nesbitt engineering, inc.

227 N. Upper Street
Lexington, Kentucky 40507-1016
(859) 233-3111 (Phone)
(859) 259-2717 (Fax No.)

LETTER OF TRANSMITTAL

Date: 3/13/13
Job No. 998-37

TO:
Linda Faulkner
Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40602-0615

Subject: **Case # 2013-00077**

BCWD: KY 1110/28 Waterline Interconnection

WE ARE SENDING YOU:

Estimate _____ Plans ___X_____ Change Order _____
Report (s) _____ Copy of Letter _____ Other _____

COPIES	DATE	DESCRIPTION
2	November 2012	Bid Plans (half size) & Specifications, Contract #1
2	2/12/13	11"x 17" map showing waterline locations
1	3/13/13	Written project description

THESE ARE TRANSMITTED AS CHECKED BELOW:

_____ For approval _____ Approved as Submitted ___ For Your Information and Files
_____ For Your Use _____ Approved as Noted ___x___For Your Necessary Action
___X___ As Requested ___ Returned for Corrections ____For Review and Comment

REMARKS:

Please call me if you have any questions. 859-685-4523

RECEIVED
MAR 14 2013
PUBLIC SERVICE COMMISSION

SIGNED: _____
Michael M. Steen
Nesbitt Engineering, Inc.

COPIES TO: File.

If enclosures are not as noted, kindly notify us at once.

P:\Breathitt\998-37 Buckhorn\PSC\LOT PSC 3-13-13.docx

Steven L. Beshear
Governor

Leonard K. Peters
Secretary
Energy and Environment Cabinet

Commonwealth of Kentucky
Public Service Commission
211 Sower Blvd.
P.O. Box 615
Frankfort, Kentucky 40602-0615
Telephone: (502) 564-3940
Fax: (502) 564-3460
psc.ky.gov

David L. Armstrong
Chairman

James W. Gardner
Vice Chairman

Linda Breathitt
Commissioner

March 8, 2013

Honorable Brendon D. Miller
Attorney at Law
1149 Main Street
Jackson, Kentucky 41339

RE: Case No. 2013-00077
Filing Deficiencies

The Commission Staff has reviewed Breathitt County Water District's application in the above case. This filing is rejected for the reasons set forth below.

Filing deficiencies pursuant to:

807 KAR 5:001, Section 15(2)(c):
A full description of the proposed location, route, or routes of the new construction or extension, including a description of the manner in which same will be constructed and also the names of all public utilities, corporations, or persons with whom the proposed new construction or extension is likely to compete.

KRS 322.340:
Engineering plans, specifications, plats and report of the proposed construction. The engineering documents prepared by a registered engineer, must be signed, sealed, and dated by an engineer registered in Kentucky.

807 KAR 5:001, Section 17(2):
Maps and plans of property.

The statutory time period in which the Commission must process this case will not commence until the above–mentioned information is filed with the Commission. If your filing contains a proposed effective date, the rejection of your filing for reasons of deficiencies voids that proposed effective date. When you file the required information to correct the deficiencies, you may re-file your proposed tariff with a new proposed effective date that is a least 30 days from the date you file the required information. You are requested to file 10 copies of this information within 15 days of date of this letter. If you need further assistance, please contact my staff at 502-564-3940.

Sincerely,

Linda Faulkner

Linda Faulkner
Filings Division Director

Detailed Project Description

This project includes the replacement of water service along KY 1110 from Bowling Fork to KY 28. This section of waterline replacement will allow for a connection to be made to the Village of Buckhorn Water System at KY 28 for emergency use only. Also included is new water service along KY 315 from Elsome Creek Road to the intersection of KY 315 and KY 28. There are no other existing water utilities in this area and therefore this project will not cause duplication of service. For the majority of the project the waterline will be constructed by simply open cut of the earth, at stream locations the waterline will be directionally drilled and state road crossings the waterline will be bore and jacked.

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227 North Upper Street
Lexington, KY 40507-1016

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COMMISSION

Contract and Technical Specifications

KY 1110/28 Waterline Interconnection Project
Contract 1 Waterlines
Breathitt County Water District
Jackson, Kentucky



January 2013

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ADVERTISEMENT FOR BIDS

Breathitt County Water District
1137 Main Street
Jackson, KY 41339

Sealed bids for: **KY 1110/28 Waterline Interconnection Project, Contract 1 Waterlines** will be received by the **Breathitt County Water District** at the Breathitt County Court House until **January 31, 2013 at 1:00 pm local time** and then at said office publicly opened and read aloud.

Work is to include installation of approximately 29,000 LF of 8-inch waterline with 400 LF of various sized directionally drilled creek/river crossings and other appurtenances, Installation of a master meter vault with telemetry, a pressure reducing vault and 65 service connections.

The Plans and Specifications and other contract documents may be examined at the following locations:

Breathitt County Water District	**Builders Exchange**	**AGC / F.W. Dodge Corporation**
1137 Main Street	**225 Walton Ave**	**2321 Fortune Drive, Suite 112**
Jackson, KY 41339	**Lexington, KY 40502**	**Lexington, Kentucky 40509**

Copies may be obtained at the office of **Lynn Imaging, Inc.,** located at **328 East Vine Street, Lexington, KY 40507, 859-255-1021**, upon payment of **$150.00** non refundable for each set. The owner reserves the right to waive any informality or to reject any or all bids.

Questions regarding the bid documents must be received in writing no later than 5:00 pm, January 24, 2013.

This contract will be funded by Abandoned Mine Lands. Bidders must comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, Non segregated facilities order 32FR 7439, and the Contract Work Hours Standard Act. This project will be in compliance with, and bidders must comply with Executive Order No. 11246 (EEO) as amended, prohibiting discrimination in employment regarding race, creed, color, sex or national origin. Contractors/subcontractors will comply with 41 CFR 60-4, (affirmative action), to insure equal opportunity to females and minorities and will apply the time tables and goal set forth in 41 CFR 60-4. This contract is subject to state and federal wage rates. Bidders will make positive efforts to use small, minority, women owned and disadvantaged businesses. DBE's are encouraged to bid.

No bidder may withdraw his bid within **90** days after the actual date of the opening thereof. Bid award will be made to the lowest, responsive, responsible bidder.

1/10/13
(Date)

Bobby Thorpe, Jr
Chairman

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 Law.

SUGGESTED INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACTS

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

ACEC
AMERICAN COUNCIL OF ENGINEERING COMPANIES

National Society of Professional Engineers
Professional Engineers in Private Practice

ASCE American Society of Civil Engineers

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1801 Alexander Bell Drive, Reston, VA 20191-4400

INSTRUCTIONS TO BIDDERS

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

A. *Issuing Office*--The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement or Invitation to Bid may be obtained from the Issuing Office. The deposit will be refunded to each document holder of record who returns a complete set of Bidding Documents in good condition within 30 days after opening of Bids.

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

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

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

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

A. Refer to Section 00420 Bidder's Qualification Statement.

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

4.01 On request, 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.

4.02 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. obtain and carefully study (or accept consequences of not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and

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

E. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;

F. 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;

G. correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

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 - PRE-BID CONFERENCE

5.01 A pre-Bid conference will not be held for this project. (if a pre-bid is held refer to original C-200 EJCD document located n:/Rural Development/C-200.doc)

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 to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions

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received less than ten days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

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

ARTICLE 8 - BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5 percent of Bidder's maximum Bid price and in the form of a certified check or bank money order or a Bid bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.

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

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

ARTICLE 9 - CONTRACT TIMES

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

ARTICLE 10 - LIQUIDATED DAMAGES

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

ARTICLE 11 - SUBSTITUTE AND "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 consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered 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

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apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, without an increase in the Bid.

12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner 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 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.

ARTICLE 13 - PREPARATION OF BID

13.01 The Bid Form is included with the Bidding Documents.

13.02 All blanks on the Bid Form shall be completed by printing in ink or by typewriter and the Bid signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each [section, Bid item, alternative, adjustment unit price item, and unit price item] listed therein.

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

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 below the signature.

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

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 below the signature.

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

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

13.10 The address 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 covenant to obtain such qualification prior to award of the Contract. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

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ARTICLE 14 - BASIS OF BID; COMPARISON OF BIDS

14.01 *Unit Price*

A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.

B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with Paragraph 11.03 of the General Conditions.

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

14.02 The Bid price shall include such amounts as the Bidder deems proper for overhead and profit on account of cash allowances, if any, named in the Contract Documents as provided in Paragraph 11.02 of the General Conditions.

14.03 Bid prices will be compared after resolution of discrepancies, if any, as described above.

ARTICLE 15 - SUBMITTAL OF BID

15.01 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 a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to the client at the address provided in the "advertisement for bids".

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

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

16.02 If within 24 hours after Bids are opened, any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned.

ARTICLE 17 - OPENING OF BIDS

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

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ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also 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. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

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

19.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.

19.06 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project.

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 insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

ARTICLE 21 - SIGNING OF AGREEMENT

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

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This document has important consequences; consultation with an attorney is encouraged with respect to its completion or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

SUGGESTED
BID FORM
FOR CONSTRUCTION CONTRACTS

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

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National Society of Professional Engineers
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ASCE American Society of Civil Engineers

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This document has been approved and endorsed by

The Associated General Contractors of America

Construction Specifications Institute
Knowledge for Creating and Sustaining the Built Environment

EJCDC C-410 Suggested Bid Form for Construction Contracts
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BID FORM

TABLE OF ARTICLES

Article	Article No.
Bid Recipient	1
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Time of Completion	6
Attachments to this Bid	7
Defined Terms	8
Bid Submittal	9

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Breathitt County Water District
1137 Main Street
Jackson, KY 41339

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

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

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

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____

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

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

D. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

E. 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.

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

ARTICLE 4 – FURTHER REPRESENTATIONS

4.01 Bidder further represents 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 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 sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Document for the price(s) as shown on the Bid Schedule following Article 9.01 of this Section 00410 of these Specifications.

5.02 Unit prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

5.03 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.

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07.B of the General Conditions within the number of calendar days indicated in the Agreement.

6.02 Bidder accepts the provisions of the Agreement as to Liquidated Damages in the event of failure to complete the Work within the Contract Time.

ARTICLE 7 – ATTACHMENTS TO THIS BID

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

A. Required Bid security in the form of 5%

B. List of Proposed Subcontractors

C. List of Proposed Suppliers

D. List of Project References for the last 5 years.

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E. Required Bidder Qualification Statement with Supporting Data

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

THIS BID SUBMITTED BY:

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____ (SEAL)
(Individual's signature)

Doing business as: _____

A Partnership

Partnership Name: _____ (SEAL)

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

Name (typed or printed): _____

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)

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Attest _____

Date of Authorization to do business in *Kentucky* is _____/_____/_____.

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: _____

Second Joint Venturer Name: _____ (SEAL)

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

Name (typed or printed): _____

Title: _____

(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.)

Bidder's Business Address _____

_____

Phone No. _____ Fax No. _____

SUBMITTED on _____, 20____.

State Contractor License No. _____. (If applicable)

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Breathitt County Water District

Base Bid Schedule

KY 1110/28 Waterline Interconnection

Item	Description	Unit	Quantity	Unit Cost	Total Cost
1	Tie Into Existing WL w TV&TSlv	EA	2	$	$
2	8" PVC SDR-17 Waterline	LF	30,000	$	$
3	8" D.I. Waterline with Nitrile Gaskets	LF	200	$	$
4	4" PVC SDR-17 Waterline	EA	100	$	$
5	8" D.I.M.J. Gate Valve & Box	EA	15	$	$
6	4" D.I.M.J. Gate Valve & Box	EA	1	$	$
7	10" HDPE Waterline Directional Drilled	LF	500	$	$
8	14" API 5L Grade B Steel Casing, Bore & Jack w/ carrier pipe	LF	160	$	$
9	Flushing Hydrant Assembly Type 1	EA	12	$	$
10	Reconnect existing services and replace meters	EA	15	$	$
11	5/8" x 3/4" Indiv. Meter with iprv & orion radio read profiler	EA	50	$	$
12	3/4" water service line	LF	2,420	$	$
13	1" water service line	LF	1,000	$	$
14	Combination Air Release Valve	EA	3	$	$
15	Master Meter Vault with Telemetry	LS	1	$	$
16	Pressure Reducing Valve and Vault	EA	1	$	$
17	Waterline Marker	EA	8	$	$
	Total Base Bid - (items numbered 1 - 17) =				**$**
	Total Base Bid (written) =				
	_____ **dollars** _____ **cents**				

Note No change in material and/or equipment approved prior to bids being received. Materials/equipment shall be bid as specified in specifications and plans. Any claim for price increase due to the contractor bidding a different material/equipment will be denied.

SECTION 00420

BIDDER'S QUALIFICATION STATEMENT

Submitted by:

Name of Organization _____

Name of Individual _____

Title _____

Address _____

_____

_____

Telephone ( ) -

Email Address _____

Business Organization: ___ Corporation ____ Partnership ____ Joint Venture
____ Sole Proprietorship

Name of surety company and name, address & telephone number of agent:

_____

_____

_____

_____

Project Name: _____

Tables: (These tables must be submitted with the bid form.)

Table A – list construction projects completed by this organization in the past five (5) years.

Table B – list construction projects that are currently under construction by this organization.

Table C – Details of construction experience of the principal individuals of your organization involved with construction operations.

Table D – list all subcontractors to be used on this project.

Table A – Construction Project (Past 5 years)

Reference Name (phone & address)						
Date Complete						
Contract Price						
Design Engineer						
Description of Project						
Owner						
Project Name						

Table B – Current Construction Project(s)

Project Name	Owner	Description of Project	Design Engineer	Contract Price	Precent Complete	Reference Name (phone & address)

Table C – Personal Experience

Prior position and experience in construction						
Date started in construction						
Date started with this organization						
Position						
Name						

Table D – Subcontractor Listing

Dollar amount						
Type of work						
Contact Information Phone #, address						
Subcontractor Name						

Signature _____
(BIDDING CONTRACTOR)

Title _____

Date _____

END OF SECTION

BID BOND

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

BIDDER (Name and Address):

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

OWNER (Name and Address):

BID
Bid Due Date:
Project (Brief Description Including Location):

BOND
Bond Number:
Date (Not later than Bid due date):
Penal sum _____ _____
(Words) (Figures)

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

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

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

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

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

3. This obligation shall be null and void if:
   3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
   3.2. All Bids are rejected by Owner, or
   3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

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

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

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

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

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

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

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

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

Notice of Award

Dated

Project: **KY 1110/28 Waterline Interconnection**	Owner: **Breathitt County Water District**	Owner's Contract No.:
Contract: **Contract 1 Waterlines**		Engineer's Project No.: **998-37**

Bidder:

Bidder's Address: (send Certified Mail, Return Receipt Requested)

You are notified that your Bid dated 1/31/13 for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for _____

Work is to include installation of approximately 29,340 LF of 8-inch, various sized directionally drilled creek/river crossings and other appurtenances, Installation of a master meter vault with telemetry 15 new service reconnects and 50 service connections.

The Contract Price of your Contract is Dollars and no cents($).

0 copies of each of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

2 sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [10] days of the date you receive this Notice of Award.

1. Deliver to the Owner [6] fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders (Article 20), [and] General Conditions (Paragraph 5.01) [and Supplementary Conditions (Paragraph SC-5.01).]
3. Other conditions precedent:

_____

_____

_____

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

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

Breathitt County Water District
Owner

By: _____
Authorized Signature

Chairman
Title

Copy to Engineer

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 Law.

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

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

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Professional Engineers in Private Practice

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Construction Specification Institute

Knowledge for Creating and Sustaining the Built Environment

This document has been accepted by
United States Department of Agriculture
Rural Utilities Service, Water and Waste Programs

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This Suggested Form of Agreement has been prepared for use with the Standard General Conditions of the Construction Contract, Funding Agency Edition (No. C-710, 2002 Edition). Their provisions are interrelated, and a change in one may necessitate a change in the other. The language contained in the Suggested Instructions to Bidders (No. C-200, 2002 Edition) is also carefully interrelated with the language of this Agreement. Their usage is discussed in the Commentary on EJCDC Construction Documents. See also Guide to the Preparation of Supplementary Conditions (No. C-800, 2002 Edition).

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

THIS AGREEMENT is by and between **The Breathitt County Water District** ("Owner") and

_____ ("Contractor").

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

ARTICLE 1 – WORK

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

Work is to include installation of approximately 29,340 LF of 8-inch, various sized directionally drilled creek/river crossings and other appurtenances, Installation of a master meter vault with telemetry 15 new service reconnects and 50 service connections.

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:

KY 1110/28 Waterline Interconnection, Contract 1 Waterline

ARTICLE 3 – ENGINEER

3.01 The Project has been designed by Nesbitt Engineering, Inc., who is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

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 *Days to Achieve Substantial Completion and Final Payment*

A. The Work will be substantially completed within **120** days after the date when the Contract Times commence to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within **120** days after the date when the Contract Times commence to run.

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4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner **$750.00** for each day that expires after the time specified in Paragraph 4.02 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner **$750.00** for each day that expires after the time specified in Paragraph 4.02 for completion and readiness for final payment until the Work is completed and ready for final payment.

ARTICLE 5 – CONTRACT PRICE

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

A. For all Unit Price Work, as shown on the attached "Base Bid Schedule"

All specific cash allowances are included in the above 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 on or about the 10th day of each month during performance of the Work as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions:

   a. 95 percent of Work completed (with the balance being retainage); and

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

2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts as Engineer shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions.

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6.03 *Final Payment*

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

ARTICLE 7 – INTEREST

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

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

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

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

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

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

D. Contractor 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.

E. 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.

F. 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.

G. 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.

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

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 6 inclusive).

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2. Performance bond (pages 610-1 to 610-3, inclusive).

3. Payment bond (pages 615-1 to 615-3, inclusive).

4. Other bonds (pages 620-1 to 620-2, inclusive).

   a. _____ (pages _____ to _____, inclusive).

   b. _____ (pages _____ to _____, inclusive).

   c. _____ (pages _____ to _____, inclusive).

5. General Conditions (pages 710-1 to 710-58, inclusive).

6. Supplementary Conditions (pages 800-1 to 800-5, inclusive).

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

8. Drawings consisting of 15 sheets with each sheet bearing the following general title: **KY 1110/28 Waterline Interconnection**.

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

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

    a. Contractor's Bid (pages 300-1 to 300-8, inclusive).

    b. Documentation submitted by Contractor prior to Notice of Award (pages 420-1 to 420-6, inclusive).

    c. _____.

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

    a. Notice to Proceed (pages 530-1 to 530-1, inclusive).

    b. Work Change Directives.

    c. Change Order(s).

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

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

D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

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ARTICLE 10 – MISCELLANEOUS

10.01 *Terms*

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

10.02 *Assignment of Contract*

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

10.03 *Successors and Assigns*

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

10.04 *Severability*

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

10.05 *Other Provisions*

A. None.

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

NOTE(S) TO USER

See I-21 and correlate procedures for format and signing between the two documents.

This Agreement is dated/**13.** This Agreement shall not be effective unless and until Agency's designated representative concurs.

OWNER:	CONTRACTOR
Breathitt County Water District	
By:	By:
Title: Chairman	Title:
[CORPORATE SEAL]	[CORPORATE SEAL]
Attest:	Attest:
Title:	Title:
Address for giving notices:	Address for giving notices:
Breathitt County Water District	
1137 Main St	
Jackson, KY 41339	
	Agent for service of process:
	(If Contractor is a corporation or a partnership, attach evidence of authority to sign.)

Agency Concurrence:

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

Agency:	By:
Date:	Title:

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Notice to Proceed

Dated

Project: **KY 1110/28 Waterline Interconnection**	Owner: **Breathitt County Water District**	**Owner's Contract No.:**
Contract: **Contract 1 Waterlines**		**Engineer's No.:998-37**
Contractor:		

Contractor's Address: [send Certified Mail, Return Receipt Requested]

You are notified that the Contract Times 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. In accordance with Article 4 of the Agreement, the date of Substantial Completion is_____, and the date of readiness for final payment is _____. Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds) certificates of insurance which each is 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]:

	Breathitt County Water District
(Contractor)	**Owner**
Received by:	**Given by:**
	Authorized Signature
	Chairman
(Title)	**Title**
(Date)	**Date**

Copy to Engineer

p:\breathitt\998-37 buckhorn\-03 design\specs\contract\08 00530.doc

EJCDC No. C-550 (2002 Edition)

Prepared by the Engineers' Joint Contract Documents Committee and endorsed by the Associated General Contractors of America and the Construction Specifications Institute.

PERFORMANCE BOND

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

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

OWNER (*Name and Address*):

CONTRACT
Effective Date of Agreement:
Amount:
Description (*Name and Location*):

BOND
Bond Number:
Date (*Not earlier than Effective Date of Agreement*):
Amount:
Modifications to this Bond Form:

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

CONTRACTOR AS PRINCIPAL	**SURETY**
_____ (Seal)	_____ (Seal)
Contractor's Name and Corporate Seal	Surety's Name and Corporate Seal
By: _____	By: _____
Signature	Signature (Attach Power of Attorney)
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	Attest: _____
Signature	Signature
_____	_____
Title	Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

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

1. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.

2. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
   2.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
   2.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and
   2.3 Owner has agreed to pay the Balance of the Contract Price to:
      1. Surety in accordance with the terms of the Contract; or
      2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.

3. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:

   3.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
   3.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
   3.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
   3.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
      1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
      2. Deny liability in whole or in part and notify Owner citing reasons therefor.

4. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

5. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

5.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
5.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
5.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

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

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

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

9. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

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

11. Definitions.

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

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

PAYMENT BOND

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

CONTRACTOR (*Name and Address*):

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

OWNER (*Name and Address*):

CONTRACT

Effective Date of Agreement:
Amount:
Description *(Name and Location)*:

BOND

Bond Number:
Date (*Not earlier than Effective Date of Agreement*):
Amount:
Modifications to this Bond Form:

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

Note: Provide execution by additional parties, such as joint venturers, if necessary.

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

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

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

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

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

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

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

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

1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
3. Not having been paid within the above 30 days, have sent a written notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.

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

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

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

6.2 Pay or arrange for payment of any undisputed amounts.

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

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

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

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

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

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

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

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

15. Definitions

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

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

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

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

SECTION 00620

INSURANCE CERTIFICATE

Certificate of Insurance shall be provided in accordance with the General Conditions, this Division, Section 00710.

END OF SECTION

U.S. DEPARTMENT OF AGRICULTURE

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

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

(BEFORE COMPLETING CERTIFICATION, READ INSTRUCTIONS ON REVERSE)

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

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

Organization Name | PR/Award Number or Project Name

Name(s) and Title(s) of Authorized Representative(s)

Signature(s) | Date

Form AD-1048 (1/92)

Instructions for Certification

1. By signing and submitting this form, the prospective lower tier participant is providing the certification set out on the reverse side in accordance with these instructions.

2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

4. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

5. The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

6. The prospective lower tier participant further agrees by submitting this form that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction," without modification, in all lower tier covered transaction and in all solicitations for lower tier covered transactions.

7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

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 Law.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT FUNDING AGENCY EDITION

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

ACEC
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National Society of Professional Engineers
Professional Engineers in Private Practice

ASCE American Society of Civil Engineers

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AMERICAN COUNCIL OF ENGINEERING COMPANIES

AMERICAN SOCIETY OF CIVIL ENGINEERS

This document has been approved and endorsed by

The Associated General Contractors of America

and the

Construction Specification Institute

Knowledge for Creating and Sustaining the Built Environment

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These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Funding Agency Edition No. C-521 (2002 Edition). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC Construction Documents, General and Instructions (No. C-001, 2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800, 2002 Edition).

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GENERAL CONDITIONS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

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

2. *Agency* – The Federal or state agency named as such in the Agreement.

3. *Agreement* – The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

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

5. *Asbestos* – Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

6. *Bid* – The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

7. *Bidder* – The individual or entity who submits a Bid directly to Owner.

8. *Bidding Documents* – The Bidding Requirements and the proposed Contract Documents (including all Addenda).

9. *Bidding Requirements* – The Advertisement or Invitation to Bid, Instructions to Bidders, bid security of acceptable form, if any, and the Bid Form with any supplements.

10. *Change Order* – A document recommended by Engineer which is signed by Contractor and Owner and Agency and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

11. *Claim* – A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

12. *Contract* – The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

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13. *Contract Documents* – Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

14. *Contract Price* – The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

15. *Contract Times* – The number of days or the dates stated in the Agreement to: (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.

16. *Contractor* – The individual or entity with whom Owner has entered into the Agreement.

17. *Cost of the Work* – See Paragraph 11.01.A for definition.

18. *Drawings* – That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

19. *Effective Date of the Agreement* – The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

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

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

22. *General Requirements* – Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition* – The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste* – The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

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

26. *Liens* – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

27. *Milestone* – A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

28. *Notice of Award* – The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

29. *Notice to Proceed* – A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

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30. *Owner* – The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

31. *PCBs* – Polychlorinated biphenyls.

32. *Petroleum* – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

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

34. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

35. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *Radioactive Material* – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

37. *Related Entity* – An officer, director, partner, employee, agent, consultant, or subcontractor.

38. *Resident Project Representative* – The authorized representative of Engineer who may be assigned to the Site or any part thereof.

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

40. *Schedule of Submittals* – A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

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

42. *Shop Drawings* – All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

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

44. *Specifications* – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

45. *Subcontractor* – An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

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

47. *Successful Bidder* – The Bidder submitting a responsive Bid to whom Owner makes an award.

48. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.

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

50. *Underground Facilities* – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

51. Unit Price Work – Work to be paid for on the basis of unit prices.

52. *Work* – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

53. *Work Change Directive* – A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and Agency upon recommendation of the Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

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

B. *Intent of Certain Terms or Adjectives*

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

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C. *Day*

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

D. *Defective*

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

   a. does not conform to the Contract Documents, or

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

   c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide*

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

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

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

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

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

2.02 *Copies of Documents*

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

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2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement.

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule;

2. a preliminary Schedule of Submittals; and

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

2.06 *Preconstruction Conference*

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

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

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

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

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

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ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

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

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws, and Regulations*

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

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

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor knew or reasonably should have known thereof.

B. Resolving Discrepancies

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

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

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

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

   1. A Field Order;

   2. Engineer's approval of a Shop Drawing or Sample; (Subject to the provisions of Paragraph 6.17.D.3) or

   3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

   1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or

   2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.

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

3.06 *Electronic Data*

A. Copies of data furnished by Owner or Engineer to Contractor or Contractor to Owner or Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

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C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

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

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

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

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

4.02 *Subsurface and Physical Conditions*

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

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

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 at or contiguous to the Site that is uncovered or revealed either:

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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, Owner and Engineer, and any of their Related Entities shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

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4.04 *Underground Facilities*

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

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

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

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

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

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

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

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

4.05 *Reference Points*

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

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4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:

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.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered to Contractor written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not

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limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

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

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an 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 current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

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5.03 *Certificates of Insurance*

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

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

5.04 *Contractor's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

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

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

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

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

   b. by any other person for any other reason;

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

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

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4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

   a. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

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

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (Contractor shall be responsible for any deductible or self-insured retention.). This insurance shall:

   1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

   2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

   3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

   4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

   5. allow for partial utilization of the Work by Owner;

   6. include testing and startup; and

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7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

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

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.07 *Waiver of Rights*

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

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

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

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

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C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

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 Contractor and made payable to Contractor as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Contractor shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof.

B. Contractor as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Contractor's exercise of this power. If such objection be made, Contractor as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Contractor as fiduciary shall give bond for the proper performance of such duties.

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

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

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

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

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

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B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 *Labor; Working Hours*

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

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

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

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or

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equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

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

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

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

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

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

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

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

2. Substitute Items

    a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

    b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

    c. The procedure requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.

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

        1) shall certify that the proposed substitute item will:

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

            b) be similar in substance to that specified, and

            c) be suited to the same use as that specified;

        2) will state:

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a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;

b) whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and

c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

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

b) available engineering, sales, maintenance, repair, and replacement services;

4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

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

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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

6.06 *Concerning Subcontractors, Suppliers, and Others*

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

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B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

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

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

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

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

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

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

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Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

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

6.08 *Permits*

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

6.09 *Laws and Regulations*

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

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

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.

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2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

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

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

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

6.12 *Record Documents*

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

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

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

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

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

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

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C. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or , or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

D. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

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

6.17 *Shop Drawings and Samples*

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

1. *Shop Drawings*

a. Submit number of copies specified in the General Requirements.

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

2. *Samples*

a. Submit number of Samples specified in the Specifications.

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

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

C. *Submittal Procedures*

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

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

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

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

d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

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

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

D. *Engineer's Review*

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

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures*

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

6.18 *Continuing the Work*

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

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its Related Entities shall be entitled to rely on representation of Contractor's warranty and guarantee.

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

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

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

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

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

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

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

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

7. any correction of defective Work by Owner.

6.20 *Indemnification*

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

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or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:

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

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

6.21 *Delegation of Professional Design Services*

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

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

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

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

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

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or via other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

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1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

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

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's action or inactions.

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ARTICLE 8 -- OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

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

8.05 *Lands and Easements; Reports and Tests*

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

8.06 *Insurance*

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

8.07 *Change Orders*

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

8.08 *Inspections, Tests, and Approvals*

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

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.

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8.11 *Evidence of Financial Arrangements*

A. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and will not be changed without written consent of Owner and Engineer.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

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

9.03 *Project Representative*

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

9.04 *Authorized Variations in Work*

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

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9.05 *Rejecting Defective Work*

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

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

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

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

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

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

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create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, subject to written approval by Agency at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

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

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

10.04 *Notification to Surety*

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

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part,

2. approve the Claim, or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

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

11.01 *Cost of the Work*

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

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

   a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

   b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

   c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs

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

d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressages, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A and 11.01.B.

C. Contractor's Fee: When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

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D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

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

B. Cash Allowances

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the Bid price of a particular item of Unit Price Work amounts to more than 5 percent of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect to any other item of Work; and

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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 Paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

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12.02 *Change of Contract Times*

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

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

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.B.

1. delays caused by or within the control of Contractor; or

D. Owner, Engineer and the Related Entities of each of them shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of Engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

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

13.01 *Notice of Defects*

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

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at

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reasonable times for their observation, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in said Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

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

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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 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.

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C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

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

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

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D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

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

14.02 *Progress Payments*

A. *Applications for Payments*

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

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

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3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

   b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

   a. to supervise, direct, or control the Work, or

   b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

   c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

   d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

   e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any 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;

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b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. the Contractor's performance or furnishing of the Work is inconsistent with funding Agency requirements;

d. there are other items entitling Owner to a set-off against the amount recommended; or

e. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1.

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Agency, Contractor, and Engineer shall make a prefinal inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

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

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

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E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.

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 will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

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

14.06 *Final Inspection*

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

14.07 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.7;

b. consent of the surety, if any, to final payment;

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c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

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

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

C. *Payment Becomes Due*

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

14.08 *Final Completion Delayed*

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

14.09 *Waiver of Claims*

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

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

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Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 -- SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

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

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph Owner shall not be required to obtain the lowest price for the Work performed.

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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.

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ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Owner and Contractor may mutually request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process hall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or

2. agrees with the other party to submit the Claim to another dispute resolution process, or

3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

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

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

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17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

ARTICLE 18 – FEDERAL REQUIREMENTS

18.01 *Agency Not a Party*

A. This Contract is expected to be funded in part with funds provided by Agency. Neither Agency, nor any of its departments, entities, or employees is a party to this Contract.

18.02 *Contract Approval*

A. Owner and Contractor will furnish Owner's attorney such evidence as required so that Owner's attorney can complete and execute the following "Certificate of Owner's Attorney" (Exhibit GC-A) before Owner submits the executed Contract Documents to Agency for approval.

B. Concurrence by Agency in the award of the Contract is required before the Contract is effective.

18.03 *Conflict of Interest*

A. Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer.

B. Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in Contractor. Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from Contractor or subcontractors.

18.04 *Gratuities*

A. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner or Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.

B. In the event this Contract is terminated as provided in paragraph 18.04.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in

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addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

18.05 *Audit and Access to Records*

A. For all negotiated contracts and negotiated modifications (except those of $10,000 or less), Owner, Agency, the Comptroller General, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor, which are pertinent to the Contract, for the purpose of making audits, examinations, excerpts and transcriptions. Contractor shall maintain all required records for three years after final payment is made and all other pending matters are closed.

18.06 *Small, Minority and Women's Businesses*

A. If Contractor intends to let any subcontracts for a portion of the work, Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services. Affirmative steps shall consist of: (1) including qualified small, minority and women's businesses on solicitation lists; (2) assuring that small, minority and women's businesses are solicited whenever they are potential sources; (3) dividing total requirements when economically feasible, into small tasks or quantities to permit maximum participation of small, minority, and women's businesses; (4) establishing delivery schedules, where the requirements of the work permit, which will encourage participation by small, minority and women's businesses; (5) using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce; (6) requiring each party to a subcontract to take the affirmative steps of this section; and (7) Contractor is encouraged to procure goods and services from labor surplus area firms.

18.07 *Anti-Kickback*

A. Contractor shall comply with the Copeland Anti-Kickback Act (18 USC 874 and 40 USC 276c) as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States"). The Act provides that Contractor or subcontractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. Owner shall report all suspected or reported violations to Agency.

18.08 *Clean Air and Pollution Control Acts*

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

18.09 *State Energy Policy*

A. Contractor shall comply with the Energy Policy and Conservation Act (P.L. 94-163). Mandatory standards and policies relating to energy efficiency, contained in any applicable State Energy Conservation Plan, shall be utilized.

18.10 *Equal Opportunity Requirements*

A. If this Contract exceeds $10,000, Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

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B. Contractor's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative active obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4 and its efforts to meet the goals established for the geographical area where the Contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting Contractor's goals shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

C. Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the Contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

18.11 *Restrictions on Lobbying*

A. Contractor and each subcontractor shall comply with Restrictions on Lobbying (Public Law 101-121, Section 319) as supplemented by applicable Agency regulations. This Law applies to the recipients of contracts and subcontracts that exceed $100,000 at any tier under a Federal loan that exceeds $150,000 or a Federal grant that exceeds $100,000. If applicable, Contractor must complete a certification form on lobbying activities related to a specific Federal loan or grant that is a funding source for this Contract. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 USC 1352. Each tier shall disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Certifications and disclosures are forwarded from tier to tier up to the Owner. Necessary certification and disclosure forms shall be provided by Owner.

18.12 *Environmental Requirements*

When constructing a project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental constraints:

1. Wetlands – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.

2. Floodplains – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.

3. Historic Preservation – Any excavation by Contractor that uncovers an historical or archaeological artifact shall be immediately reported to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the State Historic Preservation Officer (SHPO).

4. Endangered Species – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.

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EXHIBIT GC-A

Certificate of Owner's Attorney

I, the undersigned, _____, the duly authorized and acting legal representative of _____, do hereby certify as follows:

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

_____

Date: _____

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Supplementary Conditions

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract Funding Agency Edition (No. C-710, 2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions will have the meanings indicated 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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SC-1.01.A.2. Add the following language to the end of Paragraph 1.01.A.2:

The Project is financed in whole or in part by **Multi County Coal Severance Tax**

SC-1.01.A.4. Add the following language to the end of Paragraph 1.01.A.4:

The Application for Payment form to be used on this Project is Form RD 1924-18. The Agency must approve all Applications for Payment before payment is made.

SC-1.01.A.10. Add the following language to the end of Paragraph 1.01.A.10:

The Change Order form to be used on this Project is Form RD1927-7. Agency approval is required before Change Orders are effective.

SC-1.01.A.15. Delete in it's entirety and replace with the following:

Contract Times: The number of days or date stated in the Agreement to achieve substantial completion. Final completion date will be determined by Contractor, Owner, and Engineer, after substantial completion, based on remaining work, weather and market conditions.

SC-2.03.A. Delete Paragraph 2.03.A in its entirety and insert the following in its place:

A. The Contract Times will commence on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 10 days after the Effective Date of the Agreement.

~~*{SC-4.02. Add the following new paragraphs immediately after Paragraph 4.02.B:*~~

~~*C. In the preparation of Drawings and Specifications, Engineer relied upon the following reports of exploration and tests of subsurface conditions at the Site:*~~

~~*1. See EJCDC No.C-800 for examples.*~~

~~*D. In the preparation of Drawings and Specifications, Engineer relied upon the following drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilitates) which are at or contiguous to the Site:*~~

~~*1. See EJCDC No. C-800 for examples.*~~

~~*E. Copies of reports and drawings itemized in SC-4.02.C and SC-4.02.D that are not included with Bidding Documents may be examined at _____ during regular business hours. These reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which the Contractor may rely as identified and established above are incorporated therein by reference. Contractor is not entitled to rely upon other information and data utilized by Engineer in the preparation of the Drawings and Specifications.*~~

{OR}

SC-4.02. Delete Paragraphs 4.02.A and 4.02.B in their entirety and insert the following:

A. No reports or explorations or tests of subsurface conditions at or contiguous to the Site are known to the Owner or Engineer.}

~~***{SC-4.06. Add the following new paragraphs immediately after Paragraph 4.06.A:***~~

~~*1. In the preparation of Drawings and Specifications, Engineer relied upon the following reports of Hazardous Environmental Conditions at the Site:*~~

~~*a. See EJCDC No.C-800 for examples.*~~

~~*2. In the preparation of Drawings and Specifications, Engineer relied upon the following drawings of Hazardous Environmental Conditions which are at or contiguous to the Site:*~~

~~*a. See EJCDC No. C-800 for examples.*~~

~~*3. Copies of reports and drawings itemized in SC-4.06.A.1 and SC-4.06.A.2 that are not included with Bidding Documents may be examined at _____ during regular business hours. These reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which the Contractor may rely as identified and established above are incorporated therein by reference. Contractor is not entitled to rely upon*~~

~~*other information and data utilized by Engineer in the preparation of the Drawings and Specifications.*~~

{OR}

SC-4.06. Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

A. No reports or explorations or tests of subsurface conditions at or contiguous to the Site are known to the Owner or Engineer.

B. {Not used.}

SC-5.03. Add the following new paragraph immediately after Paragraph 5.03.B:

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

{The amounts of coverage for each type of insurance under paragraph 5.04 are recommended amounts that should be used to provide the Owner adequate protection. These amounts should be reviewed in the context of the specific project and adjusted accordingly.}

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

C. The limits of liability for insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 5.04.A.1 and A.2 of the General Conditions:

a. State:	Statutory
b. Applicable Federal (e.g., Longshoremen's)	Statutory
c. Employer's Liability	*{$ 500,000}*

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

a. General Aggregate	*{$ 2,000,000}*
b. Products – Completed Operations Aggregate	*{$ 1,000,000}*
c. Personal and Advertising Injury	*{$ 1,000,000}*
d. Each Occurrence (Bodily Injury and Property Damage)	*{$ 1,000,000}*
e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.	
f. Excess or Umbrella Liability	

1) General Aggregate *{$ 5,000,000}*
2) Each Occurrence *{$ 5,000,000}*

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

a. Bodily Injury:	
Each Person	*{$ 1,000,000}*
Each Accident	*{$ 1,000,000}*
b. Property Damage:	
Each Accident	*{$ 1,000,000}*
c. Combined Single Limit of	*{$ 1,000,000}*

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

a. Bodily Injury:	
Each Person	*{$ 2,000,000}*
Each Accident	*{$ 2,000,000}*
b. Property Damage:	
Each Accident	*{$ 2,000,000}*
Annual Aggregate	*{$ 2,000,000}*

{5. List additional types and amounts of insurance that may be required by Owner.}

{6. List by name other persons or entities to be included on policy as additional insureds.}

{SC-5.06.A. In the case of multiple prime contractors on a single Site (multiple prime contractors for the Project may each need to provide property insurance), it is necessary to define the Contractor responsible for providing the Property Insurance. If there is only one contractor on the site, do not modify paragraph 5.06.A of the General Conditions.}

{SC-5.06.A.1. List by name other persons or entities to be included on policy as additional insureds.}

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

H. The Contractor shall not award work valued at more than fifty (50%) percent of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

{When multiple prime contractors are working on a single Site, the following modification should be made.

SC-7.02.A.1. Delete paragraphs 7.02.A.1-3 in their entirety and insert the following:

1. The Contractor shall have the authority and be responsible for coordination of the activities among the other prime contractors and subcontractors on the Site to ensure a safe, efficient working environment. This authority covers scheduling delivery of materials, storage of materials, sequencing of construction involving different crafts, resolving interface issues between crafts,scheduling testing, and all other aspects of the Work that do not impact the design or function of the Work.}

SC-9.03.A. Add the following language at the end of paragraph 9.03.A:

The Engineer will provide Resident Project Representative services for this project. The Duties, Responsibilities, and Limitations of Authority of the Resident Project Representative will be as stated in Exhibit D of the Agreement Between Owner and Engineer, E-510, 2002 Edition, as amended and executed for this specific Project. *{If anyone other than the Engineer is providing the Resident Project Representative,this language must be modified.}*

SC-14.02.A.3 Add the following language at the end of paragraph 14.02.A.3:

No payments will be made that would deplete the retainage prior to substantial completion, nor place in escrow any funds that are required for retainage, or invest the retainage for benefit.

SC-14.02.C.1. Delete Paragraph 14.02.C.1 in its entirety and insert the following in its place:

1. The Application for Payment with Engineer's recommendations will be presented to the Owner and Agency for consideration. If both the Owner and Agency find the Application for Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 14.02.D will become due thirty days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.

SC-18.08 Delete paragraph 18.08.A in its entirety and insert the following in its place:

A. If this Contract exceeds $100,000, the Contractor shall comply with all applicable standards, orders, or requirements issued under Section 306 of the Clean Air Act (42 USC §1857(h)), Section 508 of the Clean Water Act (33 USC §1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR Part 15).

SECTION 00810

SPECIAL CONDITIONS

1. DESIGNATION OF OWNER AND ENGINEER

All references to the OWNER in SPECIFICATIONS, CONTRACT DOCUMENTS and DRAWINGS shall mean the **Breathitt County Water District**.

All references to the ENGINEER in the specifications, CONTRACT DOCUMENTS and DRAWINGS shall mean Nesbitt Engineering, Inc.

2. AVAILABLE FUNDS

2.1 The BIDDER'S attention is invited to the financing of this project, which is by means of:

- **Multi County Coal Severance Tax**

2.2 In the event the total cost of the construction and appurtenant WORK should exceed the amount of money available, the OWNER in making awards of CONTRACT to the successful BIDDER, may reject certain items of WORK or reduce the quantities of BID items so as to award CONTRACT within the limits of available funds. In making an award of CONTRACT to a successful BIDDER, no CONTRACTOR will be allowed any claim for loss of any anticipated profits involving any items of WORK that have been reduced or eliminated by the OWNER. Successful BIDDERS will be determined before consideration of reductions or additions to the original BID.

3. TIME OF COMPLETION

The time allowed for completion of this CONTRACT is as follows:

KY 1110/28 Waterline Interconnection 120 Calendar Days

The time allowed for completion shall begin at midnight, local time, ten (10 calendar days from the date on which the OWNER, or its authorized representative instructs the CONTRACTOR in writing to start WORK. In case of awarding more than one CONTRACT to a CONTRACTOR, periods of construction are not additive, but will run concurrently. The same applies to divisions within a CONTRACT.

4. WEATHER DAYS

4.1 The CONTRACT completion time stipulated above includes an allowance for an average number of inclement weather days as follows:

	J	F	M	A	M	J	J	A	S	O	N	D
PRECIPITATION	8	7	9	9	12	9	8	5	7	5	6	9
FREEZE TEMP.	24	18	9	1	0	0	0	0	0	0	3	22

The number of days shown above are an average recorded over the last three years for each month's recorded weather conditions for the Jackson Weather Station and provided by the University of Kentucky Agricultural Weather Center.

When number of days (including Saturdays, Sundays, and Holidays) of precipitation in excess of 0.1" per day or maximum daily temperatures of 32° F exceed those shown above in any month, the CONTRACTOR shall be entitled to an equal number of additional days for CONTRACT completion.

4.2 If, in the ENGINEER'S opinion, sustained bad weather conditions prevent satisfactory performance of the WORK, the ENGINEER may suspend operations for an extended period until weather conditions are favorable. In this event, CONTRACT completion time shall be extended an equal number of days. Upon suspension of the WORK by the ENGINEER, the CONTRACTOR shall properly protect his WORK during the suspension period.

5. LIQUIDATED DAMAGES

It is understood that time is the essence of this CONTRACT, and that the OWNER will sustain damages, monetary and otherwise, in the event of delay in completion of the WORK hereby CONTRACTED.

Therefore, if the CONTRACTOR shall neglect, fail or refuse to complete the WORK within the time herein specified, or any proper extension thereof granted by the OWNER, then the CONTRACTOR does hereby agree, as a part consideration for the awarding of this CONTRACT, to pay to the OWNER the amount specified in the CONTRACT, not as a penalty but as liquidated damages for such breach of CONTRACT as hereinafter set forth, for each and every calendar day the CONTRACTOR shall be in default after the time stipulated in the CONTRACT for completing the WORK.

The said amount is fixed and agreed upon by and between the CONTRACTOR and the OWNER because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the OWNER would in such event sustain, and said amount is agreed to be the amount of damages which the OWNER should sustain and said amount shall be retained from time to time by the OWNER from current periodical estimates.
Liquidated damages are fixed at the following amount per calendar day of overrun beyond the date set for completion or authorized extension thereof for the CONTRACT:

$750.00 Per Calendar Day

6. INSURANCE

The minimum amount of insurance to be furnished by the CONTRACTOR shall be in accordance with the more stringent requirements of Paragraphs 21 and 28 of the RD and CDBG General Conditions, respectively, and this Section 5. Said insurance shall be for the joint protection of the CONTRACTOR, OWNER, and ENGINEER. Insurance against all damage from blasting shall be included in the policies.

All policies written for and applicable to the CONTRACT of which this specification is a part shall provide for a minimum of thirty (30) days advance written notice by certified mail of cancellation or any material change. Notice shall be given both to the OWNER and the ENGINEER. The minimum amounts:

(1) Worker's Compensation: The CONTRACTOR shall procure and shall maintain during the life of the CONTRACT, Worker's Compensation Insurance for all of CONTRACTOR'S employees to be engaged in the WORK under this CONTRACT, and in case where the WORK is sublet, the CONTRACTOR shall require the SUBCONTRACTOR similarly to provide Worker's Compensation Insurance. Worker's Compensation Insurance shall include Broad Form All States Endorsement and Voluntary Compensation.

Each Accident	$100,000.00
Disease - Policy Limit	$500,000.00
Disease - Each Employee	$100,000.00

(2) Comprehensive General Liability: The CONTRACTOR shall procure and shall maintain during the life of the CONTRACT, such Comprehensive General Liability and Broad Form Property Damage Insurance as shall protect CONTRACTOR and any SUBCONTRACTOR performing WORK from claims for damages for bodily injury, including accidental death, as well as from claims for property damages, which may arise from operations under the CONTRACT, whether such operations are by the CONTRACTOR or by any SUBCONTRACTOR or by anyone directly or indirectly employed by either of them. The amount of insurance shall not be less than the following:

General Aggregate	$1,000,000.00
Products Comp/Ops Aggregate	$1,000,000.00
Personal and Advertising Injury	$1,000,000.00
Each Occurrence	$1,000,000.00
Fire Damage (Any one fire)	$ 50,000.00
Medical Expenses (Any one person)	$ 5,000.00

The insurance shall include coverage of the following hazards:

Underground
Explosion/Collapse

For the purpose of insurance coverage, each detonation of blasting is a single occurrence.

(3) OWNER'S and CONTRACTOR'S Protective Liability: The CONTRACTOR shall maintain during the life of the CONTRACT, OWNER'S and CONTRACTOR'S Protective Liability Insurance with the same limits as the Comprehensive General Liability.

(4) Automobile Liability: The CONTRACTOR shall procure and shall maintain during the life of the CONTRACT Agreement, Comprehensive Automobile Liability Insurance. The insurance shall include coverage for owned, non-owned and hired vehicles. Amounts shall not be less than the following:

Comprehensive Single Limits (CSL) $1,000,000.00

(5) Builder's Risk: The CONTRACTOR shall procure and shall maintain during the life of the CONTRACT, Builder's Risk Insurance to protect the interests of the OWNER, CONTRACTOR, and SUBCONTRACTORS against loss by fire, vandalism, malicious mischief, and all hazards included in a standard special form cover. The amount of the insurance shall at all times equal or exceed the full amount of the CONTRACT. The policies shall be in the names of the OWNER and the CONTRACTOR and SUBCONTRACTOR.

(6) Umbrella Excess Liability $1,000,000.00 Per Occurrence (With no aggregate except products completed operations).

(7) Certificates of Insurance: Certificates acceptable to the OWNER shall be attached to the signed CONTRACT DOCUMENTS when they are transmitted to the OWNER for execution. These certificates shall contain the statement that "Coverages afforded under the policies will not be canceled unless at least thirty (30) days prior to cancellation written notice has been given to the OWNER and ENGINEER, as evidenced by receipts of registered or certified mail." The OWNER shall be a named insured.

7. PERFORMANCE AND PAYMENT BONDS

The CONTRACTOR shall furnish separate performance and payment BONDS (forms included elsewhere in these Specifications) issued by an approved bonding company, in an amount at least equal to one-hundred percent (100%) of the CONTRACT PRICE, as security for the faithful performance of this CONTRACT and for the payment of persons performing labor and furnishing materials in connection with this CONTRACT. These BONDS shall be executed by a surety authorized to do business in the Commonwealth of Kentucky.

A Performance Bond and a Payment Bond on any other form than the ones attached will not be acceptable. The Surety Bond will and ensure payment of all unemployment contributions required under the Unemployment Insurance laws of the Commonwealth of Kentucky and of the Federal Government.

8. METHOD OF BIDDING

The method of bidding under this CONTRACT shall be by lump sum and/or unit price as shown on the Proposal form.

9. PERMISSION TO USE PROPERTY OTHER THAN THAT PROVIDED BY OWNER

Should the CONTRACTOR desire or elect to use, pass over and/or encroach on private property other than that provided by the OWNER, either by fee simple title or right-of-way for a specific purpose, the CONTRACTOR shall obtain such rights and permission from the legal owner of said private property at his own expense and risk.

10. ROCK SOUNDING

Excavation is unclassified. The CONTRACTOR shall be responsible for the determination of the amount of rock excavation required.

11. OWNER FURNISHED EQUIPMENT AND MATERIALS

There will be no OWNER furnished equipment or materials for installation in this CONTRACT.

12. SUBCONTRACTOR LISTING

In the event the CONTRACTOR contemplates subletting WORK on the CONTRACT, he shall list the SUBCONTRACTOR names and addresses on the attachment provided with the BID form.

Failure on the part of the bidding CONTRACTOR to list SUBCONTRACTORS or write the WORK "None" (if no SUBCONTRACTOR is to be used) may, at the option of the OWNER be cause for rejection of the CONTRACTOR'S BID. SUBCONTRACTOR, as listed by the CONTRACTOR on his bidding form, may not be changed without approval of the OWNER.

