followed in making emergency purchases. In any event, every effort should be made to effect a competitively established price for purchases made by the state.

**Effective:** July 15, 2002

**History:** Amended 2002 Ky. Acts ch. 344, sec. 9, effective July 15, 2002. -- Amended 1997 (1st Extra. Sess.) Ky. Acts ch. 4, sec. 30, effective May 30, 1997. -- Amended 1990 Ky. Acts ch. 496, sec. 4, effective July 13, 1990. -- Created 1978 Ky. Acts ch. 110, sec. 20, effective January 1, 1979.

#### **45A.100 Small purchases.**

(1) Procurements may be made in accordance with small purchase administrative regulations promulgated by the secretary of the Finance and Administration Cabinet, pursuant to KRS Chapter 13A, as follows:

(a) Up to ten thousand dollars (\$10,000) per project for construction and one thousand dollars (\$1,000) for purchases by any state governmental body, except for those state administrative bodies specified in paragraph (b) of this subsection; and

(b) Up to forty thousand dollars (\$40,000) per project for construction or purchases by the Finance and Administration Cabinet, state institutions of higher education, and the legislative branch of government.

(2) Procurement requirements shall not be artificially divided so as to constitute a small purchase under this section. At least every two (2) years, the secretary shall review the prevailing costs of labor and materials and may make recommendations to the next regular session of the General Assembly for the revision of the then current maximum small purchase amount as justified by intervening changes in the cost of labor and materials.

(3) The secretary of the Finance and Administration Cabinet may grant to any state agency with a justifiable need a delegation of small purchasing authority, which exceeds the agency's small purchase limit, provided in subsection (1) of this section. Delegations of small purchasing authority shall be granted or revoked by the secretary of the Finance and Administration Cabinet, in accordance with administrative regulations promulgated by the cabinet pursuant to KRS Chapter 13A. These administrative regulations shall establish, at a minimum, the criteria for granting and revoking delegations of small purchasing authority, including the requesting agency's past compliance with purchasing regulations, the level of training of the agency's purchasing staff, and the extent to which the agency utilizes the Kentucky Automated Purchasing System. The administrative regulations may permit the secretary of the Finance and Administration Cabinet to delegate small purchase procurements up to the maximum amount specified in subsection (1)(b) of this section.

**Effective:** July 15, 2002

**History:** Amended 2002 Ky. Acts ch. 320, sec. 2, effective July 15, 2002. -- Amended 2000 Ky. Acts ch. 225, sec. 1, effective July 14, 2000. -- Amended 1996 Ky. Acts ch. 60, sec. 1, effective July 15, 1996. -- Amended 1994 Ky. Acts ch. 323, sec. 1, effective July 15, 1994. -- Amended 1990 Ky. Acts ch. 496, sec. 5, effective July 13, 1990. -- Amended 1986 Ky. Acts ch. 384, sec. 1, effective July 15, 1986. -- Amended 1984 Ky. Acts ch. 384, sec. 1, effective July 13, 1984. -- Amended 1982 Ky. Acts ch. 282, sec. 2, effective July 15, 1982. -- Amended 1980 Ky. Acts ch. 242, sec. 1, effective July 15, 1980; and ch. 250, sec. 19, effective April 9, 1980. -- Created 1978 Ky. Acts ch. 110, sec. 21, effective January 1, 1979.

**NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE  
EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246)**

The following excerpts are from 45 FR 65984 (October 3, 1980):

The minority and female goals apply to Federal and federally assisted construction contractors and subcontractors which have covered contracts. The goals are expressed as a percentage of the total hours worked by such a covered or subcontractor's entire onsite construction workforce, which is working on any construction site within a relevant area. The goal applies to each construction craft and trade in the contractor's entire workforce in the relevant area including those employees working on private non-federally involved projects.

Until further notice, the following goals for minority utilization in each construction craft and trade shall be included in all Federal or federally assisted construction contracts and subcontracts in excess of \$10,000 to be performed in the respective geographic area. The goals are applicable to each nonexempt contractor's total onsite construction workforce, regardless of whether or not part of that workforce is performing work on a Federal, federally assisted or non-federally related project, contract or subcontract.

Construction contractors which are participating in an approved Hometown Plan (see 41 CFR 60-4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply as follows:

Goals for female participation in each trade.....6.9%  
Goals for minority participation in each trade.....Insert goals for each year  
(see Attachment Number 6)

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or Federally assisted) performed in the covered area.

The following excerpts are from 45 FR 65977 (October 3, 1980):

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

4. As used in this Notice, and in the contract resulting from this solicitation, the covered area is (insert description of the geographical areas where the contract is to be performed giving the state, country, and city, if any).

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION  
CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)**

EEO Specifications

Following is the standard language, which must be incorporated into all solicitations for offers and bids on all Federal and Federally assisted construction contracts or subcontracts in excess of \$10,000 to be performed in designated geographical areas:

1. As used in these specifications:

- (a) Covered Area means the geographical area described in the solicitation from which this contract resulted.
- (b) Director means Director, Office of Federal Contract Compliance Program, United States Department of Labor, or any person to whom the Director delegates authority;
- (c) Employer identification number means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
- (d) Minority includes:
  - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
  - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
  - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
  - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take a good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7-a through p of these specifications. The goals set forth in the solicitation from which this contract resulted



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are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative actions steps at least as extensively as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligation.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7-b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by

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publicizing it in the company newspaper, annual report, etc., by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, lay-off, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foreman, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative actions obligations (7 a through p). The efforts of a contractor association, joint contractor-union, contractor-community, of other similar group of which the contractor is a member and

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participant may be asserted as fulfilling any one or more of its obligation, under 7 a through p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example: even though the Contractor has achieved its goal for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables for affirmative action standards to discriminate against any person because of race, color, religion, sex or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation, if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

## EEO Goals for Economic Areas in Region 4

Source: Appendix B-80 in 45 FR 65984 (October 3, 1980)

### **Kentucky:**

#### 056 Paducah, KY:

##### Non-SMSA Counties

5.2

IL Hardin; IL Massac; IL Pope; KY Ballard; KY Caldwell; KY Calloway. KY Carlisle;  
KY Crittenden; KY Fulton; KY Graves; KY Hickman; KY Livingston; KY Lyon. KY  
McCracken; KY Marshall.

#### 057 Louisville, KY:

##### SMSA Counties:

##### 4520 Louisville, KY-IN

11.2

IN Clark; IN Floyd; KY Bullitt; KY Jefferson; KY Oldham.

##### Non-SMSA Counties

9.6

IN Crawford; IN Harrison; IN Jefferson; IN Orange; IN Scott; IN Washington;  
KY Breckinridge; KY Grayson; KY Hardin; KY Hart; KY Henry; KY Larue; KY Marion;  
KY Meade; KY Nelson; KY Shelby; KY Spencer; KY Trimble; KY Washington.

#### 058 Lexington, KY

##### SMSA Counties

##### 4280 Lexington-Fayette, KY

10.8

KY Bourbon; KY Clark; KY Fayette; KY Jessamine; KY Scott; KY Woodford.

##### Non-SMSA Counties

7.0

KY Adair KY Anderson; KY Bath; KY Boyle; KY Breathitt; KY Casey; KY Clay;  
KY Estill; KY Franklin- KY Garrard; KY Green; KY Harrison- KY Jackson; KY Knott;  
KY Lee; KY Leslie; KY Letcher; KY Lincoln; KY Madison; KY Magoffin; KY Menifee;  
KY Mercer; KY Montgomery; KY Morgan. KY Nicholas; KY Owsley; KY Perry;  
KY Powell; KY Pulaski; KY Rockcastle; KY Russell; KY Taylor; KY Wolfe.

**CHECK LIST OF EEO DOCUMENTATION FOR BIDDERS  
ON GRANT/LOAN CONSTRUCTION  
(Required by Executive Order 11246 as amended)**

The low, responsive responsible bidder must forward the following items, in duplicate, to the owner no later than ten (10) days after bid opening. The owner shall have one (1) copy available for inspection by the Office of Federal Contracts Compliance within 14 days after the bid opening. The web site for the OFCC is [http://www.dol.gov/esa/ofcp\\_org.htm](http://www.dol.gov/esa/ofcp_org.htm).

1. Project Number. Project Location. Type of Construction.
2. Proof of registration with the Joint Reporting Commission. (See Attachment Number 8.)
3. Copy of Affirmative Action Plan of contractor. Indicate company official responsible for EEO.
4. List of current construction contracts, with dollar amount. List contracting Federal Agency, if applicable.
5. Statistics concerning company percent workforce, permanent and temporary, by sex, race, trade, handicapped, and age. 40 CFR Part 7.
6. List of employment sources for project in question. If union sources are utilized, indicate percentage of minority membership within the union crafts.
7. Anticipated employment needs for this project, by sex, race and trade, with estimate of minority participation in specific trades.
8. List of subcontractors (name, address and telephone) with dollar amount and duration of subcontract. Subcontractor contracts over \$10,000 must submit items 1- 8. The following information must be provided for all supplier contracts regardless of contract size: name of company, contact person, address, telephone number, dollar value of the contract, and a list of the materials to be supplied to the prime contractor.
9. List of any subcontract work yet to be committed with estimate of dollar amount and duration of contract.
10. Contract Price. Duration of prime contract.
11. DBE Documents - See special instructions regarding use of Minority, and Women Owned, and Small Businesses.

## Employer Information Report EEO-1

Under the direction of the US Equal Employment Opportunity Commission, the Joint Reporting Committee is responsible for the full-length, multi-phase processing of employment statistics collected on the Employer Information Report EEO-1. This report, also termed Standard Form 100, details the sex and race/ethnic composition of an employer's work force by job category.

The Employer Information EEO-1 survey is conducted annually under the authority of Public Law 88-352, Title VII of the Civil Rights Act of 1964, as amended by the Equal Employment Opportunity Act of 1972. All employers with 15 or more employees are covered by Public Law 88-352 and are required to keep employment records as specified by Commission regulations. Based on the number of employees and federal contract activities, certain large employers are required to file an EEO-1 Report on an annual basis.

The EEO-1 Report must be filed by:

(A) All private employers who are: (1) subject to Title VII of the Civil Rights Act of 1964 (as amended by the Equal Employment Opportunity Act of 1972) with 100 or more employees EXCLUDING State and local governments, primary and secondary school systems, institutions of higher education, Indian tribes and tax-exempt private memberships clubs other than labor organizations; OR (2) subject to Title VII who have fewer than 100 employees if the company is owned or affiliated with another company, or there is centralized ownership, control or management (such as central control of personnel policies and labor relations) so that the group legally constitutes a single enterprise and the entire enterprise employs a total of 100 or more employees.

(B) All federal contractors (private employers), who: (1) are not exempt as provided for by 41 CFR 60-1.5, (2) have 50 or more employees, and (a) are prime contractors or first-tier subcontractors, and have a contract, subcontract, or purchase order amounting to \$50,000 or more; or (b) serve as depository of Government funds in any amount, or (c) is a financial institution which is an issuing or paying agent for U.S. Savings Bonds and Notes.

Only those establishments located in the District of Columbia and the 50 states are required to submit the EEO-1 Report. No Reports should be filed for establishments in Puerto Rico, the Virgin Islands or other American Protectorates.

When filing for the EEO-1 Report for the first time, go to the web site at: <http://www.mimdns.com/jrc.html> and select "Filing for the first time" from the box labeled INFORMATION. File out the electronic questionnaire to enter your company into Joint Reporting Committee (JRC) system. Once you have completed the registration process, you will be contacted on how to proceed with the EEO-1 Report. If you have previously registered with the JRC, follow their instructions to update your information.

**Labor Standards Provisions for Federally Assisted Construction**

Labor standards provisions applicable to contracts covering federally financed and assisted construction (29 CFR 5.5, Contract Provisions and Related Matters) that apply to EPA Special Appropriations Projects grants are:

(a)(4)(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

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

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

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

(b) Contractor Work Hours and Safety Standards Act. The Administrator, EPA shall cause or require the contracting officer to insert the following clauses set forth in paragraph (b)(1),(2),(3), and (4) of this section in full in any contract subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by \*Section 5.5(a) of this title. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any work week in which he or she is employed on such work to in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

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

(3) Withholding for unpaid wages and liquidated damages. The U.S. Environmental Protection Agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally- assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b) (2) of this section.

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

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in section 5.1, the Administrator of EPA shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly worked, deductions made, and actual wages paid. Further, the Administrator of EPA shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the U.S. Environmental Protection Agency and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job. (Approved by the Office of Management and Budget under OMB control numbers 1215-0140 and 1215-0017.)



**Debarred Firms**

All prime Construction Contractors shall certify that Subcontractors have not and will not be awarded to any firm that is currently on the EPA Master List of Debarred, Suspended and Voluntarily Excluded Persons in accordance with the provisions of 40 CFR 32.500(c). Debarment action is taken against a firm for noncompliance with Federal Law.

All bidders shall complete the attached certification (Attachment Number 10) and submit to the owner with the bid proposal.

**Anti-lobbying Certification**

All prime Construction Contractors must certify (Attachment Number 11) that no appropriated funds were or will be expended for the purpose of lobbying the Executive or Legislative Branches of the Federal Government or Federal Agency concerning this contract (contract in excess of \$100,000). If the Contractor has made or agreed to make payment to influence any member of Congress in regard to award of this contract, a Disclosure Form must be completed and submitted to the owner with the bid proposal.

All prime Contractors must require all Subcontractors to submit the certification, which must also be submitted to the owner.

**CERTIFICATION REGARDING DEBARMENT,  
SUSPENSION AND OTHER RESPONSIBILITY MATTERS**

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

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or Local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

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

\_\_\_\_\_  
Typed Name & Title of Authorized Representative

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Date

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

**CERTIFICATION REGARDING LOBBYING**  
**Certification for Contracts, Grants,**  
**Loans, and Cooperative Agreements**

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

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

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

(3) The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

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Typed Name & Title of Authorized Representative

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Signature of Authorized Representative

Date

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

**EPA DISADVANTAGED BUSINESS ENTERPRISE PROGRAM**

EPA's Disadvantaged Business Enterprise Program rule applies to contract procurement actions funded in part by EPA assistance agreements awarded after May 27, 2008. The rule is found at Federal regulation Title 40, Part 33. Specific responsibilities are highlighted below.

**Grant recipient responsibilities:**

- Conduct an Availability Analysis and negotiate fair share objectives with EPA (§33.411), or adopt the fair share objectives of the oversight state agency revolving loan fund for comparable infrastructure. (§33.405(b)(3)).
- Include the Appendix A term and condition in each contract with a primary contractor (§3.106). The term and condition is included in the EPA Region 4 contract specifications insert *FEDERAL REQUIREMENTS AND CONTRACT PROVISIONS FOR SPECIAL APPROPRIATION ACT PROJECTS US ENVIRONMENTAL PROTECTION AGENCY, Region III, June 2008*.
- Employ the six Good Faith Efforts during prime contractor procurement (§33.301).
- Require prime contractor to comply with the following prime contractor requirements of Title 40 Part 33:
  - To employ the six Good Faith Efforts steps in paragraphs (a) through (e) of §33.301 if the prime contractor awards subcontracts (§33.301(f)).
  - To provide EPA form 6100-2 – *DBE Subcontractor Participation Form* to all DBE subcontractors (§33.302(e)).
  - To submit EPA forms 6100-3 – *DBE Program Subcontractor Performance Form* and 6100-4 – *DBE Program Subcontractor Utilization Form* with bid package or proposal. (§33.302 (f) and (g)).
  - To pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the recipient (§33.302(a)).
  - To notify recipient in writing by its prime contractor prior to any termination of a DBE subcontractor for convenience by the prime contractor (§33.302(b)).
  - To employ the six good faith efforts described in §33.301 if soliciting a replacement subcontractor after a DBE subcontractor fails to complete work under the subcontract for any reason. (§33.302(c)).
  - To employ the six good faith efforts described in §33.301 even if the prime contractor has achieved its fair share objectives under subpart D of Part 33. (§33.302(d)).

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- Semiannually complete and submit to Charles Hayes, IPA Region 4 DBE Coordinator EPA form 5700-52A summarizing DBE participation achieved during the previous six months (§33.502).
  - Maintain records documenting its compliance with the requirements of Title 40 Part 33, including documentation of its, and its prime contractors', good faith efforts (§33.501(a)).

**Prime Contractor Responsibilities:**

- Employ the six Good Faith Efforts steps in paragraphs (a) through (e) of §33.301 if the prime contractor awards subcontracts (§33.301(f)).
- Provide EPA form number 6100-2 – *DBE Program Subcontractor Participation Form* and form number 6100-3 – *DBE Program Subcontractor Performance Form* to each DBE subcontractor prior to opening of the contractor's bid or proposal (§33.302(e) and (f)).
- Complete EPA form number 6100-4 – *DBE Program Subcontractor Utilization Form* (§33.302(g)).
- Submit to recipient with its bid package or proposal the completed EPA form number 6100-4, plus an EPA form number 6100-3 for each DBE subcontractor used in the contractor's bid or proposal (§33.302(f) and (g)).
- Pay subcontractors for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the recipient (§33.302(a)).
- Notify the recipient in writing prior to prime contractor termination of a DBE subcontractor for convenience (§33.302(b)).
- Employ the six good faith efforts described in §33.301 if soliciting a replacement subcontractor after a DBE subcontractor fails to complete work under the subcontract for any reason. (§33.302(c)).
- Employ the six good faith efforts described in §33.301 even if the prime contractor has achieved its fair share objectives under subpart D of Part 33. (§33.302(d)).
- Semiannually inform recipient of DBE participation achieved (§33.502).
- Maintain records documenting its compliance with the requirements of Title 40 Part 33, including documentation of its, and its prime contractors', good faith efforts (§33.501(a)).

**Subcontractor Responsibilities:****DRAFT-(01.03.2013)**

- May submit EPA form 6100-2 – *DBE Subcontractor Participation Form* to Charles Hayes, EPA Region 4 DBE Coordinator (§33.302(e)).
- Must complete EPA form 6100-3 – *DBE Program Subcontractor Performance Form*, and submit it to the prime contractor soliciting services from the subcontractor prior to the opening of bids for the prime contract.

**SPAP Requirements:**

Form	Requirement	Provided By:	Completed By:	Submitted To:
EPA Form 6100-2	Grant Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	EPA Region 4 DBE Coordinator Charles Hayes
EPA Form 6100-3	Grant Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	Grant Recipients as part of a bid or proposal package
EPA Form 6100-4	Grant Recipients required to have prime contractors complete the form	Grant Recipients	Prime Contractors	Grant Recipients as part of a bid or proposal package

**SRF Requirements:**

Form	Requirement	Provided By:	Completed By:	Submitted To:
EPA Form 6100-2	Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	DOW Project Administrator
EPA Form 6100-3	Recipients required to have prime contractors provide form to Subcontractors	Prime Contractors	DBE Subcontractors	Dow Project Administrator w/ATA Package

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EPA Form 6100-4	Recipients required to have prime contractors complete the form	Recipients	Prime Contractors	DOW Project Administrator w/ATA Package
Pay Request DBE Form	Recipients required to have prime contractors complete the form	Recipients	Prime Contractors	DOW Project Administrator w/EACH PAYMENT

**PROJECT NAME:** \_\_\_\_\_

**BID DATE:** \_\_\_\_\_

**1. Name, address and telephone number of contact person on all DBE matters:**

Prime Contractor's Name: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Total Contract Amount: \_\_\_\_\_

**2. Total dollar amount/percent of contract of MBE participation:** \_\_\_\_\_

**3. Total dollar amount/percent of contract of WBE participation:** \_\_\_\_\_

**4. Are certifications\* for each MBE/WBE/DBE subcontractor enclosed; if no, please explain:** ☐ Yes ☐ No \_\_\_\_\_

**5. Are MBE/WBE/DBE subcontracts or letters of intent signed by both parties enclosed; if no, please explain:** ☐ Yes ☐ No \_\_\_\_\_

**6. List of MBE Subcontractors:**

Name: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Type of Contract: \_\_\_\_\_

Work to be Done: \_\_\_\_\_

Amount: \_\_\_\_\_

**7. List of WBE Subcontractors:**

Name: \_\_\_\_\_

Contact Person: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Cell Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Type of Contract: \_\_\_\_\_

Work to be Done: \_\_\_\_\_

Amount: \_\_\_\_\_

Attach Additional Sheets, If Necessary

\*Self-certification: Self certification of MBE/WBE/DBE firms will NOT be accepted as a valid form of certification of MBE/WBE/DBE status.



8. Information and documentation concerning efforts taken to comply with I.P.A.'s "six good faith effort"

- (i). Ensure DBE construction firms or material suppliers are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities; including placing DBEs on solicitation lists and soliciting them whenever they are potential sources. A good source for a list of DBEs is the Kentucky Transportation's website: <http://transportation.ky.gov/Civil-Rights-and-Small-Business-Development/Pages/Certified-DBE-Directory.aspx>.
- ☐ The prime contractor certifies that a bidders list (see example sheet below) of qualified vendors, including DBEs, was developed for current and future solicitations and that the list will be maintained. *Submit a copy of the list as documentation.*
- (ii). Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process; including, whenever possible, posting solicitation for bids or proposals for a sufficient amount of time as to receive a competitive bid or proposal pool.
- ☐ The prime contractor certifies that every opportunity was provided to a number of DBEs to encourage their participation in the competitive process and that an adequate amount of time was provided for response.
- a. List each DBE construction firm or material supplier to which a solicitation was attempted. *Submit copies of letters, emails, faxes, telecommunication logs, certified mail receipts, returned envelopes, certified mail return receipts, etc. as documentation.*
- Company name and phone number: \_\_\_\_\_
- Area of work expertise: \_\_\_\_\_
- Date of any follow-ups and person spoke to: \_\_\_\_\_
- b. Advertisements, if applicable: List each publication in which an announcement or notification was placed. *Submit a tear sheet of each announcement from each publication as documentation.*
- Name of publication: \_\_\_\_\_
- Date(s) of advertisement: \_\_\_\_\_
- Specific subcontract areas announced: \_\_\_\_\_
- c. Other, if applicable: List each notification method in which an announcement or outreach was used; list serve, public meeting, etc. *Submit applicable information to document effort.*
- Method of notification: \_\_\_\_\_
- Date(s) of notification: \_\_\_\_\_
- (iii). Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs; including dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
- ☐ The prime contractor certifies that the project was broken into its basic elements (i.e., dirt hauling, landscaping, painting, pipe installation, material supplies, etc.) and that a determination was made whether it's economically feasible to bid the elements separately and that the analysis of this effort was documented with a short memo to the project file.

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

☐ The prime contractor certifies that they established delivery schedules which would allow DBEs to participate in the projects.

- (v). Use the services and assistance of the Small Business Administration (SBA) and the Minority Business Development Agency (MBDA) of the U.S. Department of Commerce. The easiest way to utilize the services of SBA and MBDA is to visit their websites: [www.sba.gov](http://www.sba.gov) and [www.mbda.gov](http://www.mbda.gov) and use the electronic tools available there or you may send the nearest SBA and MBDA office a certified letter that generally describes the solicitation, the dates it will be open, the types of vendors you are seeking and applicable SIC or NAIC codes if known. You may also use the services and assistance of the Kentucky Procurement Assistance Program (KPAP). The easiest way to utilize the services of KPAP is to send an email: [ced.kpap@ky.gov](mailto:ced.kpap@ky.gov) and provide information on forthcoming opportunities available to DBEs.

☐ The prime contractor certifies that the assistance of the SBA, MBDA, and/or KPAP was utilized. *Submit pages printed off the SBA and MBDA websites which evidence efforts to register a solicitation on those sites or submit copies of the letter sent and certified mail receipt as documentation; submit copies of emails with KPAP as documentation.*

- (vi). If a subcontractor awards any subcontracts, require the subcontractor to take the steps in numbers (i) through (v) above.

☐ The prime contractor certifies that subcontractors used for this project will be required to follow the steps of the "six good faith efforts" as listed above.

**9. Signature and date:**

To the best of my knowledge and belief, all "six good faith efforts" have been met and the information contained in this document is true and correct; the document has been duly authorized by the legal representative.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print name and title

\_\_\_\_\_  
Date

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## BIDDER'S LIST FORM

OWNER: \_\_\_\_\_

LOAN NO: \_\_\_\_\_

PROJECT TITLE: \_\_\_\_\_

BID DATE: \_\_\_\_\_

**Instructions:**

1. This list must include all firms that were solicited for participation, bid on, or quoted for a prime contract or subcontracts under EPA assisted projects, included both DBE's and non DBE's.
2. SRF loan participants must keep the Bidder's List until the project period for the identified loan has ended and no funds are remaining.
3. This list must be submitted to DOW in the ATA Package. Contract Award Approval cannot be given until this form has been received by DOW.
4. The following information must be obtained from all prime and subcontractors. Please complete the form below:

ENTITY'S NAME	MAILING ADDRESS	CONTACT PERSON	PHONE#	E-MAIL ADDRESS	M/WBE?

**REGION 4**  
**DISADVANTAGED BUSINESS ENTERPRISE (DBE) NEGOTIATED RATES**  
**(Subject to change - refer to grant award for specific fair share objectives)**

KENTUCKY

Construction:	4.10% MBE and 4.60% WBE
(both programs)	
Equipment:	1.10% MBE and 1.20% WBE
Services:	10.8% MBE and 18.6% WBE
Supplies:*	3.40% MBE and 6.30% WBE

**BONDS AND INSURANCE**

The minimum requirements shall be as follows:

Bonding requirements for contracts of \$100,000 or less are contained in 40 CFR 31.36(h).

Bond requirements for contracts in excess of \$100,000 are:

- Bid guarantee equivalent to five percent of the bid price. The bid guarantee shall consist of a firm commitment such as a certified check or bid bond submitted with the bid;
- Performance bond equal to 100 percent of the contract price, and
- Payment bond equal to 100 percent of the contract price. Bonds must be obtained from companies holding Certificates of Authority as acceptable sureties, issued by the U.S. Treasury.

Insurance requirements are contained in the General Conditions of the contract. In addition to the other required insurance, the owner or the contractor, as appropriate, must acquire any flood insurance made available by the Federal Emergency Management Agency as required by 44 CFR Parts 59-79, if construction will take place in a flood hazard area identified by the Federal Emergency Management Agency. The owner's requirements on Flood Insurance are contained in the Special Conditions Section of the Contracts Documents.

## OUTLAY MANAGEMENT

The contractor must provide a contract progress schedule of percentage of work in place and costs against time; and a schedule of projected payments (cumulative) for construction and for the architectural/engineering contract when the contract is awarded. The payment schedule must be submitted, in a format similar to the attached sample, to the owner for forwarding to the State when the contract is awarded, and whenever actual payments on a project vary beyond -5 percent and +10 percent from the schedule, as determined by the grantee.

Contractor will be required to review each of these contract schedules during the month of June and to submit revised schedules, as necessary, no later than July 1<sup>st</sup> of each year.

CONSTRUCTION AND OUTLAY SCHEDULE

Project No.: \_\_\_\_\_

Applicant: \_\_\_\_\_

Contract Identification: \_\_\_\_\_

Description of Contract: \_\_\_\_\_

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*(INSTRUCTIONS FOR USE ON REVERSE SIDE)*

SCHEDULE I – CONSTRUCTION SCHEDULE

Date for Advertisement: \_\_\_\_\_

Date for Opening Bids: \_\_\_\_\_

Pre-Construction Conference Date: \_\_\_\_\_

Date of Contract Award: \_\_\_\_\_

Contract Period: \_\_\_\_\_ days. Projected Contract Completion Date: \_\_\_\_\_

Total Eligible Contract Amount: \_\_\_\_\_

Work Order Date: \_\_\_\_\_

Start Construction Date: \_\_\_\_\_

Contract Completed: \_\_\_\_\_

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SCHEDULE II – CUMULATIVE OUTLAY SCHEDULE (55% EPA Share) – Projection  
only for quarters that remain in the fiscal year (FY) plus cumulative  
annual amount for the next FY.

Cum EPA Amount thru 1 <sup>st</sup> Qtr. Oct./Dec.:	\$ _____
Cum EPA Amount thru 2 <sup>nd</sup> Qtr. Jan./Mar.:	\$ _____
Cum EPA Amount thru 3 <sup>rd</sup> Qtr. Apr./June:	\$ _____
Cum EPA Amount thru 4 <sup>th</sup> Qtr. July/Sept.:	\$ _____
Cum EPA Amount for Next Fiscal Year:	\$ _____

To insure timely achievement of the grant objectives the owner (grantee) must provide EPA with a grants activities schedule, contract construction schedules and corresponding payment outlay schedules for the grant and each contract under the grant. One copy of information similar to that showing the Construction and Outlay Schedule Form will be submitted for the grant schedule with the grant acceptance. A separate form will accompany each contract at time of contract award.

- A. The grant activities schedule shall depict the period from grant award through grant closeout and cover all major milestone date. The grant activities schedule shall include Schedule I information items as well as other appropriate items necessary to monitor the grant. Schedule II shall be filled out to estimate the cumulative (all construction and architectural/engineering contracts) payment schedule to be requested by the grantee from EPA during the grant period, and whenever actual outlays vary beyond -5% and +10% from the schedule.
  
- B. Individual contractor's construction schedules for each contract will be submitted to support the grant activities schedule. The Schedule I shall be submitted prior to date of advertisement of each contract and Schedule II along with the contractor's construction schedule shall be submitted seven (7) calendar days prior to the dates of the pre-construction conference. The contractor's construction schedule shall depict the contractor's plan for completing all contract requirements and show work placement in dollars versus contract time. Schedule II shall depict the contract payment outlay by month or quarter. The contract schedule will be coordinated with all parties at the pre-construction conference.

The grants activities schedule, contractor construction schedules, will be the basis for monitoring progress towards completion of the project. The schedules shall be maintained at the available for inspection and updated at least monthly. The schedules shall be revised to incorporate approved change orders as they occur.

All of the schedules will be submitted to the State Division of Water.



## NOTICE OF INTENT

All construction projects with surface disturbance of more than 1 acre during the period of construction must have a KPDES Storm Water General Permit. The permit can be found at the following web address: <https://dep.gateway.ky.gov/eForms/default.aspx?FormID=7>.

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

**DAVIS BACON REQUIREMENTS**

Federal Davis-Bacon rates are applicable for these funds. This determination applies only to the loan portion of this project. Please contact the other funding sources, if applicable, for their requirements pertaining to federal wage rates. You must contact the Kentucky Labor Cabinet for determination of applicable state wages.

(a) The Agency head shall cause or require the contracting officer to insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a public building or public work, or building or work financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in §5.1, the following clauses (or any modifications thereof to meet the particular needs of the agency, Provided, That such modifications are first approved by the Department of Labor):

(1) Minimum wages. (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

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

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

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

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

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

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise

the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

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

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

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

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

(2) Withholding. The (write in name of Federal Agency or the loan or grant recipient) shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records. (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as

the case may be, for transmission to the (write in name of agency). The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee ( e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

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

- (1) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
- (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
- (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

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

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

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

(4) Apprentices and trainees —(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage

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determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

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

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

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

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

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

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes

within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

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

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

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

(b) Contract Work Hours and Safety Standards Act. The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by §5.5(a) or 4.6 of part 4 of this title. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

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

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

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

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

(a) The subrecipient shall periodically interview, a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the subrecipient should conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient shall conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on an assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the subrecipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date of the contract or subcontract. Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the subrecipient shall verify evidence of fringe benefit plans and payments there under by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/esa/contacts/whd/america2.htm>.



**WAGE RATE REQUIREMENTS UNDER FY2012 APPROPRIATIONS**

CWSRF: The recipient agrees to include in all agreements to provide assistance for the construction of treatment works carried out in whole or in part with such assistance made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.), or with such assistance made available under section 205(m) of that Act (33 U.S.C. 1285(m)), or both, a term and condition requiring compliance with the requirements of section 513 of that Act (33 U.S.C. 1372) in all procurement contracts and sub-grants, and require that loan recipients, procurement contractors and sub-grantees include such a term and condition in subcontracts and other lower tiered transactions. All contracts and subcontracts for the construction of treatment works carried out in whole or in part with assistance made available as stated herein shall insert in full in any contract in excess of \$2,000 the contract clauses as set forth below entitled "Wage Rate Requirements Under FY 2010 Appropriations." This term and condition applies to all agreements to provide assistance under the authorities referenced herein, whether in the form of a loan, bond purchase, grant, or any other vehicle to provide financing for a project, where such agreements are executed on or after October 30, 2009 and before October 1, 2010.

DWSRF: The recipient agrees to include in all agreements to provide assistance for any construction project carried out in whole or in part with such assistance made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12), a term and condition requiring compliance with the requirements of section 1450(e) of the Safe Drinking Water Act (42 U.S.C.300j-9(e)) in all procurement contracts and sub-grants, and require that loan recipients, procurement contractors and sub-grantees include such a term and condition in subcontracts and other lower tiered transactions. All contracts and subcontracts for any construction project carried out in whole or in part with assistance made available as stated herein shall insert in full in any contract in excess of \$2,000 the contract clauses as set forth below entitled "Wage Rate Requirements Under FY 2010 Appropriations." This term and condition applies to all agreements to provide assistance under the authorities referenced herein, whether in the form of a loan, bond purchase, grant, or any other vehicle to provide financing for a project, where such agreements are executed on or after October 30, 2009 and before October 1, 2010.

**Wage Rate Requirements Under FY 2012 Appropriations****Preamble**

With respect to the Clean Water and Safe Drinking Water State revolving Funds, EPA provides capitalization grants to each State which in turn provides subgrants or loans to eligible entities within the State. Typically, the subrecipients are municipal or other local governmental entities that manage the funds. For these types of recipients, the provisions set forth under Roman Numeral I, below, shall apply. Although EPA and the State remain responsible for ensuring subrecipients' compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to maintain payroll records as described in Section 3(ii)(A), below and for compliance as described in Section I-5.

Occasionally, the subrecipient may be a private for profit or not for profit entity. For these types of recipients, the provisions set forth in Roman Numeral II, below, shall apply. Although EPA and the State remain responsible for ensuring subrecipients' compliance with the wage rate requirements set forth herein, those subrecipients shall have the primary responsibility to



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maintain payroll records as described in Section II-5 (ii)(A), below and for compliance as described in Section II-5.

**I. Requirements under FY 2012 Appropriations For Subrecipients That Are Governmental Entities:**

The following terms and conditions specify how recipients will assist EPA in meeting its DB responsibilities when DB applies to EPA awards of financial assistance under the FY 2010 Appropriations with respect to State recipients and subrecipients that are governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient. If a State recipient needs guidance, the recipient may contact **Dorothy L. Rayfield, Chief, Grants, Finance and Cost Recovery Branch, Regional EPA DB contact at (404) 562-9278 or [Rayfield.Dorothy@epa.gov](mailto:Rayfield.Dorothy@epa.gov)** for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at <http://www.dol.gov/esa/whd/recovery/>.

1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.

Under the FY 2012 Appropriation, Davis-Bacon prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

- (i) While the solicitation remains open, the subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) weekly to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.
- (ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) on a weekly

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basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from [www.wdol.gov](http://www.wdol.gov) into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

### 3. Contract and Subcontract provisions.

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

#### (1) Minimum wages.

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

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination

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for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, [www.dol.gov](http://www.dol.gov).

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

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

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

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

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

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

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the

classification under this contract from the first day on which work is performed in the classification.

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

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

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

### (3) Payrolls and basic records.

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

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, that is, the entity that receives the sub-grant

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

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

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

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

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

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

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

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview

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employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees.

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

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of

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fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

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

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

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

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

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

(10) Certification of eligibility.

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

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

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

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

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

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

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

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

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

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and



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mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

## 5. Compliance Verification.

(a) The subrecipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the subrecipient should conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the subrecipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractor's use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/esa/contacts/whd/america2.htm>.

## **II. Requirements under FY 2012 Appropriations Act For Subrecipients That Are Not Governmental Entities**

The following terms and conditions specify how recipients will assist EPA in meeting its DB responsibilities when DB applies to EPA awards of financial assistance under the FY2010 Appropriations Act with respect to subrecipients that are not governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient for guidance. If a State recipient needs guidance, the recipient may contact **Dorothy L. Rayfield, Chief, Grants, Finance and Cost Recovery Branch, Regional EPA DB contact at (404) 562-9278 or [Rayfield.Dorothy@epa.gov](mailto:Rayfield.Dorothy@epa.gov)** for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at <http://www.dol.gov/esa/whd/recovery/>.

**Under these terms and conditions, the subrecipient must submit its proposed DB wage determinations to the State recipient for approval prior to including the wage determination in any solicitation, contract task orders, work assignments, or similar instruments to existing contractors.**

1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.

Under the FY 2010 Appropriation, Davis-Bacon prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

2. Obtaining Wage Determinations.

(a) Subrecipients must obtain proposed wage determinations for specific localities at [www.wdol.gov](http://www.wdol.gov). After the Subrecipient obtains its proposed wage determination, it must submit the wage determination to (insert contact information for State recipient DB point of contact for wage determination) for approval prior to inserting the wage determination into a solicitation, contract or issuing task orders, work assignments or similar instruments to existing contractors (ordering instruments unless subsequently directed otherwise by the State recipient Award Official.

(b) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) on a weekly basis to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the DOW– June 2012

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applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(c) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from [www.wdol.gov](http://www.wdol.gov) into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

### 3. Contract and Subcontract provisions.

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

#### (1) Minimum wages.

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

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hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

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

Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, [www.dol.gov](http://www.dol.gov).

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

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

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

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the and the subrecipient(s) do not agree on the proposed classification

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and wage rate (including the amount designated for fringe benefits where appropriate), the award official shall refer the request, and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

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

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

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

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

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall

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maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

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

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

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

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

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

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

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

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

(4) Apprentices and trainees.

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

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

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

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

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

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

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

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



(10) Certification of eligibility.

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

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

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

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

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

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

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

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

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

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

## 5. Compliance Verification.

(a) The subrecipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the subrecipient should conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable the subrecipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/esa/contacts/whd/america2.htm>.

### SUPPLEMENTARY CONDITIONS

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

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

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Insert in the first sentence after the phrase “printed with initial capital letters” the following phrase:

“or with all capital letters”

## SC-1.01.A.17 Drawings

The following Drawings are part of the Contract Documents:

Drawings titled “Countywide Underserved Project”, Contract 1-2012, Water Distribution Upgrades, Carrollton Utilities and West Carroll Water District, Carroll, Henry, and Trimble Counties, Kentucky, Sheets No. 1 through No. 25, prepared by Strand Associates, Inc.®

Drawings titled “Countywide Underserved Project”, Contract 2-2012 and Contract 2-2012, Water Treatment Plant Upgrade, Carrollton Utilities and West Carroll Water District, Carroll, Henry and Trimble Counties Kentucky. Sheets No. 1 through No. 14, prepared by Strand Associates, Inc.®, and Drawings listed in the table of contents that are bound at the back of these Specifications.

Electronic files were provided for the convenience of CONTRACTOR. The data on which CONTRACTOR may rely is limited to the paper copy.

## SC-1.01.A.51 Work Change Directive

Amend the phrase “and signed by OWNER” in the first sentence of Paragraph 1.01.A.51 to read as follows:

“and signed by OWNER and CONTRACTOR.”

## SC-1.01.A.52 Request for Information

Add the following new paragraph immediately after Paragraph 1.01.A.51:

### 52. Request for Information:

Written request submitted by CONTRACTOR to ENGINEER on a form supplied by ENGINEER requesting clarification, interpretation, or additional information pertaining to Contract Documents.

## SC-2.01 Delivery of Bonds and Evidence of Insurance

Delete Paragraph 2.01.A of the General Conditions in its entirety and insert the following in its place:

A. When CONTRACTOR delivers the executed counterparts of the Agreement to OWNER, CONTRACTOR shall also deliver to OWNER such bonds, insurance certificates, insurance endorsements, and other documents as CONTRACTOR may be required to furnish.

Delete Paragraph 2.01.B in its entirety and insert the following in its place:

B. Evidence of Insurance: Before any Work at the Site is started, CONTRACTOR shall deliver to OWNER with copies to each additional insured or loss payee identified in the Supplementary Conditions OWNER-approved copies of certificates of insurance, copies of endorsements, and other evidence of insurance which either of them or any additional insured or loss payee may reasonably

request, which CONTRACTOR is required to purchase and maintain in accordance with Paragraphs 5.04 and 5.06.

## SC-2.02 Copies of Documents

Delete the first sentence of Paragraph 2.02.A in its entirety and insert the following in its place:

OWNER shall furnish to CONTRACTOR up to four printed or hard copies of the Drawings and Project Manual.

## SC-2.03 Commencement of Contract Times; Notice to Proceed

In the last sentence of Paragraph 2.03.A, change "sixtieth day" to "eighty-fifth day."

## SC-2.05 Before Starting Construction

Add the following subparagraph to Paragraph 2.05.A:

4. a proposed listing of subcontractors and major material and equipment suppliers. The list shall include any proposed substitutions in accordance with Paragraph 6.05.

## SC-2.05, 2.06, 2.07 Schedules and Conferences

The Bid for Contract 1-2012 will be considered the Schedule of Values of the Work required by the General Conditions.

## SC-2.07 Initial Acceptance of Schedules

Add the following language to the end of Paragraph 2.07.A.2:

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

## SC-3.03 Reporting Discrepancies

Add the following new paragraphs immediately after Paragraph 3.03.A.3:

4. CONTRACTOR shall report apparent discrepancies to ENGINEER using a Request for Information form on a form supplied by ENGINEER. The Request for Information form shall:
  - a. be submitted by CONTRACTOR only;
  - b. be legible and complete;
  - c. not be used for the purposes of only confirming or verifying issues; and,
  - d. be prioritized by CONTRACTOR in the event that multiple Requests for Information are outstanding.

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

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

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

7. If CONTRACTOR proceeds with work when CONTRACTOR had actual knowledge or should have known that a conflict, error, ambiguity, or discrepancy existed as indicated above, correction of work constructed without such notification to ENGINEER shall be at CONTRACTOR's expense, (except in an emergency as authorized by Paragraph 6.16.A).

## SC-4.02 Subsurface and Physical Conditions

Add the following new paragraph(s) immediately after Paragraph 4.02.B:

C. The following reports of explorations and tests of subsurface conditions at or contiguous to the Site are known to OWNER:

1. Report dated October 2, 2012, prepared by Patriot Engineering and Environmental, Inc., of Louisville, Kentucky, titled: Report of Geotechnical Engineering Investigation, Countywide Underserved Project, for Carrollton Utilities and West Carroll Water District, consisting of 41 pages.

The technical data in the above report(s), upon which the CONTRACTOR may rely, consists of boring methods, level of subsurface water, boring logs, laboratory test methods and results, and boring locations all as of the date made.

ENGINEER accepts no responsibility for accuracy of the soil data or water level information. Soil information, included with these Contract Documents, was not obtained for the purposes of designing excavations and trenches. Soil information was used by ENGINEER for design purposes only. CONTRACTOR shall assure itself by personal examination as to subsurface conditions and shall provide its own investigations and make its own assumptions to comply with OSHA and any other applicable laws and regulations regarding excavation and trenching requirements.

D. The following drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) known to OWNER:

1. Drawings dated July 1991, prepared by T.M. Regan, Inc., of Lexington, Kentucky, titled: Carrollton Water Plant Improvements, for Carrollton Municipal Utility Commission, consisting of 37 sheets numbered 1 to M-1, inclusive.

None of the contents of such drawings include technical data on which CONTRACTOR may rely.

E. The reports and drawings identified above are not part of the Contract Documents, but the "technical data" contained therein upon which CONTRACTOR may rely, as expressly identified and established above, are incorporated in the Contract Documents by reference. CONTRACTOR is not entitled to rely upon any other information and data known to or identified by OWNER or ENGINEER.

F. Copies of reports and drawings identified in SC-4.02.C and SC-4.02.D that are not included with the Bidding Documents may be examined at Strand Associates, Inc.<sup>®</sup>, 325 West Main Street, Suite 710, Louisville, Kentucky 40202 during regular business hours.

## SC-4.04 Underground Facilities

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

## SC-4.05 Reference Points

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

## SC-4.06.A Hazardous Environmental Conditions

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 are known to OWNER.
- B. Not Used.

## SC-5.01 Performance and Payment Bonds

Add the following new paragraphs immediately after Paragraph 5.01.C:

D. The forms of the performance and payment Bonds attached hereto shall be used for the Contract. Note instructions thereon as to the form applicable. Each form contemplates one corporate surety only. In case co-sureties or individual sureties will be furnished, proper forms therefore shall be obtained. Besides the stipulations of Paragraphs 5.01 through 5.03, the surety on the Bonds shall provide a certificate indicating surety is licensed to underwrite contracts in the jurisdiction of the project location which shall be attached to the Bonds.

E. Every Bond must run to OWNER.

F. If the principal is an individual, his/her full name and residence shall be inserted in the body thereof, and he/she shall sign the Bonds with his/her usual signature on the line opposite the scroll seal. If the principals are partners, their individual names shall appear in the body of the Bonds, with the recital that they are partners comprising a firm, naming it, and all the members of the firm shall execute the Bonds as individuals.

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

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

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

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



## SC-5.04 CONTRACTOR's Liability Insurance

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

C. The limits of liability for the insurance required by Paragraph 5.04 shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations. The types of insurance and the limits of liability indicated are the minimum required. Neither OWNER or ENGINEER warrant the adequacy of the types of insurance or the limits of liability required. Any policy exclusions shall be indicated on the insurance certificate. CONTRACTOR shall provide verification of all coverages with or on the insurance certificate.

1. Workers' Compensation, and related coverages under Paragraphs 5.04.A.1 and A.2:

- a. State: Statutory
- b. Applicable Federal (e.g., Longshoreman's): Statutory
- c. Employer's Liability:
  - Bodily Injury by Accident:
    - Each Accident \$ 4,000,000
  - Bodily Injury by Disease:
    - Each Employee \$ 4,000,000
    - Policy Limit \$ 4,000,000

2. CONTRACTOR's General Liability under Paragraphs 5.04.A.3 through A.6 which shall be written on a commercial general liability form and 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. Policy Limits:
  - 1) Each Occurrence Limit (Bodily Injury and Property Damage) \$ 1,000,000
  - 2) Medical Expense Limit (Any One Person) \$ 10,000
  - 3) Personal and Advertising Injury Limit (Per Person/Organization) \$ 1,000,000
  - 4) General Aggregate Limit (other than P-CO) \$ 2,000,000
  - 5) Products-Completed Operations Aggregate Limit \$ 2,000,000

- 6) Damages to rented premises \$ 300,000  
(Each Occurrence)

b. Policy shall include as a minimum the following coverages:

1) Broad Form Property Damage Coverage.

2) An elimination of the exclusions with respect to property under the care, custody, or control of CONTRACTOR. In lieu of elimination of the exclusion, CONTRACTOR may provide Builder's Risk or Installation Floater coverage for property under the care, custody, or control of CONTRACTOR.

3) Explosion, Collapse, and Underground coverages where applicable under Property Damage Liability Insurance.

4) Contractual Liability Coverage.

5) Independent Contractor Coverage.

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

"Amendment of Limits of Insurance-Designated Projects or Premises" Endorsement (ISO Form No. CG 25010798) or "Designated Construction Project(s) General Aggregate Limit" Endorsement (ISO Form CG 25030397) or equivalent endorsement coverage.

3. Commercial Automobile Liability under Paragraph 5.04.A.6:

a. Policy Limits:

b. Combined Single Limit \$ 1,000,000  
(Bodily Injury and Property Damage)

c. Policy shall include contractual liability coverage and coverage on all owned, non-owned, drive other and hired, drive other vehicles.

4. Umbrella Coverage:

a. Umbrella policy (pay on behalf form) with limits of \$5,000,000 for bodily injury, personal injury and property damage on a combined basis shall be provided with the stated underlying limits of Paragraphs 5.04.C.1, 5.04.C.2, and 5.04.C.3.

b. Policy shall include OWNER, ENGINEER, and any others required by Paragraph 5.04.B.1 as additional insureds.

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

## E. Additional Insured Endorsements/OCP policy/PMPL policy

1. CONTRACTOR shall purchase and maintain liability insurance, as described above, specifically naming as additional insureds OWNER and ENGINEER as well as other individuals or entities so identified (see the Supplementary Conditions), using Additional Insurance Endorsement Form CG 20 26 07 04, CG 81 11 05 06, CG 20 10 07 04, or equivalent form. General liability policies shall also be endorsed with Form CG 20 37 07 04 to include the "products-completed operations coverage."

2. As an alternative to providing Form CG 20 26 07 04, CG 81 11 05 06, or CG 20 10 07 04, CONTRACTOR may furnish to OWNER an OCP policy or a PMPL policy with OWNER as the named insured and ENGINEER as either an additional insured or a named insured. OCP policy or PMPL policy shall provide for bodily injury and property damage coverage equal to the sum of: the general aggregate limit for commercial general liability plus the amount specified for the umbrella coverage. OCP policy or PMPL policy shall provide coverage arising out of:

- i. operations performed by CONTRACTOR at the project location.
- ii. acts or omissions in connection with the general supervision, inspection and/or coordination of such operations.

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

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

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

G. The specimen Insurance Certificate bound at the end of this section has been prepared as a guide to assist CONTRACTOR and CONTRACTOR's Insurance Agent when preparing the insurance submittal. This specimen certificate is included as a representation of what acceptable documents will look like. Specific project information must be included when preparing the actual document.

### SC-5.04.B Additional Insureds Coverage

#### 5.04.B.1 Additional Insureds

Delete from the first sentence of Paragraph 5.04 B.1 of the General Conditions, the phrase "(subject to any customary exclusion regarding professional liability)."

Revise the last phrase in Paragraph 5.04.B.1 to read "and the insurance afforded to these additional insureds shall provide primary and noncontributory coverage for all claims covered thereby;"

Add the following language at the end of Paragraph 5.04.B.1:

Policies of insurance shall also include Patriot Engineering and Environmental, Inc. and the West Carroll Water District as additional insureds under the provisions of Paragraphs 5.04.A.3 through 5.04.A.6.

#### 5.04.B.4 Insurance Policies

Delete the phrase "materially changed" and insert the following in its place:  
"materially changed with respect to coverage on the Project."

## 5.04.B.6 Products and Completed Operations Insurance

Amend in Paragraph 5.04.B.6 the phrase "completed operations coverage" to read "products and completed operations coverage."

## SC-5.06.A Property Insurance

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 full replacement cost thereof. Insurance shall be completed value form.

1. This insurance shall:

a. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, and any other individuals or entities identified herein, 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 (insurance certificates shall specifically indicate by name the loss payees which are to include OWNER and ENGINEER as well as other individuals or entities so identified.);

b. be written on a Builder's Risk "Cause of Loss-Special Form" or its equivalent 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 (including that caused by flood or hydrostatic pressure), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

c. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

d. cover the total value of materials and equipment supplied under the Contract including those from procurement Contract 3-2012 from the time CONTRACTOR takes possession of them until they are installed and tested by CONTRACTOR and the project is accepted as complete by OWNER under an endorsement to this policy or in the form of Installation Floater Insurance of the "all risk" type;

e. allow for partial utilization of the Work by OWNER;

f. include testing and startup; and

g. 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.

2. CONTRACTOR shall be responsible for any deductible or self-insured retention.

3. The policies of insurance required to be purchased and maintained by CONTRACTOR in accordance with this Paragraph SC-5.06.A shall comply with the requirements of Paragraph 5.06.C.

## SC-5.06.A.1 Loss Payees

Policy shall also include Patriot Engineering and Environmental Inc., and the West Carroll Water District as loss payees under the provisions of Paragraph 5.06.A.1.

## SC-5.06.B Equipment Breakdown and Additional Property Insurance

Delete Paragraph 5.06.B in its entirety and insert the following in its place:

B. CONTRACTOR shall purchase Builder's Risk, Installation Floater, or Equipment Breakdown Insurance or a combination thereof to protect CONTRACTOR's interests in the materials and equipment which will also include the interests of OWNER, Subcontractors, ENGINEER, and any other individuals or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or loss payee. Insurance certificate shall specifically indicate by name the loss payees which are to include OWNER, ENGINEER, and Subcontractors as well as other individuals or entities so identified. CONTRACTOR's coverage shall extend until the materials and equipment are installed and tested by CONTRACTOR and the Project is accepted as complete by OWNER. CONTRACTOR's coverage shall insure against at least the following perils: accident, mechanical breakdown, electric arcing, and problems arising during testing because of defects.

Policy shall also include Patriot Engineering and Environmental, Inc. and the West Carroll Water District as loss payees under the provisions of Paragraph 5.06.B of the General Conditions.

## SC-5.06.D Deductible Provisions

Delete the first sentence of Paragraph 5.06.D and insert the following in its place:

CONTRACTOR shall pay all deductible provisions of insurances. The maximum deductible shall be \$5,000.

## SC-5.06.E Policies of Insurance

Delete Paragraph 5.06.E in its entirety.

## SC-6.03.B Materials and Equipment Warranty

Add the following to the end of Paragraph 6.03.B:

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

## SC-6.06 Concerning Subcontractors, Suppliers and Others

Add the following new paragraph immediately after Paragraph 6.06.G:

H. OWNER or ENGINEER 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-6.08 Permits

Delete last sentence of Paragraph 6.08.A and add the following in its place:

See General Requirements and technical specification sections for utility charge provisions.  
Add Paragraph 6.08.B as follows:

B. See General Requirements for additional permit information.

## SC-6.09 Laws and Regulations

Kickback Statutes—CONTRACTOR shall comply with the requirements of KRS 45A.455 with respect to gratuities and kickbacks among other matters.

Campaign Finance Disclosure—CONTRACTOR shall comply with requirements of KRS 45A.395 with respect to campaign finance laws.

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

Payment Bond for Wages Due—CONTRACTOR, whether a corporation, partnership, or individual, who have not been doing business in the State of Kentucky for 5 consecutive years, shall comply with KRS 337.200 which requires a Performance Bond to assure payment of wages.

KIA Supplemental General Conditions—CONTRACTOR shall comply with the requirements of the Kentucky Infrastructure Authority Supplemental General Conditions for Clean Water State Revolving Fund and Drinking Water State Revolving Fund (Drinking Water and Wastewater) which includes, but is not limited to, the following provisions:

SRF Special Provisions, which includes construction requirements.

40 CFR 31.36 Procurement Requirements, which includes procurement standards, taking affirmative steps to procure small, minority, female business and labor surplus area firm participation, a preference for domestic construction materials, conformance with the Contract Work Hours Act, and providing documents for KIA review.

KRS Chapter 45A Kentucky Model Procurement Code, which includes methods of awarding state contracts.

Equal Employment Opportunity Requirements, Executive Order 11246 and 41 CFR 60-4, which includes equal employment opportunity provisions; small, and female and minority participation goals to ensure equal opportunity to small, women-owned, and minority businesses; applying the timetables and goals set forth in 41 CFR 60-4, if applicable to the area of the Project; implementation of affirmative action standards; and as low, responsive, responsible Bidder submittal to OWNER of EEO documents within 10 days of Bid opening. CONTRACTOR shall make positive efforts to use small, minority, women-owned, and disadvantaged businesses.

Title VII of the Civil Rights Act of 1964, which includes Employer Information EEO-1 survey reporting requirements.

EPA Form 5720-4 Labor Standard Provisions For Federally-Assisted Construction which includes amongst others:

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Copeland "Anti-Kickback" Act (18 U.S.C. 874), as supplemented in Department of Labor regulations (29 CFR Part 3), which prohibits contractors or subcontractors from inducing any person involved in a project to give up any part of the compensation to which that person is entitled under an employment contract.

Contract Work Hours & Safety Standard Act (40 U.S.C. 327-330), which prohibits contractors and subcontractors from requiring laborers and mechanics to work in hazardous, unsanitary, or dangerous conditions.

Debarment and Suspension Requirements, 40 CFR, Part 32, which requires CONTRACTORS to provide certifications that subcontracts will not be with individuals or businesses which have been debarred or suspended from federal assistance programs.

Anti-lobbying Requirements, which requires CONTRACTOR and Subcontractors to sign certificate regarding lobbying.

EPA Disadvantaged Business Enterprise Program, which includes employing the six good faith efforts for Subcontractor procurement, completing forms, and making positive efforts to use disadvantaged businesses.

Completion of Outlay Management schedule.

Obtaining a KPDES Stormwater General Permit and providing a Notice of Intent form.

Davis-Bacon Act Requirements (40 U.S.C.) 276a to 276a-7) as supplemented by Department of Labor Regulations (29 CFR part 5).

Wage Rate Requirements Under Fiscal Year Appropriations with which CONTRACTOR shall comply.

## SC-6.10 Taxes

Add a new paragraph immediately after Paragraph 6.10.A:

B. OWNER is exempt from payment of sales and compensating use taxes of the State of Kentucky, the City of Carrollton, and the County of Carroll on all materials to be incorporated into the Work.

1. OWNER will furnish the required certificates of tax exemption to CONTRACTOR for use in the purchase of supplies and materials to be incorporated into the Work.

2. OWNER's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by CONTRACTOR, or to supplies or materials not incorporated into the Work.

All taxes are the responsibility of CONTRACTOR unless specifically exempted in the Contract Documents.

Fees and Licenses—CONTRACTOR shall comply with the City of Carrollton and Carroll, Henry, and Trimble Counties' ordinances relating to Occupational License Fees, Business Licenses, payroll, and net profits, taxes and any other ordinances which may apply to the Work. Contact City Clerk's and County Judge's offices for requirements.

CONTRACTOR shall have City of Carrollton business license prior to conducting work in the City.

## SC-6.12 Record Documents

In Paragraph 6.12.A. delete last sentence and insert the following:

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

## SC-6.14 Competent Person

Add the following new paragraph at the end of Paragraph 6.14.A:

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

## SC-6.17 Shop Drawings

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 substitution for a previously approved item, CONTRACTOR shall reimburse OWNER for ENGINEER's charges for its review time unless the need for such change is beyond the control of CONTRACTOR.

## SC-6.20 Indemnification

Add the following to the end of Paragraph 6.20.A:

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

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

Delete Paragraph 6.20.C.1 and 6.20.C.2. Insert new Paragraphs 6.20.C.1 and D:

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

D. For any matter for which OWNER and ENGINEER are indemnified under Paragraph 6.20.A, CONTRACTOR shall pay for OWNER's and ENGINEER's reasonable defense,



including, but not limited to, all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs or awards until OWNER and ENGINEER are found negligent. If OWNER or ENGINEER are found negligent, OWNER or ENGINEER shall reimburse CONTRACTOR for the prorata extent of OWNER's or ENGINEER's negligence for the cost of OWNER's or ENGINEER's reasonable defense.

## SC-9.03 Resident Project Representative

The duties and responsibilities of the resident project representative include the following:

1. Review schedules as required in Paragraph 2.05.A and amendment thereto.
2. Attend conferences and meetings with CONTRACTOR.
3. Serve as liaison between ENGINEER and CONTRACTOR and help ENGINEER serve as liaison between OWNER and CONTRACTOR.
4. Conduct on-site observation of the work.
5. Observe tests, equipment, and system startups.
6. Report to ENGINEER when clarifications and interpretations of the Contract Documents are needed. Consider, evaluate, and report to ENGINEER, CONTRACTOR's requests for modification.
7. Maintain orderly records, keep a daily log (when on a part-time basis, keep log for days visiting site), and furnish periodic reports to ENGINEER of the progress of the Work.
8. Before project completion, prepare final list of items to be completed or corrected and make recommendations to ENGINEER concerning acceptance of the Work.

The resident project representatives shall not:

1. Authorize any deviation from the Contract Documents or substitutions of materials or equipment.
2. Exceed limitations of ENGINEER's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of CONTRACTOR, Subcontractor, 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 construction.
5. Advise on, issue directions regarding, or assume control over safety precautions and programs in connection with the Work.
6. Accept shop drawing or sample submittals from anyone other than CONTRACTOR.
7. Authorize OWNER to occupy the Project in whole or in part.

8. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by ENGINEER.

## SC-10.04 Notification to Surety

Add the following language at the end of Paragraph 10.04.A:

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

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

## SC-11.03 Unit Price Work

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% or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by CONTRACTOR differs by more than 25% from the estimated quantity of such item indicated in the Agreement; and

2. If there is no corresponding adjustment with respect to any other item of Work; and

3. If CONTRACTOR believes that it has incurred additional expense as a result thereof; or

4. If OWNER believes that the quantity variation entitles it to an adjustment in the unit price,

either OWNER or CONTRACTOR may make a Claim for an adjustment in the Contract Price in accordance with Article 10 if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

## SC-12.01 Change of Contract Price

Clarification of Paragraph B.2: The overhead and profit allowance for lump sum work shall be in accordance with Paragraph 12.01.C.2 unless OWNER and CONTRACTOR agree that these allowances are not appropriate for the Work involved.

## SC-13.02 Access To Work

Add the following paragraph after Paragraph 13.02.A.

B. Representatives of the Kentucky Department of Water (KDOW), or any of their duly authorized representatives shall have full access to and the right to examine any pertinent books, documents, papers and records of CONTRACTOR involving transactions related to the project.

## SC-13.03.A Tests and Inspections

Add the following to the beginning of Paragraph 13.03.A:

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

Add the following to the end of Paragraph 13.03.A:

Samples required for testing shall be furnished by CONTRACTOR at no cost to OWNER. In the event that completed Work does not conform to specification requirements during the initial test, the Work shall be corrected and retested for conformance. The entire cost of retesting completed Work shall be borne by CONTRACTOR. This shall include the extra cost for inspection to OWNER which will be deducted from the final amount due CONTRACTOR.

## SC-13.07.A Correction Period

Delete in Paragraph 13.07.A the phrase "If within one year after the date of Substantial Completion" and insert in its place the following:

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

## SC-14.02.A Applications for Progress Payment

Add the following paragraph after Paragraph 14.02.A.3:

4. CONTRACTOR shall submit with each pay request CONTRACTOR's partial waiver of lien for the full amount of the requested payment. Beginning with the second pay request, and with each succeeding pay request, CONTRACTOR shall submit partial waivers of lien for each Subcontractor and Supplier showing that the amount paid to date to each is at least equivalent to the total value of Subcontractor's or Supplier's work, less retainage, included on the previous pay request. CONTRACTOR shall submit with each pay request a signed Waiver of Lien Log clearly documenting the following:

- a. The names of all Subcontractors/Suppliers on the project.
- b. Contract amounts for each Subcontractor/Supplier.
- c. Amount paid to date to each Subcontractor/Supplier.
- d. Lien waivers provided with current pay application for previous month's payments.
- e. Amount to be paid to each Subcontractor/Supplier included in the pending pay request.
- f. Remaining balance for each Subcontractor/Supplier.

5. CONTRACTOR shall submit one original and one copy on 8-1/2 by 11 paper of each lien waiver submitted.
6. CONTRACTOR shall submit five copies of each pay request for approval.
7. No advanced payment for shop drawing preparation will be made. Shop drawing costs will be paid when equipment and materials are delivered and suitably stored on the site.
8. All stored equipment and materials for which payment is requested shall have two copies of invoices included with the pay request. Equipment shall be identified thoroughly on the invoices, including serial numbers.
9. Payment for the stored equipment and material which are on the site shall not exceed the invoiced amount for each item, less the Contract retainage. The overhead and profit for the stored items shall not be invoiced until the item is installed.
10. Payment for off-site storage is normally reserved for sensitive or very large pieces of equipment that in ENGINEER's opinion would not be practical to have stored on the site. Payment for off-site stored items shall be limited to 75% of the invoiced value of the item, less Contract retainage. CONTRACTOR shall reimburse OWNER the cost of inspecting off-site stored items. When off-site storage is approved, CONTRACTOR shall provide Insurance Certificates and Document of Ownership to OWNER.

## SC-14.02.C Payment Becomes Due

Delete Paragraph 14.02.C.1 and insert the following in its place:

1. Within 10 days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, OWNER will (subject to the provisions of Paragraph 14.02.D) approve and submit the Application for Payment to Kentucky Infrastructure Authority for approval. Payment should be made by that agency within 30 days subject to their internal procedures and reviews.

## SC-14.05 Partial Utilization

Add the following new paragraph immediately after Paragraph 14.05.A.3, which is to read as follows:

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

Paragraph 14.05.A.4 shall be renumbered to 14.05.A.5.

## SC-15.02 OWNER May Terminate for Cause

Replace Paragraph 15.02.B.3 with the following:

3. complete the Work as OWNER may deem expedient at the expense of CONTRACTOR and surety;

Add the following new paragraphs immediately after Paragraph 15.02.B.3:

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

5. authorize the surety to complete the steps in Paragraphs 15.02.B.1 through 4 above.

## SC-15.03 OWNER May Terminate for Convenience

Add the following paragraph after Paragraph 15.03.B:

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

END OF SECTION



# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an **ADDITIONAL INSURED**, the policy(ies) must be endorsed. If **SUBROGATION IS WAIVED**, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER  Insurance Agency	CONTACT NAME:		
	PHONE (A/C, No, Ext):	FAX (A/C, No):	
	E-MAIL ADDRESS:		
	PRODUCER CUSTOMER ID #:		
INSURED  Contractor	INSURER(S) AFFORDING COVERAGE		NAIC #
	INSURER A : Insurance Company		
	INSURER B :		
	INSURER C :		
	INSURER D :		
	INSURER E :		
	INSURER F :		

**COVERAGES****CERTIFICATE NUMBER:****REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	<b>GENERAL LIABILITY</b>						EACH OCCURRENCE \$ 1,000,000
	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence) \$
	<input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR						MED EXP (Any one person) \$ 10,000
							PERSONAL & ADV INJURY \$ 1,000,000
							GENERAL AGGREGATE \$ 2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PRODUCTS - COMP/OP AGG \$ 2,000,000
	<input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC						\$
	<b>AUTOMOBILE LIABILITY</b>						COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000
	<input checked="" type="checkbox"/> ANY AUTO						BODILY INJURY (Per person) \$
	<input type="checkbox"/> ALL OWNED AUTOS						BODILY INJURY (Per accident) \$
	<input type="checkbox"/> SCHEDULED AUTOS						PROPERTY DAMAGE (Per accident) \$
	<input type="checkbox"/> HIRED AUTOS						\$
	<input type="checkbox"/> NON-OWNED AUTOS						\$
	<b>UMBRELLA LIAB</b> <input checked="" type="checkbox"/> OCCUR						EACH OCCURRENCE \$ 5,000,000
	<b>EXCESS LIAB</b> <input type="checkbox"/> CLAIMS-MADE						AGGREGATE \$ 5,000,000
	DEDUCTIBLE						\$
	RETENTION \$						\$
	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b>						<input checked="" type="checkbox"/> WC STATU-TORY LIMITS <input type="checkbox"/> OTH-ER
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)						E.L. EACH ACCIDENT \$ 4,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE \$ 4,000,000
							E.L. DISEASE - POLICY LIMIT \$ 4,000,000
	Installation Floater or Builders Risk						<b>See SC-5.06</b>

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Countywide Underserved Project, Contracts 1-2012 and 2-2012, Carrollton Utilities

Carrollton Utilities and Strand Associates, Inc. are additional insured with respect to General Liability, Automobile Liability, and Excess/Umbrella Liability. The Carrollton Utilities and Strand Associates, Inc. are loss payees with respect to Installation Floater or Builder's Risk policies. In addition, see attached Additional Insured Endorsements for the General Liability and Automobile policies.

**CERTIFICATE HOLDER****CANCELLATION**

Strand Associates, Inc. 325 West Main Street, Suite 710 Louisville, KY 40202	West Carroll Water District	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
Carrollton Utilities 225 Sixth Street P.O. Box 269 Carrollton, KY 41008	Patriot Engineering and Environmental, Inc. 400 Production Court Louisville, KY 40299	

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**CONTRACTOR'S AFFIDAVIT AND WAIVER OF LIEN  
ACKNOWLEDGEMENT OF PAYMENT**

\_\_\_\_\_, contractor, having a Contract with the  
\_\_\_\_\_, Client, on the \_\_\_\_\_ project, dated  
\_\_\_\_\_, \_\_\_\_\_, has performed work and/or furnished materials, equipment and/or  
machinery or has fabricated materials especially for the project, during the period from  
\_\_\_\_\_ to \_\_\_\_\_.

For and in consideration of \$ \_\_\_\_\_, being the total of payments hereby acknowledged;  
\_\_\_\_\_, contractor, certifies that the cost and expense for all  
Labor, payroll taxes, materials, equipment and/or machinery including but not limited to, all amounts  
owed to all subcontractors and providers of materials, incurred on or before \_\_\_\_\_,  
for the \_\_\_\_\_ project, have been paid in full.

\_\_\_\_\_, contractor, hereby certifies that with this payment  
all monies due said contractor have been paid in full to date.

\_\_\_\_\_, contractor, hereby waives and releases all rights  
to liens and claims against the Client and any surety for the payment of his contract from its inception  
through \_\_\_\_\_, and further states that no other person has any right to a  
lien or claim against the client the Client on account of work performed or for material, equipment, and/or  
machinery, or for materials especially fabricated for the project.

\_\_\_\_\_ (name), being \_\_\_\_\_ (title) of  
\_\_\_\_\_ (contractor) hereby acknowledges the foregoing in full  
and certifies that this is a true and accurate statement.

CONTRACTOR

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

STATE OF KENTUCKY \_\_\_\_\_ COUNTY

SUBSCRIBED, SWORN TO AND ACKNOWLEDGED before me by \_\_\_\_\_, of  
\_\_\_\_\_, on this the \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
Notary Public

My Commission Expires: \_\_\_\_\_

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SUBCONTRACTOR'S AFFIDAVIT AND WAIVER OF LIEN  
ACKNOWLEDGEMENT OF PAYMENT

\_\_\_\_\_, subcontractor, has performed work and/or furnished materials, equipment and/or, machinery or has fabricated materials especially for the \_\_\_\_\_ project, during the period from \_\_\_\_\_ to \_\_\_\_\_.

\_\_\_\_\_, subcontractor does hereby certify that it have been paid in full for all said materials, equipment or services.

For and in consideration of \$ \_\_\_\_\_, being the total amount due, \_\_\_\_\_, subcontractor, hereby releases and waives all rights to assert any claim or lien against the Client, and any surety. The undersigned further states that he or she knows of no other person, firm or corporation that has any right to any claim or lien against the Client due to work performed or material, equipment and/or machinery supplied concerning this project.

\_\_\_\_\_ (name), being \_\_\_\_\_ (title) of \_\_\_\_\_ (subcontractor) hereby acknowledges the foregoing \_\_\_\_\_ in full and certifies that this is a true and accurate statement.

SUBCONTRACTOR

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

STATE OF KENTUCKY  
\_\_\_\_\_ COUNTY

SUBSCRIBED, SWORN TO AND ACKNOWLEDGED before me by \_\_\_\_\_, of \_\_\_\_\_, on this the \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
Notary Public

My Commission Expires: \_\_\_\_\_



DRAFT-(01.03.2013)

**SPECIFICATIONS**

### SUMMARY OF WORK

#### PART 1-GENERAL

##### 1.01 DIVISION ONE

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

##### 1.02 PROJECT SCOPE

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

##### 1.03 CONTRACT DOCUMENTS-INTENT AND USE

A. Intent of Documents:

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

B. Use of Documents:

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

## 1.04 CONSTRUCTION REQUIREMENTS

### A. General Information and Requirements:

1. Currently, the water treatment process at the Carrollton Utilities Water Treatment Plant (WTP) is a groundwater lime-softening plant with a design capacity of 1.5 mgd. The treatment process consists of two air stripping towers, a head tank and claricone unit with lime-softening, a pH adjustment tank, and gravity filters. Chlorine gas and fluoride are applied to the filter effluent before flow enters the clearwell. The WTP is operated by a two-man crew 12 hours a day from 7 A.M. to 7 P.M.
2. It shall be the responsibility of CONTRACTOR to not in any way impair the normal treatment or operation efficiency of the facilities, regardless of the Work underway. No bypassing of raw or partially treated water to the distribution system or to downstream treatment units shall occur at any time as a result of construction unless authorized in writing by plant superintendent. In general, this requires that new facilities be complete and ready for service, including disinfection, or that temporary facilities be provided, prior to removing existing units from service for modifications or repair. CONTRACTOR shall provide all temporary piping, bypass pumping, temporary electrical, temporary construction, and disinfection required to meet the requirements of this section and to complete the Work.
3. Operation of the water supply and treatment facilities will be the responsibility of OWNER. CONTRACTOR shall cooperate with the water utility operation staff at all times, and removal of any operating units from service shall be coordinated by CONTRACTOR with OWNER and ENGINEER. Prior to removing or placing any unit process in or out of service, CONTRACTOR shall request in writing authorization from OWNER. CONTRACTOR shall attach to all requests for placing unit process in service, the laboratory results for bacteriological test showing that safe samples were obtained.
4. Unless otherwise specified or shown on the Drawings, new facilities shall be completed and ready for service and placed into successful operation before existing facilities are taken out of service for modification/upgrading. No more than one existing treatment unit may be taken out of service at a time when making piping interconnections, etc., so that the remaining units are available for treatment. CONTRACTOR shall coordinate taking units out of service and placing units back in service with OWNER.
5. CONTRACTOR shall maintain plant site roadways open at all times to meet OWNER's requirements, including the lime precipitate (sludge) discharge at all times. Access by roadway to other plant facilities including delivery of chemical such as lime, chlorine gas, coagulant, and fluoride shall be maintained, except as approved by OWNER. CONTRACTOR shall be responsible for maintaining roadways in driveable conditions.
6. Outage Plan: CONTRACTOR shall submit for review, a detailed outage plan which includes time scheduled for work activities necessary to remove unit processes, tanks, piping, electrical service, equipment or structure from service. The plan shall be in writing and also in the form a bar graph. The outage plan shall be coordinated with the work construction schedule and shall be updated monthly. The outage plan shall follow the construction sequence specified herein and shall include the length of time required to complete said work. The length of time unit processes are out of service shall be minimized. To that end, all new equipment, tools, materials required for the Work shall be readily available when outage is implemented to minimize down time of unit processes.

## B. Construction Sequence (Contract 2-2012):

1. The following construction sequence is provided as a general guideline for the information and for the benefit of CONTRACTOR. This construction sequence is not intended to dictate means, method of construction or direct construction activities. This construction sequence is a conceptual general construction sequence with minimum recommended outage, shutdowns, and operating units to be maintained in service. The general construction sequence is projected to allow the Work to be completed while maintaining treatment of the WTP. It is not intended to be all inclusive and does not list all work elements or details that are required to complete the Work, complete treatment processes, or place unit processes in service. CONTRACTOR shall be responsible for implementing any additional details required, including temporary piping, bypass pumping, or temporary construction at no additional cost to OWNER.
2. CONTRACTOR may propose alternate sequence or modifications to this sequence. OWNER will review the proposed modification and determine if such modification of the sequence interferes with the proper operation of the treatment activities. Any modifications to this general construction sequence shall be proposed in writing and shall be approved by OWNER prior to their implementations.
3. Sequence (all work can proceed upon issuance of Notice to Proceed):
  - a. Water softening system shall include the water softening units, brine tanks, brine pumps, and associated piping and appurtenances supplied by OWNER. Equipment procured by OWNER under Contract 3-2012 is expected to be delivered to the site within 130 days from the commencement of Contract Times. Existing lime-softening system shall only be out of service during time periods authorized by OWNER. Low lift pump and new backwash sanitary sewer must be ready for service when the water softening system is placed in service.
  - b. Piping and other modifications related to the existing low lift pump can be made after normal operating hours. Plant operations can be interrupted for a maximum of two hours.
  - c. Plant operations can be interrupted for a maximum of two hours to make connection to existing filter piping effluent.

## 1.05 CONTRACTOR USE OF SITE

### A. General:

1. The "area of the site" referred to in these specifications shall be as shown on the Drawings. If the "area of the site" is not shown, OWNER's property lines, the project right-of-way or the easements obtained for the project shall be considered the "area of the site."
2. Construction activities shall be confined within the "area of the site" limits.
3. From the start of work to completion CONTRACTOR is responsible for the care of the site and the premises which are affected by operations of Work of this Contract.
4. Except for permanent site improvements provided under the Contract, CONTRACTOR shall restore property disturbed during the Work, to the conditions which previously existed.
5. Work in occupied spaces shall be restricted to specified Work and essential activities, such as making necessary connections and extending services or constructing temporary access ways. Such work shall be scheduled in advance with OWNER.

### B. Parking and Deliveries:

1. CONTRACTOR is responsible for control of traffic by vehicles and persons within the limits of its operations.

2. Parking for employees, subcontractors, and agents of CONTRACTOR shall be in areas subject to approval of OWNER.
3. Access to the site for delivery of construction material or equipment shall be subject to approval of OWNER.

## 1.06 EXISTING SERVICES, STRUCTURES AND UNDERGROUND FACILITIES

- A. Interruption of existing services and systems including heating, ventilating, air conditioning, water, sanitary, lighting and power, signal and security systems, and similar work shall be kept to an absolute minimum and shall be limited to times approved by OWNER.
- B. If deemed necessary by OWNER, such work shall be accomplished after OWNER's normal office hours.
- C. Work shall not commence until all labor, materials and equipment are available so Work can continue without interruption or delay.
- D. Should uncharted or incorrectly charted piping or other utilities be encountered during installation, notify OWNER and consult with utility owner immediately for directions.
- E. Cooperate with OWNER and utility companies in keeping respective services and facilities in operation and repair any damaged utilities to satisfaction of utility owner.
- F. CONTRACTOR shall not interrupt existing utilities serving facilities occupied and used by OWNER or others, except when permitted in writing by OWNER.
- G. Any accidental interruption of services shall be repaired immediately, including provision of temporary facilities until permanent repairs can be made.
- H. Prior to any excavation, demolition, or drilling on site, CONTRACTOR shall contact owners of the underground facilities in and near the construction area of the intent to excavate, demolish, or drill. As part of this notification requirement, CONTRACTOR shall contact the utility notification service Kentucky 811 (811 or 1-800-752-6007) at least two but not more than 10 business days in advance of any work. CONTRACTOR shall be aware that not all owners participate in Kentucky 811. A call to this agency shall not absolve CONTRACTOR of the requirements for contacting all owners of underground facilities in and near the construction area. CONTRACTOR shall give reasonable advance notice to Kentucky 811 and other owners—such notification shall not be less than the minimum advance notification required.
- I. CONTRACTOR shall proceed with caution in the excavation and preparation of the Site so the exact location of structures and Underground Facilities can be determined. CONTRACTOR shall include in the Contract Price any costs for temporary or permanent relocations of such structures and Underground Facilities required to complete the Work unless specifically indicated otherwise in the Specifications.
- J. CONTRACTOR shall keep an accurate and complete record of all such structures and Underground Facilities encountered and shall provide OWNER a copy of this record. The record shall include a description of the item encountered, opinion as to conditions, and adequate measurements and depths so that the item can be located in the future.
- K. CONTRACTOR shall inspect all structures and Underground Facilities for condition and soundness. Unsound conditions shall be reported to the structure or facility owner

immediately after exposing. CONTRACTOR shall not proceed with the work until the structure or facility owner has been notified. OWNER shall then be given time to inspect and correct, if required, the structure or Underground Facility. CONTRACTOR may make claim under the provisions of Articles 11 and 12 of the General Conditions should CONTRACTOR feel a price or time adjustment is justified.

- L. Any additional costs incurred because of failure of CONTRACTOR to report the condition of any and all existing structure or Underground Facility encountered shall be paid for by CONTRACTOR.
- M. Whenever ENGINEER feels it is necessary to explore and excavate to determine the location of existing structures and Underground Facilities, CONTRACTOR shall make explorations and excavations for such purposes. If CONTRACTOR is required to perform additional work in making the explorations and excavations, extra compensation will be allowed as provided for in the General Conditions.

## 1.07 PROTECTION OF WORK AND IMPROVEMENTS

- A. CONTRACTOR shall protect the property of OWNER, existing improvements, and the Work installed by CONTRACTOR and others from abuse, damage, dust, debris, and other objectionable materials resulting from construction activities.
- B. CONTRACTOR shall provide suitable covers, partitions, or other dust and fume containment devices to suit construction operations.
- C. CONTRACTOR shall keep property, existing improvements and the Work, including structures, mains, fittings and accessories free from dirt and foreign matter at all times.
- D. CONTRACTOR shall provide temporary plugging of openings, holes and pipe ends that are existing or that CONTRACTOR has installed.
- E. Property, improvements and Work damaged by CONTRACTOR shall be repaired or replaced by CONTRACTOR to the satisfaction of OWNER.

## 1.08 OWNER-FURNISHED PRODUCTS

- A. OWNER is responsible for the following items when supplying material or equipment to CONTRACTOR for installation.
  - 1. Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to CONTRACTOR.
  - 2. Deliver supplier's bill of material to CONTRACTOR.
  - 3. Arrange and pay for delivery to site.
  - 4. Inspect deliveries jointly with CONTRACTOR.
  - 5. Submit claims for transportation damage and arrange for replacement of damaged, defective, or missing items.
- B. CONTRACTOR's responsibilities for OWNER-furnished products are:
  - 1. Receive and unload products at the site.
  - 2. Inspect deliveries jointly with OWNER and record shortage and damaged or defective items. Any materials and equipment furnished by OWNER and found to be defective shall be clearly marked and set aside to be removed by OWNER. Any materials and equipment furnished by OWNER and installed by CONTRACTOR, without discovery of such defects will be replaced with sound materials and equipment by OWNER.

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CONTRACTOR, however, shall at its own expense, furnish all equipment, labor and facilities necessary to remove the defective materials and equipment and install the sound materials and equipment.

3. Handle products at the site, including uncrating and storage.
4. Protect products from damage and from exposure to the elements.
5. Assemble, install, correct, adjust, and finish products in accordance with the appropriate technical section of these specifications.
6. Repair or replace items damaged by CONTRACTOR at no additional cost to OWNER.
7. CONTRACTOR's responsibility for materials and equipment furnished by OWNER shall begin at the point of delivery to CONTRACTOR. Materials and equipment already on the site shall become CONTRACTOR's responsibility on date of Notice to Proceed with Contract.
8. Provide insurance on materials and equipment from date of delivery until they are installed, tested, and accepted by OWNER.

- C. OWNER-Purchased Equipment and Materials: OWNER has purchased materials and equipment, and has an agreement with some manufacturers and suppliers. It is the intent of the Contract Documents for the CONTRACTOR to use the provided materials as part of the construction and install the provided equipment. The materials, equipment and agreement provided by OWNER are referred to throughout the Contract Documents. CONTRACTOR shall also furnish and install any additional equipment required to provide a complete working system as shown on the Drawings and as specified in this Contract Document. To identify the scope of the OWNER-provided material, equipment supplier and agreements, the language in the Specification has been typed in an italic font and framed as shown in the example below:

*OWNER-supplied equipment and material to be installed by CONTRACTOR and agreement to be assumed by CONTRACTOR as part of this Contract have been typed in this text font and framed in this format and inserted in the appropriate Specification sections.*

## 1.09 AVAILABILITY OF LANDS

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

## PART 2-PRODUCTS

### 2.01 OWNER-FURNISHED PRODUCTS

- A. The following is a reference list of the OWNER-furnished equipment, materials, and agreements with reference to sections of the Contract Documents for detailed information.
1. List of OWNER-Furnished Equipment to be installed by Contract 2-2012:
    - a. Water softening equipment and associated appurtenances (Section 11250).
    - b. Controls and instrumentation equipment (Section 11940).

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PART 3--EXECUTION

NOT APPLICABLE

END OF SECTION



### CONTRACT CONSIDERATIONS

#### PART 1—GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Measurement and Payment—Unit Prices.
  - 2. Measurement and Payment—Lump Sum.

##### 1.02 MEASUREMENT AND PAYMENT—UNIT PRICES

- A. Measurement methods are delineated in the individual Specification sections.
- B. CONTRACTOR shall take measurements and compute quantities. ENGINEER will check measurements and quantities.
- C. Incidental Items of Work: Any items of Work shown on the Drawings or called for in the Specifications, but not included in the Bid Form, shall be considered incidental items of Work. The cost of incidental items of Work shall be included in the prices bid for adjacent Work.

##### 1.03 MEASUREMENT AND PAYMENT—LUMP SUM

- A. No separate measurement for payment will be performed for Lump Sum Work.
- B. CONTRACTOR shall estimate percentage of Work completed. ENGINEER will review CONTRACTOR's estimate of quantity of Work completed.
- C. Payment will be made based on the percentage of the Contract completed less retainage and/or liquidated damages.
- D. Unless noted otherwise, all Work described in the Specifications and/or shown on the Drawings shall be included in the Lump Sum Bid.

#### PART 2—PRODUCTS

NOT APPLICABLE

#### PART 3—EXECUTION

NOT APPLICABLE

END OF SECTION

### COORDINATION, FIELD ENGINEERING, AND MEETINGS

#### PART 1-GENERAL

##### 1.01 SUMMARY

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

##### 1.02 COORDINATION

- A. CONTRACTOR shall coordinate scheduling, submittals, and work of the various sections of the work to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later. See Section 01010-Summary of Work for specific construction sequence.
- B. CONTRACTOR shall verify utility requirements and characteristics of operating equipment are compatible with building utilities and coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. CONTRACTOR shall coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on the Drawings and shall follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas, except as otherwise indicated, CONTRACTOR shall conceal pipes, ducts, and wiring within the construction and coordinate locations of fixtures and outlets with finish elements.
- E. CONTRACTOR shall coordinate completion and clean up of Work of separate sections in preparation for substantial completion and for portions of Work designated for OWNER's occupancy.
- F. After OWNER occupancy of premises, CONTRACTOR shall coordinate access to Site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of OWNER's activities.

##### 1.03 FIELD ENGINEERING

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

- B. CONTRACTOR shall provide field engineering services as required to establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- C. CONTRACTOR shall furnish all required plummets and graduated poles to check all Work.
- D. If stakes and boards have to be reset because of negligence of CONTRACTOR, CONTRACTOR shall bear the cost of such work.
- E. If laser beam is used, CONTRACTOR shall check its Work against intermediate grade stakes provided between manholes. Prior to initial use of the laser, CONTRACTOR shall set up laser on ground surface and check line and gradient controls. Lasers not functioning properly shall be immediately removed.
- F. If existing property stakes, not within the limits of the trench, are removed or damaged by CONTRACTOR, CONTRACTOR shall bear the cost of replacement. Replacement shall be made by a legal survey performed by a licensed Land Surveyor hired by OWNER. Cost for survey shall be deducted from the Contract Price.
- G. CONTRACTOR shall be responsible for all lines, elevations, and measurements of buildings, structures, piping, utilities, and other work executed by CONTRACTOR under the Contract. CONTRACTOR must exercise proper precaution to verify figures before laying out the Work, and will be held responsible for any error resulting from its failure to exercise such precaution.
- H. See Specifications for additional requirements concerning layout of the Work.

## 1.04 PROGRESS MEETINGS

- A. Progress meetings will be held throughout progress of the Work at intervals agreed to by OWNER, ENGINEER, and CONTRACTOR. Interval will generally be monthly.
- B. CONTRACTOR's project manager, job superintendent, major subcontractors and suppliers shall attend as appropriate to address agenda topics for each meeting. CONTRACTOR's representatives shall have authority to bind CONTRACTOR to decisions at the meetings.
- C. The project schedule shall be updated monthly and shall be reviewed at each progress meeting. CONTRACTOR shall provide the following information in written form at each meeting.
  - 1. Construction progress, including:
    - a. Activities completed this reporting period.
    - b. Activities in progress this reporting period.
    - c. Activities scheduled to commence this reporting period.
  - 2. Description of problem areas.
  - 3. Current and anticipated delays.
    - a. Cause of the delay.
    - b. Corrective action and schedule adjustments to correct the delay.
    - c. Impact of the delay on other activities, on milestones, and on completion dates.
  - 4. Changes in construction sequence.
- D. ENGINEER will prepare and distribute minutes to all attending parties.

## 1.05 PREINSTALLATION MEETING

- A. When required in individual specification sections, CONTRACTOR shall convene a preinstallation meeting at Work Site prior to commencing Work of the section.
- B. CONTRACTOR shall require attendance of parties directly affecting, or affected by, work of the specific section.
- C. CONTRACTOR shall notify ENGINEER seven days in advance of meeting date.
- D. CONTRACTOR shall prepare agenda and preside at meeting:
  - 1. Review conditions of installation, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. CONTRACTOR shall record minutes and distribute copies within two days after meeting to participants, with two copies to ENGINEER, participants, and those affected by decisions made.

### PART 2-PRODUCTS

NOT APPLICABLE

### PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

### CUTTING, PATCHING, AND ALTERATIONS

#### PART 1-GENERAL

##### 1.01 SUMMARY

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

##### 1.02 REFERENCES

- A. ANSI A10 Safety Requirements for Construction and Demolition.

##### 1.03 QUALITY ASSURANCE

- A. CONTRACTOR shall perform all cutting, patching, and alterations in strict accordance with pertinent requirements of these Specifications.
- B. Except as modified by governing codes, CONTRACTOR shall comply with the applicable provision and recommendations of ANSI A10.

##### 1.04 SUBMITTALS

- A. CONTRACTOR shall submit a written request to OWNER well in advance of executing any cutting or alteration which affects the following:
  - 1. Work of OWNER or any separate contractor.
  - 2. Structural value or integrity of any element of the Project.
  - 3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
  - 4. Efficiency, operational life, maintenance, or safety of operational elements.
  - 5. Visual qualities of sight-exposed elements.
- B. The request shall include:
  - 1. Description of affected work.
  - 2. The necessity for cutting, patching, or alteration.
  - 3. Effect on work of OWNER or any separate contractor, or on the structural or weather-proof integrity of the Project.
  - 4. Description of proposed work to include:
    - a. Scope of cutting, patching, or alteration.
    - b. Trades who will execute the work.
    - c. Products proposed to be used.
    - d. Extent of refinishing to be done.

5. Alternatives to cutting and patching.
6. Written permission of any separate contractor whose work will be affected.

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

## 1.05 SCHEDULING AND COORDINATION

- A. All work under this section shall be coordinated with OWNER's work forces and those of other contractors and shall be accomplished at times acceptable to OWNER.
- B. Before starting any work relating to existing utilities (electrical, sewer, water, heat, gas, fire lines, etc.) that will temporarily discontinue or disrupt service to the existing building, notify ENGINEER and OWNER 72 hours in advance and obtain OWNER's approval before proceeding with this phase of the work. Temporary facilities, if required, shall be in place prior to disruption of service.

## PART 2-PRODUCTS

### 2.01 NEW MATERIALS

- A. For replacement of work removed, CONTRACTOR shall use materials which comply with the pertinent sections of these Specifications.
- B. All new materials for patching and extending work shall match existing products and work.
- C. CONTRACTOR shall determine type and quality of existing products by inspection and any necessary testing, and workmanship by use of existing as the standard.

### 2.02 SALVAGEABLE MATERIAL

- A. Materials or items designated to be reinstalled or to become the property of OWNER shall be as specified or as shown on the Drawings.
- B. CONTRACTOR shall remove such items with care under the supervision of the trade responsible for reinstallation.
- C. CONTRACTOR shall store these materials (off-site if necessary) and protect from damage until they are incorporated into the new work.
- D. Items which are not to be reinstalled but are to become the property of OWNER shall be removed by CONTRACTOR with care, cleaned, and stored in a location at the Site to be approved by OWNER.
- E. Materials or items damaged in its removal shall be replaced by CONTRACTOR with similar new material at no additional cost to OWNER.
- F. Where existing equipment or fixtures are indicated to be reused, CONTRACTOR shall repair such equipment and refinish as specified elsewhere.

## 2.03 UNSALVAGEABLE MATERIALS

- A. Materials or items demolished and not designated to become the property of OWNER or not designated to be reinstalled shall become the property of CONTRACTOR and shall be removed from the site and legally and properly disposed of by CONTRACTOR.
- B. Materials shall be removed by CONTRACTOR in a manner that will avoid damage to materials or equipment to remain.

## PART 3--EXECUTION

### 3.01 INSPECTION

- A. CONTRACTOR shall inspect existing conditions including elements subject to movement or damage during cutting, patching, and other alterations.
- B. After uncovering the work, CONTRACTOR shall inspect conditions affecting installation of new products or performance of new work.
- C. CONTRACTOR shall report unsatisfactory or questionable conditions to ENGINEER in writing.
- D. CONTRACTOR shall not proceed with work until unsatisfactory or questionable conditions are resolved.
- E. Beginning of cutting, patching, and alterations work means acceptance of existing conditions by CONTRACTOR.

### 3.02 PREPARATION AND PROTECTION

- A. CONTRACTOR shall provide temporary bracing, shoring, needling, and support of the structure during alterations work as necessary to prevent collapse, settling, or deflection and to protect persons and property from injury or damage.
- B. Temporary supports must adequately carry all existing and imposed load.
- C. CONTRACTOR shall provide and maintain temporary protection of surface finishes, equipment, and adjacent work designated to remain where demolition, removal, and new work is being done, connections are being made, materials are being handled, or equipment is being removed.
- D. CONTRACTOR shall provide temporary partitions or barriers to contain all dust, dirt and debris from entering into finished areas.
- E. CONTRACTOR shall provide adequate fire protection in accordance with local Fire Department requirements.
- F. CONTRACTOR shall provide waterproofing, weather protection, heat, and other facilities for that portion of the work which may be exposed by cutting and patching, demolition, or other alterations.

- G. CONTRACTOR shall cut, move, or remove items as necessary for access to alterations and renovations work and replace and restore at completion of work.
- H. CONTRACTOR shall prepare surfaces and remove surface finishes to provide for proper installation of new work and new finishes.
- I. CONTRACTOR shall be responsible for any damage to the existing structure or its contents directly or indirectly by its crews or those of its subcontractors.

## 3.03 PERFORMANCE

- A. CONTRACTOR shall accomplish all work of cutting, removal, demolition, patching or other alterations using only persons skilled in the appropriate trade.
- B. CONTRACTOR shall execute the work in a careful and orderly manner, with the least possible disturbance to the public and to the occupants of the building.
- C. CONTRACTOR shall execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.
- D. CONTRACTOR shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
- E. CONTRACTOR shall fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- F. CONTRACTOR shall thoroughly clean and prepare all surfaces to receive new finish or covering to completely remove all dirt, dust, grease, oil, paint, loose materials, and soil.
- G. CONTRACTOR shall refinish entire surface as necessary to provide an even finish to match adjacent finishes:
  - 1. For continuous surfaces, refinish to nearest intersection.
  - 2. For an assembly, refinish entire unit.

## 3.04 DEMOLITION, CUTTING, AND REMOVAL

- A. Cutting and removal of construction shall be performed by CONTRACTOR so as not to cut or remove more than is necessary and so as not to damage adjacent work.
- B. CONTRACTOR shall cut out embedded anchorages and attachment items as required to properly provide for patching and repair of the respective finishes.
- C. CONTRACTOR shall not cut structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.
- D. CONTRACTOR shall not cut operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance.
- E. CONTRACTOR shall not cut work exposed to view (exterior or interior) in a manner resulting in noticeable reduction of visual qualities as determined by OWNER.



- F. Construction that is to remain which is loosened, cracked, or otherwise damaged or defaced as a result of careless cutting or demolition and is unsuitable for use intended shall be removed and replaced at no additional cost to OWNER.
- G. CONTRACTOR shall clean demolished areas and remove debris, waste, and rubbish from the building at the conclusion of each day's work.
- H. CONTRACTOR shall not let piled waste material endanger the structure.

## 3.05 PATCHING, EXTENDING, AND MATCHING

- A. Patching work shall conform to the standards of the Specifications where applicable and where not specified, work shall conform to the highest standards of the applicable trade.
- B. CONTRACTOR shall patch construction to match adjacent work unless noted otherwise.
- C. Patching or restoration shall be carried to natural breaks (e.g., corners) wherever possible.
- D. CONTRACTOR shall provide adequate support to substrate for patching finishes.
- E. At locations in existing areas where partitions are removed, CONTRACTOR shall patch floors, walls, and ceiling with finish material to match adjacent surfaces.
- F. Transitions:
  - 1. Where new work abuts or finishes flush with existing work, CONTRACTOR shall make the transition as smooth as possible.
  - 2. Patched work shall match adjacent work in texture and appearance so as to make the patch or transition invisible to the eye at a distance of 3 feet.
  - 3. Where masonry, tile, plaster, metal or other finished surface is cut in such a way that a smooth transition is not possible, CONTRACTOR shall terminate the existing surface in a neat fashion along a straight line at a natural line of division and provide trim appropriate to the finished surface.
  - 4. Where two or more spaces are indicated to become one space, CONTRACTOR shall rework floors and ceilings so that horizontal planes are without breaks, steps, or bulkheads, unless shown otherwise.
  - 5. In case of extreme level changes (3 inches or more) review condition with ENGINEER prior to making transition.
  - 6. CONTRACTOR shall restore existing work that is damaged during patching operations to a condition equal to its construction at the time of the start of work.

## 3.06 UNANTICIPATED MECHANICAL AND ELECTRICAL WORK EXPOSED

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

4. Unless otherwise shown, abandoned piping, ductwork, conduit, or other mechanical or electrical items in chases, vertical enclosures, or concealed above ceilings shall be completely removed.
- B. Removals, capping, or otherwise terminating services which are abandoned shall be accomplished without additional cost to OWNER.
- C. Relocation of services resulting from unanticipated conflicts of new and existing work in concealed spaces shall be paid for in accordance with the General Conditions.

END OF SECTION

### REGULATORY REQUIREMENTS

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. OSHA Requirements.
  - 2. Roadway Limits.
  - 3. Permits.
  - 4. Wage Rates.
  - 5. Recording and Preserving Historical and Archaeological Finds.

##### 1.02 OSHA REQUIREMENTS

- A. All work including site safety, equipment, materials, and fabricated items provided under the Contract shall comply with the provisions of the "Occupational Safety and Health Act" (OSHA), the Kentucky Occupational Safety and Health Act (KYOSH), and all other applicable federal, state, county and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified in other parts of these Contract Documents. Where any of these are in conflict, the more stringent requirements shall be followed.
- B. CONTRACTOR's failure to thoroughly familiarize itself with the aforementioned safety provisions shall not relieve CONTRACTOR from compliance with the obligations and penalties set forth therein.

##### 1.03 ROADWAY LIMITS

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

##### 1.04 PERMITS

- A. The following permits were obtained by OWNER:
  - 1. Kentucky Division of Water (KDOW) Stream Construction Permit.
  - 2. KDOW Construction Permit.
  - 3. United States Army Corps of Engineers Nationwide Permit.
  - 4. Kentucky Transportation Cabinet Encroachment Permit.
- B. They are included as attachments. CONTRACTOR shall comply with all provisions of these permits and shall be responsible for notifications as required by these permits. CONTRACTOR shall obtain all other permits required for the Work. Where the requirements of any permit is more restrictive than the Drawings or the Specifications, the permit requirements shall govern.
- C. A building permit will be required from OWNER. However, OWNER will waive fees associated with the permit.

- D. Any permits required for dewatering operations shall be obtained and paid for by CONTRACTOR.

1.05 WAGE RATES

- A. Not less than the prevailing wage rates for this area shall be paid to the workers employed to do the work under this Contract. CONTRACTOR shall comply with those sections of Chapter 337 of the Kentucky Revised Statutes relating to hours and wages for labor employed upon public works and to the wage rates prevailing in this locality which are applicable to this Contract. Extracts of the law on wages and hours and a schedule of wage rates are attached hereto and made a part thereof.
- B. CONTRACTOR shall also comply with the attached Davis-Bacon Federal Wage Rates. The highest wage rate shall apply.

1.06 RECORDING AND PRESERVING HISTORICAL AND ARCHAEOLOGICAL FINDS

- A. In the event archaeological materials (arrowheads, stone tools, stone axes, prehistoric and historic pottery, bottles, foundations, Civil War artifacts, and other types of artifacts) are uncovered during the construction of the Project, Work is to immediately cease at the location and the Kentucky Heritage Council shall be contacted. The telephone number is (502) 564-7005. Construction shall not commence at this location until a written release is received from the Kentucky Heritage Council. Failure to report a find could result in legal action.

PART 2-PRODUCTS

NOT APPLICABLE

PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

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## SECTION 01090

### REFERENCE STANDARDS AND DEFINITIONS

#### PART 1-GENERAL

##### 1.01 SUMMARY

###### A. Work Included:

###### 1. Reference Standards:

- a. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
- b. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is CONTRACTOR's responsibility to provide materials and workmanship which meet or exceed that specifically named code or standard.
- c. It is also CONTRACTOR's responsibility, when so required by the Contract Documents, to deliver to ENGINEER all required proof that the material or workmanship, or both, meet or exceed the requirements of the specifically named code or standard.

###### 2. Definitions:

- a. A substantial amount of specification language constitutes definitions for terms found in other Contract Documents, including the Drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon.
- b. Certain terms used in the Contract Documents are defined generally in this section to supplement definitions of the Agreement, General Conditions, Supplementary Conditions, and other general contract documents.
- c. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the Work.

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

##### 1.02 QUALITY ASSURANCE

###### A. Familiarity with Pertinent Codes and Standards:

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

###### B. Overlapping or Conflicting Requirements:

1. Where compliance with two or more industry standards or sets of requirements are specified, and the overlapping of those standards or requirements establishes different or conflicting minimums or levels of quality, the most stringent requirement (which is

generally recognized to be also most costly) is intended and will be enforced, unless more detailed language written directly into Contract Documents clearly indicates that a less stringent requirement is acceptable.

2. Refer all uncertainties to ENGINEER for decision before proceeding.

## 1.03 REFERENCE STANDARDS

- A. Applicable standards of the construction industry are made a part of the Contract Documents by reference as if copied directly into the Contract Documents, or as if published copies were bound herewith. See Article 3.02 of the General Conditions for additional provisions regarding references.
- B. Standards referenced directly in the Contract Documents or by governing regulation, have precedence over nonreferenced standards which are recognized in industry for applicability to the Work.
- C. Nonreference standards are hereby defined to have no particular applicability to the work except as a general measurement of whether the Work complies with standards recognized in the construction industry.
- D. Reference standards and codes listed in these specifications may include, but are not necessarily limited to, standards or codes published by the following agencies and organizations:

1. AA            Aluminum Association  
                 900 19th Street, NW, Washington, DC 20006
2. AAMA        American Architectural Manufacturer's Association  
                 1827 Walden Office Square, Schaumburg, IL 60173
3. AASHTO     American Association of State Highway & Transportation Officials  
                 444 North Capitol Street, NW, Washington, DC 20001
4. ACI          American Concrete Institute  
                 38800 Country Club Drive, Farmington Hills, MI 48331
5. AI            Asphalt Institute  
                 Research Park Drive, P.O. Box 14052, Lexington, KY 40512-4052
6. AISC        American Institute of Steel Construction  
                 One East Wacker Drive, Suite 3100, Chicago, IL 60601-2001
7. AISI        American Iron and Steel Institute  
                 1101 17th Street, NW, Suite 1300, Washington, DC 20036
8. ANSI        American National Standards Institute  
                 11 West 42nd Street, New York, NY 10036
9. APA        American Plywood Association  
                 7011 So. 19th, Tacoma, WA 98466

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- 10. API      American Petroleum Institute  
12201 L Street, NW, Washington, DC 20005-4070
- 11. ARI      Air-Conditioning & Refrigeration Institute  
4100 N. Fairfax Drive, Suite 200, Arlington, VA 22203
- 12. ASHRAE    American Society of Heating, Refrigerating, and Air Conditioning Engineers  
1791 Tullie Circle, NE; Atlanta, GA 30329
- 13. ASME      American Society of Mechanical Engineers  
Three Park Avenue, New York, NY 10016-5990
- 14. ASSE      American Society of Sanitary Engineering  
901 Canterbury, Suite A, Westlake, OH 44145
- 15. ASTM      American Society for Testing and Materials  
100 Barr Harbor Drive, West Conshohocken, PA 19428-2959
- 16. AWI      Architectural Woodwork Institute  
1952 Isaac Newton Square West, Reston, VA 20190
- 17. AWPA      American Wood-Preserver's Association  
P.O. Box 388, Selma, AL 36702-0388
- 18. AWS      American Welding Society  
550 N.W. LeJune Road, Miami, FL 33126
- 19. AWWA      American Waterworks Association  
6666 West Quincey Avenue, Denver, CO 80235
- 20. BHMA      Builder's Hardware Manufacturers Association  
355 Lexington Avenue, 17th floor; New York, NY 10017
- 21. BIA      Brick Industry Association  
11490 Commerce Park Drive, Reston, VA 20191-1525
- 22. CRSI      Concrete Reinforcing Steel Institute  
9333 N. Plum Grove Road, Schaumburg, IL 60173
- 23. EJMA      Expansion Joint Manufacturers Association  
25 North Broadway, Tarrytown, NY 10591
- 24. FM      Factory Mutual System  
FM Global Corporate Offices, 1301 Atwood Avenue, PO Box 7500,  
Johnston, RI 02919
- 25. FS      Federal Specification (General Services Admin.)  
Bldg. 197, Washington Navy Yard; Washington, DC 20407
- 26. FTI      Facing Tile Institute  
Box 8880, Canton, OH 44711

- 27. GA           Gypsum Association  
810 1st St., NE, Washington, DC 20002
- 28. GANA       Glass Association of North America  
2945 SW Wanamaker Drive, Suite A, Topeka, KS 66614
- 29. IESNA       Illuminating Engineering Society of North America  
120 Wall Street, Floor 17, New York, NY 10005
- 30. MIL         Military Specifications  
Naval Publications and Forms Center  
5801 Tabor Avenue, Philadelphia, PA 19120
- 31. NAAMM      National Association of Architectural Metal Manufacturers  
8 South Michigan Avenue, Suite 1000, Chicago, IL 60603
- 32. NCMA       National Concrete Masonry Association  
13750 Sunrise Valley Drive, Herndon, VA 20171-4662
- 33. NECA        National Electrical Contractors Association  
3 Bethesda Metro Center, Suite 1100, Bethesda, MD 20814
- 34. NEMA        National Electrical Manufacturers Association  
1300 North 17th Street, Suite 1847, Rosslyn, VA 22209
- 35. NFPA        National Fire Protection Association  
1 Batterymarch Park, Quincy, MA 02169-7471
- 36. NIS          National Institute of Standards  
(U.S. Department of Commerce), 100 Bureau Drive, Stop 3460  
Gaithersburg, MD 20899-3460
- 37. NRCA        National Roofing Contractors Association  
10255 W. Higgins Road, Suite 600, Rosemont, IL 60018
- 38. NSF          National Sanitation Foundation International  
P.O. Box 130140, 789 N. Dixboro Road, Ann Arbor, MI 48113-0140
- 39. OSHA        Occupational Safety & Health Administration  
200 Constitution Avenue, NW, Washington, DC 20210
- 40. PCA          Portland Cement Association  
5420 Old Orchard Road, Skokie, IL 60077
- 41. PCI          Prestressed Concrete Institute  
209 W. Jackson Blvd., Chicago, IL 60606-6938
- 42. SAE          Society of Automotive Engineers  
SAE World Headquarters  
400 Commonwealth Drive, Warrendale, PA 15096-0001



- 43. SDI            Steel Deck Institute  
                    P.O. Box 25, Fox River Grove, IL 60021
- 44. SDI            Steel Door Institute  
                    30200 Detroit Rd., Cleveland, OH 44145-1987
- 45. SIGMA        Sealed Insulating Glass Manufacturers Assoc.  
                    401 N. Michigan Avenue, Chicago, IL 60611-4267
- 46. SJI            Steel Joist Institute  
                    3127 10th Ave. North Ext., Myrtle Beach, SC 29577-6760
- 47. SMACNA      Sheet Metal and Air Conditioning  
                    Contractor's National Association  
                    4201 Lafayette Center Drive, Chantilly, VA 20151-1209
- 48. SSPC        Society for Protective Coatings  
                    40 24th Street, 6th Floor, Pittsburgh, PA 15222-4656
- 49. TCA           Tile Council of America  
                    100 Clemson Research Blvd., Anderson, SC 29625
- 50. UBC           Uniform Building Code  
                    5360 Workman Mill Road; Whittier, CA 90601-2298
- 51. UL            Underwriters' Laboratories  
                    333 Pfingston Road; Northbrook, IL 60062

## 1.04 SUBMITTALS

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

## 1.05 DEFINITIONS

- A. Indicated:
  - 1. The term "indicated" is a cross-reference to details, notes, or schedules on the drawings, to other paragraphs or schedules in the specifications and to similar means of recording requirements in the Contract Documents.
  - 2. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated", it is for the purpose of helping the reader locate cross-reference, and no limitation is intended except as specifically noted.
- B. Approve (or Words of Similar Nature):
  - 1. Where used in conjunction with ENGINEER's response to submittals, requests, applications, inquiries, reports, and claims by CONTRACTOR, the meaning of the term "approve" will be held to the limitation of ENGINEER's responsibilities and duties as specified in Paragraph 1.02.B.1. of the General Conditions.
  - 2. In no case will "approval" by ENGINEER be interpreted as a release of CONTRACTOR from responsibility to fulfill requirements of the Contract Documents.

- C. Minimum Requirements:
1. Indicated requirements are for a specific minimum acceptable level of quality or quantity, as recognized in the industry.
  2. Actual work must comply with (or within specified tolerances) or exceed minimums.
  3. CONTRACTOR shall refer uncertainties to ENGINEER before proceeding.
- D. Abbreviations: Abbreviations, where not defined in the Contract Documents, will be interpreted to mean the normal construction industry terminology.

## PART 2--PRODUCTS

NOT APPLICABLE

## PART 3--EXECUTION

NOT APPLICABLE

END OF SECTION

### SUBMITTALS

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Whenever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.
  - 2. To facilitate CONTRACTOR's understanding of the design intent, procedures have been established for advance submittal of design data and for its review or rejection by ENGINEER.
  - 3. The type of submittal requirements specified in this section include progress schedule, shop drawings, product data, samples, and other miscellaneous work related submittals.
- B. Related work described elsewhere: More detailed requirements for submittals are described in other sections of these specifications for some materials and equipment. They are to be considered additional requirements to supplement the requirements specified in this section. Submittals shall conform to Article 6 of the General Conditions.
- C. Definitions: "Electronic Submittal" is defined as any submittal transmitted electronically to ENGINEER for review.

##### 1.02 IDENTIFICATION OF SUBMITTALS

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

##### 1.03 GROUPING OF SUBMITTALS

- A. Unless otherwise specifically permitted by ENGINEER, CONTRACTOR shall make all submittals in groups containing all associated items so that information is available for checking each item when it is received.
- B. Partial submittals may be rejected as not complying with the provisions of the Contract Documents.

##### 1.04 TIMING OF SUBMITTALS

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

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

#### 1.05 CONSTRUCTION PROGRESS SCHEDULE

- A. Submit initial schedule in duplicate within 10 days after date of OWNER-CONTRACTOR Agreement.
- B. Revise and resubmit as required.
- C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
- D. Submit a horizontal bar chart with separate line for each major portion of Work or operation, identifying first workday of each week.
- E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
- F. Indicate estimated percentage of completion for each item of Work at each submission.
- G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates.

#### 1.06 SHOP DRAWINGS

- A. Shop drawings shall include specially prepared technical data for this project including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements, and similar information not in standard printed form for general application to a range of similar projects. Shop drawings shall be submitted for all manufactured or fabricated items. See individual technical sections for special requirements.
- B. CONTRACTOR shall make all shop drawings accurately to scale and sufficiently large to show all pertinent aspects of the item and its method of connection to the work.
- C. Shop drawings shall be checked, approved, and stamped by CONTRACTOR in accordance with the General Conditions before transmittal to ENGINEER for review and approval.
- D. Complete shop drawings and descriptive data shall be submitted on all manufactured or fabricated items prior to 25% completion of the Work. Applications for payment beyond 25% of the Contract amount will not be recommended for payment until all shop drawings are submitted or a revised schedule for any remaining submittals is agreed to by OWNER and ENGINEER.
- E. CONTRACTOR shall submit shop drawings following the procedure described below. Except as noted, six color copies of shop drawings and descriptive data shall be submitted to ENGINEER for approval. Three copies of these will be returned to CONTRACTOR if approved. If shop drawings are not approved or if they are stamped "Approved as Noted-Resubmit," two corrected copies will be returned to CONTRACTOR for use in

resubmittal. If CONTRACTOR desires more than three approved copies, submitted quantity shall be increased accordingly.

- F. Shop drawings shall be submitted in 3-tab report covers, binder clips, or large envelopes.
- G. Shop drawings submitted to ENGINEER will be reviewed and stamped "Approved," "Approved as Noted," "Approved as Noted-Resubmit," or "Not Approved." CONTRACTOR shall resubmit the above number of corrected shop drawings for all shop drawings stamped "Approved as Noted-Resubmit" and "Not Approved" and will continue this process until shop drawings are stamped "Approved" or "Approved as Noted." If drawings are stamped "Approved as Noted-Resubmit," fabrication may proceed in accordance with the marked-up shop drawings. Installation shall not proceed until shop drawings have been resubmitted and stamped "Approved" or "Approved as Noted."
- H. If shop drawings are stamped "Approved as Noted" or "Approved as Noted-Resubmit" and CONTRACTOR does not agree with revisions or cannot conform with revisions, fabrication shall not proceed and shop drawings shall be resubmitted with explanation of CONTRACTOR's position.
- I. All shop drawings used for construction site activities shall bear the "Approved" or "Approved as Noted" stamp of ENGINEER.
- J. Arrangements may be made between CONTRACTOR and ENGINEER to provide additional copies of "Approved" shop drawings for field activity purposes.

## 1.07 COLORS AND PATTERNS

- A. Unless the precise color and pattern is specifically described in the Contract Documents, whenever a choice of color or pattern is available in a specified product, CONTRACTOR shall submit accurate color charts and pattern charts to ENGINEER for OWNER's review and selection.
- B. Unless all available colors and patterns have identical wearing capabilities and are identically suited for the installation, CONTRACTOR shall completely describe the relative capabilities of each.

## 1.08 SAMPLES AND FIELD MOCK-UPS

- A. CONTRACTOR shall provide samples and field mock-ups where noted or specified.
- B. Samples are physical examples which illustrate materials, equipment, or workmanship and establish standards by which the work will be judged.
- C. Samples shall be of sufficient size and quantity to clearly illustrate the functional characteristics of the product and full range of color, texture, and pattern.
- D. Samples shall have labels firmly attached, bearing the following information:
  - 1. Name of project.
  - 2. Description of product and finish.
  - 3. Name of CONTRACTOR.
  - 4. Trade name and number of product.
  - 5. Standards met by the product.

- E. Approval of samples must be obtained prior to proceeding with any work affected by material requiring sample approval.
- F. Samples, unless otherwise noted, become the property of OWNER.
- G. In situations specifically approved by ENGINEER, the retained sample may be used in the construction as one of the installed items.
- H. Field mock-ups:
  - 1. CONTRACTOR shall erect field mock-ups at the project site in a location acceptable to ENGINEER and OWNER.
  - 2. When accepted by ENGINEER, the mock-up will become the basis for comparison of the actual work.
  - 3. Remove mock-up at conclusion of the work if it was not incorporated into the work.

## 1.09 PRODUCT DATA

- A. CONTRACTOR shall provide product data as required to supplement shop drawings.
- B. Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by CONTRACTOR to illustrate a material, product, or system for some portion of the work.
- C. CONTRACTOR shall collect required product data into one submittal for each unit of work or system.
- D. CONTRACTOR shall include manufacturer's standard printed recommendations for application and use, compliance with standards, performance characteristics, wiring and piping diagrams and controls, component parts, finishes, dimensions, required clearances, and other special coordination requirements.
- E. CONTRACTOR shall mark each copy of standard printed data to identify pertinent products, models, options, and other data.
- F. CONTRACTOR shall supplement manufacturer's standard data to provide information unique to the work.

## 1.10 RESUBMISSION REQUIREMENTS

- A. Make any corrections or changes in the submittals required by ENGINEER.
- B. Shop Drawings and Product Data:
  - 1. Revise initial drawings or data and resubmit as specified for initial submittal.
  - 2. Itemize in a cover letter any changes which have been made other than those requested by ENGINEER.
- C. Electronic shop drawing resubmissions shall follow the nomenclature described in Section 1.06.J.2.f.
- D. See SC-6.17 for additional information regarding resubmittals.

## 1.11 MANUFACTURER'S DIRECTIONS

- A. Manufactured articles, materials, and equipment shall be stored, commissioned, operated, applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer, unless specified to the contrary.
- B. Wherever specifications call for work to be performed or materials to be installed in accordance with the manufacturer's printed instructions or directions, CONTRACTOR shall furnish copies as required for shop drawings of those instructions or directions to ENGINEER before installing the material or performing the work.

## 1.12 MAINTENANCE MANUAL

- A. Prior to 50% completion of the Contract or at a minimum of 45 days prior to the scheduled start-up date of any individual item of equipment, whichever is earlier, CONTRACTOR shall furnish to ENGINEER four complete copies of a maintenance manual for all equipment furnished. Applications for payment beyond 50% of the contract amount will not be recommended for payment until all maintenance manuals are submitted or a revised schedule for remaining maintenance manuals is agreed to by OWNER and ENGINEER.
- B. The manuals shall include manufacturer's instructions for maintenance and operation for each item of mechanical and electrical equipment. Manuals shall be specific for the equipment as installed; provide project specific inserts as required. Manuals shall contain: operation instructions, lubrication schedules, types and quantities, preventative maintenance program, spare parts list, parts lists, I.D. No. and exploded views, assembly instructions, parts supplier location, trouble shooting and startup procedures and, where applicable, test data and curves.
- C. All sheets have reduced dimensions as described for shop drawings, and shall be furnished in 3-ring binders or 3-tab report covers.

## PART 2-PRODUCTS

NOT APPLICABLE

## PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

### QUALITY CONTROL

#### PART 1-GENERAL

##### 1.01 SUMMARY

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

##### 1.02 QUALITY ASSURANCE-CONTROL OF INSTALLATION

- A. CONTRACTOR shall monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. CONTRACTOR shall comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, CONTRACTOR shall request clarification from ENGINEER before proceeding.
- D. CONTRACTOR shall comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Work shall be performed by persons qualified to produce workmanship of specified quality.
- F. CONTRACTOR shall secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

##### 1.03 TOLERANCES

- A. CONTRACTOR shall monitor tolerance control of installed products to produce acceptable work and shall not permit tolerances to accumulate.
- B. CONTRACTOR shall comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from ENGINEER before proceeding.
- C. CONTRACTOR shall adjust products to appropriate dimensions; position before securing products in place.

##### 1.04 MANUFACTURERS' FIELD SERVICES AND REPORTS

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



- B. CONTRACTOR shall submit qualifications of observer to ENGINEER 30 days in advance of required observations.
- C. CONTRACTOR shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. CONTRACTOR shall submit report in duplicate within 30 days of observation to ENGINEER for information.

## PART 2-PRODUCTS

NOT APPLICABLE

## PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

### TEMPORARY FACILITIES

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Temporary utilities.
  - 2. Temporary stairs and access.
  - 3. Temporary support facilities.
  - 4. Construction sign.
  - 5. Removal of temporary facilities.
- B. CONTRACTOR shall arrange for and provide temporary facilities as required for proper and expeditious prosecution of the Work.
- C. CONTRACTOR shall pay all costs, except as otherwise specified, until final acceptance of the Work unless OWNER makes arrangements for use of completed portions of the Work after substantial completion in accordance with the provisions of the General Conditions.
- D. CONTRACTOR shall make all temporary connections to utilities and services in locations acceptable to OWNER and local authorities having appropriate jurisdiction.
  - 1. Furnish all necessary labor and materials.
  - 2. Make all installations in a manner subject to the acceptance of such authorities and OWNER.
  - 3. Maintain such connections.
  - 4. Remove temporary installation and connection when no longer required.
  - 5. Restore services and sources of supply to proper operating conditions.

##### 1.02 TEMPORARY UTILITIES

- A. Temporary Toilets: CONTRACTOR shall provide and maintain sanitary temporary chemical toilets located where approved by OWNER and in sufficient number required for the work force employed by CONTRACTOR.
- B. Temporary Electrical Services:
  - 1. CONTRACTOR shall make all necessary arrangements, furnish, install, and maintain necessary temporary electrical services at the Site. Temporary power and lighting services shall be adequate for the construction of this Project and in accordance with OSHA Requirements for Construction Projects. CONTRACTOR shall remove all temporary services when Project is complete.
  - 2. All utility charges for installation of the temporary services shall be paid for by CONTRACTOR. All metering installation charges and all energy charges for electric current used for temporary lighting and power are to be paid by CONTRACTOR.
  - 3. No permanent electrical equipment or wiring shall be used without express written permission of OWNER. Such approval, if given, shall not affect guarantee period. If OWNER authorizes use of permanent service facilities, CONTRACTOR shall pay all metering costs until acceptance or occupancy (whichever occurs first) of building by OWNER.

- C. Weather Protection and Temporary Heat:
1. CONTRACTOR shall provide weather protection to protect the Work from damage because of freezing, rain, snow, and other inclement weather.
  2. CONTRACTOR shall provide temporary heat within buildings, without cost to OWNER, from the time the buildings or portions thereof are enclosed until the Project is accepted or occupied by OWNER, whichever occurs first. The building work is to be heated during construction so a minimum temperature of 50°F is maintained at all times. The temporary heating equipment shall be of a type approved by ENGINEER.
  3. Tanks that are constructed and existing tanks taken out of service as part of the Work shall be protected by CONTRACTOR from damage because of frost by insulating, enclosure, heating, or a combination of methods as required.
  4. No permanent heating equipment shall be used on a temporary basis without express written permission by OWNER. Such approval, if given, shall not affect the guarantee period. If OWNER authorizes use of permanent heating equipment, CONTRACTOR shall pay all related energy costs until acceptance or occupancy (whichever occurs first) of the building by OWNER.
- D. Temporary Water: For Contract 1-2012, CONTRACTOR shall supply its own water during construction. For Contract 2-2012, CONTRACTOR may utilize water provided by OWNER. CONTRACTOR shall also provide its own piping, valves, and appurtenances for its requirements. Connection to the existing water system shall be coordinated with OWNER and shall meet all code requirements including disinfection and backflow prevention.
- E. Temporary Fire Protection: CONTRACTOR and Subcontractor(s) who maintain or provide an enclosed shed or trailer shall provide and maintain in operating order in each shed or trailer a minimum of one fire extinguisher. More extinguishers shall be provided as necessary. Fire extinguishers shall be minimum dry chemical, nonfreezing-type, UL rating 2A-30BC, with 10-pound capacity for Class A, B, and C fires.
- F. CONTRACTOR's and Subcontractor(s)' personnel shall refrain from smoking during excavation, laying pipe, backfilling, and other work at the Site which may involve potential contact with explosive vapors or gasoline products.

## 1.03 TEMPORARY STAIRS AND ACCESS

- A. CONTRACTOR shall provide and maintain all equipment such as temporary stairs, ladders, ramps, runways, chutes, and so on as required for proper execution of the Work. CONTRACTOR shall be responsible for providing its own scaffolds, hoists, etc.
- B. All such apparatus, equipment, and construction shall meet all requirements of OSHA, the labor laws, and other applicable State and local laws. Provide stairs with handrails. As soon as possible and where applicable, permanent stairs shall be installed.
- C. As soon as permanent stairs are created, provide temporary protective treads, handrails, and shaft protection.
- D. Provide barricades at hazardous locations, complete with signs, temporary general lighting, warning lights, and similar devices as required.

## 1.04 TEMPORARY SUPPORT FACILITIES

- A. CONTRACTOR shall provide whatever facilities and services which may be needed to properly support primary construction process and meet compliance requirements and governing regulations.
- B. CONTRACTOR shall not use permanent facilities except as otherwise indicated, unless authorized by OWNER.

## 1.05 CONSTRUCTION SIGN

- A. Construction signs are desired by OWNER for Contracts 1-2012 and 2-2012. Furnish and erect a construction sign to be maintained and kept in place until completion of the Contract at location directed by OWNER.
- B. The sign shall be minimum 4-feet high by 8-feet wide, constructed by a professional sign painter, and shall show the name of the Project, OWNER, all prime contractors and ENGINEER. OWNER will select colors of paint required. General sign layout shall be as shown on Drawing 01-975-158A attached at the end of these Specifications.

## 1.06 REMOVAL OF TEMPORARY FACILITIES

- A. Remove temporary materials, equipment, services, and construction as soon as practicable but no later than just prior to final completion inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities and restore existing facilities used during construction to specified, or to original, condition.
- C. Minor temporary facilities which interfere with OWNER's operations shall be removed at the end of each Work period.

## PART 2-PRODUCTS

NOT APPLICABLE

## PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

## TEMPORARY CONTROLS

### PART 1--GENERAL

#### 1.01 SUMMARY

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

### PART 2--PRODUCTS

NOT APPLICABLE

### PART 3--EXECUTION

#### 3.01 DUST CONTROL

- A. CONTRACTOR shall execute the Work by methods to minimize raising dust from construction operations.
- B. CONTRACTOR shall provide positive means to prevent air-borne dust from dispersing into atmosphere.
- C. CONTRACTOR shall provide partitions, enclosures, etc., within buildings as necessary to confine dust and protect adjacent areas.

#### 3.02 WATER, EROSION, AND SEDIMENT CONTROL

- A. CONTRACTOR shall grade site to drain and shall maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. CONTRACTOR shall protect Site from puddling or running water.
- C. CONTRACTOR shall provide erosion control measures as necessary to control discharge of sediment laden water to surface waters and wetlands.
- D. Except as provided for in the document, overland discharge of water from dewatering operations shall not be allowed. Depending on water quality, such water shall either be piped directly to the surface water or shall be directed to sedimentation basins or other such structures or features prior to discharge to surface waters so as not to cause damage to existing ground and improvements, erosion, or deposition in the discharge area.

- E. CONTRACTOR shall use jute or synthetic netting, silt fences, straw bales, dikes, channels, and other applicable measures to prevent erosion of soils disturbed by its construction operation.
- F. Restoration of the Site shall proceed concurrently with the construction operation. See Drawings and Specifications for erosion control measures in addition to that which may be required above.
- G. Erosion control measures shall comply with the following document: Kentucky's Best Management Practices for Construction Activities.

## 3.03 NOISE CONTROL

- A. Provide methods, means, and facilities to minimize noise produced by construction operations.

## 3.04 TRAFFIC CONTROL

- A. CONTRACTOR shall be responsible for providing all signs, barricades, flagmen and other traffic control devices in the construction zone.
- B. CONTRACTOR shall be responsible for providing all signs, barricades, flagmen and other traffic control devices in the construction zone. All traffic control measures shall meet the requirements Manual on Uniform Traffic Control Devices for Streets and Highways, Latest Edition.
- C. Do not close or obstruct roadways without approval of OWNER.
- D. Maintain two-way traffic on streets at all times. CONTRACTOR for Contract 2-2012 may close the alley adjacent to the water treatment plant from Sycamore Street to the plant property for up to two weeks. A one month notice must be given to the OWNER in advance of closing.
- E. Conduct operations with minimum interference to roadways.

## 3.05 SITE SECURITY

- A. CONTRACTOR shall have the sole responsibility of safeguarding the Site perimeter to prevent unauthorized entry to the Site throughout the duration of the Project. CONTRACTOR shall at all times provide such permanent and temporary fencing or barricades or other measures as may be necessary to restrict unauthorized entry to its construction area including construction in public rights-of-way or easements. Site security measures shall include safeguards against attractive nuisance hazards as a result of construction activity.
- B. CONTRACTOR shall at all times be responsible for the security of the Work including materials and equipment. OWNER will not take any responsibility for missing or damaged equipment, tools, or personal belongings. CONTRACTOR shall have the sole responsibility of safeguarding the Work and the Site throughout the duration of the Project.

## 3.06 DAILY CLEANUP

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

END OF SECTION

# DRAFT-(01.03.2013)

SECTION 01590

## FIELD OFFICES AND SHEDS

### PART 1-GENERAL

#### 1.01 SUMMARY

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

### PART 2-PRODUCTS

#### 2.01 MATERIALS, EQUIPMENT, AND FURNISHINGS

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

#### 2.02 CONSTRUCTION

- A. Portable or mobile buildings, or buildings shall be constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
- B. CONTRACTOR shall provide structurally sound, secure, weathertight enclosures for office and storage spaces.
- C. Temperature transmission resistance of floors, walls, and ceilings shall be compatible with occupancy and storage requirements.
- D. Exterior materials shall be weather resistant.
- E. Interior materials in offices shall consist of sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.
- F. Lighting for offices shall be 50-foot candles minimum at desk top height, with exterior lighting at entrance doors.
- G. Provide appropriate type fire extinguisher at each office and each storage area.
- H. Interior materials in storage sheds shall be as required to provide specified conditions for storage of products.



## 2.03 ENVIRONMENTAL CONTROL

- A. Heating, cooling, and ventilating for offices shall consist of automatic equipment to maintain comfort conditions; 70°F heating and 78°F cooling.
- B. Heating and ventilation for storage spaces shall be as needed to maintain products in accordance with Contract Documents and to provide adequate lighting for maintenance and observation of products.

## 2.04 CONTRACTOR OFFICE AND FACILITIES

- A. CONTRACTOR shall provide facilities to meet CONTRACTOR's needs and to provide space for Project meetings.
- B. Provide telephone as required for CONTRACTOR's needs.
- C. Provide furnishings in meeting area. As a minimum, provide conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.

## 2.05 STORAGE AREAS AND SHEDS

- A. Provide storage areas and sheds of size to meet storage requirements for products of individual sections, allowing for access and orderly provision for maintenance and for observation of products to meet requirements of Section 01600–Materials and Equipment.

## PART 3–EXECUTION

### 3.01 PREPARATION

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

### 3.02 INSTALLATION

- A. CONTRACTOR shall install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed or as agreed upon by ENGINEER.
- B. Provide two hard surfaced parking spaces for use by ENGINEER, connected to office by hard surfaced walk.

### 3.03 MAINTENANCE AND CLEANING

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

### 3.04 REMOVAL

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

END OF SECTION

### MATERIALS AND EQUIPMENT

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included: CONTRACTOR shall be responsible for the delivery, handling, storage and protection of all material and equipment required to complete the Work as specified herein.
- B. Related Sections and Divisions: Specific requirements for the handling and storage of material and equipment are described in other sections of these Specifications.

##### 1.02 PRODUCTS

- A. Components required to be supplied in quantity within a Specification section shall be the same, and shall be interchangeable.
- B. CONTRACTOR shall not use materials and equipment removed from existing construction, except as specifically required, or allowed, by the Contract Documents.
- C. When any construction deviations from the Drawings and/or Specifications necessary to accommodate equipment supplied by CONTRACTOR, result in additional costs to CONTRACTOR or other contractors, such additional costs shall be borne by CONTRACTOR. CONTRACTOR shall also pay any additional costs necessary for revisions of Drawings and/or Specifications by ENGINEER.
- D. Each major component of equipment shall bear a nameplate giving the name and address of the manufacturer and the catalogue number or designation.

##### 1.03 TRANSPORTATION AND HANDLING

- A. Materials, products and equipment shall be properly containerized, packaged, boxed, and protected to prevent damage during transportation and handling.
- B. CONTRACTOR shall not overload any portion of the structure in the transporting or storage of materials.
- C. CONTRACTOR shall not damage other construction by careless transportation, handling, spillage, staining or impact of materials.
- D. CONTRACTOR shall provide equipment and personnel to handle products, including those provided by OWNER, by methods to prevent soiling and damage.
- E. CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.
- F. CONTRACTOR shall handle product by methods to avoid bending or overstressing. Lift large and heavy components only at designated lift points.

## 1.04 DELIVERY AND RECEIVING

- A. CONTRACTOR shall arrange deliveries of products in accordance with the Progress Schedule, allowing time for observation prior to installation.
- B. CONTRACTOR shall coordinate deliveries to avoid conflict with the Work and conditions at the Site; work activities of other contractors or OWNER; limitations on storage space; availability of personnel and handling equipment and OWNER's use of premises.
- C. CONTRACTOR shall deliver products in undamaged, dry condition, in original unopened containers or packaging with identifying labels intact and legible.
- D. CONTRACTOR shall clearly mark partial deliveries of component parts of equipment to identify equipment and contents to permit easy accumulation of parts and to facilitate assembly.
- E. Immediately on delivery, CONTRACTOR shall inspect shipment to assure:
  - 1. Product complies with requirements of Contract Documents and reviewed submittals.
  - 2. Quantities are correct.
  - 3. Accessories and installation hardware are correct.
  - 4. Containers and packages are intact and labels legible.
  - 5. Products are protected and undamaged.

## 1.05 STORAGE AND PROTECTION

- A. General:
  - 1. CONTRACTOR shall store products, immediately on delivery, in accordance with manufacturer's instructions, with all seals and labels intact and legible.
  - 2. Available storage space at the Site is limited. Any additional off-site space required shall be arranged by CONTRACTOR.
  - 3. CONTRACTOR shall allocate the available storage areas and coordinate their use by the trades on the job.
  - 4. CONTRACTOR shall arrange storage in a manner to provide access for maintenance of stored items and for observation.
- B. In enclosed storage, CONTRACTOR shall:
  - 1. Provide suitable temporary weather tight storage facilities as may be required for materials that will be damaged by storage in the open.
  - 2. Maintain temperature and humidity within ranges stated in manufacturer's instructions.
  - 3. Provide ventilation for sensitive products as required by manufacturer's instructions.
  - 4. Store unpacked and loose products on shelves, in bins, or in neat groups of like items.
  - 5. Store solid materials such as insulation, tile, mechanical and electrical equipment, fittings, and fixtures under shelter, in original packages, away from dampness and other hazards.
  - 6. Store liquid materials away from fire or intense heat and protect from freezing.
- C. At exterior storage, CONTRACTOR shall:
  - 1. Store unit materials such as concrete block, brick, steel, pipe, conduit, door frames, and lumber off ground, out of reach of dirt, water, mud and splashing.
  - 2. Store tools or equipment that carry dirt outside.
  - 3. Store large equipment so as not to damage the Work or present a fire hazard.

4. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet material and provide ventilation to avoid condensation.
5. Completely cover and protect any equipment or material which is prime coated or finish painted with secured plastic or cloth tarps. Store out of reach of dirt, water, mud and splashing.
6. Store loose granular materials on clean, solid surfaces such as pavement, or on rigid sheet materials, to prevent mixing with foreign matter.
7. Provide surface drainage to prevent erosion and ponding of water.
8. Prevent mixing of refuse or chemically injurious materials or liquids.
9. Cover aggregates such as sand and gravel in cold wet weather.
10. Remove all traces of piled bulk materials at completion of work and return site to original or indicated condition.

## 1.06 MAINTENANCE OF STORAGE

- A. CONTRACTOR shall periodically inspect stored products on a scheduled basis.
- B. CONTRACTOR shall verify that storage facilities comply with manufacturer's product storage requirements, and verify that manufacturer required environmental conditions are maintained continually.
- C. CONTRACTOR shall verify that surfaces of products exposed to the elements are not adversely affected and that any weathering of finishes is acceptable under requirements of Contract Documents.
- D. CONTRACTOR shall perform scheduled maintenance of equipment in storage as recommended by the manufacturer. A record of the maintenance shall be kept and turned over to ENGINEER when the equipment is installed.

## 1.07 INSTALLATION REQUIREMENTS

- A. Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the respective manufacturers, unless otherwise specified.
- B. After installation, CONTRACTOR shall protect all materials and equipment against weather, dust, moisture, and mechanical damage.
- C. CONTRACTOR shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment until completion and final acceptance of the Work by OWNER. Damaged material and equipment shall be immediately removed from the Site.

## 1.08 CONCRETE EQUIPMENT BASE

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

- B. Concrete and grout shall meet applicable sections of the specifications.
- C. Provide all anchor bolts, metal shapes and templates to be cast in concrete or used to form concrete for support of equipment.

## PART 2-PRODUCTS

NOT APPLICABLE

## PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

## STARTING OF SYSTEMS

### PART 1-GENERAL

#### 1.01 SUMMARY

- A. Work Included:
  - 1. Starting equipment and systems.
  - 2. Demonstration and instructions.
  - 3. Start-up and testing.
- B. CONTRACTOR shall perform the Work described in the following subsections.

#### 1.02 STARTING EQUIPMENT AND SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify ENGINEER and OWNER a minimum of seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.
- D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative and CONTRACTOR's personnel in accordance with manufacturers' instructions.
- G. Require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Equipment manufacturer shall provide a written report covering checkout, testing, inspections, and start-up and shall identify any deficiencies noted. Report shall be submitted to ENGINEER. CONTRACTOR shall be responsible for correcting all deficiencies noted in report.
- I. Provide lubricants as recommended by manufacturer appropriate for start-up conditions.

#### 1.03 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to OWNER's personnel.
- B. For all mechanical equipment or systems, demonstrate project equipment and instruct in a classroom environment at a location acceptable to the OWNER and instructed by qualified manufacturers' representative who is knowledgeable about the Project.

- C. For equipment or systems requiring seasonal operation, perform demonstration for noncurrent season at start of noncurrent season.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with OWNER's personnel in detail to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. Supervision and Start-up: Installation of all equipment furnished under this Contract shall be supervised as required by a qualified representative of equipment manufacturer. All equipment shall be placed in operation by a qualified representative of the equipment manufacturer and the staff shall be trained to the satisfaction of OWNER by a qualified representative of the equipment manufacturer. OWNER may videotape training presentations given by manufacturer's representatives. Final payment for various items of equipment will not be made by OWNER until the equipment is operating to OWNER's satisfaction.
- H. Where items of equipment are placed into service at different times or sequence, manufacturer's services for start-up, field testing, and supervision shall be provided for each time or sequence. Training shall be provided prior to or at the time the first similar item of equipment is placed in service.

## 1.04 START-UP AND TESTING

- A. Prior to acceptance of any portion of the Work, start-up and testing of all equipment and testing of all materials furnished on the Project by CONTRACTOR shall have been conducted in the presence of representatives of CONTRACTOR, OWNER and ENGINEER and also manufacturer if requested by OWNER or ENGINEER.
- B. CONTRACTOR shall provide whatever temporary installations and conditions are necessary in order to perform start-up and testing operations on all equipment and materials furnished under the Contract. Temporary connections and equipment necessary during start-up and testing operations shall include, but not be limited to, temporary piping and electrical equipment and devices, temporary connection from various parts of the systems and any other labor, materials, fuel, devices or items that may be required for start-up and testing operations. Temporary conditions shall include filling with water, if necessary, to check equipment and materials.
- C. All temporary installations and conditions shall be removed by CONTRACTOR upon completion of start-up and testing.

## PART 2-PRODUCTS

NOT APPLICABLE

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PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION



# DRAFT-(01.03.2013)

## SECTION 01700

### CONTRACT CLOSEOUT

#### PART 1-GENERAL

##### 1.01 SUMMARY

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

##### 1.02 CLOSEOUT PROCEDURES

- A. CONTRACTOR shall provide submittals to ENGINEER that are required by governing or other authorities.
- B. CONTRACTOR shall comply with General Conditions and Supplementary Conditions and complete the following before requesting ENGINEER's observation of the Work, or designated portion thereof, for substantial completion.
  - 1. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates, and similar required documentation for specific units of Work, enabling OWNER's unrestricted occupancy and use.
  - 2. Submit record documentation, maintenance manuals, tools, spare parts, keys, and similar operational items.
  - 3. Submit consent of surety (if surety required in Contract).
  - 4. Complete final cleaning, touch-up work of marred surfaces, and remove temporary facilities and tools.

##### 1.03 FINAL CLEANING

- A. It is CONTRACTOR's responsibility to completely clean up the inside and outside of all buildings and the construction site at the completion of the Work.
- B. CONTRACTOR shall clean areas of the building in which painting and finishing work is to be performed just prior to the start of this work, and maintain these areas in satisfactory condition for painting and finishing. This cleaning includes:
  - 1. Removal of trash and rubbish from these areas.
  - 2. Broom cleaning of floors.
  - 3. Removal of any plaster, mortar, dust, and other extraneous materials from finish surfaces, including but not limited to exposed structural steel, miscellaneous metal, masonry, concrete, mechanical equipment, piping, and electrical equipment.
- C. In addition to the cleaning specified above and the more specific cleaning that may be required in various technical sections of the Specifications, CONTRACTOR shall prepare the Project for occupancy by a thorough cleaning throughout, which shall include the following:

1. Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
2. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
3. Replace filters of operating equipment.
4. Clean debris from roofs, gutters, downspouts, and drainage systems.
5. Clean site; sweep paved areas, rake clean landscaped surfaces.
6. Remove waste and surplus materials, rubbish, and construction facilities from the Site.

## 1.04 ADJUSTING

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

## 1.05 PROJECT RECORD DOCUMENTS

- A. CONTRACTOR shall maintain on Site, one set of the following record documents to record actual revisions to the Work:
  1. Drawings.
  2. Specifications.
  3. Addenda.
  4. Change orders and other modifications to the Contract.
  5. Reviewed shop drawings, product data, and samples.
  6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. CONTRACTOR shall ensure entries are complete and accurate, enabling future reference by OWNER.
- C. CONTRACTOR shall store record documents separate from documents used for construction.
- D. CONTRACTOR shall record information concurrent with construction progress.
- E. Specifications: CONTRACTOR shall legibly mark and record at each Product section description of actual products installed, including the following:
  1. Manufacturer's name and product model and number.
  2. Product substitutions or alternates utilized.
  3. Changes made by addenda and modifications.
- F. Record Documents and Shop Drawings: CONTRACTOR shall legibly mark each item to record actual construction including:
  1. Measured depths of foundations in relation to finish floor datum.
  2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
  4. Field changes of dimension and detail.
  5. Details not on original Contract drawings.

## 1.06 WARRANTIES

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

## 1.07 SPARE PARTS AND MAINTENANCE MATERIALS

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

## PART 2-PRODUCTS

NOT APPLICABLE

## PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

DRAFT-(01.03.2013)

**PERMITS**



STEVEN L. BESHEAR  
GOVERNOR

ENERGY AND ENVIRONMENT CABINET  
DEPARTMENT FOR ENVIRONMENTAL PROTECTION  
DIVISION OF WATER  
200 FAIR OAKS LANE, 4TH FLOOR  
FRANKFORT, KENTUCKY 40601  
[www.kentucky.gov](http://www.kentucky.gov)

LEONARD K. PETERS  
SECRETARY

## STREAM CONSTRUCTION PERMIT

### For Construction In Or Along A Stream

Issued to: **Carrollton Utilities**  
Address: **PO Box 269**  
**Carrollton, KY 41008**

Permit expires on  
**September 7, 2013**

Permit No. **19938**

In accordance with KRS 151.250 and KRS 151.260, the Energy and Environment Cabinet approves the application dated July 31, 2012 for construction of waterline extensions including the installation of four subfluvial pipeline crossings located in the floodplain of East Prong Locust Creek, at about stream mile 0.8, with coordinates 38.69397, -85.26351; in the floodplain of Little Kentucky River, with coordinates 38.68073, -85.20758; in the floodplain of an unnamed tributary to Little Kentucky River, with coordinates 38.68102, -85.21798; and in the floodplain of Carlisle Branch, in Carroll County. AI. 696

There shall be no deviation from the plans and specifications submitted and hereby approved unless the proposed change shall first have been submitted to and approved in writing by the Cabinet. This approval is subject to the attached limitations. **Please read these limitations carefully!** If you are unable to adhere to these limitations for any reason, please contact this office prior to construction.

This permit is valid from the standpoint of stream obstruction only. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal and local agencies. Specifically if the project involves work in a stream, such as bank stabilization, dredging, relocation, or in designated wetlands, a 401 Water Quality Certification from the Division of Water will be required.

This permit is nontransferable and is not valid unless actual construction of this authorized work is begun prior to the expiration date noted above. Any violation of the Water Resources Act of 1966 as amended is subject to penalties as set forth in KRS 151.990.

If you have any questions regarding this permit, please call Mr. Jim Oerther at (502) 564-3410.

Issued September 7, 2012.

A handwritten signature in black ink, appearing to read "Todd Powers".

**Todd Powers, P.E., Supervisor**  
Floodplain Management Section  
Surface Water Permit Branch

TAP/JO/nm

pc: **Florence Regional Office**  
**Mitchell Perkins- Carroll Co. Floodplain Coordinator**  
**Mark C. Askin, P.E. (by email)**  
**File**

**STRC0000000012 (Water Line) Construction of waterline extensions including the installation of four subfluvial pipeline crossings located in the floodplain of East Prong Locust Creek, with coordinates 38.69397, -85.26351; in the floodplain of Little Kentucky River, with coordinates 38.68073, -85.20758; in the floodplain of an unnamed tributary to Little Kentucky River, with coordinates 38.68102, -85.21798; and in the floodplain of Carlisle Branch, with coordinates 38.67924, -85.20477, in Carroll County.:**

Submittal/Action Requirements:

Condition No.	Condition
S-1	Carrollton Utilities must submit final construction report: Due within 90 days after completion of construction Carrollton Utilities must notify in writing that the project has been completed in accordance with the approved plans and specifications. A Final Construction Report Form is enclosed. [401 KAR 4:060 Section 6]

Narrative Requirements:

Condition No.	Condition
T-1	This permit is issued from the standpoint of stream obstruction only and does not constitute certification of any other aspect of the proposed construction. The applicant is liable for any damage resulting from the construction, operation, or maintenance of this project. This permit has been issued under the provisions of KRS Chapter 151.250 and regulations promulgated pursuant thereto. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal and local agencies. [KRS 151.250]
T-2	A copy of this permit must be available at the construction site. [KRS 151.250]
T-3	Any work performed by or for Carrollton Utilities that does not fully conform to the submitted application or drawings and the limitations set forth in this permit, is subject to partial or total removal and enforcement actions pursuant to KRS 151.280 as directed by the Kentucky Department for Environmental Protection. [KRS 151.280]
T-4	Any design changes or amendments to the approved plans must be submitted to the Division of Water and approved in writing prior to implementation. [KRS 151.250]

## Narrative Requirements:

Condition No.	Condition
T-5	Since Carroll County participates in the National Flood Insurance Program, a local floodplain permit must be obtained prior to beginning of construction. Upon completion of construction Carrollton Utilities must contact the local permitting agency for final approval of the construction for compliance with the requirements of the local floodplain ordinance. [401 KAR 4:060 Section 9(c)]
T-6	Erosion prevention measures, sediment control measures, and other site management practices shall be designed, installed, and maintained in an effective operating condition to prevent migration of sediment off site. [KRS 224.70-110]
T-7	To avoid secondary adverse impacts, all materials used shall be stable and inert, free from pollutants and floatable objects, and shall meet all appropriate engineering standards. (Inert here means materials that are not chemically reactive and that will not rot or decompose, such as soil, rock, broken concrete or similar materials.). [401 KAR 4:060 Section 7]
T-8	Upon completion of construction all areas disturbed within the base floodplain shall be restored as closely as possible to their original contours. [401 KAR 4:060]
T-9	All debris and excess material shall be removed for disposal outside of the base floodplain. [401 KAR 4:060]
T-10	Upon completion of construction all disturbed areas shall be seeded and mulched or otherwise stabilized to prevent erosion. [401 KAR 4:060]
T-11	The entry of mobile equipment into the stream channel shall be limited as much as reasonably possible to minimize degradation of the waters of the Commonwealth. [401 KAR 4:060]
T-12	Construction other than as authorized by this permit shall require written approval from the Division of Water. [401 KAR 4:060]
T-13	The existing stream flow shall be maintained at all times during construction using standard flow diversion or pump around methods. Cofferdams or other structures placed in the stream shall be removed immediately if adverse flooding conditions result or if a flooding event is imminent. [401 KAR 4:060 Section 4]



STEVEN L. BESHEAR  
GOVERNOR

ENERGY AND ENVIRONMENT CABINET  
DEPARTMENT FOR ENVIRONMENTAL PROTECTION  
DIVISION OF WATER  
200 FAIR OAKS LANE, 4TH FLOOR  
FRANKFORT, KENTUCKY 40601  
[www.kentucky.gov](http://www.kentucky.gov)

LEONARD K. PETERS  
SECRETARY

## STREAM CONSTRUCTION PERMIT

### For Construction In Or Along A Stream

Issued to: **Carrollton Utilities**  
Address: **PO Box 269**  
**Carrollton, KY 41008**

Permit expires on  
**September 12, 2013**

Permit No. **19944**

In accordance with KRS 151.250 and KRS 151.260, the Energy and Environment Cabinet approves the application dated **July 31, 2012** for construction of waterline extensions including the installation of four subfluvial pipeline crossings located in the floodplain of Millers Branch, at about stream mile 0.4 with coordinates 38.623325, -85.263313; in the floodplain of an unnamed tributary to Millers Branch, with coordinates 38.628001, -85.267884; in the floodplain of Hardy Creek, with coordinates 38.607756, 85.276945; and in the floodplain of an unnamed tributary to Hardy Creek, with coordinates 38.611509, -85.282828, in Trimble County. AI: 696

There shall be no deviation from the plans and specifications submitted and hereby approved unless the proposed change shall first have been submitted to and approved in writing by the Cabinet. This approval is subject to the attached limitations. **Please read these limitations carefully!** If you are unable to adhere to these limitations for any reason, please contact this office prior to construction.

This permit is valid from the standpoint of stream obstruction only. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal and local agencies. Specifically if the project involves work in a stream, such as bank stabilization, dredging, relocation, or in designated wetlands, a 401 Water Quality Certification from the Division of Water will be required.

This permit is nontransferable and is not valid unless actual construction of this authorized work is begun prior to the expiration date noted above. Any violation of the Water Resources Act of 1966 as amended is subject to penalties as set forth in KRS 151.990.

If you have any questions regarding this permit, please call Mr. Jim Oerther at (502) 564-3410.

Issued September 12, 2012.

**Todd Powers, P.E., Supervisor**  
Floodplain Management Section  
Surface Water Permit Branch

TAP/JO/nm

pc: Florence Regional Office  
Mitchell Perkins- Carroll Co. Floodplain Coordinator  
Mark C. Askin, P.E. (by email)  
File



**STRC0000000013 (Water Line) Construction of waterline extensions including the installation of four subfluvial pipeline crossings located in the floodplain of Millers Branch, with coordinates 38.623325, -85.263313; in the floodplain of an unnamed tributary to Millers Branch, with coordinates 38.628001, -85.267884; in the floodplain of Hardy Creek, with coordinates 38.607756, 85.276945; and in the floodplain of an unnamed tributary to Hardy Creek, with coordinates 38.611509, -85.282828, in Trimble County.:**

### Submittal/Action Requirements:

Condition No.	Condition
S-1	Carrollton Utilities must submit final construction report: Due within 90 days after completion of construction Carrollton Utilities must notify in writing that the project has been completed in accordance with the approved plans and specifications. A Final Construction Report Form is enclosed. [401 KAR 4:060 Section 6]

### Narrative Requirements:

Condition No.	Condition
T-1	This permit is issued from the standpoint of stream obstruction only and does not constitute certification of any other aspect of the proposed construction. The applicant is liable for any damage resulting from the construction, operation, or maintenance of this project. This permit has been issued under the provisions of KRS Chapter 151.250 and regulations promulgated pursuant thereto. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal and local agencies. [KRS 151.250]
T-2	A copy of this permit must be available at the construction site. [KRS 151.250]
T-3	Any work performed by or for Carrollton Utilities that does not fully conform to the submitted application or drawings and the limitations set forth in this permit, is subject to partial or total removal and enforcement actions pursuant to KRS 151.280 as directed by the Kentucky Department for Environmental Protection. [KRS 151.280]
T-4	Any design changes or amendments to the approved plans must be submitted to the Division of Water and approved in writing prior to implementation. [KRS 151.250]
T-5	Since Trimble County participates in the National Flood Insurance Program, a local floodplain permit must be obtained prior to beginning of construction. Upon completion of construction Carrollton Utilities must contact the local permitting agency for final approval of the construction for compliance with the requirements of the local floodplain ordinance. [401 KAR 4:060 Section 9(c)]
T-6	Upon completion of construction all areas disturbed within the base floodplain shall be restored as closely as possible to their original contours. [401 KAR 4:060]

## Narrative Requirements:

Condition No.	Condition
T-7	Erosion prevention measures, sediment control measures, and other site management practices shall be designed, installed, and maintained in an effective operating condition to prevent migration of sediment off site. [KRS 224.70-110]
T-8	To avoid secondary adverse impacts, all materials used shall be stable and inert, free from pollutants and floatable objects, and shall meet all appropriate engineering standards. (Inert here means materials that are not chemically reactive and that will not rot or decompose, such as soil, rock, broken concrete or similar materials.). [401 KAR 4:060 Section 7]
T-9	All debris and excess material shall be removed for disposal outside of the base floodplain. [401 KAR 4:060]
T-10	Upon completion of construction all disturbed areas shall be seeded and mulched or otherwise stabilized to prevent erosion. [401 KAR 4:060]
T-11	The entry of mobile equipment into the stream channel shall be limited as much as reasonably possible to minimize degradation of the waters of the Commonwealth. [401 KAR 4:060]
T-12	Construction other than as authorized by this permit shall require written approval from the Division of Water. [401 KAR 4:060]
T-13	The existing stream flow shall be maintained at all times during construction using standard flow diversion or pump around methods. Cofferdams or other structures placed in the stream shall be removed immediately if adverse flooding conditions result or if a flooding event is imminent. [401 KAR 4:060 Section 4]

DEPARTMENT OF THE ARMY  
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE  
CORPS OF ENGINEERS  
P.O. BOX 59  
LOUISVILLE KY 40201-0059  
FAX: (502) 315-6677

November 1, 2012

Operations Division  
Regulatory Branch (South)  
ID No. LRL-2012-702

Mr. Terry Roach  
Utility Engineer  
Carrollton Utilities  
P.O. Box 269  
Carrollton, Kentucky 41008

Dear Mr. Roach:

This is in response to your July 20, 2012, request for authorization to conduct open-box cut water line crossings along the East Prong of Locust Creek, Millers Branch, Hardy Creek, Carlisle Branch, and a directional boring underneath the Little Kentucky River in Carroll, Henry, and Trimble Counties, Kentucky. The information supplied by you was reviewed to determine whether a Department of the Army (DA) permit will be required under the provisions of Section 10 of the Rivers and Harbors of 1899 and Section 404 of the Clean Water Act.

Your project is considered a discharge of backfill or bedding material for utility lines. The project is authorized under the provisions of 33 CFR 330 Nationwide Permit (NWP) No. 12, Utility Line Activities, as published in the Federal Register February 21, 2012. Under the provisions of this authorization, you must comply with the enclosed Terms and General Conditions for Nationwide Permit No. 12 and the following Special Conditions:

1. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

# DRAFT-(01.03.2013)

2. The permittee shall restrict tree clearing to the winter months between October 15 and March 31, and will avoid disturbance of all caves or mine portals which may be present in the project area.

You must also comply with the enclosed Water Quality Certification (WQC) Conditions for Nationwide Permit No. 12 dated March 19, 2012, issued by the Kentucky Division of Water (KDOW). Once you obtain your certification, or if no application was required, you may proceed with the project without further contact or verification from us.

This decision is valid for 2 years from the date of this letter. The enclosed Compliance Certification should be signed and returned when the project is completed. If your project is not completed within this 2-year period or if your project is modified, you must contact us for another permit determination. Please note that we also perform periodic inspections to ensure compliance with our permit conditions and applicable Federal laws. A copy of this letter is being sent to your agent and to the KDOW (see enclosure for addresses).

If you have any questions, please contact this office by writing to the above address, ATTN: CELRL-OP-FS, or by calling me at 502-315-6702. All correspondence pertaining to this matter should refer to our ID No. LRL-2012-702.

Sincerely,

*Original Signed*

Adam Fannin  
Project Manager  
Regulatory Branch

Enclosures

# DRAFT-(01.03.2013)

## ADDRESS FOR COORDINATING AGENCY

Ms. Sandra Gruzesky  
Director  
Kentucky Energy and Environment Cabinet  
Division of Water  
200 Fair Oaks, 4<sup>th</sup> Floor  
Frankfort, Kentucky 40601

## ADDRESS FOR AUTHORIZED AGENT

Mr. Mark Askin  
Strand Associates, Inc.  
Waterfront Plaza  
325 West Main Street, Suite 710  
Louisville, Kentucky 40202

DRAFT-(01.03.2013)



**TRANSPORTATION CABINET**

**Steven L. Beshear**  
Governor

Department of Highways District 6 Office  
421 Buttermilk Pike  
Covington, KY 41017  
(859) 341-2700

**Michael W. Hancock, P.E.**  
Secretary

October 22, 2012

Carrollton Utilities  
225 Sixth Street  
Carrollton, KY 41008

SUBJECT: Carroll, MP- 3.44  
Route No. 0549  
Permit Number 06-2012-12800

Dear Applicant:

Your application for an encroachment permit has been approved by the Department of Highways. We are returning two copies of the approved permit so one may be kept in your records files. The other copy must be given to the party responsible for completing the project and must be kept at the jobsite at all times.

Please see that the work is done in strict conformity with the permit and any other applicable conditions. (See Form TC99-21 and any other attached documents, conditions or specifications). The work should be completed no later than 10/31/13. When the permitted work and any necessary restoration have been completed please notify this office by using the attached form which will serve as a notification for final inspection.

If there are any question regarding this permit, please do not hesitate to contact Caroline Justice at 859-341-2700 or fax number 859-341-6729.

Sincerely,

A handwritten signature in black ink, appearing to read "Rob Hans".

*for*  
Rob Hans, P.E.  
Chief District Engineer  
Department of Highways  
District 6- Covington  
421 Buttermilk Pike  
Covington, KY 41017



An Equal Opportunity Employer M/F/D

## NOTICE OF COMPLETION OF ENCROACHMENT PERMIT WORK

PLEASE RETURN THIS FORM TO THE DISTRICT OFFICE WHEN WORK IS COMPLETED  
AND IS READY FOR FINAL INSPECTION.

### APPLICANT INFORMATION:

**KEPT Number: 06-2012-12800**

Name: Carrollton Utilities

Address: 225 Sixth Street

City: Carrollton

State: Kentucky

Zip: 41008

Telephone: 502-732-1217

---

I wish to notify the Department of Highways that the work in the above mentioned permit and any necessary right of way restoration work have been completed and are ready for final inspection.

Applicant Signature: \_\_\_\_\_

---

Please Return To: Department of Highways  
District 6 Covington  
421 Buttermilk Pike  
Covington, KY 41017

Attention: Caroline Justice, Permits Engineer



**APPLICATION FOR ENCROACHMENT PERMIT**

<b>Applicant/Permittee</b>		KEPTS No. <span style="border: 1px solid black; padding: 2px 10px;">06-2012-12800</span>	
Name Carrollton Utilities/Terry Roach			
Address 225 Sixth Street		<b>Permit Location</b>	
		Address	
City Carrollton			
State KY	Zip 41008	City Carrollton	
Phone 502-732-1217		State KY	Zip 41008
Cell Phone		County Carroll	
Work Phone 502-732-1217			
Email Address troach@carrolltonutilities.com		Route No. KY 549 - Mound Hill Road	
<b>Access Control</b>		Mile Point 3.44	
<input type="checkbox"/> Fully Controlled Access		GPS Coordinates	
<input type="checkbox"/> Partially Controlled Access		X 5076977.1153	
<input checked="" type="checkbox"/> Control of Access by Permit		Y 4128629.3516	

<b>Type of Encroachment (KYTC)</b>
------------------------------------

<b>DESCRIPTION OF WORK:</b> 1,500 LF 3 INCH PVC WATER MAIN AND APPURTENANCES (INCLUDING VALVES, TEES, ROAD BORES). 30 LF 3 INCH PVC WATER MAIN CROSSING WITH 30 LF 8 INCH MINIMUM BORE WITH STEEL CASING PIPE STARTING AT STATION 10+00 TO STATION 10+30, SEE SHEET 15.
<div style="font-size: 2em; opacity: 0.5; margin-bottom: 10px;">APPROVED</div> <div>APPROVED OCT 22 2012</div>





## APPLICATION FOR ENCROACHMENT PERMIT

**Applicant/Permittee agrees to the following terms and conditions:**

1. The permit, including this application and all related and accompanying documents and drawings making up the permit, remains in effect and is binding upon the Applicant/Permittee, its successors and assigns, as long as the encroachment(s) exists and also until the permittee is finally relieved by the Department of Highways from all its obligations.
2. Applicant shall meet all requirements of the Clean Water Act if the project will disturb one acre or more, the applicant shall obtain a KPDES KYR10 Permit from the Kentucky Division of Water. All disturbed areas shall meet the requirements of the Department of Highway's Standard Specifications, Sections 212 and 213, as amended.
3. **INDEMNITY:**
  - A. **PERFORMANCE BOND:** The permittee shall provide to the Department a performance bond, when required, in the amount of \$ 10,000 (an amount equal to the estimated project cost as prepared and submitted by the applicant and approved by the Department) as a guarantee of conformance with the Department's Encroachment Permit requirements.
  - B. **PAYMENT BOND:** At the discretion of the department, a payment bond will be required of the permittee to ensure payment of liquidated damages assessed to the permittee.
  - C. **LIABILITY INSURANCE:** Liability insurance will be required of the permittee (in an amount approved by the department) to cover all liabilities associated with the encroachment.
  - D. It shall be the responsibility of the permittee, its successors and assigns, to maintain all indemnities in full force and effect until the permittee is authorized to release the indemnity by the Department.
4. A copy of this application and all related documents making up the approved permit will be given to the applicant and shall be made readily available for review at the work site at all times.
5. Perpetual maintenance of the encroachment is the responsibility of the permittee, its successors and assigns, with the approval of the Department as required, unless otherwise stated.
6. Permittee, its successors and assigns, shall comply with and agrees to be bound by the requirements and terms of (a) this application and all related documents making up the approved permit, (b) by the Department's Permits Manual, and (c) by the Manual on Uniform Traffic Control Devices, both manuals as revised to and in effect on the date of issuance of the permit, all of which documents are made a part thereof by this reference. Compliance by the permittee, its successors and assigns, with subsequent revisions to applicable provisions of either manual or other policy of the Department may be made a condition of allowing the encroachment to persist under the permit.
7. Permittee agrees that this and any encroachment may be ordered removed by the Department at any time, and for any reason, upon thirty days written notice to the last known address of the applicant or to the address at the location of the encroachment. The permittee agrees that the cost of removing and of restoring the associated right-of-way is the responsibility of the permittee, its successors and assigns.
8. Permittee, its successors and assigns, agree that if the Department determines that motor vehicular safety deficiencies develop as a result of the installation or use of the encroachment, the permittee, its successors and assigns, shall provide and bear the expenses to adjust, relocate, or reconstruct the facilities, and/or add signs, auxiliary lanes, or other corrective measures reasonably deemed necessary by the Department within a reasonable time after receipt of a written notice of such deficiency. The period within which such adjustments, relocations, additions, modifications, and/or other corrective measures must be completed will be specified in the notice.
9. Where traffic signals are required as a condition of granting the requested permit or are thereafter required to correct motor vehicular safety deficiencies, as determined by the Department, the costs for signal equipment and installation(s) shall be borne by the permittee, its successors and assigns, and/or the Department in its reasonable discretion and only in accordance with the Department's current policy set forth in the Traffic Operations Manual and Permits Manual. Any modifications to the permittee's entrance necessary to accommodate signalization (including necessary easement(s) on private property) shall be the responsibility of the permittee, its successors and assigns, at no expense to the Department.
10. The requested encroachment shall not infringe on the frontage rights of an abutting owner without their written consent as hereinafter described. Each abutting owner shall express their consent, which shall be binding on their successors and assigns, by the submission of a notarized statement as follows, "I (we), \_\_\_\_\_, hereby consent to the granting of the permit requested by the applicant along Route \_\_\_\_\_, which permit does affect frontage rights along my (our) adjacent real property." By signature(s) \_\_\_\_\_ subscribed and sworn by \_\_\_\_\_, on this date \_\_\_\_\_. (This requirement does not apply to utility encroachments which serve the general public).
11. The permit, if approved, is subject to the agreement that it shall not interfere with any similar rights or permit(s) previously granted to any other party, except as otherwise provided by law.



### APPLICATION FOR ENCROACHMENT PERMIT

12. Permittee shall include documentation which describes the facilities to be constructed. Permittee, its successors and assigns, agrees as a condition of the granting of the permit to construct and maintain any and all permitted facilities or other encroachments in strict accordance with the submitted and approved permit documentation and the policies and procedures of the Department. Permittee, its successors and assigns, shall not use facilities authorized herein in any manner contrary to that prescribed by the approved permit. Only normal usage as contemplated by the parties and by this application and routine maintenance are authorized by the permit.

13. Permittee, its successors and assigns, at all times from the date permitted work is commenced until such time as all permitted facilities or other encroachments are removed from the right-of-way and the right-of-way restored, **shall defend, protect, indemnify and save harmless** the Department from any and all liability claims and demands arising out of the work, encroachment, maintenance, or other undertaking by the permittee, its successors and assigns, related or undertaken pursuant to the granted permit, due to any claimed act or omission by the permittee, its servants, agents, employees, or contractors. This provision shall not inure to the benefit of any third party nor operate to enlarge any liability of the Department beyond that existing at common law or otherwise if this right to indemnity did not exist.

14. Upon a violation of any provision of the permit, or otherwise in its reasonable discretion, the Department may require additional action by the permittee, its successors and assigns, up to and including the removal of the encroachment and restoration of the right-of-way. In the event additional actions required by the Department under the permit are not undertaken as ordered and within a reasonable time, the Department may in its discretion cause those or other additional corrective actions to be undertaken and the Department may and shall recover the reasonable costs of those corrective actions from the permittee, its successors and assigns.

15. Permittee, its successors and assigns, shall use the encroachment premises in compliance with all requirements of federal law and regulation, including those imposed pursuant to Title VI of the Civil Right Act of 1964 (42 U.S.C. § 2000d et seq.) and the related regulations of the U.S. Department of Transportation in Title 49 C.F.R. Part 21, all as amended.

16. Permittee, its successors and assigns, agree that if the Department determines it is necessary for the facilities or other encroachment authorized by the permit to be removed, relocated or reconstructed in connection with the reconstruction, relocation or improvement of a highway, the Department may revoke permission for the encroachment to remain under the permit and may order its removal, relocation or reconstruction by the permittee, its successors and assigns, at the expense of the permittee, except where the Department is required by law to pay any or all of those costs.

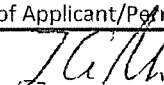
17. Permittee agrees that the authorized permit is personal to the permittee and shall remain in effect until such time as (a) the permittee's rights to the adjoining real property to have benefitted from the requested encroachment have been relinquished, (b) until all permit obligations have been assumed by appropriate successors and assigns, and (c) unless and until a written release from permit obligations has been granted by the Department. The permit and its requirements shall also bind the real property to have benefitted from the requested encroachment to the extent permitted by law. The permit and the related encroachment become the responsibility of the successors and assigns of the permittee and the successors and assigns of each property owner benefitting from the encroachment, or the encroachment may not otherwise permissibly continue to be maintained on the right-of-way. (Does not apply to utility encroachments serving the general public.)

18. If work authorized by the permit is within a highway construction project in the construction phase, it shall be the responsibility of the permittee to make personal contact with the Department's Engineer on the project in order to coordinate all permitted work with the Department's prime contractor on the project.

19. This permit is not intended to, nor shall it, affect, alter or alleviate any requirement imposed upon the permittee, its successors and assigns, by any other agency.

20. Permittee, its successors and assigns, agrees to contain and maintain all dirt, mud, and other debris emanating from the encroachment away from the surrounding right-of-way and the travel way of the highway hereafter and at all times that its obligations under the permit remain in effect.

**THE UNDERSIGNED APPLICANT(S)/PERMITTEE(S) (being duly authorized representative(s)/owner(s)) DO AGREE  
TO ALL TERMS AND CONDITIONS SET FORTH HEREIN.**

Signature (of Applicant/Permittee)	Date
	9/19/12

**This is not a permit unless and until the permittee(s) receive an approved TC 99-1(B) from the KYTC. This application will become void if not approved by the cancellation date. The cancellation date will be one year from the date the permittee submits their application.**



Kentucky Transportation Cabinet  
Department of Highways  
Permits Branch

DRAFT-(01.03.2013)

TC 99-1 (B)  
1/2012  
Page 1 of 1

ENCROACHMENT PERMIT

**KEPTS No.:** T06-2012-12800  
**Permittee:** Carrollton Utilities  
**Latitude:** 38.660478  
**Longitude:** -85.204815  
**Completion Date:** 10/31/2013

Coordinates provided on the TC 99-1(B) are the approved location for this permit

Indemnities		
Type	Amount Required	Tracking Number
Performance Bond	10000.00	
Payment Bond		
Liability Insurance		

This permit has been:

APPROVED ☒ DENIED ☐

Caroline Justice Permit Supervisor  
NAME TITLE

Caroline Justice 10/22/2012  
SIGNATURE DATE

The TC 99-1(B), including the application TC-99 1(A) and all related and accompanying documents and drawings make up the permit. It is not a permit unless both the TC 99-1(A) and TC 99-1(B) are both present

IMPORTANT NOTICE

Federal law requires that traffic control shall be implemented in accordance with MUTCD Standards and KYTC Specifications under the supervision of a Work Zone Traffic Control Supervisor.

A Work Zone Traffic Control Technician shall be available on the jobsite to ensure that the work zone is in compliance with the applicable standards.

If any questions, please contact Caroline Justice at (859) 341-2700.

IMPORTANT NOTICE

Federal law requires that High  
Visibility Class 2 or Class 3  
retroreflective safety apparel that  
meets ANSI/ISEA 107-2004  
Standards shall be worn at all times  
by anyone working within the KYTC  
R/W limits.

Class 3 apparel is required for  
flaggers after dark.

If any questions, please contact Caroline  
Justice at (859) 341-2700.



## ENCROACHMENT PERMIT GENERAL NOTES & SPECIFICATIONS

Permit No. 06-2012-12800

### I. SAFETY

#### A. General Provisions

- ☒ All signs and control of traffic shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways, latest edition, Part VI, and safety requirements shall comply with the Permits Manual.
- ☒ All work necessary in shoulder or ditch line areas of a state highway shall be scheduled to be promptly completed so that hazards adjacent to the traveled way are kept to an absolute minimum.
- ☒ No more than one (1) traveled-lane shall be blocked or obstructed during normal working hours. All signs and flaggers during lane closure shall conform to the Manual on Uniform Traffic Control Devices.
- ☒ When necessary to block one (1) traveled-lane of a state highway, the normal working hours shall be as directed by the Department. No lanes shall be blocked or obstructed during adverse weather conditions (rain, snow, fog, etc.) without specific permission from the Department. Working hours shall be between 8am and 430pm.
- ☒ The traveled-way and shoulders shall be kept clear of mud and other construction debris at all times during construction of the permitted facility.
- ☒ No nonconstruction equipment or vehicles or office trailers shall be allowed on the right of way during working hours.
- ☒ The right of way shall be left free and clear of equipment, material, and vehicles during non-working hours.

#### B. Explosives

- ☒ No explosive devices or explosive material shall be used within state right of way without proper license and approval of the Kentucky Department of Mines and Minerals, Explosive Division.

#### C. Other Safety Requirements

☐

### II. UTILITIES \* Applies to Fully Controlled Access Highways ONLY

- ☐ \*All work necessary within the right of way shall be performed behind a temporary fence erected prior to a boring operation.
- ☐ \*The temporary woven wire fence shall be removed immediately upon completion of work on the right of way, and the control of access immediately restored to original condition, in accordance with applicable Kentucky Department of Highways Standard Drawings.
- ☐ \*All vents, valves, manholes, etc., shall be located outside of the right-of-way.
- ☐ \*Encasement pipe shall extend from right-of-way line to right-of-way line and shall be one continuous run of pipe. The encasement pipe shall be welded at all joints.
- ☒ The boring pit and tail ditch shall extend past the existing toe of slope or bottom of ditch line and shall be a minimum of 42 inches deep.

Permit No. 06-2012-12800**II. UTILITIES (Continued)**

- ☒ Encasement pipe shall conform to current standards for highway crossings in accordance with the Permits Manual.
- ☐ Parallel lines shall be constructed between back slope of ditch line and right-of-way line and shall have a minimum of 30-inch cover above top of pipe or conduit.
- ☐ All pavement cuts shall be restored per Kentucky Transportation Cabinet form TC 99-13.
- ☐ Aerial crossing of this utility line shall have a minimum clearance of \_\_\_\_\_ feet from the high point of the roadway to the low point of the line (calculated at the coefficient for expansion of 120 degrees Fahrenheit).
- ☐ The 30-foot clear zone requirement shall be met to the extent possible in accordance with the Permits Manual.
- ☐ Special requirements:

**III. GENERAL****A. OSHA**

- ☒ Kentucky Occupational Safety and Health Standards for the construction industry, which has the effect of law, states in part: (Page 52, 1926.651, Specific Excavation Requirements) "Prior to opening an excavation, effort shall be made to determine whether underground installations, (sewer, telephone, water, fuel, electric lines, etc.) will be encountered, and if so, where such underground installations are located. When the excavation approaches the estimated location of such an installation, the exact location shall be determined, and when it is uncovered, proper supports shall be provided for the existing installation. Utility companies shall be contacted and advised of proposed work prior to the start of actual excavation."

**B. Archaeological**

- ☐ Whenever materials of an archaeological nature are discovered during the course of construction work or maintenance operations, contact shall be made immediately with the Division of Environmental Analysis, which maintains an archaeologist on staff, or with the Office of the State Archaeologist located at the University of Kentucky. Following this consultation, further action shall be decided on a case-by-case basis by the State Highway Engineer or the Transportation Planning Engineer or their designated representative.

**C. Utilities in the Work Areas**

- ☒ The permittee shall be responsible for any damage to existing utilities, and any utility modifications or relocations within state right of way necessary, as determined by the Department or by the owner of the utility, shall be at the expense of the permittee and subject to the approval of the Department.
- ☐ All existing manholes and valve boxes shall be adjusted to be flush with finished grade.

**D. Environmental**

- ☒ If the activity to which this permit relates disturbs one acre or more of land, you must obtain a KPDES KYR10 permit.

Websites

<http://www.water.ky.gov/permitting/wastewaterpermitting/KPDES/storm/>Inspectors for KPDES KYR10 at [www.KEPSC.org](http://www.KEPSC.org)

Permit No. 06-2012-12800

## IV. RIGHT OF WAY RESTORATION

- ☒ All disturbed portions of the right of way shall be restored to grass as per Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition). A satisfactory turf, as determined by the Department, shall be established by the permittee prior to release of indemnity. Sodding or seeding shall be as follows:

Lawn or High Maintenance Situation

70% Lawn Fescue (e.g., variety - Falcon)  
30% Bluegrass **or**

70% Lawn Rye (e.g., variety - Derby)  
30% Bluegrass

Right of Way Lawn Maintenance Situation

70% KY 31 Fescue  
30% Perennial Rye Grass **or**

100% KY Fescue

- ☒ Two tons of clean straw mulch per acre of seeding.
- ☒ Prior to seeding, the ground shall be prepared in accordance with Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).
- ☐ Substitutes for sod such as artificial turf, rocked mulch, or paved areas may be acceptable if they are aesthetically pleasing.
- ☐ All ditch-flow lines and all ditch-side slopes shall be sodded.
- ☐ Existing concrete right of way markers shall not be disturbed, but if damaged in any way, they shall be entirely replaced by the permittee, with new concrete markers to match the original markers, in accordance with Kentucky Department of Highways Standard Drawings. Markers that are entirely removed shall be re-established in the proper locations by the permittee and to the satisfaction of the Department.
- ☐ Other right of way restoration requirements are as follows:

## V. DRAINAGE

- ☐ All pipe shall be laid in a straight alignment, to proper grades, and with all materials and methods of installation including bedding and joint seating in accordance with Department Standard Specifications for Road and Bridge Construction (latest edition). Pipe shall not be covered until inspected by the Department and express permission obtained to make backfill.
- ☐ All gutter lines at the base of new curbs shall be on continuous grades, and pockets of water along with curbs or in entrance areas or other paved areas within the right of way shall not be acceptable.
- ☐ All drainage structures and appurtenances (manholes, catch basins, curbing, inlet basins, etc.) shall conform to Department specifications and shall be constructed in accordance with the Department Standard Drawings. Type required:



Permit No. 06-2012-12800**VI. Paving**

- ☐ No bituminous pavement shall be installed within the right of way between November 15 and April 1, nor when the temperature is below 40 degrees Fahrenheit, without the express consent of the Department. No bituminous pavement shall be installed when the underlying course is wet.
- ☐ Paving within the right of way shall be as follows:
- ☐ Base (Type) \_\_\_\_\_ (Thickness) \_\_\_\_\_
- ☐ Surface Base (Type) \_\_\_\_\_ (Thickness) \_\_\_\_\_
- ☐ Finished Surface (Type) \_\_\_\_\_ (Thickness) \_\_\_\_\_
- ☐ Existing pavement and shoulder material shall be removed to accommodate the above paving specifications.
- ☐ The finished surface of all new pavement within the right of way shall be true to the required slope and grade, uniform in density and texture, free of irregularities, and equivalent in riding qualities to the adjacent highway pavement or as determined by the Department of Highways.
- ☐ All materials and methods of construction, including base and subgrade preparation, shall be in accordance with Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).
- ☐ 24 hours notice to the Department is required prior to beginning paving operations.
- Phone: \_\_\_\_\_ Name: \_\_\_\_\_
- ☐ To ensure proper surface drainage, the new pavement shall be flush with the edge of existing highway pavement and shall slope away from the existing edge of the pavement as specified in drawings.
- ☐ Existing edge of pavement shall be saw-cut to provide a straight and uniform joint for new pavement. An approved joint sealer, in accordance with Kentucky Department of Highways Standard Specifications (latest edition), shall be applied between new and existing pavements.

**VII. SIDEWALKS SPECIFICATIONS \*This dimension should be equal to the width of the sidewalk.****A. New Sidewalks**

- ☐ Sidewalks shall be constructed of Class A concrete (3,500 p.s.i. test), shall be \* \_\_\_\_\_ feet in width, 6 inches in thickness across the bituminous entrance, and 4 inches in thickness across the remaining sections.
- ☐ Sidewalks shall have tooled joints not less than 1 inch in depth at four foot intervals\*, and 1/2 premolded expansion joints extending entirely through the sidewalk at intervals not to exceed 50 feet.
- ☐ All materials and methods of construction, including curing, shall be in accordance with the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).

**B. Existing Sidewalks**

- ☐ **(Applicable if existing sidewalks are being relocated)** Use of the sidewalk shall not be blocked or obstructed, and a usable walkway shall be maintained across the construction area at all times.
- ☐ All damaged sections of the sidewalks shall be entirely replaced to match existing sections.

Permit No. 06-2012-12800**VIII. DENSE GRADED SHOULDERS**

- ☒ Any existing dense-graded aggregate shoulders in the entire frontage within the construction area, which have been disturbed or damaged or on which dirt has been placed or mud has been deposited or tracked, shall be restored to original condition by removal of all contaminated material and replaced to proper grade with new dense-graded aggregate.
- ☐ All new aggregate shoulders as specified in the plan shall consist of 5 inches of compacted dense-graded aggregate, 2<sup>1/2</sup> pounds per square yard of calcium chloride.
- ☐ All dense-graded aggregate shoulders shall slope away from the new edge of pavement at the rate of 3/4 inch per foot.

**IX. CURBING****A. Bituminous Curbs**

- ☐ Bituminous concrete curbs shall be given a paint coat of asphalt emulsion.
- ☐ The surface under the bituminous concrete curb shall be tacked with asphalt emulsion.
- ☐ All bituminous concrete curbs shall be constructed of a Class I bituminous concrete mixture as specified by official Department of Highways specifications.
- ☐ All bituminous curbs shall be rolled curb, with a minimum base width of 8 inches and a minimum height of \_\_\_\_\_ inches. The top of the curb shall be constructed in such a manner as to guarantee a uniform rolled effect throughout the entire run.

**B. Concrete Curbs**

- ☐ All curbs or curb and gutter shall be constructed of Class A concrete (3,500 p.s.i. test) and shall be uniform in height, width, and alignment, true to grade, and satisfactory in finish and appearance as determined by the Department. All materials and methods of construction, including curing, shall be in accordance with Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).
- ☐ All concrete curbs shall be 6 inches in width, extend \_\_\_\_\_ inches above finished grade and 12 inches below finished grade, with all visible edge rounded to 1/2 inch radii.
- ☐ All concrete curbs shall have expansion joints constructed at intervals of not more than 30 feet, and 1/2 inch premolded expansion joint material (cut to conform to the curb or to the curb and gutter section) shall be used in each expansion joint.
- ☐ The last \_\_\_\_\_ feet of all concrete curbs are to be tapered down to finished grade.

Permit No. 06-2012-12800**X. RIGHT-OF-WAY FENCE REPLACEMENT**

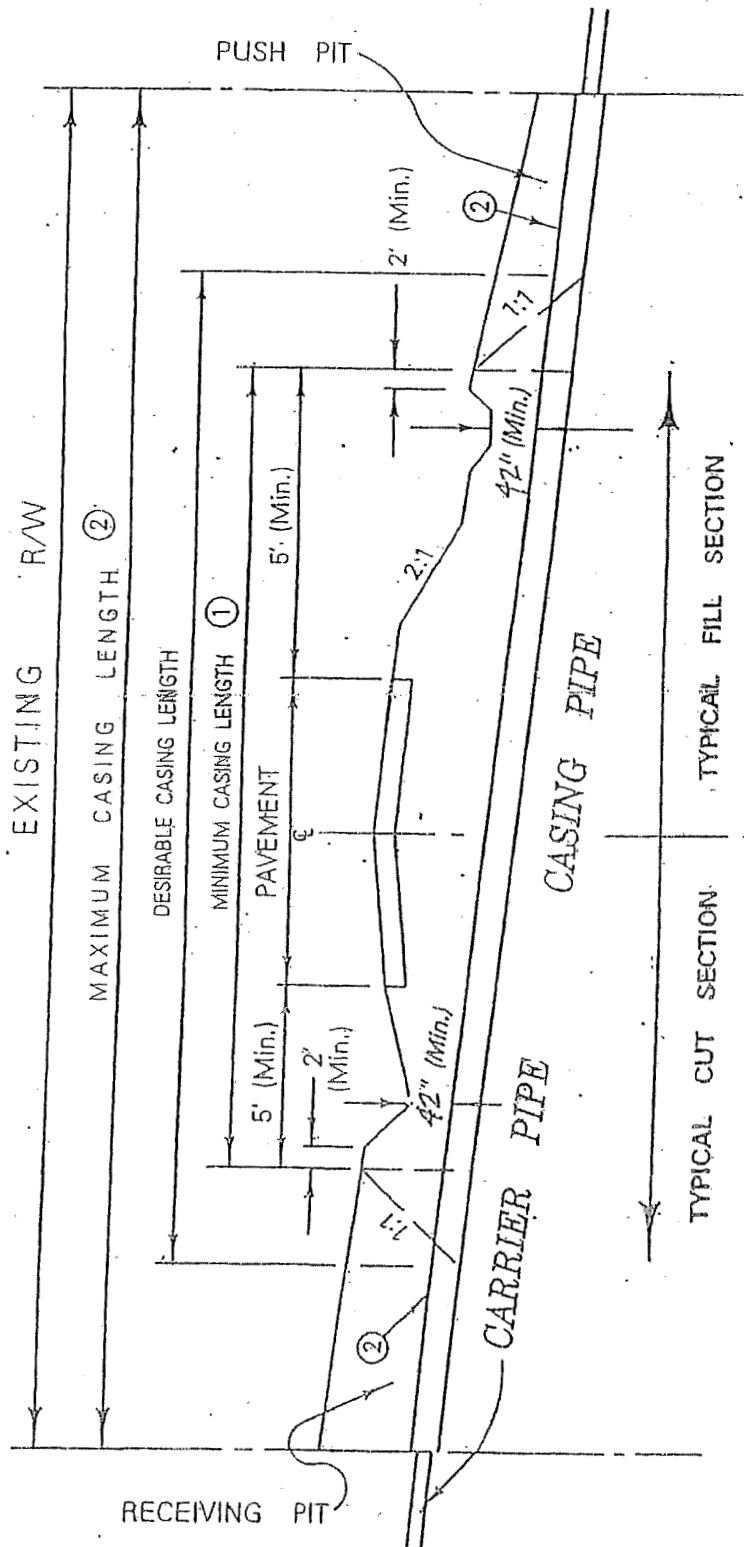
- ☐ The replacement fence shall be a height of at least 48 inches and shall be of sufficient density to contain all animals (if applicable).
- ☐ The replacement fence shall be a minimum of 1 foot and a maximum of 2 feet outside the right-of-way line.
- ☐ The fence materials and design shall meet accepted industry standards and be treated as paintable.
- ☐ The permittee shall be required to maintain the fence in a high state of repair.
- ☐ The existing fence shall be removed by permittee and stored at the Department's maintenance storage yard for future reuse by the Department.
- ☐ The control of access shall not be diminished as a result of replacement of the fence.
- ☐ Miscellaneous:

**NOTICE TO PERMITTEE**

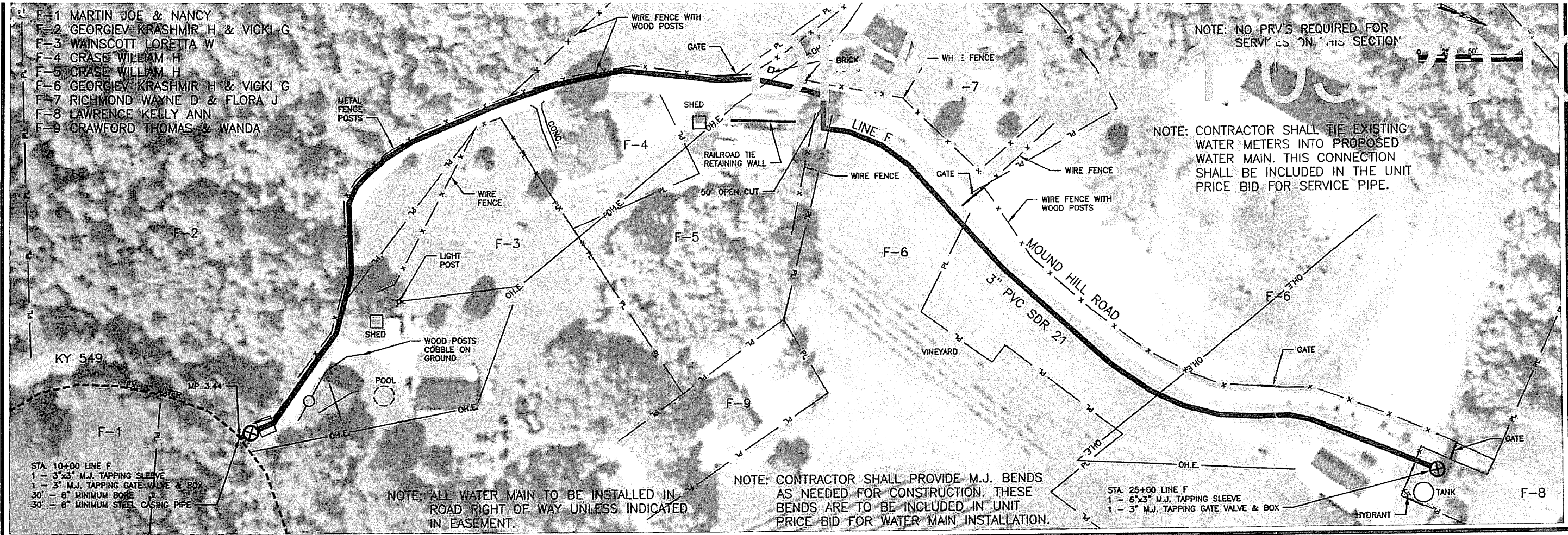
THE PERMITTEE AGREES THAT ALL WORK WITHIN THE EXISTING RIGHT OF WAY SHALL BE DONE IN ACCORDANCE WITH THE PLANS AS APPROVED AND PERMITTED BY AN ENCROACHMENT PERMIT. ANY CHANGES OR VARIANCES MADE AT THE TIME OF CONSTRUCTION WITHOUT WRITTEN APPROVAL FROM THE DEPARTMENT OF HIGHWAYS SHALL BE REMOVED BY THE PERMITTEE AT NO EXPENSE TO THE DEPARTMENT OF HIGHWAYS AND SHALL BE REDONE BY THE PERMITTEE TO CONFORM WITH THE APPROVED PLANS.

Permit No. 06-2012-12800  
Route No. 549  
Pavement Width     

- ① MAY REQUIRE VERTICAL SHEETING.
- ② MAY BE REQUIRED UNDER CERTAIN CONDITIONS.



1. Push Pit and Receiving Pit to be backfilled and thoroughly compacted.
2. All Ditch Lines to be left open.
3. Seed and straw all areas disturbed by this work.
4. The Boring Pit and Tail Ditch shall not extend past the existing toe of slope or bottom of ditch line (from the right-of-way).
5. Services over 2" to be encased or exempt under Chapter 2 of the Permits Guidance Manual.
6. Control of Access Projects, Encasement pipe shall extend from Right-of-Way to Right-of-Way.



DATE:	
REVISIONS	
NO.	

LINE F  
MOUND HILL WATERLINE EXTENSION

COUNTYWIDE UNDERSERVED IMPROVEMENTS PROJECT  
CARROLLTON UTILITIES & WEST CARROLL WATER DISTRICT  
CARROLL, HENRY, & TRIMBLE COUNTIES KENTUCKY

JOB NO.  
5104.003

PROJECT MGR.  
MCA

**SA**  
**STRAND**  
ASSOCIATES®

SHEET  
15



**TRANSPORTATION CABINET**

**Steven L. Beshear**  
Governor

Department of Highways District 6 Office  
421 Buttermilk Pike  
Covington, KY 41017  
(859) 341-2700

**Michael W. Hancock, P.E.**  
Secretary

October 22, 2012

Carrollton Utilities  
225 Sixth Street  
Carrollton, KY 41008

SUBJECT: Carroll, MP- 1.66/2.39  
Route No. 1465  
Permit Number 06-2012-12824

Dear Applicant:

Your application for an encroachment permit has been approved by the Department of Highways. We are returning two copies of the approved permit so one may be kept in your records files. The other copy must be given to the party responsible for completing the project and must be kept at the jobsite at all times.

Please see that the work is done in strict conformity with the permit and any other applicable conditions. (See Form TC99-21 and any other attached documents, conditions or specifications). The work should be completed no later than 10/31/13. When the permitted work and any necessary restoration have been completed please notify this office by using the attached form which will serve as a notification for final inspection.

If there are any question regarding this permit, please do not hesitate to contact Caroline Justice at 859-341-2700 or fax number 859-341-6729.

Sincerely,

A handwritten signature in black ink, appearing to read "Rob Hans".

*for*  
Rob Hans, P.E.  
Chief District Engineer  
Department of Highways  
District 6- Covington  
421 Buttermilk Pike  
Covington, KY 41017



## NOTICE OF COMPLETION OF ENCROACHMENT PERMIT WORK

PLEASE RETURN THIS FORM TO THE DISTRICT OFFICE WHEN WORK IS COMPLETED  
AND IS READY FOR FINAL INSPECTION.

### APPLICANT INFORMATION:

**KEPT Number: 06-2012-12824**

Name: Carrollton Utilities

Address: 225 Sixth Street

City: Carrollton

State: Kentucky

Zip: 41008

Telephone: 502-732-1217

---

I wish to notify the Department of Highways that the work in the above mentioned permit and any necessary right of way restoration work have been completed and are ready for final inspection.

Applicant Signature: \_\_\_\_\_

---

Please Return To: Department of Highways  
District 6 Covington  
421 Buttermilk Pike  
Covington, KY 41017

Attention: Caroline Justice, Permits Engineer



**APPLICATION FOR ENCROACHMENT PERMIT**

<b>Applicant/Permittee</b>		KEPTS No. <span style="border: 1px solid black; padding: 2px 10px;"><b>06-2012-12814</b></span>	
Name Carrollton Utilities/Terry Roach			
Address 225 Sixth Street		<b>Permit Location</b>	
		Address	
City Carrollton			
State KY	Zip 41008	City Carrollton	
Phone 502-732-1217		State KY	Zip 41008
Cell Phone		County Carroll	
Work Phone 502-732-1217			
Email Address troach@carrolltonutilities.com		Route No. KY 1465 - Gilgal Road	
<b>Access Control</b>		Mile Point 2.39 and 1.66	
<input type="checkbox"/> Fully Controlled Access		GPS Coordinates	
<input type="checkbox"/> Partially Controlled Access		X 5096567.5285	
<input checked="" type="checkbox"/> Control of Access by Permit		Y 4110281.3118	

<b>Type of Encroachment (KYTC)</b>
------------------------------------

<p><b>DESCRIPTION OF WORK:</b></p> <p>2,410 LF 4 INCH DIP WATER MAIN, 3,590 LF 4 INCH PVC WATER MAIN AND APPURTENANCES (INCLUDING VALVES, TEES, ROAD BORES). 30 LF 4 INCH PVC WATER MAIN CROSSING WITH 30 LF 10 INCH MINIMUM BORE WITH STEEL CASING PIPE STARTING AT STATION 69+70 TO STATION 69+40, SEE SHEET 18.</p> <p>2,550 LF 3 INCH PVC WATER MAIN AND APPURTENANCES (INCLUDING VALVES, TEES, ROAD BORES). 30 LF 3 INCH PVC WATER MAIN CROSSING WITH 30 LF 8 INCH MINIMUM BORE WITH STEEL CASING PIPE STARTING AT STATION 10+00 TO STATION 10+30, SEE SHEET 19.</p> <div style="text-align: center; margin-top: 50px;"><p>APPROVED OCT 22 2012</p></div>
--





## APPLICATION FOR ENCROACHMENT PERMIT

### Applicant/Permittee agrees to the following terms and conditions:

1. The permit, including this application and all related and accompanying documents and drawings making up the permit, remains in effect and is binding upon the Applicant/Permittee, its successors and assigns, as long as the encroachment(s) exists and also until the permittee is finally relieved by the Department of Highways from all its obligations.
2. Applicant shall meet all requirements of the Clean Water Act if the project will disturb one acre or more, the applicant shall obtain a KPDES KYR10 Permit from the Kentucky Division of Water. All disturbed areas shall meet the requirements of the Department of Highway's Standard Specifications, Sections 212 and 213, as amended.

### 3. INDEMNITY:

- A. **PERFORMANCE BOND:** The permittee shall provide to the Department a performance bond, when required, in the amount of \$ 15,000 (an amount equal to the estimated project cost as prepared and submitted by the applicant and approved by the Department) as a guarantee of conformance with the Department's Encroachment Permit requirements.
  - B. **PAYMENT BOND:** At the discretion of the department, a payment bond will be required of the permittee to ensure payment of liquidated damages assessed to the permittee.
  - C. **LIABILITY INSURANCE:** Liability insurance will be required of the permittee (in an amount approved by the department) to cover all liabilities associated with the encroachment.
  - D. It shall be the responsibility of the permittee, its successors and assigns, to maintain all indemnities in full force and effect until the permittee is authorized to release the indemnity by the Department.
4. A copy of this application and all related documents making up the approved permit will be given to the applicant and shall be made readily available for review at the work site at all times.
  5. Perpetual maintenance of the encroachment is the responsibility of the permittee, its successors and assigns, with the approval of the Department as required, unless otherwise stated.
  6. Permittee, its successors and assigns, shall comply with and agrees to be bound by the requirements and terms of (a) this application and all related documents making up the approved permit, (b) by the Department's Permits Manual, and (c) by the Manual on Uniform Traffic Control Devices, both manuals as revised to and in effect on the date of issuance of the permit, all of which documents are made a part thereof by this reference. Compliance by the permittee, its successors and assigns, with subsequent revisions to applicable provisions of either manual or other policy of the Department may be made a condition of allowing the encroachment to persist under the permit.
  7. Permittee agrees that this and any encroachment may be ordered removed by the Department at any time, and for any reason, upon thirty days written notice to the last known address of the applicant or to the address at the location of the encroachment. The permittee agrees that the cost of removing and of restoring the associated right-of-way is the responsibility of the permittee, its successors and assigns.
  8. Permittee, its successors and assigns, agree that if the Department determines that motor vehicular safety deficiencies develop as a result of the installation or use of the encroachment, the permittee, its successors and assigns, shall provide and bear the expenses to adjust, relocate, or reconstruct the facilities, and/or add signs, auxiliary lanes, or other corrective measures reasonably deemed necessary by the Department within a reasonable time after receipt of a written notice of such deficiency. The period within which such adjustments, relocations, additions, modifications, and/or other corrective measures must be completed will be specified in the notice.
  9. Where traffic signals are required as a condition of granting the requested permit or are thereafter required to correct motor vehicular safety deficiencies, as determined by the Department, the costs for signal equipment and installation(s) shall be borne by the permittee, its successors and assigns, and/or the Department in its reasonable discretion and only in accordance with the Department's current policy set forth in the Traffic Operations Manual and Permits Manual. Any modifications to the permittee's entrance necessary to accommodate signalization (including necessary easement(s) on private property) shall be the responsibility of the permittee, its successors and assigns, at no expense to the Department.
  10. The requested encroachment shall not infringe on the frontage rights of an abutting owner without their written consent as hereinafter described. Each abutting owner shall express their consent, which shall be binding on their successors and assigns, by the submission of a notarized statement as follows, "I (we), \_\_\_\_\_, hereby consent to the granting of the permit requested by the applicant along Route \_\_\_\_\_, which permit does affect frontage rights along my (our) adjacent real property." By signature(s) \_\_\_\_\_ subscribed and sworn by \_\_\_\_\_ on this date \_\_\_\_\_. (This requirement does not apply to utility encroachments which serve the general public).
  11. The permit, if approved, is subject to the agreement that it shall not interfere with any similar rights or permit(s) previously granted to any other party, except as otherwise provided by law.



### APPLICATION FOR ENCROACHMENT PERMIT

12. Permittee shall include documentation which describes the facilities to be constructed. Permittee, its successors and assigns, agrees as a condition of the granting of the permit to construct and maintain any and all permitted facilities or other encroachments in strict accordance with the submitted and approved permit documentation and the policies and procedures of the Department. Permittee, its successors and assigns, shall not use facilities authorized herein in any manner contrary to that prescribed by the approved permit. Only normal usage as contemplated by the parties and by this application and routine maintenance are authorized by the permit.

13. Permittee, its successors and assigns, at all times from the date permitted work is commenced until such time as all permitted facilities or other encroachments are removed from the right-of-way and the right-of-way restored, **shall defend, protect, indemnify and save harmless** the Department from any and all liability claims and demands arising out of the work, encroachment, maintenance, or other undertaking by the permittee, its successors and assigns, related or undertaken pursuant to the granted permit, due to any claimed act or omission by the permittee, its servants, agents, employees, or contractors. This provision shall not inure to the benefit of any third party nor operate to enlarge any liability of the Department beyond that existing at common law or otherwise if this right to indemnity did not exist.

14. Upon a violation of any provision of the permit, or otherwise in its reasonable discretion, the Department may require additional action by the permittee, its successors and assigns, up to and including the removal of the encroachment and restoration of the right-of-way. In the event additional actions required by the Department under the permit are not undertaken as ordered and within a reasonable time, the Department may in its discretion cause those or other additional corrective actions to be undertaken and the Department may and shall recover the reasonable costs of those corrective actions from the permittee, its successors and assigns.

15. Permittee, its successors and assigns, shall use the encroachment premises in compliance with all requirements of federal law and regulation, including those imposed pursuant to Title VI of the Civil Right Act of 1964 (42 U.S.C. § 2000d et seq.) and the related regulations of the U.S. Department of Transportation in Title 49 C.F.R. Part 21, all as amended.

16. Permittee, its successors and assigns, agree that if the Department determines it is necessary for the facilities or other encroachment authorized by the permit to be removed, relocated or reconstructed in connection with the reconstruction, relocation or improvement of a highway, the Department may revoke permission for the encroachment to remain under the permit and may order its removal, relocation or reconstruction by the permittee, its successors and assigns, at the expense of the permittee, except where the Department is required by law to pay any or all of those costs.

17. Permittee agrees that the authorized permit is personal to the permittee and shall remain in effect until such time as (a) the permittee's rights to the adjoining real property to have benefitted from the requested encroachment have been relinquished, (b) until all permit obligations have been assumed by appropriate successors and assigns, and (c) unless and until a written release from permit obligations has been granted by the Department. The permit and its requirements shall also bind the real property to have benefitted from the requested encroachment to the extent permitted by law. The permit and the related encroachment become the responsibility of the successors and assigns of the permittee and the successors and assigns of each property owner benefitting from the encroachment, or the encroachment may not otherwise permissibly continue to be maintained on the right-of-way. (Does not apply to utility encroachments serving the general public.)

18. If work authorized by the permit is within a highway construction project in the construction phase, it shall be the responsibility of the permittee to make personal contact with the Department's Engineer on the project in order to coordinate all permitted work with the Department's prime contractor on the project.

19. This permit is not intended to, nor shall it, affect, alter or alleviate any requirement imposed upon the permittee, its successors and assigns, by any other agency.

20. Permittee, its successors and assigns, agrees to contain and maintain all dirt, mud, and other debris emanating from the encroachment away from the surrounding right-of-way and the travel way of the highway hereafter and at all times that its obligations under the permit remain in effect.

**THE UNDERSIGNED APPLICANT(s)/PERMITTEE(s) (being duly authorized representative(s)/owner(s)) DO AGREE TO ALL TERMS AND CONDITIONS SET FORTH HEREIN.**

Signature (of Applicant/Permittee)	Date
	9/19/12

This is not a permit unless and until the permittee(s) receive an approved TC 99-1(B) from the KYTC. This application will become void if not approved by the cancellation date. The cancellation date will be one year from the date the permittee submits their application.



**ENCROACHMENT PERMIT**

**KEPTS No.:** T06-2012-12824  
**Permittee:** Carrollton Utilities  
**Latitude:** 38.609799  
**Longitude:** -85.136173  
**Completion Date:** 10/31/2013

Coordinates provided on the TC 99-1(B) are the approved location for this permit

Indemnities		
Type	Amount Required	Tracking Number
Performance Bond	15000.00	
Payment Bond		
Liability Insurance		

**This permit has been:**

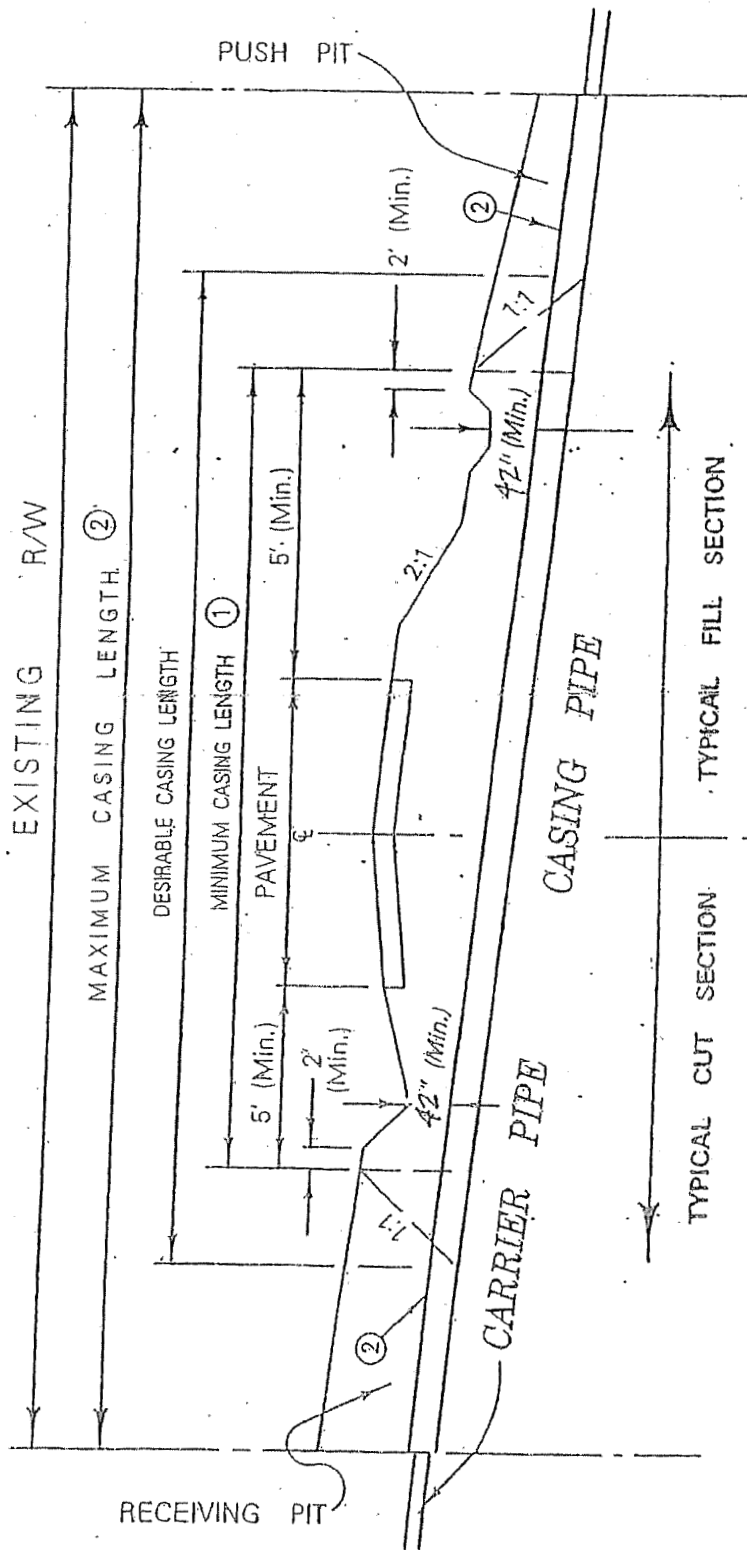
**APPROVED** ☒ **DENIED** ☐

Caroline Justice Permit Supervisor  
**NAME** **TITLE**

Caroline Justice 10/22/2012  
**SIGNATURE** **DATE**

The TC 99-1(B), including the application TC-99 1(A) and all related and accompanying documents and drawings make up the permit. It is not a permit unless both the TC 99-1(A) and TC 99-1(B) are both present

### TYPICAL HIGHWAY BORING CROSSING DETAIL



1. Push Pit and Receiving Pit to be backfilled and thoroughly compacted.
2. All Ditch Lines to be left open.
3. Seed and straw all areas disturbed by this work.
4. The Boring Pit and Tail Ditch shall not extend past the existing toe of slope or bottom of ditch line (from the right-of-way).
5. Services over 2" to be encased or exempt under Chapter 2 of the Pedestrian Guidance Manual.
6. Control of Access Projects, Encasement pipe shall extend from Right-of-Way to Right-of-Way.

6. Control of Access Projects, Encasement pipe shall extend from Right of Way to Right of Way and shall not extend beyond.



## ENCROACHMENT PERMIT GENERAL NOTES & SPECIFICATIONS

Permit No. 06-2012-12824

### I. SAFETY

#### A. General Provisions

- ☒ All signs and control of traffic shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways, latest edition, Part VI, and safety requirements shall comply with the Permits Manual.
- ☒ All work necessary in shoulder or ditch line areas of a state highway shall be scheduled to be promptly completed so that hazards adjacent to the traveled way are kept to an absolute minimum.
- ☒ No more than one (1) traveled-lane shall be blocked or obstructed during normal working hours. All signs and flaggers during lane closure shall conform to the Manual on Uniform Traffic Control Devices.
- ☒ When necessary to block one (1) traveled-lane of a state highway, the normal working hours shall be as directed by the Department. No lanes shall be blocked or obstructed during adverse weather conditions (rain, snow, fog, etc.) without specific permission from the Department. Working hours shall be between 8am and 430pm
- ☒ The traveled-way and shoulders shall be kept clear of mud and other construction debris at all times during construction of the permitted facility.
- ☒ No nonconstruction equipment or vehicles or office trailers shall be allowed on the right of way during working hours.
- ☒ The right of way shall be left free and clear of equipment, material, and vehicles during non-working hours.

#### B. Explosives

- ☒ No explosive devices or explosive material shall be used within state right of way without proper license and approval of the Kentucky Department of Mines and Minerals, Explosive Division.

#### C. Other Safety Requirements

☐

### II. UTILITIES \* Applies to Fully Controlled Access Highways **ONLY**

- ☐ \*All work necessary within the right of way shall be performed behind a temporary fence erected prior to a boring operation.
- ☐ \*The temporary woven wire fence shall be removed immediately upon completion of work on the right of way, and the control of access immediately restored to original condition, in accordance with applicable Kentucky Department of Highways Standard Drawings.
- ☐ \*All vents, valves, manholes, etc., shall be located outside of the right-of-way.
- ☐ \*Encasement pipe shall extend from right-of-way line to right-of-way line and shall be one continuous run of pipe. The encasement pipe shall be welded at all joints.
- ☒ The boring pit and tail ditch shall extend past the existing toe of slope or bottom of ditch line and shall be a minimum of 42 inches deep.

Permit No. 06-2012-12824**II. UTILITIES (Continued)**

- ☒ Encasement pipe shall conform to current standards for highway crossings in accordance with the Permits Manual.
- ☐ Parallel lines shall be constructed between back slope of ditch line and right-of-way line and shall have a minimum of 30-inch cover above top of pipe or conduit.
- ☐ All pavement cuts shall be restored per Kentucky Transportation Cabinet form TC 99-13.
- ☐ Aerial crossing of this utility line shall have a minimum clearance of \_\_\_\_\_ feet from the high point of the roadway to the low point of the line (calculated at the coefficient for expansion of 120 degrees Fahrenheit).
- ☐ The 30-foot clear zone requirement shall be met to the extent possible in accordance with the Permits Manual.
- ☐ Special requirements:

**III. GENERAL****A. OSHA**

- ☒ Kentucky Occupational Safety and Health Standards for the construction industry, which has the effect of law, states in part: (Page 52, 1926.651, Specific Excavation Requirements) "Prior to opening an excavation, effort shall be made to determine whether underground installations, (sewer, telephone, water, fuel, electric lines, etc.) will be encountered, and if so, where such underground installations are located. When the excavation approaches the estimated location of such an installation, the exact location shall be determined, and when it is uncovered, proper supports shall be provided for the existing installation. Utility companies shall be contacted and advised of proposed work prior to the start of actual excavation."

**B. Archaeological**

- ☐ Whenever materials of an archaeological nature are discovered during the course of construction work or maintenance operations, contact shall be made immediately with the Division of Environmental Analysis, which maintains an archaeologist on staff, or with the Office of the State Archaeologist located at the University of Kentucky. Following this consultation, further action shall be decided on a case-by-case basis by the State Highway Engineer or the Transportation Planning Engineer or their designated representative.

**C. Utilities in the Work Areas**

- ☒ The permittee shall be responsible for any damage to existing utilities, and any utility modifications or relocations within state right of way necessary, as determined by the Department or by the owner of the utility, shall be at the expense of the permittee and subject to the approval of the Department.
- ☐ All existing manholes and valve boxes shall be adjusted to be flush with finished grade.

**D. Environmental**

- ☒ If the activity to which this permit relates disturbs one acre or more of land, you must obtain a KPDES KYR10 permit.