13. SCHEDULING OF CONSTRUCTION ACTIVITIES

The CONTRACTOR shall, in writing, closely schedule all construction activities of the WORK with a representative of the OWNER specifically designated to provide the customers of the OWNER a minimum five-working-day notification of the impending construction activities of the CONTRACTOR. The CONTRACTOR and the representative of the OWNER shall meet on a daily basis to review the completion progress of previously scheduled construction activities and to estimate specific locations of the CONTRACTOR'S construction activity for the subsequent five (5) working day period. No unscheduled construction activities shall be performed by the CONTRACTOR unless otherwise directed by the OWNER.

Where the WORK requires construction activities adjacent to existing treatment or pumping facilities, the CONTRACTOR shall not interrupt the operation of these

facilities and shall provide the OWNER'S operations staff continuous, safe access to such parts of the affected facilities.

The CONTRACTOR will comply with OSHA (P.L. 91-596), the CONTRACT WORK hours and the Safety Standards Act (P.L. 91-54).

14. RESPONSIBILITY REGARDING EXISTING UTILITIES AND STRUCTURES

14.1 The existence and location of underground utilities indicated on the PLANS are not guaranteed and shall be investigated and verified in the field by the CONTRACTOR before starting WORK. Excavation in the vicinity of existing structures and utilities shall be carefully done by hand labor.

14.2 The CONTRACTOR shall be held responsible for any damage to, and for maintenance and protection of, existing utilities and structures.

15. ACCIDENTS

The CONTRACTOR must promptly report, in writing, to the ENGINEER all accidents whatsoever arising out of, or in connection with, the performance of the WORK, whether on, or adjacent to, the site which caused death, personal injury, or property damages, giving full details and statements of witnesses. In addition if death or serious injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the ENGINEER and the OWNER.

16. FINAL PAYMENT

16.1 Within thirty (30) days after final inspection and acceptance of the WORK by the ENGINEER and the OWNER, the final estimate for all WORK done, including all retained percentage, shall be compiled by the ENGINEER and furnished to the OWNER. Upon the latter's approval, either in whole or in part, the amount of money thus found due the CONTRACTOR, after all previous payments and other claims, if any are deducted, will be certified for payment, but before final payment is made to any CONTRACTOR on any OWNER or portion thereof, the CONTRACTOR will be required to satisfy the OWNER to the effect that all claims for labor done on the CONTRACT and all material put into the WORK have been fully paid or satisfactorily secured; and the OWNER shall be held harmless by the CONTRACTOR and the SURETY on his BOND from the payment of any money paid under the belief that said claims for labor and materials are not to be prejudiced by any mistaken payment. The acceptance by the CONTRACTOR of payment of the said final estimate shall operate as and shall be a release to the OWNER.

17. RIGHTS OF WAY

17.1 Rights of way and easements will be provided by the OWNER.

18. PROTECTION OF THE PROPERTY OF LANDOWNERS

18.1 The CONTRACTOR and all his employees shall exercise care and consideration in traveling over the lands of private property owners from whom rights-of-way and easements were obtained

18.2 The CONTRACTOR should likewise use existing roads as much as possible to transport pipe, other materials, and workmen to and from the job.

18.3 Carelessness on the part of the CONTRACTOR or any of his employees in leaving gates open, parking cars, trucks or vehicles in such a way as to interfere with farming operations will not be tolerated.

18.4 The CONTRACTOR shall deliver materials to the site of the WORK and so conduct his operations in such a manner as to cause no damage to trees, buildings, outbuildings, and other property of landowners.

18.5 Trees, fences, poles, and all other property shall be protected unless their removal is authorized by the ENGINEER. Any damaged property shall be restored to as near original condition as possible by the CONTRACTOR.

18.6 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 to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with tree dressing.

19. TEMPORARY UTILITIES

CONTRACTORS shall provide for all utilities, including water, needed during construction.

20. CONTRACTOR'S RESPONSIBILITY FOR MATERIALS

20.1 Responsibility for Materials Furnished by CONTRACTOR: The CONTRACTOR shall be responsible for all material furnished by him. All such material which is defective in manufacture or has been damaged in transit or in delivery shall be replaced by the CONTRACTOR at his expense.

20.2 Responsibility for Materials Furnished by OWNER: The CONTRACTOR'S responsibility for material furnished by the OWNER shall begin upon CONTRACTOR'S acceptance at the point of delivery to

him. All such material shall be examined and material defective in manufacture, or damaged in shipment, and/or otherwise damaged, shall be rejected by the CONTRACTOR at the time and place of delivery to him and replaced by the OWNER. Material furnished by the OWNER which is accepted by the CONTRACTOR, but which is discovered prior to acceptance of the WORK (1) to be defective in manufacture shall be replaced by the OWNER, (2) to have been damaged before or after acceptance by the CONTRACTOR, shall be replaced by the CONTRACTOR. Once accepted by the CONTRACTOR at the point of delivery to him, all defective and/or damaged material discovered prior to final acceptance of the WORK shall be removed by the CONTRACTOR. In such case, the CONTRACTOR shall furnish all labor, equipment and material incidental to replacement and necessary for the completion of the WORK to the satisfaction of the ENGINEER.

20.3 Responsibility for Safe Storage: The CONTRACTOR shall be responsible for the safe storage of all material furnished to or by him and accepted by him until it has been incorporated in the completed project.

21. MINIMUM WAGE RATES

State wage rates are applicable on this project.

22. PROJECT SIGNS

Two (2) project signs shall be provided by the CONTRACTOR as described at the end of the supplemental General Conditions section. The sign layout shall be approved by the ENGINEER and shall be placed where directed by the ENGINEER in the field.

23. **Certificate of Good Standing from the Secretary of State's (SOS) Office** - A printed copy from the web site of the SOS (http://www.sos.state.ky.us/corporate2/entityname.asp), which indicates the corporation/partnership, has a Standing of **Good** shall be submitted with the bid.

24. **Pipe Cover** - Per the Kentucky Transportation Cabinets (KTC) Encroachment Permit, all lines constructed within State Right-of-Way (ROW), shall have a minimum cover of 42" above the top of the pipe. Also, the boring pit shall be constructed according to KTC requirements. In areas off the KTC ROW the minimum cover shall be thirty inches (30") unless specifically shown otherwise on the plan sheets.

25. **Encroachment Permit Bond** – The successful CONTRACTOR SHALL obtain the encroachment bond and then the OWNER will reimburse the CONTRACTOR for the KTC Encroachment Bond upon submittal of a copy of the bond and check paying for the bond.

26. **Obtaining Permits** – The successful CONTRACTOR SHALL obtain, and/or verify that they have been obtained, any and all permits (state, federal and local) required for the construction of this project. A copy of any permit obtained must be provided to the engineer. One such permit that may be required is a KPDES

Storm Water General Permit, NOI. (see attachment 00800A) It is required when the project disturbs more than 1 acre. The contractor must complete and submit the NOI at least 48 hours prior to the start of construction.

27. **Trench Width** – The trench width shall be as shown in the Standard Details, except in rock. In rock the minimum distance from the pipe OD to the trench wall shall be between four to six inches (4" – 6").

28. **Occupational Tax/License** - The CONTRACTOR shall verify all requirements and make all necessary payments with the local county treasurer.

29. **Tree Removal** – Trees shall only be removed during October 15th through March 31st.

END OF SECTION

Kentucky Pollutant Discharge Elimination System (KPDES)

Instructions

Notice of Intent (NOI) for Storm Water Discharges Associated with Industrial Activity To Be Covered Under The KPDES General Permit

WHO MUST FILE A NOTICE OF INTENT (NOI) FORM

Federal law at 40 CFR Part 122 prohibits point source discharges of stormwater associated with industrial activity to a water body of the Commonwealth of Kentucky without a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The operator of an industrial activity that has such a storm water discharge must submit a NOI to obtain coverage under the KPDES Storm Water General Permit. If you have questions about whether you need a permit under the KPDES Storm Water program, or if you need information as to whether a particular program is administered by the state agency, call the **Storm Water Contact, Industrial Section, Kentucky Division of Water at (502) 564-3410.**

WHERE TO FILE NOI FORM

NOIs must be sent to the following address:

Section Supervisor
Inventory & Data Management Section
KPDES Branch, Division of Water
Frankfort Office Park
14 Reilly Road
Frankfort, KY 40601

COMPLETING THE FORM

Type or print legibly in the appropriate areas only. If you have any questions regarding the completion of this form call the **Storm Water Contact, Industrial Section, at (502) 564-3410.**

SECTION I - FACILITY OPERATOR INFORMATION

Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same as the name of the facility. The responsible party is the legal entity that controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Enter the appropriate letter to indicate the legal status of the operator of the facility.

F = Federal M = Public (other than federal or state)
S = State P = Private

SECTION II - FACILITY/SITE LOCATION INFORMATION

Enter the facility's or site's official or legal name and complete street address, including city, state, and ZIP code.

SECTION III - SITE ACTIVITY INFORMATION

If the storm water discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g., municipality name, county name) and the receiving water of the discharge from the MS4. (A MS4 is defined as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is owned or operated by a state, city, town, borough, county, parish, district, association, or other public body which is designed or used for collecting or conveying storm water.)

If the facility discharges storm water directly to receiving water(s), enter the name of the receiving water.

Indicate whether or not the owner or operator of the facility has existing quantitative data that represent the characteristics and concentration of pollutants in storm water discharges. If data is available submit with this form.

List, in descending order of significance, up to four 4-digit standard industrial classification (SIC) codes that best describe the principal products or services provided at the facility or site identified in Section II of this application.

If the facility listed in Section II has participated in Part 1 of an approved storm water group application and a group number has been assigned, enter the group application number in the space provided.

If there are other KPDES permits presently issued for the facility or site listed in Section II, list the permit numbers.

SECTION IV - ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION ACTIVITIES ONLY

Construction activities must complete Section IV in addition of Sections I through III. Only construction activities need to complete Section IV.

Enter the project start date and the estimated completion date for the entire development plan.

Provide an estimate of the total number of acres of the site on which soil will be disturbed (round to the nearest acre).

Indicate whether the storm water pollution prevention plan for the site is in compliance with approved state and/or local sediment and erosion plans, permits, or storm water management plans.

SECTION V - CERTIFICATION

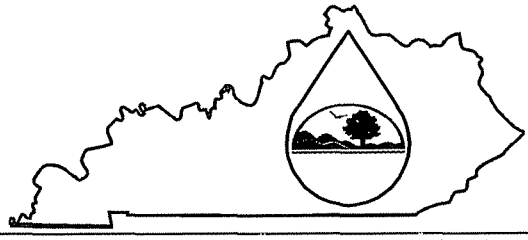
Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer,which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authroity to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

KPDES FORM NOI-SW



Kentucky Pollutant Discharge Elimination System (KPDES)

Notice of Intent (NOI) for Storm Water Discharges Associated with Industrial Activity Under the KPDES General Permit

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a KPDES permit issued for storm water discharges associated with industrial activity. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit.

ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM (See Instructions on back)

I. Facility Operator Information

Name:		**Phone:**	
Address:		**Status of Owner/Operator:**	
City, State, Zip Code:			

II. Facility/Site Location Information

Name:			
Address:			
City, State, Zip Code:			
County:			
Site Latitude: (degrees/minutes/seconds)		**Site Longitude: (degrees/minutes/seconds)**	

III. Site Activity Information

MS4 Operator Name:							
Receiving Water Body:							
Are there existing quantitative data?	**Yes** ☐ **If Yes, submit with this form.** **No** ☐						
SIC or Designated Activity Code Primary		**2nd**		**3rd**		**4th**	
If this facility is a member of a Group Application, enter Group Application Number:							
If you have other existing KPDES Permits, enter Permit Numbers:							

IV. Additional Information Required FOR CONSTRUCTION ACTIVITIES ONLY

Project Start Date:		**Completion Date:**	
Estimated Area to be disturbed (in acres):			
Is the Storm Water Pollution Prevention Plan in Compliance with State and/or Local Sediment and Erosion Plans?	**Yes** ☐ **No** ☐		

V. Certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed or Typed Name:			
Signature:		**Date:**	

SECTION 00815

KENTUCKY PREVAILING WAGE DETERMINATION

Steven L. Beshear
Governor

KENTUCKY LABOR CABINET
DEPARTMENT OF WORKPLACE STANDARDS
DIVISION OF EMPLOYMENT STANDARDS,
APPRENTICESHIP & MEDIATION
1047 US Hwy 127 S - Suite 4
Frankfort, Kentucky 40601
Phone: (502) 564-3534
Fax (502) 696-1897
www.labor.ky.gov

Mark S. Brown
Secretary

Michael L. Dixon
Commissioner

January 7, 2013

Michael Steen
Nesbitt Engineering
227 N Upper St.
Lexington KY 40507

Re: Breathitt County Water District, KY 1110/28 Waterline Interconnection

Advertising Date as Shown on Notification: January 10, 2013

Dear Michael Steen:

This office is in receipt of your written notification on the above project as required by KRS 337.510 (1).

I am enclosing a copy of the current prevailing wage determination number CR 6-030, dated November 28, 2011 for BREATHITT County. This schedule of wages shall be attached to and made a part of the specifications for the work, printed on the bidding blanks, and made a part of the contract for the construction of the public works between the public authority and the successful bidder or bidders.

The determination number assigned to this project is based upon the advertising date contained in your notification. There may be modifications to this wage determination prior to the advertising date indicated. In addition, if the contract is not awarded within 90 days of this advertising date or if the advertising date is modified, a different set of prevailing rates of wages may be applicable. It will be the responsibility of the public authority to contact this office and verify the correct schedule of the prevailing rates of wages for use on the project. Your project number is as follows: 013-H-00073-11-6, Heavy/Highway

Sincerely,

Michael L. Dixon
Commissioner

Kentucky UNBRIDLED SPIRIT

An Equal Opportunity Employer M/F/D

KENTUCKY LABOR CABINET
PREVAILING WAGE DETERMINATION
CURRENT REVISION
LOCALITY NO. 030

Determination No. CR-6-030

Date of Determination: November 28, 2011

Project No. 013-H-00073-11-6
Type: _____ Bldg ___x___ HH

This schedule of the prevailing rate of wages for Locality No. 030, which includes Breathitt, Floyd, Knott and Letcher Counties, has been determined in accordance with the provisions of KRS 337.505 to 337.550. This determination shall be referred to as Prevailing Wage Determination No. CR-6-030.

Apprentices shall be permitted to work as such subject to Administrative Regulations adopted by the Commissioner of Workplace Standards. Copies of these regulations will be furnished upon request to any interested person.

Overtime is to be computed at not less than one and one-half (1 1/2) times the indicated BASE RATE for all hours worked in excess of eight (8) per day, and/or in excess of forty (40) per week. However, KRS 337.540 permits an employee and employer to agree, in writing, that the employee will be compensated at a straight time base rate for hours worked in excess of eight (8) hours in any one calendar day, but not more than ten (10) hours worked in any one calendar day, if such written agreement is prior to the over eight (8) hours in a calendar day actually being worked, or where provided for in a collective bargaining agreement. The fringe benefit rate is to be paid for each hour worked at a straight time rate for all hours worked. Fringe benefit amounts are applicable for all hours worked except when otherwise noted. Welders will receive rate for craft in which welding is incidental.

No laborer, workman or mechanic shall be paid at a rate less than that of the General Laborer except those classified as bona fide apprentices registered with the Kentucky State Apprenticeship Supervisor unless otherwise specified in this schedule of wage rates.

NOTE: The type of construction shall be determined by applying the following definitions.

BUILDING CONSTRUCTION
Building construction is the construction of sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment, or supplies. It includes all construction of such structures, the installation of utilities and the installation of equipment, both above and below grade level, as well as incidental grading, utilities and paving.

HIGHWAY CONSTRUCTION
Highway construction includes the construction, alteration or repair of roads, streets, highways, runways, taxiways, alleys, trails, paths, parking areas, and other similar projects not incidental to building or heavy construction. It includes all incidental construction in conjunction with the highway construction project.

HEAVY CONSTRUCTION
Heavy projects are those projects that are not properly classified as either "building" or "highway". For example, dredging projects, water and sewer line projects, dams, flood control projects, sewage treatment plants and facilities, and water treatment plants and facilities are considered heavy.

Michael L. Dixon

Michael L. Dixon, Commissioner
Department of Workplace Standards
Kentucky Labor Cabinet

CLASSIFICATIONS		RATE AND FRINGE BENEFITS	
ASBESTOS/INSULATION WORKERS:			
Mechanics:		BASE RATE FRINGE BENEFITS	$26.22 12.90
Insulation removers & hazardous waste handlers:		BASE RATE FRINGE BENEFITS	$11.13 3.40
BOILERMAKERS:		BASE RATE FRINGE BENEFITS	$24.65 12.59
BRICKLAYERS:		BASE RATE	$12.00
CARPENTERS:			
Carpenters:	BUILDING	BASE RATE FRINGE BENEFITS	$27.63 14.97
Piledriver:	BUILDING	BASE RATE FRINGE BENEFITS	$28.03 14.97
Carpenters:	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	$25.95 13.40
Piledriver:	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	$26.20 13.40
Divers:	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	$39.30 13.40
BREATHITT, FLOYD & KNOTT COUNTIES:			
CEMENT MASONS:		BASE RATE FRINGE BENEFITS	$12.00 1.28
LETCHER COUNTY:			
CEMENT MASONS & PLASTERERS:		BASE RATE	$ 14.00

CLASSIFICATIONS		RATE AND FRINGE BENEFITS	
ELECTRICIANS:		BASE RATE FRINGE BENEFITS	$31.87 20.24
LINEMAN:	HEAVY HIGHWAY	BASE RATE FRINGE BENEFITS	$30.78 11.08
EQUIPMENT OPERATOR:	HEAVY HIGHWAY	BASE RATE FRINGE BENEFITS	$27.52 10.44
GROUNDMEN:	HEAVY HIGHWAY	BASE RATE FRINGE BENEFITS	$18.23 8.61
ELEVATOR CONSTRUCTORS:		BASE RATE FRINGE BENEFITS	$32.00 10.33
GLAZIERS:		BASE RATE	$8.43
IRONWORKERS:		BASE RATE FRINGE BENEFITS	$27.12 17.19
LABORERS:	**BUILDING**	BASE RATE FRINGE BENEFITS	$8.00 1.28

LABORERS/HEAVY HIGHWAY

HEAVY HIGHWAY GROUP 1:
Aging and curing of concrete (any mode or method), asbestos abatement worker, asphalt plant laborers, asphalt laborers, batch truck dumpers, carpenter tenders, cement mason tenders, cleaning of machines, concrete laborers, demolition laborers, dredging laborers, drill helper, environmental laborer - nuclear, radiation, toxic and hazardous waste - Level D, flagmen, grade checkers, all hand digging and hand back filling, highway marker placers, landscaping laborers, mesh handlers and placers, puddler, railroad laborers, rip-rap and grouters, right of way laborers, sign, guard rail and fence installers (all types), signal men, sound barrier installer, storm and sanitary sewer laborers, swampers, truck spotters and dumpers, and wrecking of concrete forms:

	HEAVY & HIGHWAY	BASE RATE FRINGE BENEFITS	$17.43 8.23

CLASSIFICATIONS — RATE AND FRINGE BENEFITS

LABORERS/ HEAVY HIGHWAY CONTINUED:

HEAVY HIGHWAY GROUP 2:
Batter board men (sanitary and storm sewer), brickmason tenders, mortar mixer operator, scaffold builders, burner and welder, bushhammers, chain saw operator, concrete saw operators, deckhand scow man, dry cement handlers, environmental laborers - nuclear, radiation, toxic and hazardous waste - Level C, forklift operators for masonry, form setters, green concrete cutting, hand operated grouter and grinder machine operator, jack hammers, lead paint abatement, pavement breakers, paving joint machine, pipe layers-laser operators (non-metallic), plastic pipe fusion, power driven Georgia buggy or wheelbarrow, power post hole diggers, precast manhole setters, walk-behind tampers, walk-behind trenchers, sand blasters, concrete chippers, surface grinders, vibrator operators, wagon drillers:

HEAVY & HIGHWAY	BASE RATE	$17.68
	FRINGE BENEFITS	8.23

HEAVY HIGHWAY GROUP 3:
Asphalt luteman and rakers, gunnite nozzleman, gunnite operators and mixers, grout pump operator, side rail setters, rail paved ditches, screw operators, tunnel laborers (free air), and water blasters:

HEAVY & HIGHWAY	BASE RATE	$17.73
	FRINGE BENEFITS	8.23

HEAVY HIGHWAY GROUP 4:

Caisson workers (free air), cement finishers, environmental laborer - nuclear, radiation, toxic and hazardous waste - Levels A and B, miners and drillers (free air), tunnel blasters, and tunnel muckers (free air), directional and horizontal boring, air track driller (all types), powderman and blaster,:

HEAVY & HIGHWAY	BASE RATE	$18.33
	FRINGE BENEFITS	8.23

MARBLE, TILE & TERRAZZO:

Workers:	BASE RATE	$19.88
	FRINGE BENEFITS	6.30
Finishers:	BASE RATE	$13.68
	FRINGE BENEFITS	2.41

MILLWRIGHTS:	BASE RATE	$31.77
	FRINGE BENEFITS	15.91

CLASSIFICATIONS		RATE AND FRINGE BENEFITS	
OPERATING ENGINEERS:	BUILDING	BASE RATE	$14.00
		FRINGE BENEFITS	1.28

OPERATING ENGINEERS/ HEAVY HIGHWAY:

HEAVY HIGHWAY CLASS A:
A-Frame Winch Truck, Auto Patrol, Backfiller, Batcher Plant, Bituminous Paver, Bituminous Transfer Machine, All types of Boom Cats, Bulldozer, Cableway, Carry-All Scoop, Carry Deck Crane, Central Compressor Plant Operator, Clamshell, Concrete Mixer (21 cu. ft. or over), Concrete Paver, Truck-Mounted Concrete Pump, Core Drills, Crane, Crusher Plant, Derrick, Derrick Boat, Ditching and Trenching Machine, Dragline, Dredge Operator, Dredge Engineer, Earth Movers, Elevating Grader and all types of Loaders, Grade-All, Gurries, Heavy Equipment Robotics Operator/Mechanic, Highlift, Hoe-Type Machine, Hoist (two or more drums), Hoisting Engine (two or more drums), Horizontal Directional Drill Operator, Hydraulic Boom Truck, Hydrocrane, Hyster, KeCal Loader, LeTourneau, Locomotive, Mechanic, Mechanically Operated Laser Screed, Mechanic Welder, Mucking Machine, Motor Scraper, Orangepeel Bucket, Piledriver, Power Blade, Pumpcrete, Push Dozer, Rock Spreader attached to Equipment, All Rotary Drills, Roller (bituminous), Scarifier, Scoopmobile, Shovel, Side Boom, Subgrader, Tailboom, Telescoping Type Forklift, Tow or Push Boat, Tower Cranes (French, German and other types), Tractor Shovel, Truck Crane, Tunnel Mining Machines including Moles, Shields, or Similar types of Tunnel Mining Equipment:

HEAVY & HIGHWAY	BASE RATE	$23.60
	FRINGE BENEFITS	12.40

Operators on cranes with booms one hundred fifty feet (150') and over including jib shall receive $.50 above base rate.

HEAVY HIGHWAY CLASS B:
All Air Compressors (over 900 cu. ft. per min.), Bituminous Mixer, Boom Type Tamping Machine, Bull Float, Concrete Mixer (under 21 cu. ft.), Electric Vibrator Compactor/Self-Propelled Compactor, Elevator (one drum or buck hoist), Elevator (regardless of ownership when used to hoist building material), Finish Machine, Firemen, Flex-Plane, Forklift (regardless of lift height), Form Grader, Hoist (one drum), Joint Sealing Machine, Mechanic Helper, Outboard Motor Boat, Power Sweeper (riding type), Roller (rock), Ross Carrier, Skid Mounted or Trailer Mounted Concrete Pumps, Switchman or Brakeman, Throttle Valve Man, Tractair and Road Widening Trencher, Tractor (50 HP and over), Truck Crane Oiler, Tugger, Welding Machine, Well Points, and Whirley Oiler:

HEAVY & HIGHWAY	BASE RATE	$21.18
	FRINGE BENEFITS	12.40

CLASSIFICATIONS — RATE AND FRINGE BENEFITS

OPERATING ENGINEERS/HEAVY HIGHWAY CONTINUED:

HEAVY HIGHWAY CLASS B2:
Greaser on Grease Facilities servicing Heavy Equipment:

HEAVY & HIGHWAY	BASE RATE	$21.56
	FRINGE BENEFITS	12.40

HEAVY HIGHWAY CLASS C:
Bituminous Distributor, Burlap and Curing Machine, Caisson Drill and Core Drill Helper (track or skid mounted), Cement Gun, Concrete Saw, Conveyor, Deckhand Oiler, Grout Pump, Hydraulic Post Driver, Hydro Seeder, Mud Jack, Oiler, Paving Joint Machine, Power Form Handling Equipment, Pump, Roller (earth), Steermen, Tamping Machine, Tractors (under 50 H.P.) and Vibrator:

HEAVY & HIGHWAY	BASE RATE	$20.92
	FRINGE BENEFITS	12.40

All Heavy Highway operators assigned to work below ground level are to be paid ten percent (10%) above base wage rate. This does not apply to open cut work.

BREATHITT, FLOYD & KNOTT COUNTIES:

PAINTERS:

Painters:	BUILDING	BASE RATE	$13.42
		FRINGE BENEFITS	1.28
	HEAVY & HIGHWAY	BASE RATE	$17.30
		FRINGE BENEFITS	3.80

LETCHER COUNTY:

PAINTERS:

Painters:	BUILDING	BASE RATE	$12.00
	HEAVY & HIGHWAY	BASE RATE	$17.30
		FRINGE BENEFITS	3.80

PLUMBERS & STEAMFITTERS:	BASE RATE	$28.00
	FRINGE BENEFITS	20.37

CLASSIFICATIONS		RATE AND FRINGE BENEFITS	
ROOFERS: (Excluding Metal Roofs)		BASE RATE	$9.30
		FRINGE BENEFITS	1.28
SHEETMETAL WORKERS: (Including Metal Roofs)		BASE RATE	$10.97
		FRINGE BENEFITS	1.28
SPRINKLER FITTERS:		BASE RATE	$29.00
		FRINGE BENEFITS	16.75
TRUCK DRIVERS:	BUILDING	BASE RATE	$10.50

TRUCK DRIVERS/HEAVY & HIGHWAY:

Truckhelper and warehouseman:	HEAVY & HIGHWAY	BASE RATE	$16.65
		FRINGE BENEFITS	5.80
Driver, winch truck and A-Frame when used in transporting materials:	HEAVY & HIGHWAY	BASE RATE	$16.75
		FRINGE BENEFITS	5.80
Driver, (semi-trailer or pole trailer), driver (dump truck, tandem axle), driver of distributor:	HEAVY & HIGHWAY	BASE RATE	$16.85
		FRINGE BENEFITS	5.80
Driver on mixer trucks (all types):	HEAVY & HIGHWAY	BASE RATE	$16.90
		FRINGE BENEFITS	5.80
Truck mechanic:	HEAVY & HIGHWAY	BASE RATE	$16.95
		FRINGE BENEFITS	5.80
Driver (3 tons and under), tire changer and truck mechanic helper:	HEAVY & HIGHWAY	BASE RATE	$16.98
		FRINGE BENEFITS	5.80

CLASSIFICATIONS		RATE AND FRINGE BENEFITS	
TRUCK DRIVERS: HEAVY/HIGHWAY (CONTINUTED):			
Driver on pavement breakers:	HEAVY & HIGHWAY	BASE RATE	$17.00
		FRINGE BENEFITS	5.80
Driver (over 3 tons), driver (truck mounted rotary drill):			
	HEAVY & HIGHWAY	BASE RATE	$17.19
		FRINGE BENEFITS	5.80
Driver, Euclid and other heavy earth moving equipment and Low Boy:			
	HEAVY & HIGHWAY	BASE RATE	$17.76
		FRINGE BENEFITS	5.80
Greaser on greasing facilities:	HEAVY & HIGHWAY	BASE RATE	$17.85
		FRINGE BENEFITS	5.80

END OF DOCUMENT CR-6-030
NOVEMBER 28, 2011
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SECTION 00820

FEDERAL PREVAILING WAGE DETERMINATION

Does not apply to this contract.

SECTION 00825

APPROVAL LETTERS & PERMITS

SECTION 00835

ADDENDUM

nesbitt engineering, inc.
providing proven solutions since 1976

227 North Upper Street
Lexington, KY 40507-1016

Technical Specifications

KY 1110/28 Waterline Interconnection
Breathitt County Water District
Breathitt County, Kentucky

January 2013

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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 SCOPE OF WORK COVERED BY THE CONTRACT

A. These SPECIFICATIONS and the accompanying DRAWINGS describe the WORK to be done and the materials to be furnished for construction of the **KY 1110/28 Waterline Interconnection.**

B. The proposed WORK is located along KY 1110 and along KY 315 in south west Breathitt County, KY, at the location shown on the drawings.

C. Contract WORK includes:

1. Approximately 29,200 LF of 10-inch waterline.
2. Approximately 2 tie-ins to existing waterlines.
3. Approximately 400 LF of HDPE.
4. Approximately 200 LF of bore & jack
5. Approximately 11 flushing hydrant assemblies.
6. Approximately 50 residential service meters.
7. Various other waterline appurtenances.

1.02 RELATED REQUIREMENTS

A. Refer to the CONTRACT AGREEMENT for a listing of the CONTRACT DOCUMENTS.

B. Refer to Section 00700 (contract docs), paragraph 25 for coordination with other contractors.

1.03 WORK SEQUENCE

A. This project includes WORK that must be properly sequenced and collection system and all other utilities. Sequencing information in this Section is intended to identify constraints with respect to maintenance of existing service, and to assist the CONTRACTOR in planning the WORK. This information does not relieve the CONTRACTOR from his responsibility to complete the WORK on time.

B. All existing water services must remain active during construction and residential and commercial traffic flow shall be maintained during construction.

Temporary pumping and piping facilities for rerouting the flows shall be provided by the CONTRACTOR as required to maintain service.

C. The CONTRACTOR shall plan, schedule and accomplish the WORK of this Contract to avoid interruption of system service. Should any such interruptions become necessary, the CONTRACTOR shall notify the OWNER and ENGINEER in writing of such need as far ahead of the interruption as possible, but in no case less than one (1) week. The CONTRACTOR must state in his notification of need to interrupt the existing system at least the following:

1. Construction sequence to minimize the interruption time, and propose time-of-day that WORK would be accomplished.

2. Expected length of time of the interruption.

3. Alternate procedures in the event the expected time is exceeded.

4. List of all equipment and material that must be on hand to complete the WORK.

D. The ENGINEER shall review the CONTRACTOR'S written notification, and the ENGINEER and OWNER must concur that the proposed interruption is acceptable prior to commencement of the interruption

E. **The KY 1110/28 interconnection with Buckhorn is to be completed first. Time is of the essence due to the fact that the existing temporary connection is subject to cold weather**.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall furnish all necessary labor, machinery, tools, apparatus, equipment, materials, service, other necessary supplies and perform all work including all excavation and backfilling (without additional compensation, except where specifically set out in these specifications) at the unit or lump sum bid price for the items or work described under PART 2 of this section.

1.02 PROGRESS AND PAYMENTS SCHEDULES

A. Within fifteen (15) days after the date of formal execution of the AGREEMENT, the Contractor shall prepare and submit to the Engineer, for approval, a construction schedule which depicts the Contractor's plan for completing the contract requirements and show work placement in dollars versus contract time. The Contractor's construction schedule must be approved by the Engineer before any payments will be made on this contract.

B. Within fifteen (15) days after the date of formal execution of the CONTRACT AGREEMENT, the Contractor shall prepare and submit to the Engineer, for approval, a periodic estimate which depicts the Contractor's cost for completing the contract requirements and show by major unit of the project work, the Contractor's dollar value for the material and the labor (two separate amounts) to be used as a basis for the periodic payments. The Contractor's periodic estimate must be approved by the Engineer before any payments will be made on this contract.

C. The Engineer's decision as to sufficiency and completeness of the Contractor's construction schedule and periodic estimate will be final.

D. The Contractor must make current, to the satisfaction of the Engineer, the construction schedule and periodic estimate each time he requests a payment on this contract.

E. The Contractor's construction schedule and periodic estimate must be maintained at the construction site available for inspection and shall be revised to incorporate approved change orders as they occur.

F. When the Contractor requests a payment on this contract, it must be on the approved periodic estimate and be current. Further, the current periodic estimate and construction schedule (both updated and revised) shall be submitted for review and approval by the Engineer before

monthly payments will be made by the Owner. The Contractor shall submit six (6) current copies of each (periodic estimate and construction schedule) when requesting payment.

1.03 CONDITIONS FOR PAYMENT

A. The Owner will make payments for acceptable work in place and materials properly stored on-site. The value of payment shall be as established on the approved construction schedule and periodic estimate, EXCEPT the Owner will retain ten percent (10%) of the work in place and a percentage as hereinafter listed for items properly stored or untested.

B. No payment will be made for stored materials unless a proper invoice from the supplier is attached to the pay request. Further, no item whose value is less than $1,000.00 will be considered as stored materials for pay purposes.

C. Payment for pipeline items shall be limited to eighty percent (80%) of the bid price until the pipeline items have been tested and accepted by the Engineer.

D. Payment for equipment items shall be limited to eighty-five percent (85%) of their scheduled value (materials portion only) until they are set in place. Eighty-five percent (85%) payment for stored materials and equipment shall be contingent on proper on-site storage as recommended by the manufacturer or required by the Engineer.

E. Payment for equipment items set in-place shall be limited to ninety percent (90%) of their scheduled value until they are ready for operation and have been certified by the manufacturer. Ninety percent (90%) payment for installed equipment shall be contingent on proper routine maintenance of the equipment in accordance with the manufacturer's recommendations.

F. Payment for equipment items set in place and ready for operation shall be limited to ninety-five percent (95%) of their scheduled value until all acceptance tests have been completed and the required manufacturer's pre-startup operator's training has been completed.

G. Payment for the labor portion of equipment items will be subject only to the degree of completeness and the appropriate retainage.

H. The Owner may reduce the percent of retainage once the project has achieved satisfactory progress and is at the fifty percent (50%) mark. If the percent of retainage is reduced, the dollar amount of retainage for work-in-place will not be reduced but will remain constant following the fifty percent (50%) constructed status. The retainage on the equipment items shall be determined as defined hereinbefore.

I. Additionally, the Owner may reinstate the retainage to a full ten percent

(10%) of the scheduled value of work-in-place and material items should the Owner, at its discretion, determine that the Contractor is not making satisfactory progress or there is other specific cause for such withholding.

1.04 CLAIMS FOR EXTRA WORK

A. If the Contractor claims that any instructions by Drawings or otherwise involve extra cost, he shall give the Engineer written notice of said claim within ten (10) days after the receipt of such instructions, and in any event before proceeding to execute the work, stating clearly and in detail the basis of his claim or claims. No such claim shall be valid unless so made.

B. Claims for additional compensation for extra work, due to alleged errors in spot elevations, contour lines, or bench marks, will not be recognized unless accompanied by certified survey data, made prior to the time the original ground was disturbed, clearly showing that errors exist which resulted, or would result, in handling more material, or performing more work than would reasonably be estimated from the Drawings and/or topographical maps issued.

C. Any discrepancies which may be discovered between actual conditions and those represented by the topographical maps and/or Drawings shall at once be reported to the Engineer, and work shall not proceed, except at the Contractor's risk, until written instructions have been received by him from the Engineer.

D. If, on the basis of the available evidence, the Engineer determines that an adjustment of the Contract Price or time is justifiable, the procedure shall then be as provided herein for "Changes in the Work".

E. By execution of this Contract, the Contractor warrants that he has visited the site of the proposed work and fully acquainted himself with the existing site conditions relating to construction and labor, and that he fully understands the facilities, difficulties, and restrictions attending the execution of the work under this Contract. The Contractor further warrants that he has thoroughly examined and is familiar with the Drawings, Specifications and all other documents comprising the Contract. The Contractor further warrants that by execution of this Contract his failure when he was bidding on this Contract to receive or examine any form, instrument or document, or to visit the site and acquaint himself with conditions there existing, in no way relieves him from any obligation under the Contract, and the Contractor agrees that the Owner shall be justified in rejecting any claim based on facts regarding which he should have been on notice as a result thereof.

1.05 DETERMINATION OF THE VALUE OF EXTRA (ADDITIONAL) OR OMITTED WORK

A. The value of extra (additional) or omitted work shall be determined in one or more of the following ways:

1. On the basis of the actual cost of all the items of labor (including on-the-job supervision), materials, and use of equipment, plus a maximum 15 percent for added work or a minimum 15 percent for deleted work which shall cover the Contractor's general supervision, overhead and profit. In case of subcontracts, the 15 percent (maximum for added work and minimum for deleted work) is interpreted to mean the subcontractor's supervision, overhead and profit, and an additional 5 percent (maximum for added work and minimum for deleted work) may then be added to such costs to cover the General Contractor's supervision, overhead and profit. The cost of labor shall include required insurance, taxes and fringe benefits. Equipment costs shall be based on current rental rates in the areas where the work is being performed but, in no case shall such costs be greater than the current rates published by the Associated Equipment Distributors, Chicago, Illinois.

2. By estimate and acceptance in a lump sum.

3. By unit prices named in the Contract or subsequently agreed upon.

B. Provided, however, that the cost or estimated cost of all extra (additional) work shall be determined in advance of authorization by the Engineer and approved by the Owner.

C. All extra (additional) work shall be executed under the conditions of the original Contract. Any claim for extension of time shall be adjusted according to the proportionate increase or decrease in the final total cost of the work unless negotiated on another basis.

D. Except for over-runs in contract unit price items, no extra (additional) work shall be done except upon a written Field Order Directive, or Change Order from the Engineer, and no claim on the part of the Contractor for pay for extra (additional) work shall be recognized unless so ordered in writing by the Engineer.

PART 2 – PRODUCTS

To be prepared after funding has been secured and the construction project scope(s) are better defined.

2.01 TIE INTO EXISTING WATERLINE (Item #1)

Payment for the **Tie to Existing Waterline** will be made at the contract unit price for this item. The CONTRACTOR shall locate existing potable waterline, (verifying exact location, orientation, material, and size); furnish and install appropriate sized D.I.M.J. fittings (including but not limited to reducer, 90 bend,

45 bend, etc.); making the necessary cuts of existing waterline to make final connection and to terminate existing waterline as shown on the drawings. Payment shall also include excavation (including rock excavation); dewatering; bedding material; temporary shoring, sheeting, and bracing; all mechanical components; testing of connection; any necessary asphalt or concrete pavement restorations; regrading; seed and straw of all areas disturbed during construction activities; erosion control measures; and all other materials not specifically delineated herein, but necessary to complete the construction of the tie in by means of tapping sleeve. Testing shall be conducted on everything except the final connection to the existing waterline; any additional material required to conduct testing is incidental and to be included in unit cost as set forth in bid. Decommissioning of the existing waterlines (as displayed in drawings) after construction is completed shall also be included in the CONTRACTOR'S contract bid price for this item.

Contractor shall notify OWNER, 72 hours prior to any connections to existing waterlines are commenced.

2.02 WATERLINES (Item #2)

Payment for **Waterlines** will be made at the contract unit price per linear foot in place, which shall include compensation for all labor, material and equipment required for furnishing and installing pipe; excavation (including rock excavation); dewatering; bedding material; laying; jointing; pipe anchoring; erosion control measures; temporary trench shoring; sheeting and bracing; initial and final backfill, seed and straw of all areas disturbed during construction activities; tracer wire; waterline markers; testing of the completed lines; and any utility relocation if necessary. Incidental to the construction of the waterline shall be crushed stone, asphalt, or concrete surface replacement (in kind), replacement or repair to drainage ditches, rip rap ditches, curb and gutter, and sidewalks.

Miscellaneous fittings required to complete the installation as shown on the drawings shall be incorporated into the unit price per linear foot of pipe. Such fittings include but are not limited to as elbows, tees, wyes and mechanical restraint.

2.03 CREEK CROSSING, DIRECTIONAL DRILLED (Item #3)

Payment for **Creek Crossing** will be made at the contract unit price per linear foot, which shall include compensation for all labor, material and equipment required for furnishing and installing pipe, excavation (including rock excavation), dewatering, bedding material, laying, jointing, pipe anchoring, erosion control measures, temporary trench shoring, sheeting and bracing, and initial and final backfill, seed and straw of all areas disturbed during construction activities, tracer wire; waterline markers; testing of the completed lines, and any utility relocation if necessary.

Miscellaneous fittings required to complete the installation as shown on the drawings shall be incorporated into the unit price. Such fittings include but are not limited to as adapters, elbows, tees, wyes and mechanical restraint.

2.05 GATE VALVE & BOXES (Item #4)

Payment for the **Gate Valves & Boxes** will be made at the contract unit price per assembly, which shall include compensation for all labor, material and equipment required for furnishing and installing Gate Valve & Box; excavation (including rock excavation); dewatering; bedding material; laying; jointing; pipe anchoring; erosion control measures; temporary trench shoring; sheeting and bracing; initial and final backfill, seed and straw of all areas disturbed during construction activities; tracer wire; terminal for tracer wire; testing of the completed valves; and fittings. Incidental to the installation of the Gate Valve & Box shall be valve box, crushed stone, asphalt, or concrete surface replacement (in kind), replacement or repair to drainage ditches, rip rap ditches, curb and gutter, gate valve concrete collar and sidewalks.

Miscellaneous fittings required to complete the installation as shown on the drawings shall be incorporated into the unit price. Such fittings include but are not limited to as adapters, elbows, tees, wyes and mechanical restraint.

2.06 COMBINATION AIR RELEASE VALVE & BOX (Item #5)

Payment for the **Combination Air Relief Valve (CARV)** assembly will be made at the contract unit price per assembly, which shall include compensation for all labor, material and equipment required for furnishing and installing CARV & box; excavation (including rock excavation); dewatering; bedding material; laying; jointing; pipe anchoring; erosion control measures; temporary trench shoring; sheeting and bracing; initial and final backfill, seed and straw of all areas disturbed during construction activities; tracer wire; terminal for tracer wire; and any utility relocation if necessary. Incidental to the installation of the air release valve shall be valve box, crushed stone, asphalt, or concrete surface replacement (in kind), replacement or repair to drainage ditches, rip rap ditches, curb and gutter, gate valve concrete collar and sidewalks.

Miscellaneous fittings required to complete the installation as shown on the drawings shall be incorporated into the unit price. Such fittings include but are not limited to as adapters, elbows, tees, wyes and mechanical restraint.

2.08 FLUSHING HYDRANT ASSEMBLY, TYPE 1 (Item #6)

Payment for the **Flushing Hydrant Assembly, Type 1** will be made at the contract unit price per assembly, which shall include compensation for all labor, material and equipment required for furnishing and installing hydrant, valve & box; excavation (including rock excavation); dewatering; bedding material; laying; jointing; pipe anchoring; erosion control measures; temporary trench shoring; sheeting and bracing; initial and final backfill, seed and straw of all areas disturbed during construction activities; tracer wire; marker posts; terminal for tracer wire; testing of the completed lines; and any utility relocation if necessary. Incidental to the installation of the hydrant assembly shall be valve box, crushed

stone, asphalt, or concrete surface replacement (in kind), replacement or repair to drainage ditches, rip rap ditches, curb and gutter, gate valve concrete collar and sidewalks.

2.11 RECONNECT EXISTING SERVICE METERS (Item #7)

Payment for the **Reconnect Existing Service Meters** will be made at the contract unit price per assembly, which shall include compensation for all labor, material and equipment required for furnishing and installing, new service saddle, new service tubing, existing meter box, existing box lid, existing copper setter, existing individual pressure reducing valve (if required), etc; excavation (including rock excavation); dewatering; bedding material; laying; jointing; pipe anchoring; erosion control measures; temporary trench shoring; sheeting and bracing; initial and final backfill, seed and straw of all areas disturbed during construction activities; and any utility relocation if necessary. Incidental to the installation shall be necessary fittings, any work required to make installation complete, crushed stone, asphalt, or concrete surface replacement (in kind), replacement or repair to drainage ditches, rip rap ditches, curb and gutter and sidewalks.

Water meter tubs shall be installed per District's ordinances.

2.14 HIGHWAY CROSSING, BORE & JACK (Item #8)

Payment for the **Highway Crossing, Bore & Jack** will be made at the contract unit price per linear foot, which shall include compensation for all labor, material and equipment required for furnishing and installing highway bore; excavation (including rock excavation); dewatering; crushed stone bedding material; laying; jointing; pipe anchoring; **carrier pipe**; casing spacers; end seals; erosion control measures; temporary trench shoring; sheeting and bracing; initial and final backfill, seed and straw of all areas disturbed during construction activities; tracer wire; marker posts; terminal for tracer wire; testing of the completed lines; and any utility relocation if necessary. Incidental to the bore and jack shall be crushed stone, asphalt or concrete surface replacement (in kind), replacement or repair to drainage ditches, rip rap ditches, curb and gutter, gate valve concrete collar and sidewalks.

2.15 WATERLINE MARKER (Item #9)

Payment for the **Waterline Marker** will be made at the contract unit price per assembly, which shall include compensation for all labor, material and equipment required for furnishing and installing Waterline Marker; excavation (including rock excavation); initial and final backfill, seed and straw of all areas disturbed during construction activities; tracer wire; terminal for tracer wire; and identification sticker. Incidental to the installation of the Waterline Marker shall be marker post, identification sticker, replacement or repair to drainage ditches, rip rap ditches, curb and gutter.

PART 3 QUANTITIES OF ESTIMATE

A. Wherever the estimated quantities of work to be done and materials to be furnished under this contract are shown in any of the documents, including the Bid Proposal, they are given for use in comparing bids and the right is especially reserved except as herein otherwise specifically limited, to increase or diminish them as may be deemed reasonably necessary or desirable by the Owner to complete the work contemplated by this contract, and such increase or diminution shall not give cause for claims or liability for damages. The Engineer will not be financially responsible for any omissions from the Contract Documents and therefore not included by the Contractor in his proposal.

B. Aerial photographs utilized for plan sheets in the Contract Documents are indicated at an approximate scale and shall not be scaled for quantity take-offs. The quantities listed in the bid schedule are given for use in comparing bids and may not be the actual quantities to be installed. It is the Contractor's responsibility to field verify the bid item quantities to be installed prior to the ordering of materials. Payment on unit price contracts are based on actual quantities installed. The Owner or Engineer will not be financially responsible for any shortage of the bid items or overrun of bid items ordered for the quantities.

C. The actual quantities of all materials to be used for this project shall be field verified prior to the Contractor ordering the necessary materials. The quantity listed in the bid schedule is given for use in comparing bids and may increase or diminish as may be deemed necessary or as directed by the Owner. Any such increase or diminution shall not give cause for claims or liability for damages. The Engineer or Owner will not be financially responsible for any charges incurred for restocking of materials ordered.

- END OF SECTION -

SECTION 01060

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 LABOR REGULATIONS ON KENTUCKY PUBLIC WORKS PROJECTS

A. All Public Works Project submitted for BIDS and constructed by a Public Authority in the State of Kentucky are subject to the provisions of the Kentucky Revised Statutes, Chapter 337, entitled Wages and Hours as may be amended from time to time.

CONTRACTORS are hereby advised that both State and Federal labor wage decisions are applicable to this contract. This does not guarantee nor infer that employees may be obtained for these rates. Should the CONTRACTOR choose or find it necessary to pay higher wage rates, the OWNER will not be liable for such higher rates.

1.02 ACCESS TO WORK

A. The representative of the OWNER, the ENGINEER, the U.S. Environmental Protection Agency, the Kentucky Division of Water, OSHA and related agencies shall have access to the WORK wherever it is in preparation or progress, and the CONTRACTOR shall provide proper facilities for such access and inspection.

1.03 LOCAL GOVERNMENT REQUIREMENTS

A. The CONTRACTOR and all SUBCONTRACTORS and SUPPLIERS shall fully comply with all local government requirements.

B. Construction debris must be disposed in accordance with the local Solid Waste Management Plan, and with DWM regulatory requirement.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 GENERAL

1.01 PRE-CONSTRUCTION CONFERENCES

A. Prior to commencing the work, a pre-construction conference will be held and representatives of the following organizations shall have at least one (1) representative in attendance:

OWNER, ENGINEER, CONTRACTOR, major Subcontractors, and representatives of the appropriate State and Federal agencies as they choose.

B. The pre-construction conference will be for the purpose of reviewing procedures to be followed concerning the orderly flow of required paperwork; coordination of the various parties involved with the project, review of shop drawing submittals, contract time, liquidated damages, payment estimates, change orders, and other items to the parties involved.

1.02 PROGRESS MEETINGS

A. A progress meeting will be held once each month to review progress of the work, discuss problems encountered or foreseen, coordinate for the following month with the OWNER, and answer any questions as they arise.

B. The organizations listed under 1.01 above shall have at least one representative in attendance at each meeting.

1.03 SCHEDULE UPDATE MEETINGS

A. Schedule update meetings shall be in accordance with schedule requirements in Division 1, Section 01310.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. This section specifies the general methods and requirements of submissions applicable to the following WORK-related submittals:

1. General Procedures for Submittals
2. Construction Schedule
3. Schedule of Values and Payments
4. Schedule of SHOP DRAWING Submittals
5. SHOP DRAWINGS, Product Data, Samples and O&M Instructions
6. Construction Photographs
7. Test Reports
8. Manufacturer's Certificates
9. Manufacturer's Instructions
10. Contractor's Responsibility
11. Submission Requirements
12. Resubmission Requirements

Additional general submissions requirements are contained in paragraphs 5.1 through 5.7 of the General Conditions. The CONTRACTOR is responsible for the submittal of all weekly payrolls, monthly utilization and other required forms and reports, including reports and forms from his SUBCONTRACTORS. The prompt submittal of all required reports and forms will help to insure the timely processing of pay request. Detailed submittal requirements will be specified in the technical SPECIFICATIONS sections.

1.02 GENERAL PROCEDURES FOR SUBMITTALS

A. Coordination of Submittal Times:

The CONTRACTOR shall prepare and transmit each submittal sufficiently in advance of performing the related WORK or other applicable activities, or within the time specified in the individual WORK section of the SPECIFICATIONS, so that the installation will not be delayed by processing times including disapproval and re-submittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the WORK.

1.03 CONSTRUCTION SCHEDULE

A. In addition to the progress schedule requirements specified in Article 3 of the General Conditions, the CONTRACTOR shall, within ten (10) days after the NOTICE TO PROCEED provide and submit to the ENGINEER for review the schedule he plans to maintain in order to successfully construct the WORK within the time allotted. The schedule shall account for all WORK of the CONTRACTOR and his SUBCONTRACTORS.

B. The CONTRACTOR shall update the schedule information monthly and submit the update information to the ENGINEER at the same time the pay estimate is prepared. The schedule shall contain all of the items of the periodic estimate and pay schedule.

C. The CONTRACTOR bears full responsibility for scheduling all phases and stages of the WORK including his SUBCONTRACTOR WORK to insure its successful prosecution and completion within the time specified in accordance with all provisions of these SPECIFICATIONS.