Websites

<http://www.water.ky.gov/permitting/wastewaterpermitting/KPDES/storm/>Inspectors for KPDES KYR10 at [www.KEPSC.org](http://www.KEPSC.org)

Permit No. 06-2012-12824**IV. RIGHT OF WAY RESTORATION**

- ☒ All disturbed portions of the right of way shall be restored to grass as per Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition). A satisfactory turf, as determined by the Department, shall be established by the permittee prior to release of indemnity. Sodding or seeding shall be as follows:

Lawn or High Maintenance Situation

70% Lawn Fescue (e.g., variety - Falcon)  
30% Bluegrass **or**70% Lawn Rye (e.g., variety - Derby)  
30% Bluegrass

Right of Way Lawn Maintenance Situation

70% KY 31 Fescue  
30% Perennial Rye Grass **or**

100% KY Fescue

- ☒ Two tons of clean straw mulch per acre of seeding.
- ☒ Prior to seeding, the ground shall be prepared in accordance with Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).
- ☐ Substitutes for sod such as artificial turf, rocked mulch, or paved areas may be acceptable if they are aesthetically pleasing.
- ☐ All ditch-flow lines and all ditch-side slopes shall be sodded.
- ☐ Existing concrete right of way markers shall not be disturbed, but if damaged in any way, they shall be entirely replaced by the permittee, with new concrete markers to match the original markers, in accordance with Kentucky Department of Highways Standard Drawings. Markers that are entirely removed shall be re-established in the proper locations by the permittee and to the satisfaction of the Department.
- ☐ Other right of way restoration requirements are as follows:

**V. DRAINAGE**

- ☐ All pipe shall be laid in a straight alignment, to proper grades, and with all materials and methods of installation including bedding and joint seating in accordance with Department Standard Specifications for Road and Bridge Construction (latest edition). Pipe shall not be covered until inspected by the Department and express permission obtained to make backfill.
- ☐ All gutter lines at the base of new curbs shall be on continuous grades, and pockets of water along with curbs or in entrance areas or other paved areas within the right of way shall not be acceptable.
- ☐ All drainage structures and appurtenances (manholes, catch basins, curbing, inlet basins, etc.) shall conform to Department specifications and shall be constructed in accordance with the Department Standard Drawings. Type required:

Permit No. 06-2012-12824**VI. Paving**

- ☐ No bituminous pavement shall be installed within the right of way between November 15 and April 1, nor when the temperature is below 40 degrees Fahrenheit, without the express consent of the Department. No bituminous pavement shall be installed when the underlying course is wet.
- ☐ Paving within the right of way shall be as follows:
- ☐ Base (Type) \_\_\_\_\_ (Thickness) \_\_\_\_\_
- ☐ Surface Base (Type) \_\_\_\_\_ (Thickness) \_\_\_\_\_
- ☐ Finished Surface (Type) \_\_\_\_\_ (Thickness) \_\_\_\_\_
- ☐ Existing pavement and shoulder material shall be removed to accommodate the above paving specifications.
- ☐ The finished surface of all new pavement within the right of way shall be true to the required slope and grade, uniform in density and texture, free of irregularities, and equivalent in riding qualities to the adjacent highway pavement or as determined by the Department of Highways.
- ☐ All materials and methods of construction, including base and subgrade preparation, shall be in accordance with Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).
- ☐ 24 hours notice to the Department is required prior to beginning paving operations.
- Phone: \_\_\_\_\_ Name: \_\_\_\_\_
- ☐ To ensure proper surface drainage, the new pavement shall be flush with the edge of existing highway pavement and shall slope away from the existing edge of the pavement as specified in drawings.
- ☐ Existing edge of pavement shall be saw-cut to provide a straight and uniform joint for new pavement. An approved joint sealer, in accordance with Kentucky Department of Highways Standard Specifications (latest edition), shall be applied between new and existing pavements.

**VII. SIDEWALKS SPECIFICATIONS \*This dimension should be equal to the width of the sidewalk.****A. New Sidewalks**

- ☐ Sidewalks shall be constructed of Class A concrete (3,500 p.s.i. test), shall be \*\_\_\_\_\_ feet in width, 6 inches in thickness across the bituminous entrance, and 4 inches in thickness across the remaining sections.
- ☐ Sidewalks shall have tooled joints not less than 1 inch in depth at four foot intervals\*, and 1/2 premolded expansion joints extending entirely through the sidewalk at intervals not to exceed 50 feet.
- ☐ All materials and methods of construction, including curing, shall be in accordance with the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).

**B. Existing Sidewalks**

- ☐ (Applicable if existing sidewalks are being relocated) Use of the sidewalk shall not be blocked or obstructed, and a usable walkway shall be maintained across the construction area at all times.
- ☐ All damaged sections of the sidewalks shall be entirely replaced to match existing sections.



Permit No. 06-2012-12824**VIII. DENSE GRADED SHOULDERS**

- ☒ Any existing dense-graded aggregate shoulders in the entire frontage within the construction area, which have been disturbed or damaged or on which dirt has been placed or mud has been deposited or tracked, shall be restored to original condition by removal of all contaminated material and replaced to proper grade with new dense-graded aggregate.
- ☐ All new aggregate shoulders as specified in the plan shall consist of 5 inches of compacted dense-graded aggregate,  $2\frac{1}{2}$  pounds per square yard of calcium chloride.
- ☐ All dense-graded aggregate shoulders shall slope away from the new edge of pavement at the rate of  $\frac{3}{4}$  inch per foot.

**IX. CURBING****A. Bituminous Curbs**

- ☐ Bituminous concrete curbs shall be given a paint coat of asphalt emulsion.
- ☐ The surface under the bituminous concrete curb shall be tacked with asphalt emulsion.
- ☐ All bituminous concrete curbs shall be constructed of a Class I bituminous concrete mixture as specified by official Department of Highways specifications.
- ☐ All bituminous curbs shall be rolled curb, with a minimum base width of 8 inches and a minimum height of \_\_\_\_\_ inches. The top of the curb shall be constructed in such a manner as to guarantee a uniform rolled effect throughout the entire run.

**B. Concrete Curbs**

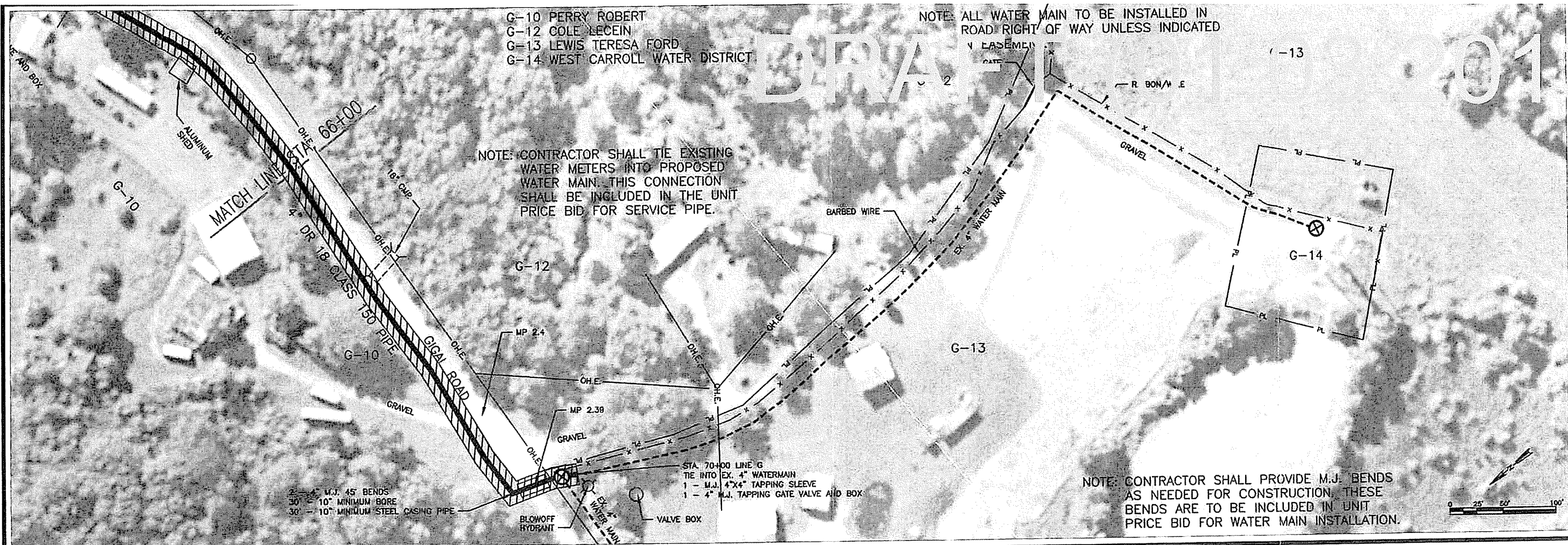
- ☐ All curbs or curb and gutter shall be constructed of Class A concrete (3,500 p.s.i. test) and shall be uniform in height, width, and alignment, true to grade, and satisfactory in finish and appearance as determined by the Department. All materials and methods of construction, including curing, shall be in accordance with Department of Highways Standard Specifications for Road and Bridge Construction (latest edition).
- ☐ All concrete curbs shall be 6 inches in width, extend \_\_\_\_\_ inches above finished grade and 12 inches below finished grade, with all visible edge rounded to  $\frac{1}{2}$  inch radii.
- ☐ All concrete curbs shall have expansion joints constructed at intervals of not more than 30 feet, and  $\frac{1}{2}$  inch premolded expansion joint material (cut to conform to the curb or to the curb and gutter section) shall be used in each expansion joint.
- ☐ The last \_\_\_\_\_ feet of all concrete curbs are to be tapered down to finished grade.

Permit No. 06-2012-12824**X. RIGHT-OF-WAY FENCE REPLACEMENT**

- ☐ The replacement fence shall be a height of at least 48 inches and shall be of sufficient density to contain all animals (if applicable).
- ☐ The replacement fence shall be a minimum of 1 foot and a maximum of 2 feet outside the right-of-way line.
- ☐ The fence materials and design shall meet accepted industry standards and be treated as paintable.
- ☐ The permittee shall be required to maintain the fence in a high state of repair.
- ☐ The existing fence shall be removed by permittee and stored at the Department's maintenance storage yard for future reuse by the Department.
- ☐ The control of access shall not be diminished as a result of replacement of the fence.
- ☐ Miscellaneous:

**NOTICE TO PERMITTEE**

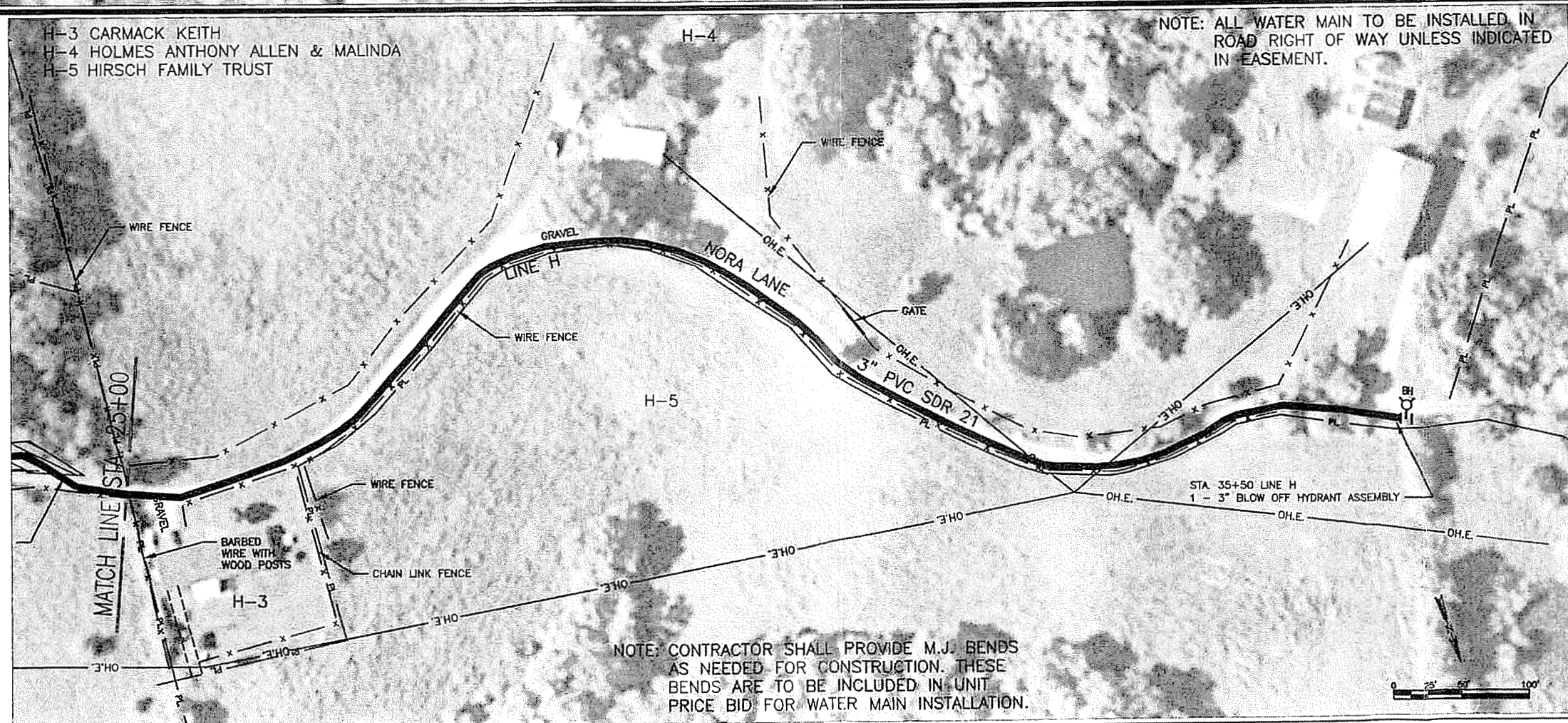
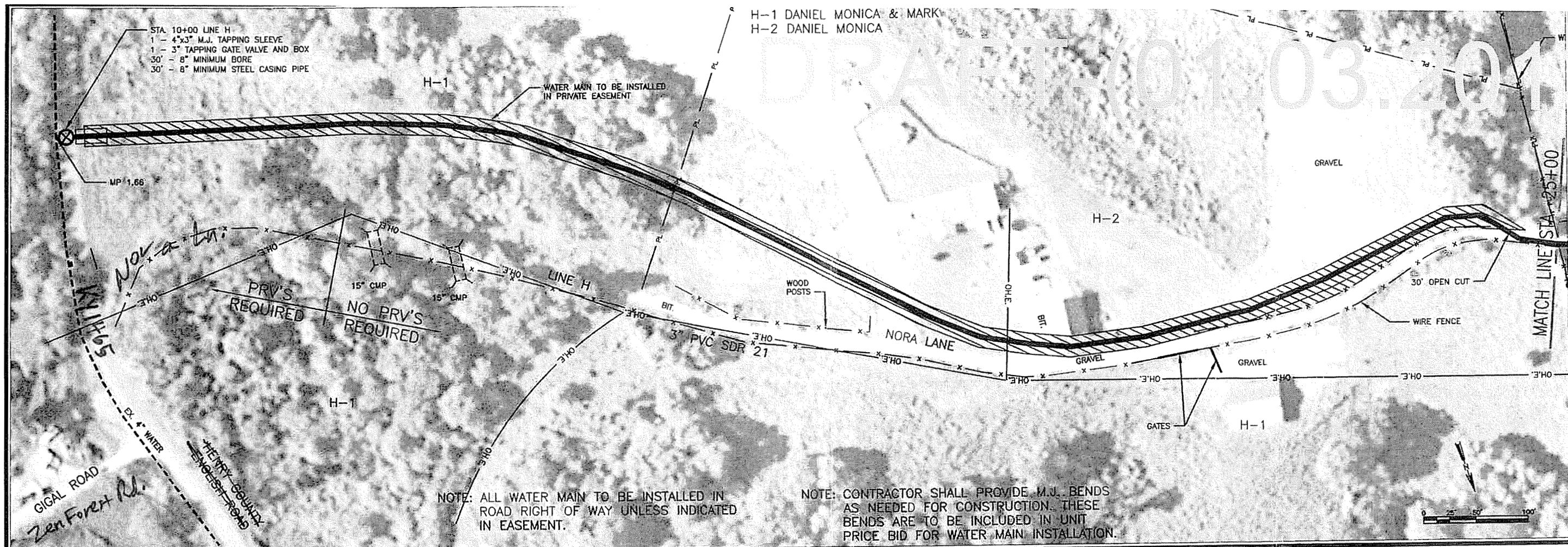
THE PERMITTEE AGREES THAT ALL WORK WITHIN THE EXISTING RIGHT OF WAY SHALL BE DONE IN ACCORDANCE WITH THE PLANS AS APPROVED AND PERMITTED BY AN ENCROACHMENT PERMIT. ANY CHANGES OR VARIANCES MADE AT THE TIME OF CONSTRUCTION WITHOUT WRITTEN APPROVAL FROM THE DEPARTMENT OF HIGHWAYS SHALL BE REMOVED BY THE PERMITTEE AT NO EXPENSE TO THE DEPARTMENT OF HIGHWAYS AND SHALL BE REDONE BY THE PERMITTEE TO CONFORM WITH THE APPROVED PLANS.



06-2012-  
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**LINE G**  
**GILGAL BOOSTER STATION**





DRAFT-(01.03.2013)

**WAGE RATES**



### DEMOLITION

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included: All demolition, removal, and salvage work as shown on the drawings or specified herein.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 SUBMITTALS

- A. CONTRACTOR shall submit permits and notices, if required, authorizing building demolition.

##### 1.03 QUALITY ASSURANCE

- A. CONTRACTOR shall perform demolition, removal, and salvage in conformity with applicable federal, state, and local safety practices and code requirements.

##### 1.04 SEQUENCE

- A. No demolition, removal, or salvage work shall commence until approval to proceed has been granted by OWNER. Such work shall be completed in accordance with the construction sequence included in Division 1 of these specifications and in accordance with the construction phases of this project and work to be done by other contractors.

#### PART 2-PRODUCTS

##### 2.01 GENERAL

- A. Compacted fill, including degree of compaction, shall meet the requirements of Section 02222--Excavation, Fill, Backfill and Grading.
- B. Pipe fittings and materials shall meet the requirements of Section 02600--Buried Piping and Appurtenances and Section 15040--Piping and Appurtenances.

#### PART 3-EXECUTION

##### 3.01 BREAKING DOWN AND REMOVING STRUCTURES

- A. General:
  - 1. When a portion of an existing structure is to be retained, CONTRACTOR shall take care during construction operations so as not to impair the value of the retained portion.

- a. Complete all operations necessary for the removal of any existing structure which might endanger the new construction prior to the construction of the new work.
  - b. Do not use any equipment or devices which might damage structures, facilities, or property which are to be preserved and retained.
2. When existing reinforcing is exposed at the surface of removal areas, CONTRACTOR shall burn back the reinforcing bars 2 inches and patch with nonshrink grout unless noted otherwise.
- B. Pavement, Curb, Gutter, Sidewalk, Driveways, Crosswalk, and Similar Structures:
1. Where portions of the existing structure are to be left in the surface of the finished work, CONTRACTOR shall remove the structure to an existing joint, or saw and chip the structure to a true line.
  2. Sufficient removal shall be made to provide for proper grades and connections in the new work.

## 3.02 EQUIPMENT

- A. CONTRACTOR shall remove all equipment specified herein or indicated.
- B. CONTRACTOR shall remove associated exposed conduit, power wiring, controls, switches, instrumentation, control wiring, control boxes, appurtenances and their supports serving equipment to be removed. Electrical items shall be removed to their junction with motor control center, control panel, or their junction with conduit serving other equipment that is to remain.
- C. CONTRACTOR shall remove all piping and appurtenances and their supports serving equipment indicated to be removed. Piping shall be removed to its junction with the main service header serving other equipment that is to remain or new equipment as indicated. Remaining piping and tubing shall be fitted with an appropriate blind flange or plug and insulated as required.
- D. CONTRACTOR shall remove equipment bases, anchor bolts, and other supports serving equipment to be removed. Concrete bases shall be removed to 1-inch below floor elevation and repaired with concrete topping grout plus surfacing to match existing.
- E. CONTRACTOR shall patch floors, walls, and ceilings as required to match existing or as indicated where equipment, piping, electrical, bases, or supports are removed.
- F. CONTRACTOR shall remove the caustic soda tanks and containment wall. These items are not intended to be all-inclusive. CONTRACTOR shall remove all items indicated or specified to be removed whether listed here or not.

## 3.03 INTERIOR PIPING, DUCTWORK, AND APPURTENANCES

- A. CONTRACTOR shall remove all piping, ductwork, and appurtenances as indicated. The location and elevations of existing piping are approximate.
- B. CONTRACTOR shall remove all supports for piping, ductwork, and appurtenances indicated to be removed. Repiping and connections to new piping shall be as specified for new piping. Remaining piping and tubing not reconnected for new piping shall be fitted with an appropriate blind flange or plugged and insulated as required.

- C. CONTRACTOR shall patch all holes resulting from removal of piping, ductwork, appurtenances, and their supports. Patching of concrete shall be with nonshrink grout and as indicated. Patching of masonry shall be with matching material toothed in. Patch other material as indicated.

#### 3.04 SALVAGE

- A. OWNER has first right of refusal to all material, piping, and equipment removed.
- B. All equipment, material, and piping, except as specified hereinafter, within the buildings and structures to be demolished and additional items as noted shall be removed by CONTRACTOR. CONTRACTOR shall inspect each structure and determine the type and amount of equipment, materials, and piping to be removed.
- C. All equipment, material, and piping, except as specified hereinafter, within the limits of the demolition and additional items noted to be removed will become the property of CONTRACTOR if OWNER does not claim under first right of refusal and shall be removed from the project site.
- D. The caustic soda feed pump shall be removed and turned over to OWNER.

#### 3.05 BACKFILL

- A. CONTRACTOR shall fill all abandoned structures and excavations resulting from removal of structures and utilities with compacted fill.
- B. Prior to filling, CONTRACTOR shall break one opening in the floor or wall near the base of each compartment to allow groundwater to freely migrate through the structure.

END OF SECTION



### SITE CLEARING AND STRIPPING

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Removal of surface debris.
  - 2. Removal of paving, curbs, and sidewalks.
  - 3. Removal of trees, shrubs, and other plant life.
  - 4. Strip and stockpile topsoil.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

#### PART 2-PRODUCTS

NOT APPLICABLE

#### PART 3-EXECUTION

##### 3.01 PREPARATION

- A. CONTRACTOR shall identify existing plant life to remain and shall tag accordingly.

##### 3.02 PROTECTION

- A. CONTRACTOR shall protect from damage utilities and structures that are to remain.
- B. CONTRACTOR shall protect trees, plant growth, and features designated to remain as final landscaping.
- C. See Division 1 for protection of survey monumentation.

##### 3.03 CLEARING AND GRUBBING

- A. Clearing and grubbing shall consist of cutting and disposing of trees, brush, windfalls, logs, and other vegetation and the removing and disposing of roots, stumps, stubs, grubs, logs, and other timber from within the clearing limits as defined on the drawings designated to be removed on the drawings or in the specifications or fall within the excavation, embankment, or improved areas of the site.
- B. All roots and stumps shall be removed to a depth of not less than 12 inches below the original ground surface in embankment areas. In cut areas, such material shall be removed to a depth of not less than 12 inches below the subgrade.

## 3.04 REMOVALS

- A. CONTRACTOR shall remove from the site all trees, brush, and other vegetation, debris, and rocks which fall within the excavation and grading limits, as well as any paving, curb and gutter, and sidewalks shown on the drawings to be removed.

## 3.05 STRIPPING

- A. Excavate topsoil from areas to be built upon, cut or filled, or to have surface improvements, including roadways and walks.
- B. Stockpile topsoil on-site and protect from erosion.
- C. Excess topsoil, if any, shall be removed from the site and disposed of at CONTRACTOR's expense.

END OF SECTION

### EXCAVATION, FILL, BACKFILL, AND GRADING

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included: Excavating, filling, backfilling, and grading for this work includes, but is not necessarily limited to:
  - 1. Excavating for footings, foundations, roads, and utilities.
  - 2. Placing and compacting all fill and backfill.
  - 3. Placement of granular cushion below slabs on grade.
  - 4. Placement of crushed stone mat below manhole/vault slabs or other structures where required.
  - 5. Rough and finish grading prior to paving, seeding, etc.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.
- C. Payment: All general excavation shall be included in the Lump Sum Bid.

##### 1.02 REFERENCES

- A. ASTM D698-Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
- B. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Kentucky, Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications. Unless specifically stated otherwise, the Measurement and Payment sections of the Standard Specifications shall not apply. Measurement and payment will be made in accordance with terms of the Contract Documents.

##### 1.03 SUBMITTALS

- A. CONTRACTOR shall submit samples of materials proposed for use as fill to soils testing laboratory for analysis of their suitability and for recommendations on moisture content during compaction, compaction methods, or other appropriate information.
- B. CONTRACTOR shall submit sufficient samples of each different type or classification of soil to obtain representative values.

##### 1.04 JOB CONDITIONS

- A. The elevations shown for existing work and ground are reasonably correct, but are not guaranteed to be absolutely accurate. No extras will be allowed because of variations between drawings and actual grades.
- B. Soil borings were made and the soils information is included in an Appendix to these Specifications. The information contained is not guaranteed to be indicative of conditions to

be encountered during construction. It is CONTRACTOR's responsibility to make its own investigations to determine physical conditions at the site, which may affect the work.

## PART 2-PRODUCTS

### 2.01 COMPACTED FILL

- A. All fill and backfill material designated to be compacted fill shall be granular with no stones larger than 4 inches and shall be reasonably well-graded throughout the particle size range.

### 2.02 CRUSHED STONE MAT

- A. Crushed stone mat below foundation slabs and footings shall be 1-inch clear crushed stone and shall meet all requirements for No. 57 of Section 805 of Standard Specifications.

### 2.03 EMBANKMENT FILL

- A. Embankment fill shall contain no stumps, brush, rubbish, or other perishable material. The top 12 inches of the earth embankment shall be earthy material free from large stones.

### 2.04 CONCRETE FILL

- A. Concrete fill shall be Class X concrete as defined in Section 03300, Cast-In-Place Concrete, or flowable fill as defined in this section.

### 2.05 CLAY FILL

- A. Clay fill shall contain at least 25% clay minerals (material finer than 0.002 mm).

## PART 3-EXECUTION

### 3.01 GENERAL

- A. Prior to all excavating, CONTRACTOR shall become thoroughly familiar with the site and site conditions.

### 3.02 PROTECTION

- A. CONTRACTOR shall provide all necessary sheeting, shoring, or other soil retention systems including all labor, material, equipment, and tools required, or as necessary to maintain the excavation in a condition to provide safe working conditions, to permit the safe and efficient installation of all items of Contract work, and to protect adjacent property. CONTRACTOR shall be held liable for any damage which may result to property from excavation or construction operations. Shoring, sheeting, and other soil retainage systems shall be withdrawn or removed in a manner so as to prevent subsequent settlement of structures, utilities, and other improvements.
- B. Design of sheet piling and other soil retaining systems shall be the sole responsibility of CONTRACTOR. Where such systems are shown on the drawings, no parameters such as

embedment depth, section profile, presence or lack of walers, etc., nor system type or suitability shall be inferred. CONTRACTOR is responsible for designing and providing a fully functional system compatible with construction and site requirements.

- C. Nothing in this specification shall be deemed to allow the use of protective systems less effective than those required by the Occupational Safety and Health Administration (OSHA) and other applicable code requirements.

## 3.03 UTILITIES

- A. Before starting excavations, CONTRACTOR shall locate existing underground utilities in all areas of the work.
- B. If utilities are to remain in place, CONTRACTOR shall provide adequate means of protection during earthwork operations.
- C. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for directions.
- D. Cooperate with OWNER and utility companies in keeping respective services and facilities in operation and repair any damaged utilities to satisfaction of utility owner.
- E. CONTRACTOR shall not interrupt existing utilities serving facilities occupied and used by OWNER or others, except when permitted in writing by OWNER.
- F. CONTRACTOR shall demolish and completely remove from the site existing underground utilities indicated to be removed after utility has been capped and sealed.
- G. CONTRACTOR shall accurately locate and record abandoned and active utility lines rerouted or extended on project record drawings.

## 3.04 FINISH ELEVATIONS AND LINES

- A. CONTRACTOR is responsible for setting and establishing finish elevations and lines.

## 3.05 EXCAVATION

- A. After the site has been cleared and stripped, the site shall be cut and filled to the indicated subgrade as shown or specified.
- B. All excavated material that does not meet the specification for compacted fill or embankment fill or meets the specification but is not required for backfill or fill shall be classified as excess material and shall be removed from the site and disposed of at CONTRACTOR's expense.
- C. All material other than suitable bearing soil or bedrock, as determined by the Project Soils Engineer, shall be removed from under concrete to be poured on ground.
- D. Excavation for all footings, foundation walls, pits, etc. shall be large enough to provide adequate clearance for the proper execution for the work within them.

- E. No footings or slabs shall bear on the top 2 feet of existing soil. Where planned subgrade is within 2 feet of existing grade, remove soils to 2 feet below existing grade and backfill with compacted fill up to subgrade elevation.
- F. When excavations reach subgrade elevations as shown on the drawings, or as specified herein, the Project Soils Engineer will observe the bottom material. Where, in the opinion of the Project Soils Engineer, unsuitable foundation material is found at the level of the subgrade, original material below the excavation necessary for construction according to grades shown or specified shall be removed and replaced with material and placing methods as specified under compacted fill and backfill.
- G. Excavations that are undercut beneath the foundation shall extend beyond the perimeter of the foundation one foot plus a distance at least equal to the depth of undercut below footing grade.
- H. CONTRACTOR shall backfill and compact all overexcavated areas.

## 3.06 PREPARATION OF SUBGRADE

- A. After the site has been cleared, stripped, and excavated to subgrade, thoroughly compact subgrade to the requirements specified for compacted fill below. Condition the subgrade as recommended by the Project Soils Engineer.
- B. Remove all ruts, hummocks, and other uneven surfaces by surface grading prior to placement of fill.
- C. All slab-on-grade and road subgrades shall be proofrolled with a heavy rubber-tired construction vehicle (such as a fully loaded tandem-axle dump truck) in the presence of the Project Soils Engineer.

## 3.07 COMPACTED FILL AND BACKFILL

- A. All fill and backfill, except as otherwise specified, shall be compacted fill placed to within 4 inches of the bottom of the topsoil or to the bottom of the structure or other improvement.
- B. No fill shall be placed under water or over unsuitable subgrade conditions.
- C. All fill and backfill except embankment fill and clay fill shall be compacted as follows:
  - 1. Class 1 Compaction—This class of compaction shall apply to all fill areas under buildings, structures, piping, bituminous roadway and parking areas, curb and gutter, and backfill within ten feet of structure walls. All compacted material shall be placed in uniform layers not exceeding eight inches in loose thickness prior to compaction. Each layer shall be uniformly compacted to a dry density at least 95% of the maximum dry density as determined by a laboratory compaction test at the optimum moisture content (ASTM Test Designation D698). Compaction shall be obtained by compaction equipment appropriate for the conditions. This requirement shall be increased to 100% (ASTM D698) for fill supporting footings.
  - 2. Class 2 Compaction—This class of compaction shall be used in excavated areas beyond 10 feet of structures without any piping or adjacent foundations. Material for backfill shall be granular material as specified above. The material shall be deposited, spread, and leveled in layers generally not exceeding 12 inches in thickness before compaction. Each layer of the fill shall be compacted to at least

90% of the maximum dry density (testing same as Class 1). Compaction shall be obtained by compaction equipment appropriate for the conditions.

- D. No frozen material shall be placed nor shall any material be placed on frozen ground.
- E. Four inches of clay fill shall be placed and compacted to at least a firm consistency in areas to be seeded or sodded prior to placement of topsoil.

## 3.08 EMBANKMENT FILL

- A. Embankment fill may be placed in fill areas to be seeded or sodded if no piping exists in the fill and the areas are at least 10 feet from any structure.
- B. Embankment fill shall be deposited, spread, and leveled in layers generally not exceeding 12 inches in thickness before compaction. Each layer shall be compacted to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment. The required compaction shall be obtained for each layer before any material for a succeeding layer is placed thereon. Compaction shall be obtained using the hauling and leveling equipment and, in addition, tamping rollers, pneumatic-tired rollers, vibratory rollers, or other types of equipment required to produce the desired results.

## 3.09 CONCRETE FILL

- A. In areas where there is inadequate room for compaction equipment and in other areas as shown or specified, Class X concrete shall be used as fill material.

## 3.10 GRADING

- A. CONTRACTOR shall perform all rough and finish grading required to attain the elevations shown on the drawings.
- B. Grading Tolerances:
  - 1. Rough Grade: Buildings, parking areas, and sidewalks— $\pm 0.1$  feet.
  - 2. Finish Grade: Granular cushion or crushed stone mat under concrete slabs— $\pm 0.03$  feet.
  - 3. Lawn areas away from buildings, parking areas, and sidewalks— $\pm 0.25$  feet.

## 3.11 PLACING CRUSHED STONE

- A. The same day that the subgrade is exposed, place 12 inches of crushed stone mat below manholes and vault slabs. Compact in place.

## 3.12 COMPACTION TESTING

- A. Compaction tests shall be done by the Project Soils Engineer. Location and frequency of the tests shall be as recommended by the Project Soils Engineer and paid for by OWNER.

END OF SECTION

### AGGREGATE BASE COURSE

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Aggregate base course for roads and parking areas.
  - 2. Gravel roads.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.
- C. Repair or replacement of aggregate base course shall be considered incidental and included in the price bid.
- D. CONTRACTOR is cautioned that existing private and public roads and shoulders may not hold up to typical construction traffic or activities. CONTRACTOR shall repair all roads, shoulders, and gravel areas damaged in accordance with this section. All paved areas shall also be repaired in accordance with Section 02510-Asphaltic Concrete Paving.

##### 1.02 REFERENCES

- A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, latest edition, including all issued supplemental specifications. Unless specifically stated otherwise, the Measurement and Payment sections of the Standard Specifications shall not apply. Measurement and payment will be made in accordance with terms of the Contract Documents.

##### 1.03 DEFINITIONS

- A. Street or road shall include streets, roads, driveways, and parking lots.

##### 1.04 SUBMITTALS

- A. Submit sieve analysis for proposed materials in accordance with Section 01300-Submittals.

##### 1.05 DRAINAGE DURING CONSTRUCTION

- A. CONTRACTOR shall comply with the provisions of Section 204 of the Standard Specifications.



## PART 2-PRODUCTS

### 2.01 AGGREGATES

- A. Aggregate for base course shall meet the requirements of dense grade aggregate of Section 302 of the Standard Specifications.
- B. Base course shall be uniformly graded and shall conform to the requirements for DGA of Section 805 for the top 3 inches and Size No. 2 for the remaining depth of basecourse.
- C. Material for top layer of shoulders shall conform to the requirements for DGA of Section 805.
- D. Material to replace yielding or unstable subgrade shall conform to Size No. 2 of Section 805.

## PART 3-EXECUTION

### 3.01 PREPARATION

- A. The subgrade shall be graded and rolled to provide uniform density and shall comply with the profile and cross sections contained in the drawings. All street subgrade in cut areas and all areas to receive fill shall be proofrolled in the presence of OWNER or ENGINEER with a heavily loaded tri-axle dump truck or similar equipment prior to the placement of any fill materials or base course. The subgrade shall be prepared in accordance with Section 207 of the Standard Specifications.

### 3.02 CONSTRUCTION

- A. Base course grade shall be set to allow placement of thickness of asphaltic pavement shown or specified.
- B. Depth of base course shall be the existing depth or 9 inches, whichever is greater.
- C. Construction of base course shall conform to Section 302 of the Standard Specifications. Each layer of base course shall be wetted and rolled to provide maximum compaction in accordance with requirements therein.
- D. The finished base course shall be fine graded in preparation for paving.
- E. After final grading, CONTRACTOR shall maintain the base course until asphaltic paving work has been completed.
- F. All gravel surfaces damaged during construction shall be replaced. The depth of aggregate shall match existing or 9 inches, whichever is greater.

END OF SECTION

### SLOPE PROTECTION AND EROSION CONTROL

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included: Erosion control devices.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 PAYMENT

- A. All costs associated with slope protection and erosion control shall be included in CONTRACTOR's Bid. This work shall include, but is not limited to, erecting fence, excavation, placing posts, backfilling, attaching woven wire and geotextile fabric; placing ditch checks; installing sediment traps; for removing the fence at completion of project; for cleaning and repairing; for removing or spreading accumulated sediment to form a surface suitable for seeding; for replacing silt fence and damages caused by overloading of sediment material or ponding of water adjacent to silt fence; and for furnishing labor, tools, equipment, and incidentals necessary to complete the work in accordance with the Contract.

##### 1.03 REFERENCES

- A. Kentucky Best Management Practices for Construction Activity (Ky BMP).

##### 1.04 REGULATORY REQUIREMENTS

- A. CONTRACTOR is required to obtain any necessary federal, state, or local permits for erosion control. The permit requirements are CONTRACTOR's responsibility and shall be included in the prices Bid.
- B. Comply with laws prohibiting pollution of any lake, stream, river, or wetland.

##### 1.05 QUALITY CONTROL

- A. Construct and maintain erosion sediment control measures in accordance with Ky BMP.
- B. Check facilities weekly and after any rainfall event and make needed repairs within 24 hours.

#### PART 2-PRODUCTS

##### 2.01 EROSION MATS

- A. Uniform web of interlocking wood excelsior fibers with a net backing on one side. The wood from which the blanket is produced shall have been properly cured to achieve

adequately curled and barbed fibers. The blanket shall be of uniform thickness with the wood fibers evenly distributed over the entire area of the blanket. The blanket shall be furnished in rolled strips. The width of the strips shall be 48 inches,  $\pm 1$  inch. Weight of blanket measured under average atmospheric conditions shall be 78 pounds per 80 square yards,  $\pm 10\%$ . Net backing shall have mesh size not exceeding 1 1/2 by 3 inches and may be woven from twisted paper, cotton cord, a biodegradable plastic, or other alternate approved by ENGINEER. The blanket shall be nontoxic to vegetation.

## 2.02 SILT FENCE

- A. Conform to Kentucky BMP as supplemented herein.
- B. Use geotextile fabric consisting of either woven or nonwoven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride with the following requirements. Fabric shall have the minimum strength values in the weakest principal direction. Nonwoven fabric may be needle punched, heat bonded, resin bonded, or combination thereof.

VALUE MINIMUM REQUIREMENTS <sup>(1)</sup>

Test	Method	Silty Soils <sup>(4)</sup>	Sandy Soils <sup>(5)</sup>
Grab Tensile-strength	ASTM D-5034, D5035 <sup>(2)</sup>	100	100
Mullen Burst strength (psi)	ASTM D-3786	200	200
Equivalent Opening Size	CW-02215-77	50-140	20-50
U.S. Standard sieve	Corps of Engineers		
Water Flow Rate (gal/min/ft. <sup>2</sup> at 50 MM Constant head	ASTM D-4491 <sup>(3)</sup>	10	10
Ultra Violet Radiation Stability (percent)	ASTM D-4355	90	90

- (1) All numerical values represent minimum average roll values (i.e., the average of test results on any roll in a lot should meet or exceed the minimum values in the table.)
  - (2) ASTM D-1682 Grab Test, Method 16, using a 4-inch by 8-inch sample, 3-inch gauge length clamped in 1-inch- by 2-inch-long grip, tested at a strain rate of 12 inches/min.
  - (3) Water Flow Rate in gal/min/ft shall be determined by multiplying Permittivity in sec. as determined by ASTM D-4491 by a conversion factor of 74.
  - (4) Silty Soil: More than 15% by weight passing No. 200 sieve.
  - (5) Sandy Soil: Less than 15% by weight passing No. 200 sieve.
- C. Furnish geotextile fabric in a wrapping which will protect the fabric from ultraviolet radiation and from abrasion because of shipping and handling. Keep geotextile dry until installed.
  - D. Provide posts, stakes, and wire reinforcement in accordance with Kentucky BMP standards.

## 2.03 GEOTEXTILE FABRIC-TYPE R

- A. For subgrade reinforcement under riprap: Either woven or nonwoven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride. Fabric shall have

the minimum strength values in the weakest principle direction. Nonwoven fabric may be needle punched, heat bonded, resin bonded, or combinations thereof.

- B. Insect, rodent, mildew, and rot resistant.
- C. Furnish in a wrapping which will protect fabric from ultraviolet radiation and from abrasion because of shipping and hauling. Keep geotextile dry until installed.
- D. Clearly mark fabric rolls showing fabric type.
- E. If sewn seams are used, furnish a field-sewn seam sample produced from the geotextile fabric and thread and with the equipment to be used on the project prior to installation.
- F. Comply with the following physical properties:

Test	Method	Value
Grab Tensile Strength (lbs) Puncture Strength (lbs) using 5/16-inch Flat-tipped Rod	ASTM D-4632 Modified ASTM D-3787	200 min. 80 min.
Mullen Burst (lbs/in <sup>2</sup> )	ASTM D-3786	250 min.
Elongation at Required Strength (percent)	ASTM D-4632	20 min.
Equivalent Opening Size (U.S. Standard Sieve)	ASTM D-4751	30 to 140
Water Flow Rate (gal/min/ft <sup>2</sup> ) at 50 mm Constant Head	ASTM D-4491	10 min.

## 2.04 STRAW BALE BARRIERS

- A. Provide in accordance with Kentucky BMP standards.

## PART 3-EXECUTION

### 3.01 GENERAL

- A. Install devices before construction activities begin.
- B. Proceed carefully with construction adjacent to stream channels to avoid washing, sloughing, or deposition of materials into the stream. If possible, the work area should be diked off and the volume and velocity of water that crosses disturbed areas be reduced by means of planned engineering works (diversion, detention basins, berms).
- C. Unless noted on drawings, do not remove trees and surface vegetation.
- D. Expose the smallest practical area of soil at any given time through construction scheduling. Make the duration of such exposure before application of temporary erosion control measures or final revegetation as short as practicable.

## 3.02 EROSION MAT INSTALLATION

- A. Place erosion mat immediately after seeding or sodding operations have been completed. Before mat placement, remove all material or clods over 1 1/2 inches in diameter and all organic material or other foreign material which interfere with the mat bearing completely on the soil or sod.
- B. Any small stones or clods which prevent contact of the mats with the soil shall be pressed in the soil with a small lawn-type roller or by other effective means. The mat shall have its lateral edge so impressed in the soil as to permit runoff water to flow over it.
- C. The matting strips shall be rolled on or laid in direction of flow. Spread mat evenly, smoothly, in a natural position without stretching and with all parts bearing on soil and place blanket with netting on top. Overlap adjacent strips at least 4 inches. Overlap strip ends at least 10 inches. Make overlaps with the upgrade section on top.
- D. Bury upgrade end of each strip of fabric or blanket at least 6 inches in a vertical slot cut in the soil and press soil firmly against the embedded fabric or blanket.
- E. Anchor mats in place with vertically driven staples driven until their tops are flush with the soil. Space staples at 3-foot centers along mat edges and stagger space at 3-foot centers through the center. Place staples at 10-inch centers at end or junction slots.
- F. Reseed areas damaged or destroyed during erosion mat placing operations as specified for original seeding.
- G. Dispose of surplus excavated materials, and all stones, clods or other foreign material removed in the preparation of the seeded soil or sodded surface before placing mat.
- H. Following mat placement, uniformly apply water to the area to moisten seedbed to 2-inch depth and in a manner to avoid erosion.
- I. Maintain erosion mat and make satisfactory repairs of damage from erosion, traffic, fires or other causes until work acceptance.

## 3.03 GEOTEXTILE FABRIC-TYPE R

- A. Before placing fabric, grade area smooth and remove stones, organic matter, or other foreign material which would interfere with fabric being completely in contact with soil.
- B. Place fabric loosely and lay parallel to direction of water movement. Pinning or stapling is acceptable to hold geotextile in place. Overlap or sew together separate pieces of fabric. Overlap joints a minimum 24 inches in the flow direction. After placement, do not expose fabric more than 48 hours before covering.
- C. Cover damaged areas with a patch of fabric using a 3-foot overlap in all directions.

## 3.04 SILT FENCE INSTALLATION

- A. Erect silt fence before starting construction operations which might cause sedimentation or siltation at site of proposed silt fence.

- B. Construct silt fence in an arc or horseshoe shape with ends pointing up slope. Construct silt fence to the dimensions and details shown on drawings. Remove silt fences after slopes and ditches have been stabilized and turf developed to the extent that future erosion is unlikely. Dispose of materials remaining after removal.
- C. Inspect all silt fences immediately after each rainfall and at least daily. Correct deficiencies immediately. Where construction activity changes the earth contour and drainage runoff, make a daily review to ensure that silt fences are properly located for effectiveness. Where deficiencies exist, install additional silt fences.
- D. Remove and dispose of sediment deposits. Sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade and the area topsoiled, fertilized, and seeded as required.

END OF SECTION

### ASPHALTIC CONCRETE PAVING

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work includes asphaltic concrete paving, tack coat, and casting adjustments.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.
- C. CONTRACTOR is cautioned that existing private and public roads and shoulders may not hold up to typical construction traffic or activities. CONTRACTOR shall replace all roads, shoulders, and paved areas damaged during the project in accordance with this section. Gravel shoulders, gravel roads, and parking areas shall be repaired in accordance with Section 02231-Aggregate Base Course.
- D. Payment: Payment for asphaltic concrete paving shall be considered incidental to the project and included in the lump sum bid.

##### 1.02 REFERENCES

- A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Kentucky Department of Transportation Construction and Material Specifications.

##### 1.03 DEFINITIONS

- A. Street or road shall include streets, roads, driveways, and parking lots.

##### 1.04 SUBMITTALS

- A. Prior to the commencement of paving, mix designs and aggregate sieve analysis shall be submitted to ENGINEER for approval in accordance with Section 01300-Submittals.

#### PART 2-PRODUCTS

##### 2.01 ASPHALTIC CONCRETE PAVEMENT

- A. Asphaltic material for binder course and surface course shall meet the requirements for Class I mixtures as set forth in Section 401 of the Standard Specifications. The mixtures shall have been approved recently by the Kentucky Transportation Cabinet and used recently on a state job.
- B. Aggregate shall conform to the requirements of the Standard Specifications.
- C. Materials for prime coat shall conform to the requirements of the Standard Specifications and shall be Primer L.

- D. Material for tack coat shall conform to the requirements of Section 806 of the Standard Specifications.
- E. Replacement of paved surfaces shall be 3 inches in thickness or existing thickness, whichever is greater. Binder course shall be 1 3/4 inches minimum. Surface course shall be 1 1/4 inches minimum.

## PART 3-EXECUTION

### 3.01 ALLOWABLE REMOVAL OF PAVEMENT

- A. CONTRACTOR shall remove bituminous pavement and road surface as a part of the general excavation. The width of pavement removed shall be the minimum possible and acceptable for convenient and safe installation of structures, utilities, and appurtenances.
- B. All bituminous pavement shall be cut on neat, straight lines and shall not be damaged beyond the limits of the excavation. Should the cut edge be damaged, a new cut shall be made in neat, straight lines parallel to the original cut encompassing all damaged areas. Pavement removal shall be extended to a seam or joint if seam or joint is within 3 feet of damaged pavement.

### 3.02 CASTING ADJUSTMENTS

- A. All new and existing manhole castings and valve boxes within the paving limits of the street that require adjustment shall be adjusted to match the finished asphaltic surface. Adjustments shall not be made greater than 48 hours before the anticipated time of paving. Adjustments shall be performed as called for in Section 2600-Buried Piping and Appurtenances. CONTRACTOR shall furnish Class 1 barricades with flashers on all adjusted casting until paving has been completed. Tops of castings and valve boxes shall be oiled or protected by other methods to prevent sealing of lids and filling of lift holes during paving. Upon completion of paving operations, CONTRACTOR shall check all castings and valve boxes to insure the lids are clean and operational. Manhole casting adjustment shall be included in the cost of other items of work, and no further compensation will be made. Valve box adjustment shall be considered an incidental item of work.

### 3.03 TACK COAT

- A. All work shall be in accordance with the Standard Specifications.
- B. If asphaltic surface course is applied to an existing street or is not applied the same day as binder course, the existing street or binder surface shall be tack coated prior to surface paving. Prior to placement of tack coat the streets shall be thoroughly cleaned and broomed. Tack coat shall be applied at a rate of 0.10 gallons per square yard immediately prior to placement of asphaltic surface course.
- C. In situations where traffic must be maintained, tack coat shall not be placed on the traveled half of the street until traffic can be switched to the new pavement.



## 3.04 JOINTS

- A. Joints between old and new pavements or between successive days' work shall be constructed and treated as to insure thorough and continuous bond between the old and new mixtures. Transverse construction joints shall be constructed by cutting the material back for its full depth so as to expose the full depth of the course. Where a header is used, the cutting may be omitted provided the joint conforms to the specified thickness. These joints shall be treated with tack coat material applied with a hose and spray nozzle attachment to fully coat the joint surface.
- B. The longitudinal joint shall be made by overlapping the screed on the previously laid material for a width of not more than 2 inches and depositing a sufficient amount of asphaltic mixture so that the finished joint will be smooth and tight. Longitudinal joints in the surface course shall at no time be placed immediately over similar joints in the binder course beneath. A minimum distance of 12 inches shall be permitted between the location of the joints in the binder course and the location of similar joints in the surface course above.
- C. All costs for furnishing and applying tack coat to butt joints as specified above shall be considered incidental.

## 3.05 FINISHING ROADWAY

- A. The finished base course shall be fine-graded in preparation for asphaltic concrete paving. Base course ramps at all existing pavement shall be removed to provide a full depth butt joint. Base course around manhole castings and valve boxes shall be hand trimmed and compacted with a vibratory plate compactor.
- B. This item shall include all of the following preparatory and finishing items and any other incidental items of work required for construction. Asphaltic ramps around manholes on existing binder course to receive surface course shall be removed. Asphaltic ramps shall be installed on all manholes and at all butt joints in areas to receive binder course only.
- C. Finishing roadway shall be considered incidental to asphaltic paving.

## 3.06 TESTING ASPHALTIC CONCRETE

- A. ENGINEER may require samples of asphaltic concrete for testing. CONTRACTOR shall cut samples from the finished pavement where marked by ENGINEER and patch the sample area. Samples for sieve analysis and asphalt content will be taken by ENGINEER prior to placement.

## 3.07 ASPHALTIC PAVING

- A. Asphaltic paving work shall include the construction of plant mixed asphaltic concrete pavement in the areas shown on the drawings. All work shall be performed in accordance with the Standard Specifications.
- B. Before commencement of paving operations, CONTRACTOR shall examine the finished road bed. CONTRACTOR shall notify ENGINEER of any areas of suspected instability.

END OF SECTION

### BURIED PIPING AND APPURTENANCES

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. All underground piping and valves of every description.
  - 2. Excavation, dewatering, and backfilling for all work under this section unless otherwise noted.
  - 3. Concrete reaction blocking, gaskets, and all miscellaneous equipment furnished under this section.
  - 4. Underground piping connections to all equipment, whether furnished under this section or not.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

#### PART 2-PRODUCTS

##### 2.01 MATERIALS OF CONSTRUCTION

- A. All materials used in the manufacture, assembly, and painting of piping and valves in contact with water shall be compatible with potable water supplies and in contact with chemical feed systems shall be compatible with the chemicals being used. All glues, solvents, solders, etc., shall likewise be compatible. For instance, no lead-base solders shall be used. All materials shall be National Sanitation Foundation (NSF)-approved.
- B. Size and Type:
  - 1. All materials shall conform to the size and type shown on the drawings or called for in the specifications.
  - 2. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event standard fittings are not available, the method of joining shall be standard selected by CONTRACTOR and submitted for review by ENGINEER.
- C. Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be selected by CONTRACTOR and submitted for review by ENGINEER.

##### 2.02 BURIED PIPING

- A. Ductile Iron Piping and Fittings:
  - 1. Unless otherwise specified, all exterior piping shall conform to AWWA C151 with wall thickness provided in accordance with AWWA C150 for the depth of cover shown on the drawings using a minimum rated working pressure of 350 psi and Laying Condition 4; minimum Special Class 52, unless otherwise shown or specified. The words "ductile iron," weight and class of pipe shall be plainly marked on each piece of exterior pipe.

2. Except where shown, exterior pipe joints shall be mechanical joint or push-on joint. All mechanical and push-on joints shall be bonded with cable bond conductors or electrobond conductivity strips.
  3. Exterior joints and gaskets shall conform to AWWA C110 and C111.
  4. Bolts on exterior joints shall be high-strength low-alloy steel (Corten, or equal) conforming to AWWA C111. Certificate to that effect shall be provided.
  5. Except where shown otherwise, exterior fittings shall be mechanical joint or push-on joint. Exterior fittings and gaskets shall comply with AWWA C110, Ductile Iron Fittings, or C153, Ductile Iron Compact Fittings, and C111, as applicable, with a minimum rated working pressure of 150 psi.
  6. Exterior and/or buried pipe and fittings shall be cement-mortar lined and asphaltic coated inside and asphaltic coated outside. Cement-mortar lining shall be in accordance with AWWA C104. Asphaltic coating shall conform to applicable standards herein for the pipe and fittings.
  7. All ductile iron fittings shall be American, Clow, Griffin, Tyler, U.S. Pipe, or equal.
- B. Copper Piping: All buried copper piping shall be provided as specified in Section 15040-Piping and Accessories.
- C. Perforated Piping:
1. Perforated pipe and fittings shall be heavy-duty corrugated polyethylene conforming to ASTM F-405 and ASTM F-667. Pipe and fittings shall be provided as shown on the drawings and in accordance with ASTM F-449.
  2. Adapters with band seals shall be provided when joining with pipe of different materials.
  3. Pipe shall be as manufactured by Advance Drainage Systems, Inc., Hancor, Inc. or equal.
  4. See detail on drawings for laying conditions.
  5. Fabric shall be provided in accordance with manufacturer's instructions. Minimum lap shall be 18 inches. All laps shall be tacked or pinned to prevent separation during installation.
- D. PVC Piping:
1. Chemical Feed Piping: Except as otherwise specified, all chemical feed piping shall be constructed of PVC. PVC chemical feed piping shall be as specified in Section 15040-Piping and Accessories.
  2. Sanitary sewers shall be PVC pipe meeting requirements of ASTM D3034 (SDR 35) or ASTM F679 (F/DY = 46) with elastomeric gasketed joints meeting ASTM D3212 requirements.
  3. Force Main:
    - a. Force main pipe shall be PVC piping, pressure class 235 psi, SDR 18, meeting the requirements of AWWA C900.
    - b. Polyvinyl Chloride (PVC) sewer pipe shall meet the requirements of Standard Specifications for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings of the American Society for Testing Materials, Serial Designation D3034 for pipe sizes 8 inches through 15 inches and F679 for pipe sizes 18 inches through 36 inches. All PVC sewer pipe shall have maximum standard dimension ratio (SDR) of 35.
    - c. The wall thickness shall conform to requirements for a T-1 wall. PVC material shall have cell classification 12454-B or 12454-C as defined in ASTM D1784 with minimum modulus of elasticity of 400,000 psi in tension. Pipe stiffness shall be minimum 46 psi when tested in accordance with ASTM D2412.

- d. Pipe and fittings shall be the product of one manufacturer and the manufacturer shall have experience records substantiating acceptable performance of the pipe to be furnished.
  - e. Fittings shall be injection molded.
  - f. Acceptance of piping shall be subject to tests conducted by an approved testing agency in accordance with ASTM D3034 and/or ASTM F679.
  - g. Fittings such as saddles, elbows, tees, wyes and others shall be of material and construction corresponding to and have a joint design compatible with the adjacent pipe. Approved adapters shall be provided for transitions to other types of pipe.
  - h. Joints shall be of the elastomeric type for pipes 4 inches or larger and elastomeric or solvent cement for pipes less than 4 inches.
  - i. Elastomeric joints shall be a bell and spigot joint conforming to ASTM D3212 sealed by a rubber gasket conforming to ASTM F477 so that the assembly will remain watertight under all conditions of service, including the movements resulting from the expansion, contraction, settlement and deformation of the pipe. Bells shall be formed integrally with the pipe and shall contain a factory installed positively restrained gasket.
  - j. Solvent cement joints shall be assembled using solvent cement obtained from the pipe manufacturer, which conforms to the requirements of ASTM D2564.
  - k. The assembled joint shall pass the performance tests as required in ASTM D3212.
  - l. PVC Schedule pipe 6 inch in diameter or less shall conform to the requirements of ASTM D1785 for Schedule 40. Pipe shall be solvent weld type conforming to ASTM D2855 with bell conforming to ASTM D2672. Pressure rating for pipe supplied shall be minimum 150 psi. Construction shall conform to Drawing 01-975-75A.
  - m. Markings on the pipe shall include the following: Nominal pipe size, type of plastic pipe material, SDR number, AWWA designation with which the pipe complies, and manufacturer's name.
4. Water Main:
- a. PVC water main shall be AWWA PVC pressure rated pipe and shall conform to the requirements of AWWA C900 for pipe 4 inches through 12 inches and AWWA C905 for pipe from 14 inches through 36 inches. Pipe shall be furnished with integral elastomeric bell and spigot joints.
  - b. PVC pipe diameter shall conform to the O.D. of ductile iron pipe. The type of PVC material, nominal pipe size, standard dimension ratio, and pressure rating shall be not less than pressure class 235 and not greater than dimension ratio 18.
  - c. Markings on pipe shall include the following: Nominal pipe size, type of plastic pipe material, DR number, AWWA Designation with which the pipe complies, manufacturer's name, and the seal or mark of the laboratory making the evaluation of the suitability of the pipe for transport of potable water.
5. Provide tracer wire for underground PVC piping as specified herein, unless otherwise noted.
- E. Concrete Storm Sewer Pipe:
- 1. Unless otherwise shown or specified, all storm sewer pipe and inlet leads shall be reinforced concrete Class III pipe.
  - 2. All wye and tee branches, transitions, and bends for storm sewer shall be factory fabricated unless otherwise indicated on the drawings. Storm sewer main shall be furnished in short lengths as required to allow for placement of bends, tees, and wyes at the locations designated.
  - 3. Reinforced concrete pipe shall meet the requirements of the Standard Specifications for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe of the American

Society for Testing Materials, Serial Designation C76 for circular pipe and Serial Designation C507 for elliptical pipe.

4. All reinforced concrete pipe used in the work shall be of adequate strength to support the trench loads applied.
5. Standard and special fittings shall be of approved manufacture and shall conform to requirements of the trade and these specifications. All fittings shall be of a strength at least equal to that of the main sewer and shall be jointed with the same type of joint as used in the main sewer.
6. Not more than one lift hole per length of pipe shall be used in storm sewer.

F. Gas Piping:

1. All natural gas piping shall be provided in accordance with all state, local, and utility codes pertaining to natural gas service or service requirements.
2. All underground natural gas piping shall be DriscoPlex 6500 yellow polyethylene pipe for gas service, or equal. Pipe material shall be PE 2708 (PE 2406) medium density polyethylene meeting cell classification 234373E in accordance with ASTM D3350. Pipe shall be tested in accordance with ASTM D2513. Pipe shall have a minimum SDR of 11.0. Pipe shall have a minimum burial depth of 3.0 feet. Joints shall be fusion-welded in accordance with manufacturer's recommendation. All fittings shall be rated for gas service. All entrances to building shall be above grade and use a riser pipe connection to below grade structures with transition fitting from PE pipe to steel pipe. Steel section shall be epoxy-coated with threaded end.
3. Provide tracer wire as specified.

G. Drainage Piping: All buried drainage piping including waste, soil, and vent piping shall be provided as specified in Section 15040-Piping and Accessories.

H. Tracer Wire:

1. Install 10-gauge solid tracer wire with buried pipe where specified. Wire shall be continuous and terminate at valve boxes, manholes, or PVC test stations. Wire shall be taped to pipe at 5-foot intervals for all piping except piping carrying combustible material. For pipe carrying combustible material, the tracer wire shall be placed in the trench directly above the pipe, maintaining 6 inches separation between the tracer wire and the PVC pipe. Any splices in copper wire shall be soldered and fitted with a Raco, or equal, insulated watertight boot.
2. Tracer wire test stations shall be a 7-foot section of 2-inch schedule 80 PVC pipe with threaded end cap. Cap shall not be glued onto pipe. The PVC pipe shall be white and the cap shall be green. Pipe shall be installed with 3 feet of pipe aboveground. The tracer wire shall be accessible at a minimum of every 500 feet along the pipeline. The tracer wire shall run into and up the sides of all manholes and be secured near the casting. PVC test stations shall be placed as required between manholes to comply with the minimum 500-foot tracer wire accessibility requirement.

## 2.03 VALVES

- A. Valves: Valves and accessories for underground service are specified in Section 15040-Piping and Accessories.

## 2.04 MANHOLES

- A. General: All provisions of Drawing 01-975-43A, enclosed in these specifications, except those contrary to provisions delineated herein or on the drawings shall apply to manholes.

- B. Unless otherwise specified or shown on the drawings for special manholes, all manholes shall be reinforced concrete precast manholes. Reinforced concrete manhole base sections, riser sections, cones, and flat slabs shall conform to the requirements of ASTM C478. Solid precast manhole bottoms shall be provided except where shown on the drawings. Manholes shall be provided with minimum diameters as shown on Drawing 01-975-43A. Diameters shall be increased from the minimum for the following:
1. To provide between adjacent pipe a minimum distance equal to 1/2 the outside diameter of the largest pipe measured circumferentially along the inside face of the manhole.
  2. To accommodate flexible manhole connections used.
  3. To accommodate multiple valves or valve assemblies.
- C. Manhole top sections shall be precast reinforced eccentric cones unless precast reinforced flat slabs are specifically required or shown on the drawings or are necessary because of shallow depth. Flat slabs shall have opening offset unless otherwise required or shown. Flat slabs shall be designed for HS20 loadings.
- D. Unless otherwise specified or shown on the drawings, all underground utility structures shall be precast, reinforced concrete. Reinforced concrete base sections, riser sections, and flat slabs shall conform to the requirements of ASTM C-858. Flat slabs shall be designed for HS20 loadings. Solid precast bottoms shall be provided unless otherwise shown on the drawings.
- E. Manhole sections shall be provided in such combinations as to conveniently make up the required depth of the manholes. A maximum of two handling holes per manhole section will be permitted. All joints shall be tongue and groove and shall be sealed with rubber O-ring gaskets of circular cross section or mastic compounds. Gaskets shall conform to ASTM C443. Mastic compounds shall be Ram-nek, Kent-Seal, Mas-stik, or equal.
- F. Except as otherwise specified, connection of pipes to manholes shall be with KOR-N-SEAL, A LOK, Interpace, PS-X, or equal joint. The joint shall provide a flexible, watertight connection between pipe and manhole. Manhole connections for storm sewer mains and leads may be made with poured-in-place concrete during completion of manhole interior in lieu of above.
- G. Steps:
1. Manhole steps shall be provided as shown on the drawings by manhole manufacturer. Manhole steps shall be M.A. Industries, Inc. PS1-PF with 1/2-inch-diameter steel reinforcing rod, conforming to ASTM A615, Grade 60, with molded copolymer polypropylene covering conforming to ASTM D4101 Type PP200B33450Z02, or equal.
  2. Steps shall be inserted in manhole riser, cone, and flat slab sections prior to the initial set of the concrete in accordance with ASTM C478 and shall have maximum embedment and pull-out resistance in accordance with ASTM C478.
  3. The top step shall be located 10 inches or less from the top of the manhole cone section. Steps shall be a maximum 16 inches apart.
- H. Frames and Covers:
1. Frames and covers shall be provided for the openings indicated on the drawings.
  2. For standard manholes, frames shall be Neenah R-1550, or equal, with Type B lid, with two concealed pickholes equipped with self-sealing gaskets. Frames for valve manholes shall be Neenah R-6065 with Type B lid with two concealed pickholes equipped with self-sealing gaskets, or equal. Catch basin grates in paved areas shall be Neenah R-2668, catch basin frame, and Type C grate, or equal. Catch basin grates

in other areas shall be Neenah R4340-B, or equal. Interior mud basin castings shall be Neenah R-6118, or equal, with grey iron Class 35 frame and grating for heavy duty use.

- I. Manhole Chimney Seals:
  - 1. External manhole chimney seals shall be provided for all new manholes. Chimney seal shall be Cretex, or equal.
  - 2. Existing manholes exposed during the construction period shall have the adjustment rings replaced and a new chimney seal installed. Existing castings shall be reused.
- J. Valve boxes shall be provided for all buried valves. Valve boxes shall be Tyler/Union 6850 Series, 4 inches through 12 inches, or equal. Extension heights shall be provided as required. Lids shall be marked for appropriate use. CONTRACTOR shall verify that all valve boxes are large enough to accommodate all operating nuts and wrenches. Provide one "Tee" valve key operator for each valve manhole and one for each tank with tank or channel drain.
- K. Floor boxes shall conform to Section 15050-Piping and Appurtenances.

## PART 3-EXECUTION

### 3.01 INSTALLATION

- A. Installation Standards:
  - 1. Except where noted or specified, all underground water main piping shall be laid in accordance with AWWA C600 with all sewer clearances and separations from water main in accordance with Kentucky Division of Water.
  - 2. Except where noted or specified, reinforced concrete pipe shall be laid in accordance with ASTM C12.
  - 3. Gas piping shall be installed in accordance with state and local codes and the National Fuel Gas Code, NFPA No. 54.
  - 4. Plumbing system shall be installed in accordance with applicable portions of the Plumbing Code. Where requirements conflict, the stricter standard shall apply.
  - 5. When PVC piping is installed during hot weather, it shall be laid in the trench with slack or permitted to cool to ground temperature before it is cut to length for making final connections. PVC expansion joints shall be provided as required.
- B. General Excavation:
  - 1. CONTRACTOR shall do all excavation, undercutting, dewatering, and backfilling necessary for work under this contract, unless otherwise noted.
  - 2. Work shall conform to other sections of Division 2 except where modified by this section.
  - 3. The width of trench below the top of the pipe shall not exceed the nominal diameter of the pipe plus 2 feet for all pipelines.
  - 4. Where the maximum trench width is exceeded, the pipe shall be placed in a concrete cradle or a stronger pipe used as necessary.
  - 5. If the maximum trench width is exceeded for any reason other than by request of ENGINEER, the concrete cradle or the stronger pipe shall be placed at CONTRACTOR's expense.

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6. Excavation shall include all necessary clearing of excavated areas, tree removal, all grubbing, all wet, dry, fill, and rock excavation, the removal of pavement, and all incidental work thereto. All above work shall be included in the Lump Sum Bid.
7. CONTRACTOR shall excavate whatever materials are encountered as required to place at the elevations shown, all pipe, manholes, and other work as required to complete the project as shown.
8. The bottom of the excavation shall be leveled off, all loose and disturbed soil shall be removed, and it shall be hand-tamped prior to pipe, manhole, etc., installation. Where requested by ENGINEER, original material below the excavation necessary for construction according to grades shown or specified shall be removed and replaced with material and placing methods as specified in Section 02222-Excavating, Backfilling and Compaction.
9. The excavation at the crossing of all underground utility services in place shall be as narrow as practicable.
10. All underground services shall be protected from damage and maintained in service at their original location and grade during the process of the work.
11. Any damage to underground services shall be replaced or repaired at no cost to OWNER or to the owner of the service.
12. The present underground services shown on the drawings are located in accordance with available data.
13. Encountering these services at a different location or encountering services not shown shall not release CONTRACTOR from the above-stated conditions.
14. Any service connections encountered which are to be removed shall be cut off at the limits of the excavation and capped in accordance with the requirements of owners of such connections.
15. Excavated material that is unsuitable or not required for filling shall be wasted.
16. Materials to be used for fill and suitable for this purpose shall be deposited where required, except that no fill shall be placed where trenches for sewers, water lines or other services will be located until after the trench work is completed.
17. CONTRACTOR shall provide adequate shoring, sheet piling, and bracing to prevent earth from caving or washing into the excavation and shall do all shoring and underpinning necessary to properly support adjacent or adjoining structures. All shoring, sheet piling, and underpinning must be maintained until permanent support is provided.

## C. Laying Pipe:

1. CONTRACTOR shall excavate and lay all pipe to the line and grade shown on the drawings with bell ends uphill.
2. Grade stakes will be required for all lines.
3. Water lines shall have a minimum of 3 feet of cover unless noted otherwise.
4. Unless shown otherwise, under floor piping shall clear floor slabs or footings by a minimum of 6 inches.
5. Any pipe or fittings cracked in cutting or handling or otherwise not free from defects shall not be used.
6. Pipe must be kept clean of mortar, cement, clay, sand or other material.
7. Trenches shall be kept water-free and dry during bedding, laying, and jointing.
8. CONTRACTOR shall provide, operate, and maintain all pumps or other equipment necessary to drain and keep all excavation pits and trenches and the entire subgrade area free from water under any and all circumstances that may arise.
9. All trees, shrubs, and improved areas outside the excavation shall be protected from damage.



**D. Restraint Based on Flexible Restrained Joints, not Thrust Blocking:**

1. Except where noted or indicated, all bends, caps, plugs, tees, and other fittings shall be restrained with flexible restrained joints.
2. Mechanical joints and ductile iron pipe shall be restrained by MEGALUG®1100 or 1100SD Series by EBAA Iron Sales, Inc. or equal restraining system.
3. Ductile iron push-on joint pipe shall be restrained by Lok-Ring Joint by American Ductile Iron Pipe, TRFLEX by U.S. Pipe, or equal.
4. Push-on joints for PVC piping shall be restrained with MEGALUG® Series 1500 (AWWA C900) or Series 2800 (AWWA C905) by EBAA Iron Sales, Inc., UNIFLANGE SERIES 1350 by Ford Meter Box Co., Inc., or equal. PVC piping with ductile iron mechanical joint fittings shall be restrained with MEGALUG® Series 2000 PV by EBAA Iron Sales Inc., UNIFLANGE Series 1500 by Ford Meter Box Co., Inc., or equal.
5. For restrained pipe joints, all underground ductile iron pipe joints (except for the branch of tees and dead ends) shall be restrained to the length listed below in all directions from all bends and fittings. The branch of tees and all dead ends shall be restrained to three times the length listed below. All joints on yard and fire hydrant leads shall be restrained. Where wall penetrations occur at less than the length indicated below, the wall fittings shall also be restrained. Additional restraint shall be provided inside of structures as required.

**MINIMUM LENGTH (IN FEET) RESTRAINED PIPE FROM BENDS  
OR FITTINGS (POLYWRAPPED AND MINIMUM  
3 FEET BURY DEPTH**

Pipe Size, Inches	Test Pressure, psi				
	10	25	50	100	150
3-12	5	18	18	36	36
14-18	5	18	18	36	54
20-24	5	18	36	54	72
30	10	18	36	72	90
36	10	18	36	72	
42	10	36	54	90	
48	10	36	54	90	

6. PVC water main and sanitary force main shall be restrained as specified above for ductile iron underground piping and shall be installed in accordance with AWWA C605.

**E. Bedding:**

1. All underground pipe, except copper, perforated pipe, and polyethylene encased pipe, shall be bedded in compacted granular material.
2. Copper and polyethylene encased pipe piping shall be bedded in compacted sand.
3. Perforated piping shall be bedded with washed stone material as shown on the drawings.
4. Ductile iron piping shall be placed using Class "C" Bedding Details as shown on Drawing No. 01-975-43A.
5. All other piping, except perforated piping and ductile iron piping, shall be placed using Class "B" Bedding Details as shown on Drawing No. 01-975-43A.
6. CONTRACTOR shall perform all necessary excavation and shall furnish all required materials to provide bedding material. Bedding material shall conform to the gradation requirements of ASTM C-33.

7. Bedding material shall be hard, tough, and durable and shall meet the following gradation requirements:

## PERCENTAGE BY WEIGHT PASSING

	Crushed Stone Aggregate	Crushed Stone Chips	Crushed Gravel Aggregate
1-inch	100	--	100
3/4-inch	90 to 100	--	90 to 100
1/2-inch	--	100	--
3/8-inch	20 to 55	90 to 100	20 to 55
No. 4	0 to 10	--	0 to 10
No. 8	0 to 5	0 to 15	0 to 5
No. 30	--	0 to 5	--
No. 100	--	--	--
Passing No. 200	--	--	--

8. CONTRACTOR shall furnish ENGINEER with a sieve analysis of the bedding material for approval prior to construction.
9. No materials native to the trench shall be used as bedding material unless they meet the above specifications.
10. Native material may be used for ductile iron piping if it consists mostly of sand and contains no stones larger than 3/4 inch.
11. Immediately prior to placing the pipe, bedding shall be shaped by hand to fit the entire bottom quadrant of the pipe between bell holes.
12. Bell holes shall be large enough to permit proper making of the joint but not larger than necessary to make the joint.
13. All adjustments to line and grade must be done by scraping away or filling in bedding under the body of the pipe. Bedding must be tamped into place.
14. If necessary to obtain uniform contact of the pipe with the bedding, a template shall be used.

**F. Cover Material:**

1. Material which is to be placed from the bedding material around and to 1 foot above the top of all pipe shall be termed cover material.
2. Except for copper piping, cover material shall consist of durable granular particles ranging in size from fine to coarse in a substantially uniform combination.
3. Unwashed bank run sand and crushed bank run gravel will be considered generally acceptable for cover material.
4. No stones larger than 3/4 inch in their greatest dimension shall be allowed in the cover material.
5. Native materials may be used if they conform to the above specifications.
6. Cover material for copper piping shall be sand.
7. Cover material shall be deposited in the trench for its full width on each side of the pipe, fittings, and appurtenances simultaneously.
8. Granular cover material shall be placed over the top of the pipe to the height as shown on Drawing 01-975-43A for Class "B" (12 inches) or Class "C" (6 inches) Bedding.
9. This cover material shall be placed by hand in 6-inch layers and shall be compacted using hand-tamping bars and/or mechanical tampers.

10. If bedding material, except sand, conforming to any of the above three gradations under "Bedding" is used as cover material, it need not be tamped.
11. Sand cover material must be tamped.
12. Unless sand backfill is required, the remaining 6 inches to make up the required 1 foot of cover material for Class "C" Bedding shall be granular material specified previously with no stones larger than 3/4 inch.
13. Compaction shall be equivalent to that described under "Filling and Backfilling" in these specifications.

- G. Backfill: Except as otherwise specified, all backfill above 1 foot above the pipe shall be granular material specified in Section 02222-Excavation, Fill, Backfill and Grading. Compaction shall be as specified herein.

## 3.02 REPAIR/RESTORATION

- A. Upon completion of the work, all improvements disturbed by CONTRACTOR's operations shall be repaired or replaced, including all site improvements, landscaping, and/or paving material as existed before construction.

## 3.03 FIELD QUALITY CONTROL

### A. Site Tests:

1. CONTRACTOR shall include the cost of all testing, cleaning, and disinfection in the price bid.
2. All piping shall be subject to test before being covered with base course or pavement. All piping and appurtenances shall be watertight or airtight and free from visible leaks.
3. All piping and appurtenances shall be flushed or cleaned after installation prior to testing.
4. When test medium for piping is water, all air shall be removed from piping by flushing and/or installation of corporations at high points in system. Presence or absence of air will be determined during pressurization of the piping system.
5. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge, and other equipment, materials, and facilities necessary to complete the specified tests. CONTRACTOR shall provide all temporary sectionalizing devices and vents for testing. Note, when pressure testing against existing valves or piping, CONTRACTOR shall assume these items will fail and provide temporary plugging or valving as required.
6. Pressure Tests: The test pressure in all nongravity lines shall be held for one hour during which time the leakage allowance shall not exceed that specified. In case repairs are required, the pressure test shall be repeated until the pipeline installation conforms to the specified requirements. Pumps, air compressors, instrumentation, and similar equipment shall not be subjected to the pressure tests.
7. Leakage allowance shall be not more than 0.002 gallon per hour per inch diameter per 100 feet of buried pipe for compression or solder joint pipe. Buried mechanical and push-on joint pipe shall meet the leakage specifications of AWWA C600.
8. Tests for all gravity sewers shall be as follows: Pipe will be plugged at its downstream end and water will be placed inside the pipe to a minimum head of 10 feet. Water shall be held for 15 minutes without dropping. No leakage is allowed.

3.04 CLEANING AND DISINFECTION

- A. All equipment and materials shall be clean before installation. CONTRACTOR shall disinfect and flush the system before it is put on line. Water main, including buried and exposed piping, shall be disinfected according to AWWA C651.
- B. In accordance with the requirements of AWWA C651-05, at least one set of samples shall be collected from every 1,200 feet of new water main, plus one set from the end of the line and at least one set from each branch.
- C. CONTRACTOR shall obtain water samples and arrange for analysis of water in potable systems for bacteria as part of the Bid. Copies of test results shall be submitted to OWNER and ENGINEER.

END OF SECTION

### CHAIN LINK FENCE

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work includes providing all chain link fencing and gates, complete, as shown on the drawings.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. ASTM A121-Zinc-Coated (Galvanized) Steel Barbed Wire.
- B. ASTM A123-Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A153-Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- D. ASTM A181-Forgings, Carbon Steel for General Purpose Piping.
- E. ASTM A392-Zinc-Coated Steel Chain-Link Fence Fabric.
- F. ASTM A428-Weight of Coating on Aluminum-Coated Iron or Steel Articles.
- G. ASTM A446-Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- H. ASTM A491-Aluminum-Coated Steel Chain Link Fence Fabric.
- I. ASTM A569-Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- J. ASTM A585-Aluminum-Coated Steel Barbed Wire.
- K. ASTM A641-Zinc-Coated (Galvanized) Carbon Steel Wire.
- L. ASTM F567-Installation of Chain-Link Fence.
- M. ASTM F669-Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence.
- N. ASTM F1083-Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
- O. ASTM F1234-Protective Coatings on Steel Framework for Fences.

## PART 2–PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

- A. The chain link fence shall be USS Cyclone, Century Fence, or equal.

### 2.02 POSTS, RAILS AND BRACES

A. Construction:

1. All posts and rails shall be either Type 1 Schedule 40 pipe with 1.8 ounce per square foot zinc coating conforming to ASTM Specification F-1083; or Type II pipe manufactured from steel conforming to ASTM A-569 Cold-Formed, Electric Welded and Triple Coated with ounce  $\pm 0.1$  ounce zinc per square foot, 30° 15 micrograms chromate, 0.5° 0.2 mils clear cross-linked polyurethane acrylic exterior coating.
2. Internal surface shall be given corrosion protection by 0.2-inch rich-based organic coating with 87% minimum zinc powder loading, with the capacity of withstanding 300 hours when subjected to Salt Spray Test ASTM B-117 with 5% maximum red rust.
3. Intermediate posts shall be 2.5 inches O.D., round column Type I 3.65 pounds per foot, Type II 3.12 pounds per foot, or 2.25 inches by 1.7 inches 11-gauge "C" Section.
4. All posts shall be braced with the same material as top rail and trussed to line posts with 3/8-inch-diameter rods and tightened. One brace assembly shall be provided with each end or gate post and two assemblies with each corner or pull post.
5. All end, corner, and pull posts shall be 2 7/8 inches O.D. standard weight pipe, Type I 5.79 pounds per linear foot, or Type II 4.64 pounds per foot.
6. Pipe posts shall have tops which exclude moisture.
7. Rails shall be 1 1/5 inches by 1 1/4 inches 14-gauge rolled-formed section or 1 5/8 inches O.D. Type I 2.27 pound per foot, or Type II 1.84 pounds per foot pipe.

### 2.03 FABRIC

A. Construction:

1. Fabric to be No. 9 gauge steel wire or aluminum-coated steel wire woven in a 2-inch mesh; top selvage to have barbed finish, bottom selvage to be knuckled.
2. Galvanized coating of wire surface shall be in accordance with A392-68T. Zinc coating shall be Class 2, minimum of 2 ounces of zinc per square foot of wire surface. The weight of coating shall be determined by the strip test, ASTM A-428. Aluminum coating shall conform to ASTM A491 and shall be 0.40 ounces per square foot minimum.
3. Fabric height shall be 6 feet.
4. Fasteners shall be galvanized steel wire clips and tie wires in accordance with ASTM A-641 Class III or aluminum coat in conformance with fence fabric specifications.

### 2.04 GATES

A. General:

1. All drive gates shall be swing-type.
2. All man gates shall be swing-type.
3. Gate width shall be 12 feet.

4. Top of gate fabric shall line up with adjacent fence fabric; gate fabric shall be the same as for fence.

B. Construction:

1. Gate construction shall be sized in accordance with chain link fence manufacturer's Institute Product Manual and shall be properly braced and trussed.
2. Gates shall have positive-type latching devices with provision for padlocking. OWNER will provide padlock. Latching device shall be operable from either side of gate.
3. Hinges shall be galvanized pressed steel or malleable iron to suit gate size, nonlift-off type, offset to permit  $180\pm$  gate opening.
4. Provide keeper for each gate leaf which automatically engages the gate when swung open and holds gate in open position.

## 2.05 ACCESSORIES

- A. General: All accessories, except tie wires and barbed wire, shall be galvanized to comply with ASTM A 153.

B. Barbed Wire:

1. Provide 3 strands of barbed wire at top of fence.
2. Barbed wire shall be 2-strand, 12 1/2-gauge wire with 14-gauge, 4-point round barbs spaced approximately 5 inches o.c.
3. Finish shall be galvanized to meet ASTM A 121, Class 3 or aluminized to meet ASTM A 585, Class 2.

C. Barbed Wire Supporting Arms:

1. Arms shall be heavy pressed steel complete with provisions for anchorage to tubular end, corner, and pull posts attaching 3 rows of barbed wire to each arm.
2. Arms not required on roll-formed terminal posts.
3. Single arms shall be integral with a post top weather cap.
4. Intermediate arms shall have hole for passage of top rail.
5. Arms shall be capable of withstanding, without failure, 250 pounds of downward pull at outermost end of arm.

D. Post Tops:

1. Material shall be pressed steel or malleable iron.
2. Top shall be weathertight.
3. Top shall permit passage of top rail.

E. Stretcher Bars:

1. Stretcher bars required for tubular end, corner, pull, or gate posts.
2. Bars shall be one-piece lengths equal to full height of fabric with minimum cross section of 3/16 inches by 3/4 inches.
3. Provide one stretcher bar for each gate and end post and two stretcher bars for each corner and pull post.

F. Stretcher Bar Bands:

1. Material shall be heavy pressed steel.
2. Spacing shall be 15 inches maximum o.c. to secure stretcher bar to tubular end, corner, pull, and gate post.

- G. Tension Wire: 7-gauge, zinc-coated steel wire.

## 2.06 CONCRETE

- A. Concrete shall be Type A or A-FA as specified in Section 03300--Cast-in-Place Concrete.

## PART 3--EXECUTION

### 3.01 INSTALLATION

- A. Install framework, fabric, accessories, and gates in accordance with ASTM F567 and manufacturer's instructions.
- B. Place fabric on outside of posts and rails.
- C. Set posts plumb in concrete footings with top of footing 6 inches below finish grade. Concrete bases shall be crowned at the post and have a smooth troweled finish. Post footings shall be minimum 10 inches in diameter and shall extend 36 inches minimum below finish grade.
- D. Posts shall be provided at 10 feet on center maximum.
- E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Provide brace rail one bay from end and gate posts.
- F. Provide top rail through line post tops and splice with sleeves.
- G. Provide center bottom brace rail on corner gate leaves.
- H. Do not stretch fabric until concrete foundation has cured 14 days.
- I. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- J. Position bottom of fabric 2 inches above finished grade.
- K. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- L. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- M. Provide bottom tension wire stretched taut between terminal posts.
- N. Provide support arms sloped outward and attach barbed wire; tension and secure.
- O. Install gate with fabric and barbed wire overhang to match fence. Install three hinges per leaf, latch, catches, and keepers.

### 3.02 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Position: 1 inch.



- C. Components shall not infringe adjacent property lines.

END OF SECTION

### RESTORATION

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Placement of topsoil.
  - 2. Fertilizing.
  - 3. Seeding.
  - 4. Mulching.
  - 5. Maintenance.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.
- C. Payment: Payment for restoration shall be included in the price bid. Costs for topsoiling, seeding, fertilizer, mulching, and maintenance of restored areas shall be included. One percent of the total Contract price shall be retained following project completion until a uniform 2-inch growth of vegetation is established over all restored areas. CONTRACTOR shall be responsible to make its own computations for area restoration.

##### 1.02 REFERENCES

- A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, current edition, including all issued supplemental specifications. Unless specifically stated otherwise, the Measurement and Payment sections of the Standard Specifications shall not apply. Measurement and payment will be made in accordance with terms of the Contract Documents.
- B. FS O-F-241-Fertilizers, Mixed, Commercial.

##### 1.03 QUALITY ASSURANCE

- A. All work shall be in accordance with Standard Specifications, unless noted otherwise.
- B. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

#### PART 2-PRODUCTS

##### 2.01 TOPSOIL

- A. Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.

- B. Topsoil from the site may be used if it meets the above requirements.

## 2.02 SEED

- A. Seed mixture No. II per Standard Specifications.
- B. Weed content shall not exceed requirements of the Standard Specifications.

## 2.03 FERTILIZER

- A. Fertilizer shall be FS O-F-241, Type I, Grade A; recommended for grass with 50% of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil to the following proportions: Nitrogen 10%, phosphoric acid 10%, soluble potash 10%. Submit composition deviations to suit site conditions for ENGINEER's approval.

## 2.04 MISCELLANEOUS

- A. Mulching material and asphalt tackifier shall conform to Section 827 of the Standard Specifications. Hay or chopped cornstalks are not acceptable as mulch.
- B. Water shall be clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.
- C. Erosion fabric shall be jute matting, open weave.

## PART 3-EXECUTION

### 3.01 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. All areas disturbed by street, curb and gutter, and sidewalk construction shall be restored. Backslopes adjacent to the sidewalk shall be seeded to the slope intercept. Borrow sites and disposal sites will not require seeding, but they shall be graded smooth.

### 3.02 TOPSOIL

- A. Placing topsoil shall be in accordance with Section 212 of the Standard Specifications. Topsoil shall be placed to a uniform depth of 6 inches in place. Topsoil placement shall be incidental to seed, fertilizer, and mulching.

### 3.03 SEEDING

- A. Seeding shall be performed in accordance with Section 212 of the Standard Specifications.
- B. Seed shall be applied at the rates specified in Section 212 of the Standard Specifications.

## 3.04 FERTILIZER

- A. Fertilizer shall be applied per Section 212 of the Standard Specifications.

## 3.05 MULCHING

- A. All areas receiving seed shall be mulched.
- B. Straw mulching shall be performed in accordance with Section 212 of the Standard Specifications.

END OF SECTION

### CONCRETE FORMWORK

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Forms for cast-in-place concrete.
  - 2. Form accessories.
  - 3. Openings for other work.
  - 4. Form stripping.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. ACI 301-Structural Concrete for Buildings.
- B. ACI 318-Building Code Requirements for Reinforced Concrete.
- C. ACI 347-Recommended Practice for Concrete Formwork.
- D. PS1-Construction and Industrial Plywood.

##### 1.03 DESIGN

- A. All formwork shall comply with ACI 347 and ACI 301.
- B. CONTRACTOR shall assume the responsibility for the complete design and construction of the formwork.

##### 1.04 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01300-Submittals for form ties, form coatings, form liners (if any), and any other form accessories.

#### PART 2-PRODUCTS

##### 2.01 FORMS

- A. Forms shall be of wood, plywood, steel, fiberboard lined, or other approved materials which will produce concrete which meets the specified requirements. The type, size, quality, and shape of all materials of which the forms are made are subject to the review of ENGINEER.

- B. Caution shall be exercised in the use of wood or composition forms or form liner to be certain that no chemical reaction will take place which causes a damaging effect on the concrete surface.

## 2.02 FORM COATINGS

- A. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

## 2.03 CHAMFER STRIPS

- A. Provide 3/4-inch by 3/4-inch wood or plastic chamfer strips at all exposed corners, except as noted.

## PART 3--EXECUTION

### 3.01 CONSTRUCTION

- A. Forms shall conform to the shape, line, grade, and dimensions as shown on the drawings. They shall be mortar-tight and sufficiently rigid to prevent displacement or sagging between supports and shall support the loads and pressures without deflection from the prescribed lines. They shall be properly braced or tied together so as to maintain position and shape and insure safety to workmen and passersby. Spacing of ties shall be recommended by the tie manufacturer.
- B. Formwork shall be constructed to meet the tolerances and intentions specified below for the indicated applications:
  - 1. Flat surfaces shall be formed in accordance with tolerances indicated in ACI 347 for buildings.
  - 2. Architectural surfaces and surfaces to be fitted with equipment shall be formed to match the shape intended. Where indicated on the drawings, the form shall be lined with minimum 3/8-inch masonite and shimmed as required.
  - 3. Variation from plumb shall not exceed 1/4 inch in 10 feet, and variation in linear lines shall not exceed 1/2 inch in 20 feet. These and other tolerance specified in ACI-347 shall be considered a part of this specification.
- C. When forms are placed for successive concrete placement, thoroughly clean concrete surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.
- D. Provide inserts and provide openings in concrete form work to accommodate work of other trades. Verify size and location of openings, recesses, and chases with the trade requiring such items. Securely support items to be built into forms.
- E. The forms shall be oiled with a field-applied commercial form oil or a factory-applied nonabsorptive liner. Oil shall not stain or impede the wetting of surfaces to be cured with water or curing compounds. The forms shall be coated prior to placing reinforcing steel. Oil on reinforcement will not be permitted.
- F. All form surfaces shall be thoroughly cleaned, patched, and repaired before reusing and are subject to the approval of ENGINEER.

## 3.02 FORM REMOVAL

- A. Supporting forms and shoring shall not be removed until the member has acquired sufficient strength to support its own weight and the construction live loads on it.
- B. All form removal shall be accomplished in such a manner that will prevent injury to the concrete and will ensure complete safety of the structure.
- C. Forms shall not be removed before the expiration of the minimum times as stated below unless specifically authorized by ENGINEER. These times may be increased by ENGINEER.
  - 1. Wall and vertical faces: 24 hours
  - 2. Beams and slabs: 14 days

END OF SECTION

### CONCRETE REINFORCEMENT

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work includes providing complete, in-place, all steel required for reinforcement of cast-in-place concrete as shown on the drawings.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. Applicable standards listed in this section include, but are not necessarily limited to the following:
  - 1. ACI 315-Manual of Standard Practice for Detailing Reinforced Concrete Structures.
  - 2. ACI 318-Building Code Requirements for Reinforced Concrete.
  - 3. ASTM A82-Standard Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement.
  - 4. ASTM A185-Standard Specifications for Welded Steel Wire Fabric for Concrete Reinforcement.
  - 5. ASTM A615-Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - 6. CRSI-Manual of Standard Practice.
  - 7. ASTM C1116-Standard Specification for Fiber-Reinforced Concrete.

##### 1.03 SUBMITTALS

- A. Comply with pertinent provisions of Section 01300-Submittals.
- B. Provide complete shop drawings of all material to be furnished and installed under this section:
  - 1. Before fabrication of the reinforcement is begun, CONTRACTOR shall obtain the approval of ENGINEER on reinforcing bar lists and placing drawings.
  - 2. These drawings and lists shall show in detail the number, size, length, bending, and arrangement of the reinforcing. Reinforcing supports shall also be located on the shop drawings.
  - 3. Shop drawings shall be in accordance with ACI 315.

##### 1.04 PRODUCT HANDLING

- A. Delivery:
  - 1. Deliver reinforcement to the job site bundled, tagged, and marked.
  - 2. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.
- B. Storage: Store reinforcement at the job site on blocks and in a manner to prevent damage and accumulation of dirt and excessive rust.



## PART 2-PRODUCTS

### 2.01 MATERIALS

- A. Reinforcing bars shall comply with ASTM A615, Grade 60. Reinforcing bars required to be welded shall be ASTM A706 low alloy.
- B. Steel wire shall comply with ASTM A82.
- C. Welded wire fabric shall comply with ASTM A185. Fabric shall be provided in flat sheets. Rolled fabric shall not be used.
- D. Reinforcement supports including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place shall be:
  - 1. Wire bar-type supports complying with CRSI recommendations, unless otherwise indicated.
  - 2. For slabs on grade, supports with sand plates, or horizontal runners where base material will not support chair legs.
  - 3. For exposed-to-view concrete surfaces or where the concrete surface will be exposed to weather or moisture, where legs of supports are in contact with forms, supports with either hot-dipped galvanized or plastic protected legs.
  - 4. When supports bear directly on the ground and it is not practical to use steel bar supports, precast concrete blocks may be used to support only the bottom lift of reinforcement. The precast blocks must be solid, be of an equal or higher strength than the concrete being placed, must provide adequate support to the reinforcement, and be of proper height to provide specified reinforcing cover. The use of face bricks, hollow concrete blocks, rocks, wood blocks, or other unapproved objects will not be permitted.

### 2.02 FABRICATION

- A. General:
  - 1. Fabricate reinforcing bars to conform to required shapes and dimensions with fabrication tolerances which comply with CRSI Manual.
  - 2. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
  - 3. Unless otherwise shown on the drawings, all end hook dimensions shall conform with "ACI Standard Hooks."
- B. Reinforcement with any of the following defects shall be deemed unacceptable and will not be permitted in the work:
  - 1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
  - 2. Bend or kinks not indicated on drawings or final shop drawings.
  - 3. Bar with reduced cross section because of excessive rusting or other cause.

## PART 3-EXECUTION

### 3.01 INSPECTION

- A. Examine the substrate, formwork, and the conditions under which concrete reinforcement is to be placed.

- B. Correct conditions detrimental to the proper and timely completion of the work.
- C. Do not proceed until unsatisfactory conditions have been corrected.

## 3.02 INSTALLATION

- A. General:
  - 1. Comply with the specified standards for details and methods of placing reinforcement and supports.
  - 2. Clean reinforcement to remove loose rust, mill scale, earth, and other materials which reduce or destroy bond with concrete.
- B. Placing Reinforcement:
  - 1. All reinforcing shall be placed in accordance with Contract drawings and with shop drawings stamped and approved by ENGINEER.
  - 2. Position, support, and secure reinforcing against displacement by formwork, construction, or concrete placement operations.
  - 3. Support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as needed.
  - 4. Unless otherwise shown on the drawings, the reinforcement is to be so detailed and placed as to allow the following concrete protection:
    - a. Three inches of cover where the concrete is placed directly against ground.
    - b. Two inches of cover where the concrete is placed in forms but is to be exposed to weather, liquid, or the ground.
  - 5. Reinforcement shall be positioned within  $\pm 3/8$ -inch for members with depth to tension reinforcing from compression face less than or equal to 8 inches. Tolerance shall be  $\pm 1/2$  inch for members with depth to tension reinforcing from compression face greater than 8 inches. Tolerance on dimension between adjacent bars in slab and wall reinforcing mats shall be 1 inch. Secure against displacement by anchoring at the supports and bar intersections with wire or clips.
  - 6. Bars shall be securely tied at all intersections except where spacing is less than 1 foot in each direction when alternate intersections shall be tied. To avoid interference with embedded items, bar spacing may be varied slightly as approved by ENGINEER. Tack welding of reinforcing will not be permitted.
  - 7. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
  - 8. If reinforcing must be cut because of openings or embedded items in the concrete, additional reinforcing must be provided adjacent to the opening at least equal in cross sectional area to that reinforcing which was cut, and it shall extend a minimum of 36 bars diameters beyond the opening on each side or as shown on the drawings. At sumps or depressions in slabs, bars shall be bent and/or extended under sumps or depressions.
  - 9. If carrier bars are to be used, CONTRACTOR shall provide reinforcing bars for this purpose in addition to the reinforcing called for by the drawings and specifications.
- C. Reinforcement Supports:
  - 1. Strength and number of supports shall be sufficient to carry reinforcement.
  - 2. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support.
  - 3. Do not use supports as bases for runways for concrete-conveying equipment and similar construction loads.

- D. Welded Wire Fabric:
  - 1. Install welded wire fabric in as long of lengths as practicable.
  - 2. Lap adjoining pieces at least one full mesh.
  - 3. Fabric shall be supported with bar supports.
- E. Splices:
  - 1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying.
  - 2. Lap splices in reinforcing shall be provided as shown on the drawings. Where lap splice lengths are not shown on the drawings, provide Class B, Category 1 lap splices in accordance with ACI 318.
  - 3. Mechanical splices and threaded dowel bar inserts may be used where approved by ENGINEER. Splices shall be capable of developing at least 125% of the yield strength of the reinforcing bar.
- F. Embedded Items:
  - 1. Allow other trades to install embedded items as necessary.
  - 2. Particularly after bottom layer of reinforcing is placed in slabs, allow electrical contractors to install conduit scheduled for encasement in slabs prior to placing upper layer of reinforcing.
- G. Minimum Reinforcing: Where reinforcing is not shown, provide a minimum of No. 4 at 8-inch centers each way in members 10 inches or less in thickness and No. 5 at 12-inch centers each way in each face in members greater than 10 inches thick.

END OF SECTION

### CAST-IN-PLACE CONCRETE

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. All cast-in-place concrete as shown except as noted otherwise.
  - 2. Expansion joint fillers, bonding agents, patching mortars, curing compounds, nonshrink grout, and other related items and accessories.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. ACI 211.1-Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- B. ACI 301-Structural Concrete for Buildings.
- 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 309-Guide for Consolidation of Concrete.
- H. ACI 318-Building Code Requirements for Reinforced Concrete.
- I. ASTM C31-Making and Curing Concrete Test Specimens in the Field.
- J. ASTM C33-Concrete Aggregates.
- K. ASTM C39-Compressive Strength of Cylindrical Concrete Specimens.
- L. ASTM C40-Organic Impurities in Fine Aggregates for Concrete.
- M. ASTM C94-Ready-Mixed Concrete.
- N. ASTM C143-Slump of Portland Cement Concrete.
- O. ASTM C150-Portland Cement.
- P. ASTM C172-Standard Practice for Sampling Freshly Mixed Concrete.
- Q. ASTM C156-Test for Water Retention by Concrete Curing Materials.

- R. ASTM C231–Air Content of Freshly Mixed Concrete by the Pressure Method.
- S. ASTM C260–Air-Entraining Admixtures for Concrete.
- T. ASTM C309–Liquid Membrane Forming Compounds for Curing Concrete.
- U. ASTM C494–Chemical Admixtures for Concrete.
- V. ASTM C618–Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- W. ASTM D994–Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- X. ASTM D1752–Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

## 1.03 SUBMITTALS

- A. Submit shop drawings in accordance with Section 01300–Submittals.
- B. Submit the following information:
  - 1. Gradation of fine and coarse aggregate–ASTM C33.
  - 2. Specific gravity and dry rodded density of each aggregate.
  - 3. Test of deleterious substances in fine and coarse aggregate–ASTM C33.
  - 4. Design mix of each individual concrete mix to be used.
  - 5. Previous test results or trial batch results with 7- and 28-day compressive strengths for each concrete mix proposed.
  - 6. Certified mill test results for cement identifying brand, type, and chemistry of cement to be used.
  - 7. Brand, type, principal ingredient, and amount of each admixture to be used.
- C. It is important that the above data be submitted to ENGINEER well in advance of anticipated concreting operations to avoid any delay in construction.

## PART 2–PRODUCTS

### 2.01 CEMENT

- A. All cement used shall be Portland Cement and shall conform to ASTM C150 and shall be Type I or Type III. Type III shall be used only when permitted by ENGINEER. All cement shall be the product of one reputable manufacturer and mill.
- B. Cement shall be stored in a dry, weather-tight, properly ventilated structure with the floor raised not less than 1 foot above the ground.

### 2.02 FLY ASH

- A. All fly ash used as an admixture in Portland cement concrete shall be Class C or F conforming to the requirements of ASTM C618.

## 2.03 AGGREGATE

- A. All aggregates shall be washed and shall consist of natural sand, gravel, or crushed rock and shall have clean, hard, durable, uncoated grains of strong minerals. The amounts of deleterious substances present in the fine and coarse aggregate expressed in percentages by weight shall not exceed the following:

Deleterious Substance	Aggregate	
	Fine	Coarse
Clay Lumps and Friable Particles	3.0	3.0
Coal and Lignite	0.5	0.5
Mineral finer than No. 200 sieve	3.0	
Soft Fragments	3.0	3.0
Chert*	---	5.0
Sum of Chert and Clay Lumps		5.0

\* Material classified as chert and having a bulk specific gravity of less than 2.45. The percentage of chert shall be determined on the basis of the weight of chert in the sample retained on a 3/8-inch sieve divided by the weight of the total sample.

- B. The combined amount of all deleterious substances in an aggregate shall not exceed 5% of the weight of the aggregate.
- C. If required by ENGINEER, sodium sulfate soundness tests (ASTM Designation C88) shall be performed on the aggregate. When the aggregate is subjected to 5 cycles, the weight loss shall not exceed 12%. Samples of proposed aggregates shall be submitted to an independent laboratory for testing in advance of concrete work. All testing shall be performed in accordance with ASTM Designation C33. Certified test results shall be submitted to ENGINEER confirming that aggregate complies with all stated specifications. Report shall identify source of aggregate and absorbed water.
- D. Fine aggregate shall be well graded from coarse to fine and shall conform to the following requirements:

Percentage by Weight	
Passing 3/8-inch sieve	100
Passing No. 4 sieve	95-100
Passing No. 8 sieve	80-100
Passing No. 16 sieve	50-85
Passing No. 30 sieve	25-60
Passing No. 50 sieve	5-30
Passing No. 100 sieve	0-10

- E. Gradation of fine aggregate shall be reasonably uniform and not subject to the extreme percentages of gradation specified above. The fineness modulus shall be not less than 2.3 or more than 3.1, nor shall the fineness modulus of any sample vary by more than +0.20 from the fineness modulus of the representative sample used in proportioning the concrete.

- F. If required by ENGINEER, fine aggregate shall be subjected to the color-metric test for organic impurities (ASTM C40) and shall not produce a color darker than Figure 1, unless they pass the mortar strength test. Aggregate producing color darker than Figure 2 shall not be used in any event.
- G. Coarse aggregate shall be well graded from coarse to fine, and when tested by laboratory sieves having square openings shall conform to the following requirements:

	Percentage by Weight Aggregate	
	3/4-inch Stone	1 1/2-inch Stone
Passing 2-inch sieve	---	100
Passing 1-1/2 inch sieve	---	90-100
Passing 1-inch sieve	100	20-55
Passing 3/4-inch sieve	90-100	0-15
Passing 3/8-inch sieve	20-55	0-5
Passing No. 4 sieve	0-10	---
Passing No. 8 sieve	0-5	---

- H. The 3/4-inch aggregate shall be used in concrete members no thinner than 4 inches and less than 10 inches thick. A blend of 3/4-inch and 1 1/2-inch aggregate shall be used in members 10 inches thick and thicker with the 3/4-inch aggregate comprising between 35% and 65% of the total coarse aggregate. When members thinner than 10 inches are placed monolithically with members thicker than 10 inches, the aggregate requirements for the thinner member shall apply.
- I. Aggregates must be allowed to drain for at least 12 hours before being used. The ground upon which aggregates are stored must be hard, firm, well-drained and free from all vegetable matter. Various sizes of aggregates must be stored separately, and if they have become contaminated or merged with each other, they shall not be used.

## 2.04 WATER

- A. Water used in mixing concrete shall be clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious substances.

## 2.05 ADMIXTURES

- A. Water Reducing Admixture shall be Pozzolith 200N by BASF Admixtures, Inc., Daracem 19 by Grace, or equal. Water reducing admixture shall conform to ASTM C494, Type A and Type F. Water reducing admixture shall not reduce durability, shall increase strength 10%, and shall not affect bleeding characteristics over reference mix.
- B. Air-Entraining Admixture shall be equal to MB AE90 Standard by BASF Admixtures, Inc., Darex by Grace Construction Products, or equal. Air-entraining admixture shall conform to ASTM C260.
- C. No other admixture will be allowed without written approval of ENGINEER. All admixture shall be compatible with cement, aggregate, and water used.

## 2.06 PROPORTIONING

- A. The proportions of aggregate to cement shall be such as to produce a workable mixture which can be thoroughly compacted and which will work readily in the forms and around reinforcement without permitting materials to segregate or excess water to collect on the surfaces. The combined aggregates shall be such that when separated on the No. 4 sieve, the weight passing the sieve shall not be less than 30% nor greater than 50%.
- B. Concrete of various classes shall have the following maximum water/cement or water/(cement + fly ash) ratio minimum compressive strengths at 28 days and minimum cement and fly ash contents:

Class	Maximum Water/ Cement or Water/ (Cement+Fly Ash)	Minimum 28 Day Strength-Pounds per Square Inch	Cement Content-Pounds per Cubic Yard	Fly Ash- Pounds per Cubic Yard	
				Type C	Type F
A	0.45	4,000	564	---	---
A-FA	0.45	4,000	480	110	125
B	0.53	3,500	517	---	---
C	0.53	3,000	517	---	---
X	---	2,000	376	---	---

- C. Except as otherwise indicated on the drawings or specified, all concrete shall be Class A or Class A-FA concrete.
- D. All concrete mixes shall be designed for a strength of 15% above that specified to allow for job variations. All mixes shall be designed in accordance with ACI 211.1 by a competent concrete engineer or competent laboratory technician. Required materials test data shall be submitted with design mixes for review and approval by ENGINEER. Mix computations shall be submitted if requested by ENGINEER.
- E. The slump for all concrete shall be 3 inches and concrete with a slump within the range of 2 to 3 1/2 inches will be acceptable unless otherwise stated.
- F. A water-reducing admixture shall be used in all concrete. A qualified representative of the manufacturer shall be available to assist in proportioning the concrete, advise on the proper addition of the admixture to the concrete, and advise on adjustments of concrete proportions to suit job conditions.
- G. An air-entraining admixture shall be used in all concrete except at patches. Air content shall be tested by the pressure method as outlined in ASTM C231 and shall be between four to seven percent by volume.
- H. CONTRACTOR shall submit to ENGINEER compressive strength of concrete cylinder test results for the same concrete mixes proposed on a previous project. If this information is not available, one cubic yard trial batches of each individual mix proposed for use shall be made prior to use in the work. Four test cylinders shall be made for each trial batch, two to be tested at 7 days and two at 28 days. The trial batches shall be made preceding actual placement operations so that the results of the 7-day tests can be obtained. All costs for material, equipment, and labor incurred during design of concrete mixes shall be borne by CONTRACTOR.



- I. All aggregates shall be measured by weight. The concrete mixer is to be equipped with an automatic water-measuring device which can be adjusted to deliver the desired amount of water. All measuring, mixing, and proportioning equipment is subject to the approval of ENGINEER.

## 2.07 JOINT FILLER

- A. Expansion joints shall have standard 1/2-inch-thick cork expansion joint filler; W. R. Meadows or equal; meeting ASTM D1752–Type II. Exceptions to this are expansion joints in exterior concrete walks and between concrete walks and other structures which shall be asphalt expansion joint filler, 1/2 inch thick; Grace, W.R. Meadows, or equal; meeting ASTM D994.

## 2.08 BONDING AGENT

- A. Acceptable manufacturers include Thorobond by BASF, Emaco P24 by BASF, or equal.

## 2.09 PATCHING ADDITIVE

- A. Acceptable manufacturers include ACRYL 60 by Harris Specialty Chemicals, Inc., Sonocrete by Sonneborn Contech Co., or equal.

## 2.10 NONSHRINK GROUT

- A. Acceptable manufacturers include Dayton Superior, Master Builders, or equal. Grout shall be nonshrink, nonmetallic and shall achieve a strength of 7,500 psi in 28 days.

## PART 3–EXECUTION

### 3.01 MIXING

- A. Ready-mixed concrete shall be batched, mixed, and delivered in accordance with ASTM C94 and ACI 304 from an approved batching plant. In general, concrete shall be mixed 50 revolutions at plant, 20 upon arrival at site, and 20 each time water is added; maximum of 110 revolutions at mixing speed. Concrete shall be delivered and discharged within 1 1/2 hours or before the drum has revolved 300 times after introduction of water to the cement and aggregates or the cement to the aggregates. Truck mixers shall be equipped with drum revolution counters. In no event shall concrete which has taken its initial set be allowed to be used. Retempering of concrete is not permitted.
- B. A representative of ENGINEER may be at the batching plant periodically to observe the batching and mixing.
- C. No water shall be added on the job unless authorized by ENGINEER; the amount of water, if added, shall be recorded on all copies of the delivery tickets.
- D. Concrete shall have a temperature not less than 60°F nor more than 80°F as delivered to the job site.
- E. With each load of concrete CONTRACTOR shall obtain delivery tickets and shall make these tickets available for review by ENGINEER. Delivery tickets shall provide the following information:
  1. Date.

2. Name of ready-mix concrete plant, job location, and CONTRACTOR.
3. Type of cement and admixtures, if any.
4. Specified cement content in sacks per cubic yard of concrete and approved concrete mix number or designation.
5. Amount of concrete in load, in cubic yards.
6. Water added at job, if any.
7. Truck number and time dispatched.
8. Number of mixing drum revolutions.

- F. For job mixed concrete, all concrete materials shall be mixed in a machine batch mixer for at least 1 1/2 minutes after all ingredients are in the mixer and shall continue until there is a uniform distribution of the materials, and the mass is uniform in color and homogeneous. The mixer shall not be loaded beyond the capacity given by the manufacturer and shall be rotated at the speed recommended by the manufacturer. The mixer is to be provided with positive timing device which will positively prevent discharging the mixture until the specified mixing time has elapsed.

## 3.02 JOINTS

- A. CONTRACTOR shall place all joints as shown on the drawings or specified herein. If approved by ENGINEER, CONTRACTOR may, at his own expense, place construction joints in addition to and at places other than those shown on the drawings. Unless otherwise shown, all joints shall be straight, truly vertical or horizontal, and proper methods shall be employed to obtain this result.
- B. Where joints are not shown on the drawings or specified elsewhere, CONTRACTOR shall provide joints as follows:
1. Walls shall have vertical joints at 30 feet on center maximum but not more than 15 feet from corners or intersections and shall have horizontal joints at 15 feet on center maximum.
  2. Slabs shall have joints at 20 feet on center maximum in each direction.
- C. Immediately after completion of the first pour at a joint, the concrete surface and reinforcement projecting beyond the joint shall be thoroughly cleaned and laitance removed. Immediately before the second pour, all extraneous matter shall be removed from the joint, the steel cleaned, and the surface thoroughly wetted.
- D. Concrete at all joints shall have been in place at least 48 hours before abutting concrete is placed. At least two hours must elapse after depositing concrete in columns or walls before depositing in beams, girders, or slab supported thereon. Beams, girders, brackets, column capital, and haunches shall be considered as part of the floor system and shall be placed integrally therewith.

## 3.03 BONDING TO EXISTING CONCRETE

- A. When placing new concrete adjacent to existing concrete, the existing concrete shall be thoroughly roughened, cleaned, and saturated with water 24 hours before pouring new concrete. Existing concrete is defined as concrete more than six months old. At time of new pour, remove any standing water and apply bonding agent. Bonding agent shall be applied in accordance with manufacturer's recommendations.
- B. When patching existing concrete, remove poor concrete until firm hard concrete is exposed; roughen and clean surface of the existing concrete, clean any exposed reinforcing bars, and pour new concrete. Concrete finish to match existing concrete. New

concrete shall be 4,000 psi 28-day strength mixed with patching additive, mixed according to manufacturer's instructions. Concrete shall not be air-entrained.

## 3.04 EMBEDDED ITEMS IN CONCRETE

- A. All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.
- B. All contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.
- C. Embedded items shall be positioned accurately and supported against displacement. Reinforcing bars shall clear embedded items a minimum of 2 inches.

## 3.05 PLACING CONCRETE

- A. Before placing concrete, all equipment, forms, ground, reinforcements, and other surfaces with which the concrete will come in contact are to be thoroughly cleaned of all debris, ice, and water. Ground shall be wetted prior to placement of concrete on it.
- B. After reinforcement is placed and before concrete is placed over it, ENGINEER shall be allowed sufficient time to observe the reinforcing.
- C. Unless otherwise authorized by ENGINEER, all concrete shall be placed in the presence of ENGINEER.
- D. Concrete shall be conveyed from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent the segregation or loss of materials. Chuting concrete directly into the form will not be allowed. Chuting for conveying purposes will be allowed only upon approval by ENGINEER and must be accomplished in such a manner as to prevent segregation or loss of materials. Receiving hoppers shall be installed at the chute discharge and at no point in its travel from the mixer to place of final deposit shall the concrete pass through a free vertical drop of more than 3 feet. Elephant trunks or tremies shall be used in all wall pours to prevent coating of forms and reinforcing bars.
- E. Care shall be taken to avoid an excess of water on the concrete surface. Excess water shall be drained or otherwise removed from the surface. Dry cement or a mixture of cement and sand shall not be sprinkled directly on the surface to absorb water.
- F. Concrete in wall and beam pours shall be deposited in approximately horizontal layers not to exceed 18 inches in thickness. Each layer shall be well worked into the preceding layer while both layers are still soft.
- G. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. The maximum allowable lateral movement of the concrete after being deposited is 3 feet. When concreting is once started, it shall be carried on as a continuous operation until the placing of the section or panel is completed.
- H. All concrete shall be placed with the aid of mechanical vibrating equipment in accordance with ACI 309. In congested areas vibration shall be supplemented by hand spading adjacent to the forms. Vibration should secure the desired results within 5 to 15 seconds at intervals of 18 inches apart maximum. The vibrator shall penetrate the preceding layer of concrete. Vibrators shall have a frequency of not less than 10,000 impulses per minute when in operation submerged in concrete.

- I. A sufficient number of spare vibrators shall be kept in ready reserve to assure adequate vibration in case of breakdown of those in use.
- J. Concrete is not to be placed under water. A suitable means shall be provided for lowering the water level below surfaces upon which concrete is to be placed. This may require excavating approximately 12 inches below the bottom of the concrete surface and refilling with gravel and compacting. The groundwater shall not be allowed to rise to the bottom of the concrete until 24 hours after the concrete pour has been completed. Water shall not be allowed to fall upon or run across the concrete during this period.
- K. No extra payment will be allowed for dewatering, undercutting, and gravel fill.

## 3.06 MOIST CURING

- A. All concrete shall be maintained in a moist condition for at least 7 days after being deposited except that for high-early strength concrete, a 3-day period will be sufficient. Moist curing shall be accomplished by one of the following methods:
  - 1. Wood forms left in place and kept wet at all times. If the forms are not going to be kept wet, they shall be removed as soon as practicable and other methods of moist curing shall be started without delay.
  - 2. Use of a curing compound conforming to ASTM C309, Type I as approved by ENGINEER. Curing compound shall be applied at a uniform rate as indicated by the manufacturer sufficient to comply with the requirements of the test water retention of ASTM C156. Curing compound applied to vertical concrete surfaces after forms are removed shall be specially adapted to provide required coverage on the vertical surface. On nonformed surfaces, the curing compound shall be applied immediately after the disappearance of the water sheen after finishing of the concrete. Curing compound shall not be used on concrete surfaces which are to be painted, receive ceramic tile or resilient flooring, or be waterproofed unless approved by ENGINEER. Care shall be taken not to get curing compound on construction joints, reinforcing steel, and other surfaces against which new concrete will be poured.
  - 3. Use of plastic film. Plastic film shall have a minimum thickness of 4 mils. It shall be placed over the wet surface of the fresh concrete as soon as possible without marring the surface and shall be weighted so that it remains in contact with all exposed surfaces of the concrete. All joints and edges shall be lapped and weighted. Any tears in the film shall be immediately repaired.
  - 4. Application of wet coverings weighing 9 ounces per square yard such as burlap, cotton mats, or other moisture-retaining fabrics. The covering system shall include two layers and shall be kept continuously moist so that a film of water remains on the concrete surface throughout the curing period.
  - 5. Use of an approved waterproof curing paper. Edges of adjacent sheets shall be overlapped several inches and tightly sealed.
  - 6. Ponding of water or continuous sprinkling of water is permitted. Sprinkling at intervals will not be permitted.
  - 7. Construction joints shall be moist cured by one of the methods listed above except by Method "2."
- B. The use of moist earth, sand, hay, or another method that may discolor hardened concrete will not be permitted.

## 3.07 HOT WEATHER CONCRETING

- A. When the atmospheric temperature exceeds 80°F during concrete placement, this section and ACI 305 shall apply in addition to all other sections of the specifications.

- B. The temperature of the delivered concrete shall not exceed 85°F.
- C. Care shall be exercised to keep mixing time and elapsed time between mixing and placement at a minimum. Ready-mix trucks shall be dispatched so as to avoid delay in concrete placement, and the work shall be organized to use the concrete promptly after arrival at the job site.
- D. The subgrade, forms, and reinforcing shall be sprinkled with cool water just prior to placement of concrete. Prior to placing concrete, there shall be no standing water or puddles on the subgrade.
- E. If approved by ENGINEER, an admixture for retarding the setting of the concrete may be used.
- F. Exposed concrete surfaces shall be carefully protected from drying. Continuous water curing is preferred. Curing compounds shall be white pigmented.

## 3.08 COLD WEATHER CONCRETING

- A. Conditions of this section shall apply, in addition to all other sections of the specifications, when placing concrete in cold weather. Cold weather is defined as a period when, for more than three successive days, the average daily temperature drops below 40°F. When temperatures above 50°F occur during more than half of any 24-hour period, the period will no longer be regarded as cold weather. The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. Cold weather concreting shall conform to all requirements of ACI 306.1, Standard Specification for Cold Weather Concreting, published by the American Concrete Institute, Detroit, Michigan, except as modified by the requirements of these specifications.
- B. Detailed procedures for the production, transportation, placement, protection, curing, and temperature monitoring of concrete during cold weather shall be submitted to ENGINEER. Cold weather concreting shall not begin until these procedures have been accepted.
- C. All concrete materials, forms, ground, mixing equipment, and other surfaces with which the concrete is to come in contact shall be free from frost, and the temperature of contact surfaces shall be 35°F or above. Ground upon which concrete is to be placed shall not be frozen at any depth.
- D. The mixing water and aggregates shall be heated and when entering the mixer shall have temperatures not exceeding 175°F and 80°F, respectively. Concrete temperature as mixed shall not exceed 80°F and shall typically be between 55°F and 70°F. Concrete, when placed in the forms, shall have a temperature of not less than 50°F.
- E. Freshly placed concrete shall be protected by adequate covering, insulating, or housing and heating. If heating is used, ambient temperature inside the housing shall be maintained at a minimum of 70°F for 3 days or 50°F for 5 days. The maximum ambient temperature during curing shall not exceed 80°F. If insulating methods are used, recommendations contained in ACI 306R-78 shall be followed. Surface temperature shall be maintained at 50°F for 7 days. After the curing period, the temperature of the concrete shall be reduced uniformly at a rate not to exceed 40°F per 24 hours until outside air temperature is reached. Heating of enclosure shall continue if it is anticipated that the outside air temperature will drop more than 20°F in the next 24 hours. The concrete temperature shall be obtained by attaching a thermometer provided by CONTRACTOR to the concrete surface. Concrete shall be kept moist.

- F. If heating is used, the housing shall be constructed weather-tight and shall be constructed in a manner that will provide uniform air circulation and air temperatures over the complete concrete area that is being cured. Special attention shall be given to the edges and ends of a concrete pour with the housing extending at least 5 feet beyond any concrete surface being protected. The housing shall be in place and heat applied within two hours after concrete placement.
- G. Heating may be by steam or hot air. Heaters shall be vented to outside of the housing. Open burning salamanders will not be permitted. Heating devices shall not be placed so close to the concrete as to cause rapid drying or discoloration from smoke.
- H. If heating is used, CONTRACTOR shall provide sufficient 24-hour inspection of the heaters to insure compliance with the above-specified temperature requirements during the curing period. CONTRACTOR shall provide maximum-minimum thermometers for ENGINEER's use.
- I. The use of calcium chloride, salts, or other chemical admixtures for the prevention of freezing is prohibited.
- J. Salts or other deleterious materials shall not be used on temporary or permanent structures above concrete surfaces that are being placed, finished, or cured.

## 3.09 FINISHING

### A. Flat Work:

1. Floated Finish: Place, consolidate, strike off, and level concrete eliminating high spots and low spots. Do not work concrete further until it is ready for floating. Begin floating with a hand float, a bladed power float equipped with float shoes, or a powered disk float when the bleed water sheen has disappeared and the surface has stiffened sufficiently to permit the operation. Immediately refloat the slab to a uniform texture.
2. Light Troweled Finish: Float concrete surface, then power trowel the surface. Hand trowel the surface smooth and free of trowel marks.
3. Hard Troweled Finish: Float concrete surface, then power trowel the surface. Hand trowel the surface smooth and free of trowel marks. Continue hand troweling until a ringing sound is produced as the floor is troweled.
4. Tolerance for concrete floors shall be 1/4-inch within 10 feet in any direction. Straight edge shall be furnished by CONTRACTOR.
5. Broom or Belt Finish: Immediately after concrete has received a floated finish, give the concrete surface a coarse transverse scored texture by drawing a broom or burlap belt across the surface.
6. The above finishes shall be used in the following locations:
  - a. Float Finish: Surface to receive roofing, waterproofing, or sand bed terrazzo.
  - b. Light Troweled Finish: Submerged tank slabs.
  - c. Hard Troweled Finish: Building floors.
  - d. Broom or Belt Finish: Exterior slabs, sidewalks, tops of walls, and tank slabs to receive grout topping.

### B. Formed Surfaces:

1. Within two days after removing forms and prior to application of a curing compound, all concrete surfaces shall be observed and any poor joints, voids, stone pockets, or other defective areas shall be patched at once before the concrete is thoroughly dry. Defective areas shall be chipped away to remove all loose and partially bonded aggregate. The area shall be thoroughly wetted and filled with as dry as practical mortar mix placed to slightly overfill the recess. Mortar shall include a bonding agent. After partial set has taken place, the excess mortar shall be removed flush with the

surface on the concrete using a wood float. All patching shall be cured, protected, and covered as specified for concrete. All cracks, leaks, or moist spots which appear shall be repaired to the satisfaction of ENGINEER. No extra compensation will be allowed CONTRACTOR for such work.

2. The exterior or removal portion of nonremovable ties shall be removed with the use of a special tool designed for this purpose. Cutting or chipping of concrete to permit removal of exterior portion will not be permitted.
  3. For nonremovable ties, tie rod holes left by the removal of the exterior portion of the tie and cone shall be thoroughly wetted and filled by ramming with as dry as practical mortar mix in such a manner as to insure complete filling of the hole. Mortar shall include a bonding agent. All patching shall be cured, protected, and covered as specified for concrete. The holes are to be filled immediately after removal of the exterior portion of the tie.
  4. Holes left by removable ties shall be filled by installing a neoprene plug near the center of the wall. The balance of the hole shall be filled with mortar as specified above to within 1 inch of the face of the wall. The remainder of the hole shall be filled with a waterproofing compound.
  5. All finished or formed surfaces shall conform accurately to the shape, alignment, grades, and sections as shown or prescribed by ENGINEER. All surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness. All sharp angles, where required, shall be rounded or beveled. Any formed surface to be painted shall be free of any material that will be detrimental to the paint. The surface of the concrete shall be given one of the following finishes immediately after form stripping:
    - a. Finish A shall be referred to as a sack finish. Surfaces shall be free of contaminants prior to sacking. After wetting the surface, a grout shall be rubbed in using a rubber float or burlap. After the grout hardens sufficiently, it shall be scraped from the surface with the edge of a steel trowel without disturbing the grout in the air holes. After further drying, the surface shall be rubbed with burlap to remove all surface grout. The entire surface shall be finished to secure a continuous, hard, dust-free and uniform texture surface free from pinholes and other minor imperfections. Finish A will be required for all painted surfaces, interior surfaces of equipment rooms, operation areas, and permanently exposed vertical surfaces. Where steel faced forms are used to form walls, the portion of wall to receive the sack finish shall first be roughened by brush blasting or other approved method to achieve a texture similar to 40-60 grit sandpaper.
    - b. Finish B shall be the same as Finish A, except that the final burlap rubbing may be omitted, providing the steel trowel scraping removes the loose buildup from the surface. Finish B shall be provided for waterproof and moistureproof coated surfaces.
    - c. Finish C shall be referred to as a finish which has surface imperfections less than 3/8 inches in any dimension. Surface imperfections greater than 3/8 inches shall be repaired or removed and the affected areas neatly patched. Finish C or smoother shall be provided for interior surfaces of wet wells, tanks, and channels from 1 foot below minimum water surfaces and down and otherwise unfinished interior surfaces.
    - d. Finish D shall be the finish for surfaces which may be left as they come from the forms, except that tie holes shall be plugged and defects greater than 1/2 inch in any dimension shall be repaired. Finish D shall be provided for surfaces to be buried or covered by other construction such as masonry veneer.
- C. All precautions shall be taken to protect the concrete from stains or abrasions, and any such damage shall be removed or repaired under this Contract.

## 3.10 LOADING OF CONCRETE STRUCTURES

- A. No concrete structure or portion thereof shall be loaded with its design load until the concrete has obtained its specified 28-day compressive strength. This shall include but not be limited to vertical live load, equipment loading, water loading, groundwater loading, and backfill load. Concrete strength at time of loading shall be determined by testing field-cured concrete cylinders.
- B. Extreme care shall be taken to ensure that construction loads do not exceed design loading of the structure.

## 3.11 NONSHRINK GROUT

- A. Nonshrink, nonmetallic grout shall be used for filling recesses and pockets left for equipment installation and for setting of base plates. The material used shall be approved by ENGINEER. Store, mix, and place the nonshrinking compound as recommended by the manufacturer. The minimum compressive strength shall be 5,000 psi at age 7 days and 7,500 psi at age 28 days.

## 3.12 TESTING AND SAMPLING

- A. The following tests of fresh concrete shall be performed by CONTRACTOR. CONTRACTOR shall prepare, protect, transport, and have tested all cylinders at his expense.
  - 1. Sampling of concrete for slump tests, air tests, temperature tests, and for making concrete test cylinders shall be performed in accordance with ASTM C172.
  - 2. Cylinders:
    - a. Three test cylinders shall be made for each pour less than 25 cubic yards, 4 test cylinders shall be made for each pour between 25 and 100 cubic yards, and 8 test cylinders made for each pour in excess of 100 cubic yards. Each concrete mix shall be represented by at least 4 cylinders for the entire job. Concrete for cylinders shall be collected near the middle of the load and/or as requested by ENGINEER.
    - b. Cylinders shall be made and tested in accordance with ASTM C31 and ASTM C39, respectively. The cylinders must be kept moist and at temperatures between 60°F and 80°F and shall remain undisturbed and stored in a location free from vibration. In hot weather, the cylinders shall be covered with wet burlap and stored in a shaded area. It is CONTRACTOR's responsibility to provide a suitable protected location for storing cylinders on the job site.
    - c. After 24 hours, the cylinders shall be transferred to an independent testing laboratory acceptable to OWNER. The cylinders shall be packed in sawdust or other cushioning material for transit to avoid any bumping or jarring of the cylinders.
    - d. Cylinders shall be broken at 7 and 28 days or as requested by ENGINEER. Test result shall be mailed immediately and directly to ENGINEER. Test data shall include date and location of pour and concrete mix used.
  - 3. Slump Test: CONTRACTOR shall make one slump test near the beginning of all pours with two tests being made for all pours in excess of 25 yards or as requested by ENGINEER. Slump tests shall conform to ASTM C143.
  - 4. Air Test:
    - a. When air-entrained concrete is used, the air content shall be checked by CONTRACTOR near the beginning of all pours with at least two checks being made for all pours in excess of 25 cubic yards, or as requested by ENGINEER.



- b. The air contents shall be checked using the pressure method in accordance with ASTM C231. The pocket-sized alcohol air indicator shall not be used unless it is first used in conjunction with the pressure method test.

- B. All costs of additional testing and sampling of fresh or hardened concrete needed because of suspected or actual violation of the specifications shall be borne by CONTRACTOR.

## 3.13 RECORDS

- A. A record is to be kept of all concrete work. The record shall include the date, location of pour, concrete mix, slump, air content, test cylinder identification, concrete temperature, and ambient air temperature. In addition, for cold weather concreting the record shall include the daily maximum-minimum thermometer readings of all thermometers during the entire curing period for all concrete pours. The project representative will keep this record, and CONTRACTOR shall assist in obtaining needed information.

## 3.14 SIDEWALKS AND EXTERIOR SLABS

- A. Sidewalks shall be constructed where shown on the drawings. They shall be a minimum of 5 inches thick and shall slope away from buildings or structures at a rate of 1/4 inch per foot. Concrete shall be as previously specified. Sidewalks shall be constructed on 3 inches of compacted granular fill. They shall have tooled joints of 1-inch minimum depth at approximately 5-foot centers with 1/2-inch preformed expansion joint filler at approximately 25-foot centers with one at all corners and located anywhere sidewalks abut structures and buildings.

## 3.15 CONCRETE REMOVAL AND PATCHING

- A. All areas disturbed due to concrete removal or repair shall be patched as specified in Bonding to Existing Concrete.

END OF SECTION

### CONCRETE TOPPING

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included: Rapid setting, Portland-cement concrete.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

#### PART 2-PRODUCTS

##### 2.01 MANUFACTURER

- A. Concrete topping shall be rapid setting Portland-cement concrete, SikaQuick 1000, as manufactured by Sika Corporation or equal.

#### PART 3-EXECUTION

##### 3.01 SURFACE PREPARATION

- A. Verify repair area is not less than 1/4 inch in depth.
- B. Remove all deteriorated concrete, dirt, grease, and all other bond-inhibiting materials from surface.
- C. Roughen surface in accordance with manufacturer's recommendations.
- D. Saturate surface with clean water.

##### 3.02 INSTALLATION

- A. Substrate shall be saturated surface dry with no standing water during application.
- B. Mix components and apply concrete according to manufacturer's instructions.
- C. Topping shall be water cured only.

END OF SECTION

## ADHESIVE ANCHORS

### PART 1-GENERAL

#### 1.01 SUMMARY

- A. Work Included: Adhesive anchors.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

#### 1.02 REFERENCES

- A. ICC-ES International Code Council-Evaluation Service.
- B. AC 308-Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete.

### PART 2-PRODUCTS

#### 2.01 ADHESIVE ANCHORS

- A. Adhesive anchors shall be PE 1000+ by Powers Fastening Systems, Set-XP by Simpson Strong-Tie Anchor Systems, or equal.
- B. Unless waived by ENGINEER for certain applications, all adhesive anchors shall comply with the Kentucky Building Code and AC 308. They shall be ICC-ES approved for use in cracked and uncracked concrete.

### PART 3-EXECUTION

#### 3.01 ADHESIVE ANCHORS

- A. At locations shown on the drawings, reinforcing bars or threaded rod shall be provided in existing concrete by drilling holes, injecting epoxy adhesive, and inserting the reinforcing bar.
- B. All existing surfaces to receive adhesive anchors, including the entire area in contact with the new concrete, shall be cleaned and roughened to amplitude of 1/4 inch.
- C. All procedures shall be in accordance with the manufacturer's recommendations.
- D. Where location of anchors is adjustable, reinforcing steel shall be located prior to drilling holes and bolts and shall be located to clear reinforcing steel.

END OF SECTION

### CAULKING

#### PART 1--GENERAL

##### 1.01 SUMMARY

- A. Work Included: Caulking on the project including primers and backer rod material.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. ASTM C920--Elastomeric Joint Sealants.

##### 1.03 SUBMITTALS

- A. Submittals shall comply with provisions of Section 01300--Submittals.
- B. Submit copies of warranty.

##### 1.04 WARRANTY

- A. Caulked joints shall be guaranteed watertight by installer for 2 years from date of final payment. Deliver original guarantee to OWNER with copies to ENGINEER.
- B. Provide manufacturer's standard 5-year product warranty.

#### PART 2--PRODUCTS

##### 2.01 CAULK--NONSUBMERGED APPLICATIONS--FLOOR JOINTS

- A. Caulk for floor joints in nonsubmerged applications shall be a one-part, self-leveling, polyurethane sealant.
- B. Acceptable products include the following, or equal:
  - 1. SL1 by BASF Construction Chemicals, LLC.
  - 2. Vulkem 45 SSL by Tremco, Inc.

##### 2.02 ACCESSORIES

- A. Backer rod shall be flexible, closed-cell polyethylene rod stock sized to be under at least 25% compression when positioned in the joint. In shallow joints and where backer rod is not used, polyethylene bond breaker tape shall be used. It is essential that the caulk bond to the side of the joint but not to the base of the joint.

- B. Primer(s) shall be used where required by the manufacturer for the specific product(s) used and the specific application(s) intended. Specific product(s) shall be as recommended by the manufacturer.
- C. Cleaning fluid shall be methyl ethyl ketone (MEK), methyl isopropyl ketone (MIK), or similar solvent material which will not etch or mar metal finishes and shall be the product of a nationally recognized manufacturer, of type expressly recommended for use with the caulking or sealant compound used.

## PART 3-EXECUTION

### 3.01 INSTALLATION

- A. All caulking shall be done in accordance with manufacturer's specifications. Allow minimum 28-day curing period for concrete, grout, or mortar prior to caulking unless requested otherwise. All caulking shall occur only when the temperature is above 40°F.
- B. Joints shall be thoroughly cleaned and primed before caulking in accordance with manufacturer's instructions. Unless otherwise shown, joints shall be square in cross section 1/2 inch by 1/2-inch and shall comply with manufacturer's joint width/depth ratio limitations.
- C. Backer rod shall be used in all openings 3/4 inches or more in depth and shall be tightly packed to completely fill the space to 1/2 inch back of face. The 1/2 inch shall then be filled with caulking compound.
- D. Caulking shall be done by hand gun. Compound shall be driven into joint grooves with sufficient pressure to force out all air and fill joint grooves solidly. Caulking where exposed shall be free of wrinkles and shall be uniformly smooth.
- E. At completion of caulking, clean off all excess material from adjoining surfaces and material. Entire installation shall be left in a perfect appearing watertight condition.

END OF SECTION

### PAINTING

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included: Surface preparation and application of paints and coatings.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. ASTM B117-Test Method of Salt Spray (Fog) Testing.
- B. ASTM D2247-Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
- C. ASTM D3363-Test Method for Film Hardness by Pencil Test.
- D. ASTM D4060-Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
- E. ASTM D4541-Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- F. ASTM D4585-Practice for Testing Water Resistance of Coatings Using Controlled Condensation.
- G. SSPC-The Society for Protective Coatings-Steel Structures Painting Manual.
- H. NACE-National Association of Corrosion Engineers.
- I. ICRI-International Concrete Repair Institute.
- J. Federal Register-Code of Federal Regulations (CFR).
- K. Federal Register-Resource Conservation and Recovery Act (RCRA).
- L. Federal Register-Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

##### 1.03 SUBMITTALS

- A. Submittals shall be in accordance with provisions of Section 01300-Submittals.
- B. Shop primer proposed for use shall be submitted with all material and equipment submittals. All shop primers shall be of the same generic type and quality as those specified herein.

- C. Submit two copies of manufacturer's Material Safety Data Sheets (MSDS) for each type of paint with each shop drawing submittal. MSDS sheets shall be posted at the construction site at all times painting is in progress.
- D. Substitution submittals shall include performance test data, as certified by a qualified testing laboratory, for the ASTM tests specified in paragraph 2.01.

## 1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. All paints, surface preparation, and application methods shall conform to federal requirements for allowable exposure to lead and other hazardous substances.
  - 2. All paints shall be NSF Standard 61-approved when they are in contact with potable water or within potable water reservoirs.
- B. Prepainting Meeting:
  - 1. A prepainting meeting shall be held immediately following the project preconstruction conference. The prepainting meeting is to be held prior to any material and equipment that requires painting is delivered to the site.
  - 2. CONTRACTOR, the paint subcontractor, and the paint manufacturer's representative shall be present to review the specifications and project scope.
  - 3. The paint manufacturer's representative shall review progress at the site as requested by ENGINEER. These are generally expected to be prior to monthly progress meetings.

## 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered to the site in original containers with labels intact and seals unbroken.
- B. Drop cloths shall be used in all areas where painting is done to fully protect other surfaces.
- C. Oily rags and waste must be removed from the building each night or kept in an appropriate metal container.

## 1.06 ENVIRONMENTAL REQUIREMENTS

- A. CONTRACTOR shall dry-heat, dehumidify, and ventilate to obtain painting conditions recommended by the paint manufacturer during surface preparation, application, and cure.
- B. Relative humidity conditions as specified by the paint manufacturer's data sheet shall be adhered to. This includes times in which supplemental heat is used. Supplemental heat shall be indirect-fired hot air furnaces or electric heat. Open-flame heaters shall not be used.
- C. No unprotected, unheated exterior painting shall be undertaken when damp weather appears probable, nor when the temperature of the substrate is below 55°F, unless approval in writing is received from the paint manufacturer.

## 1.07 COLOR SELECTIONS

- A. Provide color charts for all coatings being used on the project. After initial selection of colors by OWNER, provide draw down samples of selected colors for OWNER's final approval. For stained wood, provide specified wood species sample with selected color for final approval.
- B. CONTRACTOR shall provide a summary sheet at the completion of the project listing the finish paint products used and the manufacturer's color identification for each item painted. This summary sheet should be submitted to ENGINEER and OWNER for review.

## PART 2-PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

- A. All materials required for painting shall be types and quality as manufactured by Tnemec Company, Inc., Sherwin Williams Company, or equal, unless noted otherwise in the schedule.
- B. Where thinning is necessary, only the products of the manufacturer furnishing the paint will be allowed. All such thinning shall be done strictly in accordance with the manufacturer's instructions.
- C. Paint and paint products of Tnemec Company and Sherwin Williams, listed in the following specifications, are set up as standard of quality. Other manufacturer's products will be considered as a substitution if CONTRACTOR and paint manufacturer certify that the products offered are recommended for the service intended, are compatible with the shop primers used, are equal in solids content and composition, and are of the same type. Submittal shall include the following performance data as certified by a qualified testing laboratory. ASTM Specifications shall be the latest revision:
  - 1. Abrasion-ASTM D4060, CS-17 Wheel, 1,000 grams load.
  - 2. Adhesion-ASTM D4541.
  - 3. Hardness-ASTM D3363.
  - 4. Humidity-ASTM D2247 and D4585.
  - 5. Salt (Fog) Spray-ASTM B117.

## PART 3-EXECUTION

### 3.01 SURFACE PREPARATION

- A. General:
  - 1. All surfaces to be painted shall be prepared as specified herein and by the manufacturer's published data sheet and label directions. The objective shall be to obtain a uniform, clean, and dry surface.
  - 2. No field painting shall be done before the prepared surfaces are observed by ENGINEER. Surfaces painted without such observation shall be abrasive-blast-cleaned and repainted.
  - 3. Prior to field-blasting, a sample of the blast abrasive shall be provided to ENGINEER for pH testing. Additional samples of subsequent deliveries or batches of blast abrasive shall be provided to ENGINEER for pH testing.



4. For on-site abrasive-blasting, low-dust, low-silica content material shall be used. Coal slag abrasive shall be used on pipe and ferrous materials. Stauroilite abrasive shall be used on concrete and concrete block.
5. Quality of surface preparations listed below are considered a minimum. If paint manufacturer requires a better preparation for a particular application, it shall be considered a requirement of this specification.

B. Ferrous Metal:

1. All ferrous metal to be primed in the shop shall have all rust, dust, and mill scale, as well as all other foreign substances, removed by abrasive blasting. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent new rusting.
2. All ferrous metals not primed in the shop shall be abrasive-blasted in the field prior to application of the primer, pretreatment, or paint.
3. Abrasive blasting of metals in the shop shall be in accordance with SSPC-SP 10 Near White Blast Cleaning. Abrasive blasting of metals in the field for immersion service shall be in accordance with SSPC-SP 10 Near White Blast Cleaning. Abrasive blasting of metals in the field for nonimmersion service shall be in accordance with SSPC-SP6 Commercial Blast Cleaning.
4. Solvent cleaning in accordance with SSPC-SP1 shall precede all abrasive-blasting operations.
5. Ductile iron pipe shall be prepared by abrasive blasting per National Association of Pipe Fabricators NAPF 500-03.
6. Prior to finish coating, all primed areas that are damaged shall be cleaned and spot-primed.

C. Concrete:

1. All concrete surfaces, including precast concrete to be painted, shall be cleaned of all form oil, curing compound, and other foreign matter. Concrete floors containing oil and grease residues shall be cleaned with detergent to remove all residues.
2. All new concrete and precast concrete walls, floors, and ceilings shall be abrasive-blast cleaned in accordance with SSPC-SP13/NACE No. 6 in order to prepare the surfaces for adherence of the painting systems as specified. Abrasive blasting of concrete shall result in a surface profile in accordance with ICRI No. 03732 at CSP-3 to CSP-5. Bug holes that are opened up shall be filled with an appropriate filler.
3. Bug holes shall be filled as specified in Section 03300, Cast-in-Place Concrete without placing a friable sand-cement surface overall. The dried surface shall be stoned down.
4. Paint manufacturer shall observe and approve the surface preparation method and the prepared surface prior to painting.
5. After cleaning, the surface shall be washed and all dust, sand, and loose particles shall be removed by vacuuming. If CONTRACTOR elects to blow the surfaces off with air, it shall be oil-free air, and the methods shall conform to OSHA requirements.

D. Galvanized: Where galvanized items are not submerged or buried, they shall be cleaned with nonhydrocarbon solvent cleaner (such as Clean N Etch, or equal) in accordance with SSPC SP 1 and shall be abrasive-blasted in accordance with SSPC-SP7.

E. Copper: Where copper piping is not submerged or buried, it shall be solvent-cleaned in accordance with SSPC SP 1 and shall be lightly sanded.

F. PVC and CPVC: All PVC and CPVC to be painted shall be solvent-cleaned in accordance with SSPC SP 1 and shall be lightly sanded.

- G. Aluminum: Where listed in the Schedule to be painted, it shall be solvent-cleaned in accordance with SSPC SP 1 and shall be lightly sanded.
- H. Wood:
  - 1. Wood surfaces shall be thoroughly cleaned and free of all foreign matter. Cracks and nail holes and other defects shall be properly filled and smoothed.
  - 2. Wood trim shall be sandpapered to a fine finish and wiped clean of dust.

## 3.02 APPLICATION

- A. All materials shall be used as specified by the manufacturer's published data sheets and label directions.
- B. No paint shall be applied on a wet or damp surface and in no case until the preceding coat is dry and hard. Each coat shall be allowed to dry in accordance with manufacturer's data sheets before the next coat is applied.
- C. Drying time shall be construed to mean "under normal conditions." Where conditions are other than normal because of the weather or because painting must be done in confined spaces, other drying times will be necessary.
- D. Additional coats of paint shall not be applied, nor shall units be returned to service until paints are thoroughly dry and cured.
- E. Steel that will be inaccessible in the completed work shall receive the final coat before enclosure.
- F. Paint shall be applied to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable. Tops and bottoms of walls and areas that are "cut-in" by brush prior to rolling shall have a uniform appearance in comparison with adjoining surfaces.
- G. Concrete block walls shall be back-rolled to achieve a pinhole-free surface coat.
- H. Walls and ceiling surfaces shall receive a minimum of one coat of paint before surface-mounted items such as conduits, boxes, piping, etc., are installed on these surfaces.
- I. Crevices and other hard-to-apply areas shall be back-rolled/back-brushed in conjunction with application of the first field coat of primer or intermediate coat. This includes, but is not limited to, between pipe flanges, pipe flange/pipe barrel joints, equipment fittings, and other narrow openings.
- J. No paint shall be applied to new or existing surfaces until joints have been caulked according to Section 07900 requirements, except at moving joints which shall be finish-painted before caulking or caulking shall be protected during painting.
- K. For PVC and CPVC piping, unions and valves shall not be painted.

## 3.03 FIELD QUALITY CONTROL

- A. Examination of work on the site by the manufacturer's representative shall be performed when requested by ENGINEER.

## 3.04 CLEANING

- A. All stains and marks shall be removed from other surfaces upon completion of the work.

## 3.05 SCHEDULE

### A. General:

1. At the completion of the project, all painted surfaces which have been damaged shall be repainted or touched up.
2. See Finish Schedule on the drawings for an additional reference for areas to be painted.
3. The painter shall use some discretion in what should and should not be painted. Do not paint over labels and other information, bronze, machined surfaces, moving parts where painting may impair movement, hot surfaces which may peel, etc. If in doubt whether a part should be painted, ask ENGINEER.
4. Products listed first are Tnemec and second are Sherwin Williams.

### B. New Work:

1. All new work done by all trades shall be painted by CONTRACTOR in accordance with the following schedule and in accordance with paint manufacturer's recommendation. It is the intent of these specifications that all ferrous metal items scheduled for painting be shop-primed. If items are not shop-coated, surfaces shall be prepared and painted in the field as specified. If any items of new construction are not listed, CONTRACTOR shall request paint system from ENGINEER, and the items shall be painted as part of this Contract without additional cost.
2. Cast or Ductile Iron; Not Submerged or Buried:
  - a. One shop coat of N69-1255 Hi-Build Epoxoline, Macropoxy 646 Beige as primer;
  - b. Touchup prime coat prior to finish coating; and apply either:
    - (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 for interior surfaces;  
or
    - (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646; and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.
3. Cast or Ductile Iron, Tar Coated; Buried:
  - a. Not painted.
4. Steel, Machinery, and Equipment; not Submerged:
  - a. One shop coat of N69-1255 Hi-Build Epoxoline, Macropoxy 646 Beige as primer;
  - b. Touchup primer prior to finish coat; and either:
    - (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 for interior surfaces;  
or
    - (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646; and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.

FIRST FIELD COAT SHALL BE APPLIED PRIOR TO INSTALLATION TO SURFACES INACCESSIBLE AFTER INSTALLATION INCLUDING BACK SIDES OF DOOR FRAMES.

5. Motors, gear drives, and doors delivered with nonepoxy primers:
  - a. Degrease per SSPC-SP1.

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- b. Lightly hand-sand per SSPC-SP2.
  - c. Apply one coat 135-1255 Chembuild Beige, Macropoxy 646 Beige.
  - d. Apply two finish coats as follows:
    - (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 for interior surfaces; or
    - (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646; and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.
  - 6. Steel, Machinery, and Equipment; Submerged:
    - a. One shop coat N69-1255 High-Build Epoxoline, Macropoxy 646 Beige as primer; and two field coats N69 High Build Epoxoline II, Macropoxy 646.
    - b. For areas in contact with potable water: One shop coat of N140-1255 Beige Pota-Pox Plus, Macropoxy 646 NSF Beige as primer; and touchup prime coat prior to finish coating; and one coat of N140-11WH White Pota-Pox Plus, Macropoxy 646 NSF White; and one coat of N140 Pota-Pox Plus, Macropoxy 646 NSF.
  - 7. Galvanized, Copper, Brass, CPVC, and PVC; not Submerged or Buried:
    - a. One coat of N69-1255 Hi-Build Epoxoline II, Macropoxy 646; and either:
    - b. Two coats of N69 Hi-Build Epoxoline, Macropoxy 646 for interior surfaces; or
    - c. One coat of N69 Hi-Build Epoxoline, Macropoxy 646; and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.
  - 8. Insulation of Equipment, Pipes, and Ductwork: Two coats of Series 6 Tnemec-Cryl, DTM Acrylic B66100.
  - 9. Galvanized, Copper, CPVC, and PVC; Submerged or Buried: Not painted.
  - 10. Aluminum Items:
    - a. Exposed areas of structural items such as railings and grating shall not be painted.
    - b. For structural items in contact with concrete, See Division 5.
  - 11. Painted Wood; Outside:
    - a. Sherwin Williams products;
    - b. One coat of A-100 Alkyd Exterior Wood Primer;
    - c. Two coats of A-100 Satin Latex House and Trim.
  - 12. Stainless Steel: Not painted.
  - 13. Equipment: Water softening equipment and appurtenances.
- C. Existing Areas: Existing areas damaged by removal of existing work and/or installation of new work shall be repainted to match existing and in accordance with the schedule for new work.
- D. Coverage:
- 1. Dry mil thickness shall conform to those specified. Mil test measurement shall conform to SSPC Steel Structures Painting Manual. Dry Film Thickness (DFT) shall be verified in accordance with SSPC-PA2.
  - 2. The coatings listed will provide the mil thickness given when applied at the coverages listed. Upon the request of ENGINEER, such surfaces shall be checked by the painter with a calibrated mil thickness gauge and any deficiencies found in the film shall be remedied by additional coat(s) at the expense of CONTRACTOR.
  - 3. On masonry, application rates will vary according to surface texture; however, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, it shall be the painter's responsibility to achieve a protective and decorative pinhole-free finish either by decreasing the coverage rate or by applying additional coats of paint.
  - 4. Coverages reflect manufacturer's recommendations using spray application techniques. Where brushing or rolling is specified or performed at the discretion of the painter, one additional coat, minimum, will be required to achieve total DFT thickness as specified and recommended by the manufacturer.

	Sq. Ft.** Coverage	Dry Mil Thickness Per Coat
<b>Products</b>		
6 Tnemec-Cryl, DTM Acrylic B66100	200	
N69 Hi-Build Epoxoline II, Macropoxy 646		
Steel or Impervious Substrate Primer Coat	---	4.0
Steel or Impervious Substrate Intermediate Coat(s)	---	5.0
Steel or Impervious Substrate Finish coat	---	5.0
135-1255 Chembuild, Macropoxy 646	335	4.0
Steel Doors	---	3.0
140 Pota-Pox Plus, Macropoxy 646 NSF		
Steel or Impervious Substrate Primer	---	4.0
Steel or Impervious Substrate Intermediate Coat(s)	---	5.0
Steel or Impervious Substrate Finish Coat	---	5.0
1074 Endura-Shield II, Acrolon 218HS	---	2.5
<b>Sherwin-Williams Products</b>		
ProMar 200 Primer (sprayed)	200	
ProMar200 Primer (rolled/brushed)	260	
ProMar 200 Enamel (sprayed)	280	
ProMar 200 Enamel (rolled/brushed)	360	
A 100 Alkyd Wood Primer (sprayed)	200	
A 100 Alkyd Wood Primer (rolled/ brushed)	260	
A 100 Satin Latex Trim (sprayed)	280	
A 100 Satin Latex Trim (rolled/ brushed)	360	

\*\* Roller or brush application requires two or more coats to obtain recommended film thickness. No allowance is made here for overspray, waste in handling, mixing, or application. Final total dry film thickness (DFT) shall be equal to that specified. Paint submittals shall note where roller or brush application is proposed and the paint manufacturer's recommendations of number of coats to achieve the required thickness shall be noted.

Primer, intermediate and/or final surface colors shall be of contrasting colors to assure coverage.

**E. Colors:**

- Colors are to be selected by OWNER, with the following piping colors used where applicable:

Saturated brine line	- Orange
Diluted brine line	- Yellow
Treated water effluent line	- blue with 6-inch yellow band at 30-inch centers
Hard water blend line	- light blue
Backwash/fast rinse effluent line	- brown
Multi-purpose ion exchange face piping	- green

- Bands above may be similar to labels supplied as specified below. Colored tape will not be permitted.

- F. Labels: In addition to the color code, each pipe shall be labeled with a minimum of two labels in each room, crawl space, or compartment. Labels shall be abbreviated as noted under fluid abbreviations on the drawings. Labels shall be painted with stencils, 2-inch letters on pipes 4 inches and larger and 1-inch letters on pipes smaller than 4 inches. Labels shall include arrows indicating direction of flow. Snap-on pipe markers with permanent tension built into each plastic marker to grip pipe firmly may be used instead of painted labels. Snap-on labels shall be Brady, System 3, or equal mechanically-affixed pipe markers.
- G. All piping containing or transporting hazardous or corrosive chemicals shall be identified with labels every 10 feet and with at least two labels in each room, closet, or pipe chase. Color coding shall also be used.
- H. Shop Finish Painting: Centrifugal pumps shall have factory-applied finishes and will not require field painting. CONTRACTOR shall field touchup any damaged areas with factory-provided touchup coating.

END OF SECTION

### CENTRIFUGAL PUMPS

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included: This section includes furnishing, installing, and placing into successful operation one horizontal, self-priming, centrifugal booster pumping unit as indicated on the drawings. The pump and appurtenances shall be furnished by the same supplier.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 SUBMITTALS

- A. Shop Drawings:
  - 1. CONTRACTOR shall furnish detailed drawings and description showing the size, dimensions of pumps, dimensions of motors, dimensions of bases, and necessary foundation drawings, giving exact position of all bolts.
  - 2. All information required in this paragraph is to be submitted in duplicate.
  - 3. Certified pump dimensional drawings shall be submitted to ENGINEER within 30 days after award of Contract.
  - 4. The drawings will be used by CONTRACTOR to order piping and construct pump bases.
  - 5. Submittals for motors shall include data sheets from the motor manufacturer. Data sheets from the pump manufacturer or supplier are not acceptable.
  - 6. Additional shop drawing requirements are discussed in Division 1.
- B. Factory Test Submittals:
  - 1. All equipment shall be factory tested, using the job motors to drive the pumps.
  - 2. Test points shall include shutoff head performance point, cutoff head, plus at least three other points as required for accurate curve plotting. Head shall not include velocity head. Three certified copies of test data, notation of presence or absence of cavitation, computations for performance curve construction, computations for kWh per 1,000 gallons power consumption, field head-discharge curves, field wire-to-water efficiency curves, and field-motor load, all from shutoff to cutoff head, shall be submitted to ENGINEER for review. Total head shall be as defined herein.
  - 3. CONTRACTOR shall supply certified reprime performance test results prepared by the manufacturer.
  - 4. Shipment shall not be made until the factory and reprime test results are acceptable.

##### 1.03 QUALITY ASSURANCE

- A. Equipment shall conform to the standards of the AIEE, NEC, and NEMA, and to the state regulatory requirements.

## 1.04 WARRANTY

- A. Extended Warranty: Manufacturer shall warrant equipment and appurtenances for a period of 5 years from the earlier of either the date established for partial utilization in accordance with GC14.04 and 14.05, as modified in the Supplementary Conditions, or Substantial Completion of the project. Warranty shall be nonprorated, include all parts and labor, and be in written form. Warranty shall specifically exclude Buyer's indemnification language. Warranty language shall not eliminate manufacturer's responsibility for sizing of the equipment. During warranty period, manufacturer shall be responsible for any travel expenses, outside contractor fees, and rental equipment fees associated with providing warranty service. Warranty shall not exclude normal wear items. Manufacturer shall pay expenses incurred for repairs and parts replacement not made by manufacturer if manufacturer's response is not within 72 hours of notification by OWNER. Warranty language shall be provided with the shop drawings.

## PART 2-PRODUCTS

### 2.01 MANUFACTURER

- A. Type of pump, efficiency, and head discharge curve shall be similar to the Gorman-Rupp Company Model T83S-B Super T Series using a right hand horizontal arrangement.
- B. The drawings were prepared based on the model described above. CONTRACTOR shall include in the Bid and be responsible for the cost of any changes, including engineering changes, to accommodate the other equipment including, but not limited to structural, mechanical, and electrical work.

### 2.02 EQUIPMENT

- A. Design Requirements:
1. Pumps shall be horizontal, self-priming, centrifugal, single-stage, double-suction, nominal 1,150 rpm.
  2. Pump shall each have a performance point capacity of 1,500 gpm against a total head exterior to the pump of 58 feet.
  3. A head discharge curve equal to or steeper than specified model, maintaining high efficiency to each side of the performance point is required.
  4. Minimum pump efficiency shall be 63% at 1,500 gpm at 58 feet TDH.
  5. Total head as specified is the sum of suction and discharge pressure heads measured through piezometer connections on the horizontal centerline of the suction and discharge nozzles with no credit for difference in velocity heads at these points.
  6. The pump design shall be such that the units operate satisfactorily without cavitation, excessive noise, or vibration in excess of limits set forth in the Hydraulic Institute Standards on the pumping units installed as shown on the drawings and operating within the range of heads and suction conditions specified.
- B. Reprime Performance:
1. During unattended operation, the pump shall retain adequate liquid in the casing to insure automatic repriming while operating at its rated speed in a completely open system. Suction check valves or external priming devices shall not be allowed.
  2. Pump must reprime a maximum of 16 vertical feet at the specified speed and impeller diameter. Reprime lift is defined as the static height of the pump suction above the liquid, while operating with only one-half of the liquid remaining in the pump casing.



Pump must reprime and deliver full capacity within five minutes after the pump is energized in the reprime condition. Reprime performance shall be confirmed with the following test setup:

- a. A check valve shall be installed downstream of the pump discharge flange. Check valve size shall be equal to or greater than the pump discharge.
- b. A length of air release pipe shall be installed between the pump and the discharge check valve. This line shall be open to atmosphere at all times duplicating the air displacement rate anticipated at a typical pump station fitted with an air release valve.
- c. The pump suction valve shall be removed. No restrictions in the pump or suction piping will prevent the siphon drop of the suction leg. Suction pipe configuration for reprime test shall incorporate a 2 foot minimum horizontal run and a 90 degree elbow and vertical run as specified in the lift. The pipe size shall be equal to the pump suction diameter.
- d. Impeller clearances shall be set as recommended in pump service manual.
- e. Repeatability of performance shall be demonstrated by testing five consecutive reprime cycles. Full pump capacity shall be achieved within five minutes during each cycle.
- f. Liquid used for reprime test shall be water.

## 2.03 COMPONENTS

### A. Casings:

1. The casings shall be cast iron, horizontally split with ASA 125 psi flanged suction and discharge connections.
2. The pump may be started and stopped against a closed valve in the discharge piping, and pump construction shall be proper for pressures developed under this condition.
3. Provide 1/4-inch tapped piezometer connections on horizontal centerline of suction and discharge nozzles.
4. Mounting feet shall be sized to prevent tipping or binding when pump is completely disassembled for maintenance.
5. Fill port coverplate, 3 1/2-inch diameter, shall be opened after loosening a hand nut/clamp bar assembly. Hand nut threads must provide slow release of pressure and the clamp bar shall be retained by détente lugs. A gasket shall prevent adhesion of the fill port cover to the casing.
6. Casing drain plug shall be at least 1 1/4-inch NPT to insure complete and rapid draining.

### B. Impellers:

1. Impellers shall be ductile iron, two vane, semi-open, nonclog with integral pump out vanes on the back shroud. Impeller shall thread onto the pump shaft and be secured with a lock screw and conical washer.
2. Provide renewable bronze wearing rings on impellers and bronze or cast iron rings on casings.
3. Impellers shall be compatible with chlorinated water.

### C. Coverplate

1. Coverplate shall be cast iron.
2. Coverplate shall be retained by hand nuts for complete access to pump interior. Coverplate removal must provide ample clearance for removal of stoppages and allow service to the impeller, seal, wearplate, or check valve without removing suction or discharge piping.

3. A replaceable wearplate secured to the coverplate by weld studs and nuts shall be AISI 1015 HRS.
  4. Pressure relief valve shall be supplied in the coverplate and shall open at 75 to 200 psi.
  5. Two O-rings of Buna-N material shall seal coverplate to pump casing.
  6. Pusher bolt threaded holes shall be sized to accept same retaining cap screws as used in rotating assembly.
  7. A handle shall be mounted to the face of the coverplate.
- D. Shafts shall be AISI 4150 alloy steel. Shaft sleeve shall be alloy steel 4130. External piping complete with snubber valves shall be installed from the casing to each sealing box to circulate water to the seals.
- E. Bearings and Couplings:
1. Bearings shall be anti-friction ball bearings, oil-lubricated, designed to resist radial and thrust loads.
  2. Oil seals and water slingers shall be provided for protection of the bearings.
  3. Bearings to provide average AFBMA B-10 rated life of 50,000 hours or more at duty point.
  4. Shaft deflection shall not exceed 0.003 inches at greatest loads to prolong mechanical and bearing life.
  5. Each pump is to be furnished with mechanical seal boxes, placed on both sides of the pump centerline to seal pump shaft. Seals shall have all metal parts, 303 stainless steel with Buna-N elastomers, Ni-Resist seal and carbon washers.
  6. A bypass line shall be provided for the upper seal between the seal faces and the discharge flange to assure adequate venting of the seal chamber and to provide lubrication.
  7. The mechanical seal boxes shall be equipped with heavy cast one-piece O-ring sealed glands made from bronze or cast iron.
  8. A flexible coupling, Wood, Dodge, or equal shall be provided. A base-mounted coupling guard shall be provided.
  9. For dual drive pumps, an extended shaft and guard for future addition of a standby engine to be mounted opposite of the electric motor shall be provided.
  10. Bearing cavity shall have an oil level sight gauge and fill plug check valve. The clear sight gauge shall provide easy monitoring of the bearing cavity oil level and condition of oil without removal of the fill plug check valve. The check valve shall vent the cavity but prevent introduction of moist air to the bearings.
  11. The seal cavity shall have an oil level sight gauge and fill/vent plug. The clear sight gauge shall provide easy monitoring of the seal cavity oil level and condition of oil without removal of the fill/vent plug.
  12. Double lip seal shall provide an atmospheric path providing positive protection of bearings with capability for external drainage monitoring.
- F. Base:
1. A one-piece cast iron or fabricated steel base shall be provided upon which both the pump and motor are mounted.
  2. The base shall have a raised edge or trough for collecting drainage, and this trough shall be provided with 1-inch-diameter tapped outlets for pumps with packing glands.
  3. Anchor bolts and foundation drawings are to be provided.
  4. The space under the base will be filled with grout, and proper and separate openings shall be provided for placing grout and venting air. Vents shall be at each corner of the base.

- G. An air release valve shall be provided and installed between the pump and the discharge check valve as shown on the drawings. Air release valve shall be 1-inch GRP33-07 as manufactured by Gorman-Rupp or equal. A length of air release pipe shall be installed from the air release valve to the low lift pump station wet well.
- H. Suction check valve shall include a blowout center to protect pump casing from hydraulic shock or excessive pressure. Removal or installation of the check valve must be accomplished through the coverplate opening without disturbing the suction piping. The suction check valve shall eliminate the need to reprime after each pumping cycle. Pumps requiring a suction check valve to assist reprime shall not be acceptable.

## 2.04 MOTORS

- A. Motors shall conform to all applicable requirements of NEMA, ANSI, IEEE, and NEC standards and shall be UL-Listed for the service specified.
- B. Motors provided shall meet the following requirements. Motors shall not be loaded beyond nominal rating, not including service factor, at any design condition:
  - 1. Physical Construction:
    - a. Copper leads and windings with ball- or roller-bearings in end brackets of steel or cast iron or aluminum brackets with steel-bearing sleeves.
    - b. Rotor bars shall be copper. Where installed in NEMA 4X locations, a 45% nonphosphorous silver copper brazing shall be applied.
    - c. Motor shaft shall be high-strength steel protected by a bronze shaft sleeve secured to the shaft to prevent rotation. The maximum allowable no-load shaft runout shall be 0.002 inches.
    - d. Motors shall be equipped with grease fittings and automatic grease reliefs. Bearings shall be prelubricated and field regreasable. Openings for addition of grease shall have grease fittings provided.
  - 2. Mounting: Horizontal.
  - 3. Enclosure: TEFC.
  - 4. Efficiency: Premium efficiency as noted in schedule below.
  - 5. Service Factor: 1.25.
  - 6. Power requirements: 60 Hz, three phase, 208-230/460 volt, factory-wired for 460 volt connection,  $\pm 10\%$  voltage variation.
  - 7. Load type: Variable torque.
  - 8. NEMA Design: B.
  - 9. Insulation: Class F and rated for a Class B temperature rise.
  - 10. Nominal operating speed: Single speed 1,800 rpm.
  - 11. Nameplate: Stainless steel engraved attached to motor frame or enclosure with stainless steel rivets.
  - 12. Conduit/Junction Box: Cast iron, diagonally split, fully rotatable, gasketed between cover and bar, and between box and frame. Motor lead opening in the frame shall also be gasketed. A clamp-type terminal shall be provided inside each motor conduit box for grounding.
  - 13. Accessories:
    - a. Oversized motor junction box.
    - b. Lifting eyes.
    - c. Thermostats applied to motor windings, capable of shut down and manual reset by external controls (by Division 16).

14. VFD requirements: Motor operating on VFDs shall be inverter duty rated, meet the requirements of NEMA MG1, Part 31, and be capable of a minimum speed turndown of 4:1.

- C. Motor Schedule: If motor horsepower is increased to meet the requirements of this specification, CONTRACTOR is responsible for increasing all wiring, starters, drives, and other electrical components as required by Code, at no additional cost to OWNER.

Pump	Horsepower	Nominal Speed	Efficiency
IP-10-01	40	1,800	93%

## 2.05 CONTROLS

- A. All equipment and controls specified to be furnished with the equipment shall comply with the requirements of Division 16 and specification Section 11940.
- B. Equipment manufacturer shall review electrical wiring and control diagrams prepared by the Division 16 contractor. Manufacturer shall provide written approval to CONTRACTOR with copy to ENGINEER and OWNER.
- C. Electrical controls and instrumentation for this equipment are specified under Section 16480--Motor Control of these specifications.

## 2.06 VARIABLE SPEED DRIVE CONTROLS

- A. Variable speed drives are specified in Division 16 of these specifications. Care shall be taken in sizing the drive to ensure adequate starting torque is available for the drive. This information shall be provided to the variable speed supplier specified in Division 16.
- B. VFD controls are specified in Division 16, Section 16480--Motor Control of these specifications. VFD manufacturer shall review these controls and coordinate with Division 16.

## 2.07 FINISHES

- A. It is the intent of this specification that all equipment, supports, and appurtenances shall be furnished factory shop-primed and factory-finished. Preparation and painting shall conform to all requirements and provisions specified in Division 9. All surfaces of the mechanical equipment and accessories (except galvanized, stainless steel, rubber, copper, PVC) shall be prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation shall be done at such time during the assembly process to preclude damage to the equipment once assembled. Cleaned surfaces shall then be factory shop-primed. Factory shop-priming shall be with one coat of Tnemec N69-1255 Hi-Build Epoxoline primer, or equal, applied to a minimum of 5.0 mils dry thickness. (For equipment surfaces in contact with potable water, primer shall be 140-1255 Beige Pota-Pox Primer and shall be NSF-approved.) Factory shop-finish system shall consist of two coats of Tnemec N69 Hi-Build Epoxoline II, or equal, applied to a minimum of 5.0 mils dry thickness each. (For equipment surfaces in contact with potable water, primer shall be 140 Pota-Pox Plus and shall be NSF-approved.) Motors and speed reducers shall be factory shop-primed and finished-painted using the manufacturer's standard paint system for the specified application. Touchup paint shall be provided by manufacturer.

## 2.08 ANCHOR BOLTS

- A. Provide all anchor bolts required for equipment furnished. Anchor bolts shall be 316 stainless steel of ample strength for the intended service. Provide anchor bolts in accordance with Division 5.

## PART 3-EXECUTION

### 3.01 GENERAL

- A. Refer to requirements specified in Division 1 for equipment installation, quality control, testing, supervision, start-up, and operator training.

### 3.02 INSTALLATION

- A. Pump shall be installed, leveled, aligned, and lubricated as indicated on drawings and in accordance with written instructions provided by the manufacturer.

### 3.03 VARIABLE SPEED CONTROL COORDINATION

- A. The equipment manufacturer shall coordinate with the variable speed drive supplier at the time of equipment startup to address minimum speed requirements to protect both motor and equipment and to meet specified design and performance requirements. Minimum speed settings (in hertz) shall be provided to OWNER. Equipment operation over the entire control range shall be completed to demonstrate successful operation and to meet specified design and performance requirements.
- B. Pump manufacturer shall perform a vibration analysis and harmonics frequency test of the installed units to determine the actual field-defined range of VFD speeds that should be locked-out and where the VFD should be ramped across (not operate) in this range to limit harmonic frequencies. A vibration analysis and harmonics frequency test of the installed units shall be performed under the full range of operating conditions.

### 3.04 FIELD QUALITY CONTROL

- A. Site Tests (Vibration):
  - 1. Vibration at any point on the equipment and shafting as operated in the field in excess of limits set forth in the current edition of the Hydraulic Institute Standards shall be the cause for rejection. All surfaces intended for bearing shall be in full contact, and insertion of washers or spacers to minimize vibration will not be permitted.
  - 2. OWNER will make field tests to check compliance with the specifications.
- B. Penalties: If the unit, after installation, does not operate smoothly, does not meet the vibration limitations, or does not operate in accordance with the factory characteristics curve, it shall be removed by CONTRACTOR. OWNER retains the right to assess a 5-year power consumption penalty if the pump does not operate according to the factory test power-consumption curve once the pump is installed in the field.

END OF SECTION

### WATER SOFTENING EQUIPMENT (ION EXCHANGE)

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. *Work Included:* This section includes furnishing, installing, and placing into successful operation three zeolite softeners as shown on the drawings and described herein. The softeners and appurtenances shall be furnished by the same supplier.
- B. *Related Sections and Divisions:* Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 SYSTEM DESCRIPTION

A. *Design Requirements:*

1. Each softener unit shall be capable of softening the water at the rate of 400 gpm and shall have a capacity for delivery of not less than 130,000 gallons of soft water between regenerations when regenerated with salt (NaCl) brine at a rate of 6 pounds of salt per cubic foot of resin while softening water with the following average water quality:

Parameter		Minimum	Average	Maximum
Total Hardness	Calculated as $\text{CaCO}_3$ (mg/L)	360	424	466
Calcium Hardness	Calculated as $\text{CaCO}_3$ (mg/L)	270	282	290
Magnesium Hardness	Calculated as Mg (mg/L)	90	142	176
Alkalinity	Calculated as $\text{CaCO}_3$ (mg/L)	320	336	350
Chlorides	Calculated as Cl (mg/L)	45.6	56	62.9
Sulfates	Calculated as $\text{SO}_4$ (mg/L)	45	48	51
Iron	Calculated as Fe (mg/L)	0.14	0.32	0.6
Manganese	Calculated as Mn (mg/L)	0.11	0.12	0.18
pH		6.7	7.4	8

2. System shall bypass between 260 gpm and 460 gpm with a total flow of 1,024 gpm during routine operation.
3. System shall bypass between 300 gpm and 675 gpm with a total flow of 1,500 gpm under maximum flow conditions.

##### 1.03 SUBMITTALS

- A. Submit shop drawings, product data, and maintenance manual in accordance with provisions of Section 01300-Submittals. The instructions in the maintenance manual shall define the sequence and timing of the necessary controls, valves, pumps, and meters supplied by the treatment equipment manufacturer.

## 1.04 WARRANTY

- A. *Standard 1-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of 1 year from the earlier of either the date established for partial utilization in accordance with GC14.04 and 14.05, as modified in the Supplementary Conditions, or Substantial Completion of the project.*

## PART 2-PRODUCTS

### 2.01 MANUFACTURERS

- A. *Type of softener shall be as manufactured by Tonka Equipment Company, or equal.*
- B. *Drawings and specifications were prepared based on Tonka Equipment Company. SUPPLIER shall include in Bid and shall be responsible for the cost of any changes, including engineering changes, to accommodate other equipment including, but not limited to, structural, electrical, and mechanical work.*

### 2.02 COMPONENTS

- A. *Softener Units:*
1. *The diameter of each softener unit shall be 102 inches with a straight side height of 120 inches and shall be constructed as shown on the plans.*
  2. *The head thickness shall be a minimum of 5/8 inches, and the shell wall shall be a minimum of 1/2 inch and be rated for a minimum working pressure of 100 psi.*
  3. *The filter vessel shall be hydrostatically-tested at 150 psi prior to shipment.*
  4. *The vessel shall be constructed in accordance with ASME code requirements for pressure vessels and bear the ASME stamp.*
  5. *The softener vessels shall have a false bottom underdrain plate of steel with a minimum thickness of 3/8 inches.*
  6. *The underdrain plate shall be structurally reinforced so as to withstand differential pressure of at least 12 psi without structural damage.*
  7. *Certification of this design capability by a registered structural engineer shall accompany the submittal.*
  8. *The underdrain diffuser nozzles shall be Tonka high-impact, ABS-injection molded self-cleaning nozzles, or equal. They shall be mounted in the underdrain plate on 12-inch centers.*
  9. *Layout of nozzles shall ensure uniformity of backwash flow as well as structural support of the underdrain plate.*
  10. *An underdrain design for gravel-less (nonsupport bed) applications will not be acceptable.*
  11. *The influent distributor and backwash collection system shall be of the header/lateral design with multiple openings covering the entire cross-sectional area of the softener vessel so as to assure uniformity of flow.*
  12. *Each softener unit shall be equipped with a manhole of the standard 14 inches by 18 inches and shall be supported on structural steel I-beam legs.*
  13. *The flanges, plates, angles, channels, and beams shall be joined by full penetration welds, both sides, continuous welding.*
  14. *Each welding path shall be cleaned by brushing or grinding to remove welding slag.*

15. All finish welds shall be done by electric metallic arc process.
16. All finish welds shall be ground so that they are acceptably smooth to receive paint.

**B. Brine Distributor:**

1. The regenerant distribution system shall be of the type where the regenerant (brine) is introduced at the top of the vessel through a separate brine distribution header.
2. This header shall be designed so as to provide multiple points of injection covering the entire cross-sectional area of the softener vessel to assure a uniform downward flow of brine solution.
3. Introduction of the regenerant through the treated water effluent or raw water influent ports or without the use of a separate brine distributor is not acceptable.
4. The regenerant distributor shall be firmly anchored to the inside of the softener vessel and structurally reinforced to prevent any movement.
5. Any internal hardware required shall be of the appropriate grade of stainless steel or other corrosion-resistant materials.

- C. Support Gravel:** The support gravel shall consist of material which is free of clay, loam, vegetation, and other foreign matter and shall be furnished to the jobsite in bags. The gravel shall be capable of immersion in warm hydrochloric acid for a period of 24 hours with a total loss not to exceed 5% during that period. The gravel shall be placed in the softener as follows:

Bottom Layer	4 inches of 3/4-inch by 1/2-inch gravel
Next Layer	4 inches of 1/2-inch by 1/4-inch gravel
Next layer	4 inches of 1/4-inch by 1/8-inch gravel
Next layer	3 inches of 0.8 to 1/2 mm filter sand

**D. Zeolite:**

1. A quantity of 170 cubic feet of high-capacity polystyrene cation exchange resin shall be furnished for each softener vessel for a total of 510 cubic feet of resin for the entire system.
2. The resin shall have a rated exchange capacity of 20,000 grains as  $\text{CaCO}_3$  per cubic foot when regenerated with 6 pounds of salt per cubic foot.
3. The ion exchange resin shall be manufactured domestically. Approved manufacturers are Ionac, Purolite, Rohm and Haas, Dow, and Thermax.

**E. Pipe and Fittings:**

1. All piping used with the softener unit shall be ductile iron conforming to AWWA C151 or welded steel conforming to AWWA C200.
2. All fittings shall be flanged cast-iron fittings.
3. All gaskets shall be ring gaskets.
4. The piping shall be so arranged as to make the unit complete from inlet to outlet.
5. All necessary brine piping shall be included to make the connection between the brine pump and the softener unit complete.
6. Brine piping shall be PVC with PVC valves and fittings.



## F. *Butterfly Valves:*

1. *Except as otherwise specified or shown on the drawings, shutoff valves in lines 4 inches in diameter or larger shall be butterfly valves.*
2. *Butterfly valves shall be AWWA C504, short body, Class 150B. Provide certified drawings by manufacturer and Affidavit of Compliance.*
3. *Valve bodies shall be cast iron (ASTM A126, Class B), or ductile iron ASTM A536. Valves shall be flanged interior exposed and mechanical joint underground and conform to ANSI B16.1, Class 125.*
4. *Valve shaft shall be stainless steel.*
5. *Valve disk shall be cast iron with a welded nickel or 316 stainless steel edge or Nylon 11 coating ASTM A536 Gr. 65-45-12.*
6. *Valve seat shall be constructed of synthetic rubber compound and shall be recess-mounted and bonded in the valve body, or attached to the disk. Seat shall be mechanically-attached to the valve body or seat with screws, bolts, clamping-rings, or similar devices.*
7. *Valve shaft bearing shall be self-lubricating Teflon, nylon, or bronze.*
8. *Shaft seals shall have split V-type packings that are replaceable without removing the valve from the line.*

## G. *Electric Valve Operators:*

1. *Provide electrical valve operators Limitorque, Auma, or equal.*
2. *The motorized valve operators shall be 120 volt, single-phase, and 60 Hz. Motorized valve operators shall be sized for a minimum of one and one-half times the valve manufacturer's torque requirements. The minimum pressure for determining torque requirements for valve operator shall be based on pipe service test pressure or 25 psi, whichever is greater.*
3. *Automatic control shall be through the softener control panel. Where control service is listed as "modulating" on the drawings or specified herein as such, provide positioner board and position feedback board internal to the actuator which will receive a 4-20 MADC control signal, and output a 4-20 MADC position feedback.*
4. *Each actuator shall be supplied with an integral pushbutton station containing three buttons (open/stop/close); three indicator lights, one green (closed), one amber (fault), and one red (open); and three-position selector switch, lockable in each of the three positions (Hand/Off/Auto). In the "Hand" position, the actuators shall be operated from the local pushbutton station. In the "Auto" position for modulating service, the actuators shall be controlled by a remote 4-20 MADC signal or from open-close dry contacts, and for open/close service, the actuators shall be controlled from open/close dry contacts from the softener control panel. An auxiliary contact shall be provided for "In Auto" indication.*
5. *The electric valve actuators shall include the motor, motor heater, actuator unit gearing, reversing motor starter package with control power supply transformer, phase discriminator, interface board with optically-isolated input signals, and monitor relay for collective fault signal, position limit switches, torque switches, declutch lever, and handwheel as a self-contained unit. The actuator shall meet the latest revision of the applicable AWWA specification.*
6. *The motors shall be specifically designed for valve actuator service and shall be of high-starting torque, totally-enclosed, nonventilated construction. Motor insulation shall be a minimum NEMA Class F, with a maximum continuous temperature rating of 155°C (rise plus ambient) for one complete open-to-close (or reverse) cycle.*
7. *The motors shall be of sufficient size to open or close the valve at the maximum stated torque. The motor shall be capable of operating at plus or minus 10 of nominal*

- voltage. The motor duty-rating shall be sufficient for one complete cycle (open-close-open or reverse) without exceeding its temperature rating. Motor bearings shall be of the antifriction-type and permanently lubricated.
8. The motors shall be an independent subassembly so that the power gearing shall not be an integral part of the motor assembly to allow for motor or gear changes dictated by system operation changes.
  9. The motors shall be equipped with internal thermal contacts to protect against motor overload.
  10. The actuator shall be a multiple reduction unit with power gearing consisting of spur or helical gears and worm gearing. Antifriction bearings with caged balls or rollers shall be used throughout.
  11. All rotating power-train components shall be immersed in grease with provisions for inspection and relubrication without disassembly. Lubricants shall be suitable for ambient conditions of minus 20°F to 150°F.
  12. The actuators shall have a built-in device which allows the motor to reach full speed before engaging the valve load when required by unseating applications.
  13. A handwheel shall be provided for manual operation of each motor-operated valve with arrow to indicate "open" rotation. The handwheel shall not rotate during motor operation. A fused motor shall not prevent manual operation. When in manual-operating mode, the actuator will remain in this mode until the motor is energized, at which time the actuator will automatically return to electric operation. Movement from motor operation to handwheel operation shall be accomplished by a positive, padlockable declutching lever, which mechanically disengages the motor and related gearing. It shall be impossible for simultaneous manual and motor operation to occur. Friction-type declutch mechanisms are not acceptable.
  14. Position limit switches and associated gearing shall be an integral part of the valve actuator. Limit switch gearing shall be of the intermittent-type, made of bronze or stainless steel, grease-lubricated, and totally-enclosed, to prevent dirt and foreign matter from entering the gear train. Limit switch contacts shall be heavy-duty and silver-plated with wiping action. The actuator shall have sixteen contacts, four contact/four rotor-type, all of the same basic design. As an alternative, a limit switch assembly may be directly coupled to the valve stem eliminating the need for intermittent gearing, and providing six Single Pole Double Throw (SPDT) contacts. Contacts shall be convertible from N/O to N/C, or reverse.
  15. Switches shall be adjustable, allowing for trip points from fully-open to fully-closed positions of valve travel. They shall not be subject to breakage or slippage due to over-travel. Limit switch design shall permit visible verification of switch position without disassembly.
  16. Each valve actuator shall be equipped with a switch that will interrupt the control circuit in both the opening and closing directions when valve torque-overload occurs. Contacts shall be silver-plated. The torque switch shall have graduated dials for both open and close directions of travel, and each shall be independently adjustable. The torque switch shall include a positive means to limit adjustability so as not to exceed the actuator output torque capability. The activating spring pack shall be of the Belleville spring design. Switch design shall permit visible verification of switch position without disassembly.
  17. Enclosures shall be NEMA 4 for general areas. For high-moisture areas or areas below grade, provide watertight compartment between terminal compartment and the balance of the actuator, and shall be submersible to IP68 standard of 20 feet for 72 hours.

18. Valve shall act to limit surge pressures which might occur upon opening and closing the valve. The valve shall open and close slowly under operation; all necessary accessories, pressure and limit switches, contacts, and controls shall be provided to accomplish these functions, even though not specifically enumerated herein.
  19. The valve shall open to 90 degrees in no less than 30 seconds.
  20. Normal pressure at the softener electrically actuated valves is 25 psi while open. Pressure on the upstream and downstream side while closed may be 0 to 10 psi when pump is not operating. Upstream pressure when pump is running and valve is closed may be 45 psi.
- H. *Air Release Valve:*
1. The air release valve shall be 1-inch APCO Model No. 50, Val-Matic No. 15A, or equal.
  2. The valve assembly shall be installed as shown on drawings.
  3. CONTRACTOR shall run 1-inch pipe from the top of the valve as shown. Screen end of pipe where appropriate.
- I. *Solenoid Valves:*
1. Except where otherwise shown or specified, solenoid valves for water services shall be normally closed, two-way pilot-operated, slow-closing solenoid valves, ASCO Red-Hat II 8221 Series, or equal. Valve shall be brass body with Buna-N disk. Enclosure shall be rated for NEMA 4X. Valve shall be operated on 120 VAC, 60 Hz power supply. Valve shall be rated for a maximum operating pressure differential of 150 psi. Unit shall be CSA Certified and UL Listed.
- J. *Softener Treated Water Effluent (TWE) Flow Meters:*
1. Each softener unit shall be provided with a 6-inch magnetic water meter located in the softwater treated effluent lines as shown.
  2. There shall be an operator adjustable batch total setpoint and totalizer set up within the softener control panel PLC for each flow meter. The instantaneous and totalized TWE flow values shall be monitored by the PLC and the PLC shall totalize the TWE flow based on the flow reading from the associated meter. The PLC shall initiate the regeneration cycle once the batch quantity is equal to the batch quantity set point as programmed into the softener controls. Upon completion of the regeneration cycle, the batch quantity within the PLC shall be reset for the next service cycle.
  3. The flow meter 4-20 mA and flow pulse output signals shall be taken back to the softener control panel.
- K. *Hard Water Blending System:*
1. The ion exchange softening system shall incorporate a hard water blending system which will blend a controlled amount of hard water with the treated water effluent from the softeners to maintain a finished water hardness in the range of 5 to 12 grains per gallon.
  2. Provide a 4-inch butterfly valve with modulating electric actuator in the hard water bypass line.
  3. Provide one 4-inch magnetic water meter for hard water bypass line mounting.
  4. Valve 4-20 mA position control and feedback signals as well as water meter 4-20 mA and flow pulse output signals shall be taken back to the softener control panel for monitoring and control of the hard water blending system.

## L. Magnetic Flow Meters:

1. The magnetic flow meter shall utilize DC bipolar-pulsed coil excitation, automatically rezeroing after every cycle. The accuracy shall be at least 0.5% of rate over a 33:1 turndown at all flow rates above 1 fps. Accuracy shall be verified by calibration in a flow laboratory traceable to the NIST.
2. The flow sensor tube shall be epoxy-coated carbon steel. The flow sensor liner shall be polyurethane-lined. The electrodes shall be flush-mounted 316 stainless steel. The sensor shall have a NEMA 6P rating. The electronics shall be remote-mounted in an enclosure. The enclosure shall be NEMA 6P-rated and be equipped with a two-line, 16-character, backlit alphanumeric LCD display, indicating instantaneous flow and total flow. Provide cable for remote mounting of the enclosure length as required. Cable lengths shall be verified by CONTRACTOR.
3. The meter and electronics shall be suitable for operation in ambient temperatures from 40°F to 180°F and at pressures from full vacuum to 250 psig. Entire meter and components shall be suitable for temporary submersion.
4. The meter shall incorporate HI/Z circuitry. The preamplifier input impedance shall not be less than  $10^{12}$  ohms. External ultrasonic electrode cleaners will not be acceptable.
5. Meter outputs shall be isolated 4~20 mA DC and scaled pulse. Low-flow cutoff shall be adjustable from 0 to 9% of full scale. Provide two flow alarms (dry contacts rated for 0.5 A at 120 volts) that are adjustable from 0 to 99% of span.
6. The meter shall allow menu selection and configuration changes to be made from outside the housing. It shall not be necessary to remove covers, panels, or fasteners to make the menu selection of configuration changes. The meter software shall incorporate password protection, preventing inadvertent program changes. All printed circuit boards shall be contained in a plug-in module and be interchangeable for any size without requiring test equipment. The meter shall have a diagnostic feature which will provide a display message and fault output in case of a sensor failure, programming error, or empty pipe condition.
7. The meter shall be inherently bidirectional. Totalized flow and programmed configuration shall be retained in memory for up to 10 years.
8. The meter shall utilize 120 VAC, single-phase power.
9. The meter shall have 150-pound ANSI Class D flanged connections.
10. The magnetic flow meters shall be Badger Meter, Inc., Magnetoflow with Remote Primo amplifier. Flow range for 6-inch meters shall be 0 to 3,000 gpm and flow range for 4-inch meters shall be 0 to 1,400 gpm.

## M. Brine Meter:

1. One 1-inch-diameter disc brine meter shall be provided complete with an auto-reset register for measuring gallons of brine and controlling operation of brine pumps.
2. This meter shall be fitted with electric batch control totalizer and automatic reset control.
3. Meter display shall not be less than four digits.
4. The dial scale shall be capable of readings of up to 2,000 gallons per cycle.
5. The softener control panel shall shut off the designated brine pump at completion of the batch quantity as programmed into the softener controls.
6. Brine meter shall include a flow pulse signal output to be taken back to the softener control panel.
7. A solenoid valve will be provided on the common brine supply line and shall be controlled from the softener control panel to start and stop brine flow based on the brine flow volume reading through the brine meter.

N. *Brine System:*

1. *The softener manufacturer shall provide two brine pumps of suitable materials to pump saturated brine from the wet salt storage basin to the softener.*
2. *Also include accessories to provide dilution water to the brine line.*
3. *The pumps shall be of a horizontal centrifugal magnetic drive type, Model TE-5.5C/K-MD as manufactured by March Pumps, or equal, and be operated by a 1/3 hp single phase, 115/208-230 volt TEFC motor, factory wired for 115 volt operation.*
4. *The brine pump shall be sized to produce a pumping rate required by the softener.*
5. *The pump shall be provided with a mechanical seal.*
6. *The pump shall be mounted on a separate base plate with a flexible coupling to the electrical motor.*
7. *Submittal data shall include adequate information to prove that the brine pump is of a high quality, has good operating history on saturated salt brine applications, can be overhauled by operating personnel, and has good parts availability.*
8. *Provide all other brine system components including such items as shutoff valves, throttling valves, check valves, and sample cocks and as shown on the drawings.*
9. *Brine pumps shall be capable of pumping saturated brine at a capacity of 15 gpm at 26 feet TDH.*
10. *One brine pump shall run at a time. Control of the brine pumps shall be configured within the softener control panel to operate in an alternating arrangement.*
11. *A solenoid valve shall be provided on the common brine supply line from the brine pumps. The solenoid valve shall be controlled from the softener control panel to start and stop brine flow to the softener during regeneration based on the brine flow volume reading through the brine meter.*

O. *Pressure Gauges and Sampling Cocks:*

1. *An aluminum gauge panel shall be mounted on the header pipe at the front of the softeners. The panel shall contain a pressure gauge for indication of influent pressure and a diaphragm-type differential pressure gauge to indicate loss of head across the softener vessels.*
2. *Gauges shall be mounted on the panel for obtaining influent and effluent water samples.*
3. *Sample cocks shall be mounted on the panel for obtaining influent and effluent water sample.*
4. *All gauges and sample cocks shall be properly labeled.*
5. *Gauges shall be equipped with brass shutoff valves.*
6. *Gauges shall be accurate to  $\pm 1/2\%$  of scale range.*
7. *Gauges shall have a range of 0 psi to 50 psi.*

P. *Backwash/Fast Rinse Waste:*

1. *A backwash and rinse 4-inch magnetic water meter shall be provided to indicate flow rates in the waste effluent line.*
2. *Provide a 4-inch butterfly valve with modulating electric actuator in the backwash/fast rinse waste line.*
3. *Valve 4-20 mA position control and feedback signals as well as water meter 4-20 mA and flow pulse output signals shall be taken back to the softener control panel for waste flow rate control and monitoring during the backwash and fast rinse steps of regeneration. This shall allow for a common flow rate for all vessels in the system during backwash and fast rinse.*

**Q. Salt Storage Brine-Making Tank:**

1. Brine making tank shall be Bryneer brinemaker as manufactured by Plas-Tanks Industries, Inc., or equal.
2. The outdoor brine making tank shall be provided as follows:
  - a. Diameter: 10 feet 0 inch.
  - b. Straight shell height: 15 feet 0 inch.
  - c. Empty weight: 3,000 lbs.
  - d. Maximum gross (filled) weight: 85,500 lbs.
  - e. Usable dry salt capacity: 36 tons.
  - f. Salt capacity: 43 tons.
  - g. Maximum continuous brine (granulate salt) draw: 30 gpm.
  - h. Liquid capacity: 8,520 gallons.
3. Fabrication:
  - a. The laminate shall consist of an interior surface, an interior layer, a structural layer, and an exterior protective surface.
  - b. Interior surface shall be a reinforced layer of 10 to 20-mil thickness. Resin content is to be greater than 80%.
  - c. The interior surface shall be free from cracks and crazes. It shall have a smooth finish with an average of no more than two pits per square foot, providing such are no greater than 0.25 inches in diameter, are not over 0.031-inch deep, and are sufficiently covered with resin to protect the interior surface reinforcement.
  - d. The interior layer shall back the interior surface to a minimum thickness of 80 mils and have a content of 20 to 30% noncontinuous glass strands.
  - e. The finished laminate shall be as free as commercially practicable from visual defects such as dry spots, foreign inclusions, pinholes, and delamination.
  - f. The structural layer shall consist of continuous strand filament winding to satisfy hoop strength requirements. Chopped glass is to be applied before the first cycle of winding and interspersed between subsequent cycles. The vessel bottom and a minimum of the first 6 feet of the vessel wall shall be fabricated without any structural seams.
  - g. The exterior surface shall consist of resin blended with 0.6% of paraffin wax to provide a full surface cure and a tack-free corrosion-resistant surface. The translucent vessel shall have 2% ultraviolet inhibitors. If the brine vessel is insulated, the insulated portion will be finished with a white exterior gel coat.
4. Fittings:
  - a. Standard flanged nozzles shall be entirely of hand layup construction with the flange and pipe neck molded as on integral unit.
  - b. Nozzle wall and flange thickness are to be fabricated for 25 psi pressure rating.
  - c. The face of the flange shall be perpendicular to the centerline of the pipe to within  $\frac{1}{2}$  degree and shall be flat to within 1/16 inch.
  - d. The location of a nozzle will be held to 1/4 inch.
  - e. All nozzles shall be conically gusseted.
  - f. All nozzles shall have insulation replaced around layup areas.
5. The following test procedures shall be performed to ascertain quality of vessel construction:
  - a. The surface area of the vessel shall be tested for hardness with a barcol impresser. Ten readings of a resin rich surface are taken with the two highest and two lowest eliminated. An average is taken of the remaining six readings, which must equal at least 90% of the resin manufacturer's recommendation.

- b. Fabricator shall have a written quality control program demonstrating the capability to design and supply equipment conforming to customer specification with periodic internal auditing and semiannual audits such as ISO-9001.
- c. The brine vessel shall be certified to NSF 61 and shall be traceable to an NSF authorized production facility.
- 6. Shipping and Installation:
  - a. All vessels shall be shipped on padded saddles.
  - b. All vessels shall be installed in accordance with manufacturer's recommendations.
  - c. All nozzles shall be covered during shipment to keep out dirt and other contaminants.
- 7. The brine vessel shall have the following accessories:
  - a. Stainless steel tie down lugs and stainless steel lifting channels (size and quantity to be determined by fabricator).
  - b. Four-inch conically gusseted flanged nozzle with 4-inch diameter stainless steel schedule 40 salt unloading pipe with 3/4-inch water injection port, aluminum Kamlock fitting, and cap.
  - c. Twenty feet of 4-inch flexible hose with aluminum Kamlock fitting and cap.
  - d. Two inch conically gusseted flanged nozzle brine outlet with internal brine plenum and slotted PVC filter pipe.
  - e. Two inch conically gusseted flanged nozzle with PVC water inlet ring.
  - f. Eight inch gooseneck vent with PVC vent extension, clips to attach to vessel wall, polyester dust bag, and rubber connection boot.
  - g. Twenty-four inch top flanged manway with cover spring loaded for emergency pressure relief, stainless steel fasteners.
  - h. Twenty-four inch side flanged manway with cover, gasket, and stainless steel fasteners.
  - i. One water level control system to include a pressure sensing transducer, liquid level controller/level indicator, and water supply solenoid valve.
    - (1) A model EJA 530A pressure sensing transducer as manufactured by Yokogawa, or equal, shall be furnished and mounted on the brine maker/salt storage vessel sidewall with PVC isolation ball valve, strainer, and clear PVC pipe to facilitate inspection and cleaning. Pressure transducer shall be wired to liquid level controller/indicator for local tank level indication and control.
    - (2) A model UM330-30 liquid level controller/indicator as manufactured by Yokogawa, or equal, shall be furnished in an FRP NEMA 4X enclosure to be field mounted on the sidewall of the vessel. Controller and indicator shall require 120V, single phase, 60 Hz, 10-amp power supplied by others and shall provide a 4-20 mA output signal for remote monitoring of tank level.
    - (3) Level indicator shall be digital, LED, to indicate liquid level in feet.
    - (4) For level controller to be adjustable for desired liquid levels, it shall include all relays, contacts, and terminals as necessary to energize the water supply solenoid at a desired low level setting, and deenergize the solenoid to close at the desired upper level setting based on the level signal from the associated tank pressure transducer.
    - (5) Water supply solenoid shall be 1 1/4 inch, normally closed for mounting by others in the water supply piping. Solenoid shall operate from a 120V power circuit out of the level controller unit.
  - j. Fiberglass encapsulated nameplate.
  - k. A fiberglass ladder meeting OSHA requirements with safety cage, mounted on vessel, but fully supported by concrete or other suitable support base. Attachment fasteners shall be stainless steel.

- l. Fiberglass handrail mounted to the top of the vessel.*
- m. Four-inch drain and drain nozzle.*
- n. Salt level indication system to measure and display salt level.*
  - (1) Salt level measurement sensing unit shall be a model SmarBob SBR II as manufactured by BinMaster, or equal, and shall be mounted on top of tank by CONTRACTOR. Sensing unit shall require 120 volt, single-phase power supplied by others, and shall provide a level signal as well as 16 VAC power terminals for connection to a remote start unit console.*
  - (2) Remote digital meter console shall be a model RSU-MS-4 Remote Start Unit (RSU) console as manufactured by BinMaster, or equal. Console shall be mounted in a NEMA 4X enclosure, powered at 16 VAC, and have a 4-20 mA output for remote monitoring of salt level.*
- 8. Heat Retention System:*
  - a. A heat retention system shall be provided for the brine vessel. The system shall be Plasta-Therm as manufactured by Plas-Tanks Industries, Inc. or equal. Exterior piping and pressure transducer shall be heat traced and insulated by CONTRACTOR.*
  - b. Current demands shall be determined by a sensing bulb that directly reflects temperature of vessels contents. System shall be able to maintain 60°F at a minimum ambient temperature of 0°F.*
  - c. The first 6 feet of the brine vessel shall be insulated with 2-inch thick foam with 1/8-inch thick fiberglass protective covering. The top of the insulation shall be capped to seal out any moisture.*
  - d. The heat retention system shall include all required tank heat tape and a tank-mounted temperature control box factory-wired to a tank-mounted junction box. Heat retention system shall require a 1200 watt, 120 volt, single-phase power supply.*

## 2.03 CONTROLS

- A. All equipment and controls specified to be furnished with the equipment shall comply with the requirements of Section 11940.*
- B. Softener Controls:*
  - 1. Automatic Valve Nest:*
    - a. Each softener shall be equipped with a valve nest of electrically motor operated butterfly valves. The valve nest shall include the following electrically motor operated valves:*
      - (1) Backwash Influent valve (BWI).*
      - (2) Backwash Effluent valve (BWE).*
      - (3) Brine Inlet valve (BRI).*
      - (4) Fast Rinse Effluent valve (FRE).*
      - (5) Treated Water Effluent valve (TWE).*
      - (6) Raw Water Influent valve (RWI).*
    - b. Valves and piping shall be provided for the following modes of operation: backwash, brine, slow rinse, fast rinse, and service. In addition to the valves for each softener, this shall include solenoid valves on the common brine supply line and slow rinse water supply line.*
  - 2. Power (120 volts) to each electric valve actuator and solenoid valve associated with the ion exchange system shall be from the softener control panel and shall be fused.*



## 3. Control Panel:

- a. Softener control shall be fully automatic and come from a central control panel.
- b. Softener control system shall have complete control over every phase of the service mode and regeneration cycle and the various components required including brine pumps, batch meter, flow meters, valve actuators/solenoids, brine diluting equipment, slow rinse equipment, and fast rinse equipment.
- c. Each brine pump (two total) shall be powered from this control panel and start and stop through a power relay within this control panel. Power to each pump shall be through a circuit breaker within this control panel, sized as required.
- d. Provide a current switch, Hawkeye H800 HV, as manufactured by Veris Industries, or equal, on the power feed out to each brine pump. Current switches shall be wired to PLC inputs for monitoring of brine pump run status.
- e. Panel shall be stainless steel in construction and be rated NEMA 4X.
- f. Softener controls shall be provided by softener manufacturer.
- g. The regeneration control system shall consist of a programmable logic controller (PLC) and operator interface panel (OIP) mounted through the front door of the control panel. PLC shall be specifically programmed to automatically control the overall operation of the softening system and its regeneration. All softener control and monitoring functions shall be done through the OIP and PLC unless otherwise noted. Refer to Section 11940 for PLC and OIP requirements.
- h. Each softener shall normally operate under a service mode during which water enters the softener through the raw water influent valve and exits through the treated water effluent valve and flow meter. The treated effluent shall be blended back into the system through the hard water blending system. Regeneration of a softener shall be automatically initiated by means of magnetic water meters located on the effluent of each softener as specified herein. During the regeneration process, the softener shall be sent through the following steps by controlling the associated valves based on timers set up within the PLC programming and flow meter signals monitored by this PLC:
  - (1) Isolation Step.
  - (2) Backwash Step.
  - (3) Bed Settle Step.
  - (4) Brine Step.
  - (5) Slow Rinse Step.
  - (6) Fast Rinse Step.
  - (7) Upon completion of the Fast Rinse Step, the treated water effluent batch quantity totalizer set up within this PLC shall be reset for the next service cycle and the softener shall return to service mode.
  - (8) The brine step shall have a backup watchdog timer set up within this PLC so that an alarm is activated locally in the event the brine batch meter does not batch out within the allotted time.
- i. The regeneration process control for each softener vessel shall be set up to allow for interruptions in raw water influent flow during the regeneration process. The flow through the TWE flow meters shall be monitored by this control panel PLC. If the flow through all of softener TWE flow meters falls below a minimum flow setpoint, it shall be assumed that the raw water influent supply has been shut off. In the event the raw water influent supply has been shut off and the vessel is operating in a regeneration step requiring raw water influent flow (e.g. backwash step and fast rinse step), the regeneration process shall automatically go into a "hold" and a "Regeneration Process On Hold" message shall be displayed on the control panel OIP. The regeneration process shall recommence from the point it

was placed on hold once flow through one or more TWE flow meters rises above the minimum flow setpoint and any remaining regeneration process steps shall be completed. The regeneration process shall be able to be put on hold for an extended period of time without affecting the process performance.

- j. This PLC shall include outputs to send a 4-20 mA signal to modulating electric valve actuators and open and close command signals to open/close electric valve actuators for position control of each valve associated with the IEX System.
- k. This PLC shall accept a 4-20 mA signal from modulating electric valve actuators and open and close status signals from open/close electric valve actuators for position feedback from each valve actuator associated with the IEX System. A call-to-open/close fail alarm shall be generated within the PLC and indicated locally on the control panel OIP if a valve does not open/close within a certain period of time after it is called to open/close by the PLC.
- l. At a minimum, the following signals shall be available for remote monitoring by others via connection to an Ethernet network switch in this control panel:
  - (1) Control Power Fail.
  - (2) Common alarm shall include, but not be limited to, all valve call-to-open/close fail alarms and brine mode time duration exceeded. Replace UPS battery and any other alarms recommended by IEX system manufacturer.
  - (3) Service Mode Active for each Ion Exchange Unit (three total).
  - (4) Regeneration Mode Active for each Ion Exchange Unit (three total).
  - (5) Treated Effluent Flow Rate and Total for each Ion Exchange Unit (three total).
  - (6) Flow Until Next Regeneration Cycle for each Ion Exchange Unit (three total).
  - (7) Hard Water Bypass/Blend Flow Rate and Total.
  - (8) Bypass/Fast Rinse Waste Flow Rate and Total.
  - (9) Brine Flow Total.
  - (10) Brine Pump 1 Running.
  - (11) Brine Pump 2 Running.
- m. Softener control shall include provisions for manual regeneration initiation or cancellation of each softener by means of manual initiate and cancel push buttons on the front door of the control panel.
- n. Pilot lights controlled by PLC outputs shall be provided on the front door of the control panel to indicate whether each softener is in service or regeneration, and the step of regeneration that the softener is in (i.e., backwash, brine, slow rinse, fast rinse, or standby).
- o. The control system shall be designed to permit only one softener vessel to regenerate at any one time.
- p. The control panel shall require a 120 volt, single-phase power supply and be provided with a 30 amp, single-pole main circuit breaker.

## 2.04 FINISHES

- A. Exterior: It is the intent of this specification that all equipment, supports, and appurtenances exterior to the vessels shall be furnished factory shop-primed, clean, and ready to accept finish painting by CONTRACTOR with a minimal amount of surface preparation. Unless otherwise specified, mechanical equipment and accessories shall be furnished with all surfaces (except galvanized, stainless steel, rubber, copper, PVC) prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation shall be done at such time during the

assembly process to preclude damage to the equipment once assembled. Cleaned surfaces shall then be factory shop-primed. Factory shop-priming shall be with one coat of Tnemec N69-1255 Hi-Build Epoxoline primer, or equal, applied to a minimum of 5.0 mils dry thickness. (For equipment surfaces in contact with potable water, primer shall be 140-1255 Beige Pota-Pox Primer and shall be NSF-approved.) Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify.

- B. *Interior: It is the intent of this specification that all equipment, supports, and appurtenances interior to the vessels shall be furnished factory shop-primed and factory-finished. All surfaces of the mechanical equipment and accessories (except galvanized, stainless steel, rubber, copper, PVC) shall be prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation shall be done at such time during the assembly process to preclude damage to the equipment once assembled. Cleaned surfaces shall then be factory shop-primed. Factory shop-priming shall be with one coat of 140-1255 Beige Pota-Pox Primer and shall be NSF approved, or equal, applied to a minimum of 5.0 mils dry thickness. Factory shop finish system shall consist of two coats of 140 Pota-Pox Plus and shall be NSF-approved, or equal, applied to a minimum of 5.0 mils dry thickness each. Touch-up paint shall be provided by seller.*

## PART 3-EXECUTION

### 3.01 GENERAL

- A. *Refer to requirements specified in Division 1 for equipment installation, quality control, testing, supervision, start-up, and operator training.*

### 3.02 INSTALLATION

- A. *The bottom layer of the screened support gravel shall be placed by hand to avoid damage to the diffuser assemblies. Each layer shall be placed and leveled before the addition of the next layer is started.*
- B. *The support gravel bed shall be provided by seller and installed in accordance with AWWA B-100 procedures.*
- C. *Each layer of gravel shall be carefully leveled with a straight edge and level before the next layer is installed.*
- D. *The resin shall be supplied by seller and be delivered to the job site in 1 cubic-foot bags, pelletized, and shall be placed in the softener vessels above the support gravel beds.*
- E. *Placement of the gravel support bed and ion exchange resin shall be under the direct supervision of a field supervisor who is an employee of the softener equipment manufacturer.*

### 3.03 FIELD QUALITY CONTROL

- A. *The support gravel bed material shall be sampled and tested in accordance with the inspection provisions of AWWA B-100 by an independent testing lab selected by OWNER.*

*In a like manner, the ion exchange resin may be sampled and tested to show conformance with the specifications.*

## 3.04 SYSTEM START UP AND OWNER'S INSTRUCTION

- A. *The equipment manufacturer shall provide the required consecutive 8-hour days of supervisory personnel during installation of the support bed and filter media and ion exchange resin as well as the required consecutive 8-hour days of supervisory personnel for start-up of the equipment. The personnel shall make the necessary tests and adjustments to place the equipment into proper operation.*
- B. *The instructions shall include demonstration, assistance, and overseeing the regeneration procedures, review of the "Operation and Maintenance Manual," and instructions in the use of auxiliary equipment, etc.*
- C. *The supervisory personnel shall be a trained employee of the softener manufacturer experienced in the installation of this type of equipment.*

## 3.05 GUARANTEE

- A. *The equipment shall be guaranteed by seller for a period of 1 year from the date continuous satisfactory operation commenced as determined by ENGINEER. During this period of time, the softener system shall provide water of the hardness and at the flow rates and salt usage as specified. All adjustments necessary to comply with this guarantee shall be made at SELLER's expense.*

END OF SECTION

### PREPACKAGED SKID MOUNTED BOOSTER STATION

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work includes: This section includes furnishing, installing, and placing into successful operation a fully equipped prepackaged skid-mounted booster station, including booster pumps, valves, meter, and miscellaneous equipment as shown on the drawings and specified herein. The water booster pumping system shall be complete with all necessary equipment installed on a fabricated steel base. The station and appurtenances shall be furnished by the same supplier. Two booster stations will be provided: one on Gilgal Road and one on Kings Ridge Road.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 SYSTEM DESCRIPTION

- A. Performance Requirements:
  - 1. Description of Operation: The booster station shall serve to pump from the low pressure zone to the high pressure zone. The booster station shall include two booster pumps.
  - 2. The pump station control panel shall provide local automatic control based on discharge pressure. Provision shall be made for automatic control through a telemetry system provided by others. The station shall lock out the booster pumps when suction pressures fall below 20 psi.
  - 3. The manufacturer of the booster station shall provide all necessary mechanical and electrical equipment for future telemetry panel installation inside the pump station enclosure. Coordination of the required control signals will be the responsibility of the booster station supplier and CONTRACTOR.

##### 1.03 SUBMITTALS

- A. Booster Pump Data/Shop Drawing Requirements:
  - 1. CONTRACTOR shall furnish shop drawings which document performance data and head discharge curves showing pump field delivery when driven by the field motor.
  - 2. CONTRACTOR shall furnish the following information in duplicate:
    - a. Name of pump manufacturer and type of model designation of pump.
    - b. Field-operating speed of unit. All performance data and tests shall be at this speed.
    - c. NPSH required.
    - d. Impeller diameter as percent of maximum possible.
    - e. Name of motor manufacturer and type of model designation of motor with full information on frame size, insulation, and temperature rating.
    - f. Motor-rated horsepower without service factor.
    - g. Motor service factor.
    - h. Full load and locked rotor current.

- i. Motor efficiency at half, three-quarters, and full load.
  - j. Power consumption in kWh per 1,000 gallons for each pump at performance point.
  - k. Complete performance curves for the equipment being offered (not a page from a catalog) showing capacity, head, (not including velocity head), NPSH required, wire-to-water efficiency, and brake horsepower from shutoff to cutoff head where driven by the field electric motor.
  - l. Descriptive data showing pump construction and materials of construction.
3. CONTRACTOR shall furnish detailed drawings and description showing the size, dimensions of pumps, dimensions of motors, dimensions of bases, and necessary foundation drawings.

B. Factory Test Submittals:

- 1. All equipment shall be factory tested using the field motors to drive the pumps.
- 2. Test points shall include shutoff (highest) head, specified performance point, cutoff (lowest) head, plus at least three other points as required for accurate curve plotting. Head shall not include velocity head. Three certified copies of test data, notation of presence or absence of cavitation, computations for performance curve construction, computations for kWh per 1,000 gallons power consumption, field head discharge curves, field wire-to-water efficiency curves, and field motor load, all from shutoff to cutoff head, shall be submitted to ENGINEER for review. Total head shall be as defined herein.
- 3. Shipment shall not be made until ENGINEER reviews the factory test results.

- C. Submittals for motors associated with equipment specified in this section shall include data sheets from the motor manufacturer. Data sheets from the equipment manufacturer or supplier are not acceptable.

## 1.04 QUALITY ASSURANCE

- A. Equipment shall conform to the standards of the AIEE, NEC, and NEMA.

## 1.05 WARRANTY

- A. Standard 1-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of 1 year from the earlier of either the date established for partial utilization in accordance with GC14.04 and 14.05, as modified in the Supplementary Conditions, or Substantial Completion of the project.

## PART 2-PRODUCTS

### 2.01 MANUFACTURERS

- A. The booster station shall be manufactured by Excel Environmental Products of Cleveland, OH or equal.

### 2.02 MANUFACTURED UNITS

- A. Equipment Base: The station base shall be constructed of ASTM 6061-T6 aluminum plate and design to ensure adequate strength during shipping, rigging, and anchoring. The

station base shall be anchored to a CONTRACTOR-supplied poured-in-place concrete pad.

## 2.03 COMPONENTS

### A. Booster Pumps:

1. Design Requirements:
  - a. Pumps shall be vertical, centrifugal multi-stage type and nominal 3,450 rpm.
  - b. Pumps shall each have a performance point capacity of 60 gpm against a total head exterior to the pump of 300 feet for Gilgal Road and 40 gpm against a total head exterior to the pump of 480 feet for Kings Ridge Road.
  - c. A steep head discharge curve, maintaining high efficiency to each side of the performance point, is desired.
  - d. The pumps shall be Grundfos Pumps "CR" Series or equal.
  - e. The pumps shall have a 4-inch suction for Gilgal Road and 6-inch suction for Kings Ridge Road and a 4-inch discharge for Gilgal Road and 6-inch discharge for Kings Ridge Road.
  - f. Total head as specified is the sum of suction and discharge pressure heads measured through piezometer connections on the horizontal centerline of the suction and discharge nozzles with no credit for difference in velocity heads at these points.
  - g. The pump design shall be such that the units operate satisfactorily without cavitation, excessive noise, or vibration in excess of 4 mils at any point on the pumping units installed and operating within the range of heads and suction conditions specified.
2. In-line Vertical Multi-Stage Pumps shall have the following features:
  - a. The pump impellers shall be secured directly to the smooth pump shaft by means of a split cone and nut design.
  - b. The suction/discharge base shall have ANSI Class 125 or Class 250 flange connections in a slip ring (rotating flange) design.
  - c. Pump Construction:
    - (1) Suction/discharge base, pump head: ductile iron (ASTM 65-45-12).
    - (2) Shaft couplings, flange rings: ductile iron (ASTM 65-45-12).
    - (3) Shaft: 431 stainless steel.
    - (4) Motor Stool: Cast Iron (ASTM Class 30).
    - (5) Impellers, diffuser chambers, outer sleeve: 304 stainless steel.
    - (6) Impeller wear rings: 304 stainless steel.
    - (7) Intermediate Bearing Journals: Tungsten Carbide.
    - (8) Intermediate Chamber Bearings: Leadless Tin Bronze
    - (9) Chamber Bushings: Graphite Filled PTFE.
    - (10) O-rings: EPDM
3. The shaft seal shall be a single balanced metal bellows cartridge with the following construction:
  - a. Bellows: 904L stainless steel.
  - b. Shaft Sleeve, Gland Plate, Drive Collar: 316 stainless steel.
  - c. Stationary Ring: Carbon.
  - d. Rotating Ring: Tungsten Carbide.
  - e. O-rings: EPDM.

## B. Motors:

1. Motors shall conform to all applicable requirements of NEMA, ANSI, IEEE, and NEC standards and shall be UL-listed for the service specified.
2. Motors provided shall meet the following requirements. Motors shall not be loaded beyond nominal rating, not including service factor, at any design condition.
  - a. Physical Construction:
    - (1) Copper leads and windings with ball- or roller-bearings in end brackets of steel or cast iron or aluminum brackets with steel-bearing sleeves.
    - (2) Rotor bars shall be copper.
    - (3) Motor shaft shall be high-strength steel protected by a bronze shaft sleeve secured to the shaft to prevent rotation. The maximum allowable no-load shaft runout shall be 0.002 inches.
    - (4) Motors shall be equipped with grease fittings and automatic grease reliefs. Bearings shall be prelubricated and field regreasable. Openings for addition of grease shall have grease fittings provided.
  - b. Mounting: Vertical.
  - c. Enclosure: TEFC.
  - d. Efficiency: Premium efficiency.
  - e. Service Factor: 1.15.
  - f. Power requirements: 60 Hz, three phase, 230/460 volt, factory-wired for 230 volt connection (coordinate with VFD output voltage),  $\pm 10\%$  voltage variation.
  - g. NEMA Design: B.
  - h. Insulation: Class F and rated for a Class B temperature rise.
  - i. Nominal operating speed: Single speed, 3,600 rpm.
  - j. Nameplate: Stainless steel engraved attached to motor frame or enclosure with stainless steel rivets.
  - k. Conduit/Junction Box: Cast iron, diagonally split, fully rotatable, gasketed between cover and bar, and between box and frame. Motor lead opening in the frame shall also be gasketed. A clamp-type terminal shall be provided inside each motor conduit box for grounding.