D. Refer to Section 01310 for additional requirements.

1.04 SCHEDULE OF VALUES AND PAYMENTS

A. Within the (10) days after award of the Contract the CONTRACTOR shall submit to the OWNER in triplicate, a breakdown of the pay items, including a schedule of values and a schedule of payments. This breakdown shall be subject to approval by the OWNER, and when so approved shall become the basis for determining progress payments and for negotiation of CHANGE ORDERS, if required.

1.05 SCHEDULE OF SHOP DRAWING SUBMITTALS

A. The CONTRACTOR shall, within ten (10) days after the NOTICE TO PROCEED provide and submit to the ENGINEER for review a SCHEDULE OF SHOP DRAWING SUBMITTALS. The schedule shall account for all materials used by the CONTRACTOR and his SUBCONTRACTORS.

B. The schedule shall be organized to reflect the respective specification division under which it applies.

1.06 SHOP DRAWINGS, PRODUCT DATA, SAMPLES AND O & M INSTRUCTIONS

A. Shop Drawings

1. SHOP DRAWINGS, as defined in the General Conditions, and as specified in the technical SPECIFICATIONS include, but are not necessarily limited to custom-prepared data such as fabrication and erection/installation DRAWINGS, scheduled information, setting diagrams, actual shop WORK manufacturing instructions, custom templates, special wiring diagrams, coordination DRAWINGS, individual system of equipment inspection and test reports including performance curves and certifications, as applicable to the WORK.

2. All details on SHOP DRAWINGS submitted for review shall show clearly the relation of the various parts to the main member and lines of the structure, and where correct fabrication of the WORK depends upon field measurements, such measurements shall be made and noted on the SHOP DRAWINGS before being submitted for review by the ENGINEER.

3. Unless otherwise specified, the CONTRACTOR is not required to resubmit SHOP DRAWINGS on existing equipment. The CONTRACTOR shall, however, be responsible for obtaining all SHOP DRAWINGS and/or other information from the manufacturer necessary to complete the installation and startup of existing equipment.

B. Product Data

1. Product data as specified in individual sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare parts listing, and printed product warranties, as applicable to the WORK.

C. Samples

1. Samples specified in individual sections, included, but are not necessarily limited to, physical examples of the WORK such as sections of manufactured or fabricated WORK, small cuts or

containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effects, graphic symbols, and units of WORK to be used by the ENGINEER or OWNER for independent inspection and testing, as applicable to the WORK.

D. Operation and Maintenance Instructions

1. O&M instructions shall conform to Article 5 of the General Conditions (Section 00710) and the particular requirements of the individual sections.

2. Refer to Section 01785 for additional requirements.

1.07 CONSTRUCTION PHOTOGRAPHS

A. Miscellaneous photographs as directed by the ENGINEER or OWNER.

1. Photographs are required on this PROJECT and are the responsibility of the CONTRACTOR. Photographs shall be 3" x 5" color snapshots taken with a standard 35mm camera, or a digital camera with 8 MP minimum. CONTRACTOR shall be responsible for the taking, development, labeling and organizing of the photographs. All photographs shall be identified as to location, date and subject matter. Photographs shall be arranged in a photo album(s) by location, subject matter and date taken. Upon completion of the project, the CONTRACTOR shall supply the OWNER with the negatives or digital photo files. The later, if provided, shall be supplied on CD media in .jpg format.

2. Upon completion of the project, the CONTRACTOR shall provide three (3) professional-quality 8 x 10 color aerial photographs. Prior to photographing, the CONTRACTOR shall confirm with the ENGINEER that the site is ready. The photo shall also be provided in digital format (.jpg) on CD media.

3. The CONTRACTOR, before final payment is made, shall deliver one (1) set of photographic prints and negatives/.jpg's to the OWNER, one (1) set of prints to the ENGINEER, and one aerial photograph to each. Both sets of prints shall be arranged in a photo album(s) and labeled as outlined above.

4. No pay item has been set up for the photographs. The CONTRACTOR shall allow for a minimum of 200 - 3" x 5" color photographs (taken and arranged as outlined above) in his BID.

1.08 TEST REPORTS

A. Submit for the Architect/Engineer's knowledge as contract administrator or for the Owner.

B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.09 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Architect/Engineer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

1.10 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect/Engineer for delivery to owner in quantities specified for Product Data.

1.11 CONTRACTOR'S RESPONSIBILITY

A. The CONTRACTOR shall review SHOP DRAWINGS, product data and samples prior to submission to determine and verify the following:

1. Field measurements

2. Field construction criteria

3. Catalog numbers and similar data

4. Conformance with the SPECIFICATIONS

B. All SHOP DRAWINGS submitted by SUBCONTRACTORS for review shall be sent directly to the CONTRACTOR for preliminary checking. The CONTRACTOR shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

C. The CONTRACTOR shall check all SUBCONTRACTOR'S SHOP DRAWINGS regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the DRAWINGS

and SPECIFICATIONS. DRAWINGS found to be inaccurate or otherwise in error shall be returned to the SUBCONTRACTORS for correction before submission thereof.

D. Each shop drawing, WORKING drawing, sample and catalog data submitted by the CONTRACTOR shall have affixed to it a certification statement, signed by the CONTRACTOR. The certification shall state that the CONTRACTOR represents that he has determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and has checked and coordinated each item with other applicable review SHOP DRAWINGS and all Contract requirements.

E. The CONTRACTOR shall notify the OWNER in writing, at the time of submittal, of any deviations in the submittals from the requirements of the CONTRACT DOUCMENTS.

F. The CONTRACTOR should include the notation "Critical Path" on critical path submittals.

G. The review of SHOP DRAWINGS, samples or catalog data by the ENGINEER shall not relieve the CONTRACTOR from his responsibility with regard to the fulfillment of the terms of the Contract.

H. No portion of the WORK requiring a shop drawing, WORKING drawing, sample or catalog data shall be started nor shall any materials be fabricated or installed prior to the review or qualified review SHOP DRAWINGS and data shall be at the CONTRACTOR'S risk. The OWNER will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

I. PROJECT WORK, materials, fabrication, and installation shall conform with reviewed SHOP DRAWINGS, WORKING DRAWINGS, applicable samples, and catalog data.

1.12 SUBMISSION REQUIREMENTS

A. The CONTRACTOR shall make submittals promptly in accordance with the accepted schedule, and in such sequence as to cause no delay in the WORK or in the WORK of any other CONTRACTOR.

B. Number of submittals required:

1. SHOP DRAWINGS: Submit six (6) copies.

2. Operation and Maintenance Instructions: Submit six (6) copies.

C. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The PROJECT title, contract number, and submittal number.

3. CONTRACTOR identification.

4. The names of:

   a. CONTRACTOR

   b. SUPPLIER

   c. Manufacturer

5. Identification of the product, with the specification section number.

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the WORK or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of revisions on re-submittals.

10. An 8-inch x 3-inch blank space for CONTRACTOR'S and ENGINEER'S stamps.

D. Submittals shall be clear and legible. Submittals with facsimile copies will be automatically rejected.

1.13 RESUBMISSION REQUIREMENTS

A. The CONTRACTOR shall make any corrections or changes in the submittals required by the ENGINEER and resubmit until accepted, in accordance with the following:

1. SHOP DRAWINGS and Product Data:

   a. Revise initial DRAWINGS or data, and resubmit as specified for the initial submittal.
   b. Indicate any changes which have been made other than those requested by the ENGINEER.

2. Samples:

   a. Submit new samples as required for initial submittal.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01310

PROGRESS SCHEDULES

PART 1 GENERAL

1.01 GENERAL

A. Scheduling Responsibilities

1. In order to provide a definitive basis for determining job progress, a construction schedule of a type approved by the OWNER will be used to monitor the PROJECT.

2. The CONTRACTOR shall be responsible for preparing the schedule and updating on a monthly basis. It shall at all times remain the CONTRACTOR'S responsibility to schedule and direct his forces in a manner that will allow for the completion of the WORK within the contractual period.

B. Construction Hours

1. No WORK shall be done between 8:00 p.m. and 7:00 a.m. nor on Sundays or legal holiday without the written permission of the OWNER. However, emergency work may be done without prior written permission.

2. If the CONTRACTOR, for his convenience and at no additional cost to the OWNER, should desire to carry on his WORK at night or outside the regular hours, he shall submit a written request to the ENGINEER and shall allow nine (9) days for satisfactory arrangements to be made for inspecting the WORK in progress. If permission is granted, the CONTRACTOR shall light the different parts of the PROJECT as required to comply with all applicable Federal, State and local regulations. The CONTRACTOR shall also revise his schedule as appropriate at the next monthly schedule update meeting to reflect the changes in working hours.

C. Progress of the WORK

1. The WORK shall be started within ten (10) days following the NOTICE TO PROCEED and shall be executed with such progress as may be required to prevent delay to other CONTRACTORS or to the general completion of the PROJECT. The WORK shall be executed at such times and in or on such parts of the PROJECT, and with such forces, material and equipment, to assure completion of the WORK in the time established by the Contract.

2. The CONTRACTOR agrees that whenever it becomes apparent from the current monthly Schedule update that delays have resulted and, hence, that the Contract completion date will not be met or when so directed by the OWNER, he will take some or all of the following actions at no additional cost to the OWNER.

(a) Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of WORK.

(b) Increase the number of working hours per shift, shifts per working day or days per week, the amount of construction equipment, or any combination of the foregoing to substantially eliminate the backlog of WORK.

(c) Reschedule activities to achieve maximum practical concurrence of accomplishment of activities, and comply with the revised schedule.

(d) The CONTRACTOR shall submit to the OWNER or the OWNER'S representative for review a written statement of the steps he intends to take to remove or arrest the delay to the critical path in the accepted schedule. If the CONTRACTOR should fail to submit a written statement of the steps he intends to take or should fail to take such steps as required by the Contract, the OWNER may direct the level of effort in manpower (trades), equipment, and work schedule (overtime, weekend and holiday work, etc.), to be employed by the CONTRACTOR in order to remove or arrest the delay to the critical path in the accepted schedule, and the CONTRACTOR shall promptly provide such level of effort at no additional cost to the OWNER.

1.02 CONSTRUCTION SCHEDULE

A. Schedule Submissions

1. With ten (10) calendar days of the NOTICE TO PROCEED, the CONTRACTOR shall submit to the ENGINEER five (5) copies of his proposed schedule. The schedule will be the subject of a schedule review meeting with the CONTRACTOR, the ENGINEER and the OWNER or the OWNER'S representative within one (1) week of its submission. The CONTRACTOR will revise and resubmit schedule until it is acceptable and accepted by the OWNER or the OWNER'S representative.

1.03 SCHEDULE UPDATES

A. Monthly Meetings

1. A monthly Schedule Update Meeting will be held in conjunction with the applicable progress meeting at the construction site to review and update the Schedule. The Schedule Update Meetings will be chaired by the OWNER or the OWNER'S representative and attended by the CONTRACTOR and the ENGINEER. Actual progress of the previous month will be recorded and future activities will be reviewed. The duration of activities and their logical connections may be revised as needed. Decisions made at

these meetings and agreed to by all parties are binding with the exception that no contractual completion dates will be modified without formal written requests and acceptance as specified herein.

B. Conditions Requiring Revisions are as follows:

1. When a delay in completion of any WORK item or sequence of WORK items results in an extension of the PROJECT completion.
2. When delays in submittals or deliveries or work stoppages are encountered which make re-planning or rescheduling of the WORK necessary.
3. When the schedule does not represent the actual prosecution and progress of the PROJECT.

1.04 CONTRACT COMPLETION TIME

A. Causes for Extensions

1. The Contract completion time will be adjusted only for cause specified in this Contract. In the event the CONTRACTOR requests an extension of any Contract completion date, he shall furnish such justification and supporting evidence as the OWNER or the OWNER'S representative may deem necessary for a determination as to whether the CONTRACTOR is entitled to an extension of time under the provision of this Contract. The OWNER, with the assistance of ENGINEER and OWNER'S representative, will, after receipt of such justification and supporting evidence, make findings of fact and will advise the CONTRACTOR in writing thereof.

B. Request for Time Extension

1. Each request for change in any Contract completion date shall be initially submitted to the OWNER within the time frame stated in the General Conditions. All information known to the CONTRACTOR at that time concerning the nature and extent of the delay shall be transmitted to the OWNER at that time. Within the time frame stated in the General Conditions but before the date of final payment under this Contract, all information as required above concerning the delay must be submitted to the OWNER. No time extension will be granted for requests which are not submitted within the foregoing time limits.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SANITARY FACILITIES

A. The CONTRACTOR shall construct and maintain sanitary facilities for his employees and employees of the subcontractors. The CONTRACTOR shall, at completion of the Contract Work, properly dispose of these sanitary facilities.

1.02 UTILITIES

A. The CONTRACTOR shall be totally responsible for installation, maintenance and cost of his and his sub-contractor's telephone service.

B. The CONTRACTOR shall install meters at all his points of use of electric, water, and natural gas utilities. The CONTRACTOR shall pay the monthly billed cost from the servicing utility for the CONTRACTOR'S use of these utilities. The CONTRACTOR shall pay any initial installation costs.

C. If CONTRACTOR requires other utilities, he shall obtain and pay for them.

1.03 MAINTENANCE OF SERVICE IN EXISTING UTILITIES

A. Where the existing utilities must be disturbed during construction under this Contract, their operation and function shall be maintained by the CONTRACTOR to such a degree that service to customers will be interrupted for minimum time periods only. Such disturbances and any maintenance use of these lines shall constitute no cost to the OWNER. The OWNER shall be notified of interruptions in sufficient time to prepare for them and shall agree to the hour, date, and duration of them before they are undertaken.

B. Should shutdowns in service be in excess of the time of duration agreed upon, and such excessive shutdown time be due to the CONTRACTOR'S negligence, faulty Work and/or inability to perform, then and in that event, the CONTRACTOR shall be held liable to the OWNER for any and all damages that may accrue to the OWNER, by reason of such excessive shutdown periods.

C. Digging through services with trenching machines will not be permitted. Upon damage to utility services, such services shall be repaired immediately and tested to the satisfaction of the ENGINEER. The CONTRACTOR shall notify all utility users of impending interruption of service and shall notify all utility users of impending interruption of service and shall be responsible for all damage resulting from same. Payment for necessary disconnection and reconnection of utility services shall be

included as a part of the CONTRACTOR'S bid and no extra compensation will be made for same.

D. The CONTRACTOR shall at all times maintain on hand an adequate supply of repair materials and tools with which to make repair to damaged water, gas and sewer lines. Should the CONTRACTOR inadvertently damage existing utilities, he shall make immediate repair thereto and in no event shall he leave the site before such repair has been made and proven to be successful.

E. As far as possible, the locations and sizes of existing mains are indicated on the drawings; however, exact locations, pipe materials and sizes cannot be guaranteed. It shall be the responsibility of the CONTRACTOR to locate and uncover existing lines. The CONTRACTOR shall provide all connecting fittings of the correct size and type for each connection to existing lines.

1.04 PROPERTY PROTECTION

A. Care is to be exercised by the CONTRACTOR in all phases of construction, to prevent damage and/or injury to the OWNER'S and/or other property.

B. The CONTRACTOR shall avoid unnecessary injury to trees and shall remove only those authorized to be removed by written consent of the OWNER. Fences, gates, and terrain damaged or disarranged by the CONTRACTOR'S forces shall be immediately restored in their original condition or better.

1.05 CONSTRUCTION WARNING SIGNS

A. The CONTRACTOR shall provide construction warning signs for each location where he is working in the state highway right-of-way or in City or County streets. He will further provide flag men as required and shall abide by all Kentucky Transportation Cabinet, Department of Highways safety rules, including size, type and placement of construction signs.

1.06 RESIDENT OBSERVER OFFICE

A. The CONTRACTOR shall provide at the beginning of construction and remove at the completion of construction, an office for the exclusive use of the Resident Observer.

The office shall be furnished with a desk, chair and plans table. The office shall be equipped with a one-drawer steel filing cabinet, telephone, electric lights, and plug-in duplex receptacles.

During occupancy, the office shall be supplied with janitor services, adequate heat and air conditioning.

Subject to approval of the ENGINEER, the CONTRACTOR may furnish office space in an existing building or a trailer.

1.07 EXCAVATION

A. No separate payment for solid rock excavation will be made under this Contract, unless specifically noted on the Bid Form. All excavation shall be considered unclassified, except in locations where solid rock excavation is paid for on a unit price basis.

1.08 ACCESS ROADWAYS

A. The CONTRACTOR shall construct all access roadways needed during construction, and the planned access roadways for the completed project. The CONTRACTOR shall maintain access roadways continuously during the construction period.

B. The CONTRACTOR shall maintain all existing roadways within the project site which are used for any purpose by construction operations. The degree and frequency of maintenance shall be adequate to keep existing roadways in a condition at least equal to their condition prior to construction. Road maintenance shall include dust control and sweeping.

1.09 RESPONSIBILITY FOR TRENCH SETTLEMENT

A. The CONTRACTOR shall be responsible for any settlement caused by the construction, that occurs within one (1) year after the final acceptance of this Contract by the OWNER. Temporary fences shall be provided at no extra cost to the OWNER wherever necessary to keep livestock away from the construction area. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Damaged limbs shall be trimmed and damaged tree trunks shall be treated with wound dressing.

1.10 DAMAGE TO CROPS, LIVESTOCK AND VEGETATION

A. The CONTRACTOR shall protect crops, livestock and vegetation against damage or injury from construction operations at all times. Crops damaged or equipment access obtained outside of the easements provided shall be the responsibility of the CONTRACTOR. Temporary fences shall be provided at no extra cost to the OWNER wherever necessary to keep livestock away from the construction area.

B. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Damaged limbs shall be trimmed and damaged tree trunks shall be treated with wound dressing.

1.11 WASTE DISPOSAL

A. The CONTRACTOR shall dispose of waste, including hazardous waste, off-site in accordance with all applicable laws and regulations.

1.12 CONTRACTOR'S TRAILERS AND MATERIAL STORAGE

A. The location of the CONTRACTOR'S and Subcontractor's office, work trailers and parking areas for the project shall be subject to the OWNER'S approval.

B. The CONTRACTOR'S and Subcontractor's material storage yards for the project shall be subject to the OWNERS approval.

1.13 JURISDICTIONAL DISPUTES

A. It shall be the responsibility of the CONTRACTOR to pay all costs that may be required to perform any of the work shown on the Drawings or specified herein in order to avoid any work stoppages due to jurisdictional disputes. The basis for subletting work in question, if any, shall conform with precedent agreements and decisions on record with the Building and Construction Trades Department, AFL-CIO, dated June, 1973, including any amendments thereto.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01510

SURFACE WATER POLLUTION PREVENTION PLAN

PART 1 GENERAL

1.01 EROSION CONTROL MEASURES

Reference Section 2270.

All disturbed areas require erosion control. Erosion control shall consist of both natural and manmade barriers to the transport of sediment from the project area to surrounding areas not disturbed under this project.

This specification focuses on the requirement to avoid introduction of sediment into streams and other natural and manmade waterways and conveyances. A second focus is to prevent the deposition of sediment onto traffic surfaces.

A sediment pond is required to be constructed and completed prior to disturbance of the project area. All storm water run-offs from the project area will be routed to the sediment pond, where practical. Any areas not practical to route to the sediment pond shall be protected by the construction of silt fences between the disturbed area and the receiving stream. Silt fence placement shall be approved by the OWNER or his representative. Prior to beginning construction of the sediment pond, a silt fence will be constructed downstream from the downstream toe of the sediment pond to prevent silt from the construction of the embankment entering the stream.

Surface water from adjacent areas shall not be routed to the sediment pond, but rather routed around the sediment pond area.

PART 2 BEST MANAGEMENT PRACTICES

1.01 TEMPORARY BMP'S FOR

On-site storage tanks – On site storage tanks shall have a containment structure constructed around the tank. The containment structure shall be impervious to the substance stored in the tank and shall have a volume equal to 1.5 times the volume of the storage tank. Provisions shall be made to evacuate any water accumulation inside the containment structure to prevent loss of containment volume.

Stockpile areas – Stockpile areas shall have a silt fence constructed at the lower portion of the stockpile area to trap any sediment generated from the stockpile area.

Parking areas – Parking areas shall have a silt fence constructed at the lower perimeter of the parking area to trap any sediment generated from the parking area. Additionally, should the parking area be adjacent to a paved public road, a gravel pad shall be constructed at the entrance from

the public road to the parking area to prevent tracking of sediment onto the paved public road.

Equipment maintenance areas – Equipment maintenance areas shall have a silt fence constructed along the lower perimeter of the maintenance area to trap any sediment generated from the maintenance area.

Excavation areas – Excavation areas shall have a silt fence constructed at the lower perimeter of the excavation area to trap any sediment generated from the excavation area.

All temporary BMP's shall be maintained in accordance with the operations and maintenance plan until such time as permanent BMP's are constructed and completed, or until such time as the controlled area has been regraded, mulched, seeded and vegetation has been restored to the area.

1.02 PERMANENT BMP'S

Permanent BMP's shall consist of diversion ditches, sediment outfall structures, vegetation restoration and leachate containment lagoon as applicable.

1.03 OPERATIONS AND MAINTENANCE PLAN

The CONTRACTOR shall implement the following Best Management Practices (**BMP**) and shall maintain these BMP's until no longer needed or the completion of the project. The CONTRACTOR shall not remove any BMP without the agreement of the OWNER or his representative.

The CONTRACTOR shall have the sole responsibility for compliance with the requirements of the Storm Water Pollution Prevention Plan (**SWPPP**) as described in these BID DOCUMENTS, and shall be required to have a full and complete understanding of the SWPPP and the required BMP's contained in the SWPPP. It shall also be the responsibility of the CONTRACTOR to submit to the Kentucky Division of Water a completed Notice of Intent (**NOI**) prior to beginning work on this project and to submit a completed Notice of Termination (**NOT**) to the Kentucky Division of Water at the completion of this project.

Copies of the above forms are contained in this SECTION.

The required BMP's, the locations to be used, inspection frequency, and approved maintenance actions are shown in the following table.

Location	BMP	Inspection	Maintenance Action

		Frequency	
On-site Storage Tanks	Containment Structure	1. Daily 2. After rain event	Remove captured water, check for leakage
Stockpile Areas	Silt Fence	1. Weekly 2. After rain event 3. Prior to forecast storm	Clean out surplus silt, repair fence as needed
Parking Areas	Silt Fence Gravel Entrance Pad	1. Weekly 2. After rain event	Clean out surplus silt, repair fence as needed. Add gravel to pad as needed
Equipment maintenance areas	Silt Fence	1. Weekly 2. After rain event	Remove surplus silt, repair fence as needed.
Excavation Areas	Silt Fence	1. Weekly 2. After rain event 3. Prior to forecast storm	Remove surplus silt, repair fence as needed
Project Perimeter	Diversion Ditch	1. Weekly 2. After rain event	Remove accumulated sediment, install erosion protection after completion
Perimeter, along stream buffer	Silt Fence	1. Daily 2. After rain event 3. Prior to forecast storm	Remove accumulated silt when half of depth of fence is covered, straighten posts, replace destroyed sections and spray paint date on repaired sections.
Sediment Pond	Sediment Pond	1. Weekly 2. After rain event 3. Prior to forecast storm	Remove any observed obstructions in spillway systems, remove any surplus sediment accumulation
Inlets	Inlet Protection (aka "Pigs in a Blanket")	1. Weekly 2. After rain event	Remove accumulated silt when half of depth of fence is covered, straighten and replace destroyed sections

1.04 CONTINUING EDUCATION

All personnel actively involved in this project, whether associated with the Design A/E or the General Contractor, shall be notified of this SWPPP and shall be given the opportunity to review the S.O.P. prepared by the DOE for SWPPP's.

The General Contractor (CONTRACTOR), before beginning work, shall formally review the SWPPP with his site management staff, including the site superintendent, key foremen, safety officers, designated workmen, etc., as well as with any subsequent replacements. Failure to understand the details of the SWPPP will not be accepted as an excuse for violations.

1.05 OPERATION AND MAINTENANCE GUIDELINES

The CONTRACTOR's jobsite superintendent and project manager shall familiarize themselves with the SWPPP and the requirements of the SOP developed by the DOE.

The CONTRACTOR shall assemble a Maintenance Log Book to be kept on site and accessible by DOW, Project A/E, DOE, etc. Log Book shall include the following:

a. Copy of the NOI

b. Copy of the General Permit

c. Copy of the SWPPP (may be kept separate if sheet size dictates)

d. Maintenance Log Sheets

The CONTRACTOR shall inspect all BMP's on the project at intervals as stipulated on the SWPPP or in the Log Book.

The Contractor shall promptly repair, clean out, replace, or otherwise perform required maintenance of every BMP at stipulated intervals or after a significant rain event. The CONTRACTOR shall make formal notification to the A/E of any BMP's that do not appear to be functioning properly or that may need review.

END OF SECTION

Kentucky Pollutant Discharge Elimination System (KPDES)
Instructions
Notice of Intent (NOI) for Storm Water Discharges Associated with Industrial Activity
To Be Covered Under The KPDES General Permit

WHO MUST FILE A NOTICE OF INTENT (NOI) FORM

Federal law at 40 CFR Part 122 prohibits point source discharges of stormwater associated with industrial activity to a water body of the Commonwealth of Kentucky without a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The operator of an industrial activity that has such a storm water discharge must submit a NOI to obtain coverage under the KPDES Storm Water General Permit. If you have questions about whether you need a permit under the KPDES Storm Water program, or if you need information as to whether a particular program is administered by the state agency, call the **Storm Water Contact, Industrial Section, Kentucky Division of Water at (502) 564-3410.**

WHERE TO FILE NOI FORM

NOIs must be sent to the following address:

Section Supervisor
Inventory & Data Management Section
KPDES Branch, Division of Water
Frankfort Office Park
14 Reilly Road
Frankfort, KY 40601

COMPLETING THE FORM

Type or print legibly in the appropriate areas only. If you have any questions regarding the completion of this form call the **Storm Water Contact, Industrial Section, at (502) 564-3410.**

SECTION I - FACILITY OPERATOR INFORMATION

Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same as the name of the facility. The responsible party is the legal entity that controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Enter the appropriate letter to indicate the legal status of the operator of the facility.

F = Federal M = Public (other than federal or state)
S = State P = Private

SECTION II - FACILITY/SITE LOCATION INFORMATION

Enter the facility's or site's official or legal name and complete street address, including city, state, and ZIP code.

SECTION III - SITE ACTIVITY INFORMATION

If the storm water discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g., municipality name, county name) and the receiving water of the discharge from the MS4. (A MS4 is defined as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is owned or operated by a state, city, town, borough, county, parish, district, association, or other public body which is designed or used for collecting or conveying storm water.)

If the facility discharges storm water directly to receiving water(s), enter the name of the receiving water.

Indicate whether or not the owner or operator of the facility has existing quantitative data that represent the characteristics and concentration of pollutants in storm water discharges. If data is available submit with this form.

List, in descending order of significance, up to four 4-digit standard industrial classification (SIC) codes that best describe the principal products or services provided at the facility or site identified in Section II of this application.

If the facility listed in Section II has participated in Part 1 of an approved storm water group application and a group number has been assigned, enter the group application number in the space provided.

If there are other KPDES permits presently issued for the facility or site listed in Section II, list the permit numbers.

SECTION IV - ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION ACTIVITIES ONLY

Construction activities must complete Section IV in addition of Sections I through III. Only construction activities need to complete Section IV.

Enter the project start date and the estimated completion date for the entire development plan.

Provide an estimate of the total number of acres of the site on which soil will be disturbed (round to the nearest acre).

Indicate whether the storm water pollution prevention plan for the site is in compliance with approved state and/or local sediment and erosion plans, permits, or storm water management plans.

SECTION V - CERTIFICATION

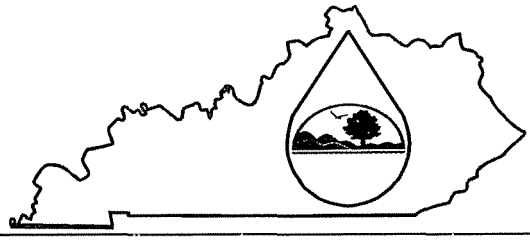
Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer,which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authroity to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

KPDES FORM NOI-SW



Kentucky Pollutant Discharge Elimination System (KPDES)

Notice of Intent (NOI)
for Storm Water Discharges
Associated with Industrial Activity Under the
KPDES General Permit

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a KPDES permit issued for storm water discharges associated with industrial activity. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit.

ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM (See Instructions on back)

I. Facility Operator Information

Name:		**Phone:**	
Address:		**Status of Owner/Operator:**	
City, State, Zip Code:			

II. Facility/Site Location Information

Name:			
Address:			
City, State, Zip Code:			
County:			
Site Latitude: (degrees/minutes/seconds)		**Site Longitude: (degrees/minutes/seconds)**	

III. Site Activity Information

MS4 Operator Name:							
Receiving Water Body:							
Are there existing quantitative data?	**Yes** ☐ **If Yes, submit with this form.** **No** ☐						
SIC or Designated Activity Code Primary		**2nd**		**3rd**		**4th**	

If this facility is a member of a Group Application, enter Group Application Number:

If you have other existing KPDES Permits, enter Permit Numbers:

IV. Additional Information Required FOR CONSTRUCTION ACTIVITIES ONLY

Project Start Date:		**Completion Date:**	
Estimated Area to be disturbed (in acres):			
Is the Storm Water Pollution Prevention Plan in Compliance with State and/or Local Sediment and Erosion Plans?		**Yes** ☐ **No** ☐	

V. Certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed or Typed Name:			
Signature:		**Date:**	

INSTRUCTIONS
NOTICE OF TERMINATION (NOT) OF COVERAGE UNDER THE KPDES GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

Who May File a Notice of Termination (NOT) Form
Permittees who are presently covered under the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit for Storm Water Discharges Associated with Industrial Activity may submit a Notice of Termination (NOT) form when their facilities no longer have any storm water discharges associated with industrial activity as defined in the storm water regulations at 40 CFR 122.26 (b)(14), or when they are no longer the operator of the facilities.

For construction activities, elimination of all storm water discharges associated with industrial activity occurs when disturbed soils at the construction site have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time, or that all storm water discharges associated with industrial activity from the construction site that are authorized by a KPDES general permit have otherwise been eliminated. Final stabilization means that all soil-disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles have been employed.

Where to File NOT Form
Send this form to the following address:

Section Supervisor
Inventory & Data Management Section
KPDES Branch, Division of Water
14 Reilly Road, Frankfort Office Park
Frankfort, KY 40601

Completing the Form
Type or print legibly in the appropriate areas and according to the instructions given for each section. If you have questions about this form, call the Storm Water Contact, Industrial Section, at (502) 564-3410.

Section I - Permit Information
Enter the existing KPDES Storm Water General Permit number assigned to the facility or site identified in Section III. If you do not know the permit number, **call the Storm Water Contact, Industrial Section at (502) 564-3410.**

Indicate your reason for submitting this Notice of Termination by checking the appropriate box:

If there has been a change of operator and you are no longer the operator of the facility or site identified in Section III, check the corresponding box.

If all storm water discharges at the facility or site identified in Section III have been terminated, check the corresponding box.

Section II - Facility Operator Information
Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same name as the facility. The operator of the facility is the legal entity which controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Section III - Facility/Site Location Information
Enter the facility's or site's official or legal name and complete address, including city, state and ZIP code. If the facility lacks a street address, indicate the state, the latitude and longitude of the facility to the nearest 15 seconds, or the quater, section, township, and range (to the nearest quarter section) of the approximate center of the site.

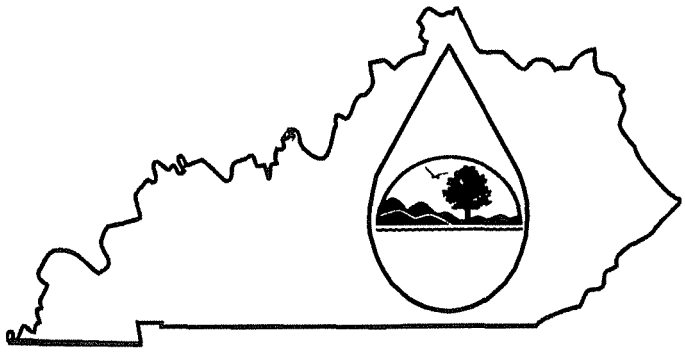
Section IV - Certification
Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, State, Federal, or other public facility: by either a principal executive

KPDES FORM NOT-SW



Kentucky Pollutant Discharge Elimination System (KPDES)

NOTICE OF TERMINATION (NOT)
of Coverage Under the KPDES General Permit for Storm Water Discharges Associated with Industrial Activity

Submission of this Notice of Termination constitutes notice that the party identified in Section II of this form is no longer authorized to discharge storm water associated with industrial activity under the KPDES program.

ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.
(Please see instructions on back before completing this form.)

I. PERMIT INFORMATION
KPDES Storm Water General Permit Number:
Check here if you are no longer the Operator of the Facility: ☐
Check here if the Storm Water Discharge is Being Terminated: ☐
II. FACILITY OPERATOR INFORMATION
Name:
Address:
City/State/Zip Code:
Telephone Number:
III. FACILITY/SITE LOCATION INFORMATION
Name:
Address:
City/State/Zip Code:

Certification: I certify under penalty of law that all storm water discharges associated with industrial activity from the identified facility that are authorized by a KPDES general permit have been eliminated or that I am no longer the operator of the facility or construction site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge storm water associated with industrial activity under this general permit, and that discharging pollutants in storm water associated with industrial activity of waters of the Commonwealth is unlawful under the Clean Water Act and Kentucky Regulations where the discharge is not authorized by a KPDES permit. I also understand that the submittal of this Notice of Termination does not release an operator from liability for any violations of this permit or the Kentucky Revised Statutes.

NAME (Print or Type)	TITLE
SIGNATURE	DATE

SECTION 02050

SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to perform all demolition and removal work as shown on the Drawings and as specified herein. All work shall be carried out in accordance with the Department of Labor:

1. Occupational and Health Hazards (29 CFR - Part 1910).

2. Safety and Health Regulations for Construction (29 CFR - Part 1518).

3. Any applicable local ordinances or codes.

B. None of the existing river bank slope protection hand placed rip rap may be removed. Sheet piling may be driven through the rip rap and it may be covered by the new construction; however, the rip rap is to remain in place throughout construction.

C. Demolition work is expected to be minimal. Any removal work shall be carried to the limits necessary for construction of the new work, as specified hereinafter as directed by the ENGINEER.

1.02 RELATED WORK

A. Concrete work is included in Division 3.

B. Trench, backfilling, and compacting is included in Division 2.

1.03 SUBMITTALS

A. Demolition and Removal Plan

The CONTRACTOR shall submit to the ENGINEER for his review and acceptance a plan for demolition and removal work, in accordance with the requirements of Division 1, Section 01300. After the contract is awarded and prior to the commencement of the work, the CONTRACTOR shall meet with the ENGINEER and OWNER and discuss the demolition and removal plan. The plan shall include a schedule for disconnection of utility services and procedures for the careful removal and disposal of materials, and coordination with other work or City activity in progress. Included in the plan must be a detailed description of the methods and equipment to be used for each operation and the sequence of operations.

1. Do not proceed with demolition until the ENGINEER has given written acceptance of the demolition plan.

2. Obtain all demolition permits required, including any necessary transportation permits, and submit copies of these to the ENGINEER.

B. The demolition plan submitted for approval shall specifically describe in detail the proposed methods and sequences of implementation of demolition work to be performed in connection with facilities, processes, and systems or parts thereof, the operation of which cannot be interrupted. The CONTRACTOR shall provide and operate at his own expense any temporary equipment, connections, bypasses, or other means necessary to assure continuous operation of facilities which in the opinion of the OWNER cannot be interrupted. Following the completion of work , any such temporary provisions shall be removed from the site to the satisfaction of the OWNER, unless otherwise directed.

1.04 PROTECTION

A. Erect barriers, fences, guardrails, enclosures, chutes, and shoring to protect personnel, structures, and utilities remaining intact.

B. Protection of Existing Work

Existing work to remain shall be protected from damage. Work damaged by the CONTRACTOR shall be repaired to match existing work at no additional cost to the OWNER, as directed by the ENGINEER. Provide temporary support and shoring as required for existing materials until new work is installed.

C. Protection of Utilities

Existing utilities that are indicated or the locations of which are made known to the CONTRACTOR prior to demolition work shall be protected from damage. Damaged utilities shall be repaired as directed by the ENGINEER at no additional cost to the OWNER.

D. Protection of Personnel

Where the safety of personnel is endangered in the area of removal work, barricades for traffic shall be used and advance notice shall be given to the ENGINEER prior to beginning any such work.

E. Wherever piping is removed for disposition, adjacent pipe and headers that are to remain in service shall be maintained in service as reconnection is accomplished.

F. Use of Saw Cuts and Pneumatic Hammers

Saw cuts shall be used wherever applicable. Pneumatic hammers shall

only be used with the approval of the ENGINEER.

G. Use of Explosives

Use of explosives will not be allowed on this project..

H. Carry out all demolition work in accordance with the accepted demolition plan and applicable permit requirements.

PART 2 PRODUCTS

None this Section.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that the use of the facilities and related equipment to be demolished has been discontinued.

B. Do not commence work until conditions are acceptable to the ENGINEER.

3.02 PREPARATION

A. Arrange for and verify termination of utility services, including removal of existing utility company appurtenances.

3.03 DEMOLITION

A. Perform demolition in accordance with the accepted demolition plan, applicable permit requirements, and as directed by the ENGINEER.

3.04 DISPOSAL

A. Debris and Rubbish Control: Debris and rubbish shall be removed and transported in a manner that will prevent spillage on streets or adjacent areas.

B. Regulations: Federal, state, and local regulations regarding hauling and disposal shall be complied with.

END OF SECTION

SECTION 02110

SITE CLEARING AND GRUBBING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor and equipment required and perform all clearing, grubbing and stripping of topsoil complete as shown on the DRAWINGS and as specified herein.

1.02 RELATED WORK

None this section.

1.03 SUBMITTALS

None this section.

PART 2 PRODUCTS

None in this Section.

PART 3 EXECUTION

3.01 GENERAL

A. The proposed areas designated for embankment construction, impoundments, ditches and channel changes, borrow pits, etc., (except any portions thereof that may be reserved) shall be cleared of all trees, timbers, brush, stumps, rubbish and other debris. All this material, unless otherwise specified, shall be burned or otherwise removed, as may be directed and without injury to adjoining property. Burning must be in compliance with any applicable regulations covering open burning and smoke abatement. Where clearing is to be done, all stumps and roots shall be grubbed. No debris will be allowed to be left under or in the embankments. In felling trees near structures and wire lines, necessary precaution must be exercised in order to prevent damage to wire lines, structures, the facilities of others. Payment for all clearing and grubbing shall be incidental to the prices bid for doing other work.

3.02 TREES

A. Trees (3" caliper and larger) shall not be disturbed by construction without written permission from the OWNER, except in those areas to be cleared. Trees disturbed by construction shall be replaced by the CONTRACTOR

with same size and type at no additional cost to the OWNER.

END OF SECTION

SECTION 02140

DEWATERING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor and equipment required to dewater all excavations. Dewatering of all excavations shall be the responsibility of the CONTRACTOR, and no additional compensation will be allowed for same unless specifically included as a BID item.

1.02 RELATED WORK

A. Earthwork is included in Division 2, Section 02200.

1.03 SUBMITTALS

Not applicable to this CONTRACT.

PART 2 PRODUCTS

Not applicable to this CONTRACT.

PART 3 EXECUTION

3.01 GENERAL

A. Dewatering equipment shall be of adequate size and quantity to assure maintaining proper conditions for installing pipe, concrete, backfill or other material or structure in the excavation. Dewatering shall include proper removal of any and all liquid, regardless of its source, from the excavation and the use of all practical means available to prevent surface runoff from entering any excavation. No extra payment shall be made for dewatering.

B. No sanitary sewer shall be used for the disposal of water from trenches or other excavations. (From "10-States' Standards)

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of earthwork is indicated on the DRAWINGS.

1. Preparation of sub-grade for embankments and outlet works is included as part of this WORK.

2. Engineered fill course for support of concrete slabs is included as part of this WORK.

3. Backfilling of structures, headwalls, channels, manholes and trenches is included as part of this WORK.

B. Excavation for Mechanical/Electrical WORK

Excavation and backfill required in conjunction with underground mechanical and electrical appurtenances is included as WORK of this Section.

C. Definition

"Excavation" consists of removal of material encountered to sub-grade elevations indicated and subsequent disposal of materials removed.

1.02 RELATED WORK

A. Dewatering is included in this Division, Section 02140.

B. Erosion and sedimentation control is included in this Division, Section 02270.

C. Piping is included in this Division, Section 02610 and 02700.

D. Landscaping is included in this Division, Section 02900.

1.03 QUALITY ASSURANCE

A. Codes and Standards

Perform excavation WORK in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing and Inspection Services

Employ, at CONTRACTOR'S expense, testing laboratory acceptable to the OWNER and the ENGINEER to perform soil testing and inspection service for quality control during earthwork operations.

1.04 SUBMITTALS

A. Test Reports

Submit following reports directly to the ENGINEER from the testing services, with copy to CONTRACTOR:

1. Test reports on borrow material.

2. Verification of each cutoff trench elevation and embankment sub-grade elevation.

3. Field density test reports, one per 3,000 S.F. per lift.

4. One optimum moisture-maximum dry density curve for each type of soil encountered, per ASTM D-698.

1.05 JOB CONDITIONS

A. Site Information

1. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that OWNER will not be responsible for interpretation or conclusions drawn therefrom by CONTRACTOR. Data are made available for convenience of CONTRACTOR.

2. Additional test borings and other exploratory operations may be made by CONTRACTOR at no cost to OWNER.

B. Existing Utilities

Locate existing underground utilities in areas of WORK. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

C. Use of Explosives

Do not bring explosives onto site or use in WORK without prior written permission from authorities having jurisdiction. Contact Kentucky Department of Mines and Minerals for information. CONTRACTOR is solely responsible for handling, storage, and use of explosive materials when their use is permitted.

D. Protection of Persons and Property

1. Barricade open excavations occurring as part of this WORK and post with warning lights.

a. Operate warning lights as directed by authorities having jurisdiction.

b. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

A. Definitions

1. Sub-base material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.

2. Backfill and fill materials: Satisfactory soil materials free of debris, waste, frozen materials, vegetable, and other deleterious matter.

3. Embankment Materials

All fill materials shall be obtained from required excavations and from the proposed borrow areas if shown on the CONTRACT DRAWINGS. The selection, blending, routing and disposition of materials shall be subject to the approval of the ENGINEER.

a. Materials - Impervious Clay Core

Core fill materials shall consist of residual overburden soils within the proposed excavation and borrow areas. These soils consist primarily of brown clays classified as CH or CL using the Unified Soil Classification System.

Fill materials shall contain no sod, organic topsoil, brush, roots or other deleterious materials. Fill material shall be rock free and shall be approved by the ENGINEER prior to fill placement.

b. Materials - Random Earth and Rock Zones

Fill material shall consist of non-organic soil or weathered rock with a maximum particle size of 12 inches. Rock materials from the borrow area shall be excavated by

ripping methods. No blasting will be allowed without written permission from the OWNER.

2.02 EMBANKMENT DRAINAGE MATERIALS

A. No. 57 crushed stone is specified in this Division, Section 02255.

B. Filter fabric for use with the embankment drain location at the downstream face of the impervious core, where called for in this Section, on the DRAWINGS or as determined by the ENGINEER shall be Mirafi 140N as manufactured by Celanese Corporation, New York, NY 10036, or equal.

PART 3 EXECUTION

3.01 STRIPPING AND TOPSOILING

A. Before excavation and grading is commenced for structures, the embankment, outlet works or other WORK described hereinafter (except pipelines and manholes) or before material is removed from borrow pits, (impoundment area) the topsoil shall be removed from the areas affected and stockpiled. When final grading is accomplished, the topsoil shall be spread evenly over the disturbed area, except within the impoundment area. Rough grading shall have been carried approximately 6 inches below finished grade (except solid rock, where it shall be carried 12 inches below finished grade) and brought back up to grade with topsoil as set out herein.

3.02 EXCAVATION

A. All excavation to be unclassified standard excavation includes excavation to sub-grade elevations indicated including excavation of earth, rock (at depth shown on DRAWINGS), bricks, wood, cinders, and other debris.

B. Differing Site Conditions

1. Should the CONTRACTOR, during the course of construction, encounter subsurface or latent physical conditions differing materially from the subsurface information provided, or unknown physical conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in this CONTRACT, he shall immediately notify the ENGINEER in writing of the conditions encountered.

2. Upon receipt of such notice, the ENGINEER shall promptly investigate the conditions described by the CONTRACTOR and shall advise the CONTRACTOR in writing of the decision and/or disposition of the conditions encountered.

C. Unanticipated Material

1. No classification of excavation will be made when unanticipated material is encountered in WORK:

a. Excavation includes excavation of pavements and other obstructions visible on ground surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as unauthorized excavation.

D. Unauthorized excavation consists of removal of materials beyond indicated sub-grade elevations or dimensions without specific direction of ENGINEER. Unauthorized excavation, as well as remedial WORK directed by ENGINEER, shall be at CONTRACTOR'S expense.

1. Under footings or foundation bases fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to the ENGINEER.

2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the ENGINEER.

E. Additional Excavation

1. When excavation has reached required sub-grade elevations, notify the ENGINEER who will make an inspection of conditions.

a. If unsuitable bearing materials are encountered at required sub-grade elevations, carry excavations deeper and replace excavated material as directed by the ENGINEER.

b. Removal of unsuitable material and its replacement as directed will be paid on basis of CONTRACT conditions relative to changes in WORK using Unit Price Modification prices.

F. Stability of Excavations

1. Slope sides of excavations to comply with Federal, State and local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

2. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

G. Shoring and Bracing

Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.

1. Establish requirements for trench shoring and bracing to comply with Federal, State and local codes and authorities having jurisdiction.

2. Maintain shoring and bracing in excavations regardless of time period excavation progresses.

3. Provide permanent steel sheet piling or pressure creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops as required and leave permanently in place.

H. Dewatering

1. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding PROJECT site and surrounding area.

   a. Do not allow water to accumulate in excavation. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of sub-grades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

   b. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavation to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

2. Prevent impoundment of water behind embankment during construction and prior to acceptance of OWNER.

3. See this Division, Section 02140 for additional requirements.

I. Material Storage

1. Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.

   a. Dispose of excess soil material and waste materials as herein specified.

J. Excavation for Structures

1. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

2. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other WORK.

K. Excavation for Pavements

1. Cut surface under pavements to comply with cross-sections, elevations, and grades as shown on DRAWINGS.

L. Trench Excavation

1. The CONTRACTOR shall include in his lump sum BID all trenching and backfill necessary for installation of all pipelines as planned and specified. Trenching shall include clearing and grubbing of all trash, weeds, briars, trees and stumps encountered in the trenching. The CONTRACTOR shall dispose of such material at no extra cost to the OWNER. Shrubs shall be removed, maintained and replanted in the same or adjacent location as the ENGINEER may direct. Trenching also includes such items as pipe and small creek crossings; cutting, moving or repairing damage to fences, posts, gates, and other surface structures regardless of whether shown on the DRAWINGS.

2. All existing facilities shall be protected from danger or damage while pipelines are being constructed and backfilled, and from damage due to settlement of the backfill.

3. In the event any existing structure is damaged, repair and restoration shall be made at once and backfill shall not be replaced until this is done. Restoration and repair shall be such that the damaged structure is equal to or better than its original condition and can serve its purpose as completely as before. All such restoration and repair shall be done without extra cost to the OWNER.

4. Trenches must be dug to lines and grades shown on the DRAWINGS. Hand trenching will be required in areas where machine trenching would result in undue damage to existing structures and facilities.

5. Excavation shall be open trenches.

6. Sheeting and shoring of trenches shall be provided at the expense of the CONTRACTOR where necessary to protect life, property and the new or existing structures from damage or to maintain maximum permissible trench widths at top of pipe. All necessary materials, including, but not limited to, sheeting, sheet piling, trench jacks, braces, shores and stringers, shall be used to hold trench walls. Sheeting and shoring may be withdrawn as the trenches are being backfilled, after backfill has been tamped over top of the pipe at least 18 inches. If removal before backfill is completed to surface endangers adjacent structures, such as buildings, pipelines, street paving, and sidewalks, then the sheeting and shoring shall be left in place until such danger has passed, and then pulled if practical. Voids caused by sheeting withdrawal shall be backfilled and tamped. If not withdrawn, sheeting shall be cut off at least 18 inches below final surface grade, so there is no obstruction at the ground level.

7. Where sub-grade of trench has insufficient stability to support the pipeline and hold it to its original grade, the ENGINEER may order stabilization by various means. Exclusive of dewatering normally required for construction, and instability caused by neglect of the CONTRACTOR, the necessary stabilization shall be paid for at unit price set up in the CONTRACT. In the event no particular BID price is applicable, then the payment for stabilization will be negotiated.

8. The location of the pipelines and their appurtenances as shown are those intended for the final construction. However, conditions may present themselves before or after construction on any line is started that would indicate desirable changes in location. The OWNER reserves the right to make reasonable changes in line and structure locations without extra cost, except as may be determined by extra units of materials and construction actually involved. The OWNER is under no obligation to locate pipelines, so they may be excavated by machine.

9. Tunneling may be used as an alternate to open-cut trenching, at no extra cost to the OWNER. The annular space between plates and excavation shall be either permanently placed pea gravel or sand, pumped grout (3 parts sand and 1 part Portland cement by volume) or other suitably installed material approved by the ENGINEER. Backfilling shall be kept close to the heading and completed after each day's WORK. Where grout is used for backfill, injection holes with threaded plugs shall be provided in liner plates at various levels and in sufficient number to effectively grout the void around the tunnel. A minimum of 3 grout holes shall be provided in each 8 feet of tunnel length. Grout shall be injected in the lower holes first, proceeding upward as the void is filled. Plugs shall be installed after each hole is filled and grout stops shall be provided behind plates as necessary to ensure complete filling of the void. In tunneling under buildings, the CONTRACTOR

will be responsible for all damage resulting from his operations and methods of excavation and backfilling. Boring may also be used as an alternate to tunneling or open-cut trenching, at no extra cost to the OWNER.

10. Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide 6" to 9" clearance on both sides of pipe or conduit.

    a. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.

    b. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel prior to installation of pipe.

    c. For pipes or conduit 3 inches or less in nominal size and for flat-bottomed, multiple-duct conduit units, excavate to sub-base depth indicated or, if not indicated, then to 2 inches below bottom of WORK to be supported.

    d. For pipes or conduit 6 inches or larger in nominal size, tanks, and other mechanical/electrical WORK indicated to receive sub-base, excavate to sub-base depth indicated or, if not otherwise indicated, to 6 inches below bottom of WORK to be supported.

    e. Except as otherwise indicated, excavate for exterior water-bearing piping (water, steam, condensate, drainage) so top of piping is no less than 2 feet 6 inches below finish grade.

    f. Grade bottoms of trenches as indicated on DRAWINGS, notching under pipe bells to provide solid bearing for entire body of pipe.

    g. Concrete is specified in Division 3.

    h. Do not backfill trenches until tests and inspections have been made and backfilling authorized by the ENGINEER. Use care in backfilling to avoid damage or displacement of pipe systems.

    i. For piping or conduit less than 2 feet 6 inches below surface of roadways, provide 4-inch thick concrete base slab support. After installation and testing of piping or conduit, provide minimum 4-inch thick encasement (sides and top) of concrete prior to backfilling or placement of roadway sub-base.