## C. Variable Frequency Drivers:

1. VFDs shall be provided to match the load type (constant or variable torque) of the specification application, as well as the full load amps of the motor furnished for the project. VFDs shall be as manufactured by Allen-Bradley, or equal.
2. System Operating Conditions:
  - a. 240 VAC single-phase input power.
  - b. 240 VAC, three-phase output power to motor.
  - c. 60 Hz  $\pm 2\%$ .
  - d. Storage temperature  $-25^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ .
  - e. Operating temperature 0 to  $40^{\circ}\text{C}$ .
  - f. Altitude: 3,300 feet above sea level maximum.
  - g. Humidity: 95% noncondensing maximum.
3. Variable Frequency Unit:
  - a. Conform to NEMA and NEC standards.
  - b. CSA and ETL approved and/or UL approved.
  - c. Overall VFD efficiency shall be a minimum of 96.5%,  $\pm 1\%$ , at 100% speed and motor load at nominal line voltage. Efficiency rating shall include control power supplies, control circuits, and all cooling fans.



4. Input:
    - a. Withstand without component failure line voltage transients up to 3,000 volts per ANSI C37.
    - b. Design to include two DC bus chokes to be used in conjunction with one or more capacitors. The DC bus chokes are to be incorporated in the design to minimize line-side harmonics. Magnetic-only designs need to include line filters to limit harmonics to a value no greater than in a system using dual DC bus chokes.
    - c. Include MOV line-side protection.
    - d. Inverter input for six pulse VFDs shall have a true power factor of 0.95 or better, at rated load and nominal line voltage throughout the entire speed range.
    - e. Three percent line reactors.
  5. Inverter Output:
    - a. Inverter shall utilize latest generation IGBTs, be microprocessor based, and isolated from power circuits.
    - b. Match motor specified.
    - c. 3 phase, 3 wire.
    - d. Pulse width modulated wave form.
    - e. Maximum output 230 volts.
    - f. Frequency 2 to 650 Hz.
    - g. Frequency accuracy  $\pm 1\%$  of setting at any point in the specified speed range in a 24-hour period.
    - h. Full load output current shall be rated in excess of the AC motor selected.
    - i. Motor performance:
      - (1) 3% regulation in the manual speed control mode.
      - (2) Normal duty overload rating: 110% continuous current for 1 minute; 150% for 3 seconds.
      - (3) Heavy-duty overload rating: 150% continuous current for 1 minute; 180% for 3 seconds.
      - (4) 110% starting torque minimum.
- D. Pump System Controller:
1. The pump system controller shall be a standard product developed and supported by the pump manufacturer.
  2. The controller shall be microprocessor based capable of having software changes and updates via personal computer (notebook). The controller user interface shall have a VGA display with a minimum screen size of 3 1/2-inches by 4 5/8-inches for easy viewing of system status parameters and for field programming. The display shall have a back light with contrast adjustment. Password protection of system settings shall be standard.
  3. The controller shall provide internal galvanic isolation to all digital and analog inputs as well as all field-bus connections.
  4. The controller shall display the following as status readings from a single display on the controller (this display shall be the default):
    - a. Current value of the control parameter, (typically discharge pressure).
    - b. Most recent existing alarm (if any).
    - c. System status with current operating mode.
    - d. Status of each pump with current operating mode and rotational speed as a percentage.
  5. The controller shall have as a minimum the following hardware inputs and outputs:
    - a. Three analog inputs (4-20mA or 0 to 10 VDC).
    - b. Three digital inputs.

- c. Two digital outputs.
- d. Ethernet connection.
- e. Field service connection to PC for advanced programming and data logging.
- 6. Pump system programming (field adjustable) shall include as a minimum the following:
  - a. Water shortage protection (analog or digital).
  - b. Transducer settings (suction and discharge analog supply/range).
  - c. PI controller (proportional gain and integral time) settings.
  - d. High system pressure indication and shutdown.
  - e. Low system pressure indication and shutdown.
  - f. Low suction pressure/level shutdown (via digital contact).
  - g. Low suction pressure/level warning (via analog signal).
  - h. Low suction pressure/level shutdown (via analog signal).
  - i. Flow meter settings (if used, analog signal).
- 7. The system controller shall be able to accept up to seven programmable setpoints via a digital input (additional input/output module may be required).
- 8. The controller shall have a low pressure shutdown to stop pumps when suction pressure drops below a selected value. Two indication levels shall be provided. One level is for warning indication only (indication that the water pressure is getting lower than expected levels) and the other level is for complete system shutdown. System restart after shutdown shall be manual or automatic (user selectable).
- 9. The system pressure setpoint shall be capable of being automatically adjusted by using an external setpoint influence. The setpoint influence function enables the user to adjust the control parameter (typically pressure) by measuring an additional parameter (example: lower the system pressure setpoint based on a flow measurement to compensate for lower friction losses at lower flow rates).
- 10. The controller shall be capable of receiving a remote analog setpoint (4-20mA or 0-10 VDC) as well as a remote system on/off (digital) signal.
- 11. The pump system controller shall store up to 24 warnings and alarms in memory. The time, date, and duration of each alarm shall be recorded. A potential-free relay shall be provided for alarm notification to the building management system. The controller shall display the following alarm conditions and provide discrete outputs for future telemetry monitoring:
  - a. High System Pressure.
  - b. Low System Pressure.
  - c. Low Suction Pressure (warning and/or alarm).
  - d. Individual Pump Failure.
  - e. VFD trip/failure.
  - f. Loss of sensor signal (4-20 mA).
  - g. Loss of remote setpoint signal (4-20mA).
  - h. System power loss.
- 12. The pump system controller shall be mounted in a UL Type 3R rated enclosure. The control panel shall be UL 508 listed as an assembly. The control panel shall include a main disconnect, circuit breakers for each pump and the control circuit, and control relays for alarm functions. Control panel shall include the following features:
  - a. Pump Run Lights (2).
  - b. Pump Alarm Lights (2).
  - c. System Fault Light.
  - d. Audible Alarm (80 db[A]).
  - e. Surge Arrestor.
  - f. Control Panel Internal Illumination.
  - g. Emergency/Normal Operation Switches.

- h. Pump Hand-Off-Automatic Switches (2).
- i. Telemetry/Local Automatic Control.
- 13. The controller shall be capable of receiving a redundant sensor input to function as a backup to the primary sensor (typically discharge pressure).
- 14. The controller shall have a pump "Test Run" feature such that pumps are switched on during periods of inactivity (system is switched to the "off" position but with electricity supply still connected). The inoperative pumps shall be switched on for a period of 2 to 3 seconds every 24 hours, 48 hours, or once a week (user selectable).
- 15. The controller shall be capable of displaying instantaneous power consumption (watts or kilowatts) and cumulative energy consumption (kilowatt-hours).
- 16. The actual pump performance curves (5th order polynomial) shall be loaded (software) into the pump system controller.

## 2.04 SYSTEM CONSTRUCTION

- A. The suction and discharge manifolds shall be constructed of steel with the following manifold connection sizes:
  - 1. 3 inch and smaller: Male NPT threaded.
  - 2. 4 inch through 8 inch: ANSI Class 150 rotating flanges.
  - 3. 10 inch and larger: ANSI Class 150 flanges.
- B. Pump isolation valves shall be provided on the suction and discharge of each pump. Isolation valve sizes 2 inch and smaller shall be nickel plated brass full port ball valves. Isolation valve sizes 3 inch and larger shall be a full lug style butterfly valve. The valve disk shall be of stainless steel. The valve seat material shall be EPDM and the body shall be cast iron, coated internally and externally with fusion-bonded epoxy.
- C. A spring-loaded nonslam type check valve shall be installed on the discharge of each pump. The valve shall be a wafer style type fitted between two flanges. The head loss through the check valve shall not exceed 5 psi at the pump design capacity. Check valves shall have a body material of stainless steel or epoxy coated iron (fusion bonded) with an EPDM or NBR resilient seat. Spring material shall be stainless steel. Disk shall be of stainless steel or leadless bronze.
- D. For systems that require a diaphragm tank, a connection of no smaller than 3/4 inch shall be provided on the discharge manifold.
- E. Pressure transducers shall be provided on the discharge manifold for pump control and on the suction manifold for water shortage protection. Pressure transducers shall be made of 316 stainless steel. Transducer accuracy shall be +/- 1.0% full scale with hysteresis and repeatability of no greater than 0.1% full scale. The output signal shall be 4-20 MA with a supply voltage range of 9-32 VDC.
- F. A bourdon tube pressure gauge, 2.5 inch in diameter, shall be placed on the suction and discharge manifolds. The gauge shall be liquid filled and have copper alloy internal parts in a stainless steel case. Gauge accuracy shall be 2/1/2%. The gauge shall be capable of a pressure of 30% above its maximum span without requiring recalibration.
- G. The base frame shall be constructed of corrosion resistant steel. Rubber vibration dampers shall be fitted between each pump and base frame to minimize vibration.

- H. The control panel shall be mounted on a steel fabricated control cabinet stand attached to the system skid.

## 2.05 STATION ENCLOSURE

- A. The pump station enclosure shall contain and enclose all valves and electrical controls and shall be constructed for optimum serviceability by incorporating the following design features:
  - 1. Two gull wing access panels shall be provided. Each gull wing panel when open shall expose the entire side allowing unrestricted access of 72 inches by 72 inches minimum to any part of the piping, valves, or electrical controls. The gull wing access panels in the open position shall provide a roof under which service personnel can perform any and all maintenance, whether routine, frequently performed adjustments and inspections, or major overhauls including equipment replacement.
  - 2. The gull wing doors shall be attached with continuous stainless steel hinges. Provision shall be made to remove the doors in the open position only for security.
  - 3. Each gull wing access panel shall be equipped with a heavy duty cast stainless steel handle operating two latches. The handles shall have provision for owner supplied padlocks.
  - 4. Each gull wing access panel shall be equipped with gas springs to assist in raising and lowering. Each side shall have one gas spring with a positive locking hold open catch to ensure operator safety.
  - 5. The entire enclosure shall be insulated with a foil coated closed cell foam. The side wall shall have a minimum of R7.2 and the roof a minimum R12.5. The insulation shall be oversprayed with a two-part polyurethane to protect the insulation and seal the inside of the enclosure making it watertight. Enclosures utilizing hand laid up or sprayed on insulation without the guaranteed minimum R value indicated above shall not be acceptable.
- B. The station enclosure shall be manufactured of mill finish ASTM 3003 and 6061-T6 aluminum, minimum sheet thickness of .080.
- C. The internal structural support shall be fabricated of 6061-T6 aluminum tubing. Major design considerations shall be given to structural stability, corrosion resistance, and watertight properties to ensure long life. No coating shall be required to make this enclosure impervious to microorganisms, mildew, mold, fungus, corrosive liquids, and gases that can be present surrounding the sewage wet well. Any coating and/or covering shall be aesthetics only.

## 2.06 STATION ENCLOSURE TEMPERATURE CONTROL

- A. The enclosure temperature control system shall include an adjustable digital thermostat for low temperature alarm. A dual wattage 500 to 1,500 heater and a high temperature vent fan shall be provided for heating and ventilation.
- B. The low temperature alarm shall be connected to the alarm control circuit including a local indicating light and a set of dry contacts for remote indication.
- C. A dual wattage 110 V, heater shall have a minimum or two wattage set points. The 500 watt primary shall be capable of maintaining up to 40°F differential (inside to outside) temperature of the enclosure with its doors closed. The 1,500-watt setting shall flash heat

the enclosure after routine maintenance or inspection and or maintain a reasonable amount of warmth for maintenance personnel working under the gull wing with the weather curtain drawn.

- D. A vent fan/blower shall be mounted in the station enclosure. Adequately sized to change the air inside the enclosure once every 30 seconds but not less than 112 CFM at 0.4-inch WC. The blower shall be operated automatically from the temperature control system and shall turn on at 90°F and turn off at 70°F. The blower motor and control shall be protected by a thermo magnetic circuit breaker. The air inlet and exhaust shall be designed to prevent entrance of rain, snow, rocks, and foreign material.

## 2.07 GAUGE PANEL

- A. The pump station shall be equipped with a glycerin filled pressure gauge to monitor discharge pressure and static system pressures. The pump suction shall be equipped with compound gauges. Each gauge shall have a minimum of 4 1/2-inch face and shall be graduated in feet of water column. Accuracy shall be 1% full scale or better. The gauges shall be sized such that full scale is not greater than twice the pump design pressure but not less than 120% of pump shutoff pressure, whichever is greater.

## 2.08 ELECTRICAL CONSTRUCTION

### A. General:

1. All wiring shall comply with the NEC and applicable state and local codes.
2. Wiring to be completely factory installed, except for the electrical feed that runs to the control panel continuously from the external electrical service. Wiring shall be type THHN, 12 AWG minimum. All wiring within control panels shall be insulation type MTW, minimum size 16 AWG.
3. All wiring within the equipment chamber and outside the control panel shall be run in rigid steel conduit.
4. Liquid-tight flexible metal conduit shall be used to connect the pump motors.
5. The electrical apparatus and control panel design, assembly and installation, and the integration of component parts will be the responsibility of the manufacturer of record for this booster pumping equipment.
6. All control and starting equipment panel(s) shall be constructed in accordance with Underwriter's Laboratories (UL) Standard 508 "Industrial Control Equipment" and be so labeled.

### B. Equipment Grounding:

1. Each electrical equipment item in the installation shall be properly grounded according to Section 250 of the National Electrical Code.
2. All ground wires from installed equipment shall be in conduit and shall lead back to the control panel to a copper ground buss specific for grounding purposes and so labeled. The ground buss shall be complete with a lug large enough to accept the installing electrician's bare copper earth ground wire. The bus shall serve as a bond between the earth ground and the equipment ground wires.

## 2.09 SEQUENCE OF OPERATION

### A. Local Automatic Control:

1. The system controller shall maintain a constant discharge pressure (system setpoint). The system controller shall receive an analog signal [4-20mA] from the pressure transducer on the discharge manifold indicating the actual system pressure. As flow demand increases the pump speed shall be increased to maintain the system setpoint pressure. When the operating pump(s) reach 96% of full speed (adjustable), an additional pump will be started and will increase speed until the system setpoint is achieved. When the system pressure is equal to the system setpoint, all pumps in operation shall reach equal operating speeds. As flow demand decreases, the pump speed shall be reduced while system setpoint pressure is maintained. When all pumps in operation are running at low speed, the system controller shall switch off pumps when fewer pumps are able to maintain system demand.
2. The system controller shall be capable of switching pumps on and off to satisfy system demand without the use of flow switches, motor current monitors, or temperature measuring devices.
3. All pumps in the system shall alternate automatically based on demand, time, and fault. If flow demand is continuous (flow shutdown does not occur), the system controller shall have the capability to alternate the pumps every 24 hours, every 48 hours or once a week. The interval and actual time of the pump changeover shall be field adjustable.

### B. Telemetry Automatic Control: When telemetry automatic control is selected, each pump shall be controlled by discrete inputs from the telemetry panel (installed by others).

## 2.10 ACCESSORIES

### A. Pipe and Fittings:

1. All internal transmission piping shall be steel and conform to ASTM A53(CW) for nominal pipe size 4 inches and smaller and ASTM A53(ERW) Grade B for nominal pipe size 5 inches and larger. Butt-welded fittings shall conform to ASTM A106.
2. Provide piping as indicated on the drawings, including flange adapters for disassembly. Manufacturer shall provide all necessary fittings and transitions to provide the minimum clearances for the equipment specified. Manufacturer shall lay out piping and perform all adjustments required for equipment to be supplied.

### B. Couplings: Flanged coupling adapters shall be installed on the pump inlet and outlet to allow easy disassembly of piping and elsewhere as required. Provide with packing utilizing a wedge gasket for efficient sealing. Provide a minimum of four tension ties spaced equally around the pipe. Tension ties shall be designed to retain pipe at a minimum pressure of 250 psi. Couplings shall be Dresser Style 128, or approved equal.

### C. Pipe Supports:

1. Provide pipe supports for every piping system installed. Support piping by pipe support where it connects to pumps, valves, or other mechanical equipment. Not all pipe supports required are shown on the drawings.
2. Pipe support components shall withstand both dead and live loads imposed by the weight of the pipes, fittings, and valves (all filled with water), plus valve actuators, and shall have a minimum safety factor of three based on the material ultimate strength.

3. Provide separate pipe supports for each pipe header, pump suction line, and pump discharge line. Install piping without springing, forcing or stressing the pipe, or any connecting valves, pumps, and other related equipment to which the pipe system is connected.
- D. Pump Piping Connections:
1. Each booster pump piping connection, both suction and discharge, shall include a standard method strain relief pipe connection. The suction side piping shall be complete with a flanged union. The discharge side piping shall be complete with a compression-type, self-restraining adapter flange. Rigid flange on flange piping systems without breakaway joints will not be accepted.
  2. The adapter flanges shall be ductile iron meeting ASTM A536 and be drilled to meet ANSI B16.5. Flanges shall meet the test requirements of AWWA C-900. The flanged union shall be a pair of raised-face steel flanges conforming to ANSI 150-pound specifications and be complete with a 1/16-inch composite ring gasket and the proper number of flange bolts with two nuts each. The flanges shall meet the test requirements of AWWA C-200.
- E. Elastomer Pipe Connector:
1. The inlet side of each booster pump shall include an elastomer connector to help isolate vibration and noise in the piping system. The elastomer connector shall be of single-sphere design, constructed of neoprene and nylon with bias-ply tire reinforcing cord to provide a 225 psi working pressure rating to a minimum of 120°F. The elastomer connector shall pass through the plate steel flanges designed to grip the connector so the connector seals without gaskets when the flange bolts are drawn up.
  2. A control joint limiting pipe connector movement shall be supplied with each pipe connector.

## 2.11 FINISHES

- A. It is the intent of this specification that all equipment, piping, valves, supports, and appurtenances shall be furnished factory shop-primed and factory-finished. Preparation and painting shall conform to all requirements and provisions specified in Division 9. All surfaces of the mechanical equipment and accessories (except galvanized, stainless steel, rubber, copper, PVC) shall be prepared in accordance with near white grade SSPC Specification No. 10 removing all dirt, rust scale, and foreign materials. Surface preparation shall be done at such time during the assembly process as to preclude damage to the equipment once assembled. Cleaned surfaces shall then be factory shop-primed. Factory shop-priming shall be with one coat of Tnemec N69-1255 Hi-Build Epoxoline primer, or equal, applied to a minimum of 5.0 mils dry thickness. (For equipment surfaces in contact with potable water, primer shall be 140-1255 Beige Pota-Pox Primer and shall be NSF-approved.) Factory shop-finish system shall consist of two coats of Tnemec N69 Hi-Build Epoxoline II, or equal, applied to a minimum of 5.0 mils dry thickness each. (For equipment surfaces in contact with potable water, primer shall be 140 Pota-Pox Plus and shall be NSF-approved.) Motors and speed reducers shall be factory shop-primed and finished-painted using the manufacturer's standard paint system for the specified application. Touch-up paint shall be provided by manufacturer.

## 2.12 ANCHOR BOLTS

- A. Provide all anchor bolts required for equipment furnished. Anchor bolts shall be 316 stainless steel of ample strength for the intended service. Provide anchor bolts in accordance with Division 5.

## 2.13 CONCRETE FOUNDATION

- A. Provide concrete foundation for booster pump station as shown on the drawings. Concrete foundation shall be in accordance with Division 3.

## PART 3-EXECUTION

### 3.01 GENERAL

- A. Refer to requirements specified in Division 1 for equipment installation quality control, testing, supervision, start-up, and operator training.

### 3.02 INSTALLATION

- A. Booster Station:
  - 1. Booster station shall be installed in accordance with specifications and drawings as recommended by manufacturer.
  - 2. Before assembly, all station components shall be inspected for quality and tested for proper function and freedom from defects.
  - 3. Upon completion, the station shall be connected to a test tank and an operational test performed under simulated field conditions while a final inspection is conducted.
  - 4. Any deficiencies shall be corrected at the factory prior to installation.
  - 5. Automatic controls shall be adjusted to approximate job requirements.

END OF SECTION



### CONTROLS AND INSTRUMENTATION EQUIPMENT

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. *Work Included:* Controls and instrumentation equipment provided with equipment in Section 11250-Water Softening Equipment (Ion Exchange).
- B. *Related Sections and Divisions:* Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 QUALITY ASSURANCE

- A. *UL labels:* All electrical equipment and material shall be listed and labeled by Underwriters Laboratories, except where UL does not include the equipment in their listing procedures. Electrical equipment shall include, but not be limited to, control panels, power supplies, controllers, relays, wire, selector switches, pilot lights, overcurrent devices, and connectors. Control panels shall bear a serialized UL label indicating that it is UL approved as an assembled unit. Panels which have individual components which are UL labeled, but do not have UL approval as an assembled unit are not acceptable.
- B. *NEMA/ANSI Compliance:* Comply with National Electrical Manufacturer's Association, American National Standards Institute and other standards pertaining to material, construction and testing, where applicable.
- C. *Code Compliance:* Comply with the National Electrical Code (NFPA 70) and any and all local codes as applicable to construction of electrical wiring devices, material, and equipment herein specified.

##### 1.03 SUBMITTALS

- A. *Manufacturer's Data:* Submit manufacturer's data, specifications, and installation recommendations for each item specified herein.
- B. *Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.*
- C. *Provide product data on all equipment and devices specified herein as well as wiring schematics for all systems.*
- D. *Provide load calculations showing battery runtimes and UPS sizing including all equipment specified herein.*

## 1.04 OPERATION AND MAINTENANCE DATA

- A. *Submit operation and maintenance data under provisions of Section 01300–Submittals.*
- B. *Include spare parts data listing, source, and current prices of replacement parts and supplies, recommended maintenance procedures and intervals.*

## 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. *Store in a clean dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect equipment from dirt, water, construction debris, and traffic.*
- B. *Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to equipment components, enclosure, and finish.*

## PART 2–PRODUCTS

### 2.01 EQUIPMENT ENCLOSURES

- A. *New enclosures shall be front access only, minimum No. 12-gauge steel, continuous hinged doors, rotating, lockable handle, 3-point latch on each equipment compartment door (not screws or bolts), with top and bottom bolts actuated by one rotating handle on large doors. Quick-opening hasps may be substituted for rotating, lockable handle latch where approved by ENGINEER. Panels shall include door stop kit, data pockets for panel wiring diagrams and minimum 18-inch fluorescent light and switch. Painting shall include phosphate treatment, zinc chromate iron oxide primer, baked rust-inhibiting enamel, white interior, and OWNER-selected exterior color. All doors and panels shall be gasketed. Enclosures shall be as manufactured by Hoffman, Lehman, or Saginaw. Enclosure rating shall be NEMA 4X stainless steel for corrosive and/or damp locations, including chemical rooms and below-grade nonconditioned spaces, unless noted otherwise on the drawings or in the associated specification section.*
- B. *The equipment mounted within the enclosures shall be mounted on the enclosure back panel, neatly organized, and shall be in accordance with the manufacturer's recommendations.*
  - 1. *All wiring within control panels shall be insulation-type MTW, minimum size 16 AWG. Wiring within the enclosure shall be routed through plastic wiring troughs with removable covers. Maximum fill for wiring troughs shall be 60%. Terminal strips located adjacent to wiring troughs shall have a minimum of 2 inches between terminal strip and trough. All wiring in control panels not in wiring troughs shall be bound with continuous-type spiral windings.*
  - 2. *All I/O devices shall be wired to rail mounted terminal blocks. Plastic wiring duct shall be Electrovert "Electro-duct," Panduit, or equal. Terminal blocks shall be Electrovert 9700 Series, Square D, Class 9080 Type G, Phoenix Contact UK 5N, or equal.*
  - 3. *Circuit breakers shall be square D type QO with mounting bases or equal. Circuit breakers can be of the rail mounted-type such as Square D, Class 9080, Type GCB-150, or equal.*

4. *Power supplies shall be Sola, rail mount, SPD or SDN series, or equal.*
  5. *Signal conditioners shall be Action Instruments, DIN rail mount, or equal.*
  6. *All field wiring shall terminate at rail-mounted terminal blocks. Field wiring terminals shall be clearly identified as to which I/O terminals they are wired. Wire markers shall be permanently attached, wraparound adhesive, or heat-shrink type markers. Wire numbering preprinted on the conductor and individual wraparound numbers are not acceptable.*
  7. *Jumpers between adjacent terminal blocks shall be copper jumper bars supplied by the terminal block manufacturer.*
  8. *All panels with DIN rail-mounted equipment shall include a minimum of 25% spare DIN rail space.*
  9. *In addition to spare I/O specified herein, provide a minimum of 25% spare hot and neutral terminals, wired to terminal strips. Spare terminals shall be provided for all voltage sources within the panel (e.g. 120V, 24V).*
- C. *All wiring for new panels shall be done in the factory, Class II, Type C with master terminal strips for exterior connections. Terminal blocks shall be mounted either at the bottom or on the side of the enclosure, depending where the I/O conduits penetrate the enclosure. Splices are not allowed within enclosures or wireways. All enclosures must pass through doors to point of installation, and if enclosures are shipped in sections, all wiring and connections between sections shall be done by CONTRACTOR. All wiring shall be labeled at each end with corresponding numbers. This numbering shall be shown on the shop and record drawings.*
- D. *All door-mounted devices shall be furnished flush-mounted, and an exterior engraved phenolic nameplate worded by the manufacturer and reviewed by OWNER (upon receipt of shop drawings) shall be provided for each compartment, device, light, etc. All components within the enclosures shall be identified with interior-mounted engraved labels. Labels shall be installed on the enclosure back panel and not on the device or wireway. Devices shall be grouped for each device or unit being controlled.*
- E. *Equipment enclosures that include motor controllers shall have a main disconnect for the enclosure.*

## 2.02 COMMON REQUIREMENTS ALL EQUIPMENT

- A. *All indicating and recording devices shall be electric or electronic.*
- B. *Power supplies shall be protected against short circuits and contain their own overcurrent and overvoltage protection. Power supplies (12 VDC and 24 VDC) shall be provided and installed in the enclosures for powering all analog input signals where required.*
- C. *Devices powered at 120 volts from control panels shall be provided with suitable circuit protection fuses or breakers. Fuse holders shall be provided with integral LEDs to indicate when the fuse is blown. This shall include, but not be limited to, solenoid valves, motor operated valves, pumps, etc.*
- D. *Provide lightning protection, isolation transformers, and fused disconnects at each end of each power circuit, supervisory circuit, and local supervisory circuit with transformers and relays, if necessary, to obtain supervisory power. Lightning protection shall be completely*

*solid-state, self-healing, and not require the use of fuses. Lightning protection shall be as manufactured by Citel, Model M40-120, or equal.*

- E. Control panels that include programmable or electronic controllers (PLCs) shall be provided with a true on-line Uninterruptible Power Supply (UPS) sufficient to power the control panel for 30 minutes. In panels with a UPS, control power shall be through the UPS and shall be plug connected. UPS power shall be provided, at a minimum, to the following components: PLC and I/O racks, power supplies for PLCs and I/O, indicating lights, devices associated with power fail and communication alarms, and power supplies for loop-powered instruments. UPS' provided in control panels with a PLC shall be provided with a relay card that provides a dry contact output to the PLC in the event that the UPS battery needs replacement. UPS shall be APC with relay IO module, or Liebert, GXT2 with relay card. Provide a stand or shelf for the UPS such that the UPS does not sit on the bottom of the enclosure.*
- F. Where PLCs or Operator Interface Panels (OIPs) are installed in control panels, two copies of all programs with associated passwords shall be turned over to OWNER at final completion. Copies shall be a bound hard copy and electronic compact disk.*
- G. CONTRACTOR shall furnish one complete extra set of fuses and similar parts that may need replacement in normal service, and an identification list of all component parts and where they may be obtained for operating the system for 3 years from start-up.*
- H. Where a certain accuracy of sensing and transmitting levels or flows and controlling operations are called for, means must be provided to read or determine that the levels or flows are within the limits or accuracy specified of the sensing, transmitting, and controlling devices. Where no accuracy is specified, but a knowledge of levels is necessary to set operating points, an indicating device of accuracy consistent with the operation of the system is required.*
- I. All internal wiring shall be color-coded and numbered, and each wire shall be terminated on terminal strips. Schematic and wiring layout drawings, following JIC standards, which show all connections to external devices, a complete bill of materials, interior and exterior panel layouts, and a detailed description of operation shall be submitted for each control panel.*

## 2.03 CONTROL PANEL DEVICES

- A. Overcurrent protection and disconnecting means for equipment shall be provided as specified in the specification section for the associated equipment. Molded case thermal magnetic circuit breakers shall include integral thermal and instantaneous magnetic trip in each pole. Nonfusible switch assemblies shall consist of quick-make, quick-break load interrupter enclosed knife switch with externally operable handle.*
- B. Pushbuttons: Heavy-duty, oil-tight (30 mm).*
- C. Indicating Lights: Heavy-duty, oil-tight, (30 mm), LED, push-to-test type.*
- D. Selector Switches: Heavy-duty, oil-tight (30 mm).*

- E. *Timing Relays: UL Listed with On and Timing Out LEDs.*
- F. *Elapsed Time Meters: Redington/Engler 722 series, 3 inches round, flush door-mounted, capable of reading up to 99,999.9 hours, nonreset-type.*

## 2.04 INDUSTRIAL CONTROL AND POWER RELAYS

- A. *Industrial control and power relays shall be installed in the control panels. Relays used to interface with PLC I/O shall be terminal style, interposing/isolation relays. Relays for motor control circuits, hard-wired control logic, and for loads less than 10 amps shall be general purpose, industrial, and square base relays. Relays for small motor loads shall be industrial, electrically held power relays.*
- B. *Relays shall meet the following requirements:*
  - 1. *Interposing/isolation relays:*
    - a. *Configuration: SPDT or DPDT as required by system supplier.*
    - b. *Mounting: DIN rail with screw terminal base socket.*
    - c. *Voltage: 120 VAC, or as required by system supplier.*
    - d. *Contact rating: 8 A (DPDT), 16 A (SPDT).*
    - e. *Operating life: 10 million cycles.*
    - f. *Status: On-Off flag-type or LED indicator.*
    - g. *UL listed.*
    - h. *Manufacturer: Allen Bradley, 700-HK, or equal.*
  - 2. *General purpose relays:*
    - a. *Configuration: DPDT or 3PDT as required by system supplier.*
    - b. *Mounting: DIN rail with screw terminal base socket.*
    - c. *Voltage: 120 VAC.*
    - d. *Contact rating: 15 A, minimum; 3/4 hp.*
    - e. *Operating life: 10 million cycles.*
    - f. *Status: On-Off flag-type or LED indicator.*
    - g. *UL listed.*
    - h. *Manufacturer: Allen Bradley, 700-HB, or equal.*
  - 3. *Power relays:*
    - a. *Configuration: Electrically held, 2-12 poles.*
    - b. *Mounting: DIN rail, square base.*
    - c. *Voltage: 120 VAC.*
    - d. *Contact rating: 20A continuous; 1 hp.*
    - e. *Operating life: 10 million cycles.*
    - f. *UL listed.*
    - g. *NEMA rated.*
    - h. *Manufacturer: Allen Bradley, 700-PK, or equal.*

## 2.05 PLC SOFTWARE

- A. *Control Panel PLC:*
  - 1. *PLC shall have a programmable address and shall accept incoming data that includes this address. PLC shall accept and process data that includes a single unique common address.*
  - 2. *The PLC shall be capable of stand-alone control.*

3. *The entire system shall be designed to accommodate all inputs and outputs in the Input/Output (I/O) list plus 25% spare for each type of input and output signal at each location or as indicated, whichever is greater. All spare and unused I/O shall be wired to terminal strips. This wiring shall include all auxiliary devices and components to complete the installation (e.g., interposing relays, wireways).*
  4. *The system shall be programmed to implement the control sequences and to provide the monitoring according to this specification. It shall be the responsibility of system supplier to include all the inputs and outputs required to meet all aspects of this specification, regardless of whether they are specifically included in this specification.*
  5. *The PLC system I/O shall communicate at a rate sufficient to perform any command to operate control within 5 seconds and receive any status feedback signals within 5 seconds.*
  6. *PLC shall be of expandable construction with all the cards necessary to process the signals specified, but with provisions for expansion.*
- B. *It shall be the responsibility of system supplier to ascertain that all field devices are compatible and consistent with the new system design. This includes reviewing drawings and data to ascertain the compatibility and consistency of the system with the field devices on such considerations as:*
1. *Power levels.*
  2. *Power sources.*
  3. *Logic schemes.*
  4. *Signal types and levels.*
  5. *Interface devices where required.*
  6. *All other aspects of field devices impacting on the design of the system.*
- C. *PLC System:*
1. *System supplier shall provide all the equipment necessary for data gathering, monitoring, and control as required to meet this specification and in accordance with the drawings. The PLC system equipment shall include, but not necessarily be limited to, the following:*
    - a. *Programmable Logic Controller (PLC) consisting of a CPU with adequate memory and instructions, local I/O mounting racks, power supplies, I/O modules, communications modules and hardware, and all other components required to make the PLC perform all the functions required in this specification. The PLC shall be mounted in an enclosure as specified herein. The new PLC enclosure shall be completely assembled, prewired, and tested at system supplier's factory.*
  2. *PLC Programming and PLC Software: System supplier shall provide all the PLC programming and PLC software required to meet this specification and shall be in accordance with the system configuration. The software shall include, but not necessarily be limited to, the following:*
    - a. *PLC logic programs to be written by system supplier for the PLC systems to accomplish the monitoring and control functions as specified elsewhere in this specification and as required by system supplier. The supplier shall document and annotate the programs, update them as required after start-up, and then turn the programs over to OWNER in the form of compact disks; two copies are required.*
    - b. *All I/O addressing that is to be viewed or manipulated by the HMI Software shall be organized into contiguous blocks of integer registers to facilitate block data transfer between OIP and PLC. The I/O addressing shall be made available to*

OWNER during shop drawing review for inclusion into remote SCADA system graphics by others.

3. *Engineering:*
  - a. *System supplier shall provide all engineering necessary to accomplish and document the requirements of this specification and in accordance with the system configuration. The engineering to be performed by system supplier on this project shall include, but not be limited to, the following categories:*
    - (1) *PLC system layouts.*
    - (2) *Panel layouts.*
    - (3) *I/O configuration and wiring drawings.*
    - (4) *PLC programming.*
    - (5) *Network layout.*
  - b. *Submittals: In addition to submittals previously described provide:*
    - (1) *Shop drawing and product data.*
    - (2) *PLC logic programs.*
    - (3) *Recommended spare parts lists.*
  - c. *Installation: CONTRACTOR shall install all the system equipment including PLC and local I/O enclosure, and interconnecting cabling as required. This work shall include all interconnection wiring from new and existing equipment as required for the completion of the system.*
4. *The PLC shall be a microprocessor-based controller.*
5. *The PLC processor shall meet the following minimum general specifications:*
  - a. *Voltage: 100 to 130 VAC.*
  - b. *Frequency: 47 to 63 Hz.*
  - c. *Temperature: 0 to 60 °C.*
  - d. *Humidity: 5 to 95% noncondensing.*
  - e. *RFI: MIL-STD-461B.*
  - f. *EMI: IEEE 472-1974.*
6. *The PLC processor shall have the following minimum features:*
  - a. *20 KB of battery-backed static RAM.*
  - b. *128 KB nonvolatile memory (compact flash).*
  - c. *Utilize 32-Bit architecture.*
  - d. *Solve 1K words of logic in 0.9 milliseconds.*
  - e. *I/O scan time of 0.225 milliseconds per I/O rack.*
  - f. *Real-time clock.*
  - g. *Selectable timed interrupts.*
  - h. *Local I/O capability of 30 modules.*
  - i. *Memory protection.*
  - j. *RS-232 and Ethernet communications ports for Ethernet data highway and OIP communications.*
  - k. *Status indicators.*
7. *The PLC must be capable of performing the necessary logic to control the system. PLC capabilities shall include, but not be limited to, the following:*
  - a. *Discrete I/O (120 VAC or isolated as required).*
  - b. *Isolated analog input (4-20 mA).*
  - c. *Isolated analog output (4-20 mA).*
  - d. *Timers.*
  - e. *Latch/unlatch relays.*
  - f. *Counters.*
  - g. *Comparators (setpoints for analog level).*

- h. *Relay ladder logic.*
- 8. *The PLC must be capable of self-diagnosing the following error conditions resulting in orderly shutdown of the unit and annunciation of an error condition.*
  - a. *Memory parity error.*
  - b. *Loss of signal communication between master and I/O.*
  - c. *Loss of logic power.*
  - d. *Halt or interrupt of memory scan.*
  - e. *Detection of incomplete relay ladder rungs in memory.*
- 9. *The PLC shall be as manufactured by Allen Bradley Micrologix 1400, or equal, with all accessories required to perform the operations described herein and to communicate with the Ethernet data highway and OIP.*
- 10. *Environmental ratings for all components of the PLC system shall meet or exceed the following requirements:*
  - a. *Humidity rating of 0% to 95% relative humidity.*
  - b. *Ambient temperature rating 0° to 55°C.*
- 11. *The vendor shall be able to attest that the PLC system has been designed and tested to operate in an industrial environment with all its associated electrical noise.*
- 12. *All components comprising the PLC system shall be manufactured by a company regularly engaged in the manufacture of programmable controllers.*
- 13. *The power supply shall be protected against short circuits.*
- 14. *The power supply shall contain its own overcurrent and overvoltage protection.*
- 15. *In the event of power loss, register or ladder information shall be retentive.*
- 16. *To allow monitoring of a malfunctioning machine or process, it shall be possible to connect or disconnect programming equipment at all times, even when the system is running.*
- 17. *PLC enclosure shall include, but not be limited to, the following equipment:*
  - a. *Main PLC processor.*
  - b. *Main power supply.*
  - c. *I/O modules and housing.*
  - d. *Computer-grade transient and spike suppressor.*
  - e. *Rail mounted terminal blocks for field wiring terminations.*
  - f. *Plastic wiring ducts.*
  - g. *General purpose duplex GFCI receptacle.*
  - h. *15A, 120/240 VAC, branch circuit breakers to feed to the main PLC controller and the I/O controlled field devices.*
  - i. *Other accessories required to provide a complete and working PLC system.*
  - j. *True online UPS backup for the control panel.*
  - k. *Network switch.*
  - l. *Slot fillers for any unused I/O module slots.*
- 18. *PLC processor shall receive power from its individual power supply, which shall be fed a dedicated 15 ampere circuit breaker through transient and spike suppressors.*

## 2.06 OPERATOR INTERFACE PANEL

- A. *The operator interface shall meet the following general specifications:*
  - 1. *Voltage: 85 to 264 VAC.*
  - 2. *Temperature: 0° to 55°C.*
  - 3. *Humidity: 5% to 95% noncondensing.*
  - 4. *RFI: MIL-STD-461B.*
  - 5. *EMI: IEEE 472-1974.*



6. *Communication Port: System Supplier to coordinate.*
- B. *The operator interface shall have the following minimum features:*
  1. *Type: Color Active Matrix Thin Film Transistor (TFT) with field replaceable backlight.*
  2. *Display Size: 8.3 inch by 6.2 inch.*
  3. *Clock: Battery-backed real time.*
  4. *Application Memory: 512 MB flash.*
  5. *Keypad: Stainless steel domed membrane.*
  6. *Function Keys: 32 (F1-F16, K1-K16).*
  7. *Key Operational Life: 2 million cycles (minimum).*
  8. *Enclosure: NEMA Type 4X.*
- C. *The operator interface panel shall be as manufactured by Allen Bradley, Panelview Plus 6 Model 1000 with keypad/touch screen operator input, or equal.*

## 2.07 INDUSTRIAL ETHERNET SWITCHES

- A. *Unmanaged Ethernet switches shall be provided for control panels that include PLCs. Unmanaged switches shall be as manufactured by Hirschman, Spider Series, N-Tron, 300 Series or Siemens SCALANCE X-100 Series and include copper ports to accommodate wiring required by system supplier as well as a minimum of one spare port for connection to a remote monitoring system. Each switch shall include the following.*
  1. *Full/half-duplex operation.*
  2. *Auto-sensing speed and flow control.*
  3. *IEEE 802.3 compliance.*
  4. *DIN rail mounting.*
  5. *Store and forward switching.*
  6. *Redundant power inputs.*

## PART 3-EXECUTION

### 3.01 GENERAL

- A. *Refer to requirements specified in Division 1 for equipment installation, quality control, testing, supervision, start-up, and operator training.*

### 3.02 INSTALLATION

- A. *All control panels and equipment enclosures shall be cleaned of debris and wires neatly arranged with surplus length cutoff. Spare wires shall be labeled as "spare" and where the wires terminate.*
- B. *Equipment shall be thoroughly cleaned of all stains, paint spots, dirt, and dust. All temporary labels not used for instruction or operation shall be removed.*
- C. *All electrical equipment shall be provided with factory-applied prime finish, unless otherwise specified. If the factory finish on any equipment furnished by CONTRACTOR is damaged in shipment during construction, the equipment shall be refinished by*

CONTRACTOR. One can of touch up paint shall be provided for each different color factory finish which is to be the final finished surface of the product.

## 3.03 SYSTEM START-UP AND SUPPORT SERVICES

- A. *Final acceptance and payment for panels that include programmable controllers will not be made until the system has operated satisfactorily for a minimum of 30 consecutive days. System supplier shall include in Bid field follow-up to ensure proper adjustments and operation during the first year following project final completion. Prior to beginning the 30-day test, the following criteria shall be met:*
1. *Satisfactory operation of I/O control loops.*
  2. *Satisfactory operation of software.*
  3. *Satisfactory operation of control program.*
  4. *Satisfactory operation of peripheral equipment.*
  5. *The necessary debugging programs have been performed.*
  6. *Data output is reliable.*
  7. *Control loops are operational.*
  8. *Checking and calibrating of systems have been completed.*
- B. *System Supplier shall provide the following support services:*
1. *Field Service Engineer: Field Service Engineer shall be responsible for programming of system PLCs in the factory and at the site. Field Service Engineer shall be present for start-up of all systems and available throughout the entire construction process until final completion. Service technicians sent for system start-up will not be acceptable. Support shall include on-site time. Services shall include, but not be limited to:*
    - a. *Commissioning, installation, start-up, and testing of equipment.*
    - b. *Revising or rewriting manuals to incorporate an installed and accepted system.*
    - c. *On-site training.*
    - d. *Software modifications.*
  2. *In-Factory support shall include consultation following the acceptance testing and shipment. Services shall include, but not be limited to:*
    - a. *Researching and answering questions related to the system operation, documentation, and system use and functions.*
    - b. *Program modifications.*
    - c. *Revising or rewriting manuals.*
  3. *Post start-up support shall include follow-up services during the 1-year period following final acceptance. Service shall include follow-up recalibration and replacement of defective equipment, as well as additional training, software modifications, and control configurations as requested by OWNER. This shall include an allowance of 10 hours for work on site other than warranty repair or replacement of defective equipment. This time shall be used for software enhancements and modifications to improve the operation of the system. It shall be assumed that this 10 hours includes at least one trip to the site.*

END OF SECTION

### PIPING AND ACCESSORIES

#### PART 1–GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Aboveground and exposed piping and valves of every description.
  - 2. Wall pipes and fittings.
  - 3. Concrete foundations and anchor bolts for all equipment furnished under this section.
  - 4. Piping connections to all aboveground or exposed equipment whether furnished under this section or not.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 SUBMITTALS

- A. Shop Drawings: General arrangement drawings of all interior cast or ductile iron or steel piping with all equipment attached shall be submitted to ENGINEER for approval prior to installation. Additional shop drawing requirements are found in the General Conditions and Division 1. Drawings shall include proposed length, location and elevation of pipe, fittings, valves, and other appurtenances.

#### PART 2–PRODUCTS

##### 2.01 MATERIALS–GENERAL

- A. All materials used in the manufacture, assembly, and painting of piping and valves in contact with water shall be compatible with potable water supplies and in contact with chemical feed systems shall be compatible with the chemicals being used. All glues, solvents, solders, etc., shall likewise be compatible. For instance, no lead-base solders shall be used. All materials shall be National Sanitation Foundation (NSF) approved.
- B. Size, Type, and Joining:
  - 1. All materials shall conform to the size and type shown on the drawings or called for in the specifications.
  - 2. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event fittings are not available, the method of joining shall be selected by CONTRACTOR and submitted to ENGINEER for review.
- C. Piping appurtenances shall be made of the materials specified. All appurtenances not designated as to type shall be subject to approval of ENGINEER.

## 2.02 PIPE MATERIALS

### A. Ductile Iron Piping and Fittings:

1. Unless otherwise shown or specified, all interior piping 4 inches in diameter or larger shall be ductile iron conforming to AWWA C151.
2. Interior piping shall be minimum Special Class 53 with a minimum rated working pressure of 250 psi.
3. Except where shown, interior pipe joints shall be flanged. Flanged joints shall conform to applicable flanged joint sections of AWWA C110 and C115 and shall be compatible with ANSI B16.1 Class 125. Flanges shall be cast or ductile iron.
4. Flanged gaskets shall be minimum 1/8-inch-thick rubber "ring" gaskets, not full-faced gaskets. Thicker gaskets shall be provided as recommended by the manufacturer to meet joint tolerances.
5. Gaps between flanges and all locations where a gap exists at flange hub/pipe intersection shall be caulked prior to finish painting with Sonneborn NP-1 by Sonneborn-Chem Rex, Inc., Sika FLEX 1-A, or equal.
6. Flange bolts shall be standard zinc-plated steel with hex head and hex nuts for the rated working pressures and installation conditions specified or shown.
7. Interior fittings shall be flanged and of ductile or cast iron. Flange fittings shall conform to AWWA C110 and ANSI B16.1, as applicable, with a minimum rated working pressure of 150 psi.
8. All ductile iron fittings shall be American, Clow, Griffin, Tyler, U.S. Pipe, or equal.
9. All flanged sections of pipe shall be made up in accordance with AWWA C115 specifications. No field make-up flanges will be allowed unless strictly conforming to AWWA C115, with facing done after turning pipe through flange.
10. Interior pipe and fittings shall be cement-mortar lined and asphaltic-coated inside and shall be shop-primed outside. Submerged pipe and fittings shall be cement-mortar lined and asphaltic-coated inside and outside. Cement mortar lining shall be in accordance with AWWA C104. Asphaltic coating shall conform to applicable standards herein for the pipe and fittings. Shop priming with products equal to, and compatible with, those listed under painting in Division 9 of these specifications shall be provided.

### B. Galvanized Iron Piping:

1. Where shown or specified, all galvanized piping shall be Schedule 40 galvanized iron pipe with galvanized malleable iron fittings.
2. An ample number of unions shall be provided for disassembling pipe.
3. Pipe shall conform to the Specifications for *Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses*, ASTM A53.

### C. PVC Piping:

1. All chemical feed lines shall be constructed of PVC.
2. PVC shall conform to ASTM D1784, Class 12454-B.
3. PVC piping and fittings shall be PVC 1120, Schedule 80 high-impact conforming to ASTM D1785 with bells conforming to ASTM D2672. Solvent-weld fittings shall conform to ASTM D2467 and for threaded ASTM D2464. PVC cement used for brine application shall be compatible with a saturated brine solution.
4. All piping shall be approved for use by the National Sanitation Foundation.
5. All pipe delivered to the job-site shall be properly marked for type, grade, and design stress rating. Expansion joints shall be provided where needed. In general, all joints shall be solvent-weld, except where flanges are shown on the drawings, or where transition to another pipe material is required. Pipe shall be installed in compliance with ASTM D2321, except as otherwise specified herein.

6. Schedule 40 PVC pipe may be used for plumbing vents where allowed by code.
- D. Gas Piping:
1. In general, gas piping shall conform to all state, local, and utility codes pertaining to natural gas service or requirements.
  2. Aboveground natural gas piping shall be Schedule 40 black steel pipe (ASTM A53 with 150 psi steel welded fittings or 150 psi malleable iron screwed fittings).
  3. Gas piping 1 1/2 inches and larger may be welded.
  4. Piping 1 1/4 inches and smaller shall be screwed.
  5. Exposed gas piping 3 inches and larger shall be ductile iron as specified.
  6. Joints for screw pipe shall be made by cutting pipe square and reaming inside. Pipe shall extend to shoulder of fitting with clean-cut taper threads. Seamless welding fittings shall be used for all welded piping. Screwed joints need to be sealed with Teflon (tape or paste).
  7. All natural gas piping shall be installed in accordance with state and local gas codes, and the National Fuel Gas Code, NFPA No. 54.
  8. In addition to the above requirements, no interior gas piping shall be concealed; all changes in direction shall be made with fittings; no pipe bends will be allowed; all pressure-regulating valves shall be vented to the outside, and piping shall grade 1/4 inch per foot to drip pots, traps, or accumulator at low points.
- E. Gas Cocks:
1. Crane, Walworth, Jenkins, Nibco, Milwaukee or DeZurik are acceptable manufacturers.
  2. One-half inch to 4-inch DeZurik Figure 425 gas valve, cast iron body, screwed or flanged ends, bronze bearings, bronze plug, and resilient seal ring for drop-tight shutoff to 175 psig working pressure.
- F. Gas Safety Relief: Kunkle or Rego are acceptable manufacturers. ASME Standard for gas safety relief with stainless steel seat and disk.
- G. Gas Regulators: Fisher, Kunkle or Rego are acceptable manufacturers. Regulation shall reduce gas pressure to scheduled pressure for roof to unit.
- H. Well Casing: Pipe used to adjust well casings shall be steel. Size, thickness, and grade to match existing or specified well casing pipe. CONTRACTOR shall adjust well casings as necessary.
- I. Drain, Waste and Vent (DWV) Piping:
1. All building drain, waste and vent (DWV) piping and aboveground conductor, and Clearwater piping located in or within 2 feet of buildings or buried under slabs, may be PVC pipe as specified herein.
  2. Sanitary and storm drain, waste and vent piping shall be Schedule 40 PVC conforming to Class 12454-B, ASTM D1785, and ASTM D2665. Fitting patterns shall conform to ASTM D3311; primers shall conform to ASTM F656, and solvent cement shall conform to ASTM D2564.
  3. Sanitary and storm building sewers that penetrate exterior foundation walls shall be ductile iron from 2 feet beyond the exterior wall.
  4. Aboveground PVC shall not be used where smoke generation, noise transmission, or physical abuse/durability are an issue.

## J. Flexible PVC Piping:

1. Flexible hose connections between chemical storage tanks and rigid chemical feed piping shall be Series K3280 Reinforced PVC Flexible Connection Hose, as manufactured by Kuriyama of America, Inc., or equal.
2. PVC hose shall have a maximum working pressure of 125 psi @150°F.
3. Hose shall be clear and compatible with chemicals being used.
4. Hose shall be certified under NSF/ANSI Standard 61.
5. All hoses shall be provided with suitable fittings and connectors to connect hose to tanks and rigid piping.

## 2.03 VALVE MATERIALS

### A. Gate Valves:

1. Where shown or specified, gate valves in lines 4 inches through 12 inches in diameter or larger, shall be AWWA C509 iron body, resilient-wedge, nonrising stem, 150 psi working pressure, with O-ring above and below the thrust collar.
2. All interior valves shall be flanged and have handwheels. Right-angle operators shall be provided, if required, because of valve position.
3. Underground valves shall have either mechanical joints or push-on joints, extended stem for maximum depth of 5 feet from operating nut to surface, valve box, and key. Valve boxes shall be cast iron telescopic-adjustable as specified herein.
4. Shutoff valves in water lines 3 inches to 1 inch in diameter shall be gate valves, Class 150 pound bronze, or iron body bronze-mounted, solid-wedge disk, threaded, rising stem, Nibco T-131, Milwaukee Valve 1150, or equal. Provide unions for ease of valve removal.

### B. Swing Check Valves:

1. Unless otherwise noted, check valves shall be a swing check valve with outside lever and weight equipped with an air-cushion chamber to cushion the closing of the valve disk. The valve shall be manufactured in accordance with AWWA C508.
2. The swing check valves shall be constructed with a heavy cast iron or cast steel body, a bronze or stainless steel seat ring, an extra-heavy noncorrosive shaft for attachment of lever and necessary weights to close valve, and a complete noncorrosive air-cushion chamber.
3. The valve shall be tight-seating and shockless in operation.
4. The seal ring shall be renewable and shall be securely held in place by a threaded joint.
5. The air-cushion chamber shall be attached to the side of the valve body externally and so constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any hammering action.
6. Shock absorption shall be by air, and the chamber shall be so arranged that the closing speed can be adjusted to meet the service requirements.
7. The valve disk shall be of cast iron or cast steel and shall be suspended from a noncorrosive shaft which shall pass through a stuffing box to be connected to the chamber on the outside of the valve.
8. The GA Industries, Inc., Fig. 250-D is representative of the installation desired. Valves that require external hydraulic connections or power will not be approved.

### C. Small Check Valves: Check valves in other than cast iron lines shall be Milwaukee Valve 510, Nibco T-433, screwed-end bronze swing-check for water, air, and gas. Provide unions to allow for ease of removal.

## D. Butterfly Valves:

### 1. General:

- a. Except as otherwise specified or shown on the drawings, shutoff valves in lines 4 inches in diameter or larger shall be butterfly valves.
- b. Butterfly valves shall be AWWA C504, short body, Class 150B. Provide certified drawings by manufacturer and Affidavit of Compliance.
- c. Valve bodies shall be cast iron (ASTM A126, Class B), or ductile iron ASTM A536. Valves shall be flanged interior exposed and mechanical joint underground and conform to ANSI B16.1, Class 125.
- d. Valve shaft shall be stainless steel.
- e. Valve disk shall be cast iron.
- f. Valve seat shall be constructed of synthetic rubber compound and shall be recess-mounted and bonded in the valve body, or attached to the disk. Seat shall be mechanically-attached to the valve body or seat with screws, bolts, clamping-rings, or similar devices.
- g. Valve shaft bearing shall be self-lubricating Teflon, nylon, or bronze.
- h. Shaft seals shall have split V-type packings that are replaceable without removing the valve from the line.

### 2. Standard Operators:

- a. Except as noted below, butterfly valves shall be equipped with top-mounted handwheel operators with totally-enclosed, sealed and lubricated gear boxes.
- b. The rated torque capability of each operator shall be sufficient to seat, unseat, and hold any valve disk position with the maximum pressure differential across the valve without creep or fluttering.
- c. Exposed valves shall be equipped with handwheels and valve disk position indicators, and shall be equipped with field-adjustable mechanical stop limiting devices.
- d. Valves for buried service shall be furnished with 2-inch-square wrench nuts, extended stem, valve box, and key. Valve boxes shall be cast iron telescopic-adjustable as specified herein.

## E. Air Release Valve:

1. The air release valve shall be 1-inch APCO Model No. 50, Val-Matic No. 15A, or equal.
2. The valve assembly shall be installed as shown on drawings.
3. CONTRACTOR shall run 1-inch pipe from the top of the valve as shown. Screen end of pipe where appropriate.

## F. Miscellaneous Valves:

1. Shutoff valves in PVC piping shall be 150 psi PVC ball valves, Chemtrol TU Series Tru-bloc, Walworth Series 8927, Wallace & Tiernan, or equal.
2. Y-strainer in chemical lines shall be transparent PVC, Asahi, or equal, Trueunion strainer. Provide 20 mesh PVC screens. Strainers used for hypochlorite service shall have Teflon O-rings.
3. Y-strainer in water lines shall be bronze, Watts, or equal. Provide 20 mesh 304 stainless steel screen.
4. Provide unions for ease of valve removal. For transition from PVC to metal, use Chemtrol transition unions.
5. For pressures <80 psi, provide 1/2-inch chrome-plated smooth-end sampling cock, Zurn Z-80401, or equal. For pressures >80 psi, provide 1/2-inch satin brass smooth-end sample cock, Conbraco 26-314, or equal.

6. Shutoff valves in potable water lines smaller than 1 inch shall be Milwaukee 1131 (threaded), or Milwaukee 1169 (solder joint), Nibco T-134 (threaded), or Nibco S-134 (solder joint), or equal, bronze 300 psi gate valves.
7. Corporations in potable water lines (3/4 inches or 1 inch) shall be Mueller H 15008 compression-type fittings, or equal.
8. Exterior hose valves shall be Woodford Model 65, Ken-Ray Model 120, or equal, freezeless wall hydrants with integral Nidel 34HD vacuum breaker, permanent valve seat, and brushed-chrome exterior face with 3/4-inch garden hose threads. Provide separate interior shutoff valves as specified herein.
9. Interior hose valves shall be Woodford Model 24, Jenkins 112, or equal, 3/4-inch garden hose thread. Interior hose valves on the potable water system shall be equipped with approved vacuum breaker, Watts 8A, Nidel Model 34H, or equal.

## 2.04 VALVE BOXES

- A. A valve box shall be provided for fire hydrant auxiliary valves and valves in the main. The valve box shall be centered and plumb over the wrench nut of the valve with the box cover flush with the finished ground elevation. Solid 4-inch concrete blocks shall be placed under the base of the valve boxes so that the bottom of the base is about 2 inches away from contact with the valve bonnet. The valve box shall not transmit shock or stress to the valve.
- B. Valve boxes shall be made of cast iron conforming to ASTM A48, Class 20. The castings shall be free from blowholes, porosity, hard spots, shrinkage defects or cracks, or other injurious defects, and shall have a normal smooth-casting finish. The castings shall be thoroughly coated with a 1 mil minimum thickness bituminous coating. Valve boxes shall be 5 1/4 inches in diameter. Valve boxes shall have a maximum length of 7 feet when extended without extension sections.
- C. Valve boxes shall consist of a base section, tubular mid and top sections, both with cast threads by which one can be telescoped on the other, extension sections if required, and a circular drop cover.

## 2.05 COUPLINGS AND RESTRAINT MATERIALS

- A. Pipe Coupling: Pipe couplings identified on the drawings shall be equal to Dresser Type 38, Rockwell 411, or equal coupling. CONTRACTOR shall provide tension ties and tie ears as shown on the drawings and specified herein.
- B. Rubber Expansion Joints:
  1. Rubber expansion joints shall be furnished and installed as shown.
  2. Expansion joints shall be the single, nonfilled arch-type as manufactured by Mercer Rubber Company, General Rubber Co., or equal.
  3. Each expansion joint shall be furnished complete with control rods and rubber washers to resist excessive deflection at rated working pressures.
  4. Expansion joints shall have integral duct and rubber flanges with split backup rings, and have a rated working pressure of 150 psi and 15 psi vacuum.
  5. Expansion joints shall meet or exceed the chemical resistance characteristics of chlorobutyl elastomers suitable for potable water usage.
  6. Flex connections on chemical feed piping shall be General Rubber, Style 1075 without backup rings, Mercer, Style 501 without backup rings, Red Valve T-205, or equal. Expansion joints shall be single-arch spool-type. No metal components shall be exposed.



## C. Tension Ties:

1. All tension ties, rod ties and control rods shall be provided to resist a minimum 150 psi (250 psi surge allowance) pressure in the pipe line.
2. CONTRACTOR shall provide tie ears to secure tension rods to flanges where necessary.
3. Rods shall be provided with nuts and washers on both sides of tie ears.
4. All nuts shall be carbon alloy steel conforming to A563, and washers shall be hardened steel conforming to ASTM F436.
5. Rods shall be ASTM A36 steel at a minimum.
6. Tie rods shall be equally spaced around pipe.
7. The following tables lists the minimum number and diameter in inches for the tie rods for various sizes of pipe.

## D. Mechanical Seals: Mechanical seals shall be 316 stainless steel link seal. Link seals shall be provided with 316 stainless steel bolts, nuts, and fasteners. Sleeve diameter shall be provided and mechanical seals installed as recommended by the manufacturer.

## E. Pulsation Dampener: Pulsation dampeners shall have PVC housing with Hypalon seals. Pulsation dampeners shall be Model PDS-80, as manufactured by Lutz-JESCO.

## F. Flange Insulating Gasket Kits: Gaskets located immediately downstream of well pump discharge flanges shall be Type F insulating gaskets as manufactured by Advance Products and Systems. Gaskets shall be plain face and come with insulating sleeves and washers manufactured of high-density polyethylene. A 1/8-inch-thick S.A.G. electroplated steel washer shall be provided to protect insulating washer. A full kit shall be provided as necessary.

## 2.06 MATERIALS–NONSHRINK MORTAR

### A. Nonshrink mortar shall be All-Crete as manufactured by Concrete Products, Inc., Woodland, California; Speed Crete as manufactured by Tamms Industries Co., Itasco, Illinois; or equal. Nonshrink mortar shall be placed in accordance with manufacturer's recommendations.

## 2.07 EQUIPMENT–PRESSURE GAUGES

### A. Gauges are to be aluminum 6-inch ANSI B40.1, Grade 2A bourdon gauges and be equipped with properly-sized Ray pressure snubbers and brass shutoff valves.

## 2.08 FINISHES

### A. It is the intent of this specification that all equipment, supports, and appurtenances shall be furnished factory shop-primed, clean, and ready to accept finish painting by CONTRACTOR, with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 9. Unless otherwise specified, mechanical equipment and accessories shall be furnished with all surfaces (except galvanized, stainless steel, rubber, copper, PVC) prepared in accordance with near white grade SSPC Specification No. 10, removing all dirt, rust scale, and foreign materials. Surface preparation shall be done at such time during the assembly process as to preclude damage to the equipment once assembled. Cleaned surfaces shall then be factory shop-primed. Factory shop-priming shall be with one coat of Tnemec N69-1255 Hi-Build Epoxoline primer, or equal, applied to a minimum of 5.0 mils dry thickness. (For equipment surfaces in contact with potable water, primer shall be 140-1255 Beige Pota-Pox Primer

and shall be NSF-approved.) Primer used shall be compatible with proposed finish coats; CONTRACTOR to verify.

- B. Factory standard prime finish for valves and meters is acceptable if material is compatible with epoxy finish coat specified in Division 9. Primer used shall be compatible with proposed finish coats; CONTRACTOR to verify.

## PART 3-EXECUTION

### 3.01 INSTALLATION

- A. Unless shown otherwise, underfloor piping shall clear floor slabs and footings by a minimum of 6 inches.
- B. Support:
  - 1. All interior or exposed pipelines, except in chemical feed rooms, shall be securely supported by adjustable metal saddles, brackets, or adjustable hangers supported directly by concrete, masonry work, or tile.
  - 2. Exposed piping in chemical feed rooms shall be supported with a plastic support system, Aickinstrut Series V, or equal.
  - 3. Strap hangers, tin clips, or U-hooks will not be acceptable.
  - 4. Piping shall be supported, even though not shown on the drawings, with base fittings and concrete pads when bottom of pipe is less than 6 inches above the floor, with Anvil 264, B-line, or equal, adjustable pipe saddle stand with floor flange to 6 feet above the floor, and with Grinnell, or equal, adjustable iron or heavy steel pipe hangers with supporting clamps or inserts more than 6 feet above the floor.
  - 5. In general, the maximum spacing of supports shall not exceed 10 feet on centers, unless approved by ENGINEER.
  - 6. Plumbing system shall be installed with hangers and supports in accordance with the Plumbing Code.
  - 7. Stainless steel supports shall be used in submerged locations.
  - 8. Insulation saddles shall be used at supports of insulated piping. CONTRACTOR shall furnish and place hangers, supports, wall pipes, sleeves, and floor boxes in the forms before concrete is poured wherever needed or shown on the drawings.
  - 9. All piping shall be adequately supported and braced to resist thrust at bends and joints. Use base elbows, poured concrete, or rod ties.
  - 10. The weight of the piping shall be supported independently of connected equipment.
  - 11. All supports and parts shall conform to the latest requirements of ASME B31 and shall have a structural safety factor of 5. Accurate weight balance calculation shall be made by CONTRACTOR to determine the required supporting force at each hanger location and the pipe weight load at each equipment connection. CONTRACTOR shall be responsible for the installation and application of the supports. Pipe hangers shall be capable of supporting the pipe weight load in all conditions of operation. The hangers shall allow free expansion and contraction of the piping to prevent excessive stress in the piping. Where vertical movement up to 1/8 inch is anticipated, a precompressed variable spring support shall be used. Rigid hangers shall be provided with a means of vertical adjustment after erection. Where horizontal piping movements are greater than 1/2 inch, or where the hanger rod angularity from vertical is greater than 4 degrees from hot to cold position of the pipe, the hanger pipe and structural attachments shall be offset in a manner that the rod is vertical in the hot position. Hangers and supports shall be spaced in accordance with ASME B31 and as

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indicated in this specification. Pipe supports shall be placed before and after a valve, expansion joint, or equipment so stress will not be transferred to them.

12. CONTRACTOR shall provide calculations of pipe supports if requested by ENGINEER.
13. All carbon steel parts shall be furnished with all surfaces (except galvanized or stainless steel), prepared in accordance with near white grade SSPC Specification No. 10, removing all dirt, rust scale, and foreign materials. Surface preparation of all carbon steel parts shall be performed at such time during the assembly process as to preclude damage to the equipment once installed and assembled. Cleaned surfaces shall then be shop-primed. Shop-priming shall be with one coat of Tnemec N69-1255 Hi-Build Epoxoline primer, or equal, applied to a minimum of 5.0 mils dry thickness. Primer used shall be compatible with proposed finish coats; CONTRACTOR shall verify. It is the intent of this specification that all equipment, supports, and appurtenances shall be furnished shop-primed, clean, and ready to accept finish painting by CONTRACTOR, with a minimal amount of surface preparation. Preparation and painting shall conform to all requirements and provisions specified in Division 9.
14. The following maximum spacings shall be provided for supports:

## MAXIMUM HORIZONTAL PIPE HANGER AND SUPPORT SPACING

Nominal Pipe or Tube Size	Copper Tubing		Ductile Iron (See Note 1) ft	PVC Pipe (See Note 2) ft
	Water Service ft	Vapor or Air Service ft		
1/4	5	5		
3/8	5	6		Continuous
1/2	5	6		Continuous
3/4	5	7		Continuous
1	6	8		4
1 1/4	7	9		4
1 1/2	8	10		4
2	8	10		4
2 1/2	9	10		4
3	10	10		4
4	10	10	10	4
5	10	10	10	4
6	10	10	10	9
8	10	10	10	9
10	10	10	10	10
12	10	10	10	10
14			10	10
16			10	10
18			10	10
20			10	
24			10	

Nominal Pipe or Tube Size	Copper Tubing		Ductile Iron (See Note 1) ft	PVC Pipe (See Note 2) ft
	Water Service ft	Vapor or Air Service ft		
30			10	
36			10	
42			10	

Note 1: Provide at least one hanger per pipe length located as close to the flange or joint on barrel as possible.

Note 2: Spacing is based on Schedule 80 at 100°F. For Schedule 40 or higher temperatures, provide shorter span. Consult manufacturer's recommendations.

15. The length of hanger span and support spacing in the above table refers to straight lengths of pipe. When there are changes of direction in pipe, two supports shall be placed less than three-fourths the full span in the table. When practical, a hanger shall be located immediately adjacent to a change in direction of piping. Where there are concentrated loads between supports such as valves, spacing shall be based on load calculations rather than this table.
16. Provide saddles or shields under piping hanger and supports for all insulated piping to prevent crushing of insulation. Provide stainless steel pipe shields under stainless steel piping to prevent indentation of piping from the support or clamp.

## C. Penetrations:

1. Where pipes pass through concrete members without wall fittings shown, CONTRACTOR shall provide sleeves in the forms for the piping.
2. The sleeve diameter shall not exceed the pipe O.D. (or flange O.D. where applicable) plus 2 inches, unless otherwise shown on drawings.
3. If the concrete members are to be watertight, the annular space around the pipe shall be caulked with lead wool or sealed with an approved mechanical seal.
4. For copper pipe provide an elastomeric sleeve on pipe where it passes through walls or slabs.
5. Where pipes pass through a roof, they shall be run through an approved roof penetration with flashing and counter-flashing.
6. Where pipes pass through nonwatertight walls, the annular space shall be grouted full.
7. Where pipes pass through nonwatertight floors, the sleeve shall extend 1 inch above the finished floor elevation, and the annular space shall remain open.
8. Where new pipes go through existing watertight concrete members, CONTRACTOR shall core a hole through the wall and provide a wall sleeve or wall pipe.
9. Space between wall sleeve or wall pipe and concrete shall be filled with nonshrinking mortar.
10. The annular space between the wall sleeve and pipe shall be sealed with an approved mechanical seal.
11. Where new pipes go through existing nonwatertight concrete or masonry members, holes shall be cored and grouted full (walls), remain open (floors).
12. Plug abandoned pipes and wall pipes, after pipe and fitting removal, flush to the concrete surface with nonshrinking mortar, or as otherwise approved, to achieve a watertight seal.
13. No chases or recesses shall be made in poured concrete for pipe installation, and no pipe shall run in poured concrete unless called for in the drawings or specifications or

permitted by ENGINEER. The cutting or core drilling of concrete for pipe shall be avoided wherever possible, and in no case, where such cutting or core drilling is necessary, shall reinforcing rods be cut or disturbed without prior consultation with ENGINEER.

14. All openings for pipe work shall be neatly patched in a workmanlike manner.

D. Layout:

1. Exposed piping shall run straight, in neat parallel lines, and shall be located far enough from walls, ceilings and floors, to permit access for covering of pipe and painting work.
2. Care shall be taken in laying out piping that there is no interference with the proper location of piping for other purposes or other equipment, and shall be run with regard to the requirements of each service.
3. Piping shall not interfere with headroom or clear floor space.
4. Do not install gas pipe in a ventilation air plenum.
5. Each gas pressure reducing valve vent and relief valve vent shall be run separately to a point outside. Terminate with a screened vent cap and locate according to gas utility regulations.
6. Unless otherwise shown, small water piping shall be concealed in (except reinforced concrete walls) walls placed in piping pits, above suspended ceilings, or under floors where possible, or as shown on the drawings.
7. Pipes under floors shall have a minimum of 6 inches of sand cover.
8. Plates shall be provided on all uncovered pipes passing through floors, walls, and ceilings, constructed of materials other than poured concrete. Plates shall be on exposed sides and shall be chrome-plated, spring- and snap-type.
9. An ample number of unions shall be provided in all threaded, soldered, and glued pipelines and at all equipment to facilitate removal and replacement. Install a shutoff valve at each appliance.
10. CONTRACTOR shall provide 3/8-inch tapped and plugged connections in suction and discharge of all pumps for testing.
11. The appropriate number, size, and lengths of spool pieces and flange fillers needed for plumbing and leveling any existing piping shall be included in the price bid.
12. Valves shall be located on all branches of water supply lines where shown on the drawings. Position valves to facilitate access and operation.

## 3.02 FIELD QUALITY CONTROL

A. Site Tests:

1. CONTRACTOR shall include the cost of all testing, cleaning, and disinfection in the price bid.
2. All piping, interior or exposed, shall be subject to test before being covered with insulation or paint. All piping and appurtenances shall be watertight or airtight and free from visible leaks.
3. All piping shall be flushed or blown out after installation prior to testing.
4. CONTRACTOR shall provide all necessary piping connections, water, air, test pumping equipment, water meter, bulkheads, valves, pressure gauge, and other equipment, materials and facilities necessary to complete the specified tests. CONTRACTOR shall provide all temporary sectionalizing devices and vents as required for testing.
5. Pressure Tests: The test pressure in all lines shall be held for 1 hour during which time the leakage allowance shall not exceed that specified. In case repairs are required, the pressure test shall be repeated until the pipeline installation conforms to

the specified requirements. Pumps, air compressors, instrumentation, and similar equipment shall not be subjected to the pressure tests.

6. Test Requirements:

Fluid Abbreviation or Name	Minimum Test Pressure in psi	Test Medium	Leakage Allowance Designation
Air Compressor Piping	30	Air	Zero
Chlorine Gas	300	dry N <sub>2</sub> gas	Zero
Brine Solution	30	Water	Zero
Chlorine Gas Under Vacuum	15 inches Hg	Vacuum	Zero
Ion Exchange Piping	60	Water	Zero
Potable Water	150	Water	"A"
Natural Gas Piping	"B"	"B"	"B"

7. Leakage allowance Designation "A" shall mean zero leakage for unburied pipe and shall be not more than 0.002 gallons per hour per inch diameter per 100 feet of buried pipe for compression or solder joint pipe.
8. Natural gas piping, test pressure, test medium, and leakage allowance designation "B" shall be tested in accordance with local gas utility requirements and leakage allowances.
9. Tests for all gravity sewers shall be as follows: Pipe will be plugged at its downstream end and water will be placed inside the pipe to a minimum head of 10 feet. Water shall be held for 15 minutes without dropping. No leakage is allowed.

### 3.03 CLEANING AND DISINFECTION

- A. All equipment and materials shall be clean before installation. CONTRACTOR shall disinfect and flush the system before it is put on line.
- B. CONTRACTOR shall obtain water samples and arrange for analysis of water in potable systems for bacteria as part of the Lump Sum Bid. Copies of test results shall be submitted to OWNER and ENGINEER.

END OF SECTION

### GENERAL ELECTRICAL REQUIREMENTS

#### PART 1–GENERAL

##### 1.01 SUMMARY

- A. Work includes general requirements for all electrical work.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. ANSI/NFPA 70–National Electrical Code.
- B. ANSI/IEEE C2.

##### 1.03 CONTRACT DOCUMENTS

- A. Any device roughed in improperly and/or not positioned on implied centerlines or as dictated by good practice shall be repositioned at no cost to OWNER.
- B. The drawings are generally diagrammatic, and CONTRACTOR shall coordinate the work so that interferences are avoided. Provide all offsets in conduit, fittings, etc., necessary to properly install the work. All offsets, fittings, etc., shall be provided without additional expense to OWNER.

##### 1.04 REGULATORY REQUIREMENTS

- A. Conform to ANSI/NFPA 70.
- B. Conform to ANSI/IEEE C2.
- C. The rules and regulations of the federal, state, local, civil authorities, and utility companies in force at the time of execution of the Contract shall become a part of this specification.
- D. Obtain electrical permits and inspections from authority having jurisdiction. Costs for permits and inspections shall be by CONTRACTOR.

##### 1.05 CODES AND ORDINANCES

- A. CONTRACTOR is expected to know or to ascertain, in general and in detail, the requirements of all codes and ordinances applicable to the construction and operation of systems covered by this Contract. CONTRACTOR shall know or ascertain the rulings and interpretations of code requirements being made by all authorities having jurisdiction over the work to be performed by them.

- B. In preparing Bid, CONTRACTOR shall include the cost of all items and procedures necessary to satisfy the requirements of all applicable codes, ordinances, and authorities, whether or not these are specifically covered by the drawings and specifications. All cases of serious conflict or omission between the drawings, specifications, and codes shall be brought to ENGINEER's attention as herein before specified. CONTRACTOR shall carry out work and complete construction as required by applicable codes and ordinances and in such a manner as to obtain approval of all authorities whose approval is required.
- C. When requested by ENGINEER, CONTRACTOR shall provide written calculations to show compliance with applicable codes or the Contract Documents. This shall include, but not be limited to, conduit and wire sizing, junction and pull box fill and sizing, conductor derating, and voltage drop. CONTRACTOR shall indicate calculation method used as well as compliance with applicable code, drawing, or specification.

## 1.06 EQUIPMENT PROVIDED UNDER OTHER DIVISIONS

- A. Included in this Contract are electrical connections to equipment provided under other divisions and by others. CONTRACTOR shall refer to final shop drawings for equipment being furnished under other divisions and by others, for exact location of electrical equipment, and the various connections required.

## 1.07 ELECTRICAL DISTRIBUTION SYSTEM

- A. Provide a complete electrical distribution system consisting of components indicated on the drawings or specified herein, including but not limited to:
  - 1. Branch wiring and electrical distribution equipment.
  - 2. All control wiring.
  - 3. Access panels and access doors for access to equipment installed by Division 16.
  - 4. Wiring between system components if equipment is not prewired.
  - 5. Support system design and supports for electrical raceways.
  - 6. Code-required disconnects.
- B. CONTRACTOR shall connect the following equipment furnished by Division 11 and by others consisting of components indicated on the drawings or specified herein, including, but not limited to:
  - 1. Pumps, starters, and control panels.
  - 2. Motor-actuated valves.
  - 3. Instrumentation.
- C. Provide balancing and adjusting of electrical loads.
- D. CONTRACTOR shall instruct OWNER's representative in the operation and maintenance of all equipment. The instruction shall include a complete operating cycle on all apparatus.
- E. Provide miscellaneous items for a complete and functioning system as indicated on the drawings and specified herein.
- F. A partial list of work not included in Division 16 is as follows: Painting (except as otherwise specified herein).



## 1.08 NOISE

- A. Eliminate any abnormal noises which are not considered by ENGINEER to be an inherent part of the systems as designed. Abnormal buzzing in equipment components will not be acceptable.

## 1.09 DRAWINGS

- A. The drawings indicate approximate locations of the various items of the electrical systems. These items are shown approximately to scale and attempt to show how these items should be integrated with building construction. Locate all the various items by on-the-job measurements in conformance with Contract Documents and cooperation with other trades.
- B. In certain instances, switches or other electrical devices and equipment, etc., may be relocated. Where relocation is within 10 feet of location shown on drawings, and when CONTRACTOR is informed of necessary relocation before work is begun on this portion of the job, the relocation shall be at CONTRACTOR's expense.
- C. The drawings are schematic in nature and are not intended to show exact locations of conduit, but rather to indicate distribution, circuitry, and control.

## 1.10 EXISTING UNDERGROUND UTILITIES

- A. Record drawings of existing underground electrical utilities are not available for this facility. CONTRACTOR shall excavate and verify the location of all underground electrical prior to installing new electrical equipment. This shall include, but not be limited to, feeders to structures and equipment, branch circuit wiring, phone and communication cabling, instrument wiring, and control wiring. CONTRACTOR shall temporarily relocate existing underground electrical to keep the existing facility in operation and for any new construction, and all costs for relocating existing electrical shall be included in the Bid.

## 1.11 SUBMITTALS

- A. CONTRACTOR shall submit to ENGINEER for approval prior to beginning work, shop drawings on the equipment and materials proposed to be furnished and installed. See Section 01300–Submittals for requirements.
- B. CONTRACTOR shall, in addition, submit drawings and/or diagrams for review and for job coordination in all cases where deviation from the Contract Drawings are contemplated because of job conditions, interference or substitution of equipment, or when requested by ENGINEER for purposes of clarification of CONTRACTOR's intent. CONTRACTOR shall also submit detailed drawings, rough-in sheets, etc., for all special or custom-built items or equipment. Drawings and details under this section shall include, but not be limited to, electrical interconnection wiring diagrams where applicable to this project. See Section 16480–Motor Control.
- C. These drawings and diagrams shall show all electrical switch and breaker sizes as well as the manufacturer's name and catalog number for each piece of equipment used.

- D. Equipment and material submittals must show sufficient data to indicate complete compliance with Contract Documents as follows:
  - 1. Proper sizes and capacities.
  - 2. That the item will fit in the available space in the manner that will allow proper service.
  - 3. Construction materials and finishes.
- E. When the manufacturer's reference numbers are different from those specified, provide correct cross reference number for each item. The shop drawings shall be clearly marked and noted accordingly.
- F. When equipment and items specified include accessories, parts, and additional items under one designation, shop drawings shall be complete and include all components.
- G. See additional requirements of shop drawings under Division 1—General Requirements.

## PART 2—PRODUCTS

### 2.01 STANDARD PRODUCTS

- A. All equipment shall be UL and NEMA approved.
- B. All equipment and wiring shall be selected and installed for conditions in which it will perform (e.g. general purpose, weatherproof, rain-tight, dust-tight, or any other special type).

### 2.02 SUBSTITUTION OF MATERIALS AND EQUIPMENT

- A. While it is not the intention of OWNER to discriminate against any manufacturer of equipment which may be equivalent to specified equipment, a strict interpretation of such equivalency will be exercised in considering any equipment offered as a substitute for specified equipment. CONTRACTOR shall submit with each request for approval of substitute material or equipment, sufficient data to show conclusively that it is equivalent to that specified in the following respects:
  - 1. Performance:
    - a. Capacity at conditions and operating speeds scheduled shall be equal to or greater than that of the specified equipment.
    - b. Energy consumption at the point of rating shall not exceed that of the specified equipment.
    - c. Vibration and noise production at the point of rating shall not exceed that of the specified equipment.
  - 2. Materials of construction.
  - 3. Gauges, weights, and sizes of all portions and component parts.
  - 4. Design arrangements, methods of construction, and workmanship.
  - 5. Coatings, finishes, and durability of wearing parts.
  - 6. National reputation of the manufacturer as a producer of first quality equipment of the type under consideration.
  - 7. Availability of prompt, reliable, and efficient service facilities franchised by or affiliated with the equipment manufacturer. This shall include the maintenance of local stocks of critical replacement parts equal to those maintained for the specified equipment.
- B. Requests for substitution shall include CONTRACTOR's reason for the request.

- C. If ENGINEER does not consider the items equivalent to those specified, CONTRACTOR shall provide those specified.
- D. See General Conditions for additional requirements.

## PART 3-EXECUTION

### 3.01 CONTINUITY OF SERVICE

- A. CONTRACTOR shall provide and maintain continuous services (power, controls, alarms, etc.) during the entire construction period.
- B. No service shall be interrupted or changed without permission from OWNER. Written permission shall be obtained before any work is started.
- C. When interruption of service is required, all persons concerned shall be notified and a prearranged time agreed upon. Notice shall be a minimum of 72 hours prior to the interruption.

### 3.02 CLEANING UP AND REMOVAL OF RUBBISH

- A. All new and existing lighting and appliance panelboards, MCCs, motor starter and disconnect switch enclosures, junction boxes, and pullboxes where work is performed shall be cleaned of debris and wires neatly arranged with surplus length cut off prior to installation of covers.
- B. Where louvers are provided in control panel or starter enclosures, louvers shall be vacuumed free of all dust and dirt. Where air filters are provided in equipment such as control panels or starter enclosures, CONTRACTOR shall replace all filters with new at the time of final completion.
- C. Equipment shall be thoroughly cleaned of all stains, paint spots, dirt, and dust. All temporary labels not used for instruction or operation shall be removed.

### 3.03 PAINTING

- A. All painting of electrical equipment shall be done by CONTRACTOR unless equipment is specified to be furnished with factory-applied finish coats.
- B. All electrical equipment shall be provided with factory-applied prime finish, unless otherwise specified.
- C. If the factory finish on any equipment furnished by CONTRACTOR is damaged in shipment or during construction, the equipment shall be refinished by CONTRACTOR.
- D. One can of touch-up paint shall be provided for each different color factory finish which is to be the final finished surface of the product.

- B. Location of process equipment as shown on the drawings is approximate.
- C. Utilization equipment and control devices required under these specifications shall be mounted in a code-approved manner.
- D. Locations of utilization equipment and control devices as shown on drawings are within 10 feet of actual positions. Any mounting of this equipment within this 10-foot distance will be performed at no additional cost to OWNER.
- E. Unless otherwise noted, equipment shall be fastened to building structure or equipment framework and not placed on the floor.
- F. Where materials, equipment apparatus, or other products are specified by manufacturer, brand name, and type or catalog number, such designation is to establish standards of desired quality and style and shall be the basis of the Bid.
- G. Materials and equipment of the types for which there are National Board of Fire Underwriters' Laboratories (UL) listing and label service shall be so labeled and shall be used by CONTRACTOR.

## 3.10 AREA CLASSIFICATION

- A. As noted on the drawings.

## 3.11 MODIFICATIONS TO EXISTING CONSTRUCTION

- A. Alterations:
  - 1. Alter, extend, and reconnect conduits as necessary.
  - 2. Reconnect existing conduits which were reused, cut, or exposed because of construction as quickly as possible.
  - 3. Where wiring is involved, new wires shall be "pulled-in" between the nearest available accessible reused outlets to the extent allowed by the governing code.
  - 4. Furnish and install new conduits for wires if they cannot be "pulled-in" to existing conduits.
  - 5. All new conduits, wiring, and electrical items shall be connected to the existing systems so as to function as a complete unit.
  - 6. Where existing electrical equipment, devices, fixtures, electrically operated items, etc., interfere with any remodeling work, they shall be removed and reinstalled in another location to avoid such interferences. All existing and relocated equipment shall be left in good operating condition.
- B. CONTRACTOR shall remove all conduit and wiring associated with items specified herein and/or shown on the drawings to be removed.
- C. Include in Bid removal of existing electrical material and equipment as specified hereinafter, as noted on the drawings, or as needed by field conditions.
- D. Provide stainless steel cover plates for all existing recessed outlet and junction boxes not being reused. Seal or cap all existing conduit penetrations not being reused.

END OF SECTION

### CONDUIT

#### PART 1--GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Rigid metal conduit and fittings.
  - 2. Rigid aluminum conduit.
  - 3. PVC externally and internally coated galvanized rigid metal conduit.
  - 4. Polyvinyl chloride conduit and fittings.
  - 5. Liquid-tight flexible metal conduit and fittings.
  - 6. Conduit seals and special fittings.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. ANSI C80.1--Rigid Steel Conduit, Zinc-Coated.
- B. ANSI C80.5--Rigid Aluminum Conduit.
- C. ANSI/NEMA FB 1--Fittings and Supports for Conduit and Cable Assemblies.
- D. NEMA RN 1--PVC Externally and Internally Coated Galvanized Rigid Steel Conduit.

##### 1.03 QUALITY ASSURANCE

- A. Manufacturers of Raceways: Firms regularly engaged in the manufacture of electrical raceways of the types and capacities required whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that for the project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide electrical cable, raceways, wire, connectors, switches, etc., which have been listed and labeled by Underwriters Laboratories.
- E. Prior to shipment to the site, all conduit provided shall be new, unused material, and may not have been stored outdoors or exposed to weather.
- F. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

## 1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.

## 1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Provide color-coded thread protectors on the exposed threads of threaded rigid metal conduit.
- B. Handle conduit carefully to prevent end damage and to avoid scoring the finish.
- C. Store conduit inside and protect from weather. When necessary to store outdoors, elevate well above-grade and enclose with durable, waterproof wrapping.

## PART 2-PRODUCTS

### 2.01 RIGID METAL CONDUIT AND FITTINGS

- A. Rigid Steel Conduit: ANSI C80.1. Heavy wall seamless tubing with hot-dipped galvanized coating.
- B. Conduit bodies for rigid steel conduit shall be as manufactured by Appleton, Form 35, or equal, and be constructed of stamped steel for sizes 2 inches and under, and cast malleable iron for sizes over 2 inches. Conduit bodies shall have built-in pulling rollers, domed gasketed covers, and stainless steel screws. CONTRACTOR shall select body style and size according to application.
- C. Rigid Aluminum Conduit: ANSI C80.5. Heavy wall.
- D. Conduit bodies for rigid aluminum conduit shall be as manufactured by Appleton, Form 85, or equal, and be constructed of pressure-cast, copper-free aluminum for sizes 2 inches and under, and sand-cast, copper-free aluminum for sizes over 2 inches. Conduit bodies shall have built-in pulling rollers, domed gasketed covers, and stainless steel screws. CONTRACTOR shall select body style and size per application.
- E. PVC coated conduit and fittings shall be internally and externally hot dipped galvanized rigid metal conduit with hot dipped galvanized threads and PVC coating. PVC coating shall be UL listed with rigid metal conduit as the primary means of corrosion protection for the conduit, and PVC coating shall have an external 40 mil thickness with an internal 2 mil urethane coating. Acceptable manufacturers shall be Plasti-bond RedH<sub>2</sub>OT by Robroy Industries, Ocal-Blue by Thomas & Betts, or equal. PVC coated conduit and fittings shall meet the following listings and manufacturing standards, without exception. All installers shall be field-certified from the factory for installation and shall provide proof of certification:
  - 1. Federal Specification WW-C-581 E.
  - 2. ANSI C80.1.
  - 3. UL6.
  - 4. NEMA RN-1.

- F. Conduit bodies for PVC coated rigid conduit shall be as manufactured by Plasti-bond RedH<sub>2</sub>OT by Robroy Industries, Ocal Blue by Thomas & Betts, or equal, and have a 40 mil PVC exterior coating and 2 mil red urethane interior coating. Conduit bodies shall be Form 7 style or pulling elbow and include pulling rollers, domed, gasketed covers and stainless steel screws. CONTRACTOR shall select body style and size per application.
- G. Fittings and Conduit Bodies: ANSI/NEMA FB 1; threaded-type, material to match conduit.
- H. Supports: One-hole or two-hole pipe straps may be used for surface-mounted conduit. Where one-hole straps are used, provide conduit clamp and back spacer. Where standoffs are required, provide pipe straps and supporting devices as specified in Section 16190-Supporting Devices. Support material shall match that of the conduit type provided.

## 2.02 POLYVINYL CHLORIDE CONDUIT (PVC) AND FITTINGS

- A. Conduit: Heavy wall rigid, Schedule 40, UL listed for underground, encased, and aboveground applications. PVC conduit installed in exterior locations shall be UV resistant.
- B. Conduit bodies for PVC conduit shall be as manufactured by Carlon, or equal, and be suitable for use with Schedule 40 or Schedule 80 PVC conduit. Conduit bodies shall have smooth hubs, textured lids, and foam-in-place gaskets. CONTRACTOR shall select body style and size per application.

## 2.03 LIQUID-TIGHT FLEXIBLE METAL CONDUIT AND FITTINGS

- A. Conduit: Electro galvanized single-strip steel with PVC coating and integral grounding conductor. Liquid-tight conduit installed in exterior locations shall be sunlight resistant.
- B. Fittings: ANSI/NEMA FB 1.

## 2.04 CONDUIT SEALS AND SPECIAL FITTINGS

- A. Expansion Fittings: Crouse Hinds or Robroy type XJG, or equal, for rigid or PVC-coated rigid conduit.
- B. Expansion-deflection Fittings: O-Z type "DX", or Appleton.
- C. Ground Bushings: Appleton, model GIB, or equal.
- D. Mechanical Seals: 316 stainless steel, Link Seal, or equal. Link seals shall be provided with 316 stainless steel bolts, nuts, and fasteners.
- E. Watertight Hubs: Die-cast, insulated, and gasketed, rated for wet or dry locations, indoors or outdoors. Water tight hubs shall be Appleton HUB, Crouse-Hinds Myers Hubs, or equal.
- F. Conduit Plugs: Kwik N Sure pipe plug as manufactured by Cherne Industries, or equal. Plug shall include natural rubber O-ring with galvanized wing nut and hex nut.

## PART 3-EXECUTION

### 3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

- A. Size conduits for branch circuit conductors, control wires, and instrumentation cables so as to have not less than 25% spare capacity after installation; 3/4 inch minimum size. Minimum size for liquid-tight flexible metal conduit is 1/2 inch.
- B. Maintain at least 1 inch of separation between conduit sizes to 1 1/2 inches and 2 inches between conduits 1 1/2 inches or larger. Maintain 1 foot of separation between signal conduits (below 100 volts) and power conduits (100 volts and above).
- C. All conduit shall be supported in accordance with the NEC and as specified herein. This shall apply to all conduit types, including flexible conduit.
- D. Provide for the proper application, installation, and location of inserts, supports, and anchor bolts for a satisfactory raceway system. Where any component of the raceway system is damaged, replace or provide new raceway system.
- E. Run conduits concealed to avoid adverse conditions such as heat and moisture, to permit drainage, and to avoid all materials and equipment of other trades. Maintain a minimum clearance of 6 inches from all hot water pipes, flues, or any high-temperature piping or duct work.
- F. Conduits shall be attached to building surfaces and not suspended unless installed in a Unistrut type conduit rack as specified herein. Individual conduits shall not be suspended. Clevis hangers are not allowed.
- G. Center conduit in structural slabs (other than topping), clear of reinforcing steel and spaced on centers equal or exceeding three times the conduit diameter. Outside diameter of conduit shall not exceed one-third the slab thickness for each run of conduit 1 1/4 inches or larger. Provide shop drawings when it will be installed in structural slabs. Conduits shall not be run in slabs-on-grade or structural topping slabs.
- H. Independently support or attach the raceway system to structural parts of construction in accordance with good industry practice.
- I. Conduit attached to building surfaces which may be damp shall be spaced out to avoid rust and/or corrosion using fittings approved for the use. Use back-straps on all conduit in damp or wet locations or mount conduit with Unistrut straps, or equal. Watertight hubs, shall be used in all damp locations. Damp locations shall include, but not be limited to, all exterior locations, all areas below grade, and any washdown areas.
- J. Conduits shall be securely fastened to building structure at intervals not exceeding 8 feet or closer, if necessary. Where hangers are necessary, 3/8-inch rod/eyelets/rings/or trapeze-type in Unistrut channel and pipe clamps shall be used. Wire or perforated strap iron is not acceptable.

### 3.02 GENERAL CONDUIT INSTALLATION REQUIREMENTS

- A. Interior conduit shall be run concealed in walls, building cavities, chases, and above suspended ceilings. Exterior conduit shall be buried below grade and concealed in



structure walls. Exposed conduit runs shall be avoided. Conduit may be run exposed only where it is impossible to conceal.

- B. Run exposed conduit grouped and parallel or perpendicular to construction. Do not route exposed conduits over high-temperature machinery nor in contact with such equipment. All conduit shall be run exposed in structures below grade.
- C. All conduit installed below grade shall be buried a minimum of 2 feet 0 inches. All conduit installed below floor slabs shall be buried a minimum of 1 foot below slab.
- D. PVC conduit installed in earth (interior and exterior) shall be bedded in compacted sand with a minimum of 6-inch cover on all sides.
- E. Ream conduit smooth at ends, cap upon installation, rigidly attach to structural parts of the building, and securely fasten to all outlet boxes, panel cabinets, junction boxes, pull boxes, splicing chambers, safety switches, and all other components of the raceway system.
- F. Conduits installed for future equipment or electrical work shall be cut off and capped flush with finished floor. Conduit ends shall have threaded fittings to accommodate future conduit installation.
- G. Provide all empty raceways 2 1/2 inches and over with No. 10 galvanized fishwire, and nylon cord for conduits smaller than 2 1/2 inches. Empty raceways and fishwire/nylon cord shall be identified with permanent label, and label shall include conduit termination point. All empty conduits shall be threaded, capped and flush with finished floor. Exposed conduits shall be threaded and capped.
- H. Provide conduit raceway for exposed cables that are not UV resistant. This shall include, but not be limited to, instrument wiring, motor terminators, pump cables, etc.
- I. Conduit seals shall be provided where conduits pass from the interior to exterior of the building, where conduits enter a room which at any time is subject to internal air pressures above or below normal, and any conduit entering a NEMA 4X area.
- J. Liquid-tight flexible conduit shall be installed in such a manner that liquids tend to run off the surfaces and not drain toward the fittings.
- K. All runs of flexible conduit to equipment and devices shall be as short as practicable, of the same size as the conduit it extends, and with enough slack to reduce the effects of vibration to a minimum. A minimum of 18 inches of flexible conduit shall be installed for each motor.
- L. Provide conduit expansion-deflection fittings as specified herein, in all conduit runs where movement perpendicular to axis of conduit may be encountered.
- M. Conduits shall be pitched so that drainage is away from all structures.
- N. Conduit bends for PVC conduit shall be made using a hot box, heat blanket, or glycol bender. Open flame or point heat sources of any type are not allowed.

## 3.03 CONDUIT PENETRATIONS AND TERMINATIONS

- A. Where fittings are brought into an enclosure with a knockout, a gasket assembly consisting of an O-ring and retainer shall be installed on the outside. Fittings shall be insulated throat-type.
- B. Conduit penetrations for control panels or enclosures containing electronic equipment shall be made on the sides or bottom of the enclosure. Conduits shall not penetrate the top of the enclosure.
- C. Provide conduit expansion fittings as specified herein, in all conduit runs that cross a structural expansion joint, and for conduits protruding from earth where the conduit is terminated within 5 feet of finished grade.
- D. All conduits that protrude from poured concrete shall be PVC-coated rigid conduit. Conduit shall extend a minimum of 4 feet beyond the poured concrete (both sides).
- E. Conduits passing through concrete or similar construction shall be cast-in-place using PVC-coated rigid conduit extending completely through the construction.
- F. Where above-grade conduits pass through cores in existing structures or through masonry walls, grout openings between conduit and walls or floors with sand-cement mortar consisting of one part Portland cement and three parts sand, by volume. Add sufficient water to make a stiff, placeable mortar.
- G. Where wall penetrations through existing walls are below grade, cored openings shall be sealed with waterproof mechanical seals. Cores shall be pitched slightly, such that conduit slopes away from building. Sleeve diameter shall be provided and mechanical seals installed as recommended by the manufacturer.
- H. All spare conduits that terminate in a building or structure below grade shall be plugged with conduit plugs as specified herein.

## 3.04 CONDUIT INSTALLATION SCHEDULE

- A. The following schedule lists specific conduit types allowed in designated areas. Those areas not listed under a specific conduit type shall not have that type of conduit installed:
  - 1. Rigid steel:
    - a. Structural slabs.
    - b. Interior locations requiring mechanical protection including NEMA 4X areas.
    - c. All exposed interior locations.
    - d. All concealed interior locations.
  - 2. Rigid Aluminum:
    - a. All exposed interior locations including NEMA 4X areas.
    - b. Interior locations requiring mechanical protection.
    - c. All locations where attached to aluminum railings or aluminum structural members.
  - 3. PVC coated rigid steel:
    - a. Conduits protruding from concrete.
    - b. Interior and exterior locations requiring mechanical protection.
    - c. Earth.
    - d. Exterior locations and locations exposed to weather.
    - e. Within 6 feet of building or structure footing or wall.

4. PVC:
  - a. Earth, except within 6 feet of a building or structure footing or wall.
  - b. Buried below slabs on grade.
5. Liquid-tight flexible metal conduit not over 3 feet in length for final connections to:
  - a. Equipment in wet locations.
  - b. Equipment with sliding bases or flexible positioning.
  - c. Equipment with vibration isolation mounting.
  - d. Equipment housing ferromagnetic cores or with integral moving components capable of generating noise or vibrations, including motors.
  - e. All pumps and associated equipment.

END OF SECTION

# DRAFT-(01.03.2013)

## SECTION 16120

### WIRE

#### PART 1--GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Wire.
  - 2. Terminal blocks and accessories.
  - 3. Wiring connections and terminations.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 QUALITY ASSURANCE

- A. Manufacturers of Wire: Firms regularly engaged in the manufacture of electrical wire products of the types and ratings needed whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide electrical raceways, wire, connectors, switches, etc., which have been listed and labeled by Underwriters Laboratories.
- E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

##### 1.03 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 01300--Submittals.
- B. Submit shop drawings for wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.
- C. Submit manufacturer's instructions.

##### 1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Provide factory-wrapped, waterproof, flexible-barrier material for covering wire on wood reels, where applicable, and weather-resistant fiberboard containers for factory-packaging of wire, connectors, outlets, boxes, lamps, fuses, etc., to protect against physical damage in transit. Do not install damaged wire or other material; remove from project site.

- B. Store wire and other material in factory-installed coverings in a clean, dry, indoor space which provides protection against the weather.

## PART 2-PRODUCTS

### 2.01 WIRE

- A. All wire for permanent installation shall be new stranded copper delivered to project in unopened cartons or reels, except where specifically noted and be UL listed for the use intended. No wire smaller than 12 AWG shall be used unless specifically noted. The use of multiconductor cable is NOT ALLOWED.
- B. Motor circuit branch wiring and associated control wiring:
1. Insulation type shall be THHN (indoors, non-VFD application).
  2. Minimum size for motor control wiring shall be 14 AWG.
  3. Control wiring for supervisory equipment shall be shielded, sized per equipment manufacturer's recommendations, or as shown on drawings.
- C. All power wiring to motors utilizing Variable Frequency Drives (VFDs) shall be type XHHW-2.
- D. All wiring within control panels shall be insulation type MTW, minimum size 16 AWG.
- E. Wiring in dry locations shall be THHN. Wiring in damp and wet locations shall be type XHHW-2. Damp and wet locations shall include, but not be limited to, exterior locations, exterior buried conduits, and any washdown areas.
- F. All available colors shall be used; however, green shall be used only for equipment grounds. Where color-coded wire in larger sizes is not available, one wrap of 1-inch-wide colored self-adhesive tape at each terminal end shall be used for identification. Initial phase color shall be used throughout the run, even for switch legs. Colors must meet code requirements for each class voltage. Do not duplicate colors, including neutral, on different voltages.
- G. Color Coding:

	120/208V	277/480V
A Phase	Black	Brown
B Phase	Red	Orange
C Phase	Blue	Yellow
Neutral	White	Gray
Travelers	Yellow	Orange
Equipment Ground	Green	Green

- H. Branch circuits 150 feet or over shall be sized for a maximum 2% voltage drop.

## 2.02 WIRING CONNECTIONS AND TERMINATIONS

- A. Provide crimp type UL or ETL listed terminations for 6 AWG and smaller stranded conductor connections to electrical devices and equipment such as switches and terminal strips. Crimp devices shall be Sta-con, or equal.
- B. Provide insulated, **silicone-filled** spring wire connectors with plastic caps for 8 AWG conductors and smaller. Connectors shall be King Silicone-Filled Safety Connectors, or equal. Spring wire connectors shall only be allowed in junction, outlet, or switch boxes. Spring wire connectors are not allowed for terminating of motor conductors.
- C. All feeder cable connections to motor leads up to 600 volts shall be insulated and sealed with factory-engineered kits. Motor connection kits shall consist of one-hole copper compression lugs for 6 AWG and larger, split-bolt connector for 8 AWG and smaller, and motor-lead pigtail splice kit. Individual components shall be as follows:
  - 1. Split-bolt connectors shall be for use with copper conductors only.
  - 2. One-hole copper compression lugs shall be as manufactured by 3M, or equal, 30000 series. Lug size shall be selected based on motor and feeder wire sizes installed.
  - 3. Pigtail splice kit shall consist of one-hole lug cover, locking pin, silicone grease and mastic sealing strip. Kit shall be as manufactured by 3M, or equal, 5300 series, and be selected based on motor, feeder, and lug sizes installed.
- D. No splices will be allowed unless approved by ENGINEER. Where allowed, provide in-line splices for all conductor connections, 6 AWG and larger. Splice crimp component shall be Burndy copper compression splice long barrel, beveled entry, type YS, or equal. Splice shall be made with crimp tool by manufacturer that allows expanded conductor ranges. Splice insulation component shall be Raychem heavy-wall, low-voltage tubing, type WCSM, or equal.

## 2.03 TERMINAL BLOCKS AND ACCESSORIES

- A. Terminal Blocks: ANSI/NEMA ICS 4: UL listed.
- B. Power Terminals: Unit construction-type, closed-back-type, with tubular pressure screw connectors, rated 600 volts.
- C. Signal and Control Terminals: Modular construction-type, channel-mounted; tubular pressure screw connectors, rated 300 volts.
- D. Manufacturer and Model Number: Phoenix Contact UK 5 N, or equal.

## PART 3-EXECUTION

### 3.01 INSPECTION

- A. Examine the areas and conditions under which the work is to be installed and notify CONTRACTOR of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

## 3.02 GENERAL WIRING METHODS

- A. Install electrical wire and connectors in accordance with the manufacturer's written instructions; applicable requirements of the NEC, the National Electrical Contractors Association's "Standard of Installation"; and in accordance with recognized industry practices to ensure that products serve the intended functions. Use appropriate wiring methods and materials for the equipment or environment.
- B. Stranded conductors shall be terminated using crimp-type devices specified herein. Conductors may not be wrapped around a terminal screw.
- C. Place an equal number of conductors for each phase of a circuit in same raceway.
- D. Torque conductor connections and terminations with calibrated torque wrench to manufacturer's recommended values. Provide permanent marking on lug, bolt, nut, or connection for conductors larger than 4 AWG.
- E. Splice only in junction or outlet boxes. Splicing is not allowed in disconnects, motor control centers, panelboards, etc. Avoid splices between terminals of interconnecting power and control wiring.
- F. Spring wire connectors shall only be used in junction, outlet, or switch boxes. Equipment wireways (e.g. motor control centers, panelboards, disconnects, etc.) and control panels shall not have any spring-wire connectors installed; all terminations shall be on terminal strips.
- G. Neatly train, lace, and tie-wrap all wiring inside boxes, equipment, MCCs, and panelboards.
- H. Make conductor lengths for parallel circuits equal.
- I. The same color shall be used for each numbered wire throughout its entire length.
- J. Terminate all wiring on terminal blocks in control panels, starter cubicles, and similar equipment. This shall include all spare or unused wires.
- K. Provide preprinted adhesive or heat shrink-type wire numbering labels at all terminations and splices. Wire numbering preprinted on the conductor, flag-type labels, and individual wraparound numbers (e.g. Brady labels) are not acceptable.
- L. Provide a dedicated neutral for each branch circuit requiring a neutral. Ampacity of neutral conductor shall match that of the branch circuit.
- M. Do not use a pulling means which can damage the raceway.
- N. Signal wiring (below 100 volts) must be in a conduit separate from power and/or control wiring (over 100 volts). Signal wire shall include, but not be limited to, loop powered devices, and communication wiring (i.e., RS-485, etc.).
- O. Control wiring (e.g. internal thermal overloads, etc.) to motors utilizing VFDs shall be in a conduit separate from motor power wiring.

- P. Provide junction or pull boxes to facilitate the "pulling in" of wires or to make necessary connections. All raceways and apparatus shall be thoroughly blown out and cleaned of foreign matter prior to pulling in wires.
- Q. Thoroughly clean wires before installing lugs and connectors.
- R. Make splices, taps, and terminations to carry full capacity of conductors without perceptible temperature rise.
- S. Terminate spare conductors within equipment, MCCs, control panels, etc., on terminal strips and label as "SPARE." Spare wiring in pull or junction boxes may be terminated with electrical tape and labeled as "SPARE." All spare conductor labels shall indicate where the conductors terminate. Refer to Section 16195-Electrical Identification, for additional requirements.
- T. Feeder connections to motors shall be installed within the motor junction box utilizing factory engineered kits as specified herein. Spring wire connectors are not allowed for connections to motors.

## 3.03 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use UL-listed wire-pulling lubricant for pulling 4 AWG and larger wires. Wax-based pulling lubricant is not allowed unless it includes a Teflon additive.
- B. Install wire in raceway after all mechanical work likely to injure conductors has been completed.
- C. Completely and thoroughly swab raceway system before installing conductors.
- D. Conductors No. 6 AWG and larger shall be pulled in to conduits utilizing a tugger with built-in tension meter. CONTRACTOR shall provide a report to ENGINEER for each pull indicating maximum tension reached during the pull along with manufacturer's maximum pulling tension. Motorized machines of any type are NOT ALLOWED for any wire pulling.
- E. Conductors shall be installed in conduit system in such a manner that insulation is not damaged, conductors are not overstressed in pulling, and walls are not damaged. No splices are permitted except in junction boxes or outlet boxes.
- F. CONTRACTOR shall observe code limitation on the number and size of wires in an outlet box. CONTRACTOR shall either lay out work so that the wires do not exceed the particular box limitation, or provide larger boxes approved for additional capacity.
- G. Circuiting is indicated diagrammatically on the drawings.