M. Cold Weather Protection

1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F (1°C).

3.03 COMPACTION

A. General

1. Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.

a. Percentage of maximum density requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D698; and not less than the following percentage of relative density, determined in accordance with ASTM D2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils). CONTRACTOR is responsible for providing one optimum moisture content - maximum dry density curve in accordance with the above referenced ASTM standards for each soil type encountered.

b. Structures, building slabs and steps, pavements: Compact top 12 inches of sub-grade and each 8 inch loose, uncompacted layer of backfill or fill material at 100 percent maximum density for cohesive material or 95 percent relative density for cohesionless material.

c. Lawn or unpaved areas: Compact to 6 inches of sub-grade and each 8 inch loose, uncompacted layer of backfill or fill material at 90 percent maximum density for cohesive soils and 90 percent relative density for cohesionless soils.

d. Walkways: Compact top 6 inches of sub-grade and each 8 inch loose, uncompacted layer of backfill or fill material at 95 percent maximum density for cohesive material or 95 percent relative density for cohesionless material.

2. Subgrade and backfill for sewers located in fill areas shall be compacted to not less than 95 percent maxium density.

B. Moisture Control

1. Where sub-grade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface or sub-grade, or layer of soil material, to prevent free water from

appearing on surface during or subsequent to compaction operations.

2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by deicing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.04 BACKFILL AND FILL

A. General

1. Place acceptable soil material in layers to required sub-grade elevations, for each area classification listed below.

a. In excavations, use satisfactory excavated or borrow material.

b. Under grassed areas, use satisfactory excavated or borrow material.

c. Under walks and pavements, use sub-base material, or satisfactory excavated or borrow material, or combination of both.

d. Under steps, use sub-base material.

e. Under building slabs, use engineered fill material for a minimum depth of 6 inches.

f. Sub-base material or satisfactory excavated or borrow material may be used below engineered fill at building slabs.

g. Under piping and conduit, use sub-base material where sub-base is indicated under piping or conduit; shape to fit bottom 90° of cylinder.

B. Backfill excavations as promptly as WORK permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Inspection, testing, approval, and recording locations of underground utilities.

3. Removal of concrete formwork.

4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

5. Removal of trash and debris.

6. Permanent or temporary horizontally supported walls.

C. Ground Surface Preparation

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface, except as otherwise specified in Section 02200-3.05 for embankments.

2. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, adjust moisture condition to optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placement and Compaction

1. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

a. Before compaction, add moisture to each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

b. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

E. Backfilling Trenches

1. Backfilling shall be accomplished as soon as practical after pipe has been laid and jointing and alignment approved. Packing of crushed rock between joints shall be the usual procedure as the laying progresses. This is in order to avoid danger of

misalignment from slides, flooding or other causes. The ENGINEER shall be given a maximum of 24 hours for inspection before backfilling.

2. The backfill over the pipe shall be in accordance with the standard details shown on the DRAWINGS for bedding and backfilling pipe.

3. In case maximum permissible trench widths (as designated by the pipe manufacturer) are exceeded, the CONTRACTOR shall furnish crushed rock backfill to a minimum of 12 inches over the top of pipe at no extra cost to the OWNER.

4. After the foregoing cover requirements over top of the pipe have been met, rock may be used in the backfill in pieces no larger than 12 inches in any dimension and to an extent not greater than one-half the backfill materials used. If additional earth is required for backfilling, it must be obtained and placed by the CONTRACTOR at no additional cost to the OWNER. Filling with rock and earth shall proceed simultaneously, such that no voids are left in the rock. After cover requirements over top of pipe have been met, backfilling may be employed without tamping, provided caution is used in quantity per dump and uniformity of level of backfilling. Surplus material shall be uniformly ridged over trench and excess rock hauled away, with no rock over 1-1/2 inch diameter in the top 6 inches. Ridged backfill shall be confined to the width of the trench and no higher than needed for replacement of settlement of backfill. All rock over 1-1/2 inch diameter shall be broomed to remove all earth and loose rock, all immediately following backfilling.

5. In the case of street, highway, railroad, sidewalk and driveway crossings; or within any roadway paving; or about manholes, valve and meter boxes; the backfill must be mechanically tamped in not over 6 inch layers, measured loose. Alternate method of compacting backfill shall be used, if refill material is in large hard lumps (crushed rock excepted) which cannot be consolidated without leaving voids.

6. In the case of tunnels, the annular space between plates and excavation shall be either permanently placed pea gravel or sand, pumped grout (3 parts sand and 1 part Portland cement by volume) or other suitably installed material approved by the ENGINEER. Backfilling shall be kept close to the heading and completed after each day's WORK. Where grout is used for backfill, injection holes with threaded plugs shall be provided in liner plates at various levels and in sufficient number to effectively grout the void around the tunnel. A minimum of 3 grout holes shall be provided in each 3 feet of tunnel length. Grout shall be injected in the lower holes first, proceeding upward as the void is filled. Plugs shall be installed after each hole is filled and grout stops

shall be provided behind plates as necessary to ensure complete filling of the void.

7. Where traffic on streets, driveways, railroads, sidewalks and highways requires temporary surfacing, backfilling shall be terminated 4 inches below original ground level and 4 inches to 6 inches of dense graded aggregate shall be placed on the trench. Backfills shall be maintained easily passable to traffic at original ground level, until acceptance of PROJECT or replacement of paving or sidewalks.

8. Excavated materials from trenches and tunnels in excess of that required for backfill shall be disposed of on the plant lot, as directed by the ENGINEER.

9. The CONTRACTOR shall protect all sewer, gas, electric, telephone, water, and drain pipes of conduits from damage while pipelines are being constructed and backfilled, and from danger due to settlement of trench backfill.

10. No extra payment shall be made for backfilling of any kind, except as specified herein before. Backfilling shall be included as a part of the Unit Price BID. No extra payment will be made to the CONTRACTOR for supplying outside materials for backfill.

11. On completion of the PROJECT, all backfills shall be dressed; holes filled; and surplus material hauled away. All permanent walks, street paving, roadway, etc., shall be restored and seeding and sodding performed as required.

3.05 EMBANKMENTS

A. Borrow Excavation

Should insufficient quantities of suitable soil fill material for construction of the embankment be located within the designated areas, where shown on the PLANS, the CONTRACTOR shall obtain suitable soil material conforming to the requirements of the "Materials" SPECIFICATIONS at no additional cost to the OWNER.

Excavation areas shall be excavated and finally dressed in a manner such that no steep or unstable side slopes or other hazardous or unsightly conditions exist.

To the extent that they are needed, all suitable materials shall be used in the construction of permanent earth fill or rock fill. The suitability of materials for specific purposes will be determined by the ENGINEER. The CONTRACTOR shall not waste or otherwise dispose of suitable excavated materials.

B. Foundation Preparation

Foundations for earth fill shall be stripped of all topsoil to remove vegetation and other deleterious materials or shall be excavated as specified.

Except as otherwise specified for foundation benches, earth foundation surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill or otherwise acceptably scored and loosened to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the earth fill, and the surface materials of the foundation shall be compacted and bonded with the first layer of earth fill as specified for subsequent layers of earth fill.

When the original ground surface is sloping at rate of 15 percent or greater, perpendicular to the embankment axis, embankment foundation benches shall be constructed as shown on the CONTRACT DRAWINGS. Preparation of the foundation shall proceed as described in the previous paragraph.
Earth abutment surfaces shall be free of loose, uncompacted earth in excess of two inches in depth normal to the slope and shall be at such a moisture content that the earth fill can be compacted against them to effect a good bond between the fill and the abutments.

C. Fill Placement

Fill shall not be placed until the required excavation and foundation preparation have been completed and the foundation has been inspected and approved by the ENGINEER. Fill shall not be placed upon a frozen surface, nor shall snow, ice or frozen material be incorporated in the fill.

Fill shall be placed in approximately horizontal layers. The thickness of each layer before compaction shall not exceed twelve inches (12"). Materials placed by dumping in piles or windrows shall be spread uniformly to not more than the specified thickness before being compacted. Hand compacted fill, including fill compacted by manually directed power tampers, shall be placed in layers whose thickness before compaction does not exceed six inches (6").

Adjacent to pipe or structures, fill shall be placed in a manner which will prevent damage to the pipes or structures and will allow the pipes or structures to assume the loads from the fill gradually and uniformly. The height of the fill adjacent to a structure shall be increased at approximately the same rate on all sides of the structures.

Earth fill for embankments shall also be placed so as to meet the following additional requirements:

1. The distribution of materials, throughout the zone shall be essentially uniform, and the fill shall be free from voids, pockets, streaks or layers of material differing substantially in texture or graduation from the surrounding material.

2. If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches before the next layer is placed.

3. The top surfaces of embankments shall be maintained approximately level during construction, except that a crown or cross-slope of not less than 2 percent shall be maintained to insure effective drainage. If the DRAWINGS or SPECIFICATIONS require or the ENGINEER directs that fill be placed at a higher level in one part of an embankment than another, the top surface of each part shall be maintained as specified above.

4. Embankments shall be constructed in continuous layers except where openings to facilitate construction or to allow the passage of stream flow during construction are specifically authorized.

5. Embankments built at different levels as described under (3) or (4) above shall be constructed so that the slope of the bonding surfaces between embankment in place and embankment to be placed is not steeper than 3 feet horizontal to 1 foot vertical. The bonding surface of the embankment in place shall be stripped of all loose material, and shall be scarified, moistened and recompacted when the new fill is placed against it as needed to insure a good bond with the new fill and to obtain the specified moisture content and density in the junction of the in place and new fill.

6. Embankment materials shall be placed in the zones (impervious core and random earth and rock) shown on the CONTRACT DRAWINGS. Prior to fill placement in the cutoff trench, the bottom of the cut off trench shall be inspected by the ENGINEER. All fractures or joints shall be clean and filled with mortar or concrete unless otherwise directed by the ENGINEER.

7. Fill placement shall then proceed in accordance with CONTRACT PLANS AND SPECIFICATIONS and in a manner such that no steep or unstable slopes or other hazardous or unsightly conditions exist. Fill material used shall conform to requirements of the "Materials" SPECIFICATIONS previously mentioned.

8. Rocks placed in the random earth and rock zones shall be kept at least 2 feet below the embankment surface. The rock shall not be dumped into final position, but shall be distributed by blading or dozing in a manner that will ensure proper placement in the embankment so that voids, pockets and bridging will be eliminated.

D. Compaction

Each layer of fill shall be compacted as necessary to make density of the fill matrix not less than the minimum density specified. The fill matrix is defined as the portion of the fill material finer than the maximum particle size used in the compaction test method specified. Embankment fill shall be compacted to minimum field densities equal to or greater than 95 percent of maximum dry density as determined by the Standard Procter Maximum Dry Density test method ASTM D-698. Moisture content may vary optimum, -2 percent to +1 percent as also determined by ASTM D-698.

CONTRACTOR shall provide one moisture content vs. dry density relationship curve as determined by standard test method ASTM D-698 to help determine optimum moisture content and maximum dry density for each soil type encountered during construction prior to placement in the embankment.

Fill adjacent to structures shall be compacted to a density equivalent to that of the surrounding fill by means of hand tamping or manually directed power tampers or plate vibrators. Heavy equipment shall not be operated within 2 feet of any structure. Vibrating rollers shall not be operated with 5 feet of any structure. Compaction by means of drop weights operating from a crane or hoist will not be permitted.

The passage of heavy equipment will not be allowed: (a) over cast-in place conduits prior to 14 days after placement of the concrete; (b) over cradled pre-cast conduits prior to 7 days after placement of the concrete cradle; or (c) over any type of conduit until the backfill has been placed above the top surface of the structure to a height equal to one-half of the clear span width of the structure or pipe or 2 feet, whichever is greater.

E. Testing

During the course of the WORK, the CONTRACTOR will perform such tests as are required to identify the materials, to determine compaction characteristics, to determine moisture content, and to determine density of fill in place. These tests performed by the CONTRACTOR will be used to verify that the fills conform to the requirements of the SPECIFICATIONS. Such tests are intended to provide the CONTRACTOR with the information required by him for the proper execution of the WORK.

Submittals shall be per Section 02200, paragraph 1.04 A.

F. Removal and Replacement of Defective Fill

Fill placed at densities lower than the specified minimum density or at moisture contents outside the specified acceptable range of moisture content or otherwise not conforming to the requirements of the SPECIFICATIONS shall be reworked to meet the requirements or removed and replaced by acceptable fill. The replacement fill, the foundation, and the surfaces upon which the fill is placed shall conform to

all requirements of the SPECIFICATIONS for foundation preparation, approval, placement, moisture control and compaction.

3.06 GRADING

A. General

1. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between such points and existing grades.

B. Grading Outside Building Lines

1. All materials used for backfill around structures shall be of a quality acceptable to the ENGINEER and shall be free from large or frozen lumps, wood and other extraneous material. All spaces excavated and not occupied by footings, foundations, walls or other permanent WORK shall be refilled with earth up to the surface of the surrounding ground, unless otherwise specified, with sufficient allowance for settlement. In making the fills and terraces around the structures, the fill shall be placed in layers not exceeding 12 inches in depth and shall be kept smooth as the WORK progresses. Each layer of the fill shall be rolled with an approved type roller and/or be compacted. When it is not practicable to compact sections of the fill immediately adjacent to buildings or structures by rolling, then such sections shall be thoroughly compacted by means of mechanical tamping or hand tamping as may be required by the conditions encountered. All fills shall be placed so as to load structures symmetrically.

2. As set out herein before, rough grading shall be held below finished grade and then the topsoil which has been stockpiled shall be evenly spread over the surface. The grading shall be brought to the levels shown on the DRAWINGS or to the elevations established by the ENGINEER. Final dressing shall be accomplished by hand WORK or machine WORK, or a combination of these methods as may be necessary to produce a uniform and smooth finish to all parts of the re-grade. The surface shall be free from clods greater than 2 inches in diameter. Excavated rock (6 inches maximum size) may be placed in the fills, but it shall be thoroughly covered. Rock placed in fills shall not be closer than 12 inches from finished grade.

3. Grade areas adjacent to building lines to drain away from structures and to prevent ponding.

a. Finish surfaces free from irregular surface changes, and as follows:

(1) Lawn or unpaved areas: Finish areas to receive topsoil to within not more than 0.10 ft. above or below required sub-grade elevations.

(2) Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10 ft. above or below required sub-grade elevation.

(3) Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 0.04 ft. above or below required sub-grade elevation.

C. Grading Surface of Fill Under Building Slabs

1. Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 0.04 ft. when tested with a 10ft. straightedge.

D. Compaction

1. After grading, compact sub-grade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.07 PAVEMENT SUB-BASE COURSE

A. General

1. Sub-base course consists of placing sub-base material, in layers of specified thickness, over sub-grade surface to support a pavement base course.

B. Grade Control

1. During construction, maintain lines and grades including crown and cross-slope of sub-base course.

C. Shoulders

1. Place shoulders along edges of sub-base course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each sub-base course layer. Compact and roll at least a 12 inch width of shoulder simultaneously with compacting and rolling of each layer of sub-base course.

D. Placing

1. Place sub-base course material on prepared sub-grade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting sub-base material during placement operations.

2. When a compacted sub-base course is shown to be 6 inches thick or less, place material in a single layer. When it is shown to be more than 6 inches thick, place material in equal layers, such that no single layer shall be more than 6 inches or less than 3 inches in thickness when compacted.

3.08 BUILDING SLAB ENGINEERED FILL COURSE

A. General

1. Engineered fill course consists of placement of fill material, in layers of indicated thickness, over sub-grade surface to support concrete building slabs.

B. Placing

1. Place fill material on prepared sub-grade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.

2. When a compacted course is shown to be 6 inches or less, place material in a single layer. When it is shown to be more than 6 inches thick, place material in equal layers, such that no single layer shall be more than 6 inches or less than 3 inches in thickness when compacted.

3.09 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction

1. Allow testing service to inspect and report to the ENGINEER on findings and approve sub-grades and fill layers before further construction WORK is performed.

a. Perform field density tests in accordance with ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2992 (nuclear density method), as applicable.

b. Footing sub-grade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing sub-grade may be based on a visual comparison of each sub-grade with related tested strata, when acceptable to ENGINEER.

c. Paved areas and building slab sub-grade: Make at least one field density test of sub-grade for every 2,000 square feet of paved area or building slab, but in no case less than three tests. In each compacted fill layer, make one field density test for every 2,000 square feet of overlaying building slab or paved area, but in no case less than three tests.

d. Foundation wall backfill: Take at least two field density tests, at locations and elevations as directed.

B. If in the opinion of the ENGINEER, based on testing service reports and inspection, sub-grade or fills which have been placed are below specified density, CONTRACTOR shall provide additional compaction and testing at no additional expense to the OWNER.

3.10 MAINTENANCE

A. Protection of Graded Areas

1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas

1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

C. Settling

1. Where settling is measurable or observable at excavated areas during general PROJECT warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent WORK, and eliminate evidence of restoration to greatest extent possible.

3.11 BASIS FOR PAYMENT

Payment for excavation shall be made on a unit price or a lump sum basis where a separate bid item is provided. Otherwise payment for all excavation, trenching and backfilling required for other work, such as structures, pipelines, etc., shall be made on a unit price or lump sum basis bid for that work.

END OF SECTION

SECTION 02255

CRUSHED STONE AND DENSE GRADED AGGREGATE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install crushed stone for miscellaneous uses as shown on the Drawings, as called for in the Specifications, or as may be directed in writing by the ENGINEER.

B. Sizes, types, and quality of crushed stone are specified in this Section, but its use for replacement of unsuitable material, pavement base, and similar uses is specified in detail elsewhere in the Specifications. The ENGINEER may order the use of crushed stone for purposes other than those specified in other sections, if, in his opinion, such use is advisable.

PART 2 PRODUCTS

2.01 MATERIALS

A. When referred to in these Specifications, crushed stone shall be Number 57 graded in accordance with the Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, 2000 Edition.

B. When referred to in these Specifications, dense graded aggregate (DGA) shall be crushed stone classified by the Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, 2000 Edition, and conforming to the following requirements:

Sieve Size	Percent Passing
1 Inch	100
3/4 Inch	70 - 100
3/8 Inch	50 - 80
#4	30 - 65
#30	10 - 40
#200	4 - 13

PART 3 EXECUTION

3.01 INSTALLATION

A. Crushed stone shall be placed in uniform layers not greater than 6 inches deep and shaped by power equipment to required lines, grades, cross sections, and depths. No minimum compacted density, method of

compaction, or compaction equipment is required since a nominal amount of compaction effort with vibration can establish the desired inter-granular locking of the aggregate under controlled placement depth. Acceptable compaction can be achieved with pneumatic-tired and tracked vibratory equipment and vibratory rollers.

B. All compaction operations shall be performed to the satisfaction of the ENGINEER.

C. Crushed stone shall be placed in those areas as shown on the Drawings and as may be directed by the ENGINEER.

3.02 BASIS FOR PAYMENT

Payment for crushed stone or DGA shall be made on a unit price or a lump sum basis where a separate bid item is provided. Otherwise payment for crushed stone or DGA required for other work show on the PLANS shall be made on a unit price or lump sum basis bid for that work.

END OF SECTION

SECTION 02270

EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials and equipment required for erecting, maintaining and removing temporary erosion and sedimentation controls as shown on the Drawings and as specified herein.

B. Temporary erosion controls include, but are not limited to grassing, mulching, seeding, watering, and reseeding on all disturbed surfaces including waste area surfaces and stockpile and borrow area surfaces; scheduling work to minimize erosion and providing interceptor ditches at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits.

C. Temporary sedimentation controls include, but are not limited to, silt dams, silt fences, traps, barriers, staked straw-bale diversions and appurtenances at the foot of sloped surfaces, which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits.

D. CONTRACTOR is responsible for providing and maintaining effective temporary erosion and sediment control measures during construction or until final controls become effective.

E. The erosion and sedimentation controls where shown on the Drawings and/or specified herein are intended to provide the required environmental protection. However, should additional controls be directed by the ENGINEER, CONTRACTOR shall furnish, install and maintain additional mulching and straw-bale diversions to control erosion and sedimentation to the satisfaction of the ENGINEER at no additional cost to OWNER.

F. Construction methods that will minimize siltation and erosion shall be employed. The CONTRACTOR shall take steps to minimize unnecessary excavation and disturbing or uprooting trees and vegetation. The CONTRACTOR is prohibited from dumping soil or debris, or pumping silt-laden water into a stream. Cleanup, grading, seeding and planting or restoration of all work areas shall begin immediately. Exposed areas shall not remain unprotected for more than seven days. (From "10-States' Standards")

1.02 RELATED WORK NOT INCLUDED

A. Site clearing and grubbing is included in this Division, Section 02110.

B. Dewatering is included in this Division, Section 02140

C. Landscape work is included in this Division, Section 02900.

D. Final erosion protection measures are included in this Division, Section 02200.

PART 2 PRODUCTS

A. Erosion control blanket where called for in this Section, on the Drawings, or as determined by the ENGINEER, shall be AMXCO Curlex Blanket as manufactured by American Excelsior Company, Arlington, TX 76011, or equal.

B Rip-rap lining where called for in this Section, on the Drawings or as determined by the ENGINEER shall be Class III or Class II lining as shown on the Drawings and as specified in Section 703 of the 2000 edition of the Kentucky Department of Highways "Standard Specifications for Road and Bridge Construction."

For Class III, no less than 80 percent, by volume, of individual stones shall range in size from 1/4 to 1-1/2 cubic feet. Stones of smaller sizes are permissible for use in filling voids in the upper surface and dressing to the proper slope. In addition to the above referenced specifications, individual stone dimensions are limited to 4 inches (minimum) and 24 inches (maximum).

For Class II lining, no more than 20 percent of the finished product shall pass through square openings 5 inches by 5 inches.

C. Filter fabric for use with rip-rap where called for in this Section, on the Drawings, or as determined by the ENGINEER, shall be Mirafi 700X as manufactured by Celanese Corporation, New York, NY 10036, or equal.

D. Silt fence fabric where called for in this Section, on the Drawings or as determined by the ENGINEER shall be Mirati 100X as manufactured by Celanese Corporation, New York, NY 10036, or equal.

PART 3 EXECUTION

3.01 GENERAL

A. Erosion control practices shall be adequate to prevent erosion of all disturbed and/or all regraded areas.

B. Earthwork procedures shall be as specified in this Division, Section 02200.

C. Silt fences shall be located and staked in all disturbed locations and/or all regraded where erosion may occur.

3.02 TEMPORARY SEEDING

A. This item shall consist of seeding a temporary cover of grass, or grass and small grain, on areas disturbed on the construction site, which will not be redisturbed within a 60 day period. The determination of the area to be temporarily seeded and the time of seeding shall be made by the ENGINEER.

B. The seed mixtures to be used for temporary cover will be governed by the time of year the seeding is accomplished. The mixture of seeding shall be as follows:

1. Time of Seeding - February 15 to June 1

   Rye 1-1/2 bushels and rye grass 25 pounds per acre; or tall fescue 30 pounds and rye grass 20 pounds per acre.

2. Time of Seeding - June 2 to August 15

   Tall fescue 30 pounds and rye-grass 20 pounds per acre; or, spring oats 2 bushels and rye grass 30 pounds per acre.

3. Time of Seeding - August 16 to February 14

   Rye 2 bushels and rye grass 20 pounds per acre; or, tall fescue 30 pounds and rye- grass 20 pounds per acre.

4. Lime will not be required for temporary seeding.

5. Fertilizer at the rate of 400 pounds per acre of 10-10-10 fertilizer, or equivalent, broadcast uniformly on the area to be seeded.

6. All seed shall be broadcast evenly over the area to be seeded and culti-packed or otherwise pressed into the soil. Seed and fertilizer may be mixed together and applied after the seed has been prepared.

7. Mulch for temporary seeding will not be required except on those areas, in the ENGINEER'S opinion, which are too steep to hold the seed without protective cover.

3.03 RIP-RAP LINING

A. Rip-rap lining shall be constructed to the lines and grades and at the location designated on the Drawings.

The filter fabric shall be placed at the locations shown on the Drawings. The surface to receive the fabric shall be prepared to a relatively smooth condition free of obstructions, debris or sharp objects that may puncture

the fabric. Construction equipment will not be permitted to operate directly on the fabric.

The fabric shall be placed with long dimension parallel to the channel or embankment centerline and shall be laid smooth and free of tension, stress, folds, wrinkles, or creases. If more than one strip is necessary, the strips shall overlap a minimum of 3 feet. Transverse laps shall be placed so the upstream strip laps over the downstream strip.

Fastener pins shall be installed through both strips of overlapped fabric at no less than 5 foot intervals along a line through the midpoint of the lap, and at any other locations as necessary to prevent any slippage of the fabric.

Fabric shall be covered with the rip-rap lining within 14 calendar days after placement of the fabric. Fabric not covered within this time shall be removed and replaced at the CONTRACTOR'S expense if the ENGINEER determines that damage or deterioration is evident.

The fabric shall be protected from damage due to the placement of the channel lining by limiting the height of drop of the material at no greater than 3 feet or by placing a cushioning layer of sand on top of the fabric before dumping the material, at the CONTRACTOR'S option. The CONTRACTOR shall demonstrate that the placement technique will prevent damage to the fabric.

Placement of channel lining shall begin at the toe of the channel and proceed upstream. The lining shall be placed to conform to the template shown on the Drawings. The lining need not be compacted but shall be placed upgrade in a manner to ensure that the larger rock fragments are uniformly distributed and the smaller rock fragments serve to fill the spaces between the larger rock fragments in such a manner as will result in a well keyed, densely placed, uniform layer of lining of the specified thickness. Hand placing will be required only to the extent necessary to secure the results specified above.

3.04 MAINTENANCE OF CONTROLS AND PERFORMANCE

A. Erosion and sedimentation controls shall be inspected weekly and after significant rainstorms. Replace silt fencing which is damaged filter stone which is dislodged, erosion control blanket which is damaged, and make other necessary repairs.

B. Should any of the temporary erosion and sediment control measures employed by the CONTRACTOR fail to produce results consistent with normal and acceptable standards of the industry. The CONTRACTOR shall immediately take whatever steps are necessary to correct the deficiency at his own expense.

C. Remove all temporary erosion and sedimentation controls as final landscaping and grading is performed.

3.05 CONSTRUCTION ALONG OR ACROSS AN INTERMITTENT OR PERENNIAL STREAM

The following special considerations shall be given to constuction along or across an intermittent or perennial stream:

A. Development/excavation shall be performed during low flow periods to minimize disturbance.

B. When crossing a stream, the pipe shall be laid perpendicular to the stream bank to minimize the direct impacts to the streambed.

C. When working adjacent to a stream, soil erosion control structures shall be placed parallel to all streams to minimize entry of silt into the stream.

D. All disturbed instream habitat shall be returned to its original condition upon completion of construction in the area.

E. The contractor shall take every possible measure to preserve the tree canopy overhanging the stream.

F. Streambanks shall be reseeded immediately with the stream bank seed mix described in Section 02900, following completion of the stream crossing, disturbed surfaces shall be restored to original contours, and excess materials removed to a properly confined upland area.

END OF SECTION

SECTION 02320

HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.01 SECTION DESCRIPTION

The work specified in this section consists of furnishing and installing underground utilities using the horizontal directional drilling (HDD) method of installation, also commonly referred to as directional boring or guided horizontal boring. This work shall include all services, equipment, materials, and labor for the complete and proper installation, testing, restoration of underground utilities and environmental protection and restoration.

1.02 REFERENCES

Specification 02610 – High Density Polyethylene (HDPE) Pipe and Fittings shall be used as a reference.

1.03 QUALITY ASSURANCE

The requirements set forth in this document specify a wide range of procedural precautions necessary to insure that the very basic, essential aspects of a proper directional bore installation are adequately controlled. Strict adherence shall be required under specifically covered conditions outlined in this specification. Adherence to the specifications contained herein, or the Engineer's approval of any aspect of any directional bore operation covered by this specification, shall in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract.

1.04 SUBMITTALS

A. WORK PLAN

Prior to beginning work, the Contractor must submit to the Engineer a general work plan outlining the procedure and schedule to be used to execute the project. Plan should document the thoughtful planning required to successfully complete the project.

B. EQUIPMENT

Contractor will submit specifications on directional drilling equipment to be used to ensure that the equipment will be adequate to complete the project.

C. MATERIALS

Specifications on material to be used shall be submitted to Engineer. Material shall include the pipe, fittings and any other item which is to be an installed component of the project.

PART 2 EQUIPMENT REQUIREMENTS

2.01 EQUIPMENT

The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.

2.02 DRILLING SYSTEM

A. DRILLING RIG

The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations.

B. DRILL HEAD

The drill head shall be steerable by changing its rotation and shall provide the necessary cutting surfaces and drilling fluid jets.

C. MUD MOTORS (if required)

Mud motors shall be of adequate power to turn the required drilling tools.

D. DRILL PIPE

Shall be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tool joints should be hardened to 32-36 RC.

2.03 GUIDANCE SYSTEM

The Guidance System shall be of a proven type and shall be setup and operated by personnel trained and experienced with this system. The Operator shall be aware of any magnetic anomalies and shall consider such influences in the operation of the guidance system if using a magnetic system.

2.04 DRILLING FLUID (MUD) SYSTEM

A. MIXING SYSTEM

A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water and appropriate additives. Mixing system shall be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank shall be sized for adequate storage of the mud. Mixing system shall continually agitate the drilling fluid during drilling operations.

B. DRILLING FLUIDS

Drilling fluid shall be composed of clean water and an appropriate additive. Water shall be from a clean source with a pH of 8.5 – 10 and/or as per mixing requirements of the Manufacturer. Water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. The water and additives shall be mixed thoroughly and be absent of any clumps or clods. No hazardous additives may be used. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall.

C. DELIVERY SYSTEM

The mud pumping system shall have a minimum capacity to supply mud in accordance with the drilling equipment pull-back rating at a constant required pressure. The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be relatively leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. A berm, minimum of 12" high, shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system (if used) to prevent spills into the surrounding environment. Pumps and or vacuum truck(s) of sufficient size shall be in place to convey excess drilling fluid from containment areas to storage facilities.

2.05 OTHER EQUIPMENT

A. PIPE ROLLERS

Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall used to prevent excess sagging of pipe.

B. PIPE RAMMERS

Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of Engineer.

C. RESTRICTIONS

Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the Engineer prior to commencement of the work. Consideration for approval will be made on an individual basis for each specified location. The proposed device or system will be evaluated prior to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the project.

PART 3 - EXECUTION

3.01 GENERAL

The Engineer must be notified 48 hours in advance of starting work. The Directional Bore shall not begin until the Engineer is present at the job site and agrees that proper preparations for the operation have been made. The Engineer approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract. It shall be the responsibility of Engineer to provide inspection personnel at such times as appropriate without causing undue hardship by reason of delay to the Contractor.

3.02 PERSONNEL REQUIREMENTS

All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety.

3.03 DRILLING PROCEDURE

A. SITE PREPARATION

1. Prior to any alterations to work-site, contractor shall photograph or video tape entire work area, including entry and exit points. One copy of which shall be given to Engineer and one copy to remain with contractor for a period of one year following the completion of the project.

2. Work site as indicated on drawings, within right-of-way, shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made. Contractor shall confine all activities to designated work areas.

B. DRILL PATH SURVEY

Entire drill path shall be accurately surveyed with entry and exit stakes placed in the appropriate locations within the areas indicated on drawings. If contractor is using a magnetic guidance system, drill path will be surveyed for any surface geo-magnetic variations or anomalies.

C. ENVIRONMENTAL PROTECTION

Contractor shall place silt fence between all drilling operations and any drainage, wetland, waterway or other area designated for such protection by contract documents, state, federal and local regulations. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains and other measures. Contractor shall adhere to all applicable environmental regulations. Fuel or oil may not be stored in bulk containers within 200' of any water-body or wetland.

D. SAFETY

Contractor shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner.

E. PIPE

Pipe shall be welded/fused together in one length, if space permits. Pipe welds will be X-rayed prior to being placed in bore hole. Pipe will be placed on pipe rollers before pulling into bore hole with rollers spaced close enough to prevent excessive sagging of pipe.

F. PILOT HOLE

1. Pilot hole shall be drilled on bore path with no deviations greater than 5%of depth over a length of 100'. In the event that pilot does deviate from bore path more than 5% of depth in 100', Contractor will notify Engineer and Engineer may require Contractor to pull-back and re-drill from the location along bore path before the deviation.

2. In the event that a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations, contractor shall cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and

then wait another 30 minutes. If mud fracture or returns loss continues, contractor will cease operations and notify Engineer. Engineer and contractor will discuss additional options and work will then proceed accordingly.

G. REAMING

Upon successful completion of pilot hole, contractor will ream bore hole to a minimum of 25% greater than outside diameter of pipe using the appropriate tools. Contractor will not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.

H. PULL-BACK

1. After successfully reaming bore hole to the required diameter, contractor will pull the pipe through the bore hole. In front of the pipe will be a swivel. Once pull-back operations have commenced, operations must continue without interruption until pipe is completely pulled into borehole. During pull-back operations contractor will not apply more than the maximum safe pipe pull pressure at any time.

2. In the event that pipe becomes stuck, contractor will cease pulling operations to allow any potential hydro-lock to subside and will commence pulling operations. If pipe remains stuck, contractor will notify Engineer. Engineer and contractor will discuss options and then work will proceed accordingly.

3.04 PIPE TESTING

A. Sections 02620 and 02715 shall be followed in its entirety following pull-back of the pipe.

1. All mains shall be swabbed.

2. All mains shall be chlorinated.

3.05 Basis For Payment

A. Piping shall be paid for at the unit price bid or lump sum bid and shall include all work incidental to making a complete installation such as excavation, bedding, backfill, painting, testing, disinfection, cleanup, seeding, etc.

END OF SECTION

SECTION 02326

STEEL CASING PIPE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Steel casing pipe shall be furnished and installed as shown on the DRAWINGS and specified herein.

1.02 RELATED WORK

A. Erosion and sedimentation control is included in this Division, Section 02270.

B. Piping is included in this Division, Section 02700.

C. Landscaping is included in this Division, Section 02900.

PART 2 PRODUCTS

2.01 STEEL CASING PIPE

A. Steel casing or jack pipe shall be plain end steel pipe with a minimum yield strength of 35,000 psi and tensile strength of 60,000 psi per API-5L Grade B material. The steel pipe supplied shall be manufactured by the seamless, electric-weld, submerged are weld or gas metal-arc weld process as specified in API-5L. Certifications of 35,000 psi minimum yield strength shall be furnished by the CONTRACTOR.

B. The inside diameter shall be at least 2 inches greater than the largest outside diameter of the carrier pipe, joint or couplings for carrier pipe less than 6" in diameter and at least 4" greater for carrier pipe 6" and over in diameter unless otherwise noted on the plan sheets. In all cases, the casing pipe shall be great enough to allow the carrier pipe to be removed subsequently without disturbing the casing pipe or roadbed.

C. Casing pipe shall have minimum wall thickness as shown in the following table:

Nominal Diameter (Inch)	Nominal Thickness (Inch)	Nominal Diameter (Inch)	Nominal Thickness (Inch)
Under 10	0.188	24	0.438
10 - 12	0.250	26	0.438
14 - 16	0.281	28 - 30	0.500

PART 3 EXECUTION

3.01 TUNNELING, BORING OR JACKING

A. Boring or jacking as specified herein shall be located as shown on DRAWINGS. All other casing pipe installations shall be open cut trench.

B. Tunneling under paving, railroads, buildings and underground structures is included as an alternate to boring or repaving required by open cut trenching at no extra cost to the OWNER. Bore and casing pipe is also included as an alternate to tunneling. Backfilling of tunnels shall be mechanically tamped in not more than 3-inch layers and with material rendered suitable for tamping before being placed in tunnel unless otherwise shown on the DRAWINGS. No payment will be made for tunnels less than 3 feet long.

C. In tunneling under buildings, the CONTRACTOR will held responsible for all damage by his operations and methods of excavation and backfilling.

D. Should the CONTRACTOR elect and receive permission to tunnel and bore, other than locations designated on the DRAWINGS or required by the ENGINEER to be tunneled or bored, the entire compensation therefore shall be the same as the unit prices bid for installation in open trench, including paving replacement, but not including bore or unit prices.

E. At locations where tunneling or boring or jacking is called for on the DRAWINGS, in addition to the unit prices for permanent tunnel, tunnel liner, temporary tunnel, boring or jacking and/or casing pipe, payment will be made for furnishing and laying carrier pipe inside the tunnel or casing pipe. No payment will be made for separate trench and backfill unit price items where permanent tunnel, tunnel liner, temporary tunnel, boring or jacking and/or casing pipe unit prices is paid.

F. Boring or jacking under highways, railroads, sidewalks, pipelines, etc., shall be done at the locations shown on the DRAWINGS. It shall be performed by mechanical means and accurate vertical and horizontal alignment must be maintained. When shown on the DRAWINGS, casing pipe shall be used and shall be installed inside bored holes concurrently with boring, or jacking.

3.02 STEEL CASING PIPE INSTALLATION

A. Steel casing pipe shall be of the size and wall thickness as shown on the DRAWINGS or specifications.

B. When casing pipe is jacked, concurrent with boring, all joints shall be solidly welded. The weld shall be such that the joint shall be of such strength to withstand the forces exerted from the boring and jacking

operation as well as the vertical loading imposed on the pipe after installation. The weld shall also be such that it provides a smooth, non-obstructing joint in the interior of the pipe, which will allow easy installation of the carrier pipe without hanging or abrasion to the carrier pipe upon installation.

C. When casing pipe is installed in open trench or permanent tunnel, it shall be bedded and backfilled as specified in Division 2. When casing pipe is installed in temporary tunnel, it shall be laid accurately to alignment of proposed pipeline and at an elevation below proposed pipeline necessary to support it at the planned elevation. Bedding and backfill for casing pipe in temporary tunnel shall be as specified in Division 2.

D. Casing pipe in open trench, permanent tunnel and temporary tunnel shall be joined by welding such that it will no be moved out of alignment or grade and will prevent backfill material from entering joint. Where casing pipes are shown on the DRAWINGS to be equipped with vent pipes, vents shall be installed as shown on the DRAWINGS with cost of the same included in the price bid for the casing pipe unless otherwise specified.

3.03 CARRIER PIPE IN CASING PIPE INSTALLATION

A. Pipeline Spacers

Carrier pipes shall be centered inside casing pipe throughout the length of the casing pipe. Centering shall be accomplished by the installation of polyethylene pipeline spacers attached to the casing pipe in such a manner as to prevent the dislodgment of the spacers as the carrier pipe is pulled or pushed through the casing pipe. Spacers shall be of such dimensions to provide (1) full supportive load capacity of the carrier pipe and contents; (2) of such thickness to allow installation and/or removal of the pipe; and (3) to allow no greater than 1/2 inch movement of the carrier pipe within the casing pipe after the carrier pipe is installed. Installation shall be in accordance with manufacturer's recommendations.

B. Upon completion of installation of the carrier pipe, the annular space at the ends of the cover pipe shall be sealed to prevent the entrance of groundwater, silt, etc., into the casing pipe. The seal shall be a manufactured product specially made for this purpose. The seal shall be the best seal type constructed of synthetic rubber with stainless steel banding straps. Seals may be of the "pull-on" or "wrap around" type as manufactured by Advance Products and Systems, Inc. or equal.

3.04 BASIS FOR PAYMENT

Steel Casing Pipe shall be paid for at the unit price bid or lump sum bid and shall include all work incidental to making a complete installation such as excavation, carrier pipe, bedding, backfill, painting, testing, disinfection, cleanup, seeding, etc.

END OF SECTION

SECTION 02500

BITUMINOUS PAVEMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Extent of bituminous pavement paving, as applicable, is shown on the Drawings, including roads, driveways, and parking areas.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Unless noted, all specification designations refer to the Kentucky Transportation Cabinet Department of Highways Standard Specification for Road and Bridge Construction, latest edition. Appropriate portions of the referenced sections of the Specifications shall apply, but all work shall be included in lump sum bid items described herein unless otherwise specified or shown on the Drawings.

B. Preparation of sub-base is specified in this Division, Section 02200.

C. Crushed stone and dense graded aggregate are specified in this Division, Section 02255.

1.03 QUALITY ASSURANCE

A. Performance: Bituminous seal coat that fails as the result of not meeting the requirements of these Specifications shall be corrected as directed by the ENGINEER at the CONTRACTOR'S expense.

B. The design plant mix shall be submitted to the ENGINEER for review and acceptance. The submittal shall include the last date the mixture was approved by the Kentucky Transportation Cabinet Department of Highways for use on a state road project; and the location where the mixture was recently used, and the name and address of the paving contractor.

PART 2 PRODUCTS

2.01 BITUMINOUS CONCRETE SURFACE MATERIAL

A. Aggregates shall meet the applicable requirements of Sections 804 and 805.

B. Bituminous materials shall meet the applicable requirements of Section 806.

C. Bituminous materials for tack coat shall be one of the following:

SS-1, SS-1h, CSS-1, CSS-1h, AE-60, RS-1, CRS-1, RC-70 or RC-250.

D. Steel, wood, or other suitable material shall be of size and strength necessary to resist movement during bituminous placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

2.02 BITUMINOUS SEAL COAT MATERIAL

A. Coarse aggregate shall be Kentucky Transportation Cabinet Department of Highways Standard No. 8, graded 3/8 inch to No. 8, meeting applicable requirements of Section 805.

B. Bituminous materials shall meet applicable requirements of Section 806.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. The road shall be swept with an approved mechanical sweeper and with wire hand brooms, when necessary. Special care shall be taken to clean the edges of the surface so that full width of the roadway to be treated shall be uniformly clean. Where any mud or earth exists, it shall be removed sufficiently in advance of application of bituminous material to allow the surface to become thoroughly dry.

3.02 BITUMINOUS CONCRETE PAVING

A. Composition of Mixtures: Surface pavement mixture, meeting requirements of Sections 401.02 through 401.05 shall be used as determined by local plant mix availability. The mixture shall have been approved recently by the Kentucky Transportation Cabinet Department of Highways, used recently on a state project, and conform to the requirements below when tested in accordance with ASTM D 1559-latest revision:

Stability, minimum pounds	750
Flow, 0.01 inch	Min, 8, Max. 16
Percent air voids	Min. 3, Max. 5
Minimum voids in mineral aggregate, percent: 3/4 inch	14
1 inch	13
Voids filled, percent	Min. 75, Max. 85

B. Construction Methods: Construction requirements shall conform to applicable requirements of Sections 401, 402, and 407.

C. A tack coat shall be required to bond new paving to the surface of concrete or brick pavements and bases or existing bituminous surfaces. It shall be applied at the rate of 0.8 pound (0.1 gal.) per square yard at the following range of application temperatures:

SS-1, SS-1h, CSS-1, CSS-1h, AE-60	70-160°F
RS-1, CRS-1	70-140°F
RC-70	120°F
RC-250	165°F

* These temperatures should be used unless higher temperatures are required for satisfactory coverage. Caution must be exercised to prevent fire or explosion.

D. When SS-1, SS-1h, CSS-1, CSS-1h, or AE-60 is furnished for tack material, it shall be diluted with an equal quantity of water conforming to Section 803, shall be thoroughly mixed prior to application, and shall be applied a sufficient time in advance of the paver to ensure that all water has evaporated before the bituminous concrete mixture is placed. The application rate shall be 0.8 pound (0.1 gal.) per square yard of the diluted SS-1, SS-1h, CSS-1, CSS-1h, or AE-60.

E. Where bituminous paving is placed against vertical surfaces such curbs, gutters, manhole frames, valve boxes, etc., the vertical face shall be tack coated to seal the surface. Where these surfaces are inaccessible to pressure distributor, the tack coat may be brushed or broomed into place. The tack coat shall not be allowed to spill over onto any horizontal surface outside the area to be paved.

F. Unless otherwise indicated on the Drawings or in these Specifications, the compacted thickness of the bituminous concrete paving shall be a minimum of 2 inches and the minimum ambient temperature for placing shall be 40°F. Mixing and laying temperatures shall be as follows:

Aggregates	Min. 240°F - Max. 325°F
Asphalt Cement	Min. 225°F - Max. 325°F
Mixture at Plant (measured in truck)	Min. 240°F - Max. 325°F
Mixture when Placed (measured in truck when discharging)	275° + 20°F **

** The 275°F + 20°F mixture placing temperature is based on 275°F being about the ideal temperature for obtaining optimum compaction under average conditions. However, when the distance between the asphalt plant and the job is such that specified placing temperatures are covered, insulated hauling equipment as described below are used, the minimum placing temperature shall be 225°F.

G. Trucks for hauling bituminous mixtures shall have tight, clean, and smooth metal beds that have been sprayed with a minimum amount of soap emulsion, paraffin oil, or other approved material that is not detrimental to the mixture to prevent the mixture from adhering to the beds. All trucks shall be equipped with covers of sufficient size to completely cover the loaded material and all covers shall be securely fastened in place before the truck leaves the plant. Truck beds shall be insulated, when necessary, to maintain the specified temperature to the point of delivery.

Any truck causing excessive segregation of material by its spring suspension or other contributing factors shall be discharged from the work until such conditions are corrected.

H. The CONTRACTOR shall have an accurate thermometer on the job at all times for verifying all temperature requirements and for taking temperature measurements whenever requested by the ENGINEER or OWNER. The CONTRACTOR shall closely control temperature and compaction requirements to achieve quality bituminous paving and related work.

I. Bituminous paving that fails as the result of not meeting the requirements of these Specifications shall be removed and replaced as directed by the ENGINEER at the CONTRACTOR's expense.

3.03 BASIS FOR PAYMENT

Payment for Bituminous Pavement shall be made on a unit price or a lump sum basis where a separate bid item is provided.

END OF SECTION

SECTION 02515

PORTLAND CEMENT CONCRETE PAVING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of portland cement concrete paying for driveways and walks is shown on the DRAWINGs.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Prepare sub-base as specified in this Division, Section 02200.

B. Concrete and related materials are specified in Division 3.

C. Bituminous pavement is specified in this Division, Section 02500.

D. Crushed stone and dense graded aggregate are specified in this Division, Section 02255.

1.03 SUBMITTALS

A. Furnish samples, manufacturer's product data, test reports, and materials certifications as required in referenced sections for concrete and joint fillers and sealers.

1.04 JOB CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Utilize flagmen, barricades, warning signs and warning lights as required.

PART 2 PRODUCTS

2.01 MATERIALS

A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.

B. Use flexible spring steel forms or laminated boards to form radius bends as required.

C. Coat forms with a non-staining form release agent that will not discolor or deface surface of concrete.

D. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185-85.

E. Furnish in flat sheets, not rolls, unless otherwise acceptable to ENGINEER.

F. Concrete Materials: Comply with requirements of Division 3, Section 03300, for concrete materials, admixtures, bonding material, curing materials, and others as required.

G. Expansion Joint Materials: Comply with requirements of Division 7, Section 07900 for preformed expansion joint fillers and sealers.

H. Anti-spalling Compound: 50% (by volume) boiled linseed oil and 50% (by volume) commercial grade kerosene or mineral spirits.

2.02 CONCRETE MIX, DESIGN AND TESTING

A. Comply with requirements of Division 3, Section 03300 for concrete mix design, sampling and testing, and quality control, and as herein specified.

B. Design mix to produce normal-weight concrete consisting of portland cement, aggregate, water-reducing or high-range water-reducing admixture (super plasticizer), air-entraining admixture and water to produce the following properties:

1. Comprehensive Strength: 4,000 psi, minimum at 28 days.
2. Slump Range: 8 inches for concrete containing HRWR admixture (super-plasticizer); 3 inches for other concrete.
3. Air Content: 5% to 8%.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Remove loose material from compacted sub-base surface immediately before placing concrete.

B. Proof-roll prepared sub-base surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

3.02 FORM CONSTRUCTION

A. Set forms to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of WORK and so that forms can remain in place at least twenty-four (24) hours after concrete placement.

B. Check completed form WORK for grade and alignment to following tolerances:

1. Top of forms not more than 1/8 inch in 10 feet.
2. Vertical face on longitudinal axis, not more than 1/4 inch in 10 feet.

C. Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

3.03 REINFORCEMENT

A. Locate, place and support reinforcement as specified in Division 3, Section 03300, unless otherwise indicated.

3.04 CONCRETE PLACEMENT

A. General: Comply with requirements of Division 3 sections for mixing and placing concrete, and as herein specified.

B. Do not place concrete until sub-base and forms have been checked for line and grade. Moisten sub-base if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate and care to prevent dislocation of reinforcing, dowels, and joint devices.

D. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place a construction joint.

3.05 JOINTS

A. General: Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

B. Weakened-plane (contraction) Joints (Wk-PlJt): Provide weakened-plane (contraction) joints, sectioning concrete into areas as shown on DRAWINGs. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness, as follows:

1. Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.

C. Construction Joints (CnsJt): Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2 hour, except where such placements terminate at expansion joints.

D. Construct joint as shown or, if not shown, use standard metal keyway-section forms.

E. Expansion Joints (ExpJt): Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects unless otherwise indicated.

F. Locate expansion joints at 50 ft. o.c. for each pavement lane, unless otherwise indicated.

G. Extended joint fillers full-width and depth of joint, and not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.

H. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together.

I. Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

J. Fillers and Sealants: Comply with the requirements of Division 7, Section 07900, for preparation of joints, materials, installation, and performance.

3.06 CONCRETE FINISHING

A. After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

B. After floating, test surface for trueness with a 10 foot straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

C. Work edges of slab, gutters, back top edge of curb and formed joints with an edging tool, and round to a 1/2 inch radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

D. After completion of floating and troweling when excess moisture or surface sheet has disappeared, complete surface finishing, as follows:

1. Broom finish, by drawing a find-hair broom across concrete surface, perpendicular to line of traffic. Repeat operation if

required to provide a fine line texture acceptable to ENGINEER.

2. On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to lien of traffic.

E. Do not remove forms for twenty-four (24) hours after concrete has been placed. Any form removal, clean ends of joints and point up any minor honeycombed areas. Remove and replace areas or sections with major defects.

3.07 CURING

A. Protect and cure finished concrete paving, complying with requirements of Division 3, Section 03300. Use curing and sealing compound or approved moist-curing methods.

B. Do not use liquid membrane-forming material where anti-spalling treatment will be applied.

C. Anti-spalling Treatment: Apply compound to concrete surfaces no sooner than twenty-eight (28) days after placement. Apply to clean, dry concrete free of oil, dirt, and other foreign materials, in two sprayed applications. First application, 60 sq. yd. per gallon. Allow complete drying between applications.