## 3.04 FIELD QUALITY CONTROL

- A. Inspect wire for physical damage and proper connection.
- B. Prior to energizing, check conduit, raceways, boxes, and wire for continuity of circuitry and for short circuits. Correct malfunction when detected.



- C. Subsequent to wire hook-ups, energize circuitry and demonstrate functioning in accordance with these specifications.
- D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.
- E. Perform field inspection and testing according to provisions of this section.

## 3.05 ACCEPTANCE TESTS

- A. CONTRACTOR shall furnish all materials, labor, and equipment necessary for the acceptance tests specified herein. Acceptance tests shall be performed in the presence of OWNER or OWNER's representative and must be passed before final acceptance of the work.
- B. CONTRACTOR shall be responsible for powered tests of each field-installed device unless specifically noted otherwise. CONTRACTOR shall be responsible for device operation as powered from its power source and signals as received at the I/O modules.
- C. Operation Test—By operational testing, OWNER will give final acceptance of the wiring system when all of the wiring is considered a complete system. All equipment shall function and operate in the proper manner as indicated in the details of the specifications and on the drawings. All motors shall be properly connected to protective devices, and motor rotation shall be in the correct direction.
- D. At the request of OWNER's representative, demonstrate by test the compliance of the installation with these specifications and drawings, the National Electrical Code, and the accepted standards of good workmanship. These tests shall include operation of equipment, continuity of the conduit system, grounding resistance and insulation resistance.
- E. A written record of performance tests on electrical and control and instrumentation systems and equipment shall be supplied to OWNER. Such tests shall show compliance with governing codes.

## 3.06 WIRE INSTALLATION SCHEDULE

- A. Install all wiring in raceways except as otherwise noted. This includes all low-voltage wiring such as instruments, etc.

END OF SECTION

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## SECTION 16130

### BOXES

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Wall and ceiling outlet boxes.
  - 2. Pull and junction boxes.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. ANSI/NEMA OS 1-Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- B. NEMA 250-Enclosures for Electrical Equipment (1000 Volts Maximum).

##### 1.03 QUALITY ASSURANCE

- A. Manufacturers of switches, boxes, fuses, lugs, etc.: Firms regularly engaged in the manufacture of these products, of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide electrical cable, boxes, raceways, wire, connectors, switches, etc., which have been listed and labeled by Underwriters Laboratories.
- E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

##### 1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.

## PART 2-PRODUCTS

### 2.01 SWITCH AND SMALL JUNCTION BOXES

- A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel, 4-inch square or octagon, minimum 2 1/8 inches deep. Raco, Appleton, or equal. Boxes with knockouts for multiple size conduits not allowed.
- B. Cast Boxes: Aluminum or cast ferrous, deep-type, gasketed cover, threaded hubs, Crouse-Hinds FD Series, or equal.
- C. PVC Coated Cast Boxes: Provide PVC coated cast boxes in areas where PVC-coated conduit is used. Boxes shall be by the same manufacturer as the conduit.
- D. NEMA 4X Boxes: PVC or FRP, Carlon FS Series, or equal, with proper cover and gasket.

### 2.02 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: ANSI/NEMA OS 1: Code gauge steel with galvanized or sherardized finish, secured by galvanized machine screws. Hoffman ASG Series without knockouts, or equal.
- B. Cast Boxes: NEMA 250; Type 4, flat-flanged, surface-mounted junction box, UL-listed as watertight. Cast aluminum or ferrous box and cover with ground flange, neoprene gasket, and stainless steel cover screws, Crouse-Hinds WCB Series, or equal.
- C. PVC Coated Cast Boxes: Provide PVC coated cast boxes in areas where PVC coated conduit is used. Boxes shall be by the same manufacturer as the conduit.
- D. NEMA 4X Boxes: PVC or FRP, Carlon NS Series, or equal with proper cover and gasket.
- E. Boxes Larger Than 12 inches in Any Dimension: Hinged enclosure in accordance with Section 16160-Cabinets and Enclosures.
- F. Boxes specified in this section are not allowed to have knockouts and are not allowed to be used as enclosures for control panels.

## PART 3-EXECUTION

### 3.01 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on drawings and as necessary for splices, taps, wire pulling, cable bending radii, equipment connections, and code compliance.
- B. Electrical box locations shown on drawings are approximate. Verify location and size of outlet boxes in all work areas prior to rough-in.
- C. Where dedicated raceways are provided for different voltage systems or wiring, (e.g. motor power wiring and motor thermostats), separate boxes shall also be provided unless approved by ENGINEER. Where approved by ENGINEER, combined boxes shall be physically divided to separate the wiring.

- D. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of access doors.
- E. Locate and install to maintain headroom and to present a neat appearance.
- F. All boxes attached to building surfaces which may be damp shall be spaced out to avoid rust and/or corrosion. All boxes in damp locations shall be on 1-inch standoffs. Damp locations shall include, but not be limited to, all exterior locations, all areas below grade, and any washdown areas.

## 3.02 SWITCH AND OUTLET BOX INSTALLATION

- A. Provide knockout closures for unused openings.
- B. Support boxes independently of conduit.
- C. Use multiple gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- D. Switch boxes provided for branch circuits and feeders shall not contain control wiring. Control wiring shall have dedicated pull and junction boxes provided. Wiring for different voltage systems (e.g. 24 V, 120 V, 480 V) shall have dedicated pull and junction boxes for each voltage.
- E. In inaccessible ceiling areas, position outlet boxes within 6 inches of recessed luminaire to be accessible through luminaire ceiling opening.
- F. Align wall-mounted outlet boxes for switches and similar devices.
- G. For weatherproof switches, devices, and exterior fixtures use cast boxes with proper cover and gasket.
- H. All exterior outlet boxes shall be NEMA 4X.
- I. All interior exposed wall and ceiling outlet boxes shall be cast boxes, unless otherwise noted.
- J. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable.
- K. Boxes shall be of a depth to accommodate wires and splices and shall be equipped with both fixture hanging studs and tapped fixture ears. Boxes shall be installed so they will support the weight of the fixture. Conduit will not be considered as adequate supports.
- L. Cast boxes with 3/4-inch hubs and aluminum fittings and enclosures may be used with all conduit types.

## 3.03 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
- B. Support pull and junction boxes independent of conduit.

- C. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable.
- D. All junction boxes shall be labeled with permanent labels (not adhesive type). Permanent labels shall include painted stencil-type labels or engraved laminated nameplates. Labels shall indicate circuit or load served, as well as power source.
- E. All interior exposed junction and pull boxes shall be cast-type with cover, unless noted otherwise.
- F. All exterior junction and pull boxes shall be NEMA 4X. Boxes in areas subject to damage shall be stainless steel.
- G. In inaccessible ceiling areas, position boxes within 6 inches of recessed luminaire to be accessible through luminaire ceiling opening.

END OF SECTION

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## SECTION 16141

### WIRING DEVICES

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Wall switches.
  - 2. Cover plates.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. NEMA WD 1-General-Purpose Wiring Devices.
- B. Drawings-Bill of Materials.

##### 1.03 QUALITY ASSURANCE

- A. Manufacturers of switches, boxes, fuses, lugs, etc.: Firms regularly engaged in the manufacture of these products, of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.
- C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.
- D. UL Labels: Provide electrical cable, raceways, wire, connectors, and switches, etc., which have been listed and labeled by Underwriters Laboratories.
- E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

##### 1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.
- B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

## PART 2-PRODUCTS

### 2.01 WALL SWITCHES

- A. A-C general use Industrial specification grade, snap switch, 20 amperes, 277 volts, one of the following: Cooper 222\*, Leviton 122\*, or Pass and Seymour PS20AC\*.
- B. Provide ivory-colored handles.
- C. Manual motor switches for 120 V or 240 V motors on circuits 20 amps or less shall be specification grade snap switch as specified above.

\*Complete catalog number for pole arrangement necessary.

### 2.02 COVER PLATES

- A. Surface boxes shall have plates to match Crouse-Hinds, Appleton, or equal cast boxes.
- B. NEMA 4X and weatherproof switch covers shall be Thomas and Betts, Industrial Gray, toggle switch cover, Model E98TSCN-CAR, or equal.
- C. Cover plates for manual motor switches shall have provisions for locking the switch in the On or Off position.

## PART 3-EXECUTION

### 3.01 INSTALLATION

- A. Install wall switches 42 inches above floor (top of box), "Off" position down, except as otherwise noted.
- B. Install devices and cover plates flush and level.
- C. Backwiring is not allowed for switches. Wires shall be terminated with the device screw terminal.
- D. Individual labels shall be placed on the back of all switch faceplates indicating the lighting panel and circuit from which the switch is fed. Labels shall be White background with Black lettering no smaller than 12-point font. Provide Pan Net permanently attached self-adhesive type, machine fed, and self-laminating labels, or equal. All labels must be by the same manufacturer, same size, and same font. Handwritten labels are not acceptable.

END OF SECTION

### CABINETS AND ENCLOSURES

#### PART 1--GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Hinged cover enclosures.
  - 2. Cabinets.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. NEMA 250--Enclosures for Electrical Equipment (1000 Volts Maximum).
- B. ANSI/NEMA ICS 1--Industrial Control and Systems.
- C. ANSI/NEMA ICS 6--Enclosures for Industrial Control Equipment and Systems.

##### 1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.
- B. Show Drawings for Equipment Panels: Include wiring schematic diagram, connection diagram, outline drawing, and construction diagram as described in ANSI/NEMA ICS 1.

#### PART 2--PRODUCTS

##### 2.01 HINGED COVER ENCLOSURES

- A. Construction: NEMA 250, larger than 12 inches in any dimension. Acceptable manufacturers: Hoffman, B-Line, or equal.
- B. Covers: Continuous hinge, applicable NEMA rating with hasp and staple for padlock.
- C. Back Panel for Mounting Terminal Blocks or Electrical Components: 14-gauge steel, white enamel finish.

##### 2.02 CABINETS

- A. Construction: NEMA 250. Acceptable manufacturers: Hoffman, Saginaw, Lehman, or equal.
- B. Cabinet Fronts: Steel, surface-type with screw cover front, concealed hinge and flush lock. Finish in white baked-enamel.



## 2.03 FABRICATION

- A. Shop-assembled enclosures and cabinets housing terminal blocks or electrical components in accordance with ANSI/NEMA ICS 6.
- B. Provide conduit hubs on all enclosures.
- C. Provide protective pockets inside front cover with schematic diagram, connection diagram, and layout drawing of control wiring and components within enclosure.
- D. Provide gasketed surfaces for all enclosure and cabinet doors and covers.

## 2.04 ENCLOSURE RATING

- A. Cabinets and enclosures shall be rated as listed below, unless noted otherwise on the drawings:
  - 1. Indoor: NEMA 12, steel.
  - 2. Outdoor, corrosive or wet location: NEMA 4X, stainless steel.

## PART 3-EXECUTION

### 3.01 INSTALLATION

- A. Install cabinets and enclosures plumb. Anchor securely to wall and structural supports at each corner minimum.
- B. All cabinets and enclosures shall be labeled with permanent labels (not adhesive-type). Permanent labels shall include painted, stencil-type labels or engraved laminated nameplates (4 inches by 4 inches minimum size).
- C. Provide accessory feet for free-standing equipment enclosures.
- D. All cabinets and enclosures attached to building surfaces which may be damp shall be spaced out to avoid rust and/or corrosion. All boxes in damp locations shall be on 1-inch standoffs. Damp locations shall include, but not be limited to, all exterior locations, all areas below grade, and any washdown areas.

END OF SECTION

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## SECTION 16190

### SUPPORTING DEVICES

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Conduit and equipment support members.
  - 2. Fastening hardware.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 QUALITY ASSURANCE

- A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

##### 1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.

#### PART 2-PRODUCTS

##### 2.01 MATERIAL

- A. Support Members:
  - 1. 316 stainless steel, fiberglass, or PVC in exterior locations and NEMA 4X areas. PVC-coated steel where used with PVC-coated conduit.
  - 2. Galvanized steel in all other areas.
- B. Hardware:
  - 1. Stainless steel in exterior locations and NEMA 4X areas.
  - 2. Galvanized steel in all other areas.
- C. Manufacturers: Unistrut P-1000, B-line, Superstrut, or equal.

#### PART 3-EXECUTION

##### 3.01 INSTALLATION

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors or support members. Do not use spring steel clips and clamps. Provide standoffs as specified in other technical sections.

- B. Use toggle bolts or hollow wall fasteners in hollow masonry, partitions and walls; expansion anchors or preset inserts in solid masonry walls, and self-drilling anchors or expansion anchors on concrete surfaces.
- C. Where support members are used for conduit, cutoff ends shall be ground smooth. Cutoff PVC-coated support members shall be ground smooth and touched-up with PVC coating material from the manufacturer.
- D. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- E. Do not use powder-actuated anchors.
- F. Do not drill structural steel members.
- G. Fabricate supports with welded end caps and all welds and surfaces ground smooth for neat appearance. Use hexagon head bolts with steel spring-lock washers under all nuts.
- H. Install surface-mounted cabinets with minimum of four anchors.
- I. Do not use chain hangers.
- J. All welds shall be continuous and ground smooth.

END OF SECTION

### ELECTRICAL IDENTIFICATION

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Nameplates.
  - 2. Labeling tags.
  - 3. Wire markers.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.
- B. Provide schedule for nameplates and labeling tags with shop drawings. Reference drawings for type used.

#### PART 2-PRODUCTS

##### 2.01 NAMEPLATES

- A. Type "A":
  - 1. Use:
    - a. Motor starters.
    - b. Each separately mounted circuit breaker or disconnect switch.
    - c. Each device in Motor Control Centers.
    - d. Cabinets, enclosures, pull, and junction boxes.
    - e. Field devices (flow meter transmitters and pressure transmitters, etc.).
  - 2. Size: 2 inch by 3 inch.
  - 3. Material: 3-layer laminated Micarta.
  - 4. Background Color: Black.
  - 5. Character Color: White.
  - 6. Character Size: 1/4 inch.
  - 7. Engraving: See drawings for labels, or as requested by ENGINEER. Label shall include equipment number and description (i.e., FIT-10-01, Tank 1 Treated Effluent Flow).
  - 8. Mounting Location: Front exterior.
- B. Type "B":
  - 1. Use: Operator instructions.
  - 2. Size: As necessary.
  - 3. Material: 3-layer laminated Micarta.
  - 4. Background Color: Yellow.
  - 5. Character Color: Black.

6. Character Size: 3/16 inch.
7. Engraving and Mounting Location: As requested by ENGINEER.

## 2.02 LABELING TAGS

- A. Use: Field-mounted Devices (Valves, Limit Switches, etc.).
  1. Size: 1 inch by 3 inch.
  2. Material: 1/32-inch-thick stainless steel.
  3. Character Size: 1/4 inch.
  4. Engraving: As requested by ENGINEER.

## 2.03 WIRE MARKERS

- A. Wire markers shall be permanently attached sleeve or heat shrink-type labels. Wire numbering preprinted on the conductor, flag-type labels, and individual wraparound numbers (such as Brady preprinted markers) are not acceptable. All wire markers shall be the same throughout the project.
- B. Wire markers shall be specifically printed for this project using permanently attached computerized adhesive tags, such as Brady IDXPRT labeling printer with self-laminating vinyl, permasleeve heat-shrink polyolefin, or equal. Handwritten markers are not acceptable.

## PART 3-EXECUTION

### 3.01 INSTALLATION

- A. Degrease and clean surfaces to receive nameplates.
- B. Install nameplates parallel to equipment lines.
- C. Affix nameplates with stainless steel screws in outdoor locations and stickyback adhesive in indoor locations.
- D. Affix labeling tags with permanent bonding cement or locking wire ties. Provide 3/8-inch hole to accommodate wire tie.
- E. Prepare and install neatly-typed directions in all panels, including existing panels where work is done under this Contract.

### 3.02 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor, including neutral and spare conductors, in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams for control wiring. Spare conductors shall have control wire number or shall indicate termination point of wire.
- B. Conductors in pull boxes, motor control centers, control panels, cabinets, and panelboards shall be grouped as to circuits and arranged in a neat manner. All conductors of a feeder or branch circuit shall be grouped, bound together with nylon ties, and identified. Phase identification shall be consistent throughout the system.

END OF SECTION

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## SECTION 16480

### MOTOR CONTROL

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included:
  - 1. Motor control devices, accessories, and general requirements.
  - 2. Variable frequency drives.
  - 3. Motor control centers.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

PART 1-GENERAL .....	1
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##### 1.02 REFERENCES

- A. ANSI/NEMA ICS 6-Enclosures for Industrial Controls and Systems.
- B. NEMA AB 1-Molded Case Circuit Breakers.
- C. NEMA ICS 2-Industrial Control Devices, Controllers, and Assemblies.
- D. NEMA KS 1-Enclosed Switches.

##### 1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals. Shop drawing submittals shall include the following:

1. Detailed catalog information, descriptive literature, and specifications of hardware. **All items being provided must be specifically noted on this literature.**
2. Electronically generated wiring diagrams, following JIC standards, which show all connections to external devices, a complete bill of materials, and a detailed description of operation shall be submitted for all starter panels and new MCC buckets, including modification drawings for existing equipment. Handwritten drawings, or drawings from manufacturers will not be accepted as shop drawings or O&M documents.

- B. Provide product data on motor starters, relays, pilot devices, and switching and overcurrent protective devices, as well as wiring schematics.

## 1.04 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01300–Submittals.
- B. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.
- C. Submit Operation and Maintenance Manuals in accordance with Division 1. The following additional information shall apply:
  1. Manuals shall contain, but not be limited to, the following:
    - a. Safety precautions, physical description, functional description, operating procedures, theory of operation, maintenance instructions, checkout procedures, troubleshooting procedures, servicing, and removal and replacement procedures.
    - b. Wiring schematic and logic diagrams, parts list, and point-to-point wiring.
    - c. Listing of all hardware timers installed in starter panels, as well as the ranges set on each timer. Listing shall also include actual timer setting after completion of start-up.

## 1.05 DELIVERY, STORAGE, AND HOLDING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to Motor Control components, enclosure, and finish.

## 1.06 SPARE PARTS

- A. Furnish spare parts for equipment specified herein as listed in Section 16951–Spare Parts.

## PART 2–PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

- A. Motor control devices and variable frequency drives shall be as manufactured by Allen-Bradley, or equal, as approved by ENGINEER and in accordance with substitutions

under provisions of the General Conditions. All equipment specified in this section and provided by CONTRACTOR shall be by the same manufacturer.

- B. The drawings and specifications were prepared based on Allen-Bradley. CONTRACTOR shall include in the Bid and shall be responsible for the cost of any changes to accommodate other equipment including but not limited to structural, mechanical, and electrical work. CONTRACTOR shall also pay additional costs necessary for revisions of drawings and/or specifications by ENGINEER.

## 2.02 MOTOR CONTROL DEVICES, ACCESSORIES, AND GENERAL REQUIREMENTS

- A. Auxiliary Contacts: NEMA ICS 2; two field convertible contacts minimum, in addition to seal-in contact, or as necessary.
- B. Pushbuttons: NEMA ICS 2; heavy-duty, oil tight (30 mm) as shown on the drawings.
- C. Indicating Lights: NEMA ICS 2; heavy-duty, oil tight (30 mm), LED, push-to-test type as shown on the drawings.
- D. Selector Switches: NEMA ICS 2; heavy-duty, oil-tight, (30 mm) as shown on the drawings.
- E. Timing Relays: UL Listed with On and Timing Out LEDs.
- F. Control Power Transformers: 240/120-volt secondary. Each motor starter shall have a dedicated control power transformer.
- G. Elapsed Time Meters: Redington/Engler 722 series, 3 inches round, flush door-mounted, capable of reading up to 99,999.9 hours, nonreset-type.
- H. Relays for motor control circuits, hardwired control logic, and for loads less than 10 amps shall be general purpose, industrial, square base relays. Relays for lighting circuits and small motor loads shall be industrial, electrically held power relays. Relays shall meet the following requirements:
  - 1. General purpose relays:
    - a. Configuration: DPDT or 3 PDT as required by system supplier.
    - b. Mounting: DIN rail with screw terminal base socket.
    - c. Voltage: 120 VAC.
    - d. Contact rating: 15 A, minimum; 3/4 hp.
    - e. Operating life: 10 million cycles.
    - f. Status: On-Off flag-type or LED indicator.
    - g. UL listed.
    - h. Manufacturer: Allen-Bradley, 700-HB, or equal.
  - 2. Power relays.
    - a. Configuration: Electrically held, 2-12 poles.
    - b. Mounting: DIN rail, square base.
    - c. Voltage: 120 VAC.
    - d. Contact rating: 20 A continuous; 1 hp.
    - e. Operating life: 10 million cycles.
    - f. UL listed.
    - g. NEMA rated.
    - h. Manufacturer: Allen-Bradley, 700-PK, or equal.



- I. All starters shall be equipped with the auxiliary devices to meet the requirements of the plans and specifications. Each starter operating at other than 120-volt, single-phase shall be equipped with a control transformer providing 120-volt secondary for control power. Transformer shall have fused primary and secondary connections and shall be sized per manufacturer's recommendations. Coils and pilot lights in all starters shall be 120 volts.
- J. Enclosures for Stand-Alone Controllers, Starters, and Control Devices:
  - 1. Enclosures in indoor dry locations shall be NEMA 1 gasketed.
  - 2. Enclosures in indoor damp or wet locations, outdoor locations, or locations below grade shall be NEMA 4X, stainless steel.
  - 3. Starters and disconnect devices for motors shall be installed in common enclosures, combination type, with all accessories such as terminal blocks, push-to-test pilot lights, and H-O-A switches.
  - 4. All wiring within starter enclosures shall be landed on terminal blocks. This shall include internal control wiring, field wiring, and any spare or unused wiring.
  - 5. Wiring within enclosures shall be routed through plastic wiring troughs with removable covers. **Maximum fill for wiring troughs shall be 60%.** All wiring in starter panels not in wiring troughs shall be bound with continuous-type spiral windings. Terminal strips located adjacent to wiring troughs shall have a minimum of 1 1/2 inches between terminal strip and wiring trough.
  - 6. All wiring for new panels shall be done in the factory, color-coded, Class II, Type C with master terminal strips for exterior connections. Terminal strips shall be located either at the bottom or on the side of the enclosure, depending on where the associated conduits penetrate the enclosure. Splices are not allowed within enclosures or wireways. All enclosures must pass through doors to point of installation. All wiring shall be labeled at each end with corresponding numbers. This numbering shall be shown on the shop and record drawings.
  - 7. All door-mounted devices shall be furnished flush-mounted, and an exterior-engraved phenolic nameplate worded by OWNER (upon receipt of shop drawings) shall be provided for each compartment, device, and light. All components within the enclosures shall be identified with interior-mounted engraved labels. Labels shall be installed on the enclosure back panel and not on the device or wireway. Devices shall be grouped for each device or unit being controlled.
  - 8. All panels with DIN rail-mounted equipment shall include a minimum of 25% spare DIN rail space.
  - 9. Enclosures that include motor controllers shall have a main disconnect for the enclosure.
  - 10. The equipment mounted within the enclosures shall be mounted on the enclosure back panel, neatly organized, and shall be in accordance with the manufacturer's recommendations.
  - 11. All wiring within control panels shall be insulation-type MTW, minimum size 16 AWG.
  - 12. Starter control panel design shall be in accordance with latest applicable NEMA standards, shall have been tested to prove adequate mechanical and electrical capabilities, and all major components shall have been individually tested. Control panel shall bear a serialized UL label indicating that it is UL-approved as an assembled unit. Panels which have individual components which are UL-labeled but do not have UL approval as an assembled unit are not acceptable.
- K. Hardwired Motor Controls:
  - 1. Equipment and wiring specified to be hardwired shall be physically wired independent of controllers, programmable relays, and communication systems to allow manual operation in the event of an emergency.

2. Motor control wiring and logic shall be set up such that in the event of a power failure, equipment shall automatically restart if previously running, or remain off if previously off. A manual reset shall not be required to restart equipment following a power failure.

## 2.03 MANUAL MOTOR CONTROLLERS

- A. Where noted on the drawings, controllers for motors rated 2 hp or less, for operation at 120 V or 240 V single-phase, shall be specification grade wall switches as specified in Section 16141-Wiring Devices.

## 2.04 VARIABLE FREQUENCY DRIVES

- A. A variable frequency drive (VFD) system consists of enclosed inverter, motor starter, motor, and any additional system control as specified. VFDs shall be provided to match the load type (constant or variable torque) of the specification application, as well as the full load amps of the motor furnished for the project.
- B. System Operating Conditions:
  1. 480 VAC  $\pm 10\%$ .
  2. 3-phase, 3-wire, any phase sequence.
  3. 60 Hz  $\pm 2\%$ .
  4. Storage temperature  $-25^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ .
  5. Operating temperature 0 to  $40^{\circ}\text{C}$ .
  6. Altitude: 3,300 feet above sea level maximum.
  7. Humidity: 95% noncondensing maximum.
- C. Variable Frequency Unit:
  1. Conform to NEMA and NEC standards.
  2. CSA and ETL approved and/or UL approved.
  3. Overall VFD efficiency shall be a minimum of 96.5%,  $\pm 1\%$ , at 100% speed and motor load at nominal line voltage. Efficiency rating shall include control power supplies, control circuits, and all cooling fans.
  4. Input:
    - a. Withstand without component failure line voltage transients up to 3,000 volts per ANSI C37.
    - b. Design to include DC bus chokes (2) to be used in conjunction with one or more capacitors. The DC bus chokes are to be incorporated in the design to minimize line-side harmonics. Magnetic-only designs need to include line filters to limit harmonics to a value no greater than in a system using dual DC bus chokes.
    - c. Include MOV line-side protection.
    - d. Inverter input for six pulse VFDs shall have a true power factor of 0.95 or better, at rated load and nominal line voltage throughout the entire speed range.
    - e. Units shall be capable of operating attached to the same power bus without affecting each other's operations. If operational problems occur, an isolation transformer shall be added to each drive at no additional Contract cost.
    - f. Three percent line reactors or equivalent DC link.
    - g. Drives larger than 40 hp shall include fuses on the drive input.
  5. Inverter Output:
    - a. Inverter shall utilize latest generation IGBTs, be microprocessor based, and isolated from power circuits.
    - b. Match motor specified.
    - c. 3-phase, 3-wire.

- d. Pulse width modulated wave form with selectable Sensorless Vector, Flux Vector, Volts/Hertz, and adjustable voltage control modes.
  - e. Maximum output 460 volts.
  - f. Frequency 2 to 650 Hz.
  - g. Frequency accuracy  $\pm 1\%$  of setting at any point in the specified speed range in a 24-hour period.
  - h. Full load output current shall be rated in excess of the AC motor selected.
  - i. Motor performance:
    - (1) 3% regulation in the manual speed control mode.
    - (2) Normal duty overload rating: 110% continuous current for 1 minute; 150% for 3 seconds.
    - (3) Heavy-duty overload rating: 150% continuous current for 1 minute; 180% for 3 seconds.
    - (4) 110% starting torque minimum.
6. AC drive features:
- a. Embedded I/O for discrete and analog signals. Analog signals shall include 4-20 mA circuitry mounted on separate printed circuit board to include offset, slope, minimum clamp, separate acceleration and deceleration adjustments from 0 to 3600 seconds. A light-emitting diode is to be provided to show signal presence and an internal manual speed potentiometer is to be supplied for simulating the 4-20 mA input for start-up and maintenance. The circuit is to be designed to accept either a positive or negative signal, grounded or ungrounded.
  - b. Slot-based architecture for expansion control and communication cards including Ethernet/IP, ControlNet, DeviceNet, discrete I/O, and analog I/O.
  - c. Real-time clock with battery for date/time stamping of events.
  - d. Integral thermostat control of door-mounted cooling fans.
  - e. Current limit circuitry: 0.1 amps to 160% of drive-rated amps.
  - f. Additional features for constant torque units shall include:
    - (1) IR compensation to provide automatic voltage boost or reduction to optimize both starting torque and system input kW.
    - (2) Slip compensation to provide 0.5% regulation with a 100% load change.
    - (3) Inner current loop regulator.
7. Enclosures:
- a. The VFD system shall be furnished with NEMA rated (as previously specified) wall-mounting enclosure.
  - b. Items to be mounted in the VFD structure.
    - (1) Inverter.
    - (2) Incoming door interlocked, thermal-magnetic, molded case circuit breaker. A defeater shall be provided to bypass this interlock.
  - c. NEMA 4/13 items to be door mounted on the enclosure:
    - (1) Power On light.
    - (2) Control devices, pilot lights, selector switches, etc., as shown on the drawings and specified herein.
    - (3) Interface to the drive shall be via a removable Human Interface Module (HIM) with integral display. This unit shall be a 7 line by 21-character backlit LCD display with graphics capability. HIM shall be used to display drive operating conditions, fault/alarm indications, and programming information with full text support in multiple languages. The LCD HIM shall be rated Type 4X/12 and may also be used as a handheld terminal by connecting via a separate cable. The HIM keypads shall include programming keys, drive operating keys (Start, Stop, Direction, Jog, and Speed Control), numeric keys for direct entry and an ALT (alternate function) key to allow drive

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programming or operating functions to be accessed directly without knowledge of programming structure. The HIM unit shall be mounted on the front of the enclosure door so the operator does not have to open the enclosure to access the HIM.

8. Interlocks:
  - a. Fault contact to terminals.
  - b. VFD run contact to terminals.
9. VFD protection:
  - a. Adjustable current limit of 20 to 160% minimum.
  - b. Instantaneous overcurrent trip.
  - c. Electronic ground fault and short-circuit protection to shut down the drive without fuse or component failure. Electronic ground and short-circuit protection to be functional with an input line of 480 VAC plus and minus 10%. The drive manufacturer is to be prepared to demonstrate ground fault and short-circuit protection without the use of an isolation transformer at drive start-up.
  - d. Input thermal-magnetic ambient compensated circuit breaker with a through-the-door interlocked operator.
  - e. Shut down on loss of any input phase for longer than 3 cycles.
  - f. Output phase sequence to be independent of input phase sequence.
  - g. High- or low-sustained voltage.
  - h. 120 VAC grounded control circuits.
  - i. Electrically and/or optically isolated low voltage logic.
  - j. Corrosion protection:
    - (1) Gold-plated plugs (male and female section) on all printed circuit boards.
    - (2) Protective board coating (conformal coating).
  - k. MOV converter protection.
  - l. DC bus chokes to minimize line side current harmonics.
  - m. Additional features for constant torque units:
    - (1)  $I^2T$  protection to provide 150% current for one minute.
    - (2) Regenerative override protection.
10. VFD adjustments:
  - a. Maximum speed: 50 to 100%.
  - b. Minimum speed: 0 to 70%.
  - c. Current limit: 20 to 110%, 160% on constant torque units.
  - d. Linear acceleration 0 to 3,600 seconds.
  - e. Linear deceleration 0 to 3,600 seconds.
  - f. Output volts/Hz trim.
  - g. Voltage boosts.
  - h. Additional features for constant torque units:
    - (1) Slip compensation.
    - (2) IR compensation.
  - i. All drives shall attempt to restart three times prior to indicating failure.
11. Inverter digital or LED diagnostic features:
  - a. Current limit signal.
  - b. Regenerative override signal.
  - c. External fault (ex. motor overload).
  - d. Low line voltage.
  - e. High line voltage.
  - f. Current overload.
  - g. High DC bus voltage.
  - h. Current trip.
  - i. Short-circuit.

12. Inverter construction:
    - a. Modular construction-ease of maintenance.
  13. Mount modules on enclosure subpanel:
    - a. Easily accessible from front.
    - b. Interconnect with plugs.
    - c. Construct boards of fire retardant materials in accordance with NEMA grade FR4 specifications.
- D. Inverter Quality Control:
1. Test all power devices at rated temperature and current for dv/dt, tq, TRR, and leakage.
  2. Test integrated circuits for programmed parameters at rated temperature.
  3. Treat printed circuit boards for corrosion resistance (conformal coating).
  4. Provide gold-plated connections at all points where plugs are used.
  5. Thermal cycle all printed circuit boards for ten cycles between 0° to 65°C prior to installation in inverter.
  6. All units to be tested at a rated load and temperature after assembly.
- E. The variable speed drives shall be Allen-Bradley, or equal, Powerflex 753. All drives shall be by the same manufacturer.
- F. Minimum, maximum, and harmonic skip speed setpoints shall be programmed into each VFD. CONTRACTOR shall coordinate these setpoints with the manufacturer of the equipment served.

## 2.05 MOTOR CONTROL CENTERS

- A. Disconnect devices for motors shall be installed in Motor Control Centers, except where shown to be remote-mounted at the motor location. Disconnect devices shall be NEMA rated, sized according to application as specified. MCC drawings provided by the MCC manufacturer will not be accepted as shop drawing submittals or O&M documents.
- B. All units shall be provided with a mechanical interlock with the unit door to prevent access unless the disconnect is in the off position. A defeater shall be provided to bypass this interlock. With the door open, an interlock shall be provided to prevent inadvertent closing of the disconnect.
- C. Padlocking facilities shall be provided to positively lock the disconnect in either the on or off position with from one to three padlocks whether the door is open or closed.
- D. Terminal blocks for NEMA Type B assemblies shall be mounted within the unit and shall be factory-wired. Provide a minimum of 25% spare terminals for all terminal blocks furnished.
- E. Wiring in Control Centers shall be Type B.
- F. Control Centers shall include NEMA 1 gasketed enclosures, unless otherwise noted.
- G. All lighting panelboards shall be Cutler Hammer Pow R-Line 1a, or equal, with 10,000 amps interrupting capacity, at 120/240- or 120/208-volt, single- or three-phase, 3- or 4-wire with branch breakers as shown on drawings, unless indicated otherwise. Branch-mounted main circuit breakers will not be allowed. Minimum size shall be 20 inches

wide by 5 3/4 inches deep. All bus shall be copper. Provide laminated, typewritten panel schedule for all panelboards at project final completion.

- H. All internal wiring shall be color-coded, numbered, and each wire shall be terminated on terminal strips, including internal spares, field wiring, and spare field wires. Schematic and wiring layout drawings following JIC Standards which show all connections to external devices, a complete bill of materials, and a detailed description of operation, shall be submitted for each piece of equipment.
- I. Arrangement and physical locations of all new equipment within each Motor Control Center shall be subject to shop drawing approval.
- J. All components shall be properly identified with laminated engraved nameplates with 3/8-inch-high letters (white or black). Nameplates located outdoors shall be mechanically fastened. Nameplates located indoors shall be adhesive-type.

## 2.06 ARC FLASH HAZARD WARNING LABELS FOR NEW EQUIPMENT

- A. Equipment specified herein shall be provided with arc flash hazard warning labels based on an arc flash hazard analysis performed by the equipment manufacturer. Labels and label placement shall meet the requirements of NFPA 70E, shall be bi-lingual, and shall clearly identify and mark electrical equipment to warn workers of shock, arc flash and electrocution hazards.
- B. Warning labels shall be self-adhesive vinyl, 4 inches by 6 inches, and be as manufactured by Conney Safety products, or equal.

## PART 3-EXECUTION

### 3.01 INSTALLATION

- A. Provide motor control equipment in accordance with manufacturer's instructions and drawings.
- B. Motor Starter Panelboard Installation: In conformance with NEMA PB 1.1.
- C. Overloads shall be selected on the basis of nameplate horsepower and service factor. Selection of overloads based on horsepower shown on the drawings is not acceptable. If power factor correction capacitors are provided, overload protection shall be compensated for the lower motor running current due to improved power factor.
- D. All motor control wiring shall be installed in accordance with control wiring diagrams furnished.
- E. Wireways in motor control centers and starter control panels shall be used only for routing of conductors. Splices are not allowed within wireways.
- F. All wiring within motor control centers and starter control panels shall be landed on terminals inside buckets or equipment compartments, and not left unterminated within wireways. This shall include all internal MCC/control panel wiring and external field wiring, including spare wires.

- G. Motor Data: Provide neatly-typed label inside each motor starter enclosure identifying motor served, nameplate horsepower, full-load amperes, code letter, service factor, and voltage/phase rating.
- H. Control wiring and field wiring (120 V and below) within MCCs and starter enclosures shall be separated from power wiring (277 V and above). Where possible, route control and field wiring in separate raceways or wireways. Provide a minimum of 2 inches separation between control wiring, field wiring, and power wiring.
- I. All motors will be provided by other divisions or Others, ready for connections. CONTRACTOR shall be responsible for electrical connections for power and control circuit wiring, proper phase relationships, and correct motor rotation.
- J. Provide motor circuit wiring for each motor from the source of supply to the terminal box on the motor including all intermediate connections at devices such as motor starters, disconnect switches, etc.
- K. All feeder cable connections to motor leads up to 600 volts shall be insulated and sealed with factory-engineered kits, as specified in Section 16120-Wire.
- L. Provide motor starters as specified for all motors, unless shown or specified that starters or control equipment will be furnished by others.
- M. Provide motor circuit disconnect devices for all motors, unless shown or specified that disconnect devices or starters are furnished with other equipment.

## 3.02 MOTOR STARTER DESCRIPTIONS

### A. INTERMEDIATE PUMP (IP-10-01) VFD ENCLOSURE

#### 1. Requirement:

##### Motor Information:

HP/KW: 40 HP

Volts: 480 V

FLA: 52 A

##### Motor Controller Information

Type: VFD

Breaker Type: Thermal-magnetic

Breaker Size: 100 Amps, 3-Pole

Control Devices: Hand-Off-Auto, Green Run, Red VFD Fault, Red Motor Overtemp, Red High Pressure, ETM, Reset pushbutton

#### 2. H-O-A selector switch:

- a. With the H-O-A selector switch in the "Hand" position, the motor shall start and run at the speed set on the VFD HIM mounted on the front of this control panel, bypassing all controls (unless noted otherwise).
- b. With the H-O-A selector switch in the "Off" position, the motor shall be inoperable.
- c. With the H-O-A selector switch in the "Auto" position, the motor shall be controlled from the existing low lift wet well low level and start level float switches currently wired to the existing low lift pump panel such that the pump runs whenever the level in the wet well rises to the start level float switch and shuts down whenever the level in the wet well falls below the low level float switch. The motor speed shall be controlled from the VFD HIM mounted on the front of this control panel whenever the motor is running.

- d. Provisions shall be made to accept a future stop signal from a SCADA System that bypasses the float switch controls and shuts down the pump while in Auto mode. Stop input terminals shall be temporarily jumpered to allow the pump to run off of the float switches as described above until a SCADA System is installed.
3. Motor has internal thermal overloads which shall shut down the motor and indicate an alarm at the SCADA System in the event of over-temperature (Hand and Auto modes). Manual reset shall be required to restart the motor. Internal thermal overloads shall be wired so that momentary power interruptions do not shut down motor.
4. There is a pressure switch (PS-10-01) on the discharge of the pump that shall shut down the pump in the event of a high discharge pressure condition (Hand and Auto modes). A time delay (0-30 seconds, adjustable) shall be provided on the pressure switch to avoid nuisance tripping due to pressure spikes. Manual reset shall be required to restart the motor.
5. Provide auxiliary contacts for VFD run status, VFD fault status, motor overtemperature alarm status, high discharge pressure alarm, and VFD speed indication at a future SCADA System.

END OF SECTION



### HEAT TRACE

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included: This section includes furnishing, installing, and placing into successful operation heat tracing. The heat-tracing cable and appurtenances shall be furnished by the same supplier.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 REFERENCES

- A. ASTM 2633-Standard Test Methods for Thermoplastic Insulations and Jackets for Wire and Cable.
- B. IEC 216-1-Guide for determination of thermal endurance properties of electrical insulating materials.
- C. UL 746B-Standard for Polymeric Materials-Long Term Property Evaluations.

##### 1.03 SUBMITTALS

- A. Submit shop drawings, product data, and design calculations in accordance with provisions of Section 01300-Submittals.
- B. Shop drawings shall include plan drawing(s) showing each heat-trace circuit. Include a bill of material identifying all components and material for each circuit.
- C. Provide product data on heating cables, end terminations, power connections, thermostats, and all accessories.
- D. Provide design calculations showing the following as a minimum:
  - 1. Circuit identification number.
  - 2. Pipe temperature to be maintained.
  - 3. Thermostat type and quantity.
  - 4. Line size and insulation type.
  - 5. Heat loss for valves, pipes and supports.
  - 6. Amount and type of heating cable required, as well as number of circuits required.
  - 7. Areas of pipe where spiral wrapping of heating cable is required.
  - 8. Heating cable service voltage.
  - 9. Heating cable power output required to maintain the required pipe temperature.
  - 10. Ambient temperature used in above calculations.
  - 11. Circuit breaker sizing and quantity.

## 1.04 QUALITY ASSURANCE

- A. Electrical components must be listed and labeled as defined in NFPA 70, Article 100.
- B. All components shall be listed by Underwriters Laboratories.

## PART 2-PRODUCTS

### 2.01 MANUFACTURERS

- A. Raychem/Tyco Thermal Controls.
- B. Chromalox.
- C. Substitutions: Under provision of the General Conditions.
- D. The drawings and specifications were prepared based on Raychem/Tyco. CONTRACTOR shall include in the Bid, and shall be responsible for, the cost of any changes to accommodate other equipment including, but not limited to, structural, mechanical, and electrical work. This shall include equal manufacturers specified above. CONTRACTOR shall also pay additional costs necessary for revisions of drawings and/or specifications by ENGINEER.

### 2.02 SELF-REGULATING HEATING CABLES

- A. Freeze Protection:
  - 1. The cable shall vary its power output relative to the temperature of the surface of the pipe or vessel. The cable shall be designed such that it can be crossed over itself and cut to length in the field.
  - 2. The cable shall have a useful life of 20 years or more with continuous power including:
    - a. Seventy-five percent of nominal power after 20 years of operation at maximum continuous exposure temperature.
    - b. Ninety percent of nominal power after 1,000 hours of operation at intermittent exposure temperature.
  - 3. The cable shall consist of two 16 AWG nickel-plated copper bus wires embedded in a self-regulating conductive core with a modified polyolefin jacket (cable inner jacket). The cable shall be suitable for use on plastic or metallic pipes. Cables shall have a temperature identification number (T-rating) of T6 without use of thermostats.
  - 4. The cable inner jacket shall be covered with a tinned copper braid with a resistance less than the heating cable bus wire resistance. The braid shall be protected from chemical attack and mechanical abuse by a fluoropolymer (for environments where cable will be exposed to organic chemicals or corrosives) jacket.
  - 5. Each circuit shall have a 30 mA ground fault protection device with a nominal 100 ms response time.
  - 6. The cable shall be supplied to provide 8 W/ft.
  - 7. The cable shall not have an increasing power output after being reenergized after exposure to 350°F for 30 minutes while energized.
  - 8. The cable shall be suitable for use with 120 VAC single phase, 60 Hz, supply voltage.

## 2.03 CONTROLS

- A. Local: Mechanical Thermostat shall be a fluid filled (silicone) remote bulb and capillary type with an adjustable setpoint between 15°F and 140°F. Bulb and capillary shall be constructed of 300 series stainless steel. Thermostat and remote bulb/capillary shall be suitable for installation in ambient temperatures of -40°F to +160°F. Enclosure shall be NEMA 4X, polyurethane-coated cast aluminum with stainless steel hardware and be equipped with at least one 3/4-inch NPT conduit entry. The thermostat shall have a 22 amp rating at 125/250/480 Vac, open on rise SPST switch. Coordinate with cable manufacturer on make and model of thermostat.

## 2.04 ACCESSORIES AND COMPONENTS

- A. Manufacturer-recommended installation tape (glass or aluminum) shall be provided depending on pipe type and installation environment.
- B. Heat-trace labels shall be manufacturer's standard material and size. Labels shall clearly include the wording "Electric Heat Tracing."
- C. Pipe straps shall be stainless steel and sized for the pipes on which they will be used. One size fits all pipe straps are not acceptable.
- D. Power connections shall be specifically designed for the heating cable being supplied and be from the same manufacturer as the heating cable. Power connections shall include NEMA 4X thermoplastic junction box with indicating light, stand, core sealer, and all accessories for making the connection from standard single conductor branch cables to the heat trace cable. Stand shall provide enough distance between the process pipe and the junction box to accommodate up to 4 inches of thermal pipe insulation. Terminations shall be rated for a maximum operating voltage of 480 Vac.
- E. Splice kits shall be specifically designed for the heating cable being supplied and be from the same manufacturer as the heating cable. Splice kits shall include splice housing, sealing grommets, core sealers and all accessories for making a cold-applied, low-profile, in-line splice of heating cable. Completed splice shall provide NEMA 4X protection for the completed splice. Splice shall be rated for operating voltage and required current of the cable being spliced.
- F. Tee connections shall be specifically designed for the heating cable being supplied and be from the same manufacturer as the heating cable. Tee kits shall include tee enclosure with lid, stand, core sealers and all accessories for making the tee connection. Enclosure shall be electrostatic charge-resistant glass-filled engineered polymer and provide NEMA 4X protection for the completed tee connection. Stand shall provide enough distance between the process pipe and the junction box to accommodate up to 4 inches of thermal pipe insulation. Tee connection shall be rated for the operating voltage and required current of the cable being connected.
- G. End seals shall be specifically designed for the heating cable being supplied and be from the same manufacturer as the heating cable. End seals shall be above-insulation cold-applied type. End seals shall project through the thermal insulation on the process pipe. End seals shall be reenterable. End seal stand shall provide enough distance between the process pipe and the seal to accommodate up to 4 inches of thermal

insulation between the process pipe and the seal. End seal shall be rated for the operating voltage of the cable being sealed.

## PART 3-EXECUTION

### 3.01 SYSTEM DESIGN

- A. The heat trace system shown on the drawings is diagrammatic and is intended only to show the process piping that must be heat traced. Heat trace system supplier shall use the information shown on the drawings to prepare plan drawings showing all system components such as thermostats, power connections, end seals, etc., for use by CONTRACTOR.
- B. Provide design calculations showing the following as a minimum:
  - 1. Circuit identification number.
  - 2. Pipe temperature to be maintained.
  - 3. Thermostat type and quantity.
  - 4. Line size and insulation type.
  - 5. Heat loss for valves, pipes, and supports.
  - 6. Amount and type of heating cable required, as well as number of circuits required.
  - 7. Areas of pipe where spiral wrapping of heating cable is required.
  - 8. Heating cable service voltage.
  - 9. Heating cable power output required to maintain the required pipe temperature.
  - 10. Ambient temperature used in above calculations.
  - 11. Circuit breaker sizing and quantity.

### 3.02 INSTALLATION

- A. Install all heat-tracing cable and appurtenances in accordance with manufacturer's recommendations.
- B. For process pipes smaller than 4 inches, local thermostats shall be wall- or stand-mounted.
- C. Coordinate installation with Division 15 contractor and install heat tracing prior to installation of piping insulation. See mechanical drawings for insulation details.
- D. All cables shall be protected from damage during construction.
- E. Protect cable ends from chemicals, mechanical damage, and moisture by means of a manufacturer-approved and provided end seal.
- F. Install heating cable to cold lead connections in accessible locations.
- G. Provide heat-trace labels located on the outside of the mechanical insulation on the pipe. Labels shall be applied every 10 feet, alternating sides of the pipe.
- H. Power connections, splice connections, tee connections, and end seals shall be installed per manufacturer's installation requirements.

## 3.03 TESTING

- A. Factory testing shall include all testing required by the latest edition of IEEE 515 and manufacturer's standard testing.
- B. Perform following testing after installation, but prior to installation of insulation or other coverings:
  - 1. Test continuity prior to energizing.
  - 2. Test insulation resistance in cables before energizing per manufacturer's instructions. Remove and replace cables with measured resistance less than 20 megaohms to ground.
- C. Perform the following testing after insulation has been installed: Test insulation resistance in cables before energizing according to manufacturer's instructions. Remove and replace cables with measured resistance less than 20 megaohms to ground.
- D. Verify rated power input. After energizing, test voltage and current simultaneously.
- E. All test reports and megger readings shall be submitted to ENGINEER.

END OF SECTION

### INSTRUMENT AND COMMUNICATION WIRE AND CABLE

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included: This specification contains the requirements for instrument wire and cable as opposed to electrical power wire and cable.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 QUALITY ASSURANCE

- A. Standards: Comply with standards specified in this section as listed in Division 1.
- B. Qualifications of Installers: Use skilled workers who are thoroughly trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work.

##### 1.03 PRODUCT HANDLING

- A. Instrument cable shall be furnished in lengths as necessary.
- B. Reels, coils, or package rolls of instrument cable shall be identified with the project name and other tagging identification as called for.

##### 1.04 SUBMITTALS

- A. Submit shop drawings and product data in accordance with provisions of Section 01300-Submittals.

#### PART 2-PRODUCTS

##### 2.01 GENERAL

- A. All materials of construction for cable and wire shall be compatible and noncontaminating.
- B. Unless otherwise noted in these specifications, the requirements herein listed shall be strictly adhered to.

##### 2.02 SHIELDED PAIR CABLING FOR ELECTRONIC INSTRUMENTS

- A. Shielded pair cabling shall have stranded, tinned-copper conductors, No. 16 AWG, twisted with 2-inch lay.
- B. Insulation of conductors shall be 15 mil, 90°C minimum PVC, rated for 300 volts. Materials shall equal or exceed UL 13 requirements for physical properties.

- C. Color coding shall be manufacturer's standard or as stated.
- D. The outer jacket shall be flame-retardant and weather- and ultraviolet-resistant PVC, 35 mils thick, and 80°C minimum rating. The outer jacket shall contain a ripcord and shall equal or exceed the requirements of UL 1277. Cable shall be UL labeled as power-limited circuit cable.
- E. If the cabling is not installed in steel conduits, a 100% coverage shield shall be applied over the insulated conductors. The shield shall consist of a 0.85 mil minimum thickness aluminum mylar tape. A No. 18 AWG, seven-strand, tinned-copper drain wire shall be furnished in continuous electrical contact with the shield.
- F. Single-pair shielded cables shall be Belden 9316, or equal.

## PART 3-EXECUTION

### 3.01 INSTALLATION REQUIREMENTS AND SPECIAL CONSIDERATIONS

- A. Shielded pair cabling specified in this section shall be installed in conduit, and may not be run free-air or in nonmetallic tubing such as innerduct.
- B. Although twisted conductors effectively reduce magnetic noise, where additional magnetic shield is necessary to minimize interference from stray magnetic fields, armored cable shall be provided.
- C. Since magnetic interference is produced by currents flowing through conductors and electrical equipment, any instrument wire run near electric motors, generators, transformers, induction heaters, circuit breakers, motor starters, or AC power and control cables may need additional magnetic shielding.

### 3.02 GROUNDING

- A. Shielded cabling shall be installed in accordance with manufacturer's instructions and to minimize electrical noise and interference to associated instruments. Refer to instrument manufacturer's instructions for additional requirements.
- B. Ends of signal wires shall be sealed to prevent the migration of moisture into the cable and to prevent unintentional grounding of the shield at the open end. Seal signal wires using a minimum 1-inch piece of heat-shrink tubing installed over PVC jacket and individual wires, and heat-shrink to a watertight fit.
- C. All shields must be grounded.
- D. Shields shall be grounded at one point only. Shielded cabling shall be isolated and left open at the instrument.
- E. Cable shield grounds shall be isolated from control system signal grounds, except at instrument system grounding electrodes.

END OF SECTION

### SPARE PARTS

#### PART 1-GENERAL

##### 1.01 SUMMARY

- A. Work Included: Spare parts for applicable sections of Division 16 as noted below.
- B. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

##### 1.02 QUALITY ASSURANCE

- A. UL Labels: All electrical equipment and material shall be listed and labeled by Underwriters Laboratories, except where UL does not include the equipment in their listing procedures.
- B. NEMA/ANSI Compliance: Comply with National Electrical Manufacturer's Association, American National Standards Institute, and other standards pertaining to material, construction, and testing where applicable.

##### 1.03 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. All electrical equipment and material shall be received and stored with the factory winter-proof wrapping intact. Provide factory-wrapped waterproof flexible barrier metal for factory packaging of equipment and material to protect against physical damage in transit. When applicable, equipment stored shall be in factory coverings in a clean, dry, indoor space which provides protection against the weather.
- B. All spare parts shall be suitably boxed or wrapped to prevent deterioration and shall be completely identified on the outside.

#### PART 2-PRODUCTS

##### 2.01 ACCEPTABLE MANUFACTURERS

- A. Spare parts specified herein shall be provided by the manufacturer listed in the section where the equipment is specified.

##### 2.02 STARTER CONTROL PANELS

- A. The following shall be furnished:
  - 1. Two spare fuses for each type of control and current-limiting fuse provided.
  - 2. One set of fuses for each VFD size (horsepower) provided.
  - 3. Two replacement lamps and lamp replacement tool for push-to-test indicating lights.
  - 4. One replacement relay for each type of relay provided, including time-delay relays.
  - 5. One control power transformer for each size provided.
  - 6. Replacement filters for each size and/or type of filter provided.



PART 3-EXECUTION

NOT APPLICABLE

END OF SECTION

STANDARD SPECIFICATIONS FOR UTILITY AND STREET CONSTRUCTION  
IN  
KENTUCKY

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## SECTION 1-MATERIALS AND EQUIPMENT

### 1.1 GENERAL

Materials provided shall be suitable for the conditions in which they are being installed and used. CONTRACTOR shall review installation requirements of the Contract with material suppliers and incorporate any additional installation requirements necessary to meet the required use within the price bid for the Work.

All material shall conform to the type, size, and shape shown on the Drawings and as specified.

All material in contact with potable water shall meet NSF Standards 60 and 61.

All pipe and materials used in performance of the Work shall be clearly marked as to strength, class, or grade. Pipe and materials not so marked shall be subject to rejection.

When requested by ENGINEER, material suppliers shall furnish certificates of compliance indicating that all tests required by the various Standards have been conducted and that the test results comply with the Standards.

#### 1.1.1 REFERENCED SPECIFICATIONS

Unless the text indicates otherwise (e.g., see Materials Standards), Standard Specifications shall refer to Division 20 Standard Specifications for Utility and Street Construction in Kentucky.

KYDOH Specifications in the Standard Specifications shall refer to the *State of Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, Latest Edition*.

Best Management Practices in the Standard Specifications shall refer to *Kentucky's Best Management Practices for Construction Activities*.

#### 1.1.2 MATERIAL STANDARDS

This listing of Material Standards is provided for convenience only and may not be all inclusive.

AASHTO	M36	Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains.
	M148	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
	M167	Standard Specifications for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches.
	M252	Standard Specifications for Corrugated Polyethylene Drainage Pipe.
	M294	Standard Specifications for Corrugated Polyethylene Pipe, 300- to 1200-mm Diameter.
ACI	211.1	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
	305.1	Specification for Hot Weather Concreting.
	306.1	Standard Specification for Cold Weather Concreting.

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ANSI	A21.10	Ductile-Iron and Gray-Iron Fittings for Water.
	A21.11	Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
	A21.5	Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
	A21.51	Ductile-Iron Pipe, Centrifugally Cast, for Water.
	B16.1	Cast Iron Pipe Flanges and Flanged Fittings Classes 25, 125, and 250.
ASTM	Z60.1	American Standard for Nursery Stock
	A48	Specification for Gray Iron Castings.
	A126	Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
	A240	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
	A479	Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels.
	A615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
	B62	Standard Specification for Composition Bronze or Ounce Metal Castings.
	B88	Standard Specification for Seamless Copper Water Tube.
	C14	Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
	C32	Specification for Sewer and Manhole Brick (Made From Clay or Shale).
	C33	Standard Specification for Concrete Aggregates.
	C76	Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
	C90	Standard Specification for Loadbearing Concrete Masonry Units.
	C139	Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
	C140	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
	C270	Specification for Mortar for Unit Masonry.
	C301	Test Method for Vitrified Clay Pipe.
	C425	Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.
	C443	Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
	C470	Specification for Molds for Forming Concrete Test Cylinder Vertically.
	C478	Standard Specification for Precast Reinforced Concrete Manhole Sections.
	C497	Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
	C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
	C655	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe.
	C700	Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.
	C828	Standard Test Method for Low-Pressure Air Test of Vitrified Clay Pipe Lines.

- C913 Standard Specification for Precast Concrete Water and Wastewater Structures.
- C923 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
- C924 Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.
- C1214 Standard Test Method for Concrete Pipe Sewerlines by Negative Air Pressure (Vacuum) Test Method.
- C1244 Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.
- C1433 Standard Specifications for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains and Sewers.
- D1557 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>).
- D1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- D1785 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- D2152 Standard Test Method for Adequacy of Fusion of Extruded Poly (Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion.
- D2240 Standard Test Method for Rubber Property—Durometer Hardness.
- D2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- D2321 Practice for Underground Installation of Flexible Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
- D2339 Standard Test Method for Strength Properties of Adhesives in Two-Ply Wood Construction in Shear by Tension Loading.
- D2412 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
- D2464 Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
- D2466 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- D2467 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
- D2564 Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
- D2672 Standard Specification for Joints for IBS PVC Pipe Using Solvent Cement.
- D2680 Specification for Acrylonitrile–Butadiene–Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.
- D2751 Specification for Acrylonitrile–Butadiene–Styrene (ABS) Sewer Pipe and Fittings.
- D2855 Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- D3034 Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.



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	D3139	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
	D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
	D3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
	D3965	Standard Specifications for Rigid Acrylonitrile–Butadiene–Styrene (ABS) Compounds for Pipes and Fittings.
	D4101	Specification for Propylene Plastic Injection and Extrusion Materials.
	D4475	Standard Test Method for Apparent Horizontal Shear Strength of Pultruded Reinforced Plastic Rods By The Short-Beam Method.
	F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
	F593	Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
	F594	Standard Specification for Stainless Steel Nuts.
	F679	Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
	F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
	F1417	Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.
AWWA	C104	Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
	C105	Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
	C110	Standard for Ductile-Iron and Gray-Iron Fittings, 3 Inches Through 48 Inches For Water.
	C111	Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
	C115	Standard for Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges.
	C150	Standard for the Thickness Design of Ductile-Iron Pipe.
	C151	Standard for Ductile-Iron Pipe, Centrifugally Cast for Water or Other Liquids.
	C153	Standard for Ductile-Iron Compact Fittings, 3 Inches (76 mm) Through 64 Inches (1,600 mm), for Water Service.
	C300	Standard for Reinforced Concrete Pressure Pipe, Steel-Cylinder Type.
	C301	Standard for Prestressed Reinforced Concrete Pressure Pipe, Steel-Cylinder Type.
	C302	Standard for Reinforced Concrete Pressure Pipe, Noncylinder Type.
	C500	Standard for Metal-Seated Gate Valves for Water Supply Service.
	C502	Standard for Dry-Barrel Fire Hydrants.
	C504	Standard for Rubber-Seated Butterfly Valves.
	C507	Standard for Ball Valves 6 Inches Through 48 Inches (150 mm Through 1,200 mm).
	C508	Standard for Swing-Check Valves for Waterworks Service, 2-In. Through 24-In. (50-mm Through 600-mm) NPS

C509	Standard for Resilient-Seated Gate Valves for Water Supply Service.
C600	Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.
C605	Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
C651	Standard for Disinfecting Water Mains.
C800	Standard for Underground Service Line Valves and Fittings.
C900	Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inches Through 12 Inches (100 mm through 300 mm), for Water Distribution.
C901	Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. (13 mm) Through 3 in. (76 mm), for Water Service.
C905	Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 Inches through 48 Inches (350 mm through 1,200 mm) for Water Transmission and Distribution.
C906	Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1575 mm) for Water Distribution and Transmission.
C907	Standard for Polyvinyl Chloride (PVC) Pressure Fittings for Water—4 In. Through 8 In. (100 mm Through 200 mm).
M55	PE Pipe-Design and Installation.

## 1.2 PIPE

The type of pipe to be used in the Project shall be as specified in the STANDARD APPLICATIONS table in the **SPECIAL PROVISIONS** or as shown on the Drawings.

Rigid pipes are defined as pipe manufactured of such materials as concrete or clay.

Thermoplastic pipe shall be defined as pipe manufactured of such materials as PVC or other plastics.

### 1.2.1 REINFORCED CONCRETE PIPE

Reinforced concrete pipe shall meet ASTM C76 for circular pipe, ASTM C507 for elliptical pipe, ASTM C655 for D-load pipe, or ASTM C1433 for box culvert pipe.

All reinforced concrete pipe used in the Work shall be of adequate strength to support the construction and trench loads applied.

Not more than one lift hole per length of pipe shall be used in storm sewer. Lift holes will not be permitted in sanitary sewers.

All reinforced concrete pipe and fittings shall be provided with joints and gaskets which meet ASTM C443. Joints for storm and sanitary sewer shall be sealed with rubber gaskets having a continuous O-ring cross-section. Joints for elliptical pipe shall be sealed with an application of a trowelable bitumastic joint sealant on the inside of the joint. All pipe shall be specifically built to fit the gasket used.

Reinforced concrete pipe shall be of the class as shown on the Drawings or in the **SPECIAL PROVISIONS** and shall have a minimum "B" wall construction.

Sanitary sewer pipe shall be provided with either a smooth exterior wall (i.e., no bell), or with an R-4 big bell joint.

All reinforced concrete pipe used for sanitary sewer shall be vacuum tested from end to end at the factory in accordance with ASTM C1214. Test result, date, pipe class, date of manufacture, and individualized pipe I.D. shall be clearly marked on each pipe. Written vacuum test results for each pipe I.D. shall be kept and submitted to ENGINEER. ENGINEER shall be provided an opportunity to observe all tests.

Acceptance of reinforced concrete pipe shall be on the basis of plant load-bearing tests, material tests, and inspection of manufactured pipe for visual defects and imperfections.

Reinforced concrete bends, tees, and reducers shall be manufactured to provide for the required transitions as shown on the Drawings. Sufficient additional reinforcement shall be added at the spring lines and top and bottom of the pipe to prevent shearing after installation. Repairs to complete fabricated pipe fittings shall be such that the completed unit shall have the same strength as that of the remainder of the pipe barrel and the concrete used to complete the section shall not spall or separate.

## 1.2.2 CLAY PIPE

Vitrified clay pipe and fittings shall conform to ASTM C700. Pipe and fittings shall be extra strength. Joints shall be compression type joints conforming to ASTM C425.

## 1.2.3 COMPOSITE PIPE (PVC AND ABS)

Composite pipe shall meet the requirements of ASTM D2680. Resin used in the manufacture of PVC composite sewer pipe and fittings shall have cell classification 12454-B or 12454-C as defined in ASTM D1784. Resin used in the manufacturer of ABS composite pipe and fittings shall have cell classification of 1-0-2-2-3 of ASTM D3965.

Acceptance of piping shall be subject to tests conducted by an approved testing agency.

Attachment of couplings and saddle fittings and field joining of pipe sections and fittings shall be accomplished by solvent welding or rubber gaskets in accordance with the recommendations of the pipe manufacturer. All exposed filler material shall be field-coated with ABS or PVC Solvent Cement. Approved adapters shall be provided for transitions to other types of pipe.

Pipe shall be subject to rejection for failure to conform to material requirements of ASTM D2680 or for any of the following reasons:

- a. Distortion or puncture of the inner plastic shell. Distortion or punctures of the outer shell shall not be reasons for rejection if the inner shell is unaffected and such exterior distortion or puncture is suitably repaired with a solvent-welded patch.
- b. Voids in the concrete filler at pipe ends, exceeding 1 inch in depth as measured from the pipe end and exceeding 10% of the pipe circumference. However, this pipe may be used if the faulty pipe end is sawed off and field-coated.
- c. Through cracks in coupling.

## 1.2.4 SOLID WALL PVC

Polyvinyl Chloride (PVC) pipe shall meet the requirements of ASTM D3034 for pipe sizes 4 inches through 15 inches and ASTM F679 for pipe sizes 18 inches through 36 inches.

PVC material for ASTM D3034 pipe shall have cell classification 12454-B or 12454-C as defined in ASTM D1784 with minimum modulus of elasticity of 400,000 psi. Pipe stiffness shall be minimum 46 psi when tested in accordance with ASTM D2412. Pipe shall have a maximum standard dimension ratio (SDR) of 35.

PVC material for ASTM F679 pipe shall have cell classification 12454 or 12364 as defined in ASTM D1784 with a minimum modulus of elasticity of 500,000 psi. Pipe stiffness shall be a minimum 115 psi when tested in accordance with ASTM D2412.

Pipe and fittings shall be the product of one manufacturer and the manufacturer shall have experience records substantiating acceptable performance of the pipe and fittings to be furnished. The minimum wall thickness of fittings shall be the same as the pipe to which it connects.

Acceptance of piping and fittings shall be subject to tests conducted by an approved testing agency in accordance with ASTM D3034 and/or ASTM F679.

Fittings such as saddles, elbows, tees, wyes, and others shall be of material and construction corresponding to and have a joint design compatible with the adjacent pipe. Approved adapters shall be provided for transitions to other types of pipe.

Joints shall be of the elastomeric type for pipes 4 inches or larger and elastomeric or solvent cement for pipes less than 4 inches.

Elastomeric joints shall be a bell and spigot joint conforming to ASTM D3212 sealed by a rubber gasket conforming to ASTM F477 so that the assembly will remain watertight under all conditions of service, including the movements resulting from the expansion, contraction, settlement, and deformation of the pipe. Bells shall be formed integrally with the pipe and shall contain a factory-installed positively restrained gasket.

Solvent cement joints shall be assembled using solvent cement obtained from the pipe manufacturer, which conforms to the requirements of ASTM D2564.

The assembled joint shall pass the performance tests as required in ASTM D3212.

## 1.2.5 OPEN PROFILE WALL PVC (18 INCH AND LARGER PIPE ONLY)

Open profile PVC pipe and fittings shall meet the requirements of ASTM F794. Fittings shall also conform to ASTM D3034 SDR 35. Pipe shall have smooth interior with a ribbed exterior. Exterior ribs shall be perpendicular to the axis of the pipe to allow placement of gaskets without additional cutting or matching. Pipe shall have solid wall cross-section—no voids between inner and outer surfaces of pipe wall.

PVC materials shall have cell classification 12454-B or 12454-C as defined in ASTM D1784 with minimum modulus of elasticity of 400,000 psi in tension. Pipe stiffness shall be minimum 46 psi when tested in accordance with ASTM D2412. Impact strength shall equal or exceed values given in ASTM D3034 or F679.

Pipe and fittings shall be the product of one manufacturer and the manufacturer shall have an experience record substantiating acceptable performance of the pipe to be furnished. Fittings shall be injection molded.

All joints shall be of the flexible elastomeric type with bells and spigots conforming to ASTM D3212. Gaskets shall conform to ASTM F477. All bells shall be formed integrally with the pipe. Elastomeric gasket shall be positively restrained in ribs on spigot of pipe.

Acceptance of piping shall be subject to tests conducted by an approved testing agency in accordance with ASTM F794.

Fittings such as saddles, elbows, tees, wyes, and others shall be of material and construction corresponding to, and have a joint design compatible with the adjacent pipe. Approved adapters shall be provided for transitions to other types of pipe. Fittings shall be molded.

Joints shall be sealed with elastomeric gaskets meeting the requirements of ASTM F477. Solvent cement shall not be used to join pipe lengths or fittings to pipe lengths. The assembled joint shall pass the performance tests as required in ASTM D3212.

The pipe wall will be homogeneous and contain no seams. Minimum pipe stiffness per ASTM D2412 shall be 60 psi for 18 inch and 46 psi for 21 inch and larger pipe sizes. Pipe shall withstand impact of 210-foot-pounds for 8 inch and 220-foot-pounds on larger sizes. Standard lengths shall be 13-foot or 20-foot lengths. Pipe shall withstand flattening up to 60% without cracking, splitting, or breaking and pass acetone immersion in accordance with ASTM D2152.

## 1.2.6 GRAVITY SANITARY SEWER SERVICE BRANCHES AND LATERALS

Branches (tees and wyes) shall be of the same material as the main except for reinforced concrete pipe used for sanitary sewer. For such reinforced concrete pipe, special branches shall be furnished and installed to accept the lateral. Such special branches are subject to review by ENGINEER.

If a different thermoplastic material is specified for laterals than for the main line, appropriate solvent welds, fittings, and other appurtenances shall be provided to effect a water tight seal.

Fittings for laterals shall be of the same material as the lateral pipe unless special fittings are needed for transition between material types or sizes or standard fittings are not manufactured.

Where the wye or tee branches and laterals are of dissimilar materials, CONTRACTOR shall provide a transition coupling, Fernco, or equal, designed to join the two pipe materials matching flow line elevations. All bands and other metal components on couplings shall be stainless steel.

All fittings used, including type of jointing, are subject to review by ENGINEER. See **SPECIAL PROVISIONS** for any additional requirements.

## 1.2.7 STEEL OR ALUMINUM CORRUGATED PIPE

Corrugated pipe composed of corrosion-protected steel or of aluminum shall meet the requirements of AASHTO M36 and of structural steel plate shall meet the requirements of M167. Pipe provided shall be new and free of defects and scale. Pipe and fittings that are dented, deformed, or have damaged coatings shall be removed from the site at CONTRACTOR's expense.

The average inside diameter of circular pipe shall not vary more than 1/2 inch or 1%, whichever is greater, from the nominal diameter.

The span and rise dimensions shall not vary more than 1 inch or 2% of the equivalent circular diameter, whichever is greater.

Coupling bands shall conform to AASHTO M36 and shall be made of the same base metal as the pipe. The bands shall not be less than 7 inches wide for diameters of 8 inches to 30 inches, inclusive; not less than 12 inches wide for pipe with diameters 36 inches to 60 inches, inclusive; and not less than 24 inches wide for pipe with diameters greater than 60 inches. Such bands shall be so constructed as to lap on an equal portion of each of the pipe sections to be connected and preferably shall be connected at the ends by galvanized angles having minimum dimensions of 2 by 2 by 3/16 inches.

All connections shall be shop fabricated where possible.

All cuts in corrugated pipe and pipe arch shall be saw cut. Connections cut in the field shall be saw cut with a saddle connection of 16-gauge material bolted on the corrugated pipe with 1/2-inch-diameter galvanized bolts.

## 1.2.8 HIGH DENSITY POLYETHYLENE (HDPE) CORRUGATED PIPE

Corrugated pipe composed of high density polyethylene shall meet the requirements of AASHTO M252 and M294. Pipe and fittings shall be made from virgin polyethylene compounds conforming to ASTM D3350.

Pipe shall have interior smooth inner wall of full circular cross section with an integrally formed outer corrugated wall AASHTO Type S designation.

Fittings may be molded or fabricated and shall not impair the integrity or function of the pipe. Only fittings supplied or recommended by pipe manufacturer shall be used. Where elastomeric gaskets are required they shall conform to ASTM F477.

## 1.2.9 IRON PIPE AND FITTINGS

General: Iron pipe shall be ductile iron conforming to AWWA C151. Fittings shall be ductile or cast iron conforming to the standards herein. Iron pipe and fittings shall be American-made: American, Clow, Griffin, Tyler, U.S. Pipe, or equal.

Ductile iron pipe shall consist of pipe centrifugally cast in metal or sand-lined molds. Pipe wall shall be homogeneous from inside to outside and shall be completely free of laminations, blisters, or other imperfections. Defects may be removed at the factory only.

Each pipe and fitting shall have the weight, class or nominal thickness, country where cast, casting period, manufacturer's mark, the year in which the pipe was produced, and the letters DI or DUCTILE cast or stamped thereon. Improper or incomplete marking will be cause for rejection of the pipe or fitting.

CONTRACTOR shall furnish certification data representing each class of pipe or fitting furnished. The certification report shall clearly state that all pipe and fittings furnished meet the appropriate AWWA specification.

Exterior Pipe: Ductile iron pipe shall be provided with mechanical joints or push-on joints where buried. Provide flanged joints inside manholes, wet wells or other such structures, and elsewhere exterior as shown on the Drawings or as specified.

Unless otherwise shown on the Drawings or specified in the **SPECIAL PROVISIONS**, buried pipe shall be minimum Pressure Class 350 with a water hammer allowance of 100 psi. Additional pipe wall

thickness shall be furnished as required by AWWA C150 for the depth of cover as shown on the Drawings when using Laying Condition 4 of AWWA C600 or the Class C Bedding Detail as shown on Drawing 01-975-43A.

Flange jointed pipe to be used elsewhere as shown on the Drawings or as specified, shall be minimum Special Thickness Class 53 conforming to AWWA C115 with a minimum rated working pressure of 250 psi and with a water hammer allowance of 100 psi. All flanged pipe shall be made up in strict accordance with AWWA C115 specifications. No field make-up flanges will be allowed unless strictly conforming to AWWA C115 with facing done after turning pipe through flange.

Linings and Coatings: Buried pipe and pipe in manholes, wet wells, and other structures shall be cement-mortar lined and asphaltic coated inside and asphaltic coated outside. Inside lining and coating shall comply with AWWA C104. Outside coating shall comply with AWWA C151. Lining and coatings shall be suitable for use with potable water systems. The asphaltic coating shall be applied over the cement lining on the inside of the pipe and directly on the outside of the pipe. The coatings shall be smooth and impervious to water without any tendency to scale off.

Exterior aboveground pipe and pipe in manholes, wet wells, and other structures shall comply with the above unless specified otherwise in the **SPECIAL PROVISIONS**.

Polyethylene Encasement: Where required on the Drawings or specified in the **SPECIAL PROVISIONS**, CONTRACTOR shall provide polyethylene encasement conforming to AWWA C105. Film shall be Class C–Carbon Black, with a minimum thickness of 0.008 inches (8 mils). Tape for securing the film shall be a thermoplastic material with a pressure sensitive adhesive face capable of bonding to metal, asphaltic coating, and polyethylene. Tape shall have a minimum thickness of 8 mils and a minimum width of 1 inch.

The polyethylene film envelope shall be as free as is commercially possible of gels, streaks, pinholes, particles of foreign matter, and undispersed raw materials. There shall be no other visible defect such as holes, tears, blisters, or thinning out at folds.

Tapping: In cases where corporation stops are to be tapped into mains, pipe wall thickness shall be furnished as specified in AWWA C151 to provide four threads or pipe saddles shall be furnished as approved by manufacturer.

Cutting-in and Repair Tees and Sleeves and Tapping Tees: Cutting-in and repair tees and sleeves and tapping tees shall be of ductile or cast iron with the same rated working pressure of the pipe in which they are installed but no less than 150 psi.

Exterior Joints, Fittings, and Gaskets: Joints, fittings, and gaskets shall have the same rated working pressure of the pipe in which they are installed but no less than a minimum rated working pressure of 150 psi. Fittings shall be cement-mortar lined and asphaltic coated inside and shall be shop primed or asphaltic coated outside as specified above for the piping in which they are being installed.

Joints, fittings, and gaskets for buried piping shall be mechanical joint or push-on joint conforming to AWWA C110 and AWWA C111, as well as AWWA C153 (compact), with vulcanized styrene butadiene rubber gaskets conforming to AWWA C111.

Bolts on mechanical joints shall be high-strength low-alloy steel (Corten, or equal) conforming to AWWA C111; a certificate to that effect shall be provided.

Flange joints, fittings, and gaskets to be used elsewhere as shown on the Drawings or as specified shall conform to AWWA C110, AWWA C111, and to ANSI B16.1. Gaskets for flanged piping shall be full face, minimum 1/8-inch-thick, synthetic rubber gaskets with factory-made holes for flange bolts.

Thicker gaskets shall be provided as needed to accommodate allowed tolerances in flange manufacturing.

Gaskets shall be furnished in sufficient number for all joints. Sufficient joint lubricant shall be furnished by the manufacturer with the gaskets.

## 1.2.10 PVC PIPE (AWWA)

AWWA PVC pressure rated pipe shall conform to the requirements of AWWA C900 for pipe from 4 inch through 12 inch and AWWA C905 for pipe from 14 inch through 36 inch. Pipe shall be furnished with integral elastomeric bell and spigot joints.

PVC pipe diameter shall conform to the O.D. of ductile iron pipe (DIOD). The type of PVC material, nominal pipe size, standard dimension ratio, and pressure rating shall be not less than pressure class 235 and not greater than dimension ratio 18.

Markings on the pipe shall include the following: Nominal pipe size, type of plastic pipe material, DR number, AWWA Designation with which the pipe complies, manufacturer's name, and the seal or mark of the laboratory making the evaluation of the suitability of the pipe for the transport of potable water.

## 1.2.11 PVC PIPE (SDR-PR)

Standard dimension ratio PVC pressure rated pipe shall conform to the requirements of ASTM D2241 (SDR-PR) for pipe from 4 inch through 12 inch. Pipe shall be furnished with integral elastomeric bell and spigot joints. Spigot end shall conform to ASTM D2241. Bell end shall conform to ASTM D3139. Gaskets shall meet ASTM F477.

PVC pipe diameter shall conform to galvanized iron or steel pipe sizes (IPS). The type of PVC material, nominal pipe size, standard dimension ratio, and pressure rating shall be not less than pressure class 200 and not greater than standard dimension ratio (SDR) 21.

Markings on the pipe shall include the following: Nominal pipe size, type of plastic pipe material, SDR number, pressure class rating, manufacturer's name, and the seal or mark of the laboratory making the evaluation of the suitability of the pipe for the transport of potable water.

## 1.2.12 PVC PIPE (SCHEDULE PIPE)–4 INCH OR LESS

PVC Schedule pipe 4 inch or less shall conform to the requirements of ASTM D1785 for Schedules 40, 80, or 120. Pipe shall be solvent weld type conforming to ASTM D2855 with bell conforming to ASTM D2672. Pressure rating for pipe supplied shall be minimum 150 psi. PVC pipe diameter shall conform to galvanized iron or steel pipe sizes (IPS).

## 1.2.13 HIGH DENSITY POLYETHYLENE PRESSURE (HDPE) PIPE AND FITTINGS

HDPE pressure rated pipe shall conform to the requirements of AWWA C906 for pipe from 4 inch through 63 inch. HDPE pipe shall be manufactured from material conforming to PE Code PE3608.

HDPE pipe diameter shall conform to the O.D. of ductile iron pipe (DIOD). The type of HDPE material, nominal pipe size, standard dimension ratio, and pressure rating shall be not less than pressure class 200 and not greater than a dimension ratio (DR) 9.



Markings on the pipe shall include the following: Nominal pipe size, type of plastic pipe material, DR number, pressure class rating, manufacturer's name, and the seal or mark of the laboratory making the evaluation of the suitability of the pipe for the transport of potable water.

Fittings for HDPE pipe shall conform to AWWA C906 and shall have the same pressure rating as the pipe in which they are installed.

#### 1.2.14 PVC PRESSURE PIPE fittings (4 INCH AND LARGER)

Unless otherwise specified in the **SPECIAL PROVISIONS** or shown on the Drawings, fittings for PVC pressure pipe shall be iron pipe fittings as specified herein.

#### 1.2.15 GRINDER PUMP PRESSURE SEWER PIPE AND FITTINGS (LESS THAN 4 INCH)

Grinder pump pressure sewer pipe and laterals, shall be constructed of PVC conforming to ASTM D1785 for Schedules 40, 80, or 120 or to ASTM D2241, Class 250, SDR 17 with solvent weld joints.

All fittings shall be solvent weld, 1120 PVC, Schedule 40 conforming to ASTM D2466 or Schedule 80 in accordance with ASTM D2467. Threaded fittings shall be Schedule 80 minimum conforming to ASTM D2464.

All fittings and joints shall have a working pressure rating at least equal to the pipe to which they are attached. Fittings shall be compatible with the above-specified SDR-PR or Schedule Pipe. All PVC fittings outside of manholes shall have socket or bell ends. Transitions to curb stops shall be socket type on the PVC side and threaded on the curb stop side. Fittings inside manholes shall be as shown on the Drawings. All PVC pipe and fittings shall be approved by the National Sanitation Foundation and shall bear their mark of approval.

#### 1.2.16 PIPE RESTRAINT

Pipe restraint fittings shall be provided as follows:

- a. For mechanical joints for ductile iron pipe--Megalug Series 1100 or 1100SD, by EBAA Iron Sales, Inc., or equal.
- b. For push-on joints for ductile iron pipe-- Megalug Series 1100HD or 1700, by EBAA Iron Sales, Inc., Flex-Ring, or Lok-Ring by American Cast Iron Pipe Company, TR Flex by U.S. Pipe Company, or equal.
- c. For PVC pipe with ductile iron mechanical joint fittings--Megalug Series 2000 PV by EBAA Iron Sales, Inc., or equal.
- d. For PVC push-on pipe (not solvent welded)--Megalug Series 1500 or 2800, or equal restraint system, or equal.

Gaskets that include metal locking segments vulcanized into the gasket to grip the pipe to provide joint restraint are not acceptable.

## 1.2.17 COPPER WATER TUBING

Copper tubing installed within trenches shall be Type K soft annealed seamless copper tubing and shall conform to the specifications of ASTM B88. All other copper shall be Type K hard copper conforming to ASTM B88.

The name or trademark of the manufacturer and a mark indicating the type shall be permanently and plainly marked on tubing.

Fittings for copper tubing shall be cast brass having an alloy of 85% copper, 5% tin, 5% zinc and 5% lead. They shall have uniformity in wall thickness and strength and shall be free from any defect that may affect their serviceability.

Fittings shall be of the flared or compression-type. Unions shall be extra heavy 3-part unions only.

Each fitting shall be permanently and plainly marked with the name or trademark of the manufacturer.

## 1.2.18 SURFACE WATER CROSSINGS

Unless indicated otherwise on the Drawings or in the **SPECIAL PROVISIONS**, pipe for water crossings shall be ductile iron, Flex-Ring, or Lok-Ring by American Cast Iron Pipe Company, TR Flex by U.S. Pipe Company, or equal. Type of joint is subject to the review of ENGINEER and approval of OWNER. Mechanical joints with retainer glands will not be allowed.

## 1.2.19 MISCELLANEOUS PIPE

Piping needed for repair or reconstruction of existing utilities and appurtenances shall be of the same type and strength as the existing. The type of jointing used in repair and reconstruction shall be reviewed by ENGINEER. Special fittings shall be furnished and installed as necessary for repair, reconstruction, or connection of existing facilities.

All special fittings on or for connection to utilities shall be specifically built for the type of gasket used. Special fittings shall have joints of the same type as the utility to which the connection is being made.

When sanitary sewer construction is within 50 feet of a potable well, 200 feet of a municipal well, or as requested by ENGINEER, a water main equivalent pipe shall be used. To transition from water main equivalent pipe to pipe normally supplied, a transition pipe with suitable joints to mate the two different pipes shall be supplied. No field-constructed transitions will be allowed unless reviewed by ENGINEER and approved by OWNER. Construction shall not proceed until proper transition pipe is supplied.

## 1.3 VALVES

The type of valves to be used in the Project shall be as specified in the STANDARD APPLICATIONS table in the **SPECIAL PROVISIONS** or as shown on the Drawings.

### 1.3.1 GATE VALVES

Solid wedge and double disk gate valves and resilient wedge gate valves shall conform to AWWA C500 and C509, respectively. Double disk valves shall not be used for wastewater applications. Valves shall close clockwise.

Valve stem seals shall be O-rings. The compound shall be of Buna N or NBR rubber and have a durometer hardness of 70° when tested in accordance with ASTM D2240.

Markings shall be cast on the bonnet or body of each valve and shall show the manufacturer's name or mark, the year and location valve casting was made, the size of the valve, and the designation of working water pressure.

Valves on water distribution systems and force main shall be suitable for direct burial, be provided with nonrising stems, and be equipped with a standard 2-inch-square operating nut with cast-on directional arrow.

Valves in structures as shown on the Drawings or as specified in the **SPECIAL PROVISIONS** shall be provided with nonrising stems and handwheels.

Buried or submerged valves shall be fusion bonded epoxy coated.

## 1.3.2 BUTTERFLY VALVES

Butterfly valves shall conform to AWWA C504.

Valves shall be Class 150B with ductile iron valve body.

Shaft seals shall be the self-adjusting split-V type or standard O-ring seals.

Valves shall be suitable for direct burial-type installation on water distribution mains. Valves shall close in a clockwise direction.

All valves 30 inches and larger shall be furnished with a seat, adjustable, removable, and replaceable from the interior of the pipeline. The seat shall be removable and replaceable without removing the body from the pipeline.

Valves shall be furnished with a standard AWWA 2-inch-square nut for manual wrench operation which shall be positively secured to the operator input shaft (in conformance with AWWA C500).

A self-draining, self-aligning base 4 3/4-inch- to 5-inch-diameter concentric with the input shaft shall be provided to accept a circular valve box base.

The operator shall be self-locking with a permanent factory set stop at each end of its travel. The disc shall not creep or flutter under service conditions. The valve shall seat closed at an angle of 90° from full open.

The operator shall be designed for the output torque according to AWWA C504. Maximum input torque required to develop the rated output torque shall not exceed 150-foot pounds for any size valve.

The operator case shall be completely watertight, sealed by means of approved gaskets, gasket compounds, O-rings, or threaded plugs. Operators shall be filled with a suitable oil lubricant or thoroughly coated with an approved grease at the factory. If the operator lubricant is oil, suitable fill and drain plugs shall be provided.

Buried or submerged valves shall be fusion bonded epoxy coated.

## 1.3.3 PLUG VALVES

Plug valves shall be DeZurik Series PEC, ValMatic, or equal.

Valves shall be of the nonlubricated eccentric type with resilient faced plugs and end connections as shown on the Drawings or as needed to mate with main. Plugs and upper and lower shafts shall be cast in one piece. The plug profile shall be of a cylindrical eccentric shape so that the vertical face of the plug is straight and the horizontal face is eccentrically curved in relation to the plug shafts. Segmented ball valves with spherical plugs shall not be acceptable. Port areas shall be at least 80% of full pipe area. Valve bodies shall be of ASTM A126, Class B cast iron. Resilient plug facings shall be of chloroprene, suitable for use with wastewater.

Valves shall be furnished with corrosion-resistant seats and replaceable oil-impregnated permanently lubricated stainless steel sleeve-type bearings, which comply with the latest edition of AWWA Standards C507 and C504. Valves shall be furnished with a 1/8-inch machined smooth welded overlay seat of not less than 90% nickel. Seat area shall be raised surface completely covered with weld to ensure that the plug face contacts only nickel. Screwed-in seats are not acceptable. Valve shaft seals shall be of the type utilizing a stuffing box and pulldown packing gland. Shaft seals shall be designed for replacement with the line pressurized at design pressure with the plug in both the open and closed position. Standard Alemite No. 1610-BL grease fittings shall be installed in the upper and lower journals of the plug valves.

The design of the valve and stuffing box assembly shall be such that the packing can be adjusted or completely replaced without disturbing any part of the valve or operator assembly except the packing gland follower. Stuffing boxes shall have a depth sufficient to accept at least four rings of v-type packing. Valve seating adjustment shall be accomplished without removing the valve from the pipe line and with pressure in the line.

Valve pressure ratings shall be 175 psi for valves through 12 inch and 150 psi for valves in sizes 14 inch through 24 inch. Valves shall provide drip-tight shutoff up to the full pressure rating in both seating and unseating head conditions. Valves and all accessories shall be suitable for buried and submerged water service.

All underground valves shall be equipped with cast iron telescopic adjustable valve boxes and covers. Provide 4- and 6-inch valves with valve key and stainless steel extended stems.

Plug valves 8 inches and larger shall be mounted in the horizontal, and when open, valve plugs shall be at top of valve out of flow stream. Plug valves installed in the horizontal shall have worm gear actuators. Provide same full pressure rating for gearbox as for valve. All gearing shall be enclosed in a cast iron housing of same quality as plug valve and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft and the quadrant shall be supported on permanently lubricated bronze bearings. Actuators shall indicate valve position. Buried and submerged actuators shall be suitable for direct burial or submergence and shall be mounted on a gasketed and totally enclosed actuator mounting bracket and shall have a totally enclosed and gasketed cover. Actuator shall be filled with grease. Provide OWNER with number of revolutions to open and close valves.

Extension stems shall be provided. Extension stems for submerged gear-operated valves shall be fabricated from stainless steel rod. Stems shall be provided with 2-inch operating nut.

Buried or submerged valves shall be fusion-bonded epoxy-coated.

Valves shall be equipped with open/close rotation indicator at top of extended stem. All valves shall open when the operating shaft is rotated counterclockwise.

Provide warranty on valves and valve components, 30 months from date of shipment or 24 months from date of installation, whichever is earlier.

See **SPECIAL PROVISIONS** for any additional valve requirements.

## 1.3.4 CHECK VALVES

Swing Check Valves: Swing check valves in lines carrying liquid shall be M&H Style 259, Pratt, DeZurik, American, Dresser, (lever and weight) for sizes 2 inch to 30 inch, or equal, conforming to AWWA C508, minimum 150 psi, iron body with disk to be bronze trimmed and neoprene rubber faced. Additional weights shall be used if necessary to stop slamming.

Air Cushion Swing Check Valves: Air cushion swing check valves in lines carrying liquid shall be GA Industries 250D, or equal. The swing check valves shall be constructed with a heavy cast iron or cast steel body, a bronze or stainless steel seat ring, an extra heavy noncorrosive shaft for attachment of lever and necessary weights to close valve, and a complete noncorrosive air cushion chamber. The valve shall be tight seating and shockless in operation. The seal ring shall be renewable and shall be securely held in place by a threaded joint. The air cushion chamber shall be attached to the side of the valve body externally and so constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any hammering action. Shock absorption shall be by air, and the chamber shall be so arranged that the closing speed can be adjusted to meet the service requirements. The valve disk shall be of cast iron or cast steel and shall be suspended from a noncorrosive shaft that shall pass through a stuffing box to be connected to the chamber on the outside of the valve.

## 1.3.5 GRINDER PUMP PRESSURE SEWER SHUTOFF VALVES

All shutoff valves in valve and air release manholes for low pressure grinder pump sewers shall be PVC ball valves, ASAH1, True Union, 150 psi, Plastic Systems, Cartridge Type 342, or equal.

Ball valves shall be 1120 PVC body, union nuts, stem, handle, and end connectors. Balls shall be made of either CPVC or PVC. Valves shall be equipped with replaceable Teflon seats and EPDM O-ring seals. Ball valves shall be compatible with pipe and fittings as specified herein.

## 1.3.6 CORPORATION STOPS, CURB STOPS, AND TAPPING SADDLES

Corporation stops and curb stops from 1/2 inch to 2 inch shall be brass and shall be manufactured in accordance with AWWA C800 and ASTM B62. Unless otherwise specified in the **SPECIAL PROVISIONS**, manufacturer shall be Mueller, Ford, or equal.

With PVC main, tapping saddles shall be provided for all corporation stops. Unless otherwise specified in the **SPECIAL PROVISIONS**, tapping saddles shall be Mueller, Ford, or equal, brass, 150 psi working pressure with stainless steel bands, nuts, and bolts

## 1.3.7 FIRE HYDRANTS

Fire hydrants provided under these Specifications shall conform to AWWA C502 for Dry-Barrel Fire Hydrants. Hydrants shall have the following features:

Bury Length	Approximately 3 feet to traffic flange.
Nozzle Size	One 4 1/2-inch- and two 2 1/2-inch-diameter openings.
Nozzle Threads	National standard fire hose coupling screw threads.
Drain Port:	Drain port at base of hydrant barrel. Plug drain port when hydrant installed in area where ground water level may rise above drain port.
Size of Main Valve Opening	5 1/4-inch-diameter minimum. The hydrant lead connection shall be minimum 6 inches diameter

	mechanical joint.
Torque Requirements	Hydrant shall comply with AWWA C502 even if greater than 5-foot bury.
Lubrication	Nontoxic and providing proper lubrication for a temperature range of -30° to +120° Fahrenheit.

Hydrants shall have permanent markings identifying the manufacturer by name, initials, insignia, or abbreviations in common usage, and designating the size of the main valve opening and the year of manufacture. Markings shall be so placed as to be readily discernible and legible after hydrants have been installed.

CONTRACTOR shall furnish certification to ENGINEER that the hydrant and all material used in its construction conform to the applicable requirements of AWWA C502 and the supplementary requirements thereto.

All joints on the fire hydrant leads shall be made using MEGALUG® or Uni-flange pipe restraint specified herein, or other approved restrained joint. Approximately one-half cubic yard of clear stone shall be placed from the bottom of the trench around the hydrant elbow and up the hydrant barrel. Clear stone shall be wrapped completely in filter fabric to prevent the in-migration of fine materials.

Hydrants shall be provided with reaction backing.

CONTRACTOR shall furnish all necessary fittings in the fire hydrant lead to install the fire hydrant in a plumb condition at locations shown on the Drawings and at the specified depth of bury. The pumper nozzle of all fire hydrants shall be installed with the nozzle pointing toward the street. ENGINEER reserves the right to alter the location of fire hydrants from that shown on the Drawings.

### 1.3.8 VALVE BOXES

A valve box shall be provided for fire hydrant auxiliary valves and for valves in the main. The valve box shall be centered and plumb over the wrench nut of the valve with the box cover flush with the finished ground elevation. Solid 4-inch concrete blocks shall be placed under the base of valve boxes so that the bottom of the base is about 2 inches away from contact with the valve bonnet. The valve box shall not transmit shock or stress to the valve.

Valve boxes shall be made of cast iron conforming to ASTM A48, Class 20. The castings shall be free from blowholes, porosity, hard spots, shrinkage defects or cracks, or other injurious defects and shall have a normal smooth casting finish. The castings shall be thoroughly coated with a 1-mil minimum thickness bituminous coating. Valve boxes shall be 5-1/4 inches in diameter. Valve boxes shall have a maximum length of 5 feet when extended without extension sections. Extensions shall be provided for deeper mains.

Valve boxes shall consist of a base section, tubular mid and top sections, both with cast threads by which one can be telescoped on the other, extension sections if required, and a circular drop cover.

### 1.3.9 CURB BOXES

Curb boxes shall be of the *Arch or Minneapolis Pattern*, Ford, Mueller, or equal made with cast iron conforming to ASTM A48, Class 20. The castings shall be free from blowholes, porosity, hard spots, shrinkage defects or cracks, or other injurious defects and shall have a normal smooth casting finish. The pentagon head bolt shall be brass.

The castings shall be thoroughly coated with a 1-mil thickness bituminous coating.

A 2 1/2-inch-diameter box shall be provided for 3/4-inch and 1-inch service stops.

A 3-inch-diameter box with the enlarged base shall be provided for 1-1/4, 1-1/2, and 2-inch service stops.

All curb boxes shall have a maximum length of 5 feet when extended without the use of extension section. Extensions shall be provided for deeper mains.

### 1.3.10 MISCELLANEOUS VALVES

Shutoff valves in pipe taps and potable and nonpotable water lines smaller than 1 inch shall be Milwaukee 1131T (threaded), Milwaukee 1169 (solder joint), Nibco T-134 (threaded), Nibco S-134 (solder joint), or equal bronze 300 psi gate valves. Provide unions for ease of valve removal

Shutoff valves in pipe taps and potable and nonpotable lines, pump vent, and drain lines 1 inch through 2-1/2 inch shall be gate valves, 150 psi, bronze or iron body bronze mounted, solid wedge disk, threaded, rising stem Nibco T-131, Milwaukee 1150, or equal. Provide unions for ease of valve removal.

### 1.4 PRECAST REINFORCED CONCRETE MANHOLES

Unless otherwise required in the **SPECIAL PROVISIONS**, all manhole sections including risers, flat slab tops, conical tops, base sections, steps, and adjusting rings shall be precast reinforced concrete. Reinforced concrete manhole sections shall conform to ASTM C478. Manhole construction shall conform to Drawing 01-975-43A.

Lengths of manhole riser (barrel) shall be furnished in such combinations as to conveniently make up the depth of the manhole. A maximum of two handling holes per length of riser will be permitted.

Standard sewer and water manholes shall be constructed with eccentric cone top section and water main valve manholes shall be constructed with a concentric cone top section for 48-inch-diameter barrel sections. For other diameters the top section shall be a cone section, if available, or flat slab. Concrete adjusting rings shall be furnished to set the manhole casting to established grade. Valves and cleanout piping connections shall be centered below the casting.

Drop entrances to sanitary sewer manholes shall be installed where indicated on the Drawings and as shown on Drawing 01-975-43A. Drop entrances shall be of the same diameter as the sewer main from sizes 8 inch through 18 inch. For larger diameters, the drop shall be 18 inches unless otherwise specified in the **SPECIAL PROVISIONS** or shown on the Drawings. Drop entrances for storm sewer manholes are not required.

The interior bottom of sanitary sewer and storm sewer manholes shall be constructed of concrete benches which shall be precast or poured-in-place in the field. Benches shall extend to the top of each pipe to a maximum height of 42 inches. Flow lines shall be made smooth with uniform curves to promote flow through the manhole.

All joints between manhole pipe sections and top shall be tongue and groove conforming to ASTM C443. Manhole joints shall be sealed with circular O-ring conforming to ASTM C443 or bituminous jointing material equal to EZ-Stick, Kent Seal, Ram-Nek, or Mas-Stik butyl rubber gasket, or butyl rubber rope.

Manhole connections for sanitary sewer mains shall be made using flexible, watertight connections, PSX Press Seal, Kor-N-Seal, or equal, for sewers up through 18-inch-diameter. All other sanitary sewer

manhole connections shall be made with A-Lok, PSX Press Seal, Kor-N-Seal, or equal. Manhole connections for all other piping shall be made with A-Lok, PSX Press Seal, Kor-N-Seal, or concrete grout.

Manhole bottoms for sanitary sewer shall be monolithically precast with the bottom section for manholes up through 6-foot-diameter. Bottoms for larger diameter manholes shall be precast but need not be monolithically cast with the bottom section. All other manhole bottoms shall be either poured-in-place or precast concrete.

Manhole bottoms for air release manholes, force main cleanout manholes and water system valve manholes shall have an 18-inch-diameter sump hole. Sump hole shall have a solid concrete bottom where groundwater is above the bottom of the manhole.

Manholes shall be furnished of minimum diameters as shown on Drawing 01-975-43A. Manholes shall be furnished large enough to provide a minimum distance, between adjacent pipe, measured tangentially along the inside face of the manhole, equal to one-half the outside diameter of the intersecting sewer pipe. In any event, manholes shall be furnished in the diameter necessary to accommodate intersecting sewer pipe and the pipe to manhole connection as proposed for use.

Steps shall be installed in all sewer manholes by the manufacturer as shown on Drawing 01-975-43A and shall be cast iron conforming to ASTM A48, Class 30B or steel reinforced plastic conforming to ASTM A615, Grade 60 and ASTM D4101, Type II, Grade 49108 as shown on the Drawings. Manhole steps shall be spaced at 16 inch on center with an allowable tolerance of 1 inch plus or minus. Steps shall be embedded into the riser or conical top section wall a minimum of 3 inches.

Precast reinforced concrete manhole risers and tops shall be tested in accordance with ASTM C497. Precast reinforced concrete manhole risers and tops meeting the strength requirements will be considered acceptable and shall be stamped with an appropriate monogram. When requested, copies of test reports shall be submitted to ENGINEER before the manhole sections are installed in the Project. Final acceptance will be made after field inspection upon delivery to the job site.

Precast reinforced concrete manhole sections shall be subject to rejection for failure to conform to any of the Specification requirements. In addition, individual sections of manhole risers and tops may be rejected because of any of the following reasons:

- a. Fracture or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.
- b. Defects that indicate imperfect proportioning, mixing, and molding.
- c. Surface defects indicating honey-combed or open texture.
- d. Damaged ends, where such damage would prevent making a satisfactory joint.
- e. Manhole steps out of line, or not properly spaced.
- f. Noticeable infiltration into manhole.
- g. Variation in diameter of the manhole section of more than 1 percent from the nominal diameter.
- h. Any continuous crack having a surface width of 0.01 inch or more and extending for a length of 12 inches or more regardless of position in the section wall.



Each precast reinforced concrete manhole riser and top section shall be clearly marked with the name or trademark of the manufacturer and the date of manufacture. This marking shall be indented into the manhole section or shall be painted thereon with waterproof paint.

Precast concrete adjusting rings for standard manholes shall have an inside diameter of 26 inches, be not less than 2 inches nor more than 6 inches high, and shall have a wall thickness of 6 inches unless otherwise specified. The rings shall contain a minimum of one No. 2 reinforcing rod centered within the ring.

## 1.5 STORM SEWER INLETS

All inlets shall meet the requirements of ASTM C913. Construction shall conform to Drawing 01-975-41A. Inlets, in general, shall be rectangular in shape and shall be constructed of precast or poured-in-place concrete.

## 1.6 MASONRY

Concrete block shall meet the requirements of ASTM C139.

The face size of stretcher units shall be 7-5/8 inches by 15-5/8 inches. Variations in the face size shall be within the limits permitted by the above standards. Special shapes and sizes shall be furnished and installed as necessary.

Sewer brick shall conform to ASTM C32. All sewer brick shall be grade SS and manhole brick shall be grade MS. Sewer brick shall be installed as shown on the Drawings furnished by ENGINEER and as required in the construction of sewer appurtenances.

## 1.7 MANHOLE AND INLET CASTINGS

All manhole and inlet castings shall be gray iron and meet the requirements of ASTM A48. Unless otherwise shown on the Drawings or specified in the **SPECIAL PROVISIONS**, standard manhole castings shall be Neenah R1550 with machined frame, Type B solid lid, concealed pick holes and self sealing gaskets, East Jordan Iron Works, or equal. Floodproof castings shall be Neenah R1916 C with machined frame, type B solid lid, concealed pick holes and self-sealing gaskets, East Jordan Iron Works, or equal.

Inlet castings for locations with curb and gutter shall be Neenah R3067 with type L grates on slopes and type R grates at low points, East Jordan Iron Works, or equal. For driveway areas, inlet castings shall be Neenah R3290 with Type A grates, East Jordan Iron Works, or equal.

## 1.8 FRAME/CHIMNEY SEAL

Where required by the **SPECIAL PROVISIONS** or shown on the Drawings, CONTRACTOR shall provide internal manhole frame chimney seal. The seal shall be made of a rubber type product, with a minimum thickness of 3/16 inches, a minimum unstretched width of 8 inches and be extruded or molded from a high grade rubber compound conforming to the applicable requirements of ASTM C923. The bands used for compressing the sleeve against the manhole shall be fabricated from stainless steel conforming to ASTM A240, Type 304, for sheet and ASTM A479, Type 304, for rods. Any screws, bolts, or nuts used on these bands shall be stainless steel conforming to ASTM F593 and F594, Type 304. The internal seal or its appurtenances shall not extend far enough into the manhole opening to restrict entry into or exit from the manhole.

Manhole frame-chimney seals shall be designed to prevent the leakage of water into the manhole at the area of the joint between the manhole frame and chimney continuously throughout a 20-year design life. The seal shall remain flexible, allowing repeated vertical movements of the frame because of frost lift, ground movement, or other causes of up to 2 inches and/or repeated horizontal movements of the frame because of thermal movement of the pavement or other causes of up to 1/2 inch, both rates of movement occurring at rates not less than 0.10 inch per minute. If the seal is an internal seal, it and its appurtenances shall not extend far enough into the manhole opening to restrict entry or exit from the manhole.

The seal shall be made of only materials that have been successfully used in sanitary sewer construction for at least ten years and have proven to be resistant to sanitary sewerage; corrosion or rotting under wet or dry conditions; the gaseous environment in sanitary sewers and at road surfaces including common levels of ozone, carbon monoxide and other trace gases at the sites of installations; the biological environment in soils and sanitary sewers; chemical attacks by road salts, road oil and common street spillages or solvents used in street construction or maintenance; the temperature ranges, variations and gradients in and between manhole frames and chimneys in the climate of the location of construction; variations in moisture conditions and humidity; fatigue failure caused by a minimum of 30 freeze-thaw cycles per year; or vibrations because of traffic loadings; fatigue failure because of repeated variations of tensile, compressive and shear stresses and repeated elongation and compression; and any combination of the foregoing. The materials used shall be compatible with each other and the manhole materials.

## 1.9 MORTAR

All mortar used shall meet the requirements of ASTM C270. Mortar shall be one part Portland cement and 2-1/4 parts washed mortar sand.

## 1.10 AGGREGATE SLURRY (FLOWABLE) BACKFILL

Aggregate slurry (flowable) backfill shall consist of fine and coarse aggregate conforming to ASTM C33. Coarse aggregate shall be size number 67 and fine aggregate shall be size number 4. The material shall be mixed with water to provide an approximate 3-inch slump. The mix shall be deposited in the trench from ready mix concrete transit mix trucks and shall be consolidated using concrete vibrators or vibratory plate compactors.

## 1.11 EROSION CONTROL

Erosion and pollution control components such as silt fences, rock bags, straw bales, trash receptors, etc. shall meet the requirements of Best Management Practices and the Stormwater Pollution Prevention Plan established for this Project.

## 1.12 BEDDING DIKE

Where shown on the Drawings or requested by ENGINEER in the field, CONTRACTOR shall install clay bedding dikes to prevent groundwater from flowing continuously through the bedding material installed for the sanitary sewer. Bedding dikes shall be 4 feet long and shall extend from the bottom of the trench excavation to within 2 feet of the ground surface and 1 foot beyond the normal trench width on both sides of the trench.

## 1.13 SPECIAL MATERIALS AND EQUIPMENT

See **SPECIAL PROVISIONS** for items of material and equipment specific to the Project.

## SECTION 2—ALIGNMENT AND GRADE

### 2.1 GENERAL

Utility lines shall be laid and installed to the lines and grades specified with valves, fittings, manholes, and other appurtenances at the specified locations; spigots centered in bells; and all manholes and riser pipes plumb.

Water main and force main shall maintain a minimum of 36 inches of cover. Gravity sewer mains and laterals shall maintain a minimum 36 inches of cover but shall be deep enough to provide service to buildings.

Water main, force main, and other pressure mains shall be installed to within plus or minus 0.1 feet of designed grades. Sanitary and storm sewer and laterals shall be installed to within plus or minus 0.03 feet of designed grades.

Unless otherwise noted in the **SPECIAL PROVISIONS** or on the Drawings, service lines shown on the Drawings are approximate. ENGINEER will assist CONTRACTOR in staking the actual locations in the field.

Staking shall be completed in conformance with Division 1 of the Specifications.

### 2.2 DEVIATIONS OCCASIONED BY UNDERGROUND FACILITIES

Wherever significant obstructions not shown on the Drawings are encountered during the progress of the Work, CONTRACTOR shall proceed in accordance with the General Conditions to notify owners and protect the facilities. Existing items unnecessarily damaged during the performance of the Work shall be repaired and replaced at the expense of CONTRACTOR.

### 2.3 CAUTION IN EXCAVATION

CONTRACTOR shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures may be determined and shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on its part.