3.08 REPAIRS AND PROTECTIONS

A. Repair or replace broken or defective concrete.

B. Protect concrete from damage until acceptance of WORK. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface and spillage of materials as they occur.

C. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.

END OF SECTION

SECTION 02610

GENERAL PIPING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals necessary to install and test pipe and fittings as shown on the Drawings and required by the Specifications.

B. Piping shall be located substantially as shown. The ENGINEER reserves the right to make such modifications in locations as may be found desirable to avoid interference between pipes or for other reasons. Pipe fitting notation is for the CONTRACTOR'S convenience and does not relieve him from laying and jointing different or additional items where required without additional compensation.

C. Wherever the word pipe or piping is used it shall mean pipe and fittings unless otherwise noted.

D. All references to Standards/Specifications shall mean the latest revision.

1.02 RELATED WORK

A. Trenching, backfilling and compacting are included in this Division, Section 02200.

B. Concrete is included in Division 3, Section 03300.

1.03 DESCRIPTION OF SYSTEM

A. Piping shall be installed substantially as shown on the Drawings so as to form a complete smooth flow path and workable system.

B. The piping and materials specified herein are intended to be standard types of pipe for use in transporting the fluids as indicated on the Drawings. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and the manufacturer's recommendations.

1.04 QUALIFICATIONS

A. All pipe and fittings under this section shall be furnished by manufacturers who are fully experienced, qualified, and regularly engaged in the manufacture of the materials to be furnished.

1.05 SUBMITTALS

A. The CONTRACTOR shall submit to the ENGINEER for review in accordance with Division 1, Section 01300, complete sets of shop drawings showing layout and details of materials, joints and methods of construction and installation of the pipe, specials and fittings required.

B. Before fabrication and/or shipping of the pipe is begun, the CONTRACTOR shall submit for approval a schedule of pipe lengths for the entire job. All pipe furnished under the Contract shall be fabricated in full accordance with the approved Drawings.

1.06 INSPECTION

A. The manufacturer shall inspect all pipe joints for out-of-roundness and pipe ends for squareness. The manufacturer shall furnish to the ENGINEER a notarized affidavit stating all pipe meets the requirements of applicable ASTM Specifications, these Specifications, and the joint design with respect to square ends and out-of-round joint surfaces.

PART 2 PRODUCTS

2.01 REINFORCED CONCRETE PIPE

A. Except as otherwise specified herein, pipe shall conform to ASTM Standard Specifications for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe, Designation C 76 latest revision, Class IV, Wall B. The tabulated reinforcement given in the tables shall be the minimum required. The pipe interior shall be smooth and even, free from roughness, projections, indentations, offsets, or irregularities of any kind. The concrete mass shall be dense and uniform. The supplier is responsible for the performance of all inspection requirements as specified in ASTM C 76 latest revision. A complete set of records of the tests shall be submitted to the ENGINEER.

B. Non-air-entraining portland cement conforming to ASTM Specifications C 150 latest revision, Type II shall be used, except as otherwise approved in writing to the ENGINEER. The use of a non-bleeding, water-reducing, dispersing agent may be permitted subject to the specific approval of the ENGINEER. The use of any other admixture will not be permitted.

C. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM Specifications C 33 latest revision, except for gradation, with a maximum loss of 7.5 percent when subjected to 5 cycles of the soundness test using magnesium sulfate. Coarse aggregate shall consist of well-graded crushed stone or washed gravel conforming to the requirements of ASTM Specifications C 33 latest revision, except for gradation, with a maximum loss of 7.5 percent when subjected to 5 cycles of the soundness test using magnesium sulfate.

D. The 28-day compressive strength of the concrete, as indicated by cores cut from the pipe shall be not less than 4,000 psi. The concrete mass shall be dense and uniform. The average absorption shall not exceed 5.0 percent of the dry weight and no specimen shall exceed 5.3 percent of the dry weight. Reinforcement shall be circular for all concrete pipe. Reinforcement in the bell and spigot shall be adequate to prevent damage to concrete during shipping, handling and installation. Core indicating reinforcing steel having less than 85 percent bond shall be cause for rejection of the lot of pipes.

E. Pipe may be rejected for any of the following reasons:

1. Exposure of any wires and positioning spacers or chairs used to hold the reinforcement case in position, or steel reinforcement in any surface of the pipe, except for ends of longitudinal reinforcing.

2. Transverse reinforcing steel found to be in excess of 1/4 inch out of specified position after the pipe is molded.

3. Any shattering or flaking of concrete at a crack.

4. Air bubble voids (bugholes) on the interior and exterior surfaces of the pipe exceeding 1/4 inch in depth unless properly and soundly pointed with mortar or other approved material.

5. Unauthorized application of any wash coat of cement or grout.

6. A deficiency greater than 1/4 inch from the specified wall thickness.

7. A variation from the specified internal diameter in excess of 1 percent or interior surfaces which have been reworked after placing of concrete. The variation in internal diameter permitted herein does not apply to gasket contact surface in gasketed joint pipe.

8. A hollow spot (identified by tapping the internal surface of the pipe) which is greater than 30 inches in length or wider than 3 times the specified wall thickness. Repair of such defective areas not exceeding these limitations may be made.

9. Defects that indicate imperfect molding of concrete; or any surface defect indicating honeycomb or open texture (rock pockets) greater in size than an area equal to a square with a side dimension of 2-1/2 times the wall thickness or deeper than two times the maximum graded aggregate size; or local deficiency of cement resulting in loosely bonded concrete, the area of which exceeds, in size, the limits of area described in paragraph 8 above when the defective concrete is removed.

   Repair of such defects not exceeding these limits may be made.

10. Any of the following cracks:

    a. A crack having a width of 0.005 inch to 0.01 inch throughout a continuous length of 36 inches or more.

    b. A crack having a width of 0.01 inch to 0.03 inch or more throughout a continuous length of 1 foot or more.

    c. A crack greater than 0.0005 inch extending through the wall of the pipe and having a length in excess of the wall thickness.

    d. Any crack showing two visible lines of separation for a continuous length of 2 feet or more, or an interrupted length of 3 feet or more anywhere in evidence, both inside and outside.

    e. Cracks anywhere greater than 0.03 inch in width.

F. Pipe shall have minimum laying length of approximately 8 feet except for closure and other special pieces as approved by the ENGINEER. The CONTRACTOR shall have available at the site of the work sufficient pipe for various lengths to affect closure at manholes or structures that cannot be relocated to accommodate standard lengths. Short lengths of pipe made for closure, etc., may be used in the pipeline at the end of construction if properly spaced. The length of the incoming and outgoing concrete pipe at each structure shall not exceed 4 feet, except where the joint is cast flush with the exterior wall of the structure. Maximum laying length shall not exceed 16 feet, but the installation of 16 foot lengths will depend upon the ability of the CONTRACTOR to handle such lengths of pipe in deep sheeted trenches, comply with trench width requirements, maintain the integrity of the sheeting and avoid disturbance to adjacent ground. If in the opinion of the ENGINEER the use of 16 foot lengths is impracticable, shorter lengths shall be used.

G. Fittings and Bends

1. The manufacturer shall submit the proposed method of fabrication of bends and special pieces to the ENGINEER for approval. All such fittings shall conform to all applicable requirements of this Specification.

2. Pipe for use on curved sections shall be fabricated by beveling one or both ends sufficient to produce the radius of curvature required. Joint deflection shall not be utilized to produce the radius of curvature required. Reinforced concrete bends shall be cast to the degree of curvature required or fabricated by cutting the pipe at the required angle and then rejoining the sections.

3. Steel wall fittings to be used in the walls of the cast-in-place structures shall be equal to those manufactured by Interpace Corp., and shall be compatible with rubber and steel joints of reinforced concrete pipe and pre-stressed concrete cylinder pipe where applicable.

H. Joints for Concrete Pipe

1. Joints for concrete pipe shall be the tongue and groove or bell and spigot type of joint with provisions for using a round rubber "O-ring" gasket in a recess in the spigot end of the pipe. The bevel on the bell of the pipe shall be between 1-1/2 degrees and 2-1/2 degrees and the annular open space at the gasket when the joint is made up and pipes are centered and in line shall not exceed 3/16 inches. The faces of pipe in contact with the gasket shall be true, and free of irregularities.

2. The round rubber "O-ring" gaskets shall conform to ASTM C 443 latest revision Specifications for Joints for Circular Concrete Sewer and Culver Pipe using Rubber Gaskets. Two gaskets and a manufacturer's test report shall be submitted to the ENGINEER for tests at least 30 days before the CONTRACTOR is to joint any of the pipe. Manufacturer's test report shall state that specimens of the gaskets where subjected to tensile tests of approximately 100 psi before and after immersion and heating tests, and they showed an elongation of at least 25 percent. Upon release from the tensile tests, it shall be noted in each specimen shall return to its original length.

3. The gaskets shall be designed and manufactured so that the completed joints will withstand an internal water pressure in excess of 20 psi for a period of 10 minutes without showing any leakage by the gasket or displacement of it, see ASTM C 443-latest revision. The pipe manufacturer shall provide facilities for testing the effectiveness of the joints against leakage and one such test may be required for each 500 feet of pipe for an internal or external pressure against the joint of at least 20 psi for a period of 10 minutes.

2.02 DUCTILE IRON PIPE

A. General

1. Ductile iron pipe shall be centrifugally cast of ductile iron conforming to ASTM Specifications A 746 latest revision. The pipe design conditions shall be as follows:

a. Pressure: Minimum of 250 psi operating plus 100 psi surge allowance.

b. Trench Loading: Laying condition Type 4 unless otherwise specified on Drawings. Trench depth not less than 2' nor more than that shown on the Drawings.

c. Metal Design Strengths:

Bursting Tensile	40,000 psi
Modulus of Rupture	90,000 psi

2. The manufacturing tolerances included in the nominal thickness shall not be less than specified by ANSI/AWWA C150/A21.50, latest revision.

3. Minimum wall thickness shall be 0.33 inches (Class 52), or more if required for minimum operating pressure of 250 psi.

4. Pipe may be furnished in 18', or 20' nominal laying lengths; and the weight of any single pipe shall not be less than the tabulated weight by more than 5 percent for pipe 12" or smaller in diameter, nor by more than 4 percent for pipe larger than 12" in diameter.

5. The hydrostatic and acceptance tests for the physical characteristics of the pipe shall be as specified in ANSI/AWWA C151/A21.51, latest revision.

6. Any pipe not meeting the ANSI/AWWA specifications quotes above shall be rejected in accordance with the procedure outlined in the particular specification.

7. The ENGINEER shall be provided with 3 copies of a certification by the manufacturer that the pipe supplied for this Contract has been tested in accordance with the referenced specifications and is in compliance therewith.

8. The net weight, class or nominal thickness and sampling period shall be marked on each pipe. The pipe shall also be marked to show that it is ductile iron.

9. Unless otherwise noted, joints for ductile iron pipe will be "push-on" type consisting of a rubber gasket installed in a recess in the bell.

10. Ductile iron pipe must be used within 200 feet of underground petroleum storage tanks and shall have gaskets designed for this purpose such as Nitrile Butadiene (NBR), approved equal or better.

B. Lining and Coating Ductile Iron Pipe

1. All buried ductile iron pipe shall have manufacturer's outside coal tar or asphaltic base coating and a cement lining and bituminous seal coat on the inside. Cement mortar lining and bituminous seal

coat inside shall conform to ANSI/AWWA C104/A21.4 latest revision.

C. Fittings for Ductile Iron Pipe-3" and larger

1. Ductile Iron fittings only shall be used with the ductile iron pipe.

2. Mechanical joint fittings shall be used with underground pipe.

3. Rubber-gasket joints shall conform to ANSI/AWWA C111/A21.11 latest revision for centrifugally cast ductile iron water pipe.

4. All Working Pressures - Fittings shall conform to ANSI/AWWA Specifications C110/A21.10 latest revision for 250 psi water working pressure plus water hammer. Ductile iron fittings shall be ductile cast iron per ASTM Specifications A536, latest revision.

5. All fittings shall be cement lined and bituminous coated per Federal Specifications WW-P-421b.

D. Ductile Iron Pipe and Fittings - Smaller than 3"

1. Small size ductile iron pipe shall conform to ANSI Specifications A21.12 (AWWA C 112) latest revision. Fittings shall conform to ANSI Specifications A21.10 (AWWA C 110) latest revision.

2. Pipe may be furnished with either mechanical joints or slip-on joints. Buried fittings shall be furnished with mechanical joints.

E. Flanged Cast Iron Pipe and Flanged Coupling Adapters for Flexible Couplings

1. Non-buried ductile iron pipe and fittings shall be flanged unless otherwise specified.

2. Flanged cast iron pipe and fittings shall have dimensions facing and drilling for ANSI Class 125 flanges (125 psi steam working pressure; 250 psi water working pressure).

3. Where flanges are pit cast integrally with pipe in vertical position in dry sand molds, flanged pipe shall be AWWA Class "B" or latest revision of ANSI Specifications A21.2, Class 50 pipe for sewage, sludge, gas and air service and Class 150 pipe for all types of water service.

4. Where flanged pipe is made up by threading plain end, centrifugally cast pipe, screwing on specially designed long hub flanges, and refacing across both the face of the flange and the end or pipe, flange shall be per ANSI Specification B16.1 latest revision and pipe shall be Class 150 per ANSI Specification A21.6 latest revision.

5. Either of the foregoing methods of manufacture of flanged pipe will be acceptable, but when plain ends of flanged pipe are to fit into mechanical joint bells, then the outside diameter of the pipe shall be such that the joint can be made.

6. CBS (rubber and cloth both sides) gaskets 1/16" in thickness shall be used in connecting flanged piping. Nuts and bolts for use in making flanged connections shall have hexagonal heads, be of proper lengths and with U.S. standard threads. The tensile strength of steel used in the bolts shall be not less than 55,000 psi.

7. Flanged Coupling Adapters for flanged pipe shall be a mechanical joint cast to a special flanged joint using a neoprene "O-ring", in place of the usual 1/16" rubber ring gasket. The mechanical bell and special flanged joint piece shall be of high grade gray cast iron with bolt circle, bolt size and spacing conforming to ASA B16.1 Specifications latest revision. Mechanical joint follower flange shall be of ductile or malleable iron with high strength/weight ratio design. Bolts shall be fine grained, high tensile, malleable iron with malleable iron hexagon nuts.

8. Flanged Coupling Adapters for 12" and smaller cast iron pipe shall be Smith-Blair #912; Dresser style 127; or approved equal. For pipe larger than 12", flexible couplings shall be Smith-Blair #913; Dresser style 128; or approved equal. All flexible couplings shall be furnished with anchor studs.

F. Mechanical Joint Restraints

1. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536.

2. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN.

3. Three (3) test bars shall be incrementally poured per production shift as per Underwriter's Laboratory (U.L.) specifications and ASTM A536. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.

4. Chemical and nodularity tests shall be performed as recommended by the Ductile Iron Society, on a per ladle basis.

2.03 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. PVC pipe shall comply with ASTM D01784 and shall be Type 1, Grade 1, with pressure and SDR rating as shown on the drawings or indicated in the proposal form. All PVC pipe shall conform to the latest revisions of the following specifications:

ASTM D2241 (PVC plastic pipe SDR-PR and Class T)
Commercial Standard CS 256 (pressure rated type)
National Sanitation Foundation Testing Laboratories (NSF)

B. The name of the manufacturer of the plastic pipe to be used must be found on the current listing of Plastic Materials for Potable Water Application, published by the NSF (National Sanitation Foundation), Ann Arbor, Michigan, and must meet the requirements of the Standard Specifications for Polyvinyl Chloride (PVC) Plastic Pipe, D1785, published by ASTM (American Society for Testing and Materials).

C. Pipe lengths shall not exceed 40 feet. Wall thickness shall be in accordance with CS-256 and ASTM D-2241. Pipe ends shall be beveled to accept the gasketed coupling. Rubber gasketing shall conform to ASTM 1869.

D. Samples of pipe, physical and chemical data sheets shall be submitted to the ENGINEER for approval and his approval shall be obtained before pipe is purchased. The pipe shall be homogenous throughout and free from cracks, holes, foreign inclusions or other defects. The pipe shall be as uniform as commercially practical in color. Pipe shall have a ring painted around spigot ends in such a manner as to allow field checking of setting depth of pipe in the socket.

E. Pipe must be delivered to the job site by means which will adequately support it, and not subject it to undue stresses. In particular, the load shall be so supported that the bottom rows of pipe are not damaged by crushing. Pipe shall be unloaded carefully and strung or stored as close to the final point of placement as is practical.

F. The couplings and fittings shall be furnished by the pipe manufacturer and shall accommodate the pipe for which they are to be used. They shall have a minimum pressure rating of 200 psi. Insertion depth of the pipe in the coupling shall be controlled by an internal PVC mechanical stop in the coupling which will allow for a thermal expansion and contraction. Couplings method shall allow for half of each end of the pipe. Couplings shall permit 5 degree deflection (2-1/2 degrees each side) of the pipe without any evidence of infiltration, cracking or breaking. Couplings shall have rubber seals factory installed.

G. Pipe markings shall include the following, marked continuously down the length:

Manufacturer's Name
Nominal Size
Class Pressure Rating
PVC 1120
NSF Logo, and
Identification Code

H. Lubricant shall be water soluble, nontoxic, be non-objectionable in taste and odor imparted to the fluid, be non-supporting of bacteria growth and have no deteriorating effect on the PVC or rubber gaskets.

2.04 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS (SCHEDULE 80)

A. General

Schedule 80 PVC pipe shall be as manufactured by the Celanese Piping Systems, Inc., or approved equal. To ensure installation uniformity, all piping system components shall be the products of one manufacturer.

B. Materials

1. Pipe and fittings shall be manufactured from a PVC compound which meets the requirements of Type 1, Grade 1 polyvinyl chloride as outlined in ASTM D-1784. A Type 1, Grade 1 compound is characterized as having the highest requirements for mechanical properties and chemical resistance. Fittings shall be socket type and shall conform to the requirements of ASTM D-2467.

2. Compound from which pipe is produced shall have a design stress rating of 200 psi at 73° F., listed by the Plastics Pipe Institute (PPI).

3. Materials from which pipe and fittings are manufactured shall have been tested and approved for conveying potable water by the National Sanitation Foundation (NSF).

C. Solvent Cement

All socket type connections shall be joined with PVC solvent cement complying to ASTM D-2564. Cement shall have a minimum viscosity of 2000 cps.

D. Installation

Installation shall be in strict accordance with the manufacturer's printed instructions. Printed installation instructions shall be submitted and approved by the ENGINEER prior to shipment of the pipe.

E. Testing

1. Pressure Pipe - Refer to Paragraph 3.02 of this Division.

2. Vacuum Pipe - All pipe intended for use under partial vacuum shall be tested by subjection to 24 inches of mercury vacuum; allowing 15 minutes to stabilize and thereafter lose not more than 1% vacuum pressure per hour over a minimum 4 hour test period. This test must be met or exceed prior to final acceptance.

2.05 HIGH DENSITY POLYETHYLENE PIPE

A. General

1. High density polyethylene pipe shall be Adyl "D" polyethylene pipe manufactured by E.I. DuPont DeNemours and Co., Inc., or "Driscopipe" as manufactured by Phillips Product Co., Inc., or approved equal.

B. Materials for Polyethylene Pipe

1. The polyethylene pipe and fittings shall be made of polyethylene resins classified in ASTM D 1248 as Type III, Category 5, Grade P34 (pipe designation PE 3408 defined per ASTM D 3035 latest revision), having specific base resin densities of 0.942 g/cc minimum and 0.955 g/cc maximum, respectively; and having melt indexes of 0.4 g/10 min. maximum and 0.15 g/0.10 min. minimum, respectively.

2. Pipe made from these resins must have a long-term strength rating of 1,600 psi or more.

3. The polyethylene resin shall contain antioxidants and shall be stabilized with carbon black against ultra-violet degradation to provide protection during processing and subsequent weather exposure.

4. The polyethylene resin compound shall have a resistance to environmental stress cracking as determined by the procedure detailed in ASTM D 16930 latest revision, Condition B with sample preparation by procedure C of not less than 200 hours.

C. Polyethylene Pipe and Fittings

1. Polyethylene pipe furnished and installed under this Contract shall be of nominal outside diameter shown on the Drawings, and shall be designed for a normal internal working pressure and earth cover over top of the pipe to suit the conditions of proposed use.
2. Each length of pipe shall be marked, at no more than 10 foot intervals, with the following information:

   Nominal pipe size
   Type plastic material - PE3408
   Pipe pressure rating
   Manufacturer's name, trademark and code

3. All pipe shall be made from virgin material. No rework compound.

4. Pipe shall be homogenous throughout, and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

5. Fittings for the polyethylene pipe line shall be molded for fabricated from the same material as specified hereinbefore for the high density polyethylene pipe.

6. Fittings for bends 22-1/2 degrees or greater shall be provided as shown on the Drawings. For alignment changes of less than 20 degrees deflection, the pipe may be laid in curves with a radius of 80 feet or greater.

7. All run-of-the-pipe fittings shall be fusion welded into the pipe line. Tee branches shall be of the size shown on the Drawings and shall be furnished with flanged ends per ANSI B-16.1. All fittings shall be factory made.

8. Fittings shall be capable of withstanding the same pressure and loading conditions specified for the pipe.

9. Wye Branches shall be true wyes.

D. Pipe Jointing

1. Pipe to be joined by leak-proof, thermal, butt fusion joints. All fusion must be done by personnel trained by the pipe supplier using tools approved by the pipe supplier.

2. The fusion machine shall have hydraulic pressure control for fusing 2 pipe ends together; it shall include pressure fusion indicating gauges to correctly monitor fusion pressures. The machines shall be equipped with an electric or gasoline engine powered facing unit to trim irregularities from the pipe ends. The heating plate on the fusion machine shall be electrically heated and thermostatically controlled and shall contain a temperature gauge for monitoring temperature.

3. Joint strength must be equal to that of adjacent pipe as demonstrated by tensile test. In addition, results of tensile impact testing of joint should indicate a ductile rather than a brittle fracture. External appearance of fusion bead should be smooth without significant juncture groove.

4. Threaded or solvent cement joints and connections are not permitted.

E. Joining, Terminating or Adapting by Mechanical Means

1. The polyethylene pipe shall be connected to systems or fittings of other materials by means of an assembly consisting of a polyethylene flange adapter butt-fused to the pipe, a backup ring of either cast iron, steel, or high silica aluminum alloy made to ANSI B-16.1 dimensional standards (with modified pressure

ratings), bolts of compatible material (insulated from the fittings where necessary) and a gasket of reinforced black rubber, asbestos-rubber compound or other material approved by the ENGINEER, cut to fit the joint. In all cases, the bolts shall be drawn up evenly and in line.

2. Termination of valves, or fittings such as tees, bonds, etc., made of other materials shall be by the flange assemblies specified hereinbefore. The pipe adjacent to these joints and to joints themselves must be rigidly supported for a distance of one pipe diameter or 1 foot, whichever is greater, beyond the flange assembly.

F. Tools and Procedures

1. Fusion jointing and other procedures necessary for correct assembly of the polyethylene pipe and fittings will be done only by personnel trained in those skills by the pipe supplier.

2. Only those tools designed for aforementioned procedures and approved by the pipe supplier shall be used for assembly of pipe and fittings to ensure proper installation.

2.06 COPPER PIPE AND FITTINGS

A. Exterior copper pipe shall be Type K pipe (ASTM B88 latest revision), with compression fittings. Joints shall be drawn up firmly and shall be tested before backfilling and any leakage stopped.

B. Wherever copper pipes pass through walls or floors, they shall have wrought or cast iron sleeves, for easy removal. Pipes passing through structural beams shall be placed as near as possible to the top of the beam under the floor slab.

2.07 PRE-STRESSED CONCRETE PRESSURE PIPE, AWWA C-301 LATEST REVISION

A. General

1. Pre-stressed concrete pressure pipe shall be of the pre-stressed steel cylinder type, conforming to AWWA C301, latest revision. This standard covers two types of pre-stressed pipe: (a) pipe with steel cylinder lined with a concrete core (lined cylinder pipe, 16"-48"), and (b) pipe with a steel cylinder embedded in a concrete core (embedded cylinder pipe, 54" - 192").

2. All concrete pipe supplied for this project shall have internal cores placed as specified in either paragraph 3.6.9 (centrifugal method of 16" - 48" LCP) or paragraph 3.6.10 (vertical method for 54" - 192" ECP) of AWWA C301. Concrete pipe manufactured using other methods of core placement will not be approved.

3. The pipe shall be made by a manufacturer experienced in producing pipe of the type and size specified herein.

B. Design

1. The pipe shall be designed to withstand, with bedding and backfill as detailed in these documents (Drawings and Specifications), the indicated design pressure and the maximum trench loading which will be applied after the backfill is in place, plus an allowance of 50% for water hammer.

2. The laying condition for the pipeline shall be as is indicated on the Contract Drawings. Unless otherwise indicated, the live load shall be computed according to AASHO H-20 for one truck including AASHO recommended impact factors. The resulting design live loading is to be reduced by the load factors shown for the laying condition specified, to achieve the equivalent 3-edge bearing load.

C. Shop Drawings and Markings on Pipeline Materials

1. The CONTRACTOR shall furnish to the ENGINEER for his review sepia copies of the shop drawings, design calculations and complete laying schedule, prior to the manufacture of any materials. Pipe, fittings and specials shall not be made until the ENGINEER has reviewed these drawings.

2. The laying schedule shall be followed, in detail, during installation of the pipeline and appurtenances. The pipe and fitting identification shown on the schedule shall coincide with markings on the pipe and fittings.

D. Fittings and Specials

1. The drawings show the location of outlets, connections and appurtenances to be installed along the pipeline. The pipe manufacturer shall furnish all fittings and special pieces required for closures, curves, bends, and branches, together with connections or adapters for air valves, blow-offs, main line valves, and other pipe connections where shown on the Drawings.

2. The fittings and specials shall conform to the requirements of AWWA C301 Type "B" and shall be furnished and installed as shown on the Drawings or as required.

3. Bevel pipe may be used where the required deflection of the pipeline is more than is allowed by the joint opening method in straight pipe, yet less than that required for an elbow or special fitting. The difference in length of opposite sides (Laying length) shall be no more than one inch per foot of internal diameter of the pipe.

E. Material

1. Pre-stressing wire shall conform to ASTM A648 and will be 6 gauge minimum thickness and Class III.

F. Joints

1. Joints for pipe and fittings shall be of steel ring, bell and spigot, rubber gasket type and shall conform to AWWA C301, latest revision. Exposed portions of the joint rings shall be protected by a zinc metalized coating, having a minimum thickness of 0.004 inch.

2. Where required by the Contact Drawings, the CONTRACTOR shall furnish and install restrained joints designed to meet the same specifications as the pipe. Restrained joints for concrete pressure pie shall be "Snap Ring" or "Harness Clamp" as manufactured by Price Brothers Company and/or GHA-Lock Joint. If requested, the CONTRACTOR shall also furnish calculations supporting the restrained joint design, all at no additional cost to the OWNER.

G. Testing and Certifications

1. The manufacturer of the pipe shall furnish to the ENGINEER five copies of certified reports containing the results of control test of cement, concrete (standard test cylinders), steel sheet, pre-stressing wire and hydrostatic test on all steel cylinders (except plain end pieces).

2. Each steel cylinder, with joint ring welded to its ends, shall be subjected to a hydrostatic test which stresses the steel to a unit stress of at least 20,000 psi, but not greater than 25,000 psi and all welds shall be inspected for soundness and water-tightness.

3. The test shall comply with AWWA C301 in all respects and the pipe manufacturer shall submit an affidavit of compliance to the OWNER stating that the pipe and fittings have been designed, manufactured and tested according to Specifications.

4. The OWNER reserves the right to witness the testing of materials by the pipe manufacturer or have same performed by an independent testing service. The manufacturer shall make all laboratory facilities available to the OWNER and shall notify the ENGINEER at least 24 hours in advance of start of production of the pipeline materials for the project.

2.08 HIGH STRENGTH TRACER WIRE & LOCATOR

A. Conductor for High Strength Tracer Wire

1. Material Description: Copperweld® Copper-clad steel wire or approved equal composed of a steel core with a uniform and continuous copper cladding thoroughly bonded to the steel throughout. Wire must conform with ASTM B910/B910M.

   i. Cladding: The steel and copper interface must have a metallurgical bond achieved through a high heat and pressure bonding process. Established process for porosity-free material
   ii. Steel: High Strength with 0.54 carbon or greater. Verified to meet required mechanical properties.
   iii. Copper: UNS-C10200; of Copper according to ASTM B-170 (latest revision). High conductivity, oxygen free copper to achieve optimal signal performance.

2. Surface Condition: Wire surface shall be free of any defects, including flakes, grooves, pits, and voids. Wire surface shall be smooth, bright and shiny and free of excessive copper dust and residual drawing lubricants.

3. Physical, Mechanical, & Electrical Properties
   The wire shall conform to the properties listed in Table below:

#10 CCS 1055 Soft Drawn 21% Conductivity	**CCS Conductor**
Size (AWG)	10 AWG
Conductor Type	Copper Clad Steel (CCS)
Temper	Dead Soft Annealed (DSA)
Average Break Load	600 lbs.
Minimum Tensile Strength	67,000 psi
Minimum Elongation	15.0%
Copper Thickness (% of Diameter)	3.0%
Minimum Copper Weight	13%
Nominal DC Resistance (ohms/1000 ft)	4.7564

B. Insulating Jacket for High Strength Tracer Wire

1. Material Description: Insulating jacket is comprised of a co-polymer high molecular weight natural high density polyethylene (HDPE) designed specifically for high-speed copper wire insulating. It contains the required levels and types of primary antioxidant and metal deactivator additives to satisfy most Wire and Cable industry requirements. HDPE material will be produced with an excellent balance of surface smoothness, processing ease, tensile and elongation properties, abrasion toughness, environmental stress crack, thermal stress crack resistance, and electrical consistency.

2. Physical, Mechanical & Electrical Properties
The wire shall conform to the properties listed in Table below:

High Density Polyethylene Insulator	Value
Density (ASTM D 792)	0.943 g/cc
Bulk Density (ASTM D 1895)	0.58 g/cc
Melt Index (ASTM D 1238/E)	0.70 dg/min
Tensile-Yield (ASTM D 638)	4300 psi
Tensile-Ultimate (ASTM D 638)	2900 psi
Tensile-Elongation (ASTM D 638)	850%
Flexural Modulus (ASTM D 790/1)	120,000 psi
Hardness (ASTM D 2240)	63 Shore D
Environmental Stress-Crack (ASTM D 1693/B)	F_{20} > 48 h
Thermal Stress-Crack (ASTM D 2951)	F_0 > 1000 h
Brittleness Temperature (ASTM D 746)	< -95° F
Melting Point (DSC) (ASTM D 3417)	262° F
Softening Point (Vicat) (ASTM D 1525)	250° F
Oxidative Induction Time (ASTM D 3895)	>50 min. @ 200° C
Dielectric Constant (ASTM D 1531)	2.34 @ 1 MHz
Dissipation Factor (ASTM 1531)	0.00007 @ 1 MHz
Volume Resistivity (ASTM D 257)	5 x 10_{17} ohm-cm
Dielectric Strength (ASTM D 3755)	1000 volts @ 20 mils

C. Locator

1. Locator shall include a complete "locator" meaning receiver, transmitter, direct-connect cables, grounding rods, and hard cover carrying case as manufactured by HETEK Solutions, Inc. or approved equal.

2. Receiver shall have the ability to receive the following frequencies 8.1 kHz, 81 kHz, &/or 480 kHz. Receiver shall have continuous depth readings, right/left guidance and automatic gain. Display of Receiver shall be a backlit LCD display with battery status indicator. Sure-Lock as manufactured by HETEK Solutions, Inc. or APPROVED EQUAL. Receiver shall be powered by AA batteries with operation conditions -25 to 150° F and be enclosed in a weather-resistant housing.

3. Transmitter shall have the ability to transmit multiple frequencies simultaneously or a single frequency, frequencies utilized 8.1 kHz, 81 kHz, &/or 480 kHz, variable power outputs, rechargeable batteries with approximate battery life of 30 hours and have operating conditions of -25 to 150° F.

D. Above Ground Markers

1. Above Ground Markers shall be made of a plastic blend that will withstand fading in the sun. Marker shall he installed above the force main at location dicated by termination of tracer wire (approximately every 500 LF). Marker shall be a three sided marking post with each face being 3-1/2" wide.

2. Marker shall have a decal placed on all three sides. Decals and marker color must be specific to their intended use per APWA Uniform Color Code. Decals shall be fade resistant and remain legible after a minimum of 2,000 hours in a QUV Weatherometer. Decal graphics shall include the international 811 Dig symbol.

Red – Electric	Orange - Communication
Yellow – Gas	Blue – Potable Water
Green – Sewer	Purple – Reclaimed water

3. The marker shall be capable of withstanding a minimum of 10 vehicle impacts at 55 M.P.H. with a car bumper.

4. Markers shall have an internal tracer wire terminals with specifically designed end caps of same color as the main body of marker.

5. Marker shall be Rhino Triview Test Stations, or approved equal.

E. At-Grade Tracer Boxes

Specifications apply to materials, design and performance requirements for plastic tracer boxes, herein referred to as box(es), which provide access to underground service and mainline corrosion or locator/tracer wire systems.

1. Material Requirements

   i. Materials used to construct products in above specifies scope shall be non-corrosive or corrosion resistant.
   ii. Tube material shall be of high grade ABS, or equivalent rigid plastic that meets or exceeds ASTM D-1788, Type 1 requirements.
   iii. Lid material shall be of cast iron or ductile iron. Tensile strength or ductility of such material shall be equal or superior to hi-tensile cast iron ASTM A-126-B requirements.
   iv. Lid-locking bolt material shall be made of aluminum material equal or superior to ASTM B-253.

v. Lid-locking mechanism material shall be made of plastic to meet or exceed ASTM A-126-B requirements.

2. MATERIAL REQUIREMENTS:

i. Materials used to construct products in above specifies scope shall be non-corrosive or corrosion resistant.
ii. Tube material shall be of high grade ABS, or equivalent rigid plastic that meets or exceeds ASTM D-1788, Type 1 requirements.
iii. Lid material shall be of cast iron or ductile iron. Tensile strength or ductility of such material shall be equal or superior to hi-tensile cast iron ASTM A-126-B requirements.
iv. Lid-locking bolt material shall be made of aluminum material equal or superior to ASTM B-253.
v. Lid-locking mechanism material shall be made of plastic to meet or exceed ASTM A-126-B requirements.

3. DESIGN REQUIREMENTS:

i. Detection

1. Box shall be designed to be easily detected by magnetic and electronic locators even when box is covered by a minimum of four (4) inches of soil, sod and / or paving material.
2. A magnet shall be securely attached at the top of the upper tube of the box for locating purposes. Material used to retain magnet in place shall remain effective at minus 15 degrees Fahrenheit. ***NOTE: A MAGNETIZED LID OR MAGNET ATTACHED TO THE LID IS NOT ACCEPTABLE.***

ii. Security

1. Locking Mechanism

a. Lid of valve box shall be designed to employ a locking mechanism that will clamp it to the box collar in a closed position.
b. Locking mechanism shall incorporate a standard pentagon-shaped head bolt which when

measured from flat to vertex shall not be less than 0.830 inches or greater than 0.875 inches.

c. Locking mechanism shall be such that the lid cannot be removed without using the proper wrench. Collar.

d. Collar is designed for support of the lid and shall be securely attached to the upper tube to prevent separation after installation.

e. Collar shall be designed to withstand an applied impact force of two (2) foot pounds without failure at -15 degrees Fahrenheit.

2. Shape

a. Box shall be of a tubular construction (cylindrical) with removable round lid.

b. Box shall have a support flange at the base of the lower tube bell at least one-half (1/2) inch wide. If box is designed for use with an integral valve support, flange may be omitted.

3. Length Adjustment

a. Box shall have be of telescoping design with upper and lower tubes overlapping three (3) inches when the box is extended to its maximum overall length.

b. Box of sliding design shall be made to maintain tension in the range of 40-80 pounds at any length between minimum and maximum lengths.

c. Tension system shall be designed to allow upper portion of lower tube to be sawed off without loss of tension.

d. Tension requirements must be met after box has been removed from storage and telescoped ten (10) times.

4. Wire connection

a. Brass screw running through brass wire harness will be used as

connection for locator transmitter hook-up.

b. Brass wire harness shall be used to secure tracer wire leads to brass screw enabling locator equipment hoop-up.

c. Petrolatum wax tape incorporated with magnetized tracer box to encapsulate tracer wire leads and brass wire harness.

i. Petrolatum wax tape must be formed around brass wire harness connection after tracer wire leads are connected to prevent oxidation of wire ends.

ii. In order to ensure proper long term locatibility and signal strength, the petrolatum wax tape must be utilized to prevent oxidation.

5. Access Box shall be designed for operational access to underground tracer wire systems.

6. Lid

a. Box shall be designed so that when installed, the collar will be flush with the surface and contain the lid so that it will not be in contact with the adjoining backfill or pavement.

b. The cavity which holds the lid shall be designed so that water drains into the inside of the box.

c. The top surface of the box lid shall be flush with the top of the box. The top of the bolt or locking device when in the locked position shall be flush with or below the lid surface.

2.09 UNDERGROUND NON-DETECTABLE UTILTY MARKER TAPES

A. Non-metallic underground utility warning tapes shall be installed directly above all buried pipes which have a tracer wire installed.

B. The tape shall be a pigmented polyolefin film with a printed message on one side that is impervious to all known alkalis, acids, chemical reagents and solvents found in the soil.

C. The minimum overall thickness of the tape shall be 4.0 mils and the width shall not be less than 3" and a minimum unit length of 1000 ft/roll. The tape shall be color coded and imprinted with the message as follows:

Type of Utility	Color Code	Legends
Water	Safety Precaution Blue	Caution Buried Waterline Below
Sewer	Safety Green	Caution Buried Sewer Line Below

D. Underground marking tape shall be "Terra Tape" as manufactured by Reef Industries, or approved equal.

E. Installation of marking tapes shall be per manufactureer's recommendations and shall be as close to the finished grade as is practical for optimum protection and detectability. Allow a minimum of 18" between the tape and the pipe.

2.10 UNDERGROUND DETECTABLE UTILITY MARKER TAPES

A. Metallic underground warning tapes shall be installed directly above all buried pipes which do not have a tracer wire installed.

B. The tape shall consists of a minimum of 5.0 mil overall thickness, with a 0.35 mil solid aluminum foil core. Construction is 0.8 mil clear film, reverse print laminated to an aluminum foil to 3.75 mil clear film, making the film permanently printed and plowable.

C. The tape shall be color coded and imprinted with the message as follows:

Type of Utility	Color Code	Legends
Water	Safety Precaution Blue	Caution Buried Waterline Below
Sewer	Safety Green	Caution Buried Sewer Line Below

D. Underground marking tape shall be Presco Detectable Tape as manufactured by Presco or approved equal.

E. Installation of marking tapes shall be manufacturer's recommendations and shall be as close to the finished grade as is practical for optimum protection and detectability. Allow a minimum of 18" between the tape and the pipe.

PART 3 EXECUTION

3.01 LAYING PIPE IN COMMON TRENCH

A. Pipelines, force mains and sewers laid in same trench shall, in all cases, be laid on original earth, regardless of divergence in their elevations. Pipe shall never be laid in backfill or one above the other. The CONTRACTOR shall include payment for all trenching and backfilling in his lump sum bid.

3.02 PRESSURE PIPE INSTALLATION - GENERAL

A. General

1. Pipe shall be handled with such care as necessary to prevent damage during installation. The interior of the pipe shall be kept clean and the pipe shall be installed to the lines and grades shown on the Drawings. Pipe shall be installed according to instructions and with tools recommended by the manufacturer. Whenever pipe laying is stopped, the end of the pipe shall be securely plugged or capped.

2. Ductile Iron fittings only shall be used with the PVC pipe.

3. Mechanical joint fittings shall be used with underground pipe.

4. Fittings less than 4-inches in diameter shall be of the mechanical joint type and be firmly blocked to original earth or rock to prevent water pressure from springing pipe sideward or upward. Concrete or other blocking material approved by the ENGINEER shall be placed such that it does not cover the pipe joints, nuts, and bolts.

5. Fittings 4-inches in diameter and greater shall be of the mechanical joint type and firmly restrained to prevent water pressure from springing pipe sideward or upward. The mechanical restraint shall be the Series 2000PV produced by EBAA Iron, Inc. or approved equal.

6. Pipes shall be free of all structures other than those planned. Openings and joints to concrete walls shall be constructed as shown on the Drawings.

7. Ductile iron or steel pressure pipe, 4 inch diameter or larger, entering a structure below original earth level, unsupported by original earth for a distance of more than 6 feet shall be supported by Class "2500" concrete, where depth of such support does not exceed 3 feet, and by Class "4000" concrete piers each 6 feet, where depth exceeds 3 feet. All other pressure pipe entering buildings or basins below original earth and having a cover of more than 24 inches of earth, or under roadway, shall be supported as shown in detail on the Drawings. All piers required will be paid for in accordance with the appropriate specification hereinbefore. Class "2500" concrete required will be included in the payment for furnishing and laying the particular pipe, in order to discourage excessive excavation outside the limits of structures. Pipes entering structures shall have flexible joint within 18 inches of exterior of structure, and also from point of leaving concrete support to original earth or crushed stone bedding.

B. Pressure Pipe Laying

1. Pressure pipe shall first be thoroughly cleaned at joints, then joined according to instructions and with tools recommended by the manufacturer. A copy of such instructions shall be available at all times at the site of the work.

2. All pipes must be forced and held together, or "homed" at the joints, before sealing ground level and unsupported by original earth for a distance of more than 6 feet shall be supported by concrete to original ground where depth of such support does not exceed 3 feet. When depth exceeds 3 feet, beams with piers shall be used for support.

3. Trench excavation for pipe laying must be of sufficient width to allow the proper jointing and alignment of the pipe. Trenches in earth or rock shall be dug deep enough to ensure 30" minimum cover over top of the pipe, unless otherwise indicated on the Drawings.

4. Trench line stations shall be set ahead of the trenching at least each 100 feet of pipeline. Trenches shall be dug true to alignment of stakes. Alignment of trenches or pipes in trench must not be changed to pass around obstacles such as poles, fences and other evident obstructions without the approval of the ENGINEER. Lines will be laid out to avoid obstacles as far as possible, consistent with maintenance of alignment necessary to finding the pipeline in the future and avoiding obstruction of future utilities and structures.

5. Cut pieces of pressure pipe 18" or more in length may be used in fitting to the specials and valves and fitting changes in grade and alignment. Cut ends shall be even enough to make first class joints.

C. Testing Pressure Pipe

1. Pressure and leakage tests shall be conducted in accordance with ANSI/AWWA C600.

2. The CONTRACTOR shall furnish all necessary equipment for pressure testing.

3. Inspection of pipe laying shall in no way relieve the CONTRACTOR of the responsibility for passing tests, stopping leakage, or correcting poor workmanship.

4. Underground pipelines will not be finally accepted until leakage is less than allowable by ANSI/AWWA C600. In case leakage exceeds this amount, the CONTRACTOR shall locate and repair leaks until the entire pipeline will pass the required test. All

leakage shall be stopped in exposed piping. The pumping equipment shall be disconnected during test.

5. The CONTRACTOR shall furnish meter or suction tank, pipe test plugs and bypassing piping and make all connections for conducting the above tests. The pumping equipment used shall be compressed air, centrifugal pump or other pumping equipment which will not place shock pressures on the pipeline. Power plunger pumps will not be permitted or us on closed pipe system for any purpose.

3.03 DUCTILE IRON PIPE INSTALLATION

A. Pipe shall be handled with such care as necessary to prevent damage during installation. The interior of the pipe shall be kept clean and the pipe shall be laid to the lines and grades shown on the Drawings and/or as established by the ENGINEER.

B. Whenever pipe laying is stopped, the end of the pipe shall be securely plugged or capped. Care should be taken to prevent flotation of pipe in the event the trench should flood.

C. Fitting shall be firmly blocked to original earth or rock to prevent water pressure from springing pipe sideward or upward. Concrete or other blocking material shall be placed such that it does not cover the pipe joints, nuts and bolts.

D. Pipes shall be free of all structures other than those planned. Openings and joints to concrete walls shall be constructed as shown on the Drawings. Any cast iron pipe entering a structure below original ground level and unsupported by original earth for a distance of more than 6 feet shall be supported by concrete to original ground where depth of such support does not exceed 3 feet. When depth exceeds 3 feet, beams with piers shall be used for support.

E. All pipes entering buildings or basins below original earth level, which have less than 6 feet span between wall and original earth and having a cover of more than 24 inches of earth, or under roadway, must be adequately supported as approved by the ENGINEER or shown on the Drawings. All such supports are to be included in the contract price and no extra payment will be made for same.

F. Pipes entering structures shall have a flexible joint within 18" of exterior of structure, or from point of leaving concrete support to original earth or rock bedding.

G. Cast iron pipe shall be thoroughly cleaned at joints, then joined according to instructions and with tools recommended by the manufacturer.

H. All pipes must be forced and held together, or "homed" at the joints, before sealing or bolting. Pipe must be aligned as each joint is placed, so

as to obtain straight lines and grades. Curves and changes in grades shall be laid in such a manner that maximum allowable joint deflection is not exceeded.

I. Cut pieces of cast iron pipe 18" or more in length, may be used in connecting valves and fittings and for changes in grade and alignment. Cut ends shall be even enough to make first class joints.

J. Sufficient excavation for bell holes will be required for tightening of bolts. No pipe shall be laid resting on rock, blocking, or other unyielding objects except where laid above ground on piers or in permanent tunnels.

3.04 CONCRETE PIPE INSTALLATION

A. Bedding shall be placed and compacted to give complete vertical and lateral support for the lower section of the pipe as indicated on the Drawings. A depression shall be left in the supporting material at the joint to prevent contamination of the rubber gasket immediately before being forced home. Before the pipe is lowered into the trench, the spigot and bell must be cleaned and free from dirt. Gasket and bell shall be lubricated by a vegetable lubricant which is not soluble in water, furnished by the pipe manufacturer, and harmless to the rubber gasket. The pipe shall be properly aligned in the trench to lessen the possibility of fouling the gasket. As soon as the spigot is centered in the bell of the previously installed pipe, it shall be forced home with jacks or come-alongs. After the gasket is compressed and before the pipe is brought fully home, each gasket shall be carefully checked for proper position around the full circumference of the joint. Steel inserts shall be used to check the final position of the gasket. The jacks or come-alongs shall be anchored sufficiently back along the pipeline (a minimum of 5 lengths) so that the pulling force will not dislodge the pieces of pipe already in place. Only a jack or come-along shall be employed to force the pipe home smoothly and evenly and hold the pipe while backfilling is in progress. Under no circumstances shall crowbars alone be used nor shall any of the motor-driven equipment be used.

B. As soon as the pipe is in place and before the come-along is released backfill shall be placed and compacted as indicated on the drawings for at least one-half the length of pipe. Not until this backfill is placed shall the come-along be released. If any motion at joints can be detected, a greater amount of backfill shall be placed before pressure is released.

C. The CONTRACTOR shall carefully regulate his equipment and construction operations such that the loading of the pipe does not exceed the loads for which the pipe is designed and manufactured. Any pipe damaged during construction operations shall promptly and satisfactorily be repaired at the CONTRACTOR'S expense.

3.05 HIGH DENSITY POLYETHYLENE PIPE INSTALLATION

A. General

1. High density polyethylene pipe shall be installed in strict accordance with the manufacturer's recommendations and these Specifications.

2. The CONTRACTOR shall have the manufacturer furnish all necessary technical assistance, installation instruction and jointing supervision required to ensure that the pipe is properly installed. The CONTRACTOR shall furnish the services of a technical representative of the manufacturer to supervise the joining, bedding, laying and backfilling of at least the first 200 feet of pipe.

3. Upon satisfactory completion of the initial jointing, bedding, laying and backfilling of the first 300 feet of pipe, the CONTRACTOR shall furnish the ENGINEER a written statement from the manufacturer's technical representative certifying that he has witnessed the work in progress and approves the techniques being used and the results obtained by the CONTRACTOR.

4. The manufacturer's technical representative shall have had previous experience with similar work, and be fully qualified to supervise and demonstrate proper procedures for jointing and laying the high density polyethylene pipe.

B. Bedding

1. The laying condition for the high density polyethylene pipe will be on a 6" pad of loose soil with mechanically compacted earth (to a 90 percent of maximum density as determined by Standard Proctor density test) to the centerline of the pipe.

2. At the CONTRACTOR'S option, he may substitute a 6" pad of No. 8 crushed stone below the bottom of the pipe and backfill to the centerline of the pie with No. 8 crushed stone.

C. Grade and Alignment

1. Polyethylene pipe shall be laid to predetermined grades and lines as indicated by the Contract Drawings. Grade lines shall be established either by means of offset grade stakes or by direct levels.

3.06 INSTALLING FLANGED OR THREADED PIPE AND FITTINGS

A. The CONTRACTOR shall clean off all rush and dirt and paint all threads with red lead, before assembling, and the pipe shall be installed with flanges and pipes plumb and level, showing no leakage. Unions shall be included in threaded pipe runs to allow for easy removal of pipes. All valve operating devices shall be in locations and of types shown on the Drawings. They shall be accurately plumbed, leveled, supported and braced for smooth operation. Flanged joints shall be assembled with

appropriate flanges, gaskets, and bolting. The clearance between flange faces shall be such that the connections can be gasketed and bolted tight without imposing undue strain on the piping system. Flange faces shall be parallel and the bores concentric; gaskets shall be centered on the flange faces so as not to project into the bore. Bolting shall be lubricated before assembly to ensure uniform bolt stressing. The flange bolts shall be drawn up and tightened in staggered sequence in order to prevent unequal gasket flange spacing. When a raised face is joined to a companion flange with a flat face, the raised face shall be machined down to a smooth matching surface and a full face gasket shall be used.

3.07 INSTALLATION OF AWWA C301 PRE-STRESSED CONCRETE RESSURE PIPE

A. The interior of the pipe shall, as the work progresses, be cleaned of all dirt, jointing materials and superfluous materials of every description. When laying of pipe is stopped for any reason, the exposed end of the pipe shall be closed with a plug or cap (plywood used if neat fitting) fitted into each open pipe end. Precautions must be taken to prevent flotation of the pipe, should water enter the trench prior to putting the pipeline in operation.

B. Before assembling a joint, the spigot end of the pipe shall be thoroughly cleaned. The inside of the bell end of the pipe and the gasket shall be cleaned and lubricated with lubricant as recommended by the manufacturer. The gasket shall then be placed around the spigot end so it is properly seated in the circumferential groove to maintain uniform tension in the gasket all around the pipe. The spigot end shall then be aligned with the bell end of the pipe and carefully entered into the bell.