### 2.4 SUBSURFACE EXPLORATION

Whenever, in the opinion of ENGINEER, it is necessary to explore and excavate to determine the location of existing underground facilities, CONTRACTOR shall make explorations and excavations for such purposes. If CONTRACTOR is asked to perform additional Work in making the explorations and excavations, extra compensation will be allowed as specified in the General Conditions.

## SECTION 3—EXCAVATION AND PREPARATION OF TRENCH

### 3.1 GENERAL EXCAVATION

The trench shall be dug so that the utilities can be laid to the alignment and depth specified. Unless otherwise allowed by ENGINEER, trenches shall not be excavated more than 100 feet in advance of pipe laying. Earth excavation shall include all excavation except rock as hereinafter defined. Included in earth excavation shall be removal of street paving of all types, existing structures, existing improvements and trees smaller than 4 inches in diameter measured 4 feet above the ground, all as necessary to complete the pipe installation.

## 3.2 EXCAVATION TO GRADE

The trench shall be finished to the depth necessary to provide a uniform and continuous bearing and support for the pipe on the bedding material provided at every point between bell holes. Any part of the bottom of trench excavated below the specified grade shall be corrected with bedding material, thoroughly compacted in place. The bedding shall be shaped and finished with hand tools to fit the bottom quadrant to the pipe.

If, in the opinion of ENGINEER, unstable soil conditions are encountered at subgrade, CONTRACTOR shall replace the unstable soil with special bedding. CONTRACTOR shall be allowed extra compensation for the special bedding, unless the unstable soil conditions are caused by CONTRACTOR's failure to adequately dewater the trench, in which case CONTRACTOR shall bear the entire cost.

All excavated material shall be piled in a manner that will not endanger the Work. Stockpiles not for immediate backfilling shall have silt fences placed around their perimeter for erosion control. The Work shall be conducted in such a manner that pedestrian and motor traffic is not unnecessarily disrupted. Fire hydrants, valve boxes and manholes shall be left unobstructed. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed.

Excavated material designated by ENGINEER as being undesirable for backfilling shall be immediately removed as excavation progresses. Points of disposal are subject to approval of OWNER. All undesirable and surplus material disposed of must be leveled off and graded to rough elevations as determined by OWNER.

CONTRACTOR shall remove bituminous pavement and road surface as a part of the trench excavation. The width of pavement removed shall be the minimum possible, and acceptable, for convenient and safe installation of utilities and appurtenances.

All bituminous pavement shall be cut on neat, straight lines and shall not be damaged beyond the limits of the trench.

Where it is necessary to trench through concrete pavement, a strip shall be sawed and removed in such a manner as not to disturb the remainder of the pavement. Paving and undermining of existing concrete pavement shall be prevented by CONTRACTOR. If CONTRACTOR unnecessarily removes or damages pavement or surfaces beyond limits acceptable to ENGINEER, such pavement and surfaces shall be replaced or repaired at the expense of CONTRACTOR.

## 3.3 DEWATERING

CONTRACTOR shall, at its own expense, keep the excavation clear of water while structures and appurtenances are being built, utilities are being installed, and fill and backfill is being compacted. CONTRACTOR shall at all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outages, and shall have available at all times competent workers for the operation of the pumping equipment. The dewatering systems shall not be shut down between shifts, on holidays or weekends, or during Work stoppages.

All dewatering shall be done in accordance with applicable federal, state, and local code requirements.

Under no conditions shall the Work be laid in or under water. No water shall flow over the Work until the joints are complete or the concrete has set. Wherever necessary, CONTRACTOR shall excavate in advance of the completed Work, lead the water into sumps or pump wells, and provide erosion control measures to prevent water or sediment damage.

The expense for making all extra excavations necessary to prevent water from interfering with the proper construction of the Work and for forming of all dams, digging sumps or pump wells, bailing and pumping, and erosion control shall be borne by CONTRACTOR. Any permits necessary for the dewatering operations shall be obtained and paid for by CONTRACTOR. No extra payment will be made for dewatering of the trench whether accomplished by the use of sumps and pumps, well point systems, or deep wells.

CONTRACTOR's dewatering system shall ensure that soils within the trench will not be destabilized by hydrostatic uplift pressures from adjacent groundwater. If conditions warrant, CONTRACTOR shall furnish and install well point systems or deep wells. Spacing and depth of well points or wells shall be adequate to lower the piezometric level to at least 2 feet below the bottom of the excavation. Additional lowering shall be provided as necessary to create a stable subgrade. The control of groundwater shall be such that softening or heaving of the bottom of excavations or formation of quick conditions or boils shall be prevented. Dewatering systems shall be designed and operated to prevent the migration or removal of soils. In areas where rock is encountered, the water level shall be kept at or below top of rock but at least 6 inches below bottom of concrete. Additional rock shall be removed as needed to provide clearances.

CONTRACTOR shall take all necessary precautions during the dewatering operation to protect adjacent structures against subsidence, flooding, or other damage. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property. Any such facilities and structures damaged shall be repaired or replaced to the satisfaction of their owner.

Prior to dewatering, CONTRACTOR shall take into account the effect of its proposed dewatering operation on existing private water supply systems and shall make arrangements with property owners for protecting their supplies or providing alternative supply. If CONTRACTOR's dewatering operation adversely affects private water supply systems, CONTRACTOR shall provide property owners with alternative potable and nonpotable supplies until dewatering operations are ceased and groundwater levels return to normal. If the water in private water supply wells is contaminated through no fault of CONTRACTOR after restoration of original groundwater levels, OWNER will provide measures to restore water potability. CONTRACTOR is responsible for restoration of the water supply, not its potability after restoration.

In areas where continuous operation of dewatering pumps is necessary, CONTRACTOR shall avoid noise disturbance to nearby residences and businesses to the greatest extent possible by using electric driven pumps, intake and exhaust silencers, or housing to minimize noise.

The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted fill or backfill, and prevent floatation or movement of all structures and pipelines.

### 3.4 WIDTH OF TRENCH

CONTRACTOR shall be responsible for determining and providing the minimum width necessary to provide a safe trench in accordance with current OSHA standards and all other applicable standards. The top width of trench excavation shall be kept as narrow as is reasonably possible and acceptable to minimize pavement damage. Pay items related to maximum trench widths shall not limit CONTRACTOR's responsibility to provide safe trench conditions.

Width of Trench—Rigid Pipe: The width of trench below the outside top of the pipe shall be as shown in the following table for the sizes listed. A minimum clearance of 8 inches between the outside of the pipe barrel and the trench wall at the pipe spring line shall be maintained to allow for bedding and haunching. If sheeting is used and is going to remain in place, the trench width shall be measured as

the clear distance between inside faces of the sheeting. Otherwise, the trench width shall be based on the width between stable trench walls after sheeting is removed.

## MAXIMUM WIDTH OF TRENCH BELOW TOP OF PIPE

Nominal Pipe Diameter (Inches)	Trench Width (Inches)
4	30
6	30
8	36
10	36
12	36
15	36
18 and larger	<b>SEE SPECIAL PROVISIONS</b>

Where the width of trench below the outside top of the pipe barrel cannot be otherwise maintained within the limits shown above, CONTRACTOR, at its own expense, shall furnish an adequate pipe installation for the actual trench width which will meet design conditions. This may be accomplished by furnishing higher class bedding, a stronger pipe, concrete cradle, cap or envelope or by driving sheeting prior to excavation to subgrade. Removal of sheeting below the top of the pipe, if allowed by ENGINEER, shall be gradual during backfilling.

If the maximum trench width is exceeded for any reason other than by request of ENGINEER, the concrete cradle, cap, sheeting, bedding or the stronger pipe shall be placed by CONTRACTOR at its own expense. Where the maximum trench width is exceeded at the written request of ENGINEER, the concrete cradle, cap, sheeting, bedding or stronger pipe will be paid for on the basis of the price bid.

Width of Trench—Thermoplastic and Ductile Iron Pipe: The trench width for flexible pipe shall be minimum three times the pipe outside diameter or the maximum trench width specified for rigid pipe, whichever is greater. A minimum clearance of 8 inches between the outside of the pipe barrel and the trench wall at the pipe spring line shall be maintained to allow for bedding and haunching.

### 3.5 ROCK EXCAVATION, UTILITIES

Rock excavation for utilities shall include all hard, solid rock ledges, bedded deposits and unstratified masses and all conglomerate deposits or any other material so firmly cemented that in the opinion of ENGINEER it is not practical to excavate and remove same with a 225-net flywheel horsepower trench backhoe or equal, except after continuous drilling and blasting. Soft or disintegrated rock which can be removed with a pick, loose, shaken or previously broken rock, or rock which may fall into the excavation from outside the limits of excavation will not be classified as rock excavation. Rock excavation shall also include all rock boulders necessary to be removed having a volume of 2 cubic yards or more.

When rock is encountered, it shall be stripped of earth and ENGINEER or OWNER's representative notified and given proper time to evaluate same before removal. Any rock removed which has not been measured by ENGINEER or OWNER's representative will not be classified as rock excavation.

The depth of trench in rock shall be 6 inches below the lowest outside bottom of the pipe.

All rock excavated from the trench shall be classified as undesirable backfill material and shall be disposed of as specified in the Excavation to Grade section. All trenches in rock shall be backfilled with bedding, cover, and backfill material furnished by CONTRACTOR.

## 3.6 BLASTING

Blasting for rock excavation will be permitted only after securing the written approval of OWNER and only after proper precautions are taken for the protection of persons or property. The hours of blasting will be fixed by OWNER. Any damage caused by blasting shall be repaired by CONTRACTOR at its expense. CONTRACTOR's method and procedure of blasting shall conform to state laws and municipal ordinances.

CONTRACTOR shall provide a copy of Blaster License as required by the licensing agencies to OWNER prior to commencement of blasting.

## 3.7 SPECIAL BEDDING

Where the bottom of the trench at subgrade is found to be unstable or unsuitable material, which in the opinion of ENGINEER should be removed, CONTRACTOR shall excavate and remove such unstable or unsuitable material to the normal trench width and to a depth of 2 feet. The excavated area shall be lined with filter fabric, Mirafi 140 N, Supac, or equal, and backfilled with bedding material in layers. At subgrade the filter fabric shall be wrapped over the special bedding with an 18-inch overlap. Normal bedding shall then be placed over the special bedding to support the piping. See Dewatering section for additional conditions.

## 3.8 CONCRETE CRADLE

If, in the opinion of ENGINEER, soil conditions require it, concrete cradle or encasement shall be placed around the pipe as shown on Drawing 01-975-43A. Excavation shall be carried below the normal grade line to a depth requested by ENGINEER and concrete cradle or encasement placed. Before the concrete is placed, the pipe shall be laid to line and grade, blocked and braced, and the joint made. The cradle shall then be placed, taking care not to disturb the pipe. Concrete shall have a minimum 28-day compressive strength of 4,000 psi. Concrete cradle shall not be used for thermoplastic piping. See Trench Width section for additional conditions.

## 3.9 BRACED AND SHEETED TRENCHES

Open-cut trenches shall be sheeted and braced as required by any governing federal regulations including OSHA, state laws, and municipal ordinances; and as may be necessary to protect life, property, improvements or the Work. Underground or aboveground improvements to be left in place shall be protected and, if damaged, shall be repaired or replaced at the expense of CONTRACTOR.

Sheeting and bracing which is to be left in place must be removed for a distance of 4 feet below the present or proposed final grade of the street, road, or land, whichever is lower. Trench bracing, except that which shall be left in place, may be removed after backfilling has been completed or has been brought up to such an elevation as to permit its safe removal.

## 3.10 TUNNELING, BORING, JACKING, OR BORING AND JACKING

Where shown on the Drawings or specified in the **SPECIAL PROVISIONS**, the sewer, water main or force main (carrier pipe) shall be placed inside a casing pipe that is installed by tunneling, boring, jacking, or boring and jacking or other approved methods not using open-cut construction techniques. Installation shall be accomplished in accordance with State Laws, municipal ordinances, and any permit requirements. Casing pipe used shall be of adequate diameter and thickness to support all loads imposed and to permit installation of the carrier pipe to plan line and grade. Type and minimum size of casing pipe shall be as called for on the Drawings or as specified. Steel casing pipe joints shall be continuous circumferential welds of strength equal to pipe walls.

Casing pipe shall be installed using equipment and material that cases the hole as earth is removed to eliminate cavities at the lead end of the casing pipe. Grouting between casing pipe and soil opening shall be performed when needed to secure casing pipe, to prevent soil collapse, and to fill voids between the casing pipe and native soil.

Installation of casing and carrier pipe shall proceed in such a manner as to minimize disruption of traffic and to avoid damage to adjacent streets. No equipment shall work off the pavement or shoulder of the street being crossed during the course of construction. Signs, barricades, flagmen and lighting shall be provided to strictly comply with the Traffic Control section of the Standard Specifications as may be modified by any permit requirements. Stricter requirements shall govern in case of differences.

The carrier pipe shall be placed inside the casing pipe using hardwood blocks or stainless steel casing spacers, which are shaped to fit both the casing pipe and carrier pipe. At least three blocks or spacers shall be provided for each length of carrier pipe. They shall be banded or fixed to the barrel of the carrier pipe so they are parallel to the longitudinal centerline. The annular space between the casing pipe and carrier pipe shall be filled with sand or concrete grout. Sand fill shall be thoroughly tamped and rammed in place.

All carrier pipe within the limits of jacking pits shall be installed at CONTRACTOR's expense to resist all loads imposed including, if necessary, the use of special pipe.

Other tunneling methods shall be as specified in the **SPECIAL PROVISIONS**.

## SECTION 4-PIPE AND MANHOLE INSTALLATION

### 4.1 GENERAL

Prior to commencing pipe laying, CONTRACTOR shall notify ENGINEER of the intended date for starting Work. ENGINEER may request at CONTRACTOR's expense the removal and relaying of pipe which was installed prior to notification of ENGINEER.

Proper implements, tools, and facilities shall be provided and used by CONTRACTOR for the safe and convenient prosecution of the Work. All pipe, fittings, and appurtenances shall be carefully lowered into the trench, piece by piece, with a crane, rope or other suitable tools or equipment, in such manner as to prevent damage to materials. Under no circumstance shall pipe be dropped or rolled into the trench.

Materials shall be as shown on the Drawings or as specified herein.

### 4.2 MATERIAL INSPECTION

CONTRACTOR shall inspect the pipe, fittings, and appurtenances for defects when delivered to the job site and prior to lowering into the trench. Defective material shall be removed from the job site. All material shall be clean and free of deleterious substances prior to use in the Work.

### 4.3 BEDDING AND COVER

Immediately prior to placing the pipe, the trench bottom shall be shaped by hand to fit the entire bottom quadrant of the pipe. If pipe is of the bell and spigot type, bell holes shall be provided to prevent the bell from supporting the backfill load. Bell holes shall be large enough to permit proper making of the joint but not larger than necessary to make the joint. All adjustments to line and grade must be done by scraping away or filling in bedding material under the body of the pipe. Any fill used must be bedding material. If necessary to obtain uniform contact of the pipe with the subgrade, a template shall be used



to shape the bedding material. All pipe shall be bedded in bedding material at least 4 inches thick. CONTRACTOR shall perform all necessary excavation and shall furnish all necessary material to provide this bedding.

Bedding material shall be hard and durable and shall be made by crushing sound limestone or dolomite ledge rock, or crushed gravel aggregate. Bedding material shall conform to the requirements of ASTM C33.

## PERCENTAGE BY WEIGHT PASSING INDICATED SIEVE

Size	2-1/2 Inch	2 Inch	1-1/2 Inch	1 Inch	3/4 Inch	1/2 Inch	3/8 Inch	No. 4	No. 8	No. 16	No. 30	No. 100	No. 200
57			100	95-100		25-60		0-10	0-5				
8						100	85-100	10-30	0-10	0-5			
9						100	75-100	0-25	0-5				
10							100	85-100				10-30	

All rigid sanitary sewer pipe and related appurtenances shall be bedded and covered in accordance with the Class B bedding detail as shown on Drawing 01-975-43A. Bedding material shall conform to Size No. 8 or No. 9. With pipes greater than 15 inch, Size No. 57 may be used.

Concrete and other rigid pipe used in non-sanitary sewer applications (sanitary sewer applications, if allowed by the **SPECIAL PROVISIONS**) may be bedded using the Class C bedding detail as shown on Drawing 01-975-43A. Bedding material shall conform to the above for rigid sanitary sewer pipe.

Ductile and cast iron pipe shall be bedded in accordance with Class C bedding detail as shown on Drawing 01-975-43A or the Type 3 laying condition of AWWA C600. Bedding material shall conform to Size No. 8, or No. 9. Where ductile iron pipe is polyethylene encased, bedding material shall conform to Size No. 10 or cover material as specified below.

Thermoplastic sanitary sewer pipe and related appurtenances shall be bedded and covered in accordance with the Thermoplastic Pipe Bedding Detail on Drawing 01-975-43A. Bedding material shall conform to Size No. 8 or No. 9. With pipes greater than 15 inch, Size No. 57 may be used.

All other sanitary sewer pipe and related appurtenances shall be bedded and covered in accordance with the Class B bedding detail as shown on Drawing 01-975-43A. Bedding material shall conform to Size No. 8 or No. 9. With pipes greater than 15 inch, Size No. 57 may be used.

PVC and HDPE water main or force main shall be bedded and covered in accordance with the Thermoplastic Pipe Bedding Detail on Drawing 01-975-43A. Bedding material shall conform to Size No. 8 or No. 9. With pipes greater than 15 inch, Size No. 57 may be used.

Bedding material for copper water services shall conform to Size No. 9 or No. 10.

No material native to the trench shall be used for bedding material.

CONTRACTOR shall provide ENGINEER with a sieve analysis of the bedding material for review prior to starting construction.

Material which is to be placed from the bedding material to 1 foot above the top of the pipe shall be termed cover material. All trenches shall be backfilled by hand to 1 foot above the top of the pipe with cover material. Cover material shall be deposited in the trench for its full width on each side of the pipe, fittings and appurtenances simultaneously in 6-inch layers and shall be compacted using hand tamping bars and/or mechanical tampers. CONTRACTOR shall use special care in placing cover material to

avoid injury to or movement of the pipe. Cover material shall consist of durable granular particles ranging in size from fine to a maximum size of 3/4 inch. Unwashed bank run sand and crushed bank run gravel will be considered generally acceptable cover material. Cover material shall generally conform to the following gradation specifications:

## COVER MATERIAL GRADATION

Sieve Size	Percentage by Weight Passing
1 inch	100
3/4 inch	85 to 100
3/8 inch	50 to 80
No. 4	35 to 65
No. 30	--
No. 40	15 to 30
No. 200	5 to 15

Native trench materials may be used for cover material if they substantially conform to the above gradation specifications and a suitable credit is extended to OWNER.

All bedding materials may be substituted for cover material when requested by CONTRACTOR except where polyethylene encasement is used. In such case, only those bedding materials specifically noted for polyethylene encasement may be used.

## 4.4 PIPE LAYING

All pipe shall be laid accurately to the line and grade as designated. Preparatory to making pipe joints, all surfaces of the portions of the pipe to be joined or of the factory-made jointing material shall be clean and dry. Lubricants, primers, adhesives, and other joint material shall be used and installed as recommended by the pipe or joint manufacturer's specifications. The jointing materials or factory fabricated joints shall then be placed, fitted, joined, and adjusted in such a workmanlike manner as to obtain the degree of watertightness specified. Pertinent specifications from the joint and pipe manufacturer which outline procedures to be followed in making the joint shall be furnished to ENGINEER.

Wyes, tees, and special fittings shall be installed as called for on the Drawings or as requested by ENGINEER. Wyes, tees, and special fittings shall, in general, be jointed with the same type of joint as used in the pipe.

In joining two dissimilar types of pipe, manufactured adapters and fittings shall be used. Adapters and fittings shall be configured to maintain invert elevations at same level.

Joint deflections shall not exceed the limits established by the pipe manufacturer for the pipe and joint being used.

At times when pipe laying is not in progress, the open ends of pipe shall be closed with plugs to prevent the entry of foreign material. All foreign material shall be removed from the pipe prior to acceptance.

After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with specified backfill material tamped around it except at the bells. Trenches shall be kept water-free during bedding, laying, and jointing and for as long a period as necessary to permit proper execution of the Work.

Pipe shall be brought home by using a cross member and levers or jacks. It will not be permissible to push pipe home with motor-powered excavation equipment.

Force main and water main shall be installed in accordance with AWWA C600 for iron pipe, AWWA C605 for PVC pipe, and AWWA M55 for HDPE pipe. All plugs, caps, tees, hydrants, and bends for water mains and force mains shall be provided with positive reaction backing or restrained joints.

Reaction backing shall be poured-in-place concrete. Backing 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 sized so that the soil bearing pressure does not exceed 1,200 psf, using a working pressure in the main of 150 psi plus 100 psi water hammer allowance. Unless otherwise shown or specified, the backing shall, be so placed that the pipe and fitting joints will be accessible for repair.

CONTRACTOR may use restrained joints in lieu of reaction backing. The minimum length of pipe to be restrained shall be as shown in the following table:

REQUIRED LENGTH OF RESTRAINED PIPE BEYOND FITTING IN FEET

Fitting	Minimum Length-Ft
90° Bend (4 inch)	36
90° Bend (6 inch to 8 inch)	54
90° Bend (10 inch to 12 inch)	72
90° Bend (14 inch)	84
45° Bend ( $\leq$ 6 inch)	18
45° Bend (8 inch to 14 inch)	36
22-1/2° Bend $\leq$ 14 inch	18
11-1/4° Bend $\leq$ 14 inch	9
Fire Hydrant Leads	All Joints
End of Line Tees (4 inch)*	18 (Along Branch)
End of Line Tees (6 inch to 8 inch)*	36 (Along Branch)
End of Line Tees (10 inch to 12 inch)	54 (Along Branch)
End of Line Tees (14 inch)*	66 (Along Branch)

\*Restrained run length on tees assumed 18 feet on each side of fitting

This table assumes 150 psi test pressure plus a 100 psi water hammer allowance, ductile iron pipe, and a 3-foot bury. Lengths shall be adjusted for other conditions and fittings. For other fittings and for more specific requirements, see the Drawings or **SPECIAL PROVISIONS**.

#### 4.5 SEWER SERVICE BRANCH AND LATERAL INSTALLATION

General: CONTRACTOR shall furnish and install sanitary sewer and storm sewer branches, laterals, and leads as shown on the Drawings or requested by ENGINEER. Under normal circumstances, service laterals will be installed within the right-of-way or easement to serve all existing buildings and all platted lots. In certain cases, only wye or tee branches will be installed to vacant lots. Service laterals shall consist of a branch fitting at the main and extension of the specified lateral pipe to the end of lateral as called for and requested. All necessary fittings shall be furnished and installed to complete the installation as shown on Drawing 01-975-75A. All necessary fittings shall be furnished and installed to complete installation of for storm sewer leads as shown on Drawing 01-975-42A.

Wye or tee branches: Wherever shown on the Drawings or requested by ENGINEER, wye or tee branches shall be provided for use in making sanitary sewer service and storm sewer inlet connections.

Unless specified otherwise in the **SPECIAL PROVISIONS** or as shown on the Drawings, wye or tee branches for sanitary sewer service lateral connections to single-family residences shall be 4-inch-diameter. All other sanitary sewer service lateral connections shall be 6 inch. Wye or tee branches for storm sewer inlet connections shall be of the size called for on the Drawings, 12 inch minimum.

Sanitary sewer service branches shall be turned so that the branch is at an angle of 30° or 45° with the horizontal.

Sanitary Sewer Service Laterals: Under normal conditions and unless otherwise specified in the **SPECIAL PROVISIONS**, shown on the Drawings, or requested by ENGINEER, all service laterals shall be Standard Laterals, Type 1, as shown on Drawing 01-975-75A. Service laterals of Types 2 through 6 may be requested by ENGINEER to meet field conditions.

It is the general intent to install Modified Laterals, Type 2, 4, or 5 for service to homes that presently have shallow or no basements or where the depth to groundwater at the end of lateral is shallow. Type 3 and 6 risers are only to be provided where shown on the Drawings or specified in the **SPECIAL PROVISIONS**.

Installation and Testing Requirements: Except for those branches that are to be used on storm sewers or for extending sanitary sewer service laterals, wye and tee branches shall be closed with airtight stoppers blocked to withstand air test pressures.

The ends of all laterals shall be plugged and blocked to resist air test pressures. All plugs shall be manufactured to fit the pipe used and shall be watertight. The ends of all laterals shall be marked as shown on Drawing 01-975-75A using flagging tape and 2 by 4 markers.

A complete and accurate tabulation of length, depth, and location of all branches, risers, and laterals shall be kept by CONTRACTOR on cards available from ENGINEER. Measurements shall be made from the nearest downstream manhole. Lateral installation to meet these Specifications and field conditions are the responsibility of CONTRACTOR. Problems occurring because of failure to provide proper installation or proper records shall be corrected by CONTRACTOR at its expense.

No installed lateral shall be backfilled until ENGINEER has been notified that the lateral is complete and reasonable time is allowed for observation of the Work.

## 4.6 WATER SERVICE LATERAL INSTALLATION

Water service laterals requiring reconstruction and new service laterals shall be installed in accordance with AWWA C600. CONTRACTOR shall perform all excavation, backfill, and other Work necessary for a complete installation. The service tubing shall be continuous and shall be placed at a minimum depth of 30 inches. Each service shall include a corporation stop at the main, copper service tubing, curb stop, curb box, couplings, and all other appurtenances necessary for a complete installation. Where existing services in the street are being reconstructed, the new service shall be connected to the existing service at the property line unless otherwise shown or specified. Taps in the main shall be at an angle of 45° above the horizontal.

OWNER reserves the right to make taps and connections to the new mains prior to backfilling by CONTRACTOR. CONTRACTOR shall delay backfilling until OWNER has completed its Work.

All curb boxes on new services shall be marked by placing a 4-foot-long 2 by 4 adjacent to it. The 2 by 4 shall project 1 foot above existing ground and shall be painted blue. All services shall be extended to the street property line, unless otherwise shown or specified.

## 4.7 PORTABLE TRENCH BOX

Whenever a portable trench box or shield is used, special precautions shall be taken so as not to pull already jointed pipe apart or leave voids around the pipe wall. Whenever possible, the bottom edge of the box shall be kept at a level approximately even with the top of pipe. Cover material shall be placed to at least the top of pipe before moving the box ahead.

## 4.8 MANHOLES

Manholes shall be installed in accordance with Drawing 01-975-41A for storm sewer, Drawing 01-975-42A for water main, and Drawing 01-975-43A for sanitary sewer. Manholes shall be plumb with any steps aligned and openings located over steps. For sanitary sewers, openings shall be located over the bench and not the sewer flow line itself.

All manholes shall be made watertight and shall show no visible signs of leakage at the time of final review and within the guarantee period. Any leakage shall be sealed from the exterior of the manhole.

## 4.9 STORM SEWER INLETS

Storm sewer inlets shall be installed in accordance with Drawing 01-975-41A. Inlets shall be set to the line and grade as furnished by ENGINEER. The outside end of the lift hole shall be covered with filter fabric to prevent the entrance of fines into the inlet.

Inlets shall be connected to the storm sewer main either at manholes, at wye branches in the main, or to other inlets, all as shown on the Drawings. Minimum size of inlet lead pipe shall be 12 inches.

Storm inlets shall be backfilled to undisturbed soil and at least 2 feet along connecting piping with bedding material.

## 4.10 MASONRY

No masonry shall be laid when the temperature of the outside air is below 40°F unless all masonry materials are heated and protected against freezing.

Only enough mortar shall be mixed that can be conveniently used before it reaches initial set. Retempering of mortar will not be permitted.

## 4.11 ABANDONING UTILITIES

Utilities to be abandoned shall, unless otherwise noted on the Drawings or in the **SPECIAL PROVISIONS**, be abandoned in place. Open ends of pipes shall be plugged with 12 inches of concrete. Manhole barrels, valve boxes and other such structures shall be removed to a point 3 feet below existing or final ground surface, whichever is lower, and shall then be filled with backfill material compacted to that of the trench backfill. An approximate 9-inch-diameter opening shall be made in the bottom of the structure to allow for groundwater movement.

## SECTION 5--BACKFILLING

### 5.1 BACKFILL MATERIAL

Backfill shall be that material placed between the top of cover material to the subgrade for placement of restoration materials. Backfill for storm inlets shall be bedding material.

When the type of backfill material is not otherwise specified, CONTRACTOR may backfill with the excavated material, provided that such material consists of loam clay, sand, gravel, or other materials which, in the opinion of ENGINEER, are suitable for backfilling.

All backfill material shall exceed 35°F and be free from frost, cinders, ashes, refuse, vegetable or organic matter, boulders, rocks, or stone, frozen lumps, or other material which in the opinion of ENGINEER is unsuitable. From 1 foot above the top of the pipe to the trench subgrade, well-graded material containing stones up to 8 inches in their greatest dimension may be used, unless otherwise specified in the **SPECIAL PROVISIONS**. Care should be taken in backfilling so as not to damage the installed pipe.

In refilling the trench, if there is not sufficient material excavated therefrom suitable for refilling, CONTRACTOR shall, without extra compensation, furnish the deficiency. Where indicated on the Drawings, fill shall be provided over projecting conduits. Such fill shall be free of large boulders, and the top 6 inches shall be of suitable material to fit the adjoining ground.

### 5.2 GRANULAR BACKFILL

When called for on the Drawings, in the **SPECIAL PROVISIONS**, or requested by ENGINEER, backfill material shall be granular and shall consist of durable particles ranging in size from fine to coarse in a substantially uniform combination. Sufficient fine material shall be present to fill all the voids in the coarse material. No stones over 3 inches or clay lumps shall be present. Unless otherwise allowed by ENGINEER, granular backfill shall generally conform to the following gradation specification:

#### GRANULAR BACKFILL

Sieve Size	Percentage by Weight Passing
3 inch	100
2 inch	95 to 100
No. 4	35 to 60
No. 200	5 to 10

### 5.3 PLACEMENT

All trenches shall be backfilled using specified material so that excessive lengths of trench are not left open. In general the backfilling operation shall proceed so that no more than 100 feet of trench is open behind the pipe laying operation.

Backfill shall be left below the original surface to allow for placement of restoration materials including pavement, base course, concrete, topsoil, sod, plus any pavement replacement specified in accordance with the Asphaltic Paving section herein. When settlement occurs, CONTRACTOR shall restore the surface improvements at its expense, to maintain the finished surface.

## 5.4 BACKFILL CONSOLIDATION

Unless specifically deleted in the **SPECIAL PROVISIONS**, all trenches shall be consolidated as specified in this section for the entire depth and width of the trench.

Consolidation shall be achieved by use of smooth surface vibratory compactors or backhoe-operated hydraulic compactors for granular materials and rotating sheepsfoot type mechanisms for loam/clay soils. The lift height shall not exceed 8 inches for walk-behind hand-operated vibratory compactors and sheepsfoot. Lift height shall not exceed 24 inches for self-propelled vibratory drum or backhoe-operated hydraulic compactors. Smaller lift heights shall be provided as necessary to achieve the degree of compaction specified.

Unless specified otherwise in the **SPECIAL PROVISIONS**, backfill material beneath paved areas or future paved areas and within 5 feet of paved areas or future paved areas shall be consolidated as follows: within 3 feet of the surface 95% of maximum dry density, below 3 feet from the surface to 1 foot above the pipe 90% of maximum dry density, as determined by the modified Proctor Test (ASTM D1557).

Unless otherwise specified in the **SPECIAL PROVISIONS**, backfill material placed in all other areas shall be compacted to the point where no additional consolidation can be observed from the compaction and backfill equipment being used.

Backfill material not meeting the compaction specification shall be recompacted by CONTRACTOR at no cost to OWNER. Cost for additional testing on recompacted material shall be at CONTRACTOR's expense.

## 5.5 MAINTENANCE OF SURFACE

CONTRACTOR shall maintain all backfilling, resurfacing, repaving, and other surface improvements constructed under this Contract as a warranty item. CONTRACTOR shall, upon proper notice from OWNER, make all repairs in surfaces of trenches and excavations. All expenses incurred by OWNER and/or CONTRACTOR in making repairs and all expenses in maintaining trench and excavation surfaces shall be at the expense of CONTRACTOR regardless of the material used in backfilling trench excavations. OWNER reserves the right to make all emergency repairs necessary to make safe all streets and walks at the expense of CONTRACTOR regardless of the material used in backfilling trench excavations. A maintenance guarantee fund, if specified in the **SPECIAL PROVISIONS**, will be withheld from the final amount due CONTRACTOR for a period of six months after acceptance of the Work to assure such maintenance.

CONTRACTOR shall be responsible for controlling dust dispersion during utility and street construction. Remedial actions required as a result of inadequate dust control shall be CONTRACTOR's responsibility. To control dust, CONTRACTOR shall apply calcium chloride or ammonium lignin sulfonate in 12 to 14 percent solution. Prior to application of dust palliative, the street shall be graded smooth.

## SECTION 6--ROADWAY AND DRAINAGE EXCAVATION, GRADING AND BASE COURSE

### 6.1 GENERAL

The Work under this section includes all clearing, grubbing, excavation, grading, base course, and other miscellaneous items of Work required for restoration of utility construction Work and for street construction as shown on the Drawings and included in the Specifications.

Unless otherwise specified, all street construction Work shall conform to the KYDOH Specifications as amended herein. Street construction shall mean street, roadway, parking lot, driveway, and similar type construction.

See **SPECIAL PROVISIONS** for availability of water for use in street construction.

## 6.2 CLEARING AND GRUBBING

In general, allowable tree removals shall be those trees which are necessary to remove for utility and street construction within the right-of-way or easement areas. Actual allowable tree removals will be determined in the field by ENGINEER. All trees and brush outside the right-of-way or easement areas shall be protected by CONTRACTOR, unless otherwise allowed by ENGINEER.

For utility construction, trees and brush to be removed outside the immediate trench area shall be cut flush with the ground surface or pushed over for all brush and for all trees 12-inch caliber or less measured 4 feet above ground. Trees in excess of 12-inch caliber shall be cut to within 6 inches of the ground surface. A basal application of Rodeo, or equal, shall be applied to all remaining stumps to prevent the development of suckers. Trees that are pushed over shall have their stumps removed and disposed of off-site.

Trees and brush, including stumps, within the trench area and within areas of street, sidewalk, bike path, and driveway construction shall be removed from the site and disposed of.

## 6.3 COMMON EXCAVATION

All street excavation shall be performed as called for in Section 204 of the KYDOH Specifications and as herein modified.

The following items of Work shall be included in common excavation:

- a. The excavation to subgrade elevations as detailed in the Drawings including road bed areas, terraces, sidewalks, bike paths, driveways, and other miscellaneous surface improvements.
- b. Removal (and stockpiling, if the use of salvaged topsoil is required) of topsoil from all cut areas and fill areas within a 1:1 slope of finished street, sidewalks, bike paths, driveways, and other miscellaneous surface improvements.
- c. The preparation, grading, compaction, and proof-rolling of subgrade areas for roadbed, sidewalks, bike paths, driveways, and other miscellaneous surface improvements to the elevations detailed on the Drawings.
- d. Excavation and grading required to realign and/or create ditch lines and drainage ways to route drainage to or from storm facilities as shown on the Drawings, or as necessary to maintain positive drainage.
- e. Removal of temporary backfill placed in new utility trenches above the subgrade.
- f. The removal and disposal of all undesirable and surplus materials.

Common excavation may be completed as part of utility construction prior to initiating general street excavation activities.



All subgrade areas in streets and parking lots, including utility trench restoration areas, shall be proof-rolled with a heavily loaded tri-axle dump truck or other similar equipment requested by ENGINEER prior to the placement of any fill materials or base course. ENGINEER must be present during proof-rolling to review the Work necessary for the stabilization of any unstable areas identified.

Saw cuts shall be made in existing pavement, driveways, curb and gutter, and sidewalks to allow restoration to neat straight lines. Saw cuts damaged during construction shall be recut prior to beginning restoration.

## 6.4 ROCK EXCAVATION, STREETS

Rock excavation for streets shall include removal of rock to subgrade elevations. Rock for excavation purposes shall be as defined in the Rock Excavation, Utilities section. Such rock shall be classified as undesirable backfill and disposed of in accordance with the Excavation to Grade section.

## 6.5 BORROW EXCAVATION

CONTRACTOR shall salvage suitable materials from utility and street construction activities to provide fill for street construction. Where sufficient quantities of materials suitable for street construction are not available from areas of the site, CONTRACTOR shall perform borrow excavation to make up the deficit in accordance with Section 205 of the KYDOH Specifications.

## 6.6 EXCAVATION BELOW SUBGRADE

ENGINEER may request the excavation of unsuitable materials in areas of unstable subgrade. The excavation of such materials, except in areas where CONTRACTOR has completed utility construction or placed street fill, shall be measured by ENGINEER for payment.

The excavation and replacement of unstable utility trench backfill and/or street fill placed by CONTRACTOR shall be at CONTRACTOR's expense.

Base course placed on unstable foundation shall be removed and replaced at CONTRACTOR's cost following excavation of the affected area.

Where requested by ENGINEER in the field, excavation below subgrade areas shall be lined with geotextile material and backfilled with Size No. 2 crushed stone base course as specified herein.

## 6.7 GEOTEXTILES

Geotextile shall be placed as requested by ENGINEER to stabilize street subgrade areas. Construction fabric shall be Mirafi 600X, Propex 2006, or equal. Any alternate fabric must have ENGINEER's approval prior to use. Construction fabric shall be installed in accordance with the manufacturer's recommendations. Vibratory compaction shall not be used in the compaction of base course in areas where construction fabrics are used.

## 6.8 PREPARATION OF FOUNDATION

The subgrade shall be graded and rolled to provide uniform density and shall comply with the profile and cross sections contained in the Drawings. All Work shall comply with Section 207 of the KYDOH Specifications.

## 6.9 CRUSHED AGGREGATE BASE COURSE

Crushed aggregate base course shall consist of crushed stone or crushed gravel and be furnished in accordance with Section 302 of the KYDOH Specifications. Crushed aggregate base course shall be placed directly on subgrade areas or on top of salvaged asphaltic millings. CONTRACTOR shall supply ENGINEER with a current sieve analysis of the material prior to use. The material furnished shall be uniformly graded and shall conform to ASTM C33.

For street construction, base course shall be placed to the thickness shown on the standard sections. Where standard sections are not provided, a minimum of 9 inches of base course shall be provided. Base course thickness for utility trench patches in street areas shall match existing base course thickness with 12 inch minimum. The top 3 inches of base course shall be DGA. The remaining base course shall be Size No. 2. Base course shall be wetted and rolled with a self-propelled hydrostatic-drive vibratory roller. Unless otherwise requested by ENGINEER in the field, excavation below subgrade backfill shall be Size No. 2.

The finished new base course shall be fine-graded, rolled, and compacted in preparation for placement of new pavement. CONTRACTOR shall maintain the finished surface until pavement is placed.

## 6.10 SALVAGED ASPHALT PAVEMENT BASE

Where required on the Drawings or in the **SPECIAL PROVISIONS**, CONTRACTOR shall salvage existing asphaltic pavement for use as base course for street construction and/or restoration. Work shall be completed in accordance with Section 408 and 409 of the KYDOH Specifications as amended herein.

Pulverized asphalt millings shall consist of asphalt pavement that has been pulverized in place to the full depth of existing pavement. Pulverized millings shall be graded and compacted to the grades established by ENGINEER prior to placement of new asphaltic pavement. Ninety-five percent (95%) of pulverized millings shall pass a 1 1/4-inch screen with all material less than 4 inches in its longest dimension.

Salvaged asphalt millings shall consist of asphalt pavement that has been milled and transported for use as base course for street construction and/or restoration. Ninety-five percent (95%) of salvaged millings shall pass a 1 1/4-inch screen with all material less than 4 inches in its longest dimension.

## SECTION 7-CONCRETE CURB AND GUTTER, SIDEWALK, AND PAVEMENT

### 7.1 GENERAL

The Work under this division includes the construction or reconstruction of all concrete improvements required for utility or street construction as shown on the Drawings and as specified. CONTRACTOR shall schedule its Work to comply with the Traffic Control section of Division 1.

Unless otherwise specified, all street construction Work shall conform to the KYDOH Specifications as amended herein.

### 7.2 CONCRETE

All concrete shall conform to the requirements as called for in Section 601 of the KYDOH Specifications, unless otherwise specified. All concrete shall be normal set air-entrained concrete with water reducing agent, Grade A-WR with Type IA cement capable of producing a minimum compressive strength of 3,000 psi in ten days.

As soon after finishing operations as the free water has disappeared, the concrete surface shall be sealed by spraying on it a uniform coating of curing material to provide a continuous water impermeable film on the entire concrete surface.

Liquid curing compounds shall conform to the requirements of AASHTO Designation M148, Type 2, White Pigmented.

The material shall be applied to form a uniform coverage at the rate of not less than 1/2 gallon per 100 square feet of surface area.

Within 30 minutes after the forms have been removed, the edges of the concrete shall be coated with the curing compound, applied at the same rate as on the finished surface.

CONTRACTOR shall erect and maintain suitable barricades to protect the new concrete. Where it is necessary to provide for pedestrian traffic, CONTRACTOR shall construct adequate crossings. Crossing construction shall be such that no load is transmitted to the new concrete.

Any part of the Work damaged or vandalized prior to final acceptance shall be repaired or replaced at the expense of CONTRACTOR.

Pedestrian traffic shall not be permitted over new concrete prior to 72 hours after application of curing material. Vehicular traffic shall not be permitted over newly placed concrete until a minimum compressive strength of 3,000 psi has been achieved.

When the atmospheric temperature exceeds 80°F during concrete placement, ACI 305.1 shall apply in addition to all other sections of the Specifications.

Cold weather concreting shall conform to the requirements of ACI 306.1 and all other sections of the Specifications. Cold weather is defined as a period when, for more than 3 successive days, the average daily temperature drops below 40°F. The average daily temperature is the average of the highest and lowest temperature during the period from midnight to midnight. When temperatures above 50°F occur during more than half of any 24-hour period, the period will no longer be regarded as cold weather.

The temperature of the delivered concrete shall not exceed 85°F.

Care shall be exercised to keep mixing time and elapse time between mixing and placement at a minimum. Ready-mix trucks shall be dispatched in a timely manner to avoid delay in concrete placement, and the Work shall be organized to use the concrete promptly after arrival at the job site.

The subgrade, forms, and reinforcing shall be sprinkled with cool water just prior to placement of concrete. Prior to placing concrete, there shall be no standing water or puddles on the subgrade.

If approved by ENGINEER, an admixture for retarding the setting of the concrete may be used.

Concrete shall be thoroughly tamped to remove all voids. The exposed surface shall be thoroughly troweled and finished with a brush at right angles to vehicular or pedestrian traffic. All edges shall be rounded with a 1/4-inch-radius edger. Honeycombed areas shall be pointed and rubbed with mortar to provide a void-free surface.

Before final finishing, a 10-foot straight edge shall be used to check the surface. Any areas showing a variation of more than 1/4 inch from the straight edge shall be corrected. Final finishing shall be delayed a sufficient time so that excess water and grout will not be brought to the surface.

## 7.3 CURB AND GUTTER

Curb and gutter where required for street construction, site Work construction, or for restoration of utility construction shall be placed using forms or a machine to the dimensions and shape shown. Where curb and gutter details are not provided, curb and gutter shape and dimensions shall match existing adjacent curb and gutter. The base course beneath the curb and gutter shall be trimmed or filled as necessary to provide a full depth of curb and gutter as shown on the Detail Drawings. In the absence of Detail Drawings, depth shall be to the adjacent street subgrade with a minimum 4 inches. Prior to placement of concrete, the base shall be thoroughly compacted and moistened.

Where forms are used, they shall be of metal and of sufficient strength to resist distortion or displacement. Forms shall be full depth of the Work. Facing boards, if used, shall be built to obtain the cross section called for on the Detail Drawings. Forms shall be securely staked and held firmly to line and grade. Forms shall be cleaned thoroughly and oiled before reuse.

All curved curb and gutter shall form smooth curves and shall not be a series of chords. Radius forms shall be used for all curved curb and gutter where the radius of curvature is 100 linear feet or less.

Driveway openings in the curb line will be staked by ENGINEER in the field. The details for concrete gutter sections through a driveway are shown on the Detail Drawings.

A 3/4-inch expansion joint filler shall be placed through the curb and gutter at the radius points of all intersection curbs at storm inlets and at a maximum interval of 100 feet. This expansion joint filler shall extend through the entire thickness of concrete and shall be perpendicular to the surface and at right angles to the line of the curb and gutter.

At intervals of not more than 10 feet, a contraction joint shall be tooled to a depth of 1/5 of the total concrete thickness with a 1/4-inch-radius jointer. The contraction joint shall be at right angles to the line of the curb and gutter.

If machine-formed curb and gutter is placed by CONTRACTOR, CONTRACTOR shall create a plane of weakness at all joints that is sufficient to cause contraction cracking at the joints.

CONTRACTOR may saw contraction joints. The depth of cut shall be a minimum of 1/5 of the total concrete thickness. Sawing shall be done as soon as practicable after the concrete has set sufficiently to preclude raveling during the sawing and before any shrinkage cracking takes place in the concrete. If this results in random cracking, CONTRACTOR will be required to tool the contraction joints as specified above.

Steel separator plates of a section conforming to the curb and gutter as shown on the Detail Drawings shall be placed directly opposite all contraction joints in abutting street pavement. After separator plates have been removed, the edges of the joints shall be rounded with a 1/4-inch-radius edge. The use of steel separator plates at other locations will not be allowed.

## 7.4 CONCRETE SIDEWALK AND DRIVEWAYS

Concrete sidewalk and driveway construction required for a street or site work construction or for restoration of utility construction shall be placed using forms or machines to the dimensions and thicknesses shown. Where details are not provided match existing, but sidewalks shall be no less than 5 inches thick and driveways shall be no less than 7 inches thick.

The subgrade shall be thoroughly compacted and finished to a trim, firm surface. All soft or unsuitable material shall be removed and replaced with suitable material.

A minimum 4-inch-thick layer of sand, sand and gravel, or base course shall be placed under all sidewalks and driveways. This material shall be thoroughly moistened and compacted before the concrete is placed.

Where forms are used, they shall be of metal or wood and shall be of sufficient strength to resist distortion or displacement. They shall be full depth of the Work and shall be securely staked to hold the required line and grade. Where machines are used, concrete mixture shall be controlled to prevent distortion from sloughing.

Concrete sidewalk shall be segmented into 5-foot-long rectangular blocks with tooled joints. Concrete driveways shall be segmented into uniform rectangular blocks with tooled joints at a maximum spacing of 10 feet in each direction. The joint must extend at least 1/5 of the total thickness of concrete. The edges of the sidewalk along forms and joints shall be rounded with an edging tool of 1/4-inch radius. All joints shall be at right angles to the centerline of the sidewalk.

A 3/4-inch-thick expansion joint filler shall be placed at sidewalk-driveway intersections, at sidewalk-sidewalk intersections, at the intersection with new or existing curb and gutter, around all castings, and at maximum 50-foot intervals in sidewalks.

Sidewalk cross slope shall be 1/4-inch per foot unless otherwise noted in the Drawings or requested by ENGINEER. Handicap ramps shall have a maximum slope of 1:12 and be provided with a truncated dome patterned surface meeting ADA requirements.

## SECTION 8--ASPHALTIC PAVING

### 8.1 GENERAL

The Work under this division includes asphaltic concrete pavement and other miscellaneous items and Work required for utility or street construction as shown on the Drawings and included in the Specifications for paving.

Unless otherwise specified, all paving shall conform to the KYDOH Specifications as amended by these Specifications and by the **SPECIAL PROVISIONS**.

ENGINEER may request samples of asphaltic concrete for testing. CONTRACTOR shall cut samples from the finished pavement where requested by ENGINEER and patch the sample area. Samples for sieve analysis and asphalt content will be taken by ENGINEER prior to placement.

### 8.2 ADJUSTING CASTINGS

Where surface course paving is completed in the following construction season, castings shall initially be set to the finished lower course grade before lower course is placed. Where upper course paving and lower course paving are completed in the same construction season, castings shall be adjusted to final grade prior to paving.

Where adjustments are required, they shall not be made more than 48 hours prior to the anticipated time of paving. CONTRACTOR shall furnish Class 1 barricades with flashers on all adjusted castings until paving has been completed.

Internal chimney seals, where required, shall be installed after castings have been adjusted to finished grade.

Valve boxes shall be adjusted by turning the box. The valve box shall be seated on the adjusting threads to prevent future settlement. The box shall be adjusted to conform to the finished pavement and shall be plumb to allow valve operation. OWNER shall be contacted by CONTRACTOR to check operation of valve after box adjustment and prior to paving.

## 8.3 ASPHALTIC CONCRETE PAVING

This Work shall include the construction of asphaltic concrete surface course for areas to be paved including utility trench restoration and new street construction. All Work shall be performed in accordance with Section 403 of the KYDOH Specifications and as modified by **SPECIAL PROVISIONS**.

Asphaltic concrete pavement shall be ESAL Class 2.

Asphaltic binder for intermediate course and surface course shall be PG 64-22 per Section 806 unless specified otherwise in the **SPECIAL PROVISIONS**.

Aggregate shall comply with Sections 804 and 805.

Prior to the commencement of paving, mix designs and aggregate sieve analysis shall be submitted to ENGINEER.

The pavement structure for street areas and driveways shall be in accordance with the standard sections. Where standard sections are not provided, the minimum pavement structure shall consist of 2-1/4 inches of asphaltic concrete intermediate course material and 1-3/4 inches of asphaltic concrete surface course for street and parking lot construction and 2-1/2 inches of surface course material for bike paths, sidewalks, and asphalt driveways. Pavement thickness for trench restoration shall match adjacent pavement thickness or minimum thickness as specified for street construction, whichever is greater.

## 8.4 TACK COAT

Unless otherwise specified in the **SPECIAL PROVISIONS** or shown on the Drawings, CONTRACTOR shall provide tack coat between all layers of new asphalt and on existing pavement to be overlaid with new asphalt. Tack coat shall meet the requirements of Section 406 of the KYDOH Specifications.

## 8.5 PAVEMENT STRIPING

Where required on the Drawings or in the **SPECIAL PROVISIONS**, CONTRACTOR shall provide painted pavement markings.

Two-way traffic shall be maintained at all times.

Centerline marking shall be double 4-inch solid yellow line, placed at the marked centerline.

Traffic lane marking shall be single 4-inch broken white line, placed 12 feet from median curb flange or as shown or requested by ENGINEER. Turning lane markings and crosswalk markings shall be 8 inch and 6 inch solid white, respectively. Stop bars shall be 18 inch solid white.

All markings shall be applied in accordance with Sections 713 and 842 of the KYDOH Specifications and the Manual on Uniform Traffic Control Devices.

Markings shall be placed at locations noted within 1-inch tolerance.

## SECTION 9—RESTORATION AND SITE WORK

### 9.1 SCOPE

The Work under this portion of the Contract includes finished grading, seeding, sodding, miscellaneous restoration, and other miscellaneous items of Work outside of the areas to be paved.

Unless otherwise specified, all restoration Work shall conform to the KYDOH Specifications and the **SPECIAL PROVISIONS**.

See **SPECIAL PROVISIONS** for availability of water for use in restoration and site Work.

### 9.2 SEEDING AND SODDING

Seeding and sodding shall be completed in all areas disturbed by construction other than areas with finished gravel, brick, asphalt, concrete, or decorative landscape treatments.

#### 9.2.1 SEED RESTORATION

Unless otherwise shown on the Drawings or specified in the **SPECIAL PROVISIONS**, all areas disturbed by construction shall be restored with seed restoration. Prior to seeding, disturbed areas shall be graded to subgrade for placement of topsoil.

Topsoil shall consist of salvaged topsoil or hauled-in topsoil provided and placed in accordance with Sections 212 and 827 of the KYDOH Specifications. Topsoil shall be placed to a uniform depth of 6 inches in place.

All areas requiring terrace restoration that do not require sod restoration shall be restored by seed restoration. Seed restoration shall consist of placing and grading topsoil, seeding, fertilizing, and mulching.

Seed materials and placement shall conform to Sections 212 and 827 of the KYDOH Specifications unless otherwise requested by ENGINEER. CONTRACTOR shall not be responsible for watering. Fertilizer shall conform to Sections 212 and 827. Mulching shall conform to Sections 213 and 827 for straw mulch.

#### 9.2.2 SOD RESTORATION

Specific areas to be restored with sod shall be shown on the Drawings or specified in the **SPECIAL PROVISIONS**. Sod restoration shall be completed in accordance with the following:

Prior to placement of sod, finish grading shall be completed. Finish grading shall consist of placing topsoil to the edge of hard-surfaced areas or to limits established by ENGINEER.

Topsoil shall be of humus-bearing soil, adapted to the sustenance of plant life and commonly known as black dirt, and shall be free of stones, debris, vegetable material, and excesses of peat, sand, or clay. Unless otherwise specified, topsoil shall be placed 4 inches thick and shall be graded and raked. Finished top soiled areas shall be free of stones, road material, or lumps of dirt. The soil in the area to be sodded shall be loosened and brought to a reasonably fine granular texture to a depth of not less than about 1 inch.

A 15-30-15 fertilizer shall be spread uniformly over the areas at the rate of 17 pounds per 1,000 square feet of area unless otherwise specified in the Contract. Fertilizer shall be worked into the soil prior to placing sod.

Sod shall consist of a dense, well-rooted growth of permanent and desirable grasses, indigenous to the general locality where it is to be used, and shall be practically free from weeds or undesirable grasses. At the time the sod is cut, the grass on the sod shall have a length of approximately 2 inches (if longer, the grass shall be cut to approximately this length), and the sod shall have been raked free from debris.

The sod shall be cut in uniform strips approximately 18 inches by 36 inches but no longer than is convenient for handling and transporting.

The thickness of the sod shall be as uniform as possible, approximately 1-1/2 inches or more, depending on the nature of the sod, so that almost all of the dense root system of the grasses will be retained, but exposed, in the sod strip and so that the sod can be handled without undue tearing or breaking.

Sod shall be laid so that the joints caused by abutting ends of sod strips are not continuous. Each sod strip shall be so laid as to abut snugly against the strip previously laid.

As the sod is being laid, it shall be rolled or firmly but lightly tamped with suitable wooden or metal tampers to set or press the sod into the underlying soil.

At points where water will flow over a sodded area, the upper edges of the sod strips shall be turned into the soil below the adjacent area and a layer of earth placed over this juncture, which earth shall be thoroughly compacted to conduct the surface water over the upper edge of the sod.

At the limits of sodded areas, wherever practical or feasible, the end strips shall be placed to effect a broken line, and ends of the strips shall be turned in and treated as above described.

All sodded areas shall be kept thoroughly moist until the sod is established. Sod that dies during warranty period shall be replaced at no cost to OWNER.

### 9.3 MISCELLANEOUS RESTORATION ITEMS

CONTRACTOR shall be responsible for the proper replacement of all damaged street and highway signs and markers at all times during construction. Repair or replacement of signs shall be subject to review of ENGINEER and applicable local, state, and federal highway departments before final acceptance of the Work.

CONTRACTOR shall restore all culverts removed, damaged, or disturbed during construction to their original condition or they shall be replaced. Mailboxes shall be restored to their original locations and height. Light poles and power poles shall be restored to their original location. Underground improvements, such as water main, electric lines or drain tiles shall be restored to original condition. At all locations where utilities cross, compacted backfill shall be used from the bottom of the excavation to the top of the highest conduit. All street improvements, fences, walkways, and home and yard improvements, if destroyed, damaged, or removed shall be replaced to original condition or better.

Where construction interrupts existing private or public sewer and water systems, it shall be CONTRACTOR's responsibility to maintain these systems or provide alternative means until the new system is placed in operation or until final acceptance of the Work, whichever occurs first. No bypassing of untreated wastewater will be allowed.



CONTRACTOR shall proceed with restoration of property and clean up of all disturbed areas concurrently with the installation of utilities and street construction.

Where restoration is included as a portion of a Bid item, the estimated cost of restoration and cleanup, up to a maximum of 15% of each Bid item, may be withheld until final cleanup of the Work in each Bid item.

## 9.4 RETAINING WALLS

### 9.4.1 BOULDER WALLS

In areas as generally shown on the Drawings and as specifically noted in the field by ENGINEER, CONTRACTOR shall construct boulder walls.

The boulders shall be round field stone. The stone shall consist of varying sizes and weights. The minimum weight shall be 250 pounds.

The stone shall be placed randomly. The larger stone shall be placed at the bottom; minimum 12 inches deep into the soil. The minimum batter shall be 3 inches in one vertical foot unless otherwise allowed by ENGINEER. Geotextile fabric shall be installed behind the wall to prevent the backfill from eroding through the joints and courses. Backfill shall meet the requirements of the Backfilling section. The layout of the wall shall be reviewed by ENGINEER prior to construction of the wall. A suitable foundation shall be provided to preclude settlement. The wall may be constructed in conjunction with the new embankment. Chinking shall be provided to secure stability of the stones.

### 9.4.2 CUT BLOCK MODULAR RETAINING WALL

This Work includes construction of interlocking modular concrete retaining wall units and accessories at locations shown on the Drawings and as requested by ENGINEER in the field.

Modular wall units shall be constructed in accordance with ASTM C90, ASTM C140, ASTM D2339, and ASTM D4475.

Masonry units, when delivered to the site, shall be thoroughly cured and shall be dry. When stored on the site, they shall not be in contact with the ground and shall be kept clean.

CONTRACTOR shall submit gradation of base leveling pad material and unit fill material as well as color samples for OWNER's selection.

CONTRACTOR shall provide to ENGINEER design calculations prepared and stamped by a Professional Engineer registered in the state of the Project verifying the proposed design satisfies the design parameters as shown on the Drawings and as required herein.

Masonry units shall be Keystone Retaining Units, or equal, as manufactured in accordance with ASTM C90 and ASTM C140.

Masonry units shall have a minimum 28-day compressive strength of 3,000 psi. The concrete shall have a maximum moisture absorption of 8%.

Standard units shall be classic straight split face, 8 inches high by 18 inches wide. Top row of units shall have a smooth face. Color of units will be selected by OWNER from manufacturer's standard color selections. A concrete wall cap/sidewalk will be constructed on top of the wall.

Units shall be interlocked with noncorrosive fiberglass pins.

Connecting pins shall be 1/2-inch-diameter thermoset isophthalic polyester resin-pultruded fiberglass reinforcement rods.

Pins shall have a minimum flexural strength of 128,000 psi and short beam shear of 6,400 pounds per ASTM D4475.

Construction adhesive shall be Keystone Kapseal, or equal, and shall meet requirements of ASTM D2339.

Base leveling pad material shall be 6 inches of compacted crushed stone, 3/8 inch to 3/4 inch. Pea gravel shall not be allowed.

Unit fill shall be free-draining, well-graded crushed stone, 3/8 inch to 3/4 inch, with no more than 5% passing the No. 200 sieve. Masonry unit voids shall be capable of accepting a railing post diameter of up to 3 inches. Non-shrink grout shall be used in voids accepting railing posts.

All walls shall be designed for a surcharge of 250 psf and a railing load of 50 plf in addition to the loads imposed by the retained material. The engineered design shall be in accordance with the AASHTO Standard Specifications for Highway Bridges, Section 5.8.

Foundation soil shall be excavated as required for leveling pad dimensions shown on the Drawings.

Subgrade shall be approved by the Project Soils Engineer to confirm that the actual foundation soil conditions meet or exceed assumed design strength. Soils not meeting required strength shall be removed and replaced with acceptable material.

Leveling pad materials shall be placed as shown on the Drawings to a minimum thickness of 6 inches and shall extend laterally a minimum of 6 inches in front of and behind the modular wall.

Materials shall be compacted to provide a level surface on which to place the first course of units. Compaction shall be to 95% of standard proctor for sand or gravel type materials. For crushed rock, material shall be densely compacted.

Leveling pad shall be prepared to ensure complete contact of retaining wall unit with base.

Units shall be installed to conform to elevations shown on the Drawings or as staked in the field to match existing grade.

The first course of concrete wall units shall be placed on the base leveling pad. The units shall be checked for level and alignment. Bottom of wall shall be minimum 12 inches below finished grade.

Units shall be placed side by side for full length of wall alignment. Alignment may be done by a string line or offset from base line.

Units shall be interlocked with fiberglass pins. Pins shall protrude into adjoining courses above a minimum of 1 inch. Two pins required per unit.

All voids inside and between units and drainage zone behind units shall be filled with tamped unit fill material. Automated compaction equipment shall not be used directly over the units. Walk-behind mechanical compaction equipment may be used to compact soils that are placed beyond the drainage zone behind the unit. Mobile mechanical compaction equipment shall not be used within 5 feet of the wall face.

While placing material behind first course of units, the passive soil wedge at the front of these units shall be placed.

All excess material from top of units shall be cleaned prior to installing the next course. Each course is to be completely filled, backfilled, and compacted prior to proceeding to next course.

A permanent mechanical connection of cap units to wall units shall be provided with construction adhesive.

## 9.4.3 STRUCTURAL GEOGRID

Geogrid shall be a product with a regular grid structure of a select high density polyethylene or polypropylene resin, UX1500MSE, as manufactured by Tensar Corporation, or equal.

Minimum allowable junction strength of the geogrid, per G.R.I.-GG2, shall be equal to or greater than 90% of the ultimate strength of the geogrid, as per G.R.I.-GG1.

The geogrid soil reinforcement shall be laid horizontally on compacted backfill. Place the next course of modular concrete facing units over geogrid. The geogrid shall be pulled taut and anchored prior to backfill placement on the geogrid.

Geogrid reinforcement shall be continuous throughout their embedment length(s). Spliced connections between shorter pieces of geogrid will not be allowed.

## 9.5 PLANTINGS

Plantings shall be provided as shown on the Drawings or as otherwise specified in the **SPECIAL PROVISIONS**. Plants should be planted on the day of delivery. If this is not possible, protect the stock not planted. Plant material shall be kept in the shade, well-protected with soil, wet moss or other acceptable material and shall be well-watered. Plants shall not be bound with wire or rope at any time to avoid damaging the bark or breaking branches.

Plants shall be lifted and handled from the bottom of the ball only. Plants moved with a ball will not be accepted if the ball is cracked, loose, or broken before or during the planting operations.

Fertilizer shall be delivered to site in original, unopened containers, each bearing manufacturer's guaranteed analysis. Packaged materials shall be stored off ground and protected from moisture.

CONTRACTOR shall coordinate planting Work with installation of sod and the construction of other site features.

CONTRACTOR shall take precautions to ensure that equipment and vehicles do not disturb or damage existing site grading, walks, drives, utilities, plants, etc., and shall replace and/or return to original condition any damage caused by CONTRACTOR's negligence at no cost to OWNER.

CONTRACTOR shall maintain plantings immediately upon installation of plants and continue until acceptance, including watering, weeding, removal of dead material, resetting of plants to proper grade and plumb position, and other necessary operations.

Plants shall be alive and in good, healthy, and flourishing condition of growth at the end of the guarantee period.

Any plant installed under this Contract that is dead or not in a vigorous, thriving condition shall be removed from the site and replaced at CONTRACTOR's cost as soon as conditions permit during the

normal planting season. In case of any questions regarding the condition of a rejected plant, CONTRACTOR may elect to allow such plant to remain through another complete growing season. If at that time, the rejected plant is found to be dead or in an unhealthy or badly impaired condition, it shall be replaced. One replacement after acceptance shall constitute fulfillment of CONTRACTOR's guarantee for the particular plant replaced. All replacements shall be plants of the same kind and size as specified originally. CONTRACTOR shall make all necessary repairs required because of plant replacements. Such repairs shall be done at no extra cost to OWNER. Plants shall be replaced, mulched, wrapped, fertilized, pruned, and restored to original condition at no extra cost to OWNER.

Plant names shall conform to those given in *Standardized Plant Names*, 1942 Edition, American Joint Committee on Horticultural Nomenclature. All plants shall be true to name and legibly tagged as to name and size. Federal or other governmental certificates of inspection shall accompany all shipments as required.

Plant materials, methods, etc. shall conform to the latest edition of ANSI Z60.1.

CONTRACTOR shall have investigated the sources of supply and shall be satisfied that CONTRACTOR can supply the listed plants in the size, variety and quality specified before submitting a Bid. Failure to do so will not relieve CONTRACTOR of the responsibility for furnishing and installing all plant materials in strict accordance with the Contract Documents.

All material shall be the highest quality. Plants shall have typical growth habit for their species. Plants shall be sound, healthy, vigorous, and free from insect pests, plant diseases, and injury. One-sided plants and plants taken from tightly planted nursery rows will be rejected.

All plants shall equal or exceed measurements specified, measured before pruning with branches in normal position. Height and spread refers to main body of plant and not from tip to tip of branches and roots. Trees shall have a well-defined central leader.

Soil excavated from plant pits that is similar in nature to topsoil and is determined to be suitable for planting soil shall be thoroughly mixed with one part of peat to five parts of existing soil. Very poor soils of clay, gumbo, gravel, hard-pan, or other soils injurious to plants shall not be used.

If quantity of soil excavated from planting pits is not adequate for planting, CONTRACTOR shall furnish imported planting soil consisting of partially decomposed vegetable matter of natural occurrence. Such soil shall be black, clean, low in content of mineral or woody material, mildly acidic, fertile and friable. This soil shall be mixed with one part of peat to five parts of soil. Peat shall be a domestic product consisting of partially decomposed vegetable matter of natural occurrence-black, clean, granulated, or shredded.

Fertilizer shall be equal to Milorganite (6-2-0), Louisville Green (5-3-0), or equal uniform in composition and free-flowing. Fertilizer which becomes caked or otherwise damaged making it unsuitable for use will not be accepted. Rate of application shall be as recommended by nursery.

Wood mulch shall be shredded hardwood bark of local origin, similar in physical composition to shredded mulches sold under the brand names of Montaho, Pay-Gro, or equal.

Mulches shall be a minimum of 4 inches thick.

Deciduous trees and shrubs shall be planted from November 1 to April 1. All trees and shrubs shall be planted so as to provide the maximum growing time allowable under the Contract Times. At the option and on full responsibility of CONTRACTOR, planting operations may be conducted under unseasonable conditions without additional compensation or change to warranty.

CONTRACTOR shall stake out on the ground the location of all plants before excavation is begun, and review layout with OWNER. Plants installed at incorrect locations shall be relocated by CONTRACTOR at no expense to OWNER.

CONTRACTOR shall excavate the plant pit, centered at the location stake, cylindrical in shape with vertical sides and flat or saucer-shaped bottom. Planting soil for backfilling shall be kept separate from excavated subsoil. Pit shall be large enough to provide at least 12 inches of planting soil backfill around and beneath the root system. Where surface or subsurface conditions prevent digging a plant pit to specified dimensions, obtain approval from landscape architect to modify location or pit dimensions.

The root ball shall be centered in the plant pit resting on 12 inches of planting soil well-tamped. The plant hole shall be backfilled with planting soil placed in layers around the root ball. Each layer shall be hand-tamped in place in a manner to avoid injury to roots and ball. When approximately two thirds of the plant hole has been backfilled, the hole shall be filled with water to allow the soil to settle around the roots. Top of root ball shall be 1 inch above surrounding grade. The cord or wire securing burlap at base of tree shall be cut, with the burlap folded back.

Just prior to inspection for acceptance, CONTRACTOR shall prune all plantings. The amount of pruning will be limited to the minimum necessary to remove dead or injured twigs and branches to compensate for loss of roots as a result of transplanting operations. Pruning shall be done in such a manner as not to change the natural habit or shape of the plant.

CONTRACTOR shall promptly remove any soil, peat or similar material that has been brought onto paved areas by planting operations, keeping those areas clean at all times, and shall remove all debris resulting from planting operations from the site.

Replacement plantings shall match existing plant type, with minimum 4-year nursery growth.

## SECTION 10-MISCELLANEOUS REQUIREMENTS

### 10.1 GRADE STAKES AND PROPERTY STAKES

CONTRACTOR shall furnish and place in position all items necessary to control the horizontal and vertical accuracy of the Work including lasers, batterboards, string lines, plummets and graduated poles.

Where lasers are used, CONTRACTOR shall check the Work against intermediate grade stakes. Prior to initial use of the laser, CONTRACTOR shall set up laser on ground surface and check line and gradient controls. Lasers not functioning properly shall be immediately removed.

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

### 10.2 TESTING PIPELINES

#### 10.2.1 GENERAL

CONTRACTOR shall conduct testing on all new pipe lines as specified below.

Utility installations which fail to meet the test limits shall be repaired in a manner acceptable to ENGINEER. In general, defective pipe installations should be uncovered and relaid, with new pipe if

necessary, to repair the defect. Under no circumstances shall defects be sealed from the interior of the pipe, and only where specifically allowed by ENGINEER, shall defects be sealed from the exterior of the pipe.

## 10.2.2 SANITARY SEWER AIR AND LEAKAGE TESTING

All sanitary sewer gravity mains shall be tested for leakage after installation of laterals and placement of backfill. Leakage testing of thermoplastic sanitary sewer gravity mains shall be conducted in accordance with ASTM F1417. Testing of rigid sanitary sewer mains shall be in accordance with ASTM C828 for clay pipe and ASTM C924 for concrete pipe. CONTRACTOR shall keep a record of all tests performed. These records shall show the individual lengths of main tested and test results.

All sanitary sewer gravity mains in groundwater shall also be tested by measuring the infiltration through the use of a weir installed in the manhole at the downstream end of the sewer being tested. Groundwater shall be at least 2 feet above the crown of the sewer at the upstream end for all such tests.

Sewers 18 inches and larger may be tested for leakage by infiltration or exfiltration in lieu of air testing. If groundwater is 2 feet or more above the sewer, measurements will be taken to determine the rate of infiltration into the sewer. If groundwater is below 2 feet above the sewer, the stretch of sewer shall be plugged at its downstream end and water shall be placed inside the sewer to provide a minimum of 4 feet of head above the upstream end.

Measurements will then be taken to determine the rate of leakage out of the sewer. CONTRACTOR shall furnish all labor and materials necessary for making the tests. The allowable leakage shall be as indicated below for final acceptance.

At the conclusion of construction and before final acceptance of the Work, the downstream end of the sewer will be measured for infiltration. Allowable infiltration shall not exceed 200 gallons/inch of pipe diameter/mile/day for that portion of the Work under groundwater. If infiltration is exceeded, the leak or leaks shall be located and repaired.

CONTRACTOR shall prepare all pipeline for testing and shall furnish all equipment, materials, tools, and labor necessary for performance of the tests. Equipment for the low pressure air test of gravity mains shall be equal in all operational aspects to that as furnished by Cherne Industrial, Inc, or United Survey, Inc.

Air and leakage testing of storm sewers will not be required.

## 10.2.3 MANHOLE TESTING

If required on the Drawings or in the **SPECIAL PROVISIONS**, sanitary sewer manholes shall be vacuum tested in accordance with ASTM C1244. Pipes entering the manhole shall be plugged and the seal inflated in accordance with manufacturer's recommendations.

Vacuum testing of storm sewer and other manholes will not be required.

## 10.2.4 TELEVISED INSPECTION

Where specified in the **SPECIAL PROVISIONS**, a color televised survey of installed sanitary sewer shall be provided after air testing to confirm branch locations, verify cleanliness of sewer, and confirm presence or absence of sags or deviations in sewer alignment. Sewers shall be cleaned immediately prior to the survey. The survey shall conform to NASCO PACP standards.

Televised inspection of storm sewers will not be required.

## 10.2.5 DEFLECTION TESTING

All PVC pipe used for sanitary sewer shall be tested for vertical deflection. Maximum deflection after completion of backfilling shall be 5% of the inside pipe diameter. Testing shall not be started until trench backfill has been in place for 30 days. CONTRACTOR shall keep a record of all tests performed. These records shall show the individual lengths of main tested and test results. Deflection shall be measured by pulling a mandrel with a vertical diameter equal to 95% of the pipe inside diameter through the line, after thoroughly flushing the lines to be tested. The testing device shall be controlled using cables at both the upstream and downstream manholes. The testing device must pass freely through the sewer without the use of unreasonable force on the control cables. Any line that will not pass the test cylinder will not be accepted until the faulty sections have been removed and replaced and the line retested.

Deflection testing of thermoplastic storm sewer shall be provided in accordance with the above requirements.

## 10.2.6 WATER MAIN DISINFECTION

CONTRACTOR shall furnish all water and other materials, equipment, and labor necessary to disinfect all new water mains and all existing water mains disturbed by construction. Sampling and testing shall conform to AWWA C651 and Section 4 of 401 KAR 8:150. CONTRACTOR shall coordinate and bear cost for necessary testing by a certified laboratory and shall submit the results to the Environmental and Public Protection Cabinet. Sampling and testing shall be scheduled to complete the Work within the Contract Times. A water main shall not be placed in service until satisfactory test results are obtained. Items of material for testing shall be furnished in the size and quantity necessary to properly complete the test. Interruption or delay of CONTRACTOR's Work progress caused by testing and sampling shall not be cause for extra payment under the Contract nor shall they be cause for extension of Contract Time.

## 10.2.7 WATER MAIN AND FORCE MAIN TESTING

CONTRACTOR shall conduct hydrostatic pressure tests and leakage tests of all joints in accordance with the requirements of AWWA C600 for iron pipe and AWWA C605 for PVC pipe. During performance of the hydrostatic pressure test, water main shall be subjected to a minimum pressure of at least 50 percent above normal working pressure with a minimum pressure 125 psi. Force main shall be tested to 200% of normal operating pressure in the main, but to no more than the pressure rating of the pipe. All air shall be removed from the main during testing. This shall be done by flushing, by installing corporations at high points, or by releasing air at valves at high points. Test pumping equipment used shall be centrifugal pumps or other pumping equipment that will not place shock pressures on the main. Power plunger pumps will not be permitted for use on closed pipe systems. Pumps shall be disconnected during test periods.

Prior to conducting the pressure and leakage test, CONTRACTOR shall backfill the trench for its full depth. All bends and special connections to the main shall be adequately blocked and tied prior to the test. Any damage caused to the main or its appurtenances during performance of these tests shall be corrected by CONTRACTOR at its expense.

CONTRACTOR shall keep a record of all tests performed. These records shall show the individual lengths of main tested and test results.

Where connections are made to existing mains, it shall be the responsibility of CONTRACTOR to provide the necessary hydrostatic tests on all new mains installed. This may necessitate, but is not

limited to, the installation of temporary valves to isolate the new system from the existing system. All materials, Work, and equipment necessary for this Work shall be furnished by CONTRACTOR at its expense.

All testing of pipelines shall proceed concurrently with installation. CONTRACTOR is advised that it may be advantageous to conduct daily preliminary testing of its Work.

Water from disinfection testing shall not be discharged to a stream, creek, river, storm sewer tributary thereto, or to a navigable water without first neutralizing the chlorine residual in the water and complying with local, state, and federal laws thereto.

## 10.3 TRAFFIC CONTROL

CONTRACTOR shall conduct its Work to minimize disruption of traffic on the job site and on adjacent streets and alleys. Where construction is in an area having only one vehicular access, CONTRACTOR shall conduct its Work to avoid or minimize blockage of such access. Blocking of streets or providing detours shall only be done if allowed in the **SPECIAL PROVISIONS**. Safe access shall be provided at all times for local traffic when CONTRACTOR is not working. CONTRACTOR shall keep local police and fire departments informed as to traffic access status as the Work proceeds.

CONTRACTOR shall furnish and install all necessary flagmen, barricades, signs, warning lights, and appurtenances to provide for safe and convenient control of traffic throughout the Project site. Barricading, signing and flagging shall be accomplished in strict accordance with the Manual on Uniform Traffic Control Devices and the KYDOH Specifications.

## 10.4 EROSION CONTROL

Where land disturbance activities do not exceed one acre, CONTRACTOR shall maintain site conditions where erosion and pollution are controlled.

Unless otherwise specified in the **SPECIAL PROVISIONS**, CONTRACTOR shall, for land disturbance activities exceeding one acre, develop and implement a Storm Water Erosion and Pollution Control Plan in accordance with conditions of federal and state permits, local ordinances, Best Management Practices, and as required by the Notice of Intent (NOI).

The following certification shall be included in the Storm Water Erosion and Pollution Control Plan, which CONTRACTOR and all subcontractors shall sign:

"I certify under penalty of law that I understand the terms and conditions of the General Pollutant Discharge Elimination System (NPDES) Permit that authorizes the storm water discharges associated with industrial activities from the construction site and as may be detailed in the Contract Documents. I agree to indemnify and hold OWNER harmless from any claims, demands, suits, causes of action, settlements, fines, or judgments and the costs of litigation, including, but not limited to, reasonable attorneys fees and costs of investigation and arising from a condition, obligation or requirement assumed or to be performed by CONTRACTOR for storm water pollution and erosion control."

Where land disturbances exceed one acre, CONTRACTOR shall execute a Notice of Intent (NOI) and send to OWNER and the Kentucky Division of Water, KPDES Branch.

Such controls as identified in the Storm Water Erosion and Pollution Control Plan shall be installed prior to disturbing any soil on the site. CONTRACTOR shall construct, maintain, and remove the erosion and pollution controls in accordance with the plan.



CONTRACTOR shall provide a "qualified" inspector to inspect erosion control and pollution controls. Inspector shall have prior experience with erosion and pollution controls and have knowledge of installation and maintenance of erosion and pollution controls as described by the Best Management Practices. Inspector shall be identified in the erosion and pollution control plan. In accordance with the General Pollution Elimination Systems General Permit conditions, the Project site erosion control inspection shall be every seven days and after each 1/2 inch rainfall or greater. CONTRACTOR shall maintain hard copies of the inspection report with Storm Water Erosion and Pollution Control Plan for the duration of the Project.

CONTRACTOR shall respond within 24 hours to all corrective measures noted on the inspection report to address pollution issues. CONTRACTOR shall submit to OWNER a written notice stating the times, dates and actions taken to rectify the defective pollution and erosion controls.

CONTRACTOR shall pay any fines or other fees resulting from failure of CONTRACTOR to comply with the permit requirements or failure to provide a permit.

CONTRACTOR shall submit a "Notice of Termination" (NOT) to KDOW at end of the Project.

## 10.5 MISCELLANEOUS WORK

CONTRACTOR shall provide miscellaneous Work as specified in the **SPECIAL PROVISIONS**.

## SECTION 11-MEASUREMENT AND PAYMENT

### 11.1 GENERAL

Payment for changes in quantities, as shown in the Bid and Contract, shall be made in accordance with the prices bid. No change of grade, alignment or location shall annul or impair the Contract made and entered into relative to said Work. Payment shall be made for the quantities of each Bid item as actually installed. If a price is not provided in the Bid for an item of Work, the Work shall be considered incidental and included in adjacent items of Work.

### 11.2 UTILITY CONSTRUCTION

Payment for utility construction including water main, storm sewer, sanitary sewer, and force main will be made as listed in the Bid for furnishing all materials, labor, and equipment for the complete installation of the sewers, mains, and appurtenances as shown and specified.

The prices bid shall include the pipe, excavation, dewatering, bedding, laying, jointing, backfilling, paving, restoration, testing, and maintenance of surface, and all other labor and material necessary for complete compliance with these Specifications. Wye and tee branches shall be included in the prices bid for sewer main unless otherwise listed in the Bid proposal form. The cost of all special connections to existing mains and appurtenances shall be included in the prices bid. Unless otherwise shown on the Drawings or specified in the **SPECIAL PROVISIONS**, the prices bid for utility construction shall include the cost of backfilling with existing materials.

### 11.3 SERVICES, LATERALS, AND RISERS

Water services, standard sewer laterals, and modified sewer laterals, as listed in the Bid, will be paid for in addition to the prices bid for water main and sanitary sewer. The prices bid for services and laterals shall include the entire cost for all labor, tools, bends, couplings and incidentals to install the services and laterals beyond the tap or wye or tee branches as shown and specified. Lengths of

services and laterals for payment will be measured along the centerline of the pipe from the center of the main to the end of service. The cost of tunneling under or removing and replacing existing sidewalk and curb and gutter or other existing improvements shall be included in the prices bid. The cost of connecting existing water services to new water services shall be considered incidental to the Work

Risers will be paid for in addition to the prices bid for sanitary sewer main. The prices bid for risers shall be for the installation of risers constructed of ductile iron complete in place as shown on Drawing 01-975-75A. If included in the Bid, lengths of risers for payment will be measured along the centerline of the riser from the center of the main to the top 90° bend. In the prices bid, CONTRACTOR shall include all labor, equipment, and material necessary to install and support the riser column and to also provide ductile iron pipe from the riser column to the end of the service. If not included in the Bid, risers shall be paid for the same as for sanitary sewer laterals above.

## 11.4 INLET LEADS

The prices bid for inlet leads shall include the entire cost of all labor, excavations, backfilling, and material necessary for installation of the pipe from the center of the sewer main to the inlet box. The costs of special pipe fittings necessary to make the connections at the sewer main and at the inlet box shall be included in the prices bid.

The depth of service laterals and inlet leads will vary. The prices bid shall be for pipe installed at depths as shown on the Drawings or as requested by ENGINEER.

## 11.5 MANHOLES

Where manholes are not included in other Bid items, they will be paid for according to the prices bid. The prices bid for manholes shall include the cost of all material, Work, excavation, and backfilling necessary for construction of manholes as shown on the Drawings. Special bedding or pipe adjacent to manholes to standard trench width shall be included in the manhole price. The prices bid shall include the furnishing and installation of casting, steps, adjusting rings, and eccentric cone or flat slab as shown on the Drawings.

Special manholes will be paid for as shown on the Drawings and as listed in the Bid.

## 11.6 DROP ENTRANCES

Drop entrances to manholes shall be furnished and installed as shown on the Drawings and as specified. No additional payment will be made for drop entrances to manholes. Drop entrances will vary in depth from a minimum of 2 feet to the maximum as indicated on the Drawings.

## 11.7 STORM SEWER INLETS

The prices bid for inlets is to include the entire cost of all materials, labor, excavation, and backfilling necessary for complete construction of the inlets as shown and as specified. The cost of inlet lead pipe will be paid for under a separate Bid item. The depth of inlet will vary from the minimum shown on Drawing 01-975-41A to the amount specified. The prices bid shall apply for all inlet depths as actually installed. The cost of concrete encasement at the sewer main, where necessary, shall be included in the prices bid for inlets.

## 11.8 ROCK EXCAVATION, UTILITIES

Rock excavation for utility trenches shall be paid at the price bid. Such price bid may either be per linear foot regardless of trench depth or on a cubic yard basis as measured in place.

Rock excavation shall include the cost of hauling and disposal of excavated rock and furnishing and placing backfill material and will be in addition to the prices bid for utility or street installations and appurtenances thereto.

## 11.9 SPECIAL BEDDING AND CONCRETE CRADLE

Where ENGINEER determines that unstable soils are present and are not CONTRACTOR's fault, payment for special bedding will be made. The price bid for special bedding shall include excavation for the bedding and furnishing and placing the bedding material.

The price bid for concrete cradle shall include forming, sheeting, excavation, and all materials for installation as shown on the Drawings. Measurement of concrete cradle will be made within the trench width for the depth as shown on the Drawings or requested by ENGINEER.

Special bedding and concrete cradle, where requested, will be paid for in addition to the prices bid for utility installations.

## 11.10 GRANULAR BACKFILL

The cost of granular backfill shall be included in the prices bid for utility installations and appurtenances where shown on the Drawings or specified. Where requested in the field by ENGINEER, payment will be made based on the prices bid measured in place following compaction. Costs shall include hauling away and disposing of material replaced by the granular backfill. Volume allowed for payment on a unit price basis shall not exceed an average trench width of 8 feet for the depth of fill placed.

Cover material and material placed within the zone of the trench where restoration materials are to be placed, such as topsoil and base course, shall not be included in the quantity measured for hauled-in granular backfill.

## 11.11 TRENCH SHEETING

Payment will be made only for sheeting required on the Drawings or **SPECIAL PROVISIONS**. The prices bid shall include the entire cost of furnishing all materials and labor for installation of the sheeting.

## 11.12 DEWATERING

The cost of removal of ground water and surface water shall be included in the prices bid for utility and street construction. No separate payment will be made for dewatering.

## 11.13 TUNNELING, BORING, JACKING, OR BORING AND JACKING

Payment for placement of casing pipe and carrier pipe inside the casing pipe shall be for the limits as shown on the Drawings and as listed in the Bid. The prices bid shall include the cost for furnishing the casing and carrier pipes, equipment, and labor necessary for installation including jacking pits, sheeting, special Work to install the casing and carrier pipe, backfilling, and restoration of surface improvements. Placement of the carrier pipe inside the casing pipe, including blocking and filling of the annular space, shall also be included in the prices bid.

## 11.14 EROSION CONTROL

Erosion control shall be paid at the various prices bid, if listed individually, or shall be included in the price bid for erosion control. If not included in the Bid, erosion control shall be considered incidental and included in the price bid for adjacent Work.

## 11.15 BEDDING DIKE

Bedding dike shall be paid at the prices bid, if listed separately. If not included in the Bid, it shall be considered incidental and included in the price bid for adjacent Work.

## 11.16 AGGREGATE SLURRY (FLOWABLE) BACKFILL

Aggregate slurry (flowable) backfill shall be paid at the prices bid, if listed separately. If individual Bid items are not provided in the Bid, it shall be considered incidental and included in the price bid for adjacent Work.

## 11.17 CLEARING AND GRUBBING

Cost for clearing and grubbing as described shall be paid for according to the Bid items included in the Bid. If individual Bid items are not provided in the Bid, the cost of this Work shall be considered incidental to adjacent utility and street construction Work.

## 11.18 COMMON EXCAVATION

Common excavation shall be included in the price bid for the Work, if listed separately. If individual Bid items are not provided in the Bid, the cost of this Work shall be considered incidental to adjacent utility and street construction Work.

The cost for utility installations within areas where common excavation is to be performed shall not include the cost for common excavation required in this Contract for street construction.

If listed separately, the price bid shall include excavation of materials and placement and compaction of excavated materials, except topsoil, to subgrade elevations. For lump sum bids, CONTRACTOR shall be responsible to make its own computations for common excavation in compiling the price bid. No changes in payment for common excavation will be allowed unless changes in the Work to be completed have been approved by ENGINEER. If not on a unit price basis, payment for any such changes shall be determined by calculating the common excavation quantity related to the change in Work and applying a unit price cost based on the lump sum bid and ENGINEER's original estimated common excavation quantity. For CONTRACTOR's information, ENGINEER's estimated quantity for common excavation will be noted in the Bid.

Saw cutting will be paid for according to the price bid, if listed separately. If individual Bid items are not provided, the cost of this Work shall be considered incidental.

## 11.19 ROCK EXCAVATION, STREETS

Rock excavation for grading of streets or for site work shall be paid at the price bid, and shall include the hauling and disposal of the excavated rock. Such price bid will be on a cubic yard basis as measured in place by cross sectioning the rock before and after its removal.

## 11.20 BORROW EXCAVATION

Cost for borrow excavation shall be paid for according to the items included in the Bid. If individual Bid items are not provided in the Bid, the cost of this Work shall be considered incidental to adjacent utility and street construction Work.

## 11.21 EXCAVATION BELOW SUBGRADE

Payment for excavation below subgrade will only be made if excavation below subgrade is approved by ENGINEER and only within the limits as requested. Excavation below subgrade shall be measured in place. The price bid for excavation below subgrade shall include all costs to excavate, remove, and dispose of undesirable material.

Cost for providing geotextile beneath excavation below subgrade shall be paid for in accordance with the price bid, if listed separately. If individual Bid items are not provided in the Bid, it shall be considered incidental and included in the price bid for adjacent Work.

## 11.22 GEOTEXTILES

Geotextile fabrics shall be paid at the prices bid, if listed separately. If individual Bid items are not provided in the Bid, they shall be considered incidental and included in the price bid for adjacent Work.

## 11.23 BASE COURSE

Payment for crushed aggregate base course shall be made at the price bid and shall include all labor, materials, and Work necessary for complete installation. Payment will be made based on weight tickets provided to ENGINEER within one week of delivery for each truckload of base course.

Fine grading shall be included in the price bid for fine grading, if listed separately. If a Bid price for fine grading is not provided in the Bid, the cost of this Work shall be considered incidental to adjacent utility and street construction Work.

Placement of base course for driveways, sidewalks, and outside the limits of a 1:1 slope from the bottom pavement or curb edge or top of shoulder edge shall not be eligible for payment unless the limits are extended on the typical section.

## 11.24 SALVAGED ASPHALT PAVEMENT

Cost for placement of salvaged asphalt pavement as base course shall be included in the price bid, if listed separately. This price shall include grading and compaction. Cost for salvaged asphalt milling shall include the cost of milling and transport. If a Bid price is not provided in the Bid, the cost of this Work shall be considered incidental to adjacent utility and street construction Work.

## 11.25 CONCRETE

The cost for removal of existing concrete pavement, curb and gutter, sidewalk, driveway, and pavement shall be paid for according to the price bid for these items. If a Bid price is not provided in the Bid, the cost for these removals shall be included in the price bid for adjacent utility and street construction Work.

Concrete pavement shall be included in the price bid for the Work, if listed separately. If a Bid price is not provided in the Bid, the cost of this Work shall be considered incidental to adjacent utility and street construction Work.

## 11.26 CURB AND GUTTER

The prices bid for concrete curb and gutter, if listed separately, shall apply to both straight and curved curb and gutter (outside of median nose areas), to standard and reject curb and gutter, and to driveway sections at driveways and curb ramps (outside of median nose areas). Curb and gutter will be paid for through all inlets. The cost of base preparation, placing and finishing, jointing, tie bars, and utility markings, shall be included in the price bid for curb and gutter. The cost of curb and gutter placed in median nose areas shall be included in the price bid for median nose, if listed separately. If Bid prices are not provided in the Bid, the cost for these items shall be included in the cost for adjacent utility and street construction Work.

## 11.27 CONCRETE SIDEWALK AND DRIVEWAYS

Cost for new concrete sidewalk and driveway, if listed separately, shall be paid for according to the price bid. Price shall include grading, subgrade preparation, base material, placement, finish, and all other items necessary to complete the Work. If a Bid price is not provided in the Bid, the cost for these items shall be included in the price bid for adjacent utility and street construction Work.

Cost for replacement sidewalk and driveways shall be considered incidental to the Work.

## 11.28 ASPHALTIC CONCRETE PAVING

The cost for adjusting castings for new utility construction shall be considered incidental to the Work.

If existing castings are being replaced as part of the Work, the cost for adjusting the replacement castings shall be included in the price bid for the replacement castings.

Payment for adjusting new manhole castings from the finished intermediate course surface to finished grade and for adjusting existing castings to intermediate course and/or surface course grades shall be in accordance with the prices bid, if listed separately. If a Bid price is not provided in the Bid, the cost for these adjustments shall be included in the price bid for adjacent utility and street construction Work.

Providing and placing asphaltic tack coat material, if listed separately in the Bid shall include all labor, materials, and equipment necessary to provide the tack coat as specified herein. If not included in the Bid, it shall be considered incidental to the Work.

The price bid for new asphaltic concrete intermediate and surface course pavement, if listed separately, will be based on the price bid for the Work. Payment will only be made for the quantities where weight tickets for each truckload have been delivered to ENGINEER within one week of placement. Price bid shall include all materials, labor, and Work necessary for complete, in-place, asphaltic concrete pavement including fine grading and ramps. Asphaltic material will not be paid for as a separate item. The price bid for asphaltic pavement shall include CONTRACTOR's costs for labor, tools, and materials to cut, excavate, and match the new Work to the existing pavement. Where a unit price is not provided, the cost for paving shall be considered incidental to the Work.

## 11.29 PAVEMENT STRIPING

Pavement striping, if listed separately in the Bid, shall include all labor, materials, and equipment necessary to provide the markings as specified herein, including traffic control. If not included in the Bid, it shall be considered incidental and included in the price bid for adjacent Work.

## 11.30 SEEDING AND SODDING

Seeding and sodding (including topsoil), if listed separately, shall be paid for in accordance with the prices bid, which price shall be full compensation for preparing the earth bed including providing, grading, and rolling topsoil; furnishing and placing seed or sod, watering; and for all labor, equipment, tools, and incidentals necessary to complete the Work. Where prices are not provided, the cost for this Work shall be considered incidental to the Work and included in the costs for adjacent utility and street construction Work.

## 11.31 MISCELLANEOUS RESTORATION

Cost for miscellaneous restoration items shall be paid for according to the prices bid, if listed separately. Where prices are not provided in the Bid, the costs shall be included in the price bid for adjacent utility and street construction Work.

## 11.32 BOULDER WALLS

Boulder wall will be paid for at the price bid, which price shall be full compensation for furnishing and installing the stone, for selecting the stone, preparation of the foundation, including excavation, backfilling, disposing excess materials, for all labor, tools, and equipment, and transportation necessary to complete the Work. Payment shall include the stone wall face that is buried 12 inches.

## 11.33 CUT BLOCK MODULAR RETAINING WALLS

Modular retaining wall will be paid for at the price bid, which price shall be full compensation for furnishing and installing the wall; preparation of the foundation, including excavation, backfilling, and disposing excess materials; and for all labor, tools, equipment, and transportation necessary to complete the Work.

## 11.34 PLANTINGS

Plantings, if listed separately, shall be paid for in accordance with the prices bid. The price bid for plantings shall include all items as specified herein and as shown on the Drawings. Where unit prices are not provided for, they shall be included in the cost for adjacent utility and street construction Work.

## 11.35 DUST CONTROL

Unless, provided for in the Bid, dust control shall be considered incidental to the Work and included in adjacent or related items of Work.

## 11.36 SPECIAL ITEMS OF WORK, MATERIAL, and equipment

Payment for special items of Work, material, and equipment will be paid for as specified in the **SPECIAL PROVISIONS**.

## 11.37 MISCELLANEOUS WORK

Payment for miscellaneous Work will be paid for as specified in the **SPECIAL PROVISIONS**.

## SECTION 12-SPECIAL PROVISIONS

The following modifies, expands, or clarifies the Standard Specifications for Utility and Street Construction. Reference is made in this Section 12 to the specific provision of the Standard Specifications being clarified, modified, or expanded. These **SPECIAL PROVISIONS** shall govern whenever there is conflict or discrepancy with the Standard Specifications and the KYDOH Specifications.

### 12.1 1.2 PIPE

The following pipe materials shall be used on the Project:

Pipe Application	Material
Water Main	Ductile Iron Pressure Class 350, PVC Pipe, HDPE
Water Services	Copper, Polyethylene
Culvert Pipe	Reinforced Concrete, CMP
Fittings for PVC and DI Pipe Used in Water Main or Force Main	Ductile or cast Iron

### 12.2 1.2.11 PVC PIPE (SDR-PR)

Standard dimension ratio PVC pressure rated pipe in sizes 2 inch to 3 inch may be used. Pipe shall comply with all other requirements of the Standard Specifications.

### 12.3 1.2.13 HIGH DENSITY POLYETHYLENE PRESSURE (HDPE) PIPE AND FITTINGS

For water services, HDPE pipe may be used in lieu of copper tubing. HDPE pipe shall comply with AWWA C901. Pipe material shall conform to PE 3408. The pipe shall be NSF approved and have a rated working pressure of 200 psi. Stainless steel inserts shall be required at compression joints.

### 12.4 1.2.18 SURFACE WATER CROSSINGS

Crossings shall be installed as indicated in the drawings. When installing pipe crossings, CONTRACTOR shall keep pipe full of water until the trench is backfilled with well graded 3 inch minimum to 6 inch maximum to the bottom profile. All Work shall be done with suitable equipment and erosion control measures to prevent bed disturbance or silt deposition. Excavation shall be made so as to provide relatively level bottom conditions and to have side slopes at the edge of the area from which material is removed of not more than one vertical to four horizontal.

See Division 1 for any permit requirements. All spoil material shall be disposed of at upland sites. CONTRACTOR shall give notice to OWNER and KDOW no less than 5 days before the Work is to begin.

### 12.5 1.3 VALVES

The following valves shall be used on the Project:

Valve Applications	Type
Shutoff Valves in Water Main ≤12 inches	Resilient Wedge Gate Valves



## 12.6 1.3.6 CORPORATION STOPS, CURB STOPS, AND TAPPING SADDLES

Corporations stops shall be Mueller H-15000 (flair connections), H-15008 (compression connections), or equal. Tapping saddles are required at PVC main installations.

Curb stops shall be Mueller Mark II Oriseal with H-15204 (flair connections), H-15209 (compression connections), or equal. Contractor shall provide all necessary transition fittings to make connections to existing services on the customer side of the curb stop.

## 12.7 1.3.7 FIRE HYDRANTS

Fire hydrants are not required for the Project. Provide flush hydrants meeting the requirements of Standard Specifications for fire hydrants except that the 4 1/2-inch nozzle is not to be provided. Flush hydrants shall be manufactured by AVK Industrial, Minden, Nevada, or equal.

## 12.8 1.13 SPECIAL MATERIALS AND EQUIPMENT

### RURAL WATER INSTALLATIONS

TRACER WIRE—PVC water main shall be provided with #12 gauge solid insulated copper tracer wire taped at 5-foot intervals. Wire shall be continuous between and terminate at valve boxes, manholes, and fire hydrants. Any splices shall be soldered and fitted with a Raco, or equal insulated water-tight boot.

DETECTABLE-TYPE MARKING TAPE—All water main shall be provided with 2-inch wide detectable-type marking tape placed 12 inches above the water main.

AIR RELEASE VALVES—Automatic air release valves shall be installed at locations shown on the Drawings. Automatic air release valves shall be Val-Matic Model 25, APCO, or equal iron body with bronze or stainless steel internals with 1-inch screw connection. Air release valves shall be lever and pin operated, 150 psi working pressure with flanged top plate cover for ease of repair. Valve body shall contain drain and blow-off plugs.

PRESSURE REDUCING VALVES—When required for individual customer service as shown on the Drawings, pressure reducing valves shall be provided. For services sizes 1 inch and less valves shall be Wilkins 70 Series, or equal. CONTRACTOR shall provide, as needed, adapter for proper laying length.

TAPPING SLEEVES AND VALVES—Tapping sleeves shall be A. P. Smith Division of U. S. Pipe or equal, ductile iron, 200 psi working pressure with cadmium plated cast iron nuts and bolts. Provide gaskets for full area of sleeve flanges. Tapping valves shall conform to requirements for gate valves except that one end shall be flanged and the other mechanical joint. Tapping valves shall be provided with oversized openings to permit use of full sized cutters.

WATER METER BOXES—Meter boxes shall be “ultra-rib” boxes Extrusion Technologies, Inc., or equal. They shall be made of PVC material, 18-inch-diameter by 2-foot long, with cast iron lids.

Provide Mueller H-15403, or equal compression union for splicing copper.

METER SETTERS—Meter setters for services 1 inch or less shall be copper with plain stop, with appropriate riser. Setters shall be 5/8 inch x 3/4 inch x 7 inch with dual check valves and shall have a 1-inch FML x 1-inch CTS grip. Copper setters shall be Mueller, Ford Model VHH 727W-4F-44G, or equal. Tandem setters with PRVs shall be Mueller, Ford, or equal. Custom setters shall be Mueller,

Ford, or equal for sizes larger than 1 inch. Where pressure reducing valves are required setter shall accommodate their installation.

SERVICE SADDLES—Saddles for service connections to PVC pipe shall be Dresser Series 194, Ford Model S70 or S90 Series, Mueller, or equal made of bronze or stainless steel.

Saddles for cast iron sized pipe shall be Dresser Industries, Inc. Style 91 or 291, Smith-Blair, Inc. Style 311 or 313, Ford, Mueller, or equal with malleable or ductile iron bodies that extend at least 160 degrees around the circumference of the pipe. Clamps shall have neoprene gaskets cemented to the saddle bodies. Clamps with tap sizes 1 inch and smaller may be single strap design. Clamps with taps sizes larger than 1 inch shall be double strap design.

## 12.9 3.5 ROCK EXCAVATION, UTILITIES

Blasted rock may be used as backfill from 1 foot above the top of the pipe to 1 foot below finished grade as long as all rock material is less than 4 inches in its greatest dimension. Rock excavation is included in unit price bid. No additional monies will be allocated to unit price due to rock excavation. All excavation is unclassified.

No rocks shall be left on property. No rocks shall be in topsoil when restored to from original grade to a depth of 12 inches below trench.

## 12.10 4.3 BEDDING AND COVER

Native material greater than 3 inches in diameter can be utilized as bedding rocks and can be present for bedding if native material is used.

## 12.11 6.1 STREET CONSTRUCTION—GENERAL

There is no local water available. CONTRACTOR shall provide water needed via tanker trucks or other similar means.

## 12.12 8.3 ASPHALTIC CONCRETE PAVING

All pavement and gravel replacement shall be in accordance with the Standard Specifications and as follows.

CONTRACTOR shall remove bituminous pavement as a part of the general excavation. The width of pavement removed shall be the minimum possible and acceptable for convenient and safe installation of structures, utilities, and appurtenances. All bituminous pavement shall be cut on neat, straight lines and shall not be damaged beyond the limits of the excavation. Should the cut edge be damaged, a new cut shall be made in neat, straight lines parallel to the original cut encompassing all damaged areas. Pavement removal shall be extended to a seam or joint if seam or joint is within 3 feet of damaged pavement.

## 12.13 9.1 RESTORATION AND SITE WORK—SCOPE

There is no local water available. CONTRACTOR shall provide water needed via tanker trucks or other similar means.

## 12.14 10.3 TRAFFIC CONTROL

CONTRACTOR shall comply with the requirements of Section 01560.

## 12.15 11.36 MISCELLANEOUS WORK (DIRECTIONAL DRILLING)

The directionally drilled pipe shall be manufactured of a high density high molecular weight polyethylene resin that conforms to ASTM D1248 and meets the requirements for Type III, Class B, Grade P34, Category 5, and has a PPI rating of PE 3408 when compounded. The pipe produced from this resin shall have a minimum cell classification of 345464C (inner wall shall be light in color) under ASTM D3350.

A certificate of "Compliance with Specification" shall be furnished for all materials to be supplied. Test reports prepared by an independent testing laboratory shall be provided certifying that polyethylene pipe conforms to the requirements of ASTM D1248 and ASTM D3350.

Where pipe sizes are shown on the Drawings, they refer to the minimum outside diameter required.

Subject to compliance with the complete requirements of these specifications, manufacturers offering HDPE pipe products that may be incorporated into the work include ISCO, Performance Pipe, Poly Pipe, or equal.

Fusion Welding—Polyethylene pipe and fittings shall be joined using the butt fusion welding process. Provide a fused HDPE Mechanical Joint adapter for interconnection with ductile iron piping.

CONTRACTOR may use a drilling fluid that is completely biodegradable. Clay-based drilling fluids will also be allowed. Drilling fluid shall be subject to the review of OWNER. CONTRACTOR shall provide MSDS for drilling fluid. CONTRACTOR shall provide its own clean water for drilling fluid. At no time shall the drilling fluid be discharged to a surface water. This includes drilling fluid that may surface along the directionally drilled pipe route. CONTRACTOR shall provide other drilling fluids or procedures as needed to prevent a discharge of drilling fluids to surface waters at no additional cost to OWNER.

CONTRACTOR shall include in the cost, all excavation required to initiate and terminate directional drilling. All drilling fluid and slurry that enters the initiation and termination excavations shall be removed and properly disposed by the CONTRACTOR. CONTRACTOR shall restore all disturbed areas to original condition. CONTRACTOR shall provide disposal plan for approval prior to commencement of the Work.

CONTRACTOR shall be responsible for performing line and grade staking or marking as required to install the water main in accordance with the Contract Drawings and Specifications.

The boring unit shall have a tracking device which is capable of providing depth and location at all points of the boring path. Record drawings showing horizontal and vertical locations of the conduit shall be created by CONTRACTOR based on the tracker information and submitted to OWNER.

Post Televising of Completed Sections—CONTRACTOR shall provide a color videotape taken by a 360-degree radial-view camera for closeup view showing the completed Work. Posttelevising shall be incidental to the cost of the installation.

Television inspections, tapes, and reports shall be in accordance with applicable sections of the specifications. CONTRACTOR will submit all posttelevising color TV tapes in VHS or DVD format prior to payment.

Finished Pipe—CONTRACTOR shall submit detailed information to OWNER of the procedure and the steps to be followed for the installation of the directional drilling method selected, even if the process is named in the specification. All such instructions and procedures submitted shall be carefully followed during installation. Any proposed changes in installation procedures shall require submittal of revised procedures.

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The installed pipe shall be continuous over the entire directionally drilled length and shall be free from visual defects, such as foreign inclusions, concentrated ridges, discoloration, pitting, varying wall thickness, and other deformities. Pipe with gashes, nicks, abrasions, or any such physical damage which may have occurred during storage and/or handling, which are deeper than 10% of the wall thickness shall not be used and shall be removed from the construction site. The pipe passing through or terminating in a manhole shall be carefully cut out. The invert and benches shall be streamlined and improved for smooth flow. The installed pipe shall meet the requirements of the sanitary sewer testing techniques.

Pipe Jointing—Sections of polyethylene pipe shall be assembled and joined on the job site above ground. Pipe ends to be joined shall be cut square and then joined by the heating and butt-fusion method in strict conformance with the manufacturer's printed instructions.

The butt-fusion method for pipe jointing shall be carried out in the field by operators with prior experience in fusing polyethylene pipe with similar equipment using proper jigs and tools per standard procedures outlined by the pipe manufacturer. These joints shall have a smooth, uniform double-rolled back bead made while applying the proper melt, pressure, and alignment. It shall be the sole responsibility of CONTRACTOR to provide an acceptable butt-fusion joint. The replacement pipe shall be joined on the site in appropriate working lengths near the insertion pit.

Insertion or Access Pits—The location and number of insertion or access pits shall be planned by CONTRACTOR and submitted in writing prior to excavation. The pits shall be located such that their total number shall be minimized and the length of replacement pipe installed in a single pull shall be maximized. The maximum length of continuous liner shall not exceed the pipe bursting system manufacturer's recommendations.

Upon completion of the directional drilling operation, CONTRACTOR shall backfill the excavation, perform cleanup and restore site as indicated on the Drawings. All surfaces shall be restored in kind with thicknesses matching those removed.

Process Limitations—Though the installation process may be licensed or proprietary in nature, CONTRACTOR shall not change any material, thickness, design values, or procedures stated or approved in the submittals. CONTRACTOR shall submit, in writing, full details about component materials, their properties, and installation procedures and abide by them fully during the entire course of the project.