C. The joint shall be checked to determine if the gasket is in the proper position. The joints of pipe 24 inches or larger shall be checked from the inside of the pipe. Before the spigot is thrust completely home, steel spacers shall be inserted in the seat of the bell to leave a half-inch clearance. A feeler gauge shall then be inserted into the recess to check the position of the gasket. If the gasket cannot be felt all around the pipe, the spigot shall be removed. If the gasket is not damaged it may be reused, but both the gasket and the joint shall be relubricated. After it has been determined the gasket is in its proper position, the joint spacers shall be removed and the pipe pushed or pulled completely home. The joints of pipe smaller than 24 inches may be checked from the outside of the pipe by inserting a feeler gauge into the flare of the bell to assure that no portion of the gasket is protruding.

D. After the joint is assembled, a cloth band is placed around the joint recess and wired or strapped in position to provide a means of pouring grout in the recess. A grout composed of one part cement and two parts sand is poured into the joint recess beneath the band. Measures should be taken to assure the entire recess around the pipe is completely filled.

E. As an alternative to placing grout around the outside of the joint, the CONTRACTOR may install a polyurethane foam loop impregnated with cement. The installed foam loop shall be under compression around the entire circumference of the pipe. The foam loop shall be Flex-Protex, as manufactured by Alva-Tech, or approved equal. Joints located next to valves shall be grouted for three joints each direction from the valve and all restrained joints shall also be grouted only.

F. When a change in alignment or grade is required by articulating the joint, in accordance with the manufacturer's laying schedule, then the joint shall be opened the specified amount.

3.08 PVC PIPE INSTALLATION

PVC pipe shall be installed in accordance with the manufacturer's instructions and the "General" provisions under 3.01 and 3.02 in this Section.

3.09 STERILIZATION OF POTABLE WATER PIPE

A. Upon completion of the work and cleaning up, and prior to final acceptance, the CONTRACTOR shall sterilize all new distribution system improvements which will be in contact with drinking water, including potable water pipe and connections thereto (including pumps and pump piping).

B. Sterilization shall be accomplished by filling the facilities with water containing at least fifty (50) parts per million available chlorine utilizing a contact time of 24 hours. A residual of at least 25 parts per million, at the end of the 24 hour contact time, is required. No portion of the new work shall be placed in service prior to sterilization. At the end of the sterilization period, all sterilized surfaces and areas shall be thoroughly flushed with treated water and drained from the system, as directed by the OWNER.

C. CONTRACTOR shall make an allowance in his bid to cover cost of filling the new water mains. The CONTRACTOR shall be billed for all water used for the construction and testing at a rate equal to the rate that the OWNER must pay the supplier.

D. CONTRACTOR will be responsible for notifying the Health Department to observe sterilization test and shall be responsible for all sampling, including coordination, mailing and retesting, if required.

3.10 BASIS FOR PAYMENT

Piping shall be paid for at the unit price bid or lump sum bid and shall include all work incidental to making a complete installation such as excavation, bedding, backfill, painting, testing, disinfection, cleanup, seeding, etc.

END OF SECTION

SECTION 02640

METERS, INDIVIDUAL PRESSURE REDUCING VALVES, AND SERVICE LINES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section describes the service meters, individual pressure reducing valves, and service lines to be provided, their materials, construction, type, and installation.

B. All meters shown on the plan sheets shall be 5/8 inch by 3/4 inch, unless otherwise noted.

C. All meters and appurtenances shall be compatible with the OWNERS existing Radio Read System as shown in Section 11500 of these Specifications.

PART 2 PRODUCTS

2.01 INDIVIDUAL PRESSURE REDUCING VALVES

A. Individual pressure reducing valves shall be installed with service meters where shown on the plan sheets.

B. Individual pressure reducing valves shall be Mueller, Model No. H-9001, or approved equal, and shall include a bronze strainer. Every regulator shall have an adjustable pressure range of 50 to 125 pounds per square inch. Upon installation, the outlet pressure shall be set at 65 pounds per square inch.

C. Individual pressure reducing valves shall be installed on the inlet/supply side of the service meter using a tandem coppersetter. The CONTRACTOR shall ensure the meter boxes proposed for installation will accommodate the tandem coppersetter, reducing valve and service meter.

D. The reducing valve shall not be buried or otherwise housed outside the meter box.

2.02 METERS

A. SERVICE METER ASSEMBLY

1. Service meters to be furnished under this Contract shall be cold water rotating disc type with hermetically sealed and magnetically driven registers. Meters shall be first-line quality of the

manufacturer and be in compliance with AWWA Standard C700, or latest revisions. Any type or make of meter supplied must have been manufactured and marketed in the U.S.A. for at least five (5) years. A bond may be submitted to waive this experience clause. The bond, if needed, shall be of an amount adequate for replacement of the meters and shall be held for five (5) years.

2. The main case shall be high grade waterworks bronze, with hinged, single lid cover and raised characters cast on them to indicate the direction of flow. Each meter must have the manufacturer's serial number stamped on the lid. Working pressure shall be not less than 150 pounds per square inch. Standard frost bottom meters with non-ferrous strainers snug against the main case shall be provided.

3. The measuring chamber shall be of corrosion-resistant thermoplastic material. The chamber shall be of the two piece design, equipped with a disc made of hard rubber and as near to the specific gravity of water as possible. Discs shall be of the three piece design of the thrust roller type.

4. The register shall be straight reading U.S. gallon type. The register unit shall be completely encased and hermetically sealed, and driven by permanent magnets. There shall be a test index circle, divided into 100 equal parts, and shall have a red center sweep test hand. Water meters shall be Badger Recordall Model 25, or approved equal. Registers shall be guaranteed by the manufacturer for a period of at least fifteen (15) years.

5. New Service Meters shall include meter box and cover, meter, coppersetter, four feet (4') of pipe and corporation stop, plus six feet (6') of pipe and adapter on the customer's side of meter. (This latter item is to prevent the customer or his plumber from disarranging or loosening the meter after the CONTRACTOR has already set the meter in its proper position.) Where the main line is in the highway right-of-way, meter shall be set as close to the right-of-way fence as practicable, but no meter on the same side of the road as the main line shall be set with more than ten feet (10') of service line unless prior approval has been obtained from the ENGINEER or his representative.

6. Meters shall be installed at each service connection unless directed otherwise by the ENGINEER. Meter boxes shall be concrete or PVC pipe twenty-four inches (24") deep. The box shall be twenty inches (20") in diameter. Meter box cover shall be eleven and one-half inches (11 1/2") diameter by four inches (4") deep, Ford No. XT-3 (Touch-Read), or approved equal. Meters shall be five-eighths inch by three-fourths inch (5/8" x 3/4"), unless shown otherwise on the plans. Meter connections shall be made by means of Ford coppersetters having a cutoff and three-fourths inch (3/4") spud. When shown on the plans (Standard Details) an

angle check valve shall be furnished on the meter outlet side of the coppersetter. (The size of meter box stated is for five-eighths inch by three-fourths inch (5/8" x 3/4") meter.) For larger meters, meter box size shall be in accordance with standard practice). Alternative boxes may be considered upon submittal of shop drawings and performance data.

7. Meters shall be set in a workmanlike manner with backfill neatly compacted in place. In yards, pastures and other grassed areas, top of meter box will be one-half inch (1/2") above grade, otherwise two inches (2") above grade.

2.03 SERVICE LINES

A. Unless indicated otherwise on the plans, all service lines shall be three quarter inch (¾-inch) 200 psi Polyethylene tubing. A generous loop of Polyethylene tubing shall be included with the length required for the meter setting. A corporation stop, Mueller H-15000 or approved equal, shall be used on each service line at the main line connection.

B. Service lines crossing a county road or city street will be jacked beneath paved or black topped city streets or county roads, unless rock prevents using this method. Open cut shall be used on all unpaved city streets, county roads and private driveways. Black topped private driveways shall also be jacked under. In all cases where lines are under traffic, a minimum cover of thirty inches (30") shall be provided. All backfill shall be puddled or compacted by air tampers in layers no greater than six inches (6") in depth.

C. Existing service meters shall be disconnected from existing water mains where indicated, and shall be reconnected to the new line. This work shall include up to thirty (30) lineal feet of matching type/diameter service line in the unit price bid for meter reconnection. Compression couplings with inserts shall be used to reconnect flexible (plastic) service line and sweat joints used for copper service line.

2.04 FREEZE-PROOF YARD HYDRANT

Outside hose bibbs shall be of brass construction with compression valve and provided with a heavy brass C.P. wing elbow for bolting to the wall. Hose bibbs shall be located generally where shown on the Drawings.

END OF SECTION

SECTION 02900

LANDSCAPING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Landscape development work in this phase is generally limited to seeding and sodding.

1.02 RELATED WORK

A. Sub-grade elevations, excavation, filling, and grading required to establish elevations shown on Drawings are not specified in this Section. Refer to this Division, Section 02200.

B. Erosion and sediment control are included in this Division, Section 02270.

1.03 SCOPE OF WORK

A. Sod shall be placed on all slopes steeper than 3:1 except for dam embankment slopes. All other surfaces including dam embankment slopes shall be fertilized and seeded as specified hereinafter, except for those surfaces to be paved or rip-rapped.

B. Fertilizing and seeding shall be performed on all disturbed areas within the limits of work of this contract which are not specified to be sodded and are not occupied by structures, road, concrete slab walls, etc. or within the impoundment area.

PART 2 PRODUCTS

2.01 QUALITY OF SOD

A. Sod shall be well-rooted Kentucky Blue Grass sod or other approved pasture sod, completely free from noxious weeds. and reasonably free from objectionable grasses, weeds and stones or other foreign materials. The source of the sod shall be available for inspection and approval by the ENGINEER prior to stripping.

B. Sections of sod stripped may vary in length not to exceed 8 feet but shall be of uniform width of not less than 10 inches nor more than 18 inches, and shall be cut to a depth of not less than 1 inch and not more than 2 inches. The above widths and lengths are required to ensure proper handling without undue tearing and breaking. Sod from light sand or heavy clay will not be accepted. When cut in strips, the sod shall be rolled

with the grass folded inside. The sod shall be cut by means of an approved mechanical sod cutter. During dry weather, the sod shall be watered before stripping to ensure its vitality and to prevent the loss of soil from the roots. Sod shall be rejected if permitted to decay or dry out to the extent that, in the judgment of the ENGINEER, its survival is doubtful.

2.02 PLACING SOD

A. The sod bed shall be shaped to a smooth even surface and shall be graded such that the sod, when in place, shall be flush with any adjacent turfed area, pavement or other structures, except when otherwise directed by the ENGINEER. Prior to placing of the sod, fertilizer (10-20-10 - Ratio - 25 lbs. per one thousand square feet), Agricultural Limestone (Ratio - 75 lbs. per one thousand square feet), shall be applied, harrowed, raked or otherwise incorporated into the soil. After application of above, the sod bed, if dry, shall be moistened to the loosened depth.

B. No sod shall be placed when the temperature is below 32°F. No frozen sod shall be placed, nor shall any sod be placed on frozen soil. Sod shall not be placed during extremely dry weather unless authorized, in writing, by the ENGINEER and provided that immediately after placing, the wood is covered with a 1 inch thickness of straw mulch.

C. The sod shall be carefully placed by hand so that each section closely joins the adjacent sections without overlapping. All open spaces or gaps shall be plugged with sod cut to the same size and shape.

D. The sod, after it is placed, shall be wetted thoroughly and tamped or rolled to incorporate the roots with the sod bed and to ensure tight joints between strips.

E. All sodded areas shall be kept thoroughly moist for 2 weeks after sodding.

2.03 FERTILIZING AND SEEDING

A. This work consists of furnishing all labor, equipment and materials and in performing all operations in connection with the fertilizing and seeding of all the finished graded areas not specified to be sodded or occupied by structures, roads, concrete slabs, sidewalks, walls, etc., and including grassed areas destroyed or damaged by the CONTRACTOR.

B. The areas to be seeded shall be thoroughly tilled to a depth of at least 4" by deicing, harrowing, or other approved methods until the condition of the soil is acceptable to the ENGINEER. After harrowing or deicing, the seed bed shall be dragged and/or hand raked to finished grade.

C. Fertilizer shall be 25 lbs. of 10-20-10 or equivalent per 1,000 square feet. The incorporation of the fertilizer and the agricultural lime (Ratio - 75 lbs. per one thousand square feet) may be a part of the tillage operation and shall be applied not less than 24 hours nor more than 48 hours before the seed is to be sown.

D. The seed mixture to be sown for dry land areas shall be in the following proportions:

Common Name	Proportion By Weight	% of Purity	% of Germination
Kentucky Bluegrass	40	90	85
Chewings Fescue	25	90	85
Italian Rye Grass	20	90	85
Red Top	10	90	85
White Clover	5	95	90

The seed mixture for stream bank and wet soil areas shall be in the following proportions and applied at the noted rates:

Scientific Name	Common Name	Pure Live Seed (PLS) Ounces/Acre
Andropogon gerardii	Big bluestem grass	66
Calamagrostis canadensis	Blue joint grass	4
Elymus canadensis	Canada wild rye	16
Panicum virgatum	Switch grass	2
Sorghastrum nutans	Indian grass	2
Scientific Name	Common Name	Pure Live Seed (PLS) Ounces/Acre
Spartina pectinata	Prairie cord grass	6
Agrostis alba	Redtop	8
Avena sativa	Seed oats	360
Lolium multiflorum	Annual rye	100
Phleum pratense	Timothy	20
Aster ericoides	Heath aster	2
Aster novae-angliae	New England aster	1.25
Baptisia leucantha	White wild indigo	1.5
Cassia fasciculata	Partridge pea	3.5
Coreopsis tripteris	Tall coreopsis	1.25
Desmodium illinoense	Illinois tick trefoil	1
Eryngium yuccifolium	Rattlesnake master	3
Gentiana andrewsii	Bottle gentian	1
Helenium autumnale	Sneezeweed	1.25

Helianthus grosseserratus	Sawtooth sunflower	2
Lespedeza capitata	Round-headed bush clover	3
Liatris spicata	Marsh blazing star	4
Monarda fistulosa	Prairie bergamot	0.75
Parthenium integrifolium	Wild quinine	2.5
Physostegia virginiana	False dragon; Obedient plant	1
Pycnanthemum virginianum	Common mountain mint	0.5
Ratibida pinnata	Yellow coneflower	3.5
Rudbeckia hirta	Black-eyed susan	1.5
Rudbeckia laciniata	Wild golden glow	2
Rudbeckia subtomentosa	Sweet black-eyed susan	1.25
Silphium integrifolium	Rosin weed	2
Silphium laciniatum	Compass plant	3
Silphium perfoliatum	Cup plant	3
Silphium terebinthinaceum	Prairie dock	2
Solidago juncea	Early goldenrod	2
Solidago rigida	Stiff goldenrod	2
Solidago rugosa	Rough goldenrod	2.5
Tradescantia ohioensis	Common spiderwort	1.25
Vernonia altissima taeniotricha	Hairy tall ironweed	3
Veronicastrum virginicum	Culver's root	1
Zizia aurea	Golden alexanders	0.5

E. All seed shall be fresh and clean and shall be delivered mixed, in unopened packages, bearing a guaranteed analysis of the seed and mixture.

F. Seed shall be broadcast either by hand or approved sowing equipment at the rate of ninety (90) pounds per acre (two pounds per 1,000 square feet), uniformly distributed over the area. Broadcasting seed during high winds will not be permitted. The seed shall be drilled or raked into a depth of approximately 1/2 inch and the seeded area shall be lightly raked to cover the seed and rolled. Drill seeding shall be done with approved equipment with drills not more than 3 inches apart. All ridges shall be smoothed out, and all furrows and wheel tracks, shall be removed.

G. Seed may be sown during the following periods:

February 1 to April 15
August 15 to October 15

H. Seed may not be sown at any other time except with the written approval of the ENGINEER.

I. After the seed has been sown, the areas so seeded shall be mulched with clean straw at the rate of one (1) bale per 2,000 feet (approximately 1 inch loose depth). Mulch on slopes shall be held in placed with binder twine staked down at approximately 18 inch centers or by other equally acceptable means.

J. Areas seeded shall be protected until a uniform stand develops, when it will be accepted and the CONTRACTOR relieved of further responsibility for maintenance. Displaced mulch shall be replaced or any damage to the seeded area shall be repaired promptly, both in a manner to cause minimum disturbance to the existing stand of grass. If necessary to obtain a uniform stand, the CONTRACTOR shall re-fertilize, re-seed and re-mulch as needed. Scattered bare spots up to one (1) square yard in size will be allowed up to a maximum of 10 percent of any area.

PART 3 EXECUTION

3.01 SEQUENCE OF WORK

A. All finish grading in a general area shall be complete before sodding or fertilizing and seeding begins.

3.02 BASIS FOR PAYMENT

A. Payment for sod or fertilizing and seeding shall be made on a unit price or a lump sum basis where a separate bid item is provided. Otherwise payment for all landscaping required for other work, such as structures, pipelines, etc., shall be made on a unit price or lump sum basis bid for that work.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

A. This section includes cast-in-place concrete, formwork, reinforcing steel and related accessories in conformance with the requirements of ACI 301-latest revision, Specifications for Structural Concrete, which is hereby made a part of these Specifications except as modified by the Supplemental Requirements under PART 3. - EXECUTION, this Section.

B. ACI 301 - latest revision is the latest consensus standard publication on concrete work and, as modified by the Supplemental Requirements in PART 3 - EXECUTION, this Section, is a complete specification. ACI 301-latest revision is part of Field Reference Manual ACI Publication SP-15 (latest revision) which includes pertinent ACI and ASTM standards considered helpful and necessary job-site reference. The Supplemental Requirements can easily be noted or clipped and taped in SP-15 (latest revision) for ready referral. The CONTRACTOR shall keep at least one copy of SP-15 (latest revision) in the field office at all times.

C. PART 2 - PRODUCTS, this Section, includes the common concrete ingredients of cement, aggregate and water as well as admixture and grout and other concrete related items such as reinforcing steel, waterstop and joint materials. These products are also generally addressed under PART 3 - EXECUTION in ACI 301-latest revision with modifications.

D. The work also includes furnishing all labor, materials, equipment and incidentals required to place anchor bolts, inserts, reglets, flashing, pipe sleeves, conduits and other items to be embedded or passed through the concrete as specified under other sections or as shown on the Architectural, Mechanical, Electrical and Instrumentation and Heating and Ventilating Project Drawings.

E. Quality assurance (ACI Section 1.6). The CONTRACTOR shall employ a qualified testing agency to measure the slump, air, temperature and age of the concrete mixture delivered to the site. The CONTRACTOR'S testing agent will also make three test cylinders from each 50 cubic yards, or fraction thereof, of each concrete mixture placed in any one day.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including

reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, shrinkage-resistant grout, and any others that may be requested by ENGINEER.

B. Shop Drawings, General: All shop drawings submitted shall be a complete set of original drawings created by the Supplier. No partial or incomplete submittals nor duplication of ENGINEER original documents will be permitted.

All shop drawing submittals shall include 6 sets of prints for structural consultant to review and mark up. (Note number of prints may be increased by ENGINEER at the Preconstruction Conference.)

Shop drawings must not only bear the Contractor's stamp of approval but shall also show evidence that each item has been thoroughly checked. Failure to comply with this requirement shall result in the ENGINEER'S return of the submission (without review or action) for the Contractor's proper submission and review. No exceptions shall be taken.

The ENGINEER has set aside time to examine shop drawings one time only and to briefly reexamine a resubmission one time. Should it be required that shop drawings or product data be reviewed again, the Contractor shall reimburse the ENGINEER at the cost of 3.25 times the hourly rate of the ENGINEER'S personnel to reexamine them.

Copies of shop drawings used in the field shall bear the ENGINEER'S, review stamp with items checked to indicate a satisfactory final review.

C. Shop Drawings; Reinforcement: Prior to fabrication, submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required and openings through concrete structures.

D. Shop Drawings; Formwork: Submit shop drawings for fabrication and erection of specific finished concrete surfaces as indicated. Show general construction of forms including jointing, special form joint or reveals, location and pattern of form tie placement, and other items which affect exposed concrete visually.

ENGINEER'S review is for general architectural applications and features only. Design of formwork for structural stability and efficiency is Contractor's responsibility.

E. Samples: Submit samples of materials as specified and as otherwise requested by ENGINEER, including names, sources and descriptions.

F. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test as specified.

G. Materials Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by ENGINEER. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified.

ACI 301 "Specifications for Structural Concrete for Buildings".

ACI 304 "Recommended Practices for Measuring, Mixing, Transporting and Placing Concrete".

ACI 318 "Building Code Requirements for Reinforced Concrete".

Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

ANSI/AWS D1.4 "Structural Welding Code -- Reinforcing Steel".

ACI 117 – 90 "Standard Tolerances for Concrete Construction and Materials".

B. Materials and operations shall be tested and inspected as work progresses. Failure to detect defective work shall not prevent rejection when defect is discovered, nor shall it obligate the Owner for final acceptance.

C. All sampling and/or testing in the field shall be made by an ACI Concrete Field Testing Technician Grade I in accordance with ACI CP1 or equivalent.

D. Testing agencies shall meet the requirements of "Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction," ASTM E 329, latest edition.

E. Concrete Testing Service:

Engage a testing laboratory acceptable to ENGINEER at Contractor's expense to perform the following services:

1. Qualification of proposed materials and the establishment of mix designs in accordance with "Building Code Requirements for

Reinforced Concrete," ACI 318, latest edition and as noted under Proportioning and Design of Mixes listed elsewhere in this section.

2. See Section 3.19 Quality Control Testing During Construction For Required Tests.

3. Testing services needed or required by the Contract.

4. Correct deficiencies in structural work which inspections have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.

F. Materials and installed work may require testing and retesting, as directed by ENGINEER at anytime during progress of work. Allow free access to material stockpiles and facilities. Tests including retesting of rejected materials and installed work, shall be done at Contractor's expense.

G. Pre-installation Conference:

At least 14 days prior to the start of the concrete construction schedule, the Contractor shall conduct a pre-installation conference at the project site to review the proposed mix designs and to discuss the required methods and procedures to achieve the required concrete construction.

The Contractor shall require representatives of every party who is concerned with the concrete work to attend the conference, including, but not limited to, the following:

Contractor's superintendent
Material Testing Agency
Concrete subcontractor
Engineer
Construction Manager
Owner

1.04 PROJECT CONDITIONS

A. Protection of Footings Against Freezing: Cover completed work at footing level with sufficient temporary or permanent cover as required to protect footings and adjacent subgrade against possibility of freezing; maintain cover for time period as necessary.

B. Protect adjacent finish materials against spatter during concrete placement.

PART 2 PRODUCTS

2.01 MATERIALS

A. General

1. After award of the Contract, the CONTRACTOR shall submit in writing to the ENGINEER the name, address and qualifications of the ready-mix supplier who will furnish concrete for the project. The CONTRACTOR shall also submit the supplier and source of the sand, coarse aggregate, cement, admixtures, and the proposed mix design. The testing laboratory selected by the CONTRACTOR and approved by the ENGINEER shall receive from the ENGINEER a copy of this Section 03300, this Division, of the Project Specifications. The CONTRACTOR shall send the required materials to the testing laboratory for mix design testing unless pre-qualified mixes are on hand that have adequate test results per ACI 301.

2. Each material submitted for tests shall be from the same single source as material proposed for the concrete work unless otherwise required or permitted.

3. Also refer to ACI 301-latest revisions and Supplemental Requirements under PART 3 - EXECUTION, this Section.

B. Cement (ACI Section 4.2.1.1.a)

1. Portland cement for concrete and mortar shall conform to ASTM C 150-latest revision, Type I.

2. The ENGINEER may require the CONTRACTOR to deliver cement to the testing laboratory for tests according to ASTM Specification C 150-latest revision for Type I. Should cement fail the tests, the CONTRACTOR shall pay for the tests and the ENGINEER shall have the right to reject the brand.

3. Cement for tests shall be delivered in four-ply paper bags with supplier and source identified in writing. Cement shall be stored in a dry location for not longer than 90 days after delivery from the mill.

C. Admixtures (ACI Section 4.2.1.4)

1. The air-entraining admixture for concrete shall conform to ASTM C 260-latest revision.

2. Water-Reducing Admixture: ASTM C 494, Type A, and contain not more than 0.1% chloride ions. Type A, Water-Reducing admixture shall be a hydroxolated polymer type admixture. Admixtures that are predominantly composed of hydroxolated carboxylic acid or lignin sulfonates are not permitted.

3. The non-chloride accelerating admixture for concrete shall conform to ASTM C494-latest revision for Type C or E (accelerating admixtures).

4. The water-reducing, set retarding admixture for concrete shall conform to ASTM C 494-latest revision for Type D, and contain not more than 0.1% chloride ions (water-reducing and retarding admixtures).

5. The high range water-reducing admixture for concrete shall conform to ASTM C 494-latest revision for Type F, and contain not more than 0.1% chloride ions (high range super plasticizer water-reducing admixtures).

6. The high range water-reducing and retarding admixture for concrete shall conform to ASTM C 494-latest revision for Type G, and contain not more than 0.1% chloride ions (high range super plasticizer water-reducing and retarding admixtures).

7. The shrinkage reducing admixture (REQUIRED for all cell structural floors, walls, beams, control area floor slab and maintenance building floor slab) for concrete shall conform to ASTM C157- latest revision (shrinkage-reducing admixtures). Available materials are as follows:

   a. Eclipse Plus or Eclipse Floor by W. R. Grace & Co.

   b. Approved equivalent.

8. The plastic crack control fibers in the concrete (NOT REQUIRED for this project) shall be in accordance to ASTM C1116. They shall be virgin polypropylene, 3/4" in length, colated, fibrilated, or microfilament. Dosage rate range 1/2 to 1-1/2# pounds per cubic yard of concrete. Available materials are as follows:

   a. Grace Fibers, Microfibers, or Gilco by W. R. Grace & Co.

   b. Approved Equivalent.

9. The temperature and shrinkage or post-crack control high volume fibers in the concrete (REQUIRED for the dumpster support slab only) shall be in accordance to ASTM C1116. They shall have a minimum tensile strength of 78ksi, minimum modulus of elasticity of 1300ksi, and a minimum length of 1.5". They shall have the ability to attain a minimum average residual flexural strength (f'e3) of 150psi residual in accordance to ASTM C1018-97. Fiber dosage rate is based on f'e3, f'c, and concrete slab thickness. Available materials are as follows:

a. "Strux 90/40" by W. R. Grace & Co.

b. Approved equivalent.

10. Corrosion resistant additive such as Xypex ADMIX C-1000 (dye) or approved equal concrete waterproofing admix (REQUIRED for floor,walls and top of the plant sump, Dwg 20-2-23) shall be added to the concrete during the batching operation to provide corrosion resistance. 3% of the required weight of Portland Cement shall be added as Xypex. The amount of cement shall remain the same and not be reduced. A colorant shall be added to verify the Xypex ADMIX was added to the concrete. Colorant shall be added at the ADMIX manufacturing facility, not at the concrete batch plant. Xypex ADMIX must be added to the concrete at the time of batching. It is recommended that the ADMIX powder be added first to the rock and sand and blended thoroughly for 2-3 minutes before adding cement and water. The total concrete mass should be blended using standard practices to insure homogeneous mixture.

11. The admixture manufacturer shall furnish a qualified concrete technician employed by the manufacturer, to assist in the proper field batching and use the specified admixtures if requested by the Engineer. The technician shall visit the site at the beginning of concrete operations and as requested during construction. In addition, the manufacturer shall furnish the ready mix plant with accurate and dependable equipment for the proper dispensing of admixture.

12. Substitute admixtures will be acceptable provided they meet or exceed all properties of the specified materials and specified field service is provided.

13. The CONTRACTOR shall deliver, to the testing laboratory selected by the OWNER, 12 fluid ounces of each admixture required in the concrete design mix such as air entraining, water-reducing, and water-reducing, set-retarding admixtures. Admixture samples shall be labeled with printed identification indicating trade name, strength, dosage instructions and manufacturer.

14. Pozzolanic admixtures according to "Specification for Fly Ash and Raw or Calcined Natural Pozzolans for Use in Portland Cement Concrete" (ASTM C 618 type F-latest revision) and ACI 301, 4.2.1.1.c shall be limited to 15% of the minimum cement by weight.

15. Prohibited Admixtures: Calcium chloride thyocyanates or admixtures containing more than 0.1% chloride ions are not permitted..

D. Water (ACI 301 Section 4.2.1.3)

1. Water shall be clean and free from injurious amounts of oils, acid, alkali, organic matter, or other deleterious substances. Potable tap water will normally fulfill the above requirements, but the requirements of ASTM C 94 shall be met.

2. When subjected to the mortar strength test described in ASTM C 94-latest revision, the 28-day strength of mortar specimens made with the water under examination and normal portland cement shall be at least 100 percent of the strength of similar specimens made with distilled water.

E. Fine Aggregate (ACI 301 Section 4.2.1.2)

1. Fine aggregate shall consist of clean, well grated particles of hard, durable sand and shall contain limited amounts of deleterious substances. Fine aggregates shall meet the requirements of KTC Section 805 or ASTM C 33.

2. The CONTRACTOR shall deliver sand as requested by the ENGINEER to the testing laboratory for initial and periodic tests. Usually 150 pounds of sand for initial and periodic tests will be sufficient. All material delivered to the laboratory shall be accompanied by identification in writing as to suppler and source.

3. Sand shall be graded in accordance with Section 804-latest revision of the Kentucky Transportation Cabinet, Department of Highways Standard Specifications for Road and Bridge Construction - latest edition.

	Percent
Passing 3/8 inch Sieve	100
Passing No. 4 Sieve	90-100
Passing No. 16 Sieve	45-85
Passing No. 50 Sieve	5-25
Passing No. 100 Sieve	0-8

4. Sand shall meet the requirements of these Specifications and the specifications and tests listed below:

Deleterious Substances	Par. 5 - ASTM Designation C 33-latest revision.
Soundness	Par. 6 - ASTM Designation C 33-latest revision.
Organic Impurities	ASTM Designation C 33-latest revision.

F. Coarse Aggregate (ACI 301 Section 4.2.1.2)

1. Coarse aggregate shall be washed river gravel or crushed limestone of hard durable particles and shall contain limited amounts of deleterious substances. Crushed limestone shall come from ledges of a quarry approved by the Kentucky Transportation Cabinet, Department of Highways for use in reinforced concrete untreated bridge superstructures above the tops of the caps excluding pedestals.

2. The CONTRACTOR shall deliver coarse aggregate as requested by the ENGINEER to the testing laboratory for initial tests and periodic tests. Usually 200 pounds of coarse aggregate for initial and periodic tests will be sufficient. All material delivered to the laboratory shall be accompanied by identification in writing as to supplier and source.

3. Coarse aggregate shall be graded in accordance with ASTM C 33 and Section 805 of the Kentucky Transportation Cabinet, Department of Highways Standard Specifications for Road and Bridge Construction-latest edition. Refer to ACI 301 Section 4.2.2.3 for maximum size of course aggregate.

	Percent By Weight	
	No. 57	**No. 67**
Passing 1-1/2-Inch Square Sieve	100	--
Passing 1-Inch Square Sieve	95-100	100
Passing 3/4-Inch Square Sieve	--	90-100
Passing 1/2-Inch Square Sieve	25-60	--
Passing 3/8-Inch Square Sieve	--	20-55
Passing No. 4 Square Sieve	0-10	0-10
Passing No. 8 Square Sieve	0- 5	0- 5

4. Coarse aggregate shall meet the requirements of these Specifications and the specifications and tests listed below:

Deleterious Substances	Par. 9 - ASTM Designation C 33-latest revision
Soundness	Par. 9 - ASTM Designation C 33-latest revision
Abrasion	Par. 9 - ASTM Designation C 33-latest revision

G. Reinforcing Steel (ACI Section 3)

1. Unless otherwise required or permitted, concrete reinforcing bars shall conform to grade 60 deformed bars and shall meet

requirements of Deformed and plain Billet-Steel Bars for Concrete Reinforcement (ASTM A 615-latest revision), Rail-Steel Deformed and Plain Bars for Concrete Reinforcement (ASTM A 616-latest revision) or Axle-Steel Deformed and Plain Bars for Concrete Reinforcement (ASTM A 617-latest revision). All other reinforcement and details shall conform to ACI Standard Building Code Requirements for Reinforced Concrete (ACI 318-latest revision).

2. Before steel is shipped to job, the reinforcing steel supplier shall submit to the ENGINEER, 2 certified copies of mill tests on all steel to be used in the work. The tests shall substantiate that chemical and physical properties of the steel comply with the requirements of the governing specifications.

3. The CONTRACTOR shall carry in stock at the beginning of the concrete work the following amounts of extra reinforcing steel for replacement of lost steel or additional steel considered necessary by the ENGINEER.

5	3/8-Inch Rods	30 Feet	-	0-Inch Long
5	1/2-Inch Rods	30 Feet	-	0-Inch Long
5	5/8-Inch Rods	30 Feet	-	0-Inch Long

H. Non-shrink Grout

1. Unless otherwise required or permitted, the grout for non-shrink waterproof joints, waterproof mortar patches, filling under handrail floor flanges and anchoring bolts into existing concrete shall be Sonneborn-Contech Sonogrout, Master Builders' Masterflow 713 grout, or approved equal. The grout for use under base plates of columns, pumps, compressors, generators and similar heavy equipment, and for rebar grouting shall be Sonneborn-Contech FerroLith GNC, Master Builders' Embeco 636 or approved equal.

I. Waterstop for Construction and Control Joints

1. Waterstops shall be 6-inches wide, 3/16-inch minimum thickness, ribbed with center bulb, virgin polyvinyl chloride, in accordance with Corps of Engineers Specifications CRD-C-572, latest revision, as manufactured by Vinylex Corp., W. R. Grace Co., Southern Metal and Plastics, or approved equal.

2. Waterstops shall be furnished in maximum lengths available to reduce the number of joints to the minimum. All joints shall be lapped, as recommended by manufacturer, to make the stops continuous and watertight.

J. Waterstop for Expansion Joints

1. Waterstops, where required in expansion joints, shall be 9-inches wide, 1/4-inch minimum thickness, ribbed with center bulb, virgin polyvinyl chloride, in accordance with Corps of Engineers Specification CRD-C-572, latest revision, as manufactured by Vinylex Corp., W. R. Grace Co., or approved equal.

K. Premolded Joint Fillers

1. Joint fillers, where required, shall be Sonneborn-Contech Sonoflex F foam expansion joint filler (closed cell, ultraviolet stable, polyethylene foam), or equivalent W. R. Grace Co., products, or approved equal. Where application requires cementing the joint filler into place, such as in a wall expansion joint, a pressure-sensitive adhesive recommended by the filler manufacturer shall be used.

L. Joint Sealants and Backing for Sealants

1. For sealing vertical exposed faces of joint filters, use Sonneborn-Contech Sonolastic NPI (one component urethane) or equivalent W. R. Grace Co. products, or approved equal. For water immersion, prime with Sonneborn-Contech Primer No. 733 for concrete and masonry and Primer No.758 for glass and metals or as required by manufacturers of equivalent acceptable sealants.

2. For sealing horizontal exposed faces of joint fillers, use Sonneborn-Contech Sonolastic SL1, one-part, self-leveling, polyurethane sealant with Primer No. 733 or equivalent W.R. Grace Co. products, or approved equal.

3. Where additional sealant backing is needed to control the depth of sealant in relation to joint width, use Sonneborn-Contech Sonoflex F foam expansion joint filler or Sonofoam Backer Rod (closed cell polyethylene foam) or equivalent W. R. Grace Co. products, or approved equal.

M. Self-Leveling Floor, Deck and Sidewalk Joint Sealant

1. One-part self-leveling polyurethane sealant for concrete floors, decks, sidewalks and other horizontal contraction and expansion joints shall be Sonolastic SL1 as manufactured by Sonneborne-Contech or equivalent by W. R. Grace Company, or approved equal.

2. Sealant shall comply with Federal Specification TT-S-00230C, Type 1 Class A and ASTM C 920-latest revision, Type S, Grade P, Class 25. Joint primer shall be Sonolastic Joint Primer No. 733, or equal, shall be used where joints will be subjected to

continuous or protracted periods of water immersion. When required in deep joints, backing material shall be Sonofoam Backer-Rod, or approved equal, which should not be primed and/or punctured.

3. Sealant color shall be limestone gray, tan, and/or mortar (stone) as selected by the ENGINEER unless otherwise required or permitted.

N. Concrete Floor Curing and Sealing System

1. System shall be a pigmented, ready to use, non-yellowing, acrylic curing and sealing compound which seals by providing a tough scuff resistant film over freshly finished concrete and complies with ASTM C309 and AASHTO M-148. System shall be Gray Kure-N-Seal as manufactured by Sonneborn-Contech or equivalent by W. R. Grace Company, or approved equal.

O. Vibration Isolating Pit Liners

1. Liner material shall be specifically engineered to provide optimum compression rates for inertia block foundation. Liner material shall be unaffected by oils, coolants, cutting fluids and other liquids normally found in industrial environments.

2. Liner material shall be manufactured by the traditional felting process in two densities. A less dense material shall be used to isolate sidewalls of inertia block. A more dense material shall be applied to the base surface of the pit.

3. Liner material shall be 1/2" thick 1B-500-S2 for the sidewalls and 1/2" thick 1B-500-B1 for each of two base layers in 3 feet by 5 feet sheets as manufactured by Unisorb, or approved equal.

4. Vinyl or duct tape shall be used to seal joints between sheets of materials to assure that no fluid concrete enters the joints causing "short-circuiting" of the inertia block insulation.

P. Reglets: Where resilent or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26gage galvanized sheet steel. Fill reglet or cover face opening to prevent instrusion of concrete or debris.

Q. Dovetail Anchor Slots: Hot-dip galvanized sheet steel, not less than 0.03363 inch thick (22 gauge) with bent tab anchors. Fill slot with temporary filler or cover face opening to prevent instrusion of concrete or debris.

R. Granular Base: Compacted layer of #57 stone, unless otherwise approved or directed by ENGINEER.

S. Vapor Barrier: Provide vapor barrier cover [above/under] prepared base material for slabs on grade and where indicated. Use only materials which are resistant to decay when tested in accordance with ASTM E 154, as follows:

Polyethylene sheet not less than 10 mills thick.

T. Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171.

a. Waterproof paper.

b. Polyethylene film.

c. Polyethylene-coated burlap.

U. Bonding Compound: Polyvinyl acetate, rewettable type.

a. Products: Subject to compliance with requirements, provide one of the following:

"Weldcrete"; Larson Products.
"Everbond"; L & M Construction Chemicals.
"Eucoweld"; Euclid Chemical Co.
"Daraweld C"; W.R. Grace
"Sonocrete"; Sonneborn-Contech.

V. Epoxy Adhesive: 100% solids, two component material suitable for use on dry or damp surfaces.

b. Products: Subject to compliance with requirements, provide one of the following:

"Thiopoxy"; W.R. Grace.
"Sikadur Hi-Mod"; Sika Chemical Corp.
"Euco Epoxy"; Euclid Chemical Co.

PART 3 EXECUTION

3.01 SUPPLEMENTAL REQUIREMENTS TO ACI 301-latest revision

A. ACI 301- SECTION 4 – CONCRETE MIXTURES

1. Also refer to PART 2 – PRODUCTS, for required admixtures

2. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.

a. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to batch will not be permitted.

b. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.

c. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes. Mixing and delivery time will not have to be reduced if Type D retarder is incorporated in the mix.

d. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.

B. ACI 301 – SECTION 4 – PROPORTIONING

1. General - concrete shall be composed of portland cement, fine aggregate, coarse aggregate, water, and as specified, admixtures. Proportions of ingredients shall produce concrete that will work readily into corners and angles of forms, bond to reinforcement, without segregation or excessive bleed water forming on surface. Proportioning of materials shall be in accordance with ACI 211.1-91, "Recommended Practice for Selecting Proportions for Normal, Heavyweight & Mass Concrete."

2. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to ENGINEER for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to ENGINEER.

3. Submit written reports to ENGINEER of each proposed mix for each class of concrete at least 45 days prior to start of work. Do not begin concrete production until mixes have been reviewed and approved by ENGINEER.

4. Required Average Strength Above Specified Strength: Determinations of required average strength (fcr) shall be in accordance with ACI 318, "Building Code Requirements for Reinforced Concrete," and evaluations of compressive strength results of field concrete shall be in accordance with ACI 214-88,

"Recommended Practice for Evaluation of Strength Test Results of Concrete."

a. Trial Mixes when the ready-mix producer does not have a record of past performance, the combination of materials and the proportions selected shall be selected from trial mixes having proportions and consistencies suitable for the work based on ACI 211.1, using at least three different water-cement ratios which will produce a range of strengths encompassing those required.

1) Average strength (fcr) required shall be 1200 psi (8.3 MPa) above specified strength.

b. Past Field Experience - proportions shall be established on the actual field experience of the ready-mix producer with the materials proposed to be employed. Standard deviations shall be determined by 30 consecutive tests (or two groups of tests totaling 30 or more).

1) Average strength (fcr) shall exceed specified strength (f 'c) by at least:

400 psi (2.8 MPa) - standard deviation is less than 300
550 psi (3.8 MPa) - standard deviation is 300 to 400
700 psi (4.8 MPa) - standard deviation is 400 to 500
900 psi (6.2 MPa) - standard deviation is 500 to 600
1200 psi (8.3 MPa) - standard deviation is above 600 or unknown

5. Design mixes to provide normal weight concrete with the design strengths as indicated on drawings. The average strength shall exceed specified compressive strength as required in accordance with ACI 318.

6. High Early Strength Concrete: If early strength development is a requirement to meet construction schedules, the mix shall be proportioned to develop the necessary compressive strength at the required age, and data will be provided to the engineer for review.

7. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by ENGINEER. Laboratory test data for revised mix design and strength results

must be submitted to and accepted by ENGINEER before using in work.

8. ACI Section 4.2.2. Performance and Design Requirements

Add the following final paragraph:

Specified strength of concrete, f'c for each structure or portion of structures shall be as follows unless otherwise required or permitted:

a. Class 4,000 concrete (f'c = 4,000 psi, minimum cement factor of 620 lb/cu.yd.) for all reinforced concrete structures except as otherwise noted on the Drawings and surface courses of highway and street paving except as required for Class 4,500 concrete.

b. Class 3,500 concrete (f'c = 3,500 psi, minimum cement factor 564 lb/cu. yd.) for non-reinforced portions of manholes, control chambers, interceptor structures, grout for two-course slab toppings, grout to be screeded in place by process mechanical equipment, curbs, gutters, driveways, sidewalks, and base courses for highway and street paving.

c. Class 2,500 concrete (f'c = 2,500 psi, minimum cement factor of 450 lb./cu. Yd. And 3 to 6 inch slump) for encasement around sewers and branches for cradle or refill under conduits and fill under structures as specified or indicated on the Project Drawings.

9. ACI Section 7 – Weight

Lightweight concrete shall not be used unless otherwise required or permitted.

10. ACI Section 4 – Durability

a. ACI Section 4.2.2.4 – Air Entrainment

Substitute the following:

Classes 4,000 and 3,500 concrete required to be watertight or subjected to potentially destructive exposure (other than wear and loading) such as freezing and thawing, severe weathering or deicer chemicals shall have an entrained air content of 5 +1% by volume (6+/-1% for SRA Concrete). Measurement of air content shall meet the requirements of ASTM C231-latest revision, ASTM C173-latest revision or ASTM C138-latest revision.

11. ACI 301 Section 4.2.2 – Water-Cement Ratio/Watertightness

Substitute the following:

Classes 4,000 and 3,500 concrete which must be watertight shall have a maximum water-cement ratio of 0.45. Where watertightness is the primary concern, refer to ACI 350.

12. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

a. Slabs, ramps and sloping surfaces: Not more than 3" with ordinary WRA, or 6" with MRWR.

b. Reinforced foundation systems: Not less than 2-1/2" and not more than 4" except Foundation Walls slump to be 5" to 6".

c. Other concrete: Not less than 1" nor more than 4".

d. Concrete containing MRWR admixture (mid-range): Not more than 6".

e. Concrete containing HRWR admixture (super plasticizer): Not more than 8".

C. ACI 301 Section 5 – HANDLING, PLACING, AND CONSTRUCTING.

1. ACI 301 Section 5 – Use

Add the following final paragraph:

The ENGINEER may require a set-retarding admixture if required by construction conditions. Otherwise, the CONTRACTOR shall have the option to use a retarding, a water reducing, or a water reducing set-retarding admixture. However, once accepted by the ENGINEER, the CONTRACTOR shall be consistent in admixture use, for example in all wall pours of a structure. Accelerating admixture shall not be used unless otherwise required or permitted.

2. ASTM C157-93 - Modified Testing Procedure

a. Wet cure specimens for a period of 7 days (including the period of time the specimens are in

the mold). Wet cure may be achieved either through storage in a moist cabinet or room in accordance with ASTM C 511, or through storage in lime saturated water.

b. Report results in accordance with ASTM C 157-93 at 0, 7, 14 & 28 days of curing.

3. ASTM C157-93 Test Results – Shrinkage Requirements

a. Shrinkage Test Results: Floor slab design requires using materials with combined shrinkage characteristic of 0.032% maximum at 28 days when tested per ASTM C-157-93. Provide documentation that the proposed mix design, using actual aggregates, additives, and cement of the proposed mix for this project as called for in Structural Notes, meets this criteria. Submit results for at least three (3) specimens. Each test takes 28 days. Start tests as soon as Contract is let so final test results are available for submittal.

b. If a concrete mix is proposed for use without adequate documentation of the shrinkage test described above, or if mix does not meet 0.032% maximum at 28 days when tested per ASTM C-157-93, then use shrinkage reducing admixture (SRA).

1) Use 1.5 gallons of SRA per cubic yard for mixes with no documentation or where tested shrinkage values exceed 0.050%.

2) Use 1 gallon of SRA per cubic yard for mixes with tested shrinkage values between 0.033% and 0.050%.

D. ACI 301 SECTION 2 – FORMWORK AND FORMWORK ACCESSORIES

1. ACI Section 2.1 – General

a. ACI Section 2.1.2 – Submittals

Substitute the following:

Formwork is the CONTRACTOR'S responsibility and shop drawings will not be required.

2. ACI Section 2.2 - Products

a. ACI Section 2.2.1 Materials
2.2.1.3 - Formwork Release Agents

Add the following paragraph:

For potable water treatment facilities, the form coating shall be non-toxic after a specified period, usually 30 days.

b. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

1) Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

c. Forms for Unexposed Finish Concrete: Plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

d. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match ENGINEER'S brick face control sample. Provide solid backing and form supports to ensure stability of textured form liners.

e. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

f. Form Ties: Factory-fabricated, adjustable-length, removable or snapoff metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units which will leave no metal closer than 1-1/2" to surface.

g. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer stips fabricated to produce uniform smooth lines and tight edge joints.

h Provide ties which, when removed, will leave holes not larger than 1" diameter in concrete surface.

i. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

3. ACI Section 2.3 – Execution

a. ACI Section 2.3.1 Construction and erection of formwork

b. ACI Section 2.3.2 Removal of formwork

Add the following:

Forms and shoring in the formwork used to support the weight of concrete in beams, slabs and other structural members shall remain in place until the concrete has reached 75 percent of the specified strength if, after stripping the forms, the structural system is reshored the same day of stripping and shores remain in place until the specified concrete strength is reached. Deviation from these requirements shall not occur unless otherwise required or permitted.

When shores and other vertical supports are so arranged that the non-load-carrying form facing material may be removed without loosening or disturbing the shores and supports, the facing material may be removed when the concrete has reached 50 percent of the specified strength unless otherwise required or permitted.

c. ACI Section 2.3.3 Reshoring and backshoring

d. ACI Section 2.3.4 Strength of concrete required for removal of formwork.

e. ACI Section 2.3.5 Field quality control – horizontal and vertical location.

1) Establish and maintain controls and benchmarks in an undisturbed condition until final completion and acceptance of the project.

2) Variations from plumb and designated building lines shall not exceed the tolerances specified in ACI 117.

E. VAPOR BARRIER INSTALLATION

1. Place vapor barrier above compacted granular base.

2. Lap joints 6" and seal with appropriate tape

F. ACI SECTION 3 – REINFORCEMENT AND REINFORCEMENT SUPPORTS

1. ACI Section 3.1 – General

a. ACI Section 3.1.1 Submittals, data, and drawings

Add the following:

Submit cut sheets describing any coated reinforcement, placement spacers, or other accessories.

b. Reinforcing Bars: ASTM A 615, Grade 60, deformed. Bars indicated to be welded shall conform to ASTM A706 and have the approval of the ENGINEER.

c. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.

1) For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2) For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class I) or stainless steel protected (CRSI, Class 2).

3) For elevated slabs on metal deck, use standard chairs to position reinforcement at mid-height above deck ribs, unless otherwise shown.

d. Mechanical Couplers: Couplers used for reinforcing bar splices must develop a minimum of 125% of bar yield strength. Approved manufacturers include but are not limited to "Bar-Grip System" or "Grip-Twist System" by Barsplice Products Inc.

2. ACI Section 3.3 - Execution

a. ACI Section 3.3.1 – Preparation

b. ACI Section 3.3.2 – Placement

G. INSTALLATION OF EMBEDDED ITEMS

1. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.

2. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3. Install reglets to receive top edge of foundation sheet waterproofing, and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.

4 Install dovetail anchor slots in concrete structures as noted on drawings.

H. CONCRETE PLACEMENT

1. Preplacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

   a. Apply temporary protective covering to lower 2'-0" of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during placement.

2. General: Comply with ACI 304, and as herein specified. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

   When placing operations will involve dropping concrete more than 5 feet, the concrete shall be dropped through a tube fitted with a hopper head, or through other approved devices, as necessary to prevent segregation. This requirement shall not apply to cast-in-place piling or caissons when concrete placement is completed before initial set occurs in the first placed concrete.

3. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

4. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

5. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

6. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

7. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

8. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

9. Maintain reinforcing in proper position during concrete placement operations.

10. Cold Weather Placing:

    a. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

    b. When air temperature has fallen to or is expected to fall below 40°F (4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C), and not more than 80°F (27°C) at point of placement.

c. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

d. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

11. Hot Weather Placing:

a. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

b. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90° F (32° C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing.

c. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

d. Fog spray forms, reinforcing steel and subgrade thoroughly just before concrete is placed.

e. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

H. SECTION 5 – HANDLING, PLACING, AND CONSTRUCTING

1. ACI Section 5.3.3 – Finishing concrete surfaces.

a. Rough Form Finish: For formed concrete surfaces not exposed to view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

b. Smooth Form Finish: Provide a smooth form finish to formed concrete surfaces exposed-to-view, or that are to be covered with a coating or waterproofing material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is an as-cast

concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas, with fins or other projections completely removed and smoothed.

c. Grout Cleaned Finish: Provide a grout cleaned finish to concrete surfaces which have received smooth form finish treatment, where shown on drawings or in schedules. Finish shall be performed by the following procedure:

1) Combine one part portland cement to 1-1/2 parts fine sand by volume, and mix with water to consistency of thick paint. Use of proprietary additives may be used at Contractor's option. Blend standard portland cement and white portland cement, amounts determined by trail patches, so that final color of dry grout will closely match adjacent surfaces.

2) Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

d. Related Uniform Surfaces: At tops of walls where horizontal offsets surfaces occur adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

e. Trowel finish shall be applied to concrete on which process water and sewage flow and to all surfaces normally intended as walking surfaces including surfaces to receive covering such as tile, and in working and operating areas except as required below for non-slip surfaces.

f. Broom or belted finish shall be applied to all exterior sidewalks, steps, platforms, ramps and concrete walking surfaces and to interior sloped walking surfaces frequently cleaned by hosing such as garage floors. Brooming shall be in the direction of the slab drainage maintaining the required surface tolerance to provide non-slip finish.

g. Floated finish shall be applied to all surfaces intended to receive roofing, waterproofing membranes or sand bed terrazzo.

h. Refer to Project Drawings for any special requirements.

i. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete loading dock, stairs, ramps, stoops, and elsewhere as indicated. Flatness and levelness requirements are listed later in this section.

1) Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with ENGINEER before application.

j. Flatness and Levelness Requirements (unless otherwise noted):

1) Slab on Grade: Check and level surface plane to a tolerance for floor flatness (F_F) =28 overall value and minimum local value of 23 and floor levelness (F_L)= 20 overall value and minimum local value of 18.

2) Supported Slabs: Check and level surface plane to a tolerance for floor flatness (F_F)=25 overall value and minimum local value of 17 and floor levelness (F_L)=20 overall and minimum local value of 15. Supported floors must be tested before any shoring is removed.

3) All testing and sampling to conform to ASTM E11-55.

I. CONCRETE CURING AND PROTECTION

1. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting; keep continuously moist for not less than 7 days.

3. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

4. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, as herein specified.

a. Provide curing and sealing compound to exposed interior slabs and to exterior slabs, walks, and curbs as follows:

1) Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period. Coordinate curing/sealing compounds with coating materials to verify compatibility of materials.

2) Use moisture retaining covering in lieu of membrane curing compound on surfaces which are to be covered with coating materials applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring, (such as ceramic or quarry tile or glue down carpet), resinous epoxy finish, painting, and other coatings and finish materials, unless it can be documented that no reaction or bonding problem will be developed. See finish schedule(s) for proper coordination and extent of these materials.

3) All interior slabs that are to remain exposed and that are not to receive special coating materials shall be cleaned and covered with one additional coat of curing and sealing compound after all construction traffic is off of slab surface.

b. Provide moist curing by one of the following methods:

1) Keep concrete surface continuously wet by covering with water.

2) Continuous water-fog spray.

3) Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

c. Provide moisture-cover curing as follows:

1) Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest

practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

d. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

e. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

1) Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

K. BASIS FOR PAYMENT

1. Payment for concrete work shall include all excavation, crushed stone bedding, forms, reinforcing steel, finishing, concrete testing, etc. and shall be made on a unit price or lump sum basis where a separate bid item is provided. Otherwise payment for all concrete required for other work as shown on the PLANS shall be made on a unit price or a lump sum basis for that work.

2. Payment for concrete work shall be made only after an acceptable finish and compression tests results are obtained.

END OF SECTION

SECTION 05520

METAL FABRICATIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, and equipment required to construct and install metal fabrications as shown on the Drawings and specified herein. Included in this section are handrails, grating, nuts, bolts, anchors, hatches, ladders, and stairs.

1.02 RELATED WORK NOT INCLUDED

A. Concrete work is included in Division 3.

B. Castings are included in Division 5, Section 05540.

C. Flashing and sheet metal work for roofing is included in Division 7, Section 07600.

D. Painting is included in Division 9, Section 09900.

1.03 QUALITY ASSURANCE

A. All fabricated materials shall be of the highest quality, free of structural, handling, and workmanship defects.

B. Pre-assembled items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installations.

1.04 SUBMITTALS

A. Shop Drawings

1. The CONTRACTOR shall submit to the ENGINEER in accordance with Division 1, Section 01300 detailed shop drawings of all materials to be fabricated, and shall receive the ENGINEER'S certification of review before fabrication. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor bolt installation by others. Include any requirements for surface preparation, paint products, or grout.

2. Where materials or fabrications are indicated to comply with certain requirements for design loadings, include structural computations, material properties and other information needed for structural analysis. This shall not relieve the CONTRACTOR of responsibility for all errors, omissions, and deviations of his shop drawings from the Drawings and Specifications and from requirements of final results called for in the Drawings and Specifications.

B. Samples

1. The CONTRACTOR shall submit 2 sets of representative samples of materials and finished products as may be requested by the ENGINEER, or as specified herein.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel

1. Steel fabrication shall be done in conformity with the "AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", latest revision and supplements.

2. Prime and paint in accordance with Division 9, unless otherwise required or permitted.

3. Unless otherwise noted on the Drawings or in the Specifications, galvanizing shall be by hot-dip process in accordance with ASTM A525 - latest revision, Coating Designation G90 (previous Coating Class Commercial 1.25 oz. per sq. ft.).

4. Damaged zinc coating shall be repaired according to Federal Specification DOD-21035A (Galvanizing Repair Spec.) and ASTM A780 - latest revision as follows:

a. Remove foreign matter from both damaged and contiguous undamaged area by wire brushing and cleaning with metal conditioner recommended by cold galvanizing coating manufacturer.

b. Apply 2 coats of cold galvanizing coating to damaged area, ensuring an overlap of the surrounding undamaged galvanizing for continuity of galvanic protection. Cold galvanizing coating shall be Z.R.C. Chemical Products Co., "Z.R.C. Cold Galvanizing," or equal.

B. Aluminum

1. Aluminum shall have a high resistance to corrosion and shall be Alloys 6061-T6, 6062-T6, 6063-T5 or 6063-T6 for wrought products such as rods, bards, standard structural shapes, extrusions, and forgings; and Alloys 214 for castings, or equal.

2. Aluminum fabrication shall be in accordance with ASCE the Aluminum Associations "Specifications for Aluminum Structures," latest revision. Welding shall be done by the argon-shielded tungsten-arc method or the automatic or semi-automatic argon-shielded consumable-electrode method, or equal. Welding rod and electrodes shall be in strict accordance with above specifications.

3. Where anodic coating is required and type is not specified or shown on the Drawings, coating shall be No. 2 Clear. Anodic coatings shall conform for the following requirements:

   a. Clear Anodic Coatings

      1) The exposed surfaces of aluminum shall be cleaned of all fabricating oils and foreign matter, given a medium caustic etch pretreatment and shall receive one of the following clear anodized finishes:

         a) No. 1 - a minimum coating thickness of 0.0004 inch (0.001 mm) and a minimum coating weight of 15.5 mg per square inch (204R1).

         b) No. 2 - a minimum coating thickness of 0.0008 inch (0.0018 mm) and a minimum coating weight of 27.0 mg per square inch (215R1).

   b. Color Anodic Coatings

      1) All aluminum parts (both extrusion and sheet stock) shall be of a controlled aluminum alloy and temper suitable for receiving an electrochemically produced hard anodic oxide coating. All aluminum parts (both extrusion and sheet stock) shall receive a caustic etch pretreatment to remove all surface foreign matter followed by an electrochemically produced anodic oxide coating having a minimum coating thickness of 0.0007 inch (0.0018 mm). Color shall be specified by the Owner and range samples shall be submitted to establish the upper and lower limits of color variations.

2.02 HANDRAILS

A. General

1. All handrail components and systems shall meet applicable federal and state regulations.

2. All handrails shall be the fence-type handrail system, except where located inside of buildings or on steps which shall be standard post and rail handrail, unless otherwise noted on the Drawings.

3. Shop drawing submittals shall include verification that all components including base flanges, side mounting assemblies and anchor bolts can meet required strength capacities. Anchorages shall be identical to those shown on the Drawings or equal.

4. A vertical post sample with fittings and base connection shall be submitted for review and acceptance prior to preparation and submission of the shop drawings.

B. Standard Aluminum Pipe Handrail

1. Pipe for rails and posts shall be of 6063-T6 extruded aluminum with smooth standard mill finish. Scratches and discolorations uncommon to standard mill finish and sharp edges and rough surfaces shall be removed by rubbing with stainless steel wool lubricated with neutral soap solution.

2. Joints shall be welded and/or slip-on fitting type.

3. Welded joints shall be ground smooth, buffed and rubbed to a finish similar to the pipe.

4. Slip-on fittings shall be cast of magnesium aluminum alloy meeting Aluminum Association requirements for Alloy B-535.2 and furnished with stainless steel set screws. Fittings shall be "SpeedRail" and "NuRail" as manufactured by Hollaender Manufacturing Company, Cincinnati, Ohio, or equal.

C. Performance

1. Handrail system design, construction and installation shall meet or exceed all applicable Federal and State regulations. Handrail anchors, posts, rail and fabric shall be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the top rail, with a minimum of deflection.

2. The manufacturer shall submit to the ENGINEER certified test data verifying the strength of his handrail system.

2.03 STEEL PIPE RAILINGS AND HANDRAILS

A. Fabricated steel pipe railings and handrails to design, dimensions, and details indicated. Provide railings and handrails members formed of pipe of sizes and wall thickness indicated, but not less than that required to support design loading.

B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

1. At tee and cross intersections provide coped joints.

2. Form bends by use of prefabricated elbow fittings and radius bends or by bending pipe, at fabricator's option.

3. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-connection of pipe throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces of pipe.

4. Provide wall returns at ends of wall-mounted handrails, except where otherwise indicated.

5. Close exposed ends of pipe by welding 3/16" thick steel plate in place or by use of prefabricated fittings.

6. Toe Boards: Where required, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated, or if not indicated, use 4" high x 1/4" plate secured to each railing post and intermediate brackets, as required, with stainless steel fasteners. Provide for thermal expansion and contraction, as necessary, through elongated holes, or equal.

C. Brackets, Flanges, Fittings and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

1. For railing posts set in concrete, provide sleeves of galvanized steel pipe not less than 6" long and with inside diameter not less than 1/2" greater than the outside diameter of pipe. Provide steel plate closure welded to bottom of sleeves and of width and length not less than 1" greater than outside diameter of sleeve.

2. Provide friction fit, removable covers designed to keep sleeves clean and hold top edge of sleeve 1/2" below finished-surface of concrete.

D. Galvanized steel railings, including pipe, fittings, brackets, fasteners and other ferrous metal components.

2.04 GRATINGS

A. Gratings shall be the dimensions required on the Drawings and as required to meet deflection specifications below and of aluminum Alloy 6063-T5, 6063-T6, or 6061-T6, or equal. Gratings shall be designed for an allowable uniformly distribution load of 200 lbs./s.f. and a concentrated load of 400 lbs./ft. of width with less than 0.25 inch deflection. Gratings shall be IKG Industries "IBAR," Reliance "ILOK," or equal.

2.05 NUTS AND BOLTS

A. Unless otherwise shown on the Drawings or required in other parts of these Specifications, all nuts and bolts shall be in accordance with ASTM A307 - latest revision, Grade A and shall be electro-galvanized according to ASTM B633 - latest revision.

B. All nuts, bolts, washers and accessories in contact with water, in any moist atmosphere or damp area such as occurs above water, or embedded in concrete exposed to the weather, shall be Type 302 or 304 stainless steel. Stainless steel nuts, bolts, and washers shall be used to fasten aluminum to all materials including aluminum.

2.06 CONCRETE ANCHORS

A. Sizes and spacings or numbers of anchors shall be shown on the Drawings and materials shall comply with exposure requirements listed under Nuts and Bolts above. All anchors used for securing moving or vibrating equipment (pumps, motors, gears, sluice gates, conveyors, etc.), shall be of the cast-in-place type.

B. The size and number of anchors shall be approved by the equipment manufacturer.

C. Unless specifically noted otherwise on the Drawings or Specifications, concrete anchors for other applications shall be chemical grout-type anchors equal to Hilti "HVA Adhesive Anchor," or Ramset "Chemset Chemical Anchors." Installation shall be in strict accordance with the manufacturer's recommendations which shall be available on the job site.

2.07 ALUMINUM LADDERS

A. Aluminum ladders shall be fabricated as detailed on the Drawings.

2.08 HATCHES

A. Metal hatches shall be fabricated as detailed on the Drawings.

2.09 BOLLARDS

A. Concrete filled, steel posts as shown on Drawings.

PART 3 EXECUTION

3.01 GENERAL

A. The CONTRACTOR shall be responsible for all errors, omissions, and deviations of the shop drawings from the Drawing and Specifications. Any errors or omissions shall be brought to the attention of the ENGINEER whose interpretation and instructions shall be received before proceeding with the fabrication of that portion of the work.

B. Similarly, manufacturers' printed installation instructions shall be strictly followed an any conflicts with the shop drawings and/or Contract Drawings shall be directed to the ENGINEER for resolution before proceeding with installation.

C. All base plates, inserts and anchorages shown embedded in concrete shall be accurately located and secured before placing concrete as per a manufacturer supplied template. All structural members and components shall be accurately leveled, plumbed and secured at location shown on the Drawings.

D. Painting

1. Cleaning and painting of all fabricated materials shall be in strict accordance with Division 9, Section 09900, of these specifications.

E. Steel

1. All fabrication and erection shall be done in conformity with the "AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings," - latest revision.

2. Refer to Article 2.01.A of this Specification Section for repair of galvanized surfaces.

F. Aluminum

1. The contact surfaces of aluminum with steel, dissimilar materials, concrete and/or masonry shall be protected from corrosion by a thick coating of coal tar, Koppers Bitumastic No. 50, or equal.

2. Aluminum surfaces embedded in concrete shall be protected from corrosion by a tightly adherent coating of 2 applications of zinc chromate primer.

3.02 HANDRAILS

A. General

1. Refer to Article 2.02 this Section for types of handrails.

2. Shop drawings and handrail manufacturer's printed instructions shall be closely followed during handrail installation. Posts shall be installed plumb and rails parallel.

3. Required anchorages shall be strictly followed.

B. Workmanship

1. All rail and post cuts shall be square and accurate for minimum joint gap, clean and straight, and free of burrs and nicks.

2. In exterior and high humidity interior fabricated fitting installations, provision shall be made to drain entrapped water from inside the railing system to prevent electrolysis and/or damage from freezing. Manufacturer's printed instructions shall be strictly followed.

3. Welds and damaged areas shall be finished and coated according to Article 2.02, this Section.

4. Where required, holes shall be drilled and countersunk the correct size for proper fit of all components.

5. In aluminum handrail systems where protection is applied for prevention of electrolysis from dissimilar materials, visibility of protective material shall be minimized.

6. Handrail system surfaces shall be protected from physical damage and discoloration during storage, assembly and installation. Manufacturer's coverings to protect anodized finishes shall be left intact until damage from construction operations no longer exists.

C. Rigidity

1. Posts shall be continuous from mounting surface to top rail.

2. Top and bottom rails shall be un-spliced lengths between post except as covered under expansion joints.

3. Railing manufacturer's instructions shall be strictly followed regarding torquing and tightening of fittings, and type and materials of fasteners.

4. Only stainless steel fasteners shall be used in aluminum installations, unless otherwise noted.

D. Expansion Joints

1. To prevent excessive stresses and misalignment in standard joints and gaps shall be provided in top and bottom rails. Joints shall be located within 8 inches of posts and supports and the top and bottom rail joints shall be in vertical alignment. In fence-type handrail systems, top rail couplings shall be furnished with galvanized expansion compression spring as required in Part 2, this Section.

2. Where sleeve-type expansion joints are used, fasten only one side of sleeve to rail and allow other side of sleeve to slide on adjacent rail in standard aluminum handrail systems.

3. Gaps shall be provided according to the table below which is based on the coefficients of expansion of 0.000013 inch/°F for aluminum and 0.0000065 inch/°F for steel; a temperature difference of 120°F less the minimum listed temperature; and an expansion joints spacing of 24'-0" on centers for aluminum and 40'-0" on centers for steel. Where it is know that other temperature differentials and/or expansion joint spacings will be experienced, gap dimensions can be determined by: gap in inches = (coefficient of expansion) x temperature difference from maximum to minimum) x (distance in inches between expansion joints).

EXPANSION JOINTS GAP TABLE

Gap Dimension Required at Each Expansion Joint

Temperature (°F) at Time of Installation	Aluminum Railing with Expansion Joints on 24' - 0" Centers	Steel Railing with Expansion Joints on 40' - 0" Centers
-20 to 0	1/2"	7/16"
0 to 20	7/16"	3/8"
20 to 35	3/8"	5/16"
35 to 50	5/16"	1/4"
50 to 70	1/4"	1/4"
70 to 90	3/16"	3/16"
90 to 12	1/8"	1/8"

3.03 GRATINGS

A. Grating frames shall be installed flush with the floor surfaces. Adequate blocking shall be provided to hold corners square during placing concrete and exposed aluminum surfaces shall be protected to prevent pitting from the concrete. Surfaces embedded in concrete shall be protected as covered under Article 3.01, this Section.

3.04 NUT AND BOLTS

A. Refer to Article 2.05, this Section, for material requirements.

B. Bolts embedded in concrete shall be secured with templates at the time of pouring concrete. Bolts shall be suitably protected from damage throughout the construction period.

C. Damaged galvanized surfaces on nuts and bolts shall be repaired according to Article 2.05, this Section.

3.05 CONCRETE ANCHORS

A. Refer to Article 2.06, this Section, for anchor specifications.

B. Concrete anchors shall be installed strictly in accordance with manufacturer's printed instructions which shall be available on the job site.

C. Refer to Division 15 for supporting small pipe.

3.06 LADDERS

A. Install ladders as herein specified and as detailed on the Drawings.

3.07 HATCHES

A. Install hatches as herein specified and as detailed on the Drawings.

3.08 BOLLARDS

A. Set in concrete as indicated. Fill cores solidly with air-entrained concrete having a 28-day minimum compressive strength at 3,000 psi.

END OF SECTION

SECTION 05540

CASTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, and equipment required to install castings as shown on the Drawings and specified herein. Included in this section are manhole covers, steps, valve boxes, and hatch covers.

1.02 RELATED WORK NOT INCLUDED

A. Concrete work is included in Division 3.

B. Surface preparation and furnishing of castings is included in Division 9, Section 09900.

1.03 SUBMITTALS

The CONTRACTOR shall submit to the ENGINEER, in accordance with Division 1, Section 01300, copies of construction details of castings proposed for use.

PART 2 MATERIALS

2.01 GENERAL

A. All castings shall be gray iron, conforming to the requirements of the ASTM Standards, Designation A48 - latest revision, Class 35B.

2.02 MANHOLE CASTINGS

A. Frames and Covers

1. Sanitary sewer manhole castings shall consist of cast iron frames and 22-3/4 inch diameter covers, having a combined weight of not less than 350 pounds for out of traffic locations and 460 pounds for traffic locations. The frame shall be at least 7 inches high overall. Manhole covers must set neatly in the frame, with contact surfaces machined smooth for even bearing. The top of the cover shall be flush with the frame edge. The top of the cover shall sufficient corrugations to prevent slipperiness and be marked in large letters "SANITARY SEWER." Covers shall have one pick hole only, about 1-1/2 inches wide and 3/4 inch deep with 3/8 inch square undercut at rear and 3/4 inch square undercut on sides. Covers on sanitary sewer manholes must not be perforated and shall be as manufactured by J.R. Hoe & Sons, Inc. or approved equal.

2. Storm sewer manhole castings shall consist of cast iron frames and 22-3/4 inch diameter grate type covers, having a combined weight of not less than 460 pounds. The frames shall be at least 7 inches high overall. Manhole covers must set neatly in the frame with contact surfaces machined smooth for even bearing. The top of the cover shall be flush with the frame edge. The castings shall be Neenah Foundry Company with type "D" grate, or approved equal.

B. Steps

1. Cast iron or polypropylene plastic encapsulated steel manhole steps shall be patterns shown on the detail Drawings, and have corrugated treads. In case of need for non-protruding steps, shop drawings of special inset cast iron steps shall be reviewed by and be acceptable to the ENGINEER.

2. If a step constructed of another material is going to be considered, shop drawings will need to be submitted far enough in advance to allow consideration.

3. It is intended that the cast iron step be Neenah Foundry Company's R-1980-E, or equal, and the polypropylene plastic encapsulated steel step be M.A. Industries PS-1, or equal.

2.03 VALVE BOXES

A. Screw Type for Iron Body Gate Valves

1. Valve boxes for 2 inch through 10 inch valves shall be the 2 piece type, with screw adjustment, of sufficient length to allow for 36-42 inches of cover over the top of the pipe, Tyler 6855 series, model #562-S, or approved equal. The inner section shall have a minimum inside diameter of 5-1/4 inches with a hood type base that will cover the packing gland on a 2 inch through 10 inch valve (minimum of 8 inches inside diameter). The base of the top section shall be flanged at least 1-1/4 inches. The caps shall be circular with a corrugated surface and have pick holes in the periphery and be marked "Water", "Gas", "Sewer", or "Air" according to use. For 12 inch through 16 inch valves, the valve boxes shall be Opelika Foundry Company No. 4907 for cast iron or approved equal.

2. Valve boxes for valves in the horizontal position shall be Opelika Foundry Company No. 4907 for cast iron or approved equal, with a base that is sized to allow covering of the bevel gear case and centering of the operating nut in the valve box.

PART 3 EXECUTION

3.01 INSTALLATION

A. The installation of castings is generally covered under specifications for pipe work and manholes. Castings shall be leveled, plumbed, secured, and installed in accordance with the Drawings.

END OF SECTION

SECTION 11500

REMOTE METER READING SYSTEM
5/8 X ¾ Orion Radio Read Meter

1.01 Location

The remote meter reading system shall consist of all hardware's necessary to equip new meters such as to provide a complete functioning system complimentary to the existing 5/8 X ¾ Orion Radio Read System.

A. Transmitter / registers for all meters which are to be straight reading, permanently sealed, magnetic drive and which measures in U.S. Gallons. This unit is to be factory wired to the end cap assembly for maximum reliability with the end cap to be bottom mounted thru a drilled hole in the meter pit lid. This unit is to communicate with the interrogation device.

The transmitter shall use two (2) 3.6 V 2.4 Ahr Lithium batteries as a power source and said batteries shall be guaranteed for a minimum of seven (7) years from initiation of operation.

This unit shall be capable of providing optional leak detection when no tow hour window of no usage within a 24 hour period is detected. It shall also be capable of tampered detection such as a cut wire.

B. Meter Reading Hardware shall include all necessary equipment to perform remote meter readings. The Water District already owns a lap top computer with appropriate mounting hardware for an outside antenna and mounting for the computer in meter reading vehicles.

The District already owns appropriate software to communicate with the new meter transmitters and provide accurate meter readings. The unit must notify the reader when a particular meter is not read with provisions for a reread of that meter. The software is compatible with the billing system currently used by the District such that the meter reading can be directly downloaded to the billing computer.

It shall be the responsibility of the provider of this additional meter system to provide compatibility of the furnished system with the software to be compatible with the existing billing software.

C. Replacement Meters shall be Badger Recordall Bronze Disc meters (5/8" X 3/4") Model 25 which complies with ANSIA./AWWA Standard C700.

END OF SECTION

SECTION 11900

SCADA SYSTEM WITH RADIO TELEMETRY

PART 1 GENERAL

1.01 Location

The work to be accomplished under this section shall consist of new SCADA equipment for a new **Master Meter** monitoring RTU. Future additions to the operational strategy should be planned for utilizing the existing SCADA Master and Workstation at the Districts Water Office.

RTU-3200 ..... KY 28 Master Meter

1.02 Scope of Work

1.02.2 Radio communications work is required in this contract. Work to be performed as noted herein to provide system updates to meet FCC narrowband requirements.

The CONTRACTOR shall furnish all labor, hardware, software, panel wiring, conduit and appurtenances required; and install complete and ready for operation: Programming Logic Controller (PLC), radio, telemetry, and integration with the existing Supervisory Control and Data Acquisition (SCADA) system as shown on the Drawings and as specified herein. Work shall include start-up and testing of the new equipment and software, preparation of an Operations and Maintenance (O&M) manual and training for key personnel. It shall include all materials, apparatus and labor necessary to install, equip and place into operation the respective items shown or called for in the Contract Documents. Any apparatus, material and labor not hereinafter specifically mentioned or shown on the Drawings, which may be found necessary to complete or perfect any portion of the work in a substantial manner and in compliance with the requirements implied or intended in these Specifications or Drawings shall be furnished by the CONTRACTOR without additional compensation. This shall include all materials, devices or methods peculiar to the apparatus or system furnished and installed by the CONTRACTOR.

The system shall be based on the utilization for Programmable Logic Controllers (PLC) which are sold or distributed on a national basis through multiple distributors in various Cities throughout the State of Kentucky. Proprietary hardware/software products sold/provided via an exclusive territorial basis by only one entity/representative per area are specifically and unconditionally not acceptable.

Complete and detailed integration of equipment supplied under this contract with any existing equipment and/or all new equipment furnished herein as well as by other specific suppliers is required. The complete

system shall be constructed with UL listed materials wherever applicable. The new SCADA hardware and associated modifications specified herein shall be the product of a manufacturer who can demonstrate a proven track record of no less than 10 years of satisfactory experience in construction, furnishing, and maintenance of the product.

The SCADA SUPPLIER shall be of identical equipment type and brand of the owner's existing telemetry equipment as built by HTI Inc, Horse Branch, Kentucky (270)-274-4632. Suppliers desiring to submit as alternate must provide to the engineer 2 weeks prior to bid date, prior experience demonstrating qualifications to perform the project task along with a listing of equipment types and guarantees of required compatibility with the existing system. All control hardware components, communications equipment, software, programming and control methods shall be completely compatible with the exiting system.

The SCADA SUPPLIER will furnish the following services to the CONTRACTOR prior to acceptance by the OWNER, and to the OWNER after acceptance. All costs involved in these services shall be included. These services include:

Coordinate shop drawings for other items, or equipment, as required to insure proper interface into the System.

Furnish Instrumentation and SCADA System wiring diagrams reflecting all equipment approved for use on the project. The wiring diagrams will be used by the CONTRACTOR for installation of the equipment and wiring. All wires shall be tagged and labeled at both ends by the CONTRACTOR for quick identification.

During construction, the SCADA SUPPLIER shall assist the CONTRACTOR, as necessary, to calibrate, test, and coordinate the installation of the System. If interrelated devices furnished by others do not perform properly when tested, the SUPPLIER shall use suitable test equipment to introduce simulated signals to and or measure signals from those devices as my be required to locate the source of trouble or malfunction. A written report regarding the results of such tests shall be furnished to the ENGINEER and CONTRACTOR. The report shall identify the measures needed to correct the installation.

Services of a trained instrumentation and SCADA technician for:

One day, during construction, for consultation and assistance to the CONTRACTOR in planning and implementing the installation.

Two days, one trip, for start-up of the System. Startup services shall include checking, calibrating, and adjusting all equipment integrated into the System. The OWNER shall accompany the supplier during start-up services.

One day, one trip, following start-up to instruct the OWNER's personnel in the proper operation, adjustment, and maintenance of the System. Instructions may be video taped by the owner for future reference. The program shall include at least eight (6) clock hours of instruction for owner personnel, and shall cover at least the following topics:

Preventive and scheduled maintenance for all equipment.

Programming and resetting set points and alarm conditions.

Emergency maintenance and restoration procedures.

PLC troubleshooting

Radio troubleshooting and replacement.

Operation and Maintenance Manuals will be furnished as specified in Division 1 shall be furnished to the ENGINEER for equipment supplied under this Section.

PART 2 PRODUCTS

2.01 General

A. Operational Description

The operation for the telemetry control system will include a (RTU) Remote Terminal Unit at the new KY28 Master Meter. The KY28 Master Meter RTU will communicate with the existing KY1110 Relay Tower to relay meter data. The general system operation as described herein for local PanelView monitoring and control shall also be available at the (2 Ea) Water Office SCADA workstation. Required SCADA PC/MTU programming and configuration shall be included to accommodate similar graphical control functions as presently available for existing pump stations.

SCADA software tag count upgrade requirements for all SCADA workstations shall be included in the SUPPLIER'S scope of work. The SUPPLIER shall assure all SCADA HMI and Autodial software is up to the latest revisions and shall be procured and installed under this project. All new I/O points and related control functions shall be included in the integration of related interface software for this project.

2.02 CONTROL SYSTEM OVERVIEW OF SCADA SITES

A. RTU-3200 Master Meter RTU (KY28)

Flow rate signal shall be measured and displayed via the RTU utilizing 4-20mA output from the flowmeter. The RTU shall calculate flow totals based on flow rate input from the meter. Flow rate and total values are to be displayed and logged at the water office SCADA computer workstations and follow protocol of previously installed flow data.

- Master meter hardware and configuration NOT provided by the SCADA SUPPLIER

2.03 PROGRAMMABLE CONTROLLER

PLC Hardware: Listed hardware is to establish basic major components only. Any required related ancillary devices shall be provided by the integrator at no additional cost to the owner.

A. RTU 3200

Manufacture Allen-Bradley (No substitutions allowed)

- Meter Station RTUs: Micrologix 1100 series with required I/O

B. PLC General Specifications

The supplier shall provide a copy of all final working programs on CD ROM disks. Ladder logic programming shall include detailed descriptions of I/O and internal bit/word functions.

1. Main Frame Hardware

The CPU shall be a self-contained unit, and will be capable of displaying Ladder Rung program execution through its communication port. The CPU will also control all I/O scanning and communications servicing.

The CPU within the system shall perform internal diagnostic checking and give visual indication to the when a fault is detected.

The controller shall be designed to operate in a free air flow environment. (Convection cooling only, no fans or other air moving devices shall be required).

The main front panel of the packaged PLC shall include the following indicators:

a. Power

b. Run

c. Fault

d. Force

Processor mode shall be selected by a command from a programming device. Available settings must include "program", "run", and "test" modes.

RUN - No ladder edits possible, program always executing;
PROGRAM - Programming allowed, program execution disabled;
SINGLE SCAN TEST - The PLC scans and solves the user program once, does NOT control the real world outputs, and stops.
CONTINUOUS SCAN TEST - The PLC continuously scans the user program, but does not control the real world outputs

Non-volatile memory shall store the operating system, user program, and all user data information to protect against loss in the case of power loss or system shut-down.

2. Firmware:

The processor shall be provided with the latest firmware version. The processor must support firmware version flash updates.

3. Power.

120 VAC, single phase, in power systems that operate on 50/60 Hz. The controller must also be available with an operating voltage of 12/24 VDC.

The onboard power supply must be capable of supplying all necessary power to all subsystems. (CPU, Memory, I/O, etc.) External power supplies must not be needed to provide power to controller circuitry.

The power supply shall provide surge protection, isolation, and outage carry-over of at least 1 cycle of the AC line.

At the time of power-up, the power supply shall inhibit operation of the processor and I/O modules until the DC voltages are within specifications.

4. Networking and Communications

The packaged controller shall support direct connection to a programming computer equipped with standard RS-232 serial ports Supporting DF1 and Modbus protocols. Native Ethernet I/P @ 10/100 MBPS shall also be supported.

The packaged controller shall support direct connection to a modem for remote programming functionality.

The packaged controller shall support full function peer to peer communications (program management, controller to controller

messaging, etc.) over a network that supports a minimum of 32 devices.

The packaged controller family shall support connectivity with an industry standard "open" device level network.

The packaged controller shall support DF-1 full duplex point-to-point, DF-1 radio modem and Master or Slave ½ duplex communications on a network capable of at least of 250 nodes. The ½ duplex network shall support program upload/download, monitoring, and peer to peer communications. The unit shall include store and forward and Masterless peer-to-peer support.

5. Interfacing and Peripherals.

The programming means shall be an IBM or compatible desktop/portable, or industrial quality programming terminal. Programming tools must be available that run on Windows XP and V7 32 Bit environments.

6. Programming Techniques.

The programming format shall be traditional relay ladder diagram. It shall be possible to program a maximum instruction matrix containing as many as 128 instructions.

7. Quality Requirements.

The packaged controller shall be able to withstand conducted susceptibility tests as outlined in:

Electrostatic Discharge	IEC801-2 @ 15KV
Radiated Susceptibility	IEC801-3 @ 10V/m, 27 MHz - 1000 MHz.
Fast Transient	IEC801-4 @ 2 KV Power Supply, 1KV I/O.
Isolation	1500 Vac, 250 Vdc continuous

The packaged controller and its associated peripherals shall be listed or recognized by the following registrations: UL listed, CSA and CE certified.

2.05 RADIO COMMUNICATIONS

Wireless communications shall be accomplished using licensed VHF radio modems. The SCADA SUPPLIER shall supply proper FCC licensing for the owner all sites and cover all associated fees. The SUPPLIER shall provide a computer generated radio path study to the CONTRACTOR to determine recommend antenna heights. The RF path study must be provided with bid by the CONTRACTOR. Radio path study results shall indicate requirements for communications towers where required. The tower heights shall be provided as recommend by the SCADA SUPPLIER and installed by the CONTRACTOR. The SCADA SUPPLIER shall be responsible for informing the CONTRACTOR of proper locations and installation techniques of towers.

- The CONTRACTOR shall provide all supporting labor and materials for installation, assembly and erection of communications towers.

Antenna heights to be located at appropriate heights as noted in the computer path study for a fade margin of 20 dB at a RX threshold of 2.0 uv. An average foliage height of 85 ft shall be used in the RF path calculations.

A. Radio/Modem

ESTEEM 192M series (No substitutions allowed)

B. Antenna

Omni Directional: Celwave, Astron or approved equal
Yagi: Celwave, Astron or approved equal
(System gain an type as determined by path study and FCC requirements)

C. Coaxial Cable

Times Microwave: LMR-400DB with type "N" end connectors

D. Antenna Towers

Towers to be free standing "tilt up" type and constructed of high quality aluminum. Properly sized base section shall be provided with tower. Tower to be sized by SUPPLIER for adequate regional wind loading for antenna type used.
*Towers to be as manufactured by Universal Tower Inc.

Any required permitting and fess shall be administrated by the owner.

2.07 RTU ENCLOSURES

A. Outdoor environment exposure:

24x24x10" minimum
NEMA 4, Painted Steel
Pad lockable handle required for outdoor units
Manufacture: Hoffman Concept or approved equal

B. Indoor:

24x24x10" minimum
NEMA 12, Painted Steel
Manufacture: Hoffman Concept or approved equal

Enclosures shall be supplied with adequate heating capacity for condensation protection and component temperature rating exposure. A thermostat shall be included for heater control for desired control. Outdoor enclosures shall include ventilation if required to accommodate component temperature specification limits. Enclosures mounted outdoors shall include an interior swing panel for mounting of push buttons, switches,

displays, etc. No buttons, displays, switches, etc., shall be exposed directly to outdoor weather conditions.

2.08 SURGE PROTECTION

A. RTU Panel AC 120 VAC Supply:

MOV protection
Current capacity: 15Amp
Surge Current: 6.5 kA
PHYSICAL SPECIFICATIONS
Operating Temperature Range -40°C to 60°C
Storage Temperature Range -40°C to 90°C
Relative Humidity 0 to 95% non-condensing
Manufacture: MGC, Citel or approved equal

B. RTU Analog signals:

Analog I/O devices located outside of the RTU shall be surge protected in the RTU panel
Max. DC Operating Voltage DC 38.5V DC
Max. Surge Current 1kA
Max. Capacitance L-L: 53pf L-G: 73pf
STRIKE BREAKDOWN PER UL 497B
at 100V/µs 13.0V 48.6V
at 100V/s 10.5V 40.8V
PHYSICAL SPECIFICATIONS
Operating Temperature Range -10°C to 60°C
Storage Temperature Range -10°C to 90°C
Relative Humidity 0 to 95% non-condensing
Manufacture: MGC, Citel or approved equal

C. RTU Coax Surge Protection:

Bulkhead mount, NF-NF end connectors
Manufacture: Polyphaser, CITEL
Model: IS-B50LN-C0 or approved equal

2.09 POWER SUPPLIES

A. 12 VDC:

7.0 Amp minimum continuous output rating @ 12 VDC
Adjustable output 11-14 VDC
DIN rail mountable
Manufacture: Allen-Bradley, Sola, MeanWell or approved equal

B. 24 VDC:

3 Amp minimum continuous output rating @ 24 VDC
DIN rail mountable
Manufacture: Allen-Bradley, Sola, MeanWell or approved equal

2.10 UNINTERRUPTIBLE POWER SUPPLY

All RTU's shall be equipped with a battery backup system with voltage regulation. The backup time shall be 30 minutes minimum.

2.11 CIRCUIT BREAKER

The RTU shall be fitted with a UL listed DIN rail mounted circuit breaker. The circuit breaker shall disconnect the RTU panel from all outside AC voltage sources. Manufactured by Allen-Bradley, GE or approved equal

2.12 RTU PANEL WIRING

RTU panel wiring shall conform to high quality assembly standards. All components shall be UL listed where available. Panel wiring shall conform to standard color coding practices for easy identification. Color coding scheme shall be clearly stated on system drawings. All internal back plate wiring shall be in slotted wiring duct. Duct shall be neatly installed in vertical and horizontal runs. Duct installed at angles other than vertical or horizontal shall not be accepted. Exposed wiring shall only be acceptable where wiring transitions to the intended device or termination point. All exposed wiring crossing door panels or similar transitions shall be wrapped in plastic wire wrap or flexible duct.

Proper grounding practice for personnel and equipment protection shall apply. All field wiring shall terminate at DIN rail mounted terminal strips. Direct field termination to RTU devices shall not be allowed. Terminal strips shall be feed through type rated @ 600 V/ 20 Amp. All terminals and wiring shall be clearly marked using machine printed permanent making labels. Wires shall be clearly identified at termination points and clearly identified on system drawings.

Individually fused components shall be required for the following:

A. PLC AC supply power

B. DC power supplies AC supply power

C. Radio/Modem Power supply DC output

D. DC Loop power to analog devices

PART 3 EXECUTION

3.01 FINAL DOCUMENTATION

Upon system substantial completion, (3) copies of as built drawings shall be supplied to the engineer for assembly of Owner's project documentation. Documents that have not changed from the submittal process will not require resubmittal. Field corrected or hand written changes to documentation will not be acceptable for final documentation.

Documents to be included are:

A. RTU panel drawings (Detailed wiring diagrams with termination points, panel component layout and identification)

B. PanelView screen shots

C. Project instrumentation calibration and configuration data sheets

D. Radio signal strength and data quality report.

E. PLC user manuals

F. Radio/Modem user manuals

3.02 DEMONSTRATION & START-UP

A. Inspect each System for conformity and compliance of materials, equipment and construction.

B. Inspect each installation for conformity with manufacturer's recommendations. Correct any discrepancies or improper conditions.

C. Loops: Check each loop from the end element to the respective control display. Include instruments, control devices, panels, termination cabinets, input/output cards and other devices in the loop to ensure proper operation.

D. Maintain a test set of loops drawings. Document loop checks on the test set.

E. Energize and verify correct operation of all components of each System. This operation includes verification of accuracy of all interconnecting wiring..

F. Place System into operation including all System software, logic, and displays.

G. Adjust all control loop components and parameters to provide stable control of System process.

H. Check validity of all System alarm displays.

I. Schedule inspection with Owner to approve and verify satisfactory compliance with this section.

3.03 SPARE INPUTS / OUTPUTS

Provide 25 percent spare capacity (minimum) on all inputs and outputs. Provide extra terminal blocks and extra I/O modules as required to meet this minimum. Where designated future, provide complete wired input/output circuit including programming and associated PLC I/O module. Future input shall also be displayed on the drawings, denoted as future.

Electrical Components

All electrical circuit components, such a switches, relays, alternators, fuses, etc., shall be manufactured by Allen-Bradley or approved equal.

3.03 SPARE PARTS

Provide the following spare parts.

(1) ea Complete set replacement fuses

3.04 FACTORY TEST

Before the equipment is shipped to the job site, the factory test shall be performed and recorded. The test shall occur in the supplier's facility. The test shall have a minimum duration of two days after the de-bugging phase.

3.05 FCC LICENCING

The system supplier shall be responsible for collecting all information, generation of all paper work, and paying all fees required obtaining a license on behalf of the Owner as applicable.

3.06 ADJUSTMENTS DURING WARRANTY PERIOD

The SCADA supplier shall supply "Factory" startup service and operator training as required insuring satisfactory operation. Subsequent trips to the job site to correct defects shall be made at no charge to the Owner during the warranty period.

3.07 WARRANTY

The control system manufacturer shall supply a one-year parts and labor warranty for all items supplied under this section as part of the control system. The warranty shall begin from the time of final completion and acceptance of the completed project. Damage incurred by acts of vandalism or acts of nature shall be excluded.

3.08 BASIS OF PAYMENT

The payment for the basic telemetry shall include all equipment and installation needed for the SCADA system.

END OF SECTION

SECTION 15100

SMALL PLUMBING VALVES, PLUMBING SPECIALTIES

AND SERVICE ACCESSORIES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor, materials, equipment, and incidentals required, and install complete and ready for operation, all valves and appurtenances as show on the Drawings and as specified herein.

1.02 RELATED WORK

A. Excavation, backfill and grading are included in Division 2

B. Painting is included in Division 9, Section 09900.

C. Electrical is included in Division 16.

1.03 SYSTEM DESCRIPTION

A. All of the equipment and materials specified herein is intended to be standard for use in controlling the flow of wastewater, sludge, water, air or chemicals, depending on the applications.

1.04 QUALITY ASSURANCE

A. All of the types of valves and appurtenances shall be products of well established firms who are fully experienced, reputable and qualified in the manufacture of the particular equipment to be furnished. All materials of construction shall be of an acceptable type and shall be designated for the pressure and temperature at which they are to be operated, for the materials they are to handle and for the use for which they are intended. The materials shall meet established technical standards of quality and strength necessary to assure safe installations and conform to applicable standards. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications as applicable.

1.05 REFERENCES

A. Kentucky Basic Building Code.

B. Kentucky State Plumbing Law, Regulations and Code

1.06 SUBMITTALS

A. Copies of all materials required to establish compliance with these Specifications shall be submitted in accordance with the provisions of Division 1, Section 01300. Submittals shall include at least the following:

1. Certified drawings showing all important details of construction and dimensions.

2. Descriptive literature, bulletins, and/or catalogs of the equipment.

3. The total weight of each item.

4. A complete total bill of materials.

5. A list of the manufacturer's recommended spare parts.

1.07 OPERATING INSTRUCTIONS

A. Operating and maintenance instructions shall be furnished to the ENGINEER as provided in Division 1. The instructions shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc., that are required to instruct operating and maintenance personnel unfamiliar with such equipment.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. General

1. All valves and appurtenances shall be of the size shown on the Drawings and as far as possible all equipment of the same type shall be from one manufacturer.

2. All valves and appurtenances shall have the name of the maker, flow directional arrows, and the working pressure for which they are designed cast in raised letters on some appropriate part of the body.

3. All buried valves shall open left (counterclockwise). Insofar as possible, all valves shall open counterclockwise.

2.02 VALVES

A. Gate Valves

Gate valves shall be used in shut-off applications and where the valves are scheduled for infrequent use.

1. Gate Valves for Water

   a. Gate valves shall be for 125-pound water working pressure, 2-1/2 inches and 3 inches for air release. Valves 3 inches and smaller shall be standard brass construction, rising stem, double disc, parallel seat, with handwheel where exposed or key operated when in the ground. The valves shall be Crane No. 440, Jenkins 62U or approved equal.

   b. In copper-solder-joint piping, Chase Style 1334 or approved equal, gate valves are preferred with solder joint connections.

B. Plug Valves

Eccentric plug valves shall be used in shut-off applications for pump stations and where the valves are scheduled for infrequent use.

Eccentric plug valves 3 to 12 inches in diamater shall be rated for 175 psi working pressure. The body and cover shall be cast iron conforming to ASTM A126, Class B. Flange ends shall comply with ANSI B16.1, Class 125 standards. Mechanical joint ends shall comply with AWWA C11/ANSI 21.11. The entire seat surface shall be protected by a welded nickel seat of minimum 1/8" thickness. The plug shall be cast iron ASTM A126, Class B. The portion of the plug in the valve body cavity shall be coated with Buna-N rubber using an injection-mold process. Valve bonnet shall be full sealed and bolted to the body for ease of maintenance. The seal between the body and the bonnet shall be an O-ring. Stem packing shall be Buna-N multiple "V" ring stem packing seals, conforming to AWWA C504 and AWWA C507 standards. The packing seal shall be held in place with an adjustable gland follower. Shaft bearings shall be sintered 316 stainless steel for both the upper and lower trunnions. Bearings shall be permanently lubricated. 3" valves shall be quarter-turn and shall be supplied with a position indicator marked at 10 degree increments. Valves 4" and larger shall be equipped with a worm gear operator. Eccentric plug valves shall be Clow F-5412, F-5413 or approved equal.

C. Ball Valves

Ball valves shall normally be used in quick shut-off and frequent use applications.

1. Ball Valves for Water Service

   a. Ball valves shall be for 125-pound water working pressure, 2 inches and smaller, standard bronze construction, with

precision machined bronze ball, twin Buna-N seats, and handle operator with integral stop where exposed. Buried ball valves shall be as above with key or nut operators. Valves shall be Lunkenheimer No. 700-SB, Ford, or approved equal.

2. Ball Valves for Chlorine Solutions

a. Ball valves shall be for 150 pound water working pressure, 140 degree Fahrenheit maximum temperature, 3 inches and smaller, standard PVC "True Union" construction, with PVC ball, Viton seats, and handle operator where exposed. Buried ball valves shall be as above with key, nut, pneumatic, or electric operators as shown on the DRAWINGS. Valves shall be Utilities Supply Corp., Plastic Piping Systems, or approved equal.

D. Swing Check Valves

Check valves for cast iron and ductile iron pipelines shall be swing type and shall meet the material requirements of AWWA Specification C508-latest revision. The valves shall be cast iron body with reinforced 125 lb flanges conforming to ANSI B 16.1. Valves shall be single disc with Buna-N seat, stainless steel hinge pin, 150 psi working water pressure, non-shock, and hydrostatically tested at 300 psi. The valves shall be manufactured by Clow, Kennedy or approved equal.

1. When there is no flow through the line, the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the water-way.

2. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and adjustable weight.

E. Globe Style Silent Check Valves

1. General

a. This specification covers the design, manufacture, and testing of 2 in. (50 mm) through 42 in. (1050 mm) Silent Check Valves suitable for pressures up to 500 psig (3450 kPa) water service.

b. The Check Valve shall be of the silent operating type that begins to close as the forward flow diminishes and fully closes at zero velocity preventing flow reversal and resultant water hammer.

2 Standards, Approvals and Verification

a. The valves for use in fire protection systems shall be Factory Mutual approved in sizes 2 1/2 in.-12 in.

b. Stainless steel valves shall meet the requirements of ASME B16.34 and MSS SP-126.

c. The valves used in potable water service shall be certified to NSF/ANSI 61, Drinking Water System Components – Health Effects, and certified to be Lead-Free in accordance with NSF/ANSI 61, Annex G.

d. Manufacturer shall have a quality management system that is certified to ISO 9001 by an accredited, certifying body.

3 Connections

a. Globe style valves shall be provided in sizes 2 1/2 in (75 mm) through 42 in. (1050 mm) and have flat faced flanges in accordance with ASME B16.1 for Class 125 or Class 250 iron flanges. Sizes 10 in (250 mm) and smaller flanged valves shall be capable of mating directly to a wafer butterfly valve without disc interference.

b. Wafer style valves shall be provided in sizes 2 in (50 mm) through 10 in. (250 mm) for installation between ASME B16.1 Class 125 or Class 250 iron flanges. Stainless steel wafer style valves shall include raised faces for installation between ASMEB16.5 Class 150 flanges.

4 Design

a. The valve design shall incorporate a center guided, spring loaded disc, guided at opposite ends and having a short linear stroke that generates a flow area equal to the nominal valve size.

b. The operation of the valve shall not be affected by the position of installation. The valve shall be capable of operating in the horizontal or vertical positions with the flow up or down. Heavy duty springs for vertical flow down installations shall be provided when specified on 14 in. and larger valves.

c. All component parts shall be field replaceable without the need of special tools. A replaceable guide bushing shall be provided and held in position by the spring. The spring shall be designed to withstand 100,000 cycles without failure and provide a cracking pressure of 0.5 psi.

d. The valve disc shall be concave to the flow direction providing for disc stabilization, maximum strength, and a minimum flow velocity to open the valve.

e. The valve disc and seat shall have a seating surface finish of 16 micro-inch or better to ensure positive seating at all pressures. The leakage rate shall not exceed the allowable rate for metal seated valves allowed by AWWA Standard C508 or 1 oz (30 ml) per hour per inch (mm) of valve diameter.

f. The valve flow way shall be contoured and unrestricted to provide full flow areas at all locations within the valve. Cv flow coefficients shall be equal to or greater than specified by the manufacturer cited in Paragraph 7, and verified by an independent testing laboratory.

g. Wafer-style valve seats shall be fully retained with full size threads, and sealed with an o-ring. Globe style valve seats shall be contained with a machined counterbore and restrained by the mating flange and gasket.

5 Materials

a. The valve body shall be constructed of ASTM A126 Class B cast iron for Class 125 and Class 250 valves and ASTM A351Grade CF8M for Class 150 stainless steel valves. Optional body material include ASTM A536 Grade 65-45-12 ductile iron.

b. The seat and disc shall be ASTM B584 Alloy C83600 cast bronze or ASTM B148 Alloy C95200 aluminum bronze. Optionaltrim material include ASTM A351 Grade CF8M stainless steel.

c. The compression spring shall be ASTM A313 Type 316 stainless steel with ground ends.

6 Options

a. A Buna-N seal shall be provided on the seat when specified to provide zero leakage at both high and low pressures without overloading or damaging the seal. The seal design shall provide both a metal-to-metal and a metal-to-Buna-N seal.

b. Valve interiors and exteriors shall be coated with an NSF/ANSI 61 certified fusion bonded epoxy in accordance with AWWAC550 when specified.

7 Manufacture

a. The valves shall be hydrostatically tested at 1.5 times their rated cold working pressure and seat tested at the valve CWP. When requested, the manufacturer shall provide test certificates, dimensional drawings, parts list drawings, and operation and maintenance manuals.

b. The exterior of the valve shall be coated with a universal alkyd primer.

c. Silent Check Valves shall be Series #1400A (Wafer Style), 1400A.4 (Stainless Steel Wafer Style) or 1800 (Globe Style) as manufactured by Val-Matic® Valve & Mfg. Corporation, Elmhurst, IL. USA or approved equal.

E. Y Check Valves

Check valves for PVC pipelines shall be Y-type. The valves shall be PVC body with Viton seals, rated for150 psi working water pressure. The disk guide shall be a PVC coil. The valves shall be manufactured by George Fischer, Hayward, or approved equal.

1. Valves shall be so constructed that the plunger assembly can be easily accessed for cleaning.

2. Valves shall be so constructed such full flow may be achieved. Minimal back pressure shall be necessary to seat the plunger.

F. Blow Off Valves

Blow off valves shall normally be used in quick shut-off and infrequent use applications.

1. Blow Off Valves for Plant Air, Instrument Air, and Water Service

a. Blow off valves shall be for 175 pound working pressure, 180 degree Fahrenheit, 3/4 inch thru 2 inches, and shall have a positive sealing system accomplished without metal-to-metal fits. O-ring seals shall be attached to removable plug for ease of replacement. The O-ring seals shall be pre-lubricated with a long life lubricant. Valves shall have a plastic thrust washer on top of the plug to provide a means of reducing thrust and rotary friction between metal plug and body and bronze retaining rings. The valve body and plug shall be cast of composition bronze ASTM B62-latest revision; O-ring shall be synthetic rubber. Connections shall be as shown on the DRAWINGS. All valves shall be subject to the following tests:

(1) 10-psi air test, valve open and closed position submerged in water. No leaks permitted.