All allowable directional drilling methods are considered to be structurally equal processes as far as end product required. The minimum required performance criteria, and/or standards, physical/structural properties, chemical resistance tests, and the replacement pipe thicknesses as given in this specification shall be strictly complied with. It shall be the responsibility of CONTRACTOR to comply with the specifications in full without any request for any change after the award of the Contract.

It is CONTRACTOR's responsibility to examine the proposed line segment and notify if conditions exist that could cause problems with the directional drilling method. Such conditions could include nearby services that could be damaged by the operations, existing slabs that could be damaged, or less than acceptable depth of cover.

CONTRACTOR must connect the directionally drilled pipe to the ductile iron pipe as shown on the Drawings. The procedure for the connection of the HDPE to the force main is subject to the review of ENGINEER.

Warranty—During the warranty period, which shall be defined as 12 calendar months after acceptance, any defects that will affect the integrity or strength of the replacement pipe or hydraulic capacity shall be repaired at CONTRACTOR's expense.

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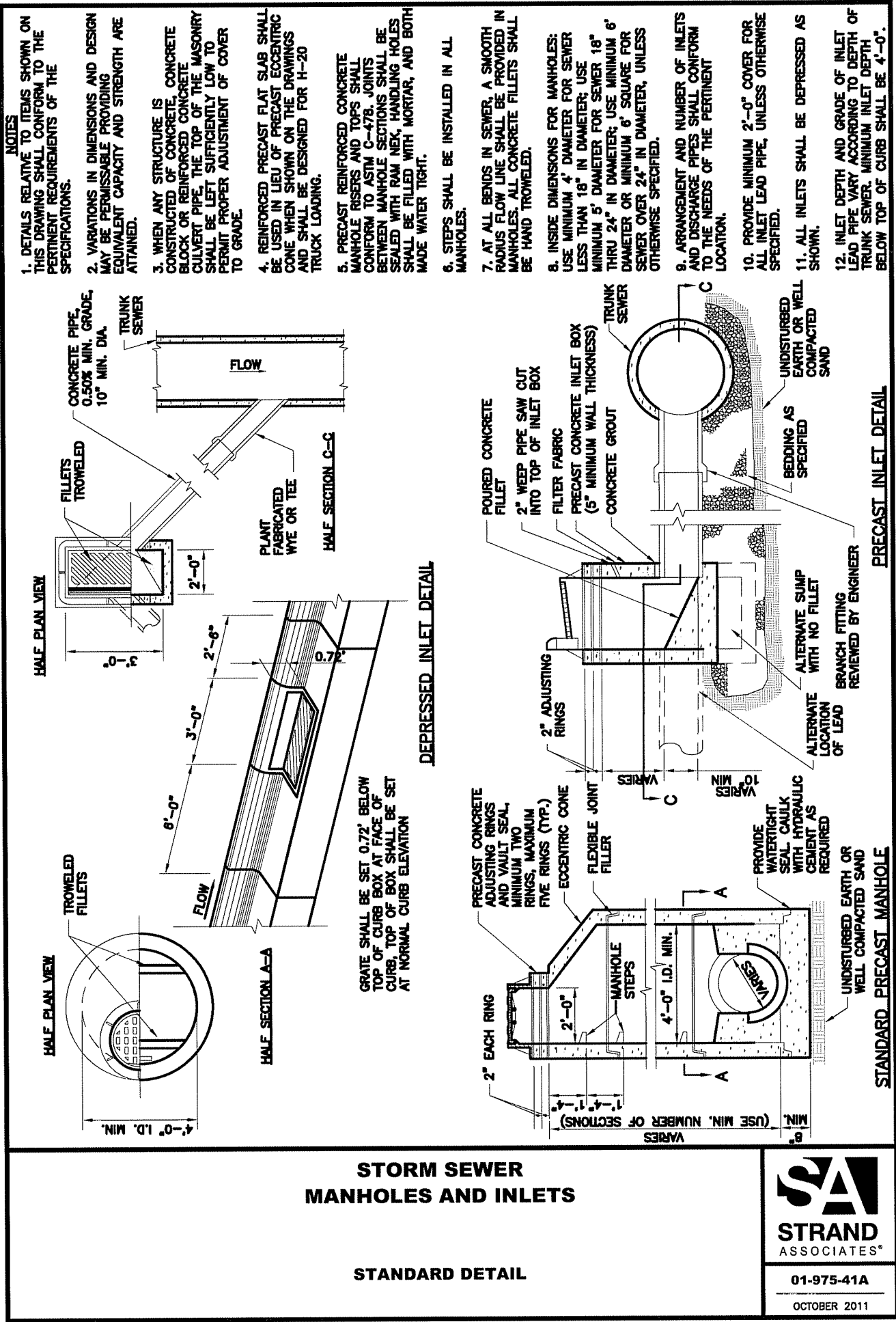
Testing of The Directionally Drilled Pipe—Testing of the directionally drilled pipe shall be in accordance with water main and force main testing and pipe laying.

Measurement and Payment—Measurement and payment for all work discussed herein and otherwise required for directionally drilling pipe in the locations shown on the Drawings shall be paid for at the Unit Bid Price Bid for Directional Drilling. This shall include any removal and/or excavation of all materials necessary, providing temporary access during operations, and replacement and restoration in accordance with applicable standards.

END DIVISION 20

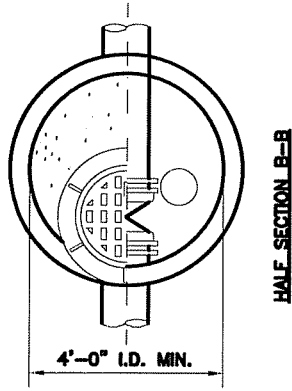
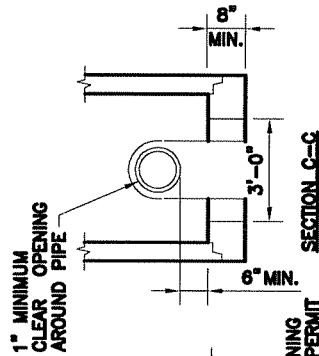
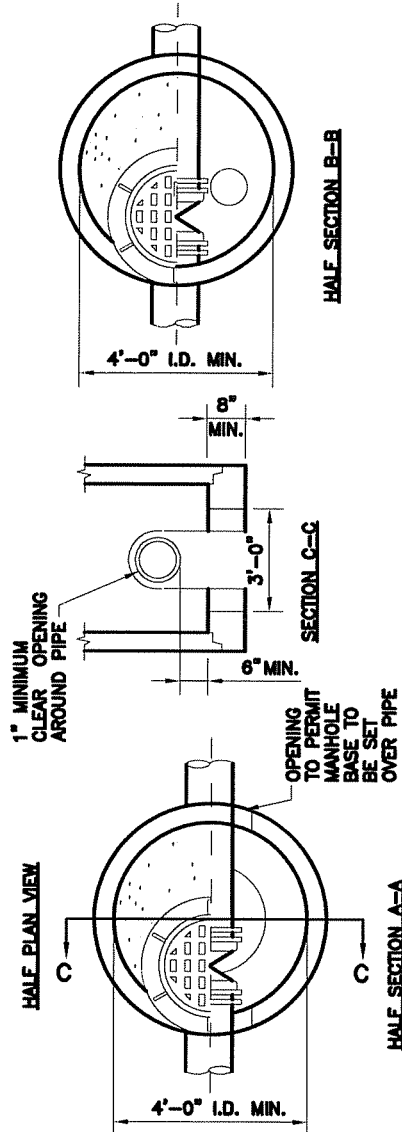
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**DRAWINGS**



**NOTES:**

1. TYPE 1 OR 2 MANHOLE SHALL BE INSTALLED AS SHOWN ON THE DRAWINGS. TYPE 2 MANHOLE SHALL BE MADE WATERTIGHT AND SHALL BE USED WHEN NORMAL GROUND WATER LINE IS ABOVE BOTTOM SLAB.
2. VARIATION IN DIMENSIONS AND DESIGN MAY BE PERMISSABLE PROVIDING EQUIVALENT CAPACITY AND STRENGTH ARE ATTAINED.
3. WHEN ANY STRUCTURE IS CONSTRUCTED OF CONCRETE, CONCRETE BLOCK, OR REINFORCED CONCRETE CULVERT PIPE, THE TOP OF THE MASONRY SHALL BE LEFT SUFFICIENTLY LOW TO PERMIT PROPER ADJUSTMENT OF COVER TO GRADE BY THE USE OF MORTAR.
4. CONCRETE BLOCK MANHOLES REVIEWED BY THE ENGINEER WILL BE PERMITTED AS AN ALTERNATE. BACK PLASTER OUTSIDE OF ALL CONCRETE BLOCK. CONCRETE BLOCK MANHOLE WALLS SHALL BE 2 BLOCKS THICK BELOW DEPTHS OF 10 FEET.
5. REINFORCED PRECAST FLAT SLAB SHALL BE USED IN LIEU OF PRECAST ECCENTRIC CONE AS SHOWN ON THE DRAWINGS AS NEEDED TO INSTALL EQUIPMENT OR VALVES.
6. PRECAST REINFORCED CONCRETE MANHOLE RISERS AND TOPS SHALL CONFORM TO ASTM C-478. JOINTS BETWEEN SECTIONS SHALL BE SEALED WATERTIGHT WITH KENT SEAL, RAM NEX OR EQUAL.
7. STEPS SHALL BE INSTALLED IN ALL MANHOLES. MANHOLE STEPS SHALL BE NEENAH TYPE R-1881-N. MA INDUSTRIES NO. PS-4, OR EQUAL, 1'-4" O.C.
8. MANHOLE COVER SHALL BE NEENAH TYPE R-1550, OR EQUAL, WITH TYPE B NON-ROCKING LID.
9. TYPE 1 MANHOLE SHALL BE FILLED WITH CLEAN BEDDING UP TO THE BOTTOM OF THE PIPE.
10. DETAILS RELATIVE TO ITEMS SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE SPECIFICATIONS.
11. FLAT SLAB TOPS SHALL BE DESIGNED FOR H-20 TRUCK LOADING AND SHALL MEET REQUIREMENTS OF ASTM C-478.
12. BASE SLABS SHALL BE REINFORCED AS FOLLOWS. REINFORCING SHALL BE PLACED IN EACH DIRECTION 1" CLEAR FROM TOP SURFACE OF SLAB. REINFORCING SHALL BE GRADE 60. USE OF CAST-IN-PLACE SLAB SHALL NOT RELIEVE CONTRACTOR OF REQUIREMENTS TO PROVIDE WATERTIGHT JOINTS.

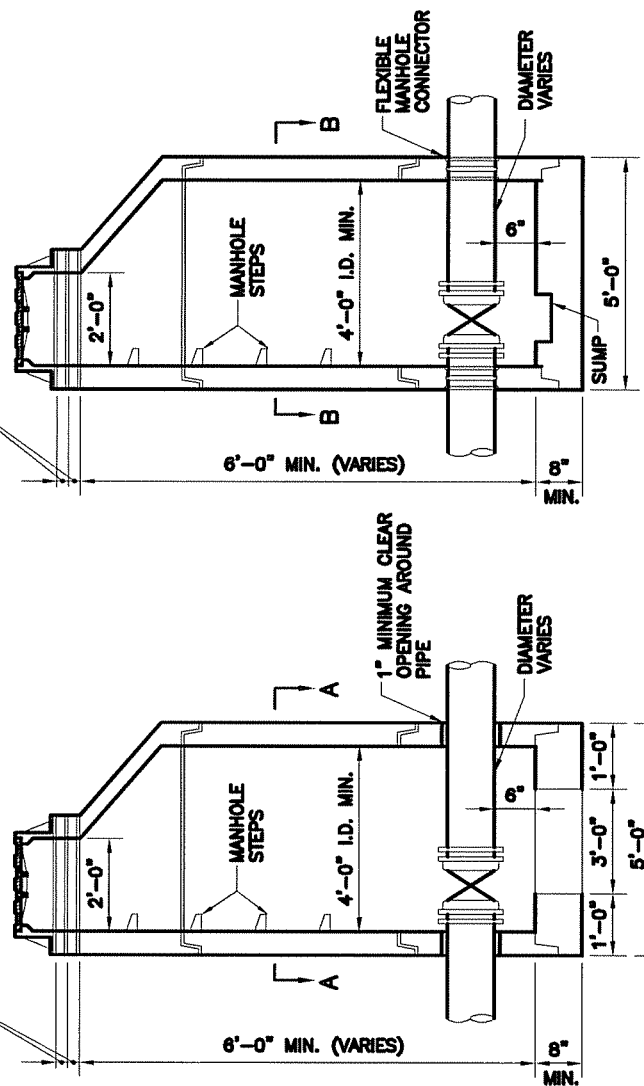


**WATER MAIN  
VALVE MANHOLES**

**STANDARD DETAIL**

CONCRETE ADJUSTING RING,  
2" EACH RING (MIN. 2 RINGS,  
MAX. 4 RINGS)

CONCRETE ADJUSTING RING,  
2" EACH RING (MIN. 2 RINGS,  
MAX. 4 RINGS)



INSIDE DIA.	DEPTH	REINF.
4'	≤ 30'	#3 @ 8"
5'	≤ 20'	#3 @ 8"
5'	20'-30'	#4 @ 10"
6'	≤ 20'	#4 @ 10"
6'	20'-25'	#4 @ 8"
6'	25'-30'	#4 @ 6"



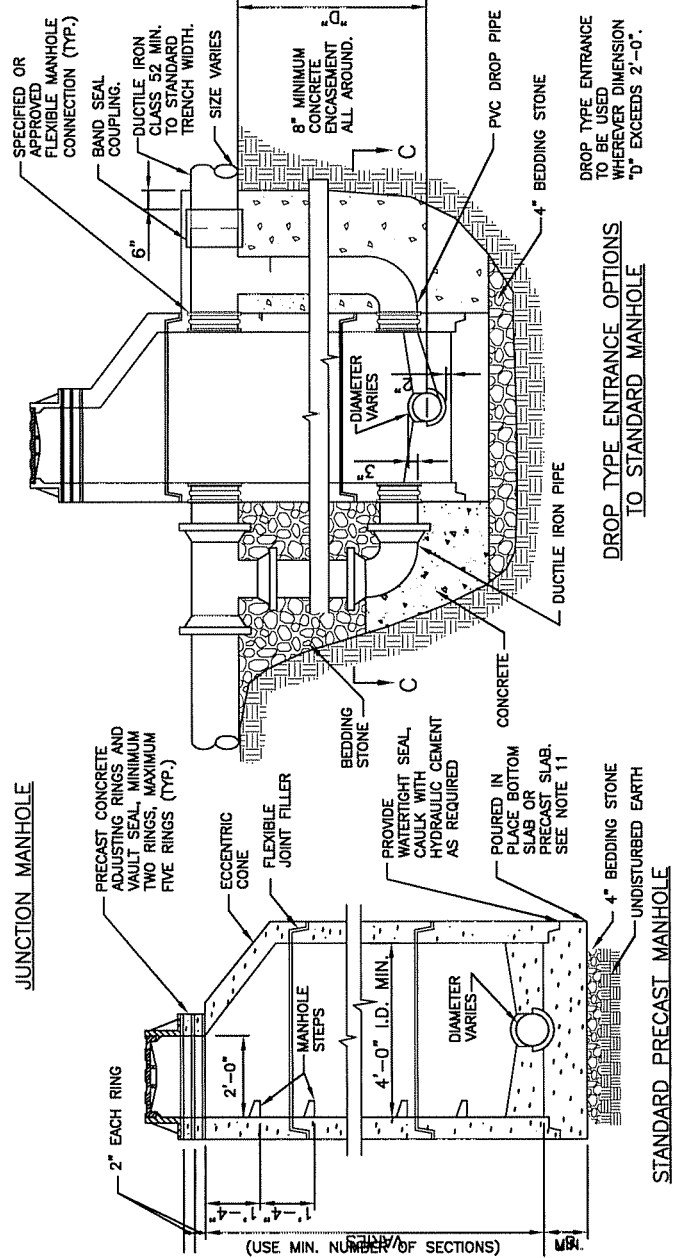
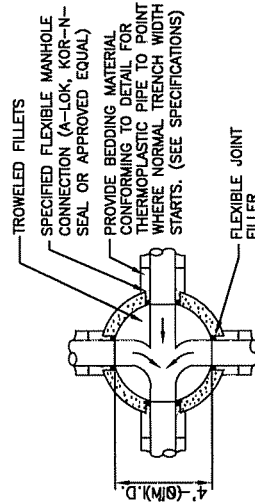
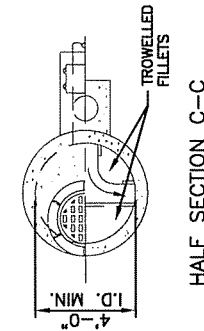
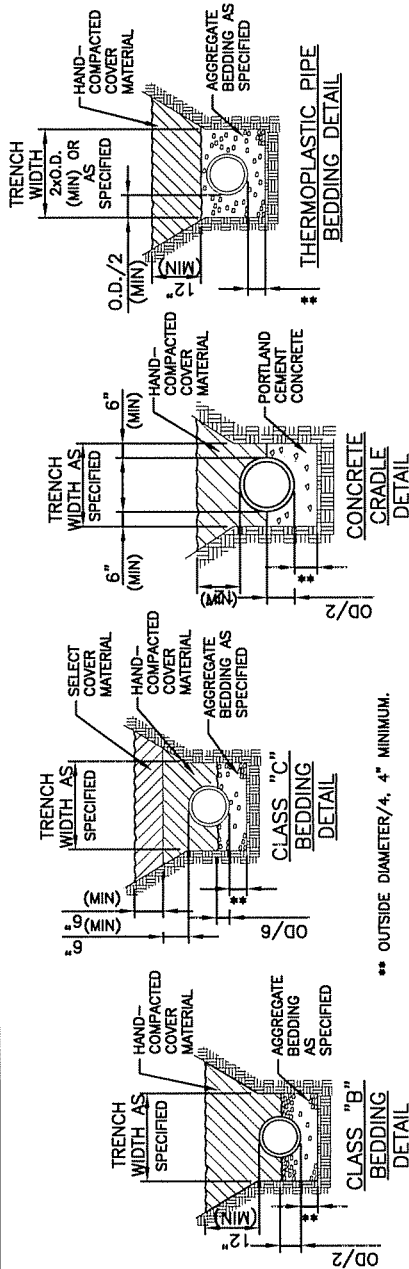
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OCTOBER 2011



## NOTES

1. DETAILS RELATIVE TO ITEMS SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.
2. VARIATIONS IN DIMENSIONS AND DESIGN MAY BE PERMISSIBLE, PROVIDING EQUIVALENT CAPACITY AND STRENGTH ARE ATTAINED.
3. ALL CONCRETE FILLETS SHALL BE HAND TROWELED WITH A 1/4" FT. SLOPE.
4. INSIDE DIMENSIONS FOR MANHOLES: USE MINIMUM 4" DIAMETER FOR SEWER LESS THAN 18" IN DIAMETER; USE MINIMUM 5" DIAMETER FOR SEWER 18" THRU 24" IN DIAMETER; USE MINIMUM 6" DIAMETER OR MINIMUM 6' SQUARE FOR SEWER OVER 24" IN DIAMETER.
5. BEDDING CLASSES "B" AND "C" SHALL MEET OR EXCEED ASTM C12 REQUIREMENTS.
6. DROP TYPE ENTRANCE TO STANDARD MANHOLE WILL BE PAID FOR SEPARATELY IF SO LISTED IN THE BID.
7. SEE DRAWINGS FOR DROP TYPE ENTRANCES FOR SANITARY SEWERS LARGER THAN 15".
8. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF REGULATORY BODIES OF THE STATE AND APPLICABLE MUNICIPAL ORDINANCES.
9. ALL NEW CONSTRUCTION SHALL BE PLACED ON UNDISTURBED EARTH OR STONE BEDDING.
10. FLAT SLAB TOPS SHALL BE DESIGNED FOR H-20 TRUCK LOADING AND SHALL MEET REQUIREMENTS OF ASTM C-478.
11. BASE SLABS SHALL BE REINFORCED AS FOLLOWS: REINFORCING SHALL BE PLACED IN EACH DIRECTION AT 2" CLEAR FROM TOP SURFACE OF SLAB. REINFORCING SHALL BE GRADE 60. USE OF CAST-IN-PLACE SLAB SHALL NOT RELIEVE CONTRACTOR OF REQUIREMENTS TO PROVIDE WATERTIGHT JOINTS.
12. FLAT SLABS SHALL BE PROVIDED IN SHALLOW DEPTH SITUATIONS IN LIEU OF ECCENTRIC CONES.



INSIDE DIA.	DEPTH	REINF.
4'	≤ 30'	#3@8"
5'	≤ 20'	#3@8"
6'	≤ 20'-30'	#4@10"
6'	≤ 20'	#4@10"
6'	20'-25'	#4@8"
6'	25'-30'	#4@6"

## SANITARY SEWER APPURTENANCES

### STANDARD DETAIL



01-975-43A

OCTOBER 2011

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF REGULATORY BODIES OF THE STATE AND APPLICABLE MUNICIPAL ORDINANCES.

**2. DETAILS RELATIVE TO ITEMS SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.**

**3. VARIATIONS IN DIMENSIONS AND DESIGN MAY BE PERMISSIBLE, PROVIDING EQUIVALENT CAPACITY AND STRENGTH ARE ATTAINED.**

4. ALL NEW CONSTRUCTION SHALL BE PLACED ON UNDISTURBED EARTH OR STONE BEDDING.

**5. BEDDING CLASSES "B" AND "C" SHALL MEET OR EXCEED ASTM C12 REQUIREMENTS.**

6. ALL LATERALS SHALL BE LAID AT A STANDARD SLOPE OF 1/4-INCH PER FOOT UNLESS OTHERWISE NOTED ON THE DRAWINGS, OR SPECIFIED, IN NO CASE SHALL LATERAL SLOPE BE LESS THAN 1/8-INCH PER FOOT. MAXIMUM LATERAL SLOPE SHALL BE 1 TO 1.

7. END PLUGS OR STOPPERS FOR THE ENDS OF  
LATERALS AND BRANCH FITTINGS SHALL BE  
PROVIDED.

3. 2x4'S SHALL BE PLACED AT ALL LATERALS ENDS SO THAT ONE PROTRUDES 12 INCHES ABOVE FINISHED GRADE AND ONE IS LOCATED IN THE GROUND AT THE END OF THE LATERAL. 2x4'S SHALL BE PAINTED FLOURESCENT ORANGE. 2x4'S SHALL EACH BE AT LEAST 4 FT. LONG.

9. BAR STEEL REINFORCEMENT SHALL BE EMBEDDED 1 1/2-INCH CLEAR MINIMUM.

10. THE TOP OF ANY MANHOLE STRUCTURE SHALL BE LEFT SUFFICIENTLY LOW TO PERMIT PROPER ADJUSTMENT OF COVER TO GRADE.

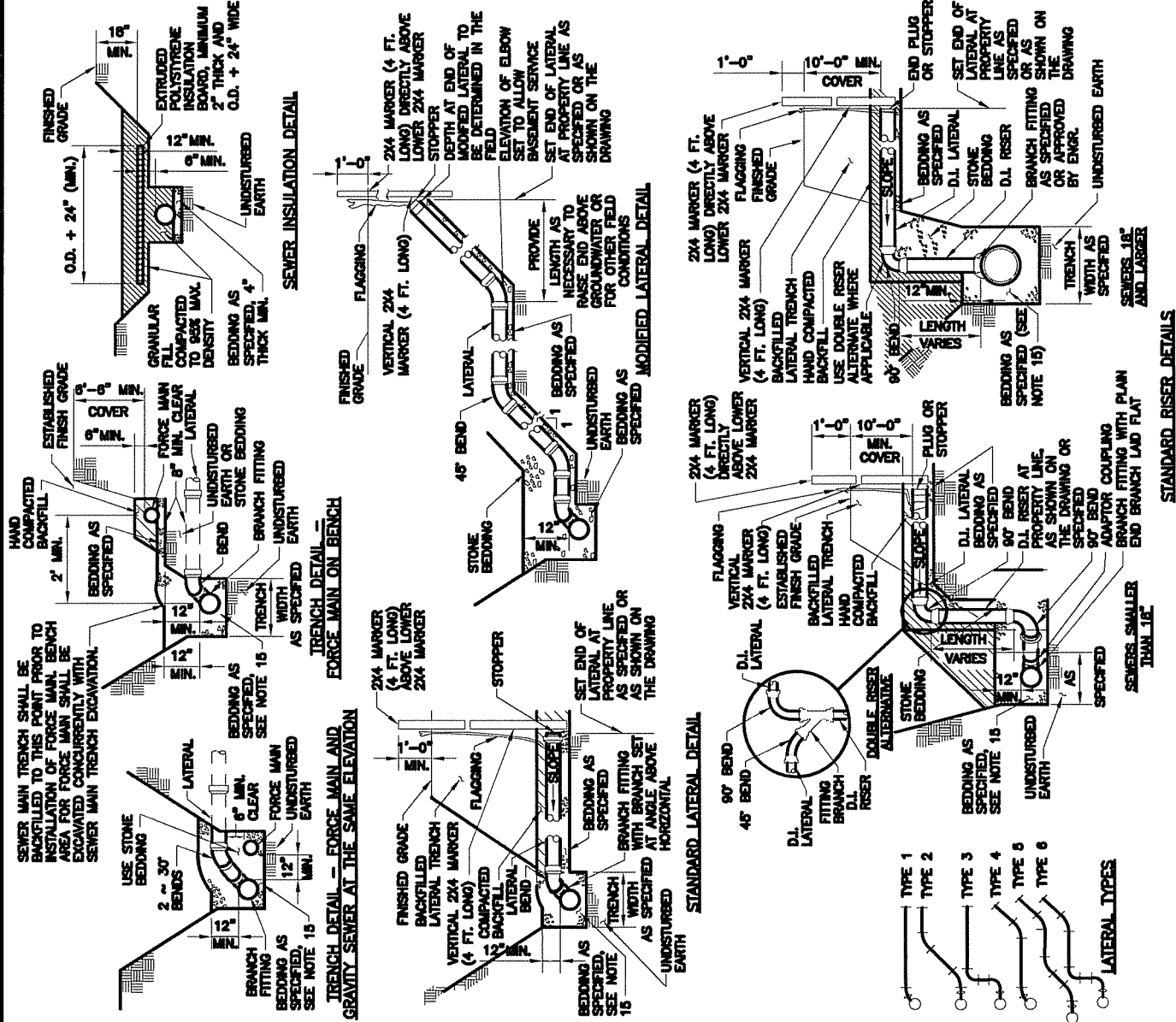
11. INSTALL DOUBLE RISERS WHERE SHOWN ON THE DRAWINGS OR SPECIFIED.

12. STANDARD LATERALS AND MODIFIED LATERALS SHALL BE CONSTRUCTED OF MATERIAL AS SPECIFIED.

3. RISERS AND LATERALS FROM RISERS SHALL BE CONSTRUCTED OF DUCTILE IRON. FITTINGS FOR RISERS AND LATERALS FROM RISERS SHALL BE GRAY IRON OR DUCTILE IRON.

14. FLAGGING SHALL BE 4-INCH WIDE STANDARD ORANGE VINYL TAPE. TIE FLAGGING AROUND ENDS OF ALL LATERALS AND EXTEND UNBROKEN TO FINISHED GRADE DIRECTLY ABOVE ENDS OF LATERALS.

15. STONE BEDDING SHALL BE USED AROUND AND TO ONE FT. ABOVE TOP OF ALL SEWER MAINS AT LATERAL CONNECTIONS. PROVIDE BEDDING AS SPECIFIED ELSEWHERE.

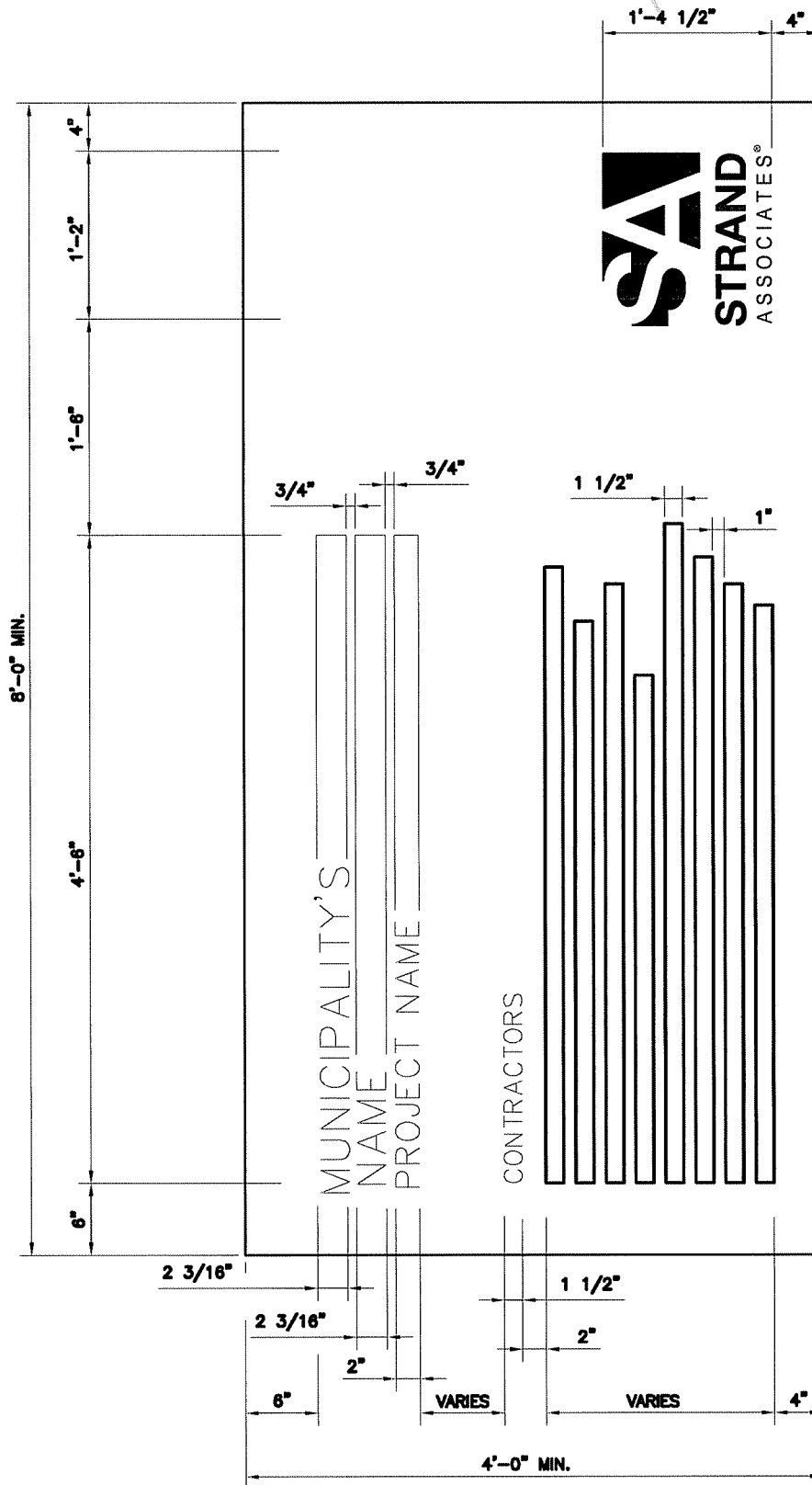


## STANDARD DETAIL



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**NOTES:**

BLUELINE FOR LOGO WILL BE FURNISHED TO CONTRACTOR FOR SIGN PAINTING.

SEE SPECIFICATIONS FOR SIGN CONSTRUCTION DETAILS AND SPECIAL REQUIREMENTS

STANDARD COLORS ARE TO BE AS NOTED:  
 "SA" LOGO = SLATE GRAY  
 LETTERING = BLACK  
 BACKGROUND = WHITE

**PROJECT SIGN LAYOUT**

**STANDARD DETAIL**



01-975-158A

OCTOBER 2011

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**APPENDIX**

Report of  
Geotechnical Engineering Investigation  
**Countywide Underserved Project**  
**Carrollton Utilities & West Carroll Water District**  
**Carroll County Utilities**  
**Carrollton, Kentucky**  
Patriot Project No. 5-12-1174

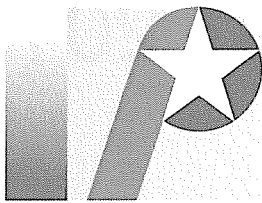
**Prepared For:**

Carrollton Utilities & West Carroll  
Water District  
c/o Strand Associates, Inc.  
325 West Main Street, Suite 710  
Louisville, Kentucky 40202

**Prepared By:**

Patriot Engineering and  
Environmental Inc.  
400 Production Court  
Louisville, Kentucky 40299

October 2, 2012



**PATRIOT ENGINEERING  
and Environmental, Inc.**

*Consulting Environmental, Geotechnical  
and Construction Materials Engineers*

DRAFT-(01.03.2013)

October 2, 2012

Carrollton Utilities & West Carroll Water District  
c/o Chris Keil, P.E., Project Manager  
Strand Associates, Inc.  
325 West Main Street, Suite 710  
Louisville, Kentucky 40202

RE: Report of Geotechnical Engineering Investigation  
**Countywide Underserved Project**  
**Carroll County Utilities**  
**Carrollton, Kentucky**  
Patriot Project No. 5-12-1174

Dear Chris:

Submitted herewith is the report of our subsurface investigation for the referenced project. This investigation was completed in general accordance with our Proposal No. PLG12-0048 dated August 20, 2012.

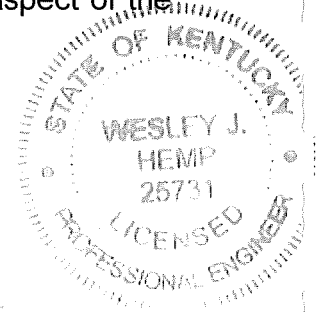
This report includes detailed and graphic logs of the six (6) soil test borings drilled at the proposed site. Also included in the report are the results of laboratory tests performed on samples obtained from the site, and geotechnical recommendations pertinent to the site development, foundation design, and construction.

We appreciated the opportunity to have performed this geotechnical engineering investigation and are looking forward to working with you during the construction phase of the project. If, however, in the interim you have any questions regarding this report or if we may be of any additional assistance regarding any geotechnical aspect of the project, please do not hesitate to contact our office.

Respectfully submitted,  
**Patriot Engineering and Environmental, Inc.**

Amanda Bilberry, E.I.T.  
Staff Engineer

Wesley J. Hemp, P.E., LEED AP  
Director – Louisville Geotechnical Services



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## REPORT OF GEOTECHNICAL ENGINEERING INVESTIGATION

**Countywide Underserved Project**  
Carrollton Utilities & West Carroll Water District  
Carrollton, Kentucky  
Patriot Project No. 5-12-1174

### 1.0 INTRODUCTION

#### 1.1 General

The City of Carrollton and Strand Associates, Inc. are planning the design and construction of improvements to an existing water treatment plant located in Carroll County, Kentucky. The improvements include the construction of two (2) brine storage tanks and two (2) pump stations. The results of the geotechnical engineering investigation for this project are presented in this report. This investigation was carried out in general accordance with *Patriot's* proposal No. PLG12-0048.

#### 1.2 Purpose and Scope

The purpose of this investigation was to determine the general near surface and subsurface conditions within the project area and to develop the geotechnical engineering recommendations necessary for design and construction of the proposed two brine storage tanks and two pump stations. This was achieved by drilling test borings at six (6) locations and by conducting laboratory tests on samples taken from the borings. This report contains the results of our findings, an engineering interpretation of these results with respect to the available project information, and recommendations to aid in design and construction of the proposed facilities.

### 2.0 PROJECT INFORMATION

The proposed project will include the design and construction of two (2) brine storage tanks located at the existing water treatment plant and two (2) pump stations located off-site and referred to as the Kings Ridge and Gilgal Road Booster Pump Stations. It is *Patriot's* understanding that the 2 brine storage tanks will each be above-grade structures with 8,500 gallon capacity measuring 10-ft in diameter and 15-ft in height with concrete floor slabs, and will induce a bearing pressure of approximately 1,500 psf on the sub-grade. The concrete slab floors for the storage tanks will be approximately 6 inches above grade. Each pump station will be an approximate 6 ft

x 6 ft prefabricated station with an enclosure on a concrete slab-on-grade floor with concrete frost walls. It is assumed that each project site is currently at the design sub-grade elevation.

### **3.0 SITE AND SUBSURFACE CONDITIONS**

#### **3.1 Site Conditions**

The proposed project site for the two brine storage tanks is located on the south side of the existing water treatment building situated on the northeast corner of the intersection of Sycamore Street and 6<sup>th</sup> Street in Carrollton, Kentucky. An alley provides access to the water treatment building and the proposed location of brine storage tanks on the west side of the water treatment building. Short grass covered the site ground surface along with several mature trees at the water treatment plant location. Both pump station locations are currently wooded locations. The Gilgal Booster Pump site is located approximately 0.1 mile north of the intersection of Vance Road and Henry County English Road in Carrollton, Kentucky. A gravel driveway is located immediately to the North of the proposed Gilgal Road Pump Station. The Kings Ridge Road Booster Pump Station is located just off the north side of Kings Ridge Road approximately 0.4 miles northwest from the intersection of Kings Ridge Road and Highway 42. The area surrounding the Kings Ridge Road Pump Station site is hilly, and rock outcroppings were encountered within 50 feet of the boring location. The weather conditions on site during field work were cloudy, misting rain, and 60 degrees Fahrenheit.

#### **3.2 Site Geology**

##### **3.2.1 Brine Storage Tank Geology**

Information pertaining to soil characteristics in the project area was obtained through the Geologic Quadrangle maps of Kentucky and experience with previous geotechnical investigations in the area. The site is located in the outwash plain of the Ohio River. Soils in this area are primarily fluvial transported materials – mostly coarse-grained soils which were carried by glacial melt-waters and deposited along the Ohio Valley rims. Thus, these soils consist of fine to coarse-grained sand and gravel with lesser amounts of silt and clay. Over time the fluvial deposits have been covered with finer-grained alluvium and man-transported fill deposits. Bedrock is

deeper than 100 feet at this location based upon published water well records and previous experience.

### **3.2.2 Kings Ridge Road Booster Pump Station Geology**

A review of the Geologic Quadrangle Map for Carrollton, Kentucky prepared by the United States Geological Survey (USGS) provided by the Kentucky Geological Society indicates that the site is located within the Ohio River Basin. The underlying stratum in this area is primarily Ordovician Age limestone. Specifically, the underlying stratum is referred to as the Calloway Creek Limestone formation.

The formation consists of interbedded limestone and shale. The medium gray and light brownish gray limestone makes up approximately 75 to 85 percent of the formation and weathers light gray and grayish yellow. The three types of limestone present are coarse poorly sorted fossil fragmental limestone, medium to coarse grained fossil fragmental limestone, and argillaceous to silty micrograined limestone. The shale in the formation is medium gray and weathers light gray to grayish yellow. The shale is calcareous, occurs as partings and thin irregular beds and locally contains abundant coarse fossil fragments. The formation weathers to steep slopes with numerous slabs and ledges.

### **3.2.3 Gilgal Road Booster Pump Station Geology**

A review of the Geologic Quadrangle Map for Carrollton, Kentucky prepared by the United States Geological Survey (USGS) provided by the Kentucky Geological Society indicates that the site is located within the Ohio River Basin. The underlying stratum in this area is primarily Ordovician Age limestone and shale. Specifically, the underlying stratum is referred to as the Kope and Clays Ferry formation, undivided.

The limestone within this formation is medium gray to light olive gray and weathers to light gray and grayish yellow. The two main types of limestone are fossil-fragmental limestone and fine-grained argillaceous to silty limestone. The fossil-fragmental limestone is medium to coarse grained and in even to irregular beds as much as 2 feet thick. It consists of whole to finely broken fossils in a very fine grained to coarsely sparry calcite matrix. The fine-grained argillaceous to silty limestone is usually in even beds less than 6 inches thick and is sparsely to moderately fossiliferous. The shale in the formation is medium gray and weathers yellowish gray to yellowish brown. It is calcareous, locally silty, and slightly to abundantly

fossiliferous. The Clays Ferry includes minor amounts of medium gray laminated calcareous siltstone that weather to thin yellowish-brown plates and chips. The Clays Ferry formation commonly forms steep grassy slopes with scattered limestone ledges and slabs.

### **3.3 Subsurface Conditions**

Our interpretation of the subsurface conditions is based upon soil borings drilled at the approximate locations shown on the Boring Location Maps in Appendix A. The following discussion is general; for more specific information, please refer to the boring logs presented in Appendix A. It should be noted that the dashed stratification lines shown on the soil boring logs indicate approximate transitions between soil types. In situ stratification changes could occur gradually or at different depths. All depths discussed below refer to depths below the existing ground surface. All test borings were performed at predetermined locations selected by the design consultant and client.

#### **3.3.1 Brine Storage Tank Location**

The water treatment facility site is generally covered with topsoil, a surficial layer of material that is a blend of silts, sands, and clays, with varying amounts of organic matter. The topsoil layer ranged from 2 to 4 inches thick in the borings, with an average thickness of about 4 inches. Scant crushed stone (about 1 inch) was encountered above the topsoil layer in boring B-1.

Below the topsoil surface cover at the water treatment facility, moist, stiff to very stiff, yellowish and orangish brown lean silty clay (CL) was generally encountered to a depth of approximately 6 feet. Below the silty clay, a layer of medium dense light brown silty sand (SM) was encountered to approximately 8.5 feet in Boring 1. A particle size analysis of the 6.0 to 7.5 feet interval showed the soil consists of 79% sand and 21% silt within this layer. Loose to medium dense orangish brown silty sand (SP-SM) was encountered until termination depth in Boring B-2 and to a depth of approximately 13.5 feet in B-1. A particle size analysis of the 13.5 to 15 feet interval in boring B-2 showed the soil consists of 92% sand and 8% clay and silt. At the location of B-1, lean silty clay (CL) was encountered from 13.5 feet to boring termination of 15 feet. At the location of B-3 and B-4, moist, very stiff, brown and yellowish brown lean silty clay (CL) was encountered to a depth of approximately 6

feet. Below the silty clay, moist, loose to medium dense sand with silt was encountered to boring termination depths of 15 feet.

Standard Penetration Test N-values (blow counts) ranged from 8 to 22 blows per foot (bpf) these soils. The natural moisture content of these soils ranged from 7 to 25 percent. The silty clay soils have unconfined compressive strengths, as determined by a calibrated hand penetrometer, of 2.5 to 4.5 tons per square foot (tsf).

Borings B-1 and B-2 were performed for the proposed brine storage tanks, while borings B-3 and B-4 were drilled at the locations of possible future structures. All four (4) borings were advanced to a termination depth of 15 feet.

### **3.3.2 Kings Ridge Road Booster Pump Station Location**

Scant (less than 1 inch) topsoil was present at the location of B-5 at the Kings Ridge Road Booster Pump Station. Upon encountering auger refusal at the beginning of the boring, 5 feet of coring was performed in B-5. The recovered limestone core sample consisted of very poor quality, light to dark gray limestone with some interbedded shale. The core produced 40% recovery with an RQD (rock quality designation) of 0%.

### **3.3.3 Gilgal Road Booster Pump Station Location**

A very small amount of topsoil (less than 1 inch) was present at the locations of B-6 at the Gilgal Road Booster Pump Station and the surface covering was weeds.

Below the surface cover at the Gilgal Road Pump Station location, moist, very stiff to hard, light gray and brown lean silty clay (CL) was generally encountered to refusal at the boring termination depth of 9.2 feet.

Standard Penetration Test N-values (blow counts) ranged from 17 bpf to 50 blows per 2 inches of penetration to boring termination. The natural moisture content of these soils ranged from 13 to 27 percent. The silty clay soils have unconfined compressive strengths, determined by a calibrated hand penetrometer, of 4.0 to 4.5 tons per square foot (tsf).

### **3.4 Groundwater Conditions**

Groundwater was not encountered during or upon completion of drilling in any of the test borings. The term groundwater, for the purpose of this report, pertains to any water that percolates through the naturally occurring soil materials found on site. This includes any overland flow that permeates through a given depth of soil, perched water, and water that occurs below the "water table", a zone that remains saturated and water-bearing year round.

It should be recognized that fluctuations in the groundwater level should be expected to occur due to variations in rainfall and other environmental or physical factors at the time measurements are made. The true static groundwater level can only be determined through observations made in cased holes over a long period of time, the construction of which was beyond the scope of this investigation.

## **4.0 DESIGN RECOMMENDATIONS**

### **4.1 Basis**

Our recommendations are based on data presented in this report, which include soil borings, laboratory testing and our experience with similar projects. Subsurface variations that may not be indicated by a dispersive exploratory boring program can exist on any site. If such variations or unexpected conditions are encountered during construction, or if the project information is incorrect or changed, we should be informed immediately since the validity of our recommendations may be affected. Refer to Appendix B for additional qualifications and contractual considerations.

### **4.2 Foundations**

#### **4.2.1 Brine Storage Tank Foundations**

The proposed brine storage tanks will be constructed on grade. We recommend that these structures be designed with an allowable bearing pressure of no greater than **1,500** psf, for foundations bearing on native stiff to very stiff silty clay, provided the foundations are constructed in accordance with this report.

#### 4.2.2 Kings Ridge Road Booster Pump Station Foundations

The proposed Kings Ridge Road Booster Pump Station will be placed on grade. We recommend that the pump station be designed with an allowable bearing pressure of **10,000** psf for foundations bearing on native limestone, provided the foundations are constructed in accordance with this report. ***Auger refusal was met on limestone at the proposed bearing elevation in test boring B-5 performed in the immediate vicinity of the Kings Ridge Road Pump Station location. Under no circumstances should foundations bear partly on rock and partly on soil due to excessive bending stresses that could develop.***

#### 4.2.3 Gilgal Road Booster Pump Station Foundations

The proposed Gilgal Road Booster Pump Station will be placed on grade. We recommend that the pump station be designed with an allowable bearing pressure of **4,000** psf for foundations bearing on native very stiff to hard silty clay.

#### 4.2.4 General Foundation Considerations

All exterior foundations and foundations in unheated areas should be located at a depth of at least 24 inches below final exterior grade for frost protection. We estimate that the total foundation settlement for the brine storage tanks should not exceed approximately 1.25 inches and that differential settlement should not exceed about 1 inch. Total and differential settlements for the proposed pump stations should not exceed 1 inch and  $\frac{3}{4}$  inch, respectively. Careful field control during construction is necessary to minimize the actual settlement that will occur.

Positive drainage of surface water, including downspout discharge, should be maintained away from structure foundations to avoid wetting and weakening of the foundation soils both during construction and after construction is complete.

In using the above net allowable soil bearing pressures and the weight of the foundation need not be considered. Hence, only loads applied at or above the minimum finished grade adjacent to the footing need to be used for dimensioning the foundations. Each new foundation should be positioned so it does not induce significant pressure on adjacent foundations; otherwise the stress overlap must be considered in the design.

#### 4.3 Modulus of Subgrade Reaction

Provided that a minimum of 6 inches of granular base course is placed below the floor slabs, a modulus of subgrade reaction, " $K_{30}$ ", value of **100** pounds per cubic inch (pci) is recommended for the design of ground supported floor slabs. It should be noted that the " $K_{30}$ " modulus is based on a 30-inch diameter plate load. A CBR of **3.0** was assumed in order to calculate modulus of subgrade reaction.

The shear resistance against base sliding can be computed using a cohesion value of 1,000 psf for foundations bearing on native soils. A friction coefficient of 0.60 can be used for foundations bearing on limestone. A minimum factor of safety of 1.5 is recommended for sliding stability.

#### 4.4 Seismic Considerations

We have reviewed Section 1613 of the 2006 International Building Code with respect to the subsurface conditions disclosed by our geotechnical investigation and the following recommendations and comments are presented for your use in developing the seismic design criteria for the structural design.

##### 4.4.1 Brine Storage Tanks Location

For structural design purposes for the Water Treatment Plant brine storage tank locations, we recommend using a **Site Class of D** as defined by 2006 International Building Code. Other earthquake resistant design parameters should be applied consistent with the minimum requirements of the International Building Code.

The Site Class of D was based upon the upper 10 feet of soil consisting of cohesive (clayey) soils with an average undrained shear strength of about 1,500 psf, and granular soils with an average N-value ranging from 15 to 50 bpf between 10 and 100 feet.

##### 4.4.2 Kings Ridge Road Booster Pump Station Location

For structural design purposes for the Kings Ridge Road Booster Pump Station, we recommend using a **Site Class of B** as defined by 2006 International Building Code. Other earthquake resistant design parameters should be applied consistent with the minimum requirements of the International Building Code.



The Site Class of B was based upon moderately hard limestone bedrock with an average shear wave velocity of 3,000 feet per second between from the existing ground surface to a depth of 100 feet.

#### 4.4.3 Gilgal Road Booster Pump Station Location

For structural design purposes for the Gilgal Road Booster Pump Station, we recommend using a **Site Class of B** as defined by 2006 International Building Code. Other earthquake resistant design parameters should be applied consistent with the minimum requirements of the International Building Code.

The Site Class of B was based upon cohesive soils with an average undrained shear strength of 1,500 psf to a depth of 10 feet and moderately hard limestone with an average shear wave velocity of 3,000 ft/s from 10 to 100 feet.

## 5.0 CONSTRUCTION CONSIDERATIONS

### 5.1 Site Preparation

All areas that will support foundations fill must be properly prepared. All loose surficial soil or "topsoil", and other unsuitable materials must be removed. Unsuitable materials include: highly plastic clay, frozen soil, relatively soft material, relatively wet soils, deleterious material, soils that exhibit a high organic content.

Prior to construction of floor slabs, the exposed subgrade must be evaluated by the Patriot representative. The evaluation should include proofrolling of the subgrade. Proofrolling should consist of repeated passes of a loaded, pneumatic-tired vehicle such as a tandem-axle dump-truck or scraper. The proofrolling operations should be observed by a *Patriot* site representative, and the proofrolling vehicle should be loaded as directed by *Patriot*. Any area judged by the engineer to rut, pump, or deflect excessively should be compacted in-place or, if necessary, undercut and replaced with structural fill, compacted as specified below.

Care must be exercised during grading and fill placement operations. The combination of heavy construction equipment traffic and excess surface moisture can cause pumping and deterioration of the near surface soils. The severity of this potential problem depends to a great extent on the weather conditions prevailing during

construction. The contractor must exercise discretion when selecting equipment sizes and also make a concerted effort to control construction traffic and surface water while the subgrade soils are exposed. We recommend that heavy construction equipment (i.e., dump trucks, scrapers, etc.) be rerouted away from the foundation areas. If such problems do arise, the operations in the affected area must be halted and the geotechnical engineer contacted to evaluate the condition.

## 5.2 Foundation Excavations

The exposed bearing surface in the base of foundation excavations (except for footings bearing on structural backfill) should be observed by a *Patriot* site representative to confirm that soil of adequate strength has been reached. ***Structural fill used as backfill beneath most footings and thickened slab foundations should be limited to compacted lean clay (CL), well-graded sand and gravel, or DGA placed and compacted in accordance with this report. Material used as structural fill below the Kings Ridge Pump Station foundations should be limited to coarse crushed limestone or lean concrete with a minimum 28-day compressive strength of 2,500 psi.***

***Structure foundations (including thickened slab foundations) should not bear partly on rock and partly on soil to eliminate excessive bending stresses that could develop in the foundations bearing partly on rock and partly on soil.***

Construction traffic on the exposed surface of the bearing soils will potentially cause some disturbance of the subgrade and consequently loss of bearing capacity. However, the degree of disturbance can be minimized by proper protection of the exposed surface.

## 5.3 Structural Fill and Fill Placement Control

Structural fill, defined as any fill that will support structural loads, should be clean and free of organic material, debris, deleterious materials and frozen soils. Samples of the proposed fill materials should be tested prior to initiating the earthwork and backfilling operations to determine the classification, natural and optimum moisture contents, maximum dry density and overall suitability as a structural fill. Acceptable material for structural backfill has been further defined above in Sections 5.1 and 5.2. In general, *any material used as structural fill should have a liquid limit of less than 40% and a plasticity index of less than 20%.*

All structural fill placed beneath floor slabs and above foundation bearing elevation should be compacted to at least 95 percent of its maximum Standard Proctor dry density (ASTM D-698). This minimum compaction requirement should be increased to 100 percent of the maximum Standard Proctor dry density for fill supporting footings, provided foundations are designed as outlined in Recommendations, Section 4.2.

To achieve the recommended compaction of the structural fill, we suggest that the fill be placed and compacted in layers not exceeding eight (8) inches in loose thickness. A Patriot soils engineer or his representative should monitor all fill placements.

#### **5.4 Groundwater**

Groundwater was not encountered during or upon completion of drilling in any of the test borings.

Groundwater inflow into shallow excavations above the groundwater table is expected to be adequately controlled by conventional methods such as gravity drainage and/or pumping from sumps. More significant inflow can be expected in deeper excavations below the groundwater table requiring more aggressive dewatering techniques, such as well or wellpoint systems. For groundwater to have minimal effects on the construction, foundation excavations should be constructed and poured in the same day, if possible.

#### **5.5 Sinkhole Considerations**

Review of available geologic information and our prior experience in the area suggests the Brine Storage tanks and Gilgal Road Booster Pump Station sites are not located in a karst region.

However, the Kings Ridge Road Pump Station is located in an area of medium karst potential and sinkhole development has been known to occur in the general project region. Therefore, the underlying limestone bedrock may be susceptible to solution weathering. Review of published geologic literature indicates that while there are no sinkholes on the project site, several sinkholes are identified as being located primarily to the southwest of the site. There are risks associated with construction activity in karst regions, including some risk of future dropout occurrence. It is possible that site

grading activity may uncover insipient sinkholes that were not previously discovered by our investigation. A quantitative evaluation of this risk is beyond the scope of this geotechnical engineering investigation. However, qualitative assessments may be made based on past experience in the area and other site specific indicators. In our opinion, the risks at this site should be no greater than that of numerous other sites which have been successfully developed in the general area of the site. Therefore, the following general discussion should be considered in regard to sinkholes and their treatment.

Our prior experience with similar sites indicates that the risks associated with future sinkhole development can be reduced by properly treating existing sinkholes and prudent site design and development procedures.

Solution activity typically results from water movement through the limestone bedrock. Therefore, an important factor in site design and construction is to reduce the quantity of surface water which is allowed to infiltrate into the subgrade near planned structural areas. We recommend that project design and construction include the following considerations:

- Building areas should be sited as far as practical, horizontally from identified solution features.
- All surface drainage should be directed away from structural areas.
- Water should not be allowed to pond in structural areas.
- Water collected from the roof systems should be collected in pipes and suitably disposed of in non-structural areas. The collected waters should not be routed and discharged to sinkholes near structural areas.
- All water pipelines and planters should be designed and installed such that leakage and water infiltration is minimized.

The actual method used for treating of sinkholes is typically dependent on the depth to limestone bedrock (as shown in illustration C). For shallow bedrock conditions, an acceptable method of treatment is to excavate the sinkhole throat to a defined opening in the limestone bedrock at the soil/rock interface (Illustration C – top). The exposed area should be properly cleaned and then plugged with lean concrete. Once the area is plugged, the excavation may be backfilled to desired grade with properly placed and compacted fill.

Construction of a graded inverted filter inside the cone of depression is another treatment method available (Illustration C – bottom). This methodology is more suitable for deeper (i.e., greater than 10 to 15 feet) bedrock conditions. The filter should be constructed by initially excavating the area down to limestone, exposing the solution drainage channel if possible. At this level, a suitable geotextile fabric (such as used for pavement edge drains) should be placed over the excavated area. The fabric should extend up on each side of the trench, with enough material to overlap the top of the excavation after backfilling. The area can then be backfilled using crushed limestone. A minimum thickness of 24 inches of coarse crushed limestone (such as No. 1 stone) should be placed initially and covered with finer clean crushed limestone (such as DGA stone). Upon completing the stone backfilling, the geotextile should overlap the top of the stone to encapsulate the plug. We recommend that a layer of compacted soil fill cap of at least one-foot thick be placed over the encapsulated stone plug to limit surface water migration into the inverted filter. We recommend that collected surface waters not be routed to or discharged into the treated sinkholes. Our experience indicates that changes in the quantity of water discharged into solution features may result in enlargement of the feature, even after treatment. ***If solution features are identified during construction activities, the geotechnical engineer should be contacted for guidance.***

## 6.0 INVESTIGATIONAL PROCEDURES

### 6.1 Field Work

A total of six (6) test borings were performed at the project site on September 18, 2012. The borings were located in the field by a representative of Carroll Utilities. All of the borings were drilled to a termination depth of 15 feet or to auger refusal, whichever came first. Borings B-1 through B-4 were performed for the Brine Storage Tanks located at the Water Treatment plant at were advanced to a depth of 15 feet. Upon encountering auger refusal, 5 feet of rock coring was performed at the Kings Ridge Road Booster Pump location (B-5). Boring B-6 was located at the Gilgal Road Booster Pump site and was advanced to auger refusal at 9.2 feet.

All depths are given as feet below the existing ground surface. The borings were advanced using 3¼" I.D. hollow-stem augers. Samples were recovered in the undisturbed material below the bottom of the augers using the standard drive sample

technique in accordance with ASTM D 1586-74. A 2" O.D. by 1<sup>3</sup>/<sub>8</sub>" I.D. split-spoon sampler was driven a total of 18 inches with the number of blows of a 140-pound hammer falling 30 inches recorded for each 6 inches of penetration. The sum of blows for the final 12 inches of penetration is the Standard Penetration Test result commonly referred to as the N-value (or blow-count). Split-spoon samples were recovered at 2.5-foot intervals, beginning at a depth of 1 foot below the existing surface grades, extending to a depth of 10 feet, and at 5-foot intervals thereafter to the termination of the boring. For rock coring, a double-tube NX core barrel with a diamond bit was used to obtain the core sample. Water levels were monitored at each borehole location during drilling and upon completion of the boring.

During field work, the samples were field screened for odor, staining and the presence of volatile organic compounds (VOCs) using headspace analysis. The field screening procedure is typically used to determine if elevated levels of fuel or solvents are present in the soil samples. A Mini-Rae PID organic vapor analyzer was used to measure the concentration of total photoionizable vapors (TPVs) emitted from the samples. The PID is capable of measuring TPVs in air at concentrations ranging from about 1 to 2,000 parts per million (ppm). ***It should be noted that headspace analysis is used for qualitative purposes only and that TPVs recorded in the field do not indicate actual VOC or total petroleum hydrocarbon (TPH) concentrations reported by laboratory analyses. TPVs ranging from 12.3 to 20.1 ppm were detected in all borings assessed from 1 to 15 feet below ground surface (bgs). None of these borings, however, displayed any indication of the presence of VOC impacts based on odor or staining. The TPVs detected from the PID is attributed to the precipitation that was occurring during field activities. Precipitation commonly causes some interference with PID meters. This interference usually creates false TPV detections.***

Upon completion of the boring program, all of the samples retrieved in this sampling program were returned to Patriot's soils testing laboratory where they were visually examined and placed in groups of like materials. A laboratory generated log of each boring has been prepared based upon the driller's field log, laboratory test results, and visual classification. Test boring logs, and a field classification system for soil exploration, are included, in Appendix A, in this report. Indicated on each log is the primary strata encountered, the depth of each stratum change, the depth of sample, Standard Penetration Test results, groundwater conditions, and selected laboratory test

data. The laboratory logs were prepared for each boring giving the appropriate sample data and the textural description and classification.

## 6.2 Laboratory Testing

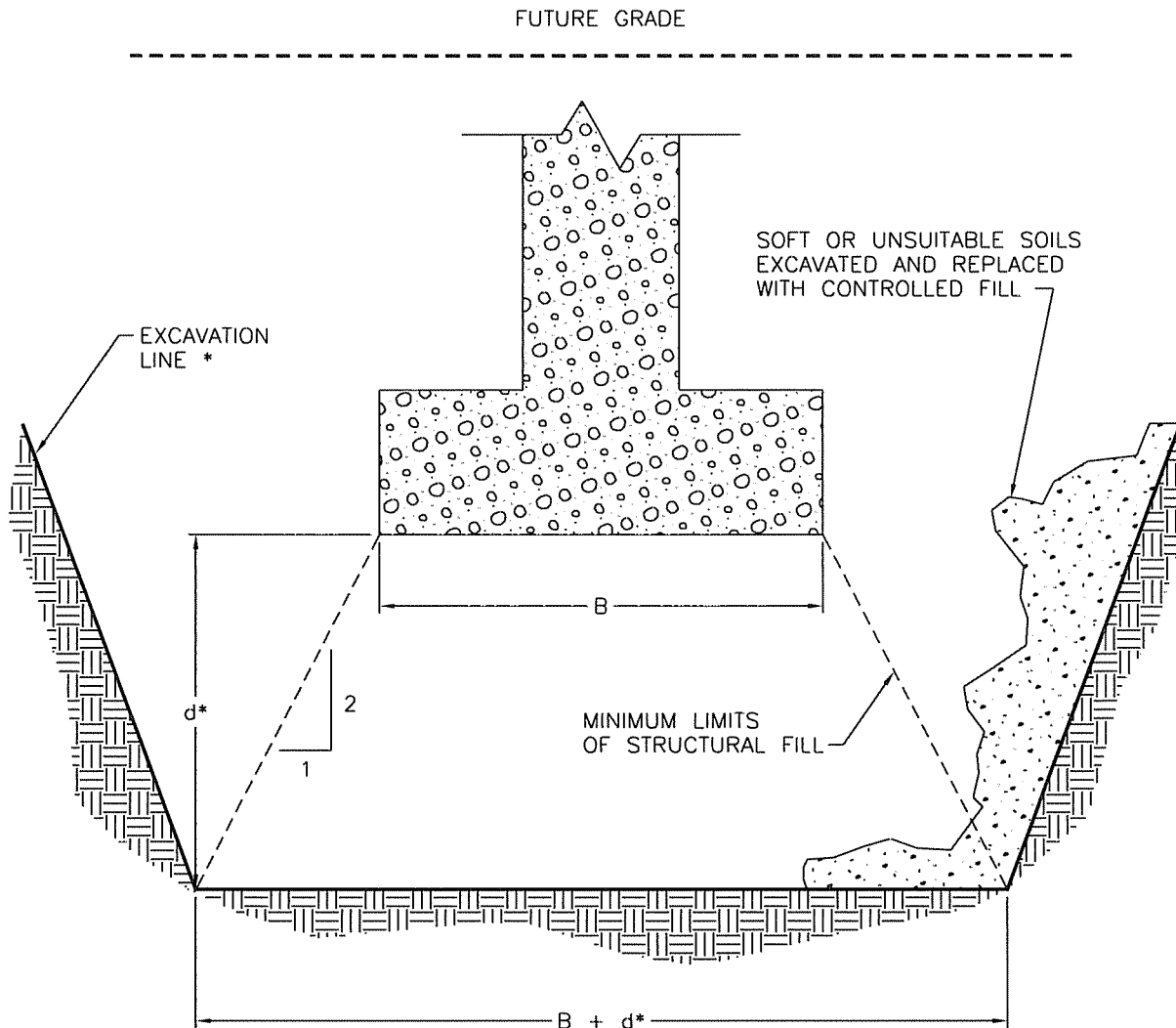
Representative samples recovered in the borings were selected for testing in the laboratory to evaluate their physical properties and engineering characteristics. Laboratory analyses included:

- Natural moisture content determinations (*ASTM D 2216*),
- Sieve Analysis (*ASTM C-136-06*).

An estimate of the unconfined compressive strength ( $q_u$ ) of the cohesive soil samples utilizing a calibrated hand penetrometer was also performed on each split-spoon sample, the results of all laboratory tests are summarized on the boring logs.

## 7.0 ILLUSTRATIONS

See Illustrations A, B and C on the following pages. These illustrations are presented to further visually clarify the Construction Considerations presented in Section 5.2.



\*d IS DEPTH TO SUITABLE SOILS

\* IN COMPLIANCE WITH OSHA STANDARDS



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## Excavation for Footings In an Area of Fill ILLUSTRATION A

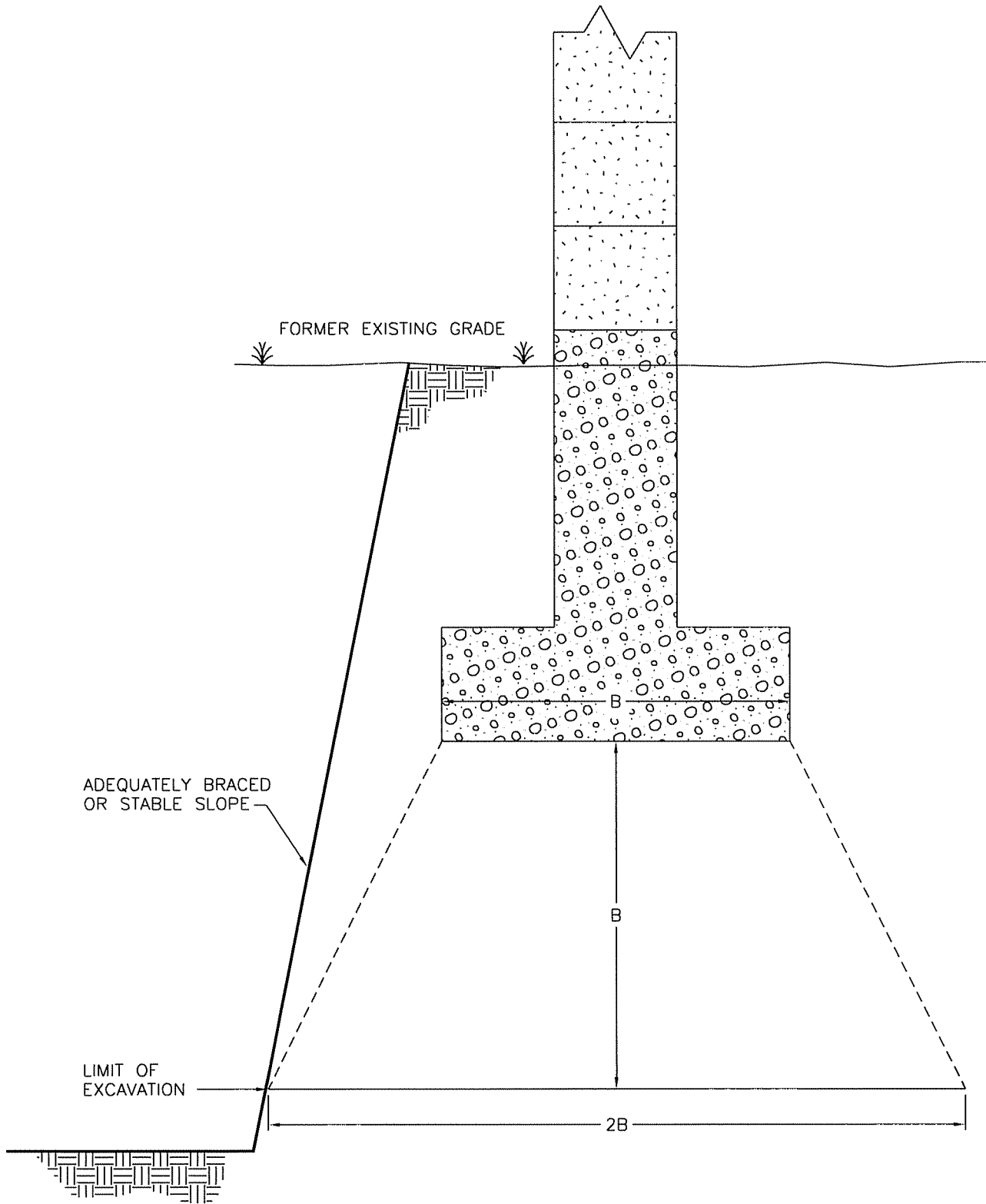
job. no.:

PAT-UC

figure:

1





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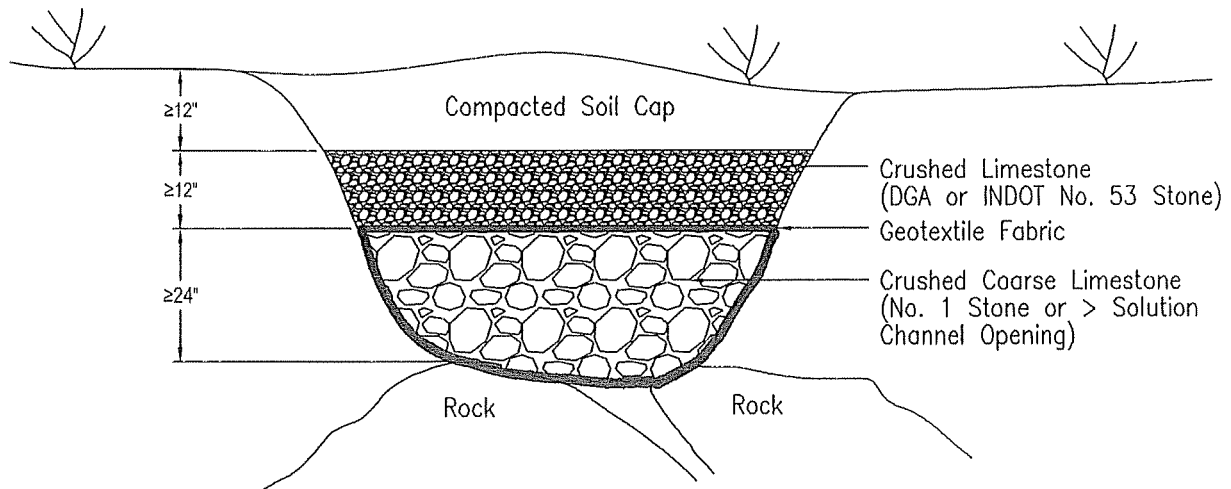
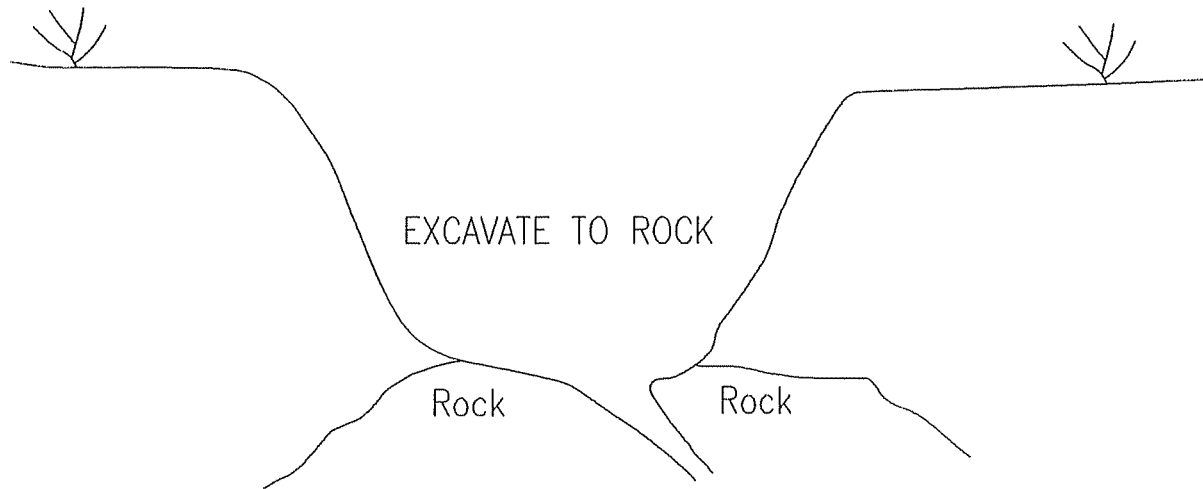
## Excavation Near Existing In Use Foundations ILLUSTRATION B

job no.:

PAT-UC1

figure:

1



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Treatment Method For  
Deep Sink Holes  
ILLUSTRATION C

PROJECT NO.

FIGURE

1

**APPENDIX A**

**Site Vicinity Map**

**Boring Location Map**

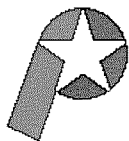
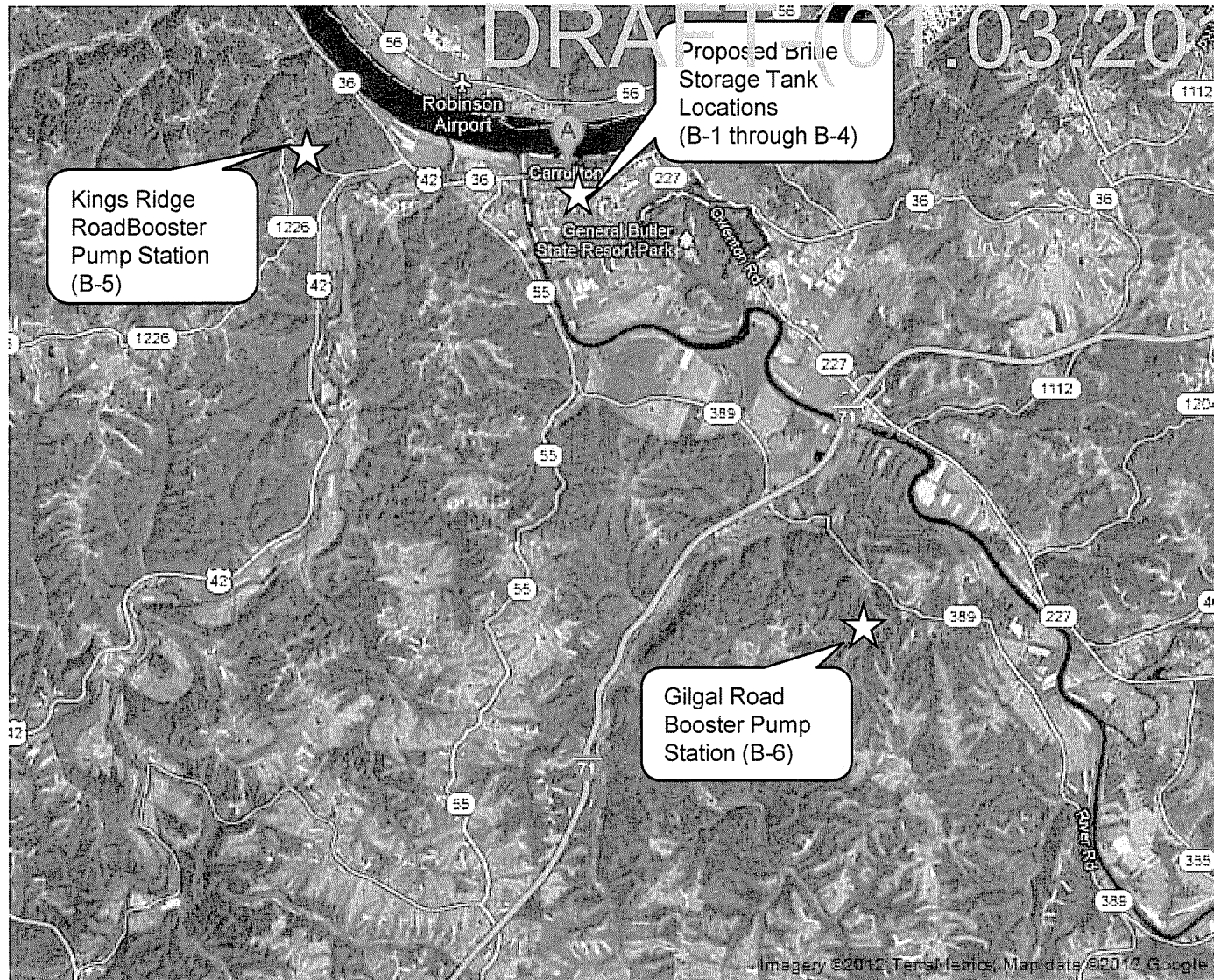
**Karst Potential Map**

**Boring Logs**

**Boring Log Key**

**Unified Soils Classification (USCS)**

**Sieve Analysis Test Results**



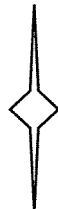
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Louisville, Kentucky 40299

**Site Vicinity Map**  
Carrollton Utilities  
Carrollton, Kentucky

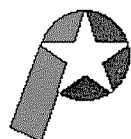
**Job No.** 5-12-1174

**Figure** 1

N



Note: Boring locations are approximate.



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### Boring Location Plan

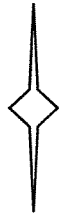
Brine Storage Tank Location  
6<sup>th</sup> Street & Sycamore Street  
Carrollton, Kentucky

Job No. 5-12-1174

Figure 2



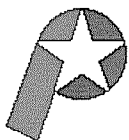
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Note: Boring locations are approximate.



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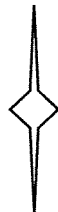
### Boring Location Plan

Kings Ridge Road Booster Pump Station  
Kings Ridge Road  
Carrollton, Kentucky

Job No. 5-12-1174

Figure 3

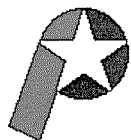
N



DRAFT-(01.03.2013)



Note: Boring locations are approximate.

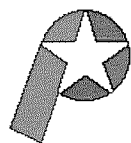
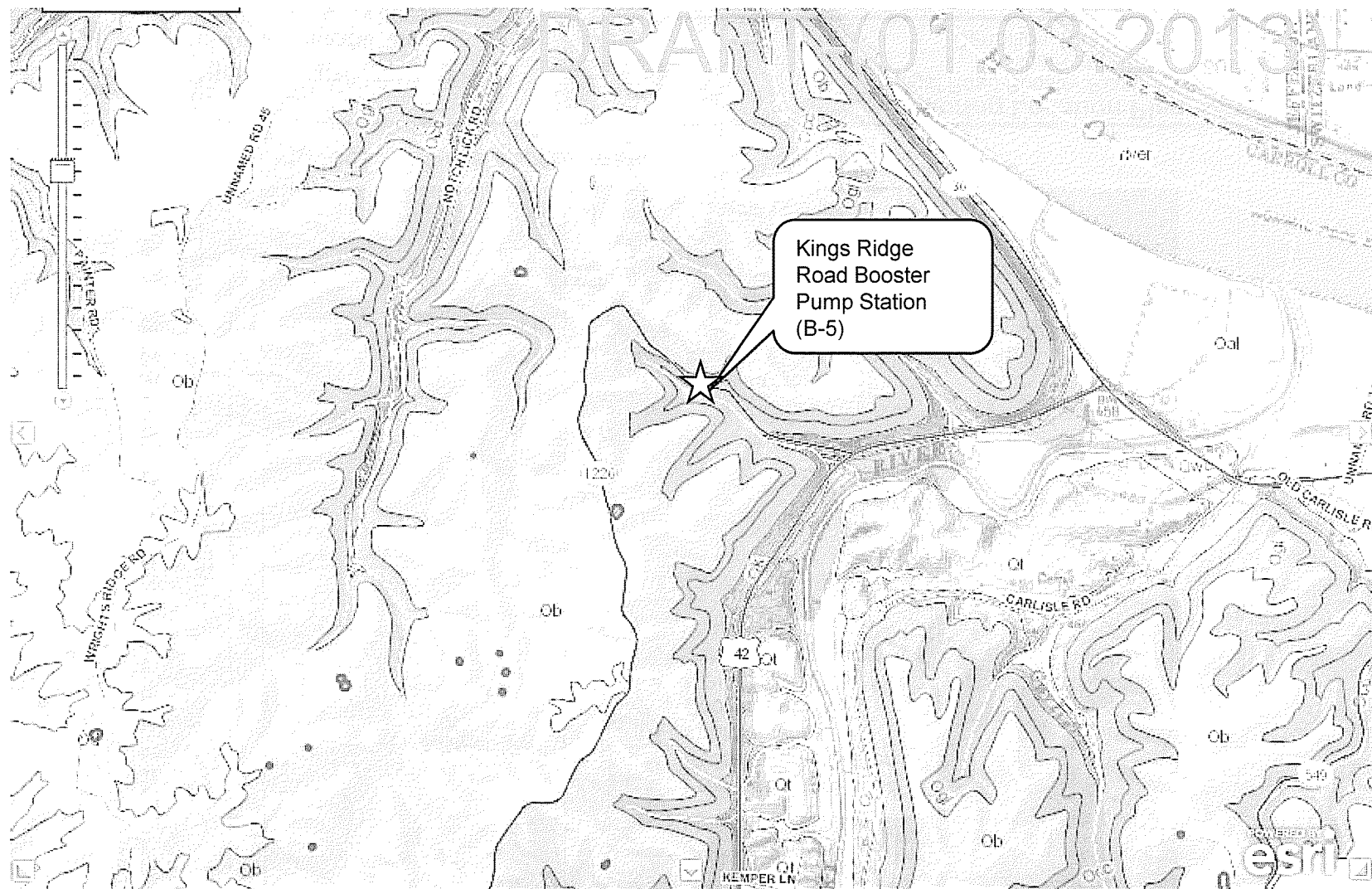


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**Boring Location Plan**  
Gilgal Road Booster Pump Station  
Gilgal Road  
Carrollton, Kentucky

Job No. 5-12-1174

Figure 4



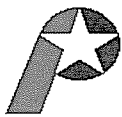
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**Karst Map**  
Carrollton Utilities  
Kings Ridge Road Booster Pump Station  
Carrollton, Kentucky

**Job No.** 5-12-1174

**Figure** 5





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Lafayette, Louisville KY, Dayton OH, Nashville TN,  
Carmi, IL

# DRAFT-(01.03.2013)

## LOG OF BORING B-1

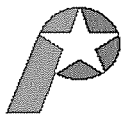
(Page 1 of 1)

Countywide Underserved Project  
Carrollton Utilities & West Carroll Water District  
Carroll County Utilities  
Carrollton, Kentucky

Client Name : Carrollton Utilities  
Project Number : 5-12-1174  
Logged By : A. Bilberry  
Start Date : 09/18/2012  
Drilling Method : HSA

Driller : H. Popp  
Sampling : Splitspoon  
Approximate Elevation :  
Drill Rig : CME-55 ATV

Depth in Feet	Water Level	USCS	GRAPHIC	Water Levels	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
				▼ During Drilling ▽ After Completion ◆ After 24 Hours						
0				Crushed Stone (1")						
				Topsoil (2")						
		CL		SILTY CLAY, dark brown, moist, stiff, w/ trace organics		89	4/4/5	2.5	22	
		CL		SILTY CLAY, orangish brown, moist, stiff		93	3/4/6	2.5	22	
5		SM		SAND, orangish brown, moist, medium dense		100	7/8/8	-	7	Boring caved to 6.0' upon auger removal. Particle Size Analysis: 79% Sand 21% Silt
		SP-SM		SAND, orangish brown, moist, medium dense, w/ silt		100	3/4/8	-	11	
10		CL		SILTY CLAY, dark organish brown, moist, medium stiff		100	3/3/5	-	25	
15				Boring terminated at 15.0'						
20										



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**LOG OF BORING B-2**

(Page 1 of 1)

Countywide Underserved Project  
Carrollton Utilities & West Carroll Water District  
Carroll County Utilities  
Carrollton, Kentucky

Client Name : Carrollton Utilities  
Project Number : 5-12-1174  
Logged By : A. Bilberry  
Start Date : 09/18/2012  
Drilling Method : HSA

Driller : H. Popp  
Sampling : Splitspoon  
Approximate Elevation :  
Drill Rig : B-53 ATV

Depth in Feet	Water Level	USCS	GRAPHIC	Water Levels	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
				DESCRIPTION						
0				Topsoil (4")						
		CL		SILTY CLAY, light yellowish brown, moist, stiff		100	5/6/9	4.5	19	
		CL		SILTY CLAY, light orangish brown, moist, very stiff		89	9/11/11	3.75	21	
		SP-SM		SAND, light brown, moist, medium dense, w/ silt		100	7/9/9	-	15	Boring caved to 6.5' upon auger removal.
		SP-SM		SAND, orangish brown, moist, loose, w/ silt		100	4/5/5	-	12	
						100	4/4/6	-	8	Particle Size Analysis: 92% Sand 8% Clay and Silt
15				Boring terminated at 15.0'						
20										



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**LOG OF BORING B-3**

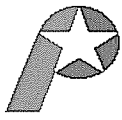
(Page 1 of 1)

Countywide Underserved Project  
Carrollton Utilities & West Carroll Water District  
Carroll County Utilities  
Carrollton, Kentucky

Client Name : Carrollton Utilities  
Project Number : 5-12-1174  
Logged By : A. Bilberry  
Start Date : 09/18/2012  
Drilling Method : HSA

Driller : H. Popp  
Sampling : Splitspoon  
Approximate Elevation :  
Drill Rig : B-53 ATV

Depth in Feet	Water Level	USCS	GRAPHIC	Water Levels	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
				▼ During Drilling ▽ After Completion ◆ After 24 Hours						
0				Topsoil (4")						Boring caved to 6.0' upon auger removal.
		CL		SILTY CLAY, orangish brown and yellowish brown, moist, very stiff, w/ trace organics		100	5/7/9	-	19	
		CL		SILTY CLAY, orangish brown, moist, very stiff		100	5/9/11	-	17	
		SP-SM		SAND, orangish brown, moist, medium dense, w/ silt		100	6/6/7	-	16	
		SP-SM		SAND, medium to dark brown, moist, loose, w/ silt		100	4/5/5	-	6	
						100	2/4/4	-	10	
15	Boring terminated at 15.0'									
20										



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**LOG OF BORING B-4**

(Page 1 of 1)

Countywide Underserved Project  
Carrollton Utilities & West Carroll Water District  
Carroll County Utilities  
Carrollton, Kentucky

Client Name : Carrollton Utilities  
Project Number : 5-12-1174  
Logged By : A. Bilberry  
Start Date : 09/18/2012  
Drilling Method : HSA

Driller : H. Popp  
Sampling : Splitspoon  
Approximate Elevation :  
Drill Rig : B-53 ATV

Depth in Feet	Water Level	USCS	GRAPHIC	Water Levels	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
				▼ During Drilling ▽ After Completion ◆ After 24 Hours						
0				Topsoil (4")						Boring caved to 6.0' upon auger removal.
		CL		SILTY CLAY, orangish brown to dark orangish brown, moist, stiff to very stiff		93	4/7/7	-	16	
						100	5/7/9	-	21	
5						100	5/4/7	-	13	
						100	5/4/8	2.25	21	
10		SP-SM		SAND, dark brown, moist, medium dense to loose, w/ silt						
						93	3/3/5	-	8	
15		Boring terminated at 15.0'								
20										



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**LOG OF BORING B-5**

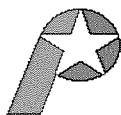
(Page 1 of 1)

Countywide Underserved Project  
Carrollton Utilities & West Carroll Water District  
Carroll County Utilities  
Carrollton, Kentucky

Client Name : Carrollton Utilities  
Project Number : 5-12-1174  
Logged By : A. Bilberry  
Start Date : 09/18/2012  
Drilling Method : HSA

Driller : H. Popp  
Sampling : Splitspoon  
Approximate Elevation :  
Drill Rig : B-53 ATV

Depth in Feet	Water Level	USCS	GRAPHIC	Water Levels	Samples	Rec %	SPT Results	qp tsf	w %	RQD %	REMARKS	
				▼ During Drilling ▽ After Completion ◆ After 24 Hours								DESCRIPTION
0				Topsoil (3")							Auger refusal encountered at 0.3'. Core rock from 0.3' to 5.3'.	
		LS/SH		LIMESTONE and SHALE, light to dark gray, highly weathered, crystalline limestone, moderately hard		40				0		
5				Boring terminated at 5.3'								
10												
15												
20												



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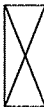


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**LOG OF BORING B-6**

(Page 1 of 1)

Countywide Underserved Project  
Carrollton Utilities & West Carroll Water District  
Carroll County Utilities  
Carrollton, Kentucky

Client Name : Carrollton Utilities  
Project Number : 5-12-1174  
Logged By : A. Bilberry  
Start Date : 09/18/2012  
Drilling Method : HSA

Driller : H. Popp  
Sampling : Splitspoon  
Approximate Elevation :  
Drill Rig : B-53 ATV

Depth in Feet	Water Level	USCS	GRAPHIC	Water Levels	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
				▼ During Drilling ▽ After Completion ◆ After 24 Hours						
0				SILTY CLAY, dark brown, moist, very stiff, w/ rock fragments		67	8/7/18	-	27	Boring caved to 3.5' upon auger removal.
		CL				89	4/8/9	4.5	14	
5				SILTY CLAY, light gray and brown, slightly moist to moist, very stiff		100	13/9/15	4.0	24	
		CL		* w/ rock fragments from 6.0' to 9.2'		75	42/(50/2")	-	-	
10				Auger refusal encountered at 9.2' Boring terminated at 9.2'						
15										
20										

## BORING LOG KEY

### UNIFIED SOIL CLASSIFICATION SYSTEM FIELD CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

#### NON COHESIVE SOILS

(Silt, Sand, Gravel and Combinations)

Density		Grain Size Terminology		
		Soil Fraction	Particle Size	US Standard Sieve Size
Very Loose	-4 blows/ft. or less			
Loose	-5 to 10 blows/ft.			
Medium Dense	-11 to 30 blows/ft.	Boulders	Larger than 12"	Larger than 12"
Dense	-31 to 50 blows/ft.	Cobbles	3" to 12"	3" to 12"
Very Dense	-51 blows/ft. or more	Gravel: Coarse	¾" to 3"	¾" to 3"
		Small	4.76mm to ¾"	#4 to ¾"
		Sand: Coarse	2.00mm to 4.76mm	#10 to #4
		Medium	0.42mm to 2.00mm	#40 to #10
		Fine	0.074mm to 0.42mm	#200 to #40
		Silt	0.005mm to 0.074 mm	Smaller than #200
		Clay	Smaller than 0.005mm	Smaller than #200

#### RELATIVE PROPORTIONS FOR SOILS

Descriptive Term	Percent
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

#### COHESIVE SOILS

(Clay, Silt and Combinations)

Consistency	Unconfined Compressive Strength (tons/sq. ft.)	Field Identification (Approx.) SPT Blows/ft.
Very Soft	Less than 0.25	0 - 2
Soft	0.25 - < 0.5	3 - 4
Medium Stiff	0.5 - < 1.0	5 - 8
Stiff	1.0 - < 2.0	9 - 15
Very Stiff	2.0 - < 4.0	16 - 30
Hard	Over 4.0	> 30

**Classification** on logs are made by visual inspection.

**Standard Penetration Test** - Driving a 2.0" O.D., 1<sup>3/8</sup>" I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30.0 inches. It is customary for **Patriot** to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6.0 inches of penetration on the drill log (Example - 6/8/9). The standard penetration test results can be obtained by adding the last two figures (i.e. 8 + 9 = 17 blows/ft.).

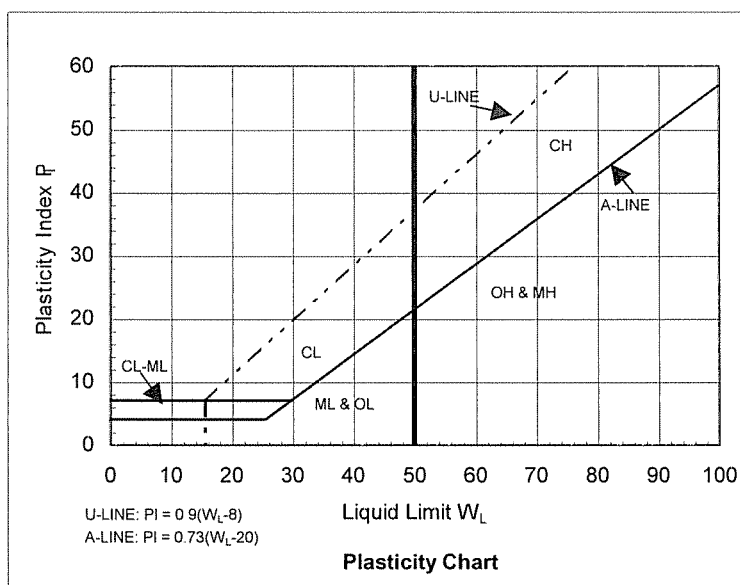
**Strata Changes** - In the column "Soil Descriptions" on the drill log the horizontal lines represent strata changes. A solid line (——) represents an actually observed change, a dashed line (- - - -) represents an estimated change.

**Groundwater** observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

**Groundwater symbols:** ▼-observed groundwater elevation, encountered during drilling; ∇-observed groundwater elevation upon completion of boring.

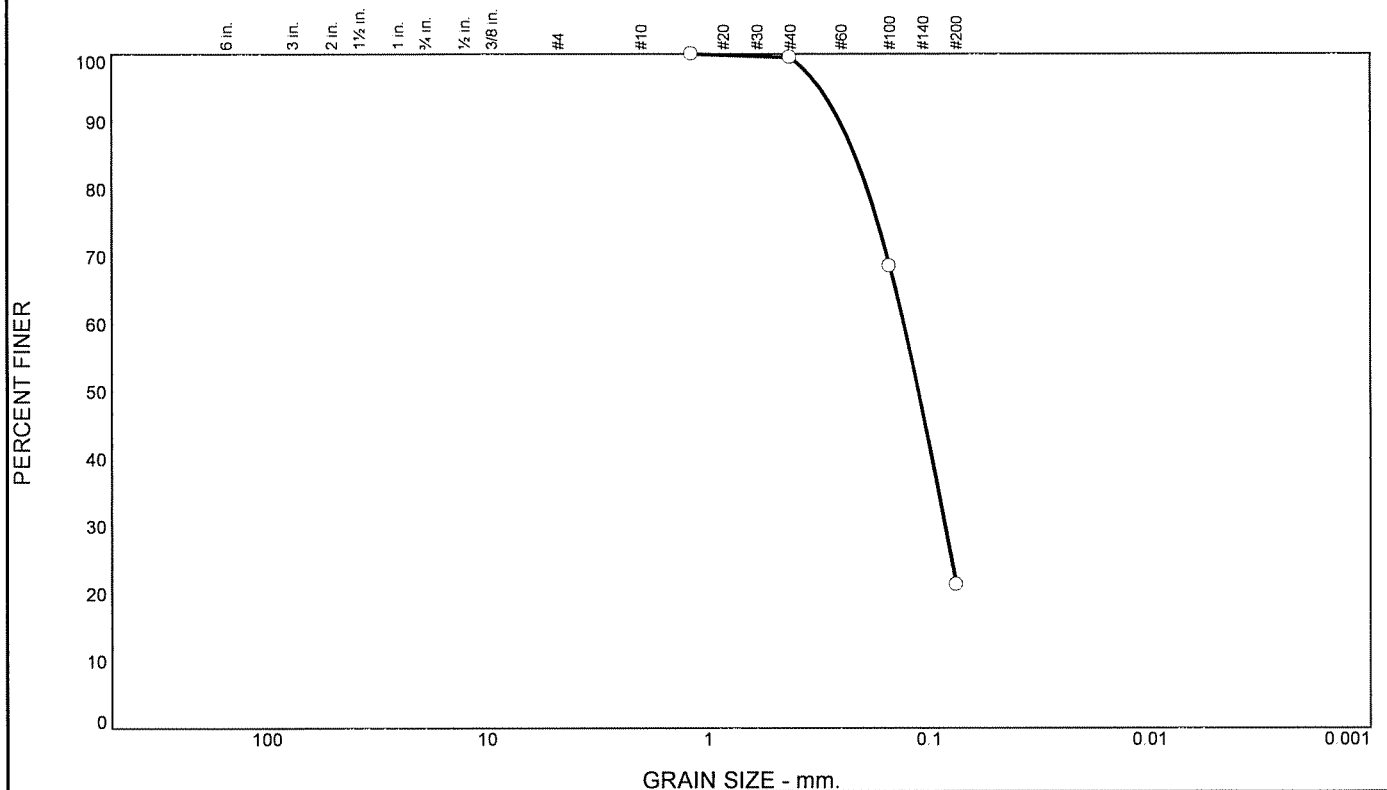


Major Divisions			Group Symbol		Typical Names	Classification Criteria for Coarse-Grained Soils		
Coarse-grained soils (more than half of material is larger than No. 200)	Gravels (more than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	$C_U \geq 4$ $1 \leq C_C \leq 3$	$C_U = \frac{D_{60}}{D_{10}}$	$C_C = \frac{D_{30}^2}{D_{10} D_{60}}$
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW ( $C_U < 4$ or $1 > C_C > 3$ )		
		Gravels with fines (appreciable amount of fines)	GM	$\frac{d}{u}$	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below A line or $P_I < 4$		Above A line with $4 < P_I < 7$ are borderline cases requiring use of dual symbols
			GC		Clayey gravels, gravel-sand-clay mixtures	Atterberg limits above A line or $P_I > 7$		
	Sands (more than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U \geq 6$ $1 \leq C_C \leq 3$	$C_U = \frac{D_{60}}{D_{10}}$	$C_C = \frac{(D_{30})^2}{D_{10} D_{60}}$
			SP		Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW ( $C_U < 6$ or $1 > C_C > 3$ )		
		Sands with fines (appreciable amount of fines)	SM	$\frac{d}{u}$	Silty sands, sand-silt mixtures	Atterberg limits below A line or $P_I < 4$		Limits plotting in hatched zone with $4 \leq P_I \leq 7$ are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	Atterberg limits above A line with $P_I > 7$		
Fine-grained soils (more than half of material is smaller than No. 200)	Silt and clays (liquid limit <50)	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	1. Determine percentages of sand and gravel from grain size curve 2. Depending on percentages of fines (fraction smaller than 200 sieve size), coarse-grained soils are classified as follows: Less than 5% - GW, GP, SW, SP More than 12% - GM, GC, SM, SC 5-12% - Borderline cases requiring dual symbols			
		CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				
		OL		Organic silts and organic silty clays of low plasticity				
	Silts and clays (liquid limit >50)	MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts				
		CH		Inorganic clays or high plasticity, fat clays				
		OH		Organic clays of medium to high plasticity, organic silts				
	Highly organic soils	PT		Peat and other highly organic soils				





## Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.5	78.2	21.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#16	100.0		
#40	99.5		
#100	68.5		
#200	21.3		

\* (no specification provided)

<b>Soil Description</b>		
Silty sand		
<b>Atterberg Limits</b>		
PL= 0	LL= 0	PI=
<b>Coefficients</b>		
D <sub>90</sub> = 0.2541	D <sub>85</sub> = 0.2169	D <sub>60</sub> = 0.1297
D <sub>50</sub> = 0.1113	D <sub>30</sub> = 0.0843	D <sub>15</sub> =
D <sub>10</sub> =	C <sub>u</sub> =	C <sub>c</sub> =
<b>Classification</b>		
USCS= SM	AASHTO=	A-2-4(0)
<b>Remarks</b>		

Sample Number: B-1      Depth: 6.0'-7.5'

Date: 10/01/12

**Patriot Engineering, Inc.**

**Louisville, KY**

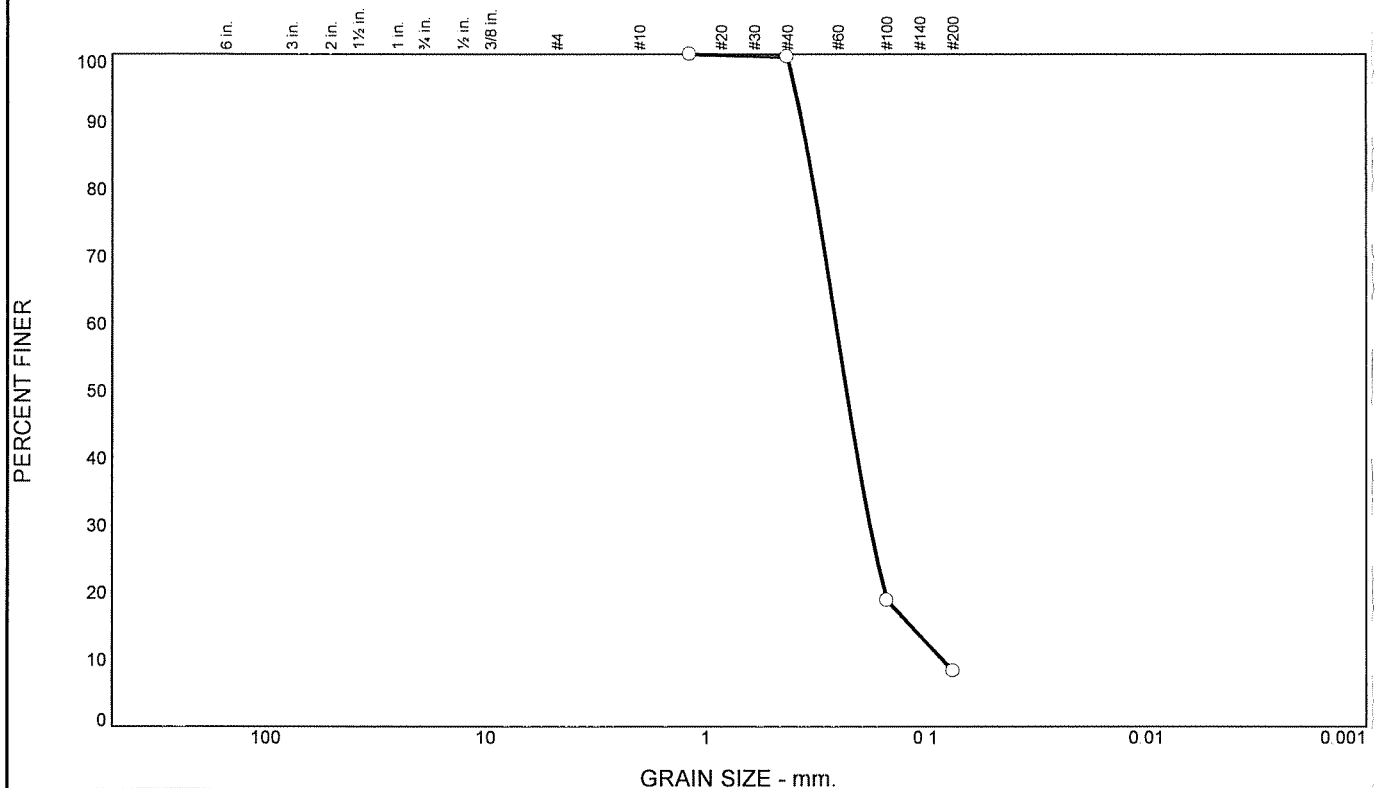
Client: Carrollton Utilities  
Project: Carrollton Utilites

Project No: 5-12-1174

Figure

Tested By: S. Khan      Checked By: W. Hemp

## Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.4	91.4	8.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#16	100.0		
#40	99.6		
#100	18.8		
#200	8.2		

\* (no specification provided)

<b>Soil Description</b>		
Poorly graded sand with silt		
<b>Atterberg Limits</b>		
PL= 0	LL= 0	PI=
<b>Coefficients</b>		
D <sub>90</sub> = 0.3644	D <sub>85</sub> = 0.3409	D <sub>60</sub> = 0.2552
D <sub>50</sub> = 0.2285	D <sub>30</sub> = 0.1794	D <sub>15</sub> = 0.1171
D <sub>10</sub> = 0.0842	C <sub>u</sub> = 3.03	C <sub>c</sub> = 1.50
<b>Classification</b>		
USCS= SP-SM	AASHTO=	A-3
<b>Remarks</b>		

Sample Number: B-2      Depth: 13.5'-15.0'

Date: 10/1/12

**Patriot Engineering, Inc.**

**Louisville, KY**

Client: Carrollton Utilities

Project: Carrollton Utilities

Project No: 5-12-1174

Figure

Tested By: S. Khan      Checked By: W. Hemp

**APPENDIX B**

**General Qualifications**

**and**

**Standard Clause for Unanticipated Subsurface Conditions**

## **GENERAL QUALIFICATIONS** **of Patriot Engineering's Geotechnical Engineering Investigation**

This report has been prepared at the request of our client for his use on this project. Our professional services have been performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report or on the test borings logs regarding vegetation types, odors or staining of soils, or other unusual conditions observed are strictly for the information of our client and the owner.

This report may not contain sufficient information for purposes of other parties or other uses. This company is not responsible for the independent conclusions, opinions or recommendations made by others based on the field and laboratory data presented in this report. Should there be any significant differences in structural arrangement, loading or location of the structure, our analysis should be reviewed.

The recommendations provided herein were developed from the information obtained in the test borings, which depict subsurface conditions only at specific locations. The analysis, conclusions, and recommendations contained in our report are based on site conditions as they existed at the time of our exploration. Subsurface conditions at other locations may differ from those occurring at the specific drill sites. The nature and extent of variations between borings may not become evident until the time of construction. If, after performing on-site observations during construction and noting the characteristics of any variation, substantially different subsurface conditions from those encountered during our explorations are observed or appear to be present beneath excavations we must be advised promptly so that we can review these conditions and reconsider our recommendations where necessary.

If there is a substantial lapse of time between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we urge that our report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse.

We urge that Patriot be retained to review those portions of the plans and specifications that pertain to earthwork and foundations to determine whether they are consistent with our recommendations. In addition, we are available to observe construction, particularly the compaction of structural backfill and preparation of the foundations, and such other field observations as may be necessary.

In order to fairly consider changed or unexpected conditions that might arise during construction, we recommend the following verbiage (Standard Clause for Unanticipated Subsurface Conditions) be included in the project contract.

## **STANDARD CLAUSE FOR UNANTICIPATED SUBSURFACE CONDITIONS**

"The owner has had a subsurface exploration performed by a soils consultant, the results of which are contained in the consultant's report. The consultant's report presents his conclusions on the subsurface conditions based on his interpretation of the data obtained in the exploration. The contractor acknowledges that he has reviewed the consultant's report and any addenda thereto, and that his bid for earthwork operations is based on the subsurface conditions as described in that report. It is recognized that a subsurface exploration may not disclose all conditions as they actually exist and further, conditions may change, particularly groundwater conditions, between the time of a subsurface exploration and the time of earthwork operations. In recognition of these facts, this clause is entered in the contract to provide a means of equitable additional compensation for the contractor if adverse unanticipated conditions are encountered and to provide a means of rebate to the owner if the conditions are more favorable than anticipated.

At any time during construction operations that the contractor encounters conditions that are different than those anticipated by the soils consultant's report, he shall immediately (within 24 hours) bring this fact to the owner's attention. If the owner's representative on the construction site observes subsurface conditions which are different than those anticipated by the consultant's report, he shall immediately (within 24 hours) bring this fact to the contractor's attention. Once a fact of unanticipated conditions has been brought to the attention of either the owner or the contractor, and the consultant has concurred, immediate negotiations will be undertaken between the owner and the contractor to arrive at a change in contract price for additional work or reduction in work because of the unanticipated conditions. The contract agrees that the following unit prices would apply for additional or reduced work under the contract. For changed conditions for which unit prices are not provided, the additional work shall be paid for on a time and materials basis."

Another example of a changed conditions clause can be found in paper No. 4035 by Robert F. Borg, published in ASCE Construction Division Journal, No. CO2, September 1964, page 37.