(2) 175-psi hydrostatic, valve open and closed. No leaks permitted. Valves shall be Mueller Company Mark II Oriseal Valves, Crane, or approved equal.

G. Air Release Valves

1. Air Release Valves shall be furnished and installed at the locations shown on the PLANS. The valves shall be combination air valves as manufactured by A.R.I. Corporation, Kfar Charuv, Israel, or approved equal.

2. The valves shall be the size shown on the PLANS and be A.R.I. Model D-40 "BARAK" or approved equal.

3. The valves shall be designed to allow entrapped air to escape from the pipeline when pumps are started and close water tight when liquid enters the valves via a float and roll seal arrangement. In the event of a vacuum on the pipeline, the valves shall allow air to enter the pipe. Working pressures shall be as follows:
¾" & 1" valve: 3-150 psi
2" valve: 2-230 psi

4. The body, of each valve assembly shall be constructed of high strength reinforced nylon. All wetted parts shall be corrosion resistant.

H. Automatic Air and Vacuum Relief Valves for Vertical Turbine Pumps

1. Combination air and vacuum valves for vertical turbine pumps shall be equal to APCO Air Valves for Vertical Turbine Pumps, per APCO Bulletin 586, as manufactured by Valve and Primer Corp., Schaumburg, Illinois, or approved equal.

2. Valves shall be the size shown on the drawings and shall be equipped with an automatic air release valve, such as APCO Valve No. 55, or approved equal.

3. Air valves for vertical turbine pumps shall be designed to allow large quantities of air to escape out the orifice when the pump is started and close water tight when the liquid enters the valve. The air valve shall also permit large quantities of air to re-enter through the orifice when the pump is stopped to prevent a vacuum from forming in the pump column.

4. The valve shall consist of a body, cover, baffle, float and seat. The valve shall be designed to prevent prematurely shut-off. The seat

shall be fastened into the valve cover, without distortion, and shall be easily removed, if necessary.

5. The entire float and baffle assembly must be shrouded with a perforated water diffuser to prevent the water column entering the valve, from slamming the float shut and eliminate water hammer in the system.

6 The float shall be stainless steel, designed to withstand a minimum of 1,000 psi, or approved equal. The float shall be center guided and not free floating for positive seating.

7. The discharge orifice shall be fitted with an automatic air release valve in order to vent small pockets of air. This valve shall consist of a body, cover, float and seat, and shall be rated at a working pressure of 150 psi.

8. The body, cover, and baffle of this valve assembly shall be constructed of cast iron, conforming to ASTM A48 Class 30, or approved equal. The float shall be stainless steel, conforming to ASTM A240, or approved equal. The seats shall be BUNA-N and the water diffuser shall be brass, or approved equal. All flanges shall be 125# ANSI.

I. Altitude Valves

1. Application: The level control valve for the water storage tank shall be single acting, automatically closing to prevent tank overflow when the high water level is reached, and opening for refilling when the tank water level lowers. Non-throttling action is required for operation (valve will assume either a fully open or fully closed position).

2. Design: The level control valve shall be globe (inline) or angle (90 degree) body with flanged end connections, be fully mounted, external pilot operated, with free floating piston (operated without springs, diaphragm or levers). It shall contain a single full-ported seat, with seat bore equal to size of valve. The minimum travel of the piston shall be equal to 25% of the diameter of the seat. For true alignment (to correct lateral thrust and stem binding), the piston shall be guided above and below the seat a distance equal to no less than 75% of the diameter of the seat. The piston shall be cushioned and so designed as to insure positive closure. The main valve shall be packed with leather (or other soft material) to insure tight closure and prevent metal-to-metal friction and seating. The valve shall be furnished with an indicator rod to show position of piston opening, and pet-cocks for attachment to valve body for receiving gauges for testing purposes. The design shall be such that repairs and dismantling internally of main valve may be made without its removal from the line. The pilot valve, controlling operation of the main valve, shall have a range of adjustment, be

easily accessible, and arranged to allow for easy removal from the main valve while the main valve is under pressure. The pilot valve, external strainer with blow-off, isolation valves, and all associated rigid brass piping and fittings (with the exception of a separate static pressure sensing line, if required) shall be factory assembled and furnished with the valve.

3. Physical and Chemical Properties: Valve body and cap(s) shall be constructed of gray iron castings that conform to ASTM Specification A 126 Class B. Internal bronze components shall conform to ASTM Specification B-584. Internal Stainless Steel components shall conform to ASTM Specification A-743 Grade CF-8 or CF-8M. The control piping shall be rigid red brass, no less than 0.5" in diameter. The flanged assemblies shall conform to ANSI standards for wall thickness of body and caps, and flange thickness and drilling, subject to other specified standards.

4. Paint: Ferrous surfaces of the valve shall be coated with NSF Certified Epoxy (Tnemec Series FC20) in accordance with ANSI/NSF Std. 61, and conforming to AWWA D102 Inside System No. 1.

5. Testing: A trio of tests shall be performed on the completely assembled valve prior to shipment. These shall include a hydrostatic test of up to two (2) times the working pressure (maximum 500 psi testing pressure), a tight seating test, and a performance test for simulated field conditions. The tests may be witnessed by the customer/engineer or representative.

6. Manufacturer and Model: The valve shall be a Model 30AWR as manufactured by Ross Valve Mfg. Co., Inc, 6 Oakwood Ave, Troy, NY 12180, or approved equal.

J. Booster Pump Control Check Valves

1. Function: The Pump Control Valve shall open fully or shut off in response to electric signals. It shall isolate the pump from the system during pump starting and stopping, to prevent pipeline surges.

2. Main Valve: The main valve shall be a center guided, diaphragm actuated globe valve of either oblique (Y) or angle pattern design. The body shall have a replaceable, raised, stainless steel seat ring. The valve shall have an unobstructed flow path, with no stem guides, bearings or supporting ribs. The body and cover shall be ductile iron. All external bolts, nuts, and studs shall be Duplex® coated. All valve components shall be accessible and serviceable without removing the valve from the pipeline.

3. Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall be center guided by a bearing in the separating partition. The replaceable radial seal disk shall include a resilient seal and shall be capable of accepting a V-Port Throttling Plug by bolting.

4. Control System: The control system shall consist of a 3-Way solenoid pilot (for 8" and larger valves, an accelerator shall be added to the solenoid), two check valves (for 12" and larger valves, an additional check valve), a limit switch, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested.

5. Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

6. Manufacturer and Model: The valve shall be manufactured by Bermad Waterworks, Model WW-(nominal size)-740-03-Y-C-A5-EB-4AC-NN or approved equal.

K. Surge Anticipating Control Valves

1. Function: The Surge Anticipating Valve shall open in response to the pressure drop associated with abrupt pump stoppage to dissipate the returning high pressure wave, eliminating the surge. It shall smoothly close drip tight as quickly as the relief feature allows, while preventing closing surge. The valve shall also relieve excessive system pressure.

2. Main Valve: The main valve shall be a center guided, diaphragm actuated globe valve of either oblique (Y) or angle pattern design. The body shall have a replaceable, raised, stainless steel seat ring. The valve shall have an unobstructed flow path, with no stem guides, bearings, or supporting ribs. The body and cover shall be ductile iron. All external bolts, nuts, and studs shall be Duplex® coated. All valve components shall be accessible and serviceable without removing the valve from the pipeline.

3. Actuator: The actuator assembly shall be double chambered with an inherent separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly (seal disk to top cover) shall be removable from the valve as an integral unit. The stainless steel valve shaft shall be center guided by a bearing in the separating partition. The replaceable radial seal disk shall include a resilient seal and shall be capable of accepting a V-Port Throttling Plug by bolting.

4. Control System: The control system shall consist of two adjustable 2-way pilots, a needle valve, a flow stem, a cock valve, and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested.

5. Quality Assurance: The valve manufacturer shall be certified according to the ISO 9001 Quality Assurance Standard. The main valve shall be certified as a complete drinking water valve according to NSF, WRAS, and other recognized standards.

6. Manufacturer and Model: The valve shall be manufactured by Bermad Waterworks, Model WW-(nominal size)-735-55-Y-C-A5-EB-NN-M or approved equal.

L. Pressure Reducing Valves

1. Pressure reducing valves shall be of the single seated balanced design type globe body with threaded inlet and outlet ports. It shall be diaphragm operated, spring loaded permitted adjustment over a range of no less than 30 psi.

2. The body shall be bronze construction with bronze or stainless steel stem and furnished with a replacement rubber seat.

3. The pressure reducing valves shall be G-A Industries, APCO, or equal.

2.03 SPECIALTIES AND ACCESSORIES

A. Yard Hydrants

1. Above ground yard hydrants shall be of the anti-freezing, non-pollutable type, 1-1/2" size for 30" cover over water service line. The yard hydrant assembly shall include a ball-wheel handle, vacuum breaker, 1-1/2" hose connection, and double-ball check valve on the drain. The operating valve shall be located at the bottom of the hydrant assembly. When the operating valve is turned off it shall allow the water remaining in the supply line in the hydrant above the valve to drain from the hydrant by means of a by-pass in the valve stem. The hydrant handle, casing, and base shall be cast iron, and the operating valve red brass.

2. The yard hydrant shall be Murdock BFHM-150, 1-1/2" or approved equal.

3. All hydrants shall be furnished with anti-siphon vacuum breaker.

B. Hose and Nozzles

1. Hose

a. Furnish 3/4-inch and 1-1/4 inch hose as indicated below. The 3/4 inch hose for hose stations shall be heavy-duty rubber, Gates Figure 35B, or approved equal. Hose for yard hydrants shall be as above in 1-1/4 inch size.

b. Furnish one 3/4" x 50' hose for each 3/4" hose station and one 1-1/4" x 75' hose for each yard hydrant.

c. Furnish 1-1/2" x 1-1/4" reducing adaptors for connecting each 1-1/4" hose to each 1-1/2" hydrant.

2. Nozzles

a. Furnish 1-1/4" x 8" cast plain brass nozzles for each yard hydrant, and 3/4-inch nozzles for each hose station. The 1-1/4-inch nozzles shall be Akron Brass, or approved equal; and the 3/4-inch nozzle for hose stations shall be Leonard N-2, or approved equal.

C. Strainers, Filters, and Dryers

1. Strainers for Water Service

a. Strainers shall be "Y" type with a cast iron body manufactured in accordance with ASTM A126-latest revision Class B steel, sizes 3/4 inch thru 12 inches. Strainer shall be rated at 200 psi pressure @ -20 to 150 deg F, and 125 @ 450 deg F., with a 304 stainless steel 0.125" perforated screen.

b. Cover shall be carbon steel manufactured in accordance with ASTM A126-B latest revision. Cover shall contain a blow off outlet with an NPT outlet for connection of a drain valve.

c. Contractor shall furnish and install on the blow off outlet, a stainless steel ball valve and cast iron piping directed to the floor drain.

d. Strainers shall be Mueller, Model 758 or approved equal.

D. Vacuum Breakers

1. Vacuum Breakers for Water Service

a. Vacuum breakers shall be designed to prevent back-siphonage of water lines. Valve types shall be either bottom inlet or side outlet, or top inlet and bottom outlet as required. Internal discs or floats shall be either plastic or

silicone. Piping systems with solenoid-operated valves shall require a vacuum breaker with an "O" ring seal. Breakers shall be Sloan No. V-350-A, V-370-A, V-188-A, Wilkins, or approved equal.

2. Air and Vacuum Valve for Surface Wash

a. Air and vacuum valve for the surface wash supply pipe shall be 1/2 inch. Valve shall be APCO Model 141 or approved equal.

E. Dielectric Pipe Couplings

1. Dielectric pipe couplings shall be used wherever copper pipe connects to steel or cast iron pipe and appurtenances. Couplings shall have steel bodies with non-conducting bushings on both ends. Ends shall have standard pipe threads. Couplings shall be rated for at least 200 psi at 225°F. Couplings shall be as manufactured by Thermodynamics Corporation, Needham, MA; Water Vallett Company, Detroit, MI; or approved equal.

F. Water-hammer Arresters

1. Water-hammer arresters shall be used on water lines as shown on the DRAWINGS. Arresters shall consist of a permanently pre-charged air chamber and a rugged rubber sealed-in diaphragm to absorb shock. The unit shall be capable of being mounted at any angle. Arresters shall be Watts No. 150, or approved equal.

G. Air Vents

1. Air vents shall be used on water lines as shown on the DRAWINGS for the removal of unwanted air. Vents shall be rated at 150 pounds working water pressure, shall have a safety drain connection, stainless or copper clad steel internal components and a cast iron or brass body and cap. Vents shall be Hoffman No. 78, or approved equal.

2. See Section 15500 of these SPECIFICATIONS for air vents on unit heaters.

H Rubber Expansion Joints

Rubber expansion joints shall be mounted on the suction and discharge of each pump.

1. Expansion joints shall be single arch type of butyl rubber construction with carcass of high grade woven cotton or suitable synthetic fiber and individual solid steel ring reinforcement. Soft rubber fillers shall be integrally cured into the arches to prevent settling of material into the arch. Interior surface shall comply with

NSF 61 for potable water contact. Joints shall be constructed to pipeline size and to meet working pressure and corrosive conditions similar to the line where installed. Joints shall have full faced fabric reinforced butyl flanges integral with body. Split type steel backup rings shall be provided to ensure a good joint. Rings shall be designed for mating the ANSI Standard 150 lb. flanges. Joints shall have a working pressure rating of 140 psig (minimum). All joints shall be finish coated with Hypalon paint.

2. Expansion joints shall be furnished with control units. Control units shall consist of two (2) drilled plates, stretcher bolts, and rubber washers backed by metal washers. The stretcher bolts shall prevent over-elongation of the joint. Extra nuts shall be provided on the stretcher bolts on the inside of the plate to prevent over-compression. All nuts, bolts and plates shall be galvanized.

3. Expansion joints shall be Style 500B as manufactured by Mercer Rubber Company, Style 4140 by Uniroyal Company, or equal.

I. Water Service Accessories

1. Backflow Preventers

a. The reduced pressure principle backflow preventers shall be a complete assembly consisting of two independently acting spring loaded toggle levers or poppet-type check valves together with an automatically operating pressure differential relief valve located between the two check valves. The first check valve shall reduce the supply pressure a predetermined amount so that during normal flow and the cessation of normal flow, the pressure between the checks is less than the supply pressure. In the case of leakage of either check valve, the differential relief valve shall discharge to atmosphere to maintain the pressure between the checks at a level less than the supply pressure.

b. Each unit shall include tightly closing shutoff valves located at each end of the device, and shall be fitted with four properly located test cocks. Operation shall be completely automatic. All parts must be removable or replaceable without removal of the unit from the line. The total head loss through the complete backflow assembly shall not exceed 10 psi at rated flow.

c. The backflow preventer shall be Watts 9090SOS&Y, or approved equal, shall have prior approval of the State Environmental Protection Agency and shall be in accordance with AWWA C506-latest revision.

d. Furnish and mount an air gap on the body of the backflow preventer. The air gap shall be Watts No. 909AG, or approved equal.

2. Service Clamps

a. Service clamps shall have malleable or ductile iron bodies, which extend at least 160 degrees around the circumference of the pipe and shall have neoprene gaskets cemented to the saddle body. Bodies shall be tapped for either corporation stop threads of IPS as required. Clamps with tap sizes 1 inch and smaller shall be of the single strap design. Clamps with tap sizes larger than 1 inch shall be of the double strap design.

b. Service clamps shall be Style 91 or 291 as manufactured by Dresser Industries, Inc., Type 311 or 313 as manufactured by Smith-Blair, Inc. or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. All valves and appurtenances shall be installed in the locations shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the ENGINEER before they are installed.

B. Control valves in all locations shall be so grouped and located that they may be easily operated, through access panels, doors, or adjacent to equipment.

C. After installation, all valves and appurtenances shall be tested at least one hour at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the ENGINEER.

D. Install all brackets, extension rods, guides, the various types of operators and appurtenances as shown on the DRAWINGS in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the CONTRACTOR shall check all DRAWINGS and figures which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.

E. All materials shall be carefully inspected for defects in workmanship and materials; all debris and foreign material cleaned out of valve openings, etc.; all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. Valves and other equipment

which do not operate easily, or are otherwise defective, shall be repaired or replaced at no additional cost to the OWNER.

F. Fire hydrants and yard hydrants shall be set at the locations as shown on the DRAWINGS and bedded on a firm foundation. A drainage pit as detailed on the DRAWINGS shall be filled with screened gravel and satisfactorily compacted.

G. During backfilling, additional screened gravel shall be brought up around, and 6-inches over, the drain port. Each hydrant shall be set in true vertical alignment and properly braced. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the DRAWINGS. Felt roofing paper shall be placed around hydrant elbow before placing concrete. CARE SHALL BE TAKEN TO INSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS.

H. If directed, the hydrant shall be tied to the pipe with suitable rods or clamps, galvanized, painted, or otherwise rustproof treated. Concrete used for backing shall be no leaner than 1 part cement, 2-1/2 parts sand, and 5-1/2 parts stone. Hydrant paint shall be touched up as required after installation.

I. Buried flanged or mechanical joints shall be made with cadmium-plated bolts. All exposed bolts and nuts shall be cadmium-plated. All exposed bolts and nuts shall be heavily coated with two coats of bituminous paint.

J. Yard hydrants shall be installed in accordance with manufacturer's recommendation and applicable requirements of the fire hydrants above.

K. Buried valves and valve boxes shall be set with the valve stem vertically aligned in the center of the box. Valves shall be set on firm foundation and supported by tamping selected excavated material under the sides of the valve. The valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with finish grade.

3.02 SHOP PAINTING

A. Interior surfaces of all valves, the exterior surfaces of buried valves, and miscellaneous piping appurtenances shall be given a shop finish of an asphalt varnish conforming to Federal Specification TT-V51e for Varnish Asphalt.

B. The exterior surface of various parts of the valves, operators, floor stands and miscellaneous piping shall be thoroughly cleaned of all scale, dirt, grease or other foreign matter and thereafter one shop coat of an approved rust-inhibitive primer, such as Inertol Primer No. 621, shall be applied in accordance with the instructions of the paint manufacturer.

C. Ferrous surfaces obviously not to be painted shall be given a shop coat of grease or other suitable rust-resistant coating.

D. Field painting is specified under Division 9, Section 09900.

3.03 INSPECTION AND TESTING

A. The various pipelines in which the valves and appurtenances are to be installed are specified to be field-tested. During these tests any defective valve or appurtenance shall be adjusted, removed and replaced, or otherwise made acceptable to the ENGINEER.

B. Various regulating valves, strainer, or other appurtenances shall be tested to demonstrate their conformance with the specified operational capabilities and any deficiencies shall be corrected or the device replaced or otherwise made acceptable to the ENGINEER.

END OF SECTION

SECTION 15101

LARGE VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and install complete and ready for operation all valves and appurtenances where shown on the Drawings as specified herein.

B. The equipment specified herein includes the following:

1. Gate valves with boxes for yard piping
2. Gate valves for inside service
3. Butterfly valves for yard piping
4. Butterfly valves for inside service
5. Plug valves for yard piping
6. Plug valves for interior or above ground service
7. Ball valves
8. Check valves
9. Air and vacuum relief valves (piping application)
10. Automatic air release valves
11. Shock absorbers
12. Service clamps
13. Expansion joints
14. Pressure-reducing valves
15. Back Pressure Sustaining Valves

C. The work of this Section shall include the installation of valve tags furnished by the CONTRACTOR. All exposed valves provided under this Section shall be tagged.

1.02 RELATED WORK NOT INCLUDED

A. Excavation, backfill, fill and grading is included in Division 2.

B. Piping is included in the respective sections of Division 2 and 15.

C. Valves, hydrants, meters and service lines for distribution system application are included in Division 2.

D. Valves and service accessories on all plumbing systems are included in this Division, Section 15100.

E. Pipe hangers and supports are included in this Division, Section 15094.

F. Electrical is included in Division 16.

1.03 DESCRIPTION OF SYSTEMS

A. All of the equipment and materials specified herein is intended to be standard for use in controlling the flow of wastewater, sludges, water, air or chemicals, depending on the applications.

1.04 QUALIFICATIONS

A. All of the types of valves and appurtenances shall be products of well-established firms who are fully experienced, reputable and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these SPECIFICATIONS as applicable.

1.05 SUBMITTALS

A. Complete shop drawings of all valves and appurtenances shall be submitted to the ENGINEER in accordance with the requirements of Division 1.

B. Furnish all information required in Division 1.

1.06 OPERATING INSTRUCTIONS

A. Manufacturer's operating and maintenance instructions as set forth in Division 1 shall be furnished to the ENGINEER for equipment furnished under this Section.

1.07 TOOLS

A. Special tools, if required for normal operation and maintenance, shall be supplied with the equipment.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. General

1. All valves and appurtenances shall be of the size shown on the PLANS and as far as possible all equipment of the same type shall be from one manufacturer.

2. All valves and appurtenances shall have the name of the maker, flow-directional arrows, and the working pressure for which they are designed cast in raised letters on some appropriate part of the body.

3. Handwheel operator shall be no less than 12-inch diameter.

4. Except as otherwise shown on the PLANS or specified herein, all valves with operators located 7 feet or more above the operating floor shall be provided with chain-wheel operators complete with chain guides and galvanized steel chain.

5. All buried valves shall open left (counterclockwise). Insofar as possible, all valves shall open counterclockwise.

6. All butterfly valves, gate valves and plug valves 8 inches or larger shall be furnished with gear operators and gear cases conforming to the requirements of AWWA C504 or as shown on the PLANS.

2.02 VALVES

A. Butterfly Valves for Buried Service

1. Butterfly valves and operators for buried service shall conform to AWWA C504, except as hereinafter provided. Butterfly valves shall be rated for Class 150B and both valve and operator shall be especially designed for service buried in the ground where the ground water may at times completely submerge the valve and operator, and shall be of the totally enclosed type.

2. The valve bodies shall be of cast iron conforming to ASTM A48-CL 40. Valve ends shall be mechanical joint meeting ANSI Specification A21.11.

3. Except as otherwise specified herein, valve shafts shall be of Type 304 stainless steel. Shaft seals shall be rubber O-ring seals. Shafts having a minimum torsional strength equivalent to shafts specified in Section 3.3 of AWWA C504 and completely isolated from the pipeline contents shall be furnished. Connections between shafts and discs shall be designed to transmit full shaft torque.

4. If the rubber seat is in the body, the disc shall be of an alloy cast iron conforming to ASTM A436 Type I with the periphery machined to a smooth spherical surface. If the rubber seat is mounted on the disc edge it shall be held in place by a one-piece Type 304 stainless steel retaining ring and stainless steel screws, the disc shall be of ASTM A48, Class 40 cast iron and a mating Type 304 stainless steel ring shall be installed in the valve body.

5. The unit shall be permanently lubricated with grease or oil. A standard AWWA 2 inch square operating nut shall be provided on the input shaft and it shall have a cap to center the valve box. Valves shall open to the left (counterclockwise).

6. Valve and operator assemblies shall be given two coats of asphalt varnish conforming to Section 4 of AWWA C504.

7. An Affidavit of Compliance in accordance with Section 1.5 of AWWA C504 shall be furnished to the ENGINEER prior to shipment of valves to the job site.

8. Valve boxes shall be provided for each buried valves. Valve boxes and appurtenances are specified in Division 5, Section 05540.

9. Four tee-handled gate wrenches of suitable length shall be furnished to operate all valves with valve boxes.

B. Butterfly Valves (for Interior Service)

1. Butterfly valves and operators shall conform to the AWWA Standard Specification for rubber seated butterfly valves Designation C504, except as hereinafter specified. Valves shall have a minimum 150-psi pressure rating and be equal to those manufactured by Allis-Chalmers, Henry Pratt Company, or equal.

2. Butterfly valves shall be flanged end with face-to-face dimensions in accordance with Table 3 of the above mentioned AWWA Specification for short-body valve, or wafer type.

3. Valve seats shall be full resilient seats retained in the body or the disc edge in accordance with Section 3.5 of the above mentioned AWWA Specification. If the resilient seat is in the body, the disc shall be of an alloy cast iron conforming to ASTM A436 Type 1 with the periphery machined to a smooth spherical surface. If the resilient seat is mounted on the disc edge, it shall be held in place by a one-piece Type 304 stainless steel retaining ring and stainless screws, the disc shall be of ASTM A48, Class 40 cast iron and a mating Type 304 stainless steel ring shall be installed in the valve body. Resilient seats shall be Hycar or equal for water service and Nordel or equal for air service.

4. The valve body shall be constructed of close grain cast iron per ASTM A126, Class B with integrally cast hubs for shaft bearing housings of the through boss-type. Permanently self-lubricating body bushings shall be provided and shall be sized to withstand bearing loads. Stuffing box of liberal dimensions shall be provided at the operator end of the vane shaft, arranged so that the packing can be replaced by removing the bronze follower without removing the operator. Packing shall be of the Chevron type as manufactured by Garlock Packing Company. A sealing element utilizing O-rings shall also be acceptable.

5. The valve shaft shall be of Type 304 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greater dynamic or seating torque.

6. In general, the butterfly valve operators shall conform to the requirements of Section 3.8 of the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable and as herein specified.

7. Gearing for the operators where required shall be totally enclosed in a gear case in accordance with Section 3.8.3 of the above mentioned AWWA Standard Specification.

8. The manual operators shall conform to Section 3.8.2 of the above mentioned AWWA Standard Specifications, insofar as applicable. Valves shall have Handwheel or lever operators and open left, or counterclockwise. Operators shall have indicators to show position of the valve disc. Operators shall be rigidly attached to the valve body.

C. Gate Valves and Appurtenances for Yard Piping

1. Gate valves for water shall meet the requirements of AWWA C509 covering resilient seated gate valves. Valves shall be rated for 200-psi working pressure and a minimum of 400-psi test pressure. The wedge shall be of cast iron completely encapsulated with rubber. The sealing rubber shall be permanently bonded to the cast iron wedge to meet ASTM tests for rubber metal bond ASTM D429. They shall have non-rising cast bronze stems (unless otherwise shown on the PLANS) and be fitted with "O-ring" seals. The operating nuts shall be 2-inch square. All valves shall open left, or counterclockwise. Stuffing boxes shall be the "O-ring" type with two rings located above thrust collar; the two rings shall be replaceable with valve fully open and subjected to full rated working pressure. Gate valves shall be mechanical joint, ANSI Standard 21.11 except where shown otherwise. The body and bonnet shall be coated with a fusion coating both interior and exterior to meet C50. Each valve shall have maker's name, pressure rating and year in which manufactured cast on the body. Gate valves shall be as manufactured by Mueller Co., or approved equal.

2. Tapping sleeves shall be as manufactured by the Ford Meter Box Company, Inc., with cadmium-plated cast iron nuts and bolts. Sleeves shall be of cast iron, designated for working pressures not less than 200 psi. Lead gaskets shall be provided for the full area of the sleeve flanges.

3. Tapping valves shall conform to the requirements specified above for gate valves except that one end shall be flanged and one mechanical. Tapping valves shall be provided with an over-sized opening to permit the use of full sized cutters.

4. Four tee-handled gate wrenches of suitable length shall be furnished to operate all valves with valve boxes.

D. Gate Valves for Inside Service

1. See Section 15100 of these SPECIFICATIONS for gate valves 2-1/2" in diameter and smaller.

2. Gate valves 3" and larger in size, unless otherwise specified shall be iron body, bronze mounted, solid wedge gate valves with flanged ends and conforming to the AWWA Standard Specification for Gate Valve for Water and Sewage Systems, Designation C509-latest revision, insofar as applicable and in addition to the following requirements:

a. Valve shall be outside screw and yoke type with rising stem (unless otherwise shown on the PLANS).

b. Flanges shall be faced and drilled to ANSI B16.1 125 pound template, unless otherwise shown on the PLANS.

c. Bronze gate rings shall be fitted into grooves of dovetail or similar shape in the gates. For grooves or other shapes, the rings shall be firmly attached to the gates with bronze rivets.

d. Handwheels shall turn counterclockwise to open the valves. Handwheels shall be of ample size and shall have an arrow and the word "OPEN" cast thereon to indicate the direction of opening.

e. Stuffing box follower bolts shall be of steel and the nuts shall be of bronze.

f. The design of the valves shall permit packing the valves without undue leakage while they are wide open and in service.

g. O-ring stuffing boxes may be used.

h. Gate valves for pipeline installation shall be housed in an adjustable two-piece cast iron valve box and have a cover with the word "Water" or "Sewer" stamped or cast.

i. Gate valves with spur gears shall be housed to accommodate the offset of the operating nut.

E. Gate Valves For 16 and 24 Inch Distribution Mains

1. General

Valves to be installed on 16 and 24-inch high service and transmission lines shall conform to the latest revision of AWWA Standard C-509 covering resilient seated gate valves. These large diameter valves shall be as manufactured by Clow Valve Co., M & H Valve Co., or approved equal.

2. Design

The valves shall be either, **non-rising stem**, opening by turning stem left or right and provided with **2" square operating nut or handwheel** with the word Open and an Arrow cast in the metal to indicate direction to open.
The wedge shall be of cast iron completely encapsulated with rubber.

The sealing rubber shall be permanently bonded to the cast iron wedge to meet ASTM tests for rubber metal bond ASTM D429.

Stems for NRS assemblies shall be cast bronze with integral collars in full compliance with AWWA. OS & Y stems shall be on bronze bar stock. The NRS stem stuffing box shall be the o-ring seal type with two rings located above thrust collar; the two rings shall be replaceable with valve fully open and subjected to full rated working pressure.

There shall be two low torque thrust bearings located above and below the stem collar. The stem nut shall be independent of wedge and shall be made of solid bronze. There shall be a smooth unobstructed waterway free of all pockets, cavities and depressions in the seat area.

3. Materials

All cast iron shall conform to ASTM-A-126 Class C. Castings shall be clean and sound without defects that will impair their service. No plugging or welding of such defects will be allowed.

Stems shall be manganese bronze having a minimum tensile strength of 60,000 psi, a minimum yield of 20,000 psi.

Bolts shall be electro-zinc plated steel with hex heads and hex nuts in accordance with ASTM A-307 and A-563, respectively.

4. Testing

Prior to shipment from factory, each valve shall be tested by hydrostatic pressure equal to twice the specified working pressure of 250 psi.

5. Coating AWWA

The body and bonnet shall be coated with a fusion coating both interior and exterior to meet C550.

6. Marking

Valves shall be marked with name of manufacturer, the year of manufacture, the maximum working pressure and size of valve.

F. Plug Valves for Interior or Above Ground Service

1. Plug valves shall be manufactured in accordance with AWWA C-504, shall be of the 1/4 turn, eccentric, non-lubricated type, serviceable under full line pressure, and capable of sealing in both directions at the rated pressure. Valves shall have a minimum port area of 80% of the nominal pipe size. The valve body shall be of cast iron, 30,000 psi tensile strength with added nickel and chromium, ASTM A-126, Class B, 175 psi rating. Valve ends shall be flanged. The valve plug shall be ductile iron conforming to ASTM A-536, Grade 65-45-12 with neoprene resilient facing. The valve seating design shall be resilient and of the continuous interface type having consistent opening/closing torques and shall be non-jamming in the closed position. Closure shall be accomplished by means of an off-set plug design with a resilient seating face that achieves full 360 degree seating contact. Valves shall be of the bolted bonnet design. The resilient faced plug shall be replaceable without removing the valve body from the line. The valve body seating area shall be corrosion resistant by a welded-in overlay of high nickel content. Sprayed or plated seating surfaces will not be acceptable. Valves shall have permanently lubricated Type 316 stainless steel bearings on the upper and lower plug stem journal. Bearings shall be replaceable. Packing shall be Buna N (Vee Type) rated for 150 psig working pressure. Packing shall be adjustable and valves shall be designed such that they can be repacked without removing the bonnet. All exposed nuts, bolts, springs, and washers shall be zinc plated, except exposed hardware for submerged valves that shall be of stainless steel.

2. All valves shall be equipped with gear actuators and handwheel operators (unless otherwise shown on the PLANS). All gearing shall be enclosed suitable for running in oil with seals provided on all shafts to prevent entry of dirt and water into the actuator. All shaft bearings shall be furnished with permanently lubricated bronze bearing bushings. Actuator shall clearly indicate valve position and an adjustable stop shall be provided. Construction of

actuator housing shall be semi-steel. Hardware on actuators shall be of the same materials as the valves.

3. All valves and actuators shall be as manufactured by DeZurik Corporation or equal.

4. All plug valves shall be installed so that the direction of flow through the valve is in accordance with the manufacturer's recommendations.

G. 3-Way Plug Valves

1. Valves shall be of the non-lubricated taper plug type and shall have resilient faced plugs for drip tight shutoff. End connections shall be flanged and shall be drilled to ANSI 125 pound standard. Valves shall be semi-steel and shall have stainless steel bearings in the upper and lower journal areas. The three-way valve shall be furnished as standard with a plug to shut off one port at a time.

2. The valve shall be furnished with a resilient facing bonded to the plug sealing surface and shall have double handwheel actuators. The actuator shall be of the worm and gear type and shall have one handwheel to lift and reseat the plug and one handwheel to rotate the plug. Handwheel actuators shall be totally enclosed and shall have seals and gaskets to prevent entry of dirt, water or corrosive atmosphere. Actuators shall have corrosion resistant bearings on the gear sector. Actuators shall provide plug rotation up to 360°.

3. The 3-way valves, actuators and accessories shall be as manufactured by DeZurik Corporation, or equal.

H. Plug Valves for Yard Piping

1. Plug valves for yard piping shall be as specified above for interior plug valves, except valves shall have mechanical joint ends and stainless steel hardware. Buried actuators shall be as specified above and shall be of buried, submerged service with seals on all covers and shafts and all exposed hardware of stainless steel. Provide valve box, stem extension, and operating nut as specified above for gate valves.

I. Ball Valves

1. See Section 15100 of these SPECIFICATIONS.

J. Check Valves

1. Check valves for cast iron and ductile iron pipelines shall be swing type and shall meet the material requirements of AWWA Specification C508-latest revision Swing-Check Valves for ordinary

water-works service. The valves shall be iron body, bronze mounted, single disc, 150 psi working water pressure, non-shock, and hydrostatically tested at 300 psi. Ends shall be 125 lb. ANSI B16.1 flanges.

a. When there is no flow through the line the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the water-way.

b. Check valves shall have bronze seat and body rings, extended bronze hinge pins and bronze nuts on the bolts of bolted covers.

c. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and spring. Springs with various tensions shall be provided and springs approved by the ENGINEER shall be installed.

K. Automatic Air and Vacuum Relief Valves for Vertical Turbine Pumps

1. Combination air and vacuum valves for vertical turbine pumps shall be equal to APCO Air Valves for Vertical Turbine Pumps, per APCO Bulletin 586, as manufactured by Valve and Primer Corp., Schaumburg, Illinois, or approved equal.

2. Valves shall be the size shown on the drawings and shall be equipped with an automatic air release valve, such as APCO Valve No. 55, or approved equal.

3. Air valves for vertical turbine pumps shall be designed to allow large quantities of air to escape out the orifice when the pump is started and close water tight when the liquid enters the valve. The air valve shall also permit large quantities of air to re-enter through the orifice when the pump is stopped to prevent a vacuum from forming in the pump column.

4. The valve shall consist of a body, cover, baffle, float and seat. The valve shall be designed to prevent prematurely shut-off. The seat shall be fastened into the valve cover, without distortion, and shall be easily removed, if necessary.

5. The entire float and baffle assembly must be shrouded with a perforated water diffuser to prevent the water column entering the valve, from slamming the float shut and eliminate water hammer in the system.

6 The float shall be stainless steel, designed to withstand a minimum of 1,000 psi, or approved equal. The float shall be center guided and not free floating for positive seating.

7. The discharge orifice shall be fitted with an automatic air release valve in order to vent small pockets of air. This valve shall consist of a body, cover, float and seat, and shall be rated at a working pressure of 150 psi.

8. The body, cover, and baffle of this valve assembly shall be constructed of cast iron, conforming to ASTM A48 Class 30, or approved equal. The float shall be stainless steel, conforming to ASTM A240, or approved equal. The seats shall be BUNA-N and the water diffuser shall be brass, or approved equal. All flanges shall be 125# ANSI.

L. Air Release Valves

1. Combination Air Valve Assemblies

a. Sizes 1-inch through 6-inch. Valve shall be single body, double orifice, allowing air to exit when filling a pipeline, and air to enter when draining. Orifices shall operate independently; the smaller release orifice shall be capable of opening when the larger is in the closed position.

b. The valve shall be designed to prevent premature closing. The closing mechanism shall be either needle and seat and be Buna-N, or of the rolling seal type made of Rubber E.P.DM., and attached to the valve cover to ensure drop-tight shut-off. The float shall be stainless steel, hermetically sealed, and designed to withstand pressures up to 1000 pounds per square inch, or approved equal. The float shall be of corrosion resistant materials in accordance with ASTM A240, or approved equal. The plug shall be bronze and in accordance with ASTM B124, or approved equal. The body, cover, and leverage frame shall be cast iron/Delrin and shall be in accordance with ASTM A126 GR, B and ASTM D2133, reinforced Nylon, or approved equal.

c. Valve exterior shall be painted with Red Oxide Phenolic Primer, or approved equal as accepted by the FDA for use in contact with potable water.

d. Valve to be APCO Model (corresponding to size) Combination Air Valve as manufactured by Valve & Primer Corp., Schaumburg, Illinois, U.S.A., or approved equal.

e. Air valves shall be installed as shown in the plans, housed in a valve box with cover. Valve boxes for air valves shall be carefully set to grade with covers at grade.

2. Air Release (Vent) Valve Assemblies

a. Air Vent Valve No. 50, or approved equal. Valve shall operate under pressure, allowing entrapped air to escape from a pipeline. Orifices shall operate by means of a simple lever mechanism (stainless steel, ASTM A240), rolling seal mechanism, or approved equal to prevent water from escaping as or after air is expelled.

b. The closing mechanism shall be either needle and seat and be Buna-N, or of the rolling seal type made of Rubber E.P.DM., and attached to the valve cover to ensure drop-tight shut-off. The float shall be stainless steel, hermetically sealed, and designed to withstand pressures up to 1000 pounds per square inch, or approved equal. The float shall be of corrosion resistant materials in accordance with ASTM A240, or approved equal. The seat shall be of stainless steel, or approved equal. The seat shall have an orifice of 3/32 inches, or approved equal to operate up to 175 pounds per square inch (psi), or a 1/16 inch orifice when operation at pressures higher than 175 psi, or approved equal. The body shall be cast iron, ASTM A48, Class 30, or approved equal, and shall have a ½ inch NPT female threaded inlet and outlet, and be rated for 350 psi test pressure.

c. Valve exterior shall be painted with Red Oxide Phenolic Primer, or approved equal as accepted by the FDA for use in contact with potable water.

d. Valve to be APCO Model 50 Air Vent Valve as manufactured by Valve & Primer Corp., Schaumburg, Illinois, U.S.A., or approved equal.

M. Shock Absorbers

1. Shock absorbers shall be supplied on the plant water distribution piping where shown on the PLANS. The shock absorbers shall be Model 1485-1 as manufactured by Josam Manufacturing Company, Michigan City, Indiana or approved equal.

N. Service Clamps

1. Service clamps shall have malleable or ductile iron bodies, which extend at least 160 degrees around the circumference of the pipe and shall have neoprene gaskets cemented to the saddle body. Bodies shall be tapped for either corporation stop threads of IPS as required. Clamps with tap sizes 1 inch and smaller shall be of the single strap design. Clamps with tap sizes larger than 1 inch shall be of the double strap design.

2. Service clamps shall be Style 91 or 291 as manufactured by Dresser Industries, Inc., Type 311 or 313 as manufactured by Smith-Blair, Inc. or equal.

O. Expansion Joints

1. Expansion joints shall be single arch type of butyl rubber construction with carcass of high grade woven cotton or suitable synthetic fiber and individual solid steel ring reinforcement. Soft rubber fillers shall be integrally cured into the arches to prevent settling of material into the arch. Joints shall be constructed to pipeline size and to meet working pressure and corrosive conditions similar to the line where installed. Joints shall have full faced fabric reinforced butyl flanges integral with body. Split type steel backup rings shall be provided to ensure a good joint. Rings shall be designed for mating the ANSI Standard 150 lb. flanges. Joints shall have a working pressure rating of 140 psig (minimum). All joints shall be finish coated with Hypalon paint.

2. Expansion joints shall be furnished with control units. Control units shall consist of two (2) drilled plates, stretcher bolts, and rubber washers backed by metal washers. The stretcher bolts shall prevent over-elongation of the joint. Extra nuts shall be provided on the stretcher bolts on the inside of the plate to prevent over-compression. All nuts, bolts and plates shall be galvanized.

3. Expansion joints shall be Style 500B as manufactured by Mercer Rubber Company, Style 4140 by Uniroyal Company, or equal.

P. Pressure Reducing Valves

1. Pressure reducing valves shall be of the single seated balanced design type globe body with threaded inlet and outlet ports. It shall be diaphragm operated, spring loaded permitted adjustment over a range of no less than 30 psi.

2. The body shall be bronze construction with bronze or stainless steel stem and furnished with a replacement rubber seat.

3. The pressure reducing valves shall be G-A Industries, APCO, or equal.

Q. Mud Valves

1. Mud valves shall be flanged end, rising stem type.

2. Bodies shall be cast iron. The stem, stem nut, disk ring, and seat ring shall be bronze. Bolts and nuts shall be rustproof steel.

3. Handwheel operator and floorstand shall be furnished where shown on the PLANS.

4. Provide stem guides for maximum unsupported stem length of 5 feet.

5. The valves shall be Clow F-3085, or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. All valves and appurtenances shall be installed in the locations shown on the PLANS, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the ENGINEER before they are installed.

B. After installation, all valves and appurtenances shall be tested at least 1 hour at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If a joint proves to be defective, it shall be repaired to the satisfaction of the ENGINEER.

C. Install all brackets, extension rods, guides, the various types of operators and appurtenances as shown on the PLANS that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the CONTRACTOR shall check all plans and figures, which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.

D. All materials shall be carefully inspected for defects in workmanship and materials; all debris and foreign material cleaned out of valve openings, etc.; all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. Valves and other equipment, which do not operate easily or are otherwise defective, shall be repaired or replaced at no additional cost the OWNER.

E. Buried flanged or mechanical joints shall be made with cadmium plated bolts. All exposed bolts and nuts shall be cadmium plated. All exposed bolts and nuts shall be heavily coated with two (2) coats of bituminous paint comparable to Inertol No. 66 Special Heavy.

F. Buried valves and valve boxes shall be set with the stem vertically aligned in the center of the gate box. Valves shall be set on a firm foundation and supported by tamping selected excavated material under the sides of the valve. The valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with finish grade.

3.02 SHOP PAINTING

A. Interior surfaces of all valves, the exterior surfaces of buried valves and miscellaneous piping appurtenances shall be given a shop finish of an asphalt varnish conforming to Federal Specification TT-V51e for Varnish Asphalt.

B. The exterior surface of various parts of valves, operators, floor stands and miscellaneous piping shall be thoroughly cleaned of all scale, dirt, grease or other foreign matter and thereafter on shop coat an approved rust-inhibitive primer (such as specified in Section 09900) shall be applied in accordance with the instructions of the paint manufacturer.

C. Ferrous surfaces obviously not to be painted shall be given a shop coat of grease or other suitable rust-resistant coating.

D. Field painting is included under Division 9.

3.03 INSPECTION AND TESTING

A. The various pipe lines in which the valves and appurtenances are to be installed are specified to be field tested. During these tests any defective valve or appurtenance shall be adjusted, removed and replaced, or otherwise made acceptable or the ENGINEER.

B. Various regulating valves, strainer, or other appurtenances shall be tested to demonstrate their conformance with the specified operational capabilities and any deficiencies shall be corrected or the device replaced or otherwise made acceptable to the ENGINEER.

END OF SECTION

SECTION 16050

BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Raceway Systems
2. Wire, Cables and Connectors
3. Wiring Devices
4. Motor Starters
5. Motor and Circuit Disconnects
6. Fuses
7. Panelboards
8. Transformers

1.02 SUBMITTALS

A. Approval of equipment supplied in this section is contingent upon CONTRACTOR verification of available fault current from electric utility.

1. Notify ENGINEER if available fault current is higher than specified equipment.

B. Product Data:

1. Submit for disconnects, motor starters, panelboards, circuit breakers, overcurrent protective devices, and transformers.
2. Product data sheets with printed installation instructions.

C. Shop Drawings:

1. Submit for motor starters.
2. Show enclosure dimensions, nameplate nomenclature, electrical ratings, and thermal unit schedule.
3. Wiring diagrams and schematics.

D. Operation and Maintenance (O&M) Data:

1. Maintenance data for materials and products for inclusion in Operating and Maintenance Manual.' "

E. Submit in accordance with Section 01340.

1.03 QUALITY ASSURANCE

A. Items provided under this section shall be listed or labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.

2. Terms "listed" and "labeled" shall be as defined in National Electrical Code, Article 100.

B. Regulatory Requirements:

1. National Electrical Code (NEC): Components and installation shall comply with National Fire Protection Association (NFPA) 70.

PART 2 PRODUCTS

2.01 METAL CONDUITAND.TUBING

A. Galvanized Rigid Steer Conduit ANSI C80.I.

B. Plastic-Coated Steel Conduit and Fittings: NEMA RN 1.

C. Liquidtight Flexible Metal Conduit: Flexible steel conduit with PVC jacket

2.02 NONMETALLIC CONDUIT

A. Rigid Nonmetallic Polyvinyl Chloride (PVC) Conduit: NEMA TC 2, Schedule 40 or 80 PVC.

2.03 FITTINGS

A. Fittings for steel conduits:

1. Steel or malleable iron, zinc galvanized or cadmium plated.

2. Do not use set screw or indentor type fittings.

3. Do not use aluminum or die cast fittings.

4. GRS Connectors and Couplings:

a. Threaded.

b. Insulated throat.

c. Gland compression type.

d. Rain and concrete type.

5. Comply with ANSI C80.4.

6. Comply with NEMA FB 1, compatible with conduit materials.

B. Conduit bodies:

1. Malleable iron with galvanized finish.

C. Fittings for flexible metal conduit.

l. Insulated throat type:

2. Threaded.

3. Grounding type.

4. Liquidtight: 1 piece sealing "0" rings with connectors when entering boxes or enclosures.

D. PVC Conduit Fittings:

1. NEMA TC3; match to conduit type and material.

E. Expansion Joints:

1. Conduit expansion fittings complete with copper bonding jumper, Crouse-Hinds Type XJ.

2. Conduit expansion/deflection fittings with copper bonding jumper, Crouse-Hinds Type XD.

F. Seals:

1. Wall entrance, OZ/Gedney Type FSK or FSC.

G. Drain Fittings:

1. Automatic Drain Breather:

a. Explosionproof.

1) Safe for Class I, Groups C and D.

b. Capable of passing minimum 25 cc water/min and

2. Condensate Drain:

a. Conduit outlet body, Type T.

b. Threaded, galvanized plug with 3/16 in. drilled holed through plug.

H. Hazardous Areas:

1. Explosionproof.

2. Horizontal seal fittings, Crouse-Hinds Type EYS.

3. Vertical seal fittings, Crouse-Hinds Type EYD.

4. Vertical seal fittings shall have drain plug.

2.04 WIREWAYS

A. Material: Sheet metal sized and shaped as indicated.

B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireway as required for complete system.

C. Select features where not otherwise indicated, as required to complete wiring system and to comply with NEC.

D. Wireway Covers:

1. Hinged type for dry locations.

2. Bolted cover with gasket for wet locations.

E. Finish: Manufacturer's standard enamel finish unlessbother wise noted.

2.05 BOXES

A. Of indicated types, sizes and NEMA enclosure classes. Where not indicated, provide units of types, sizes, and classes appropriate for use and location. Provide items complete with covers and accessories required for. intended use. Provide gaskets for units in damp or wet locations.

B. Fasteners:

1. General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.

2. Damp or Wet Locations: Stainless steel screws and hardware.

C. Outlet Boxes:

1. Boxes shall be of type, shape, size, and depth to suit each location and application.

2. Steel Boxes: Sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs..

3. Cast Boxes: Iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location; including mounting ears, threaded screw holes' for devices and closure plugs.

D. Pull and Junction Boxes:

1. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.

2. Galvanized Steel Boxes: Flat rolled, code gauge, sheet steel with welded seams. Hot-dip galvanized after fabrication. Cover shall be gasketed.

3. Stainless-Steel Boxes: Fabricate of stainless steel conforming to Type 304 of ASTMA167. Cover shall be gasketed.

4. Galvanized Cast-Iron Boxes: Molded of cast iron alloy with gasketed cover and integral threaded conduit entrances.

5. Boxes Approved for Classified Locations: Cast metal or cast nonmetallic boxes conforming to UL 886 listed and labeled for use in specific location classification, and with specific hazardous material encountered. Conduit entrances shall be integral threaded type.

2.06 WIRES, CABLES, AND CONNECTORS

A. Building wires and cables with insulation type, cable construction, and rating as required to meet application and NEC requirements.

B. Manufacturers:

1. Wire and Cable:

a. Southwire.

b. Rome Cable.

c. Houston Wire and Cable.

d. Belden.

2. Connectors:

a. Burndy.

b. Thomas and Betts.

c. Blackburn, Thomas and Berts.:

C. Copper wire only.

D. 600 v insulation (ASTM standard compounds) and color code conductors for low voltage (secondary feeders and branch circuits) as required by NEC.

1. Type THWN Stranded: Single conductor No. 12 AWG minimum for branch" circuit and feeder conductors size No. 8 AWG and smaller.

2. Type XHHW Stranded: Single conductor for branch circuits, feeders, and service conductors larger than No. 8 AWG

3. Provide grounding conductor when run with circuit conductors with same insulation as circuit conductors.

4. Type THWN Stranded: Single conductor No. 12 AWG minimum for 120 v control wiring and No. 14 AWG minimum for graphic indication, nonshielded instrumentation and other control wiring operating at less than 120 v unless otherwise noted on Drawings.

5. PVC insulation, tinned copper (19 by 27) stranded. No. 16 AWG, twisted pair cabled with aluminum mylar shielding, stranded, tinned, No. 18 AWG copper drain wire, and overall black FR-PVC, 90°C,600 volt Jacket for interference sensitive instrumentation wiring.

E. Joints, Taps, and Splices:

1. Joints, Taps, and Splices in Conductors No. 10 AWG and Smaller: UL listed pre-insulated compression spring-type solderless connectors.

2. Joints, Taps, and Splices in Conductors No. 8 AWG and Larger:

Solderless 2 or 4 -bolt compression type connectors of type that will not loosen under vibration or normal strains.

F. Terminations:

1. Power Conductors: Compression crimp type lugs.

2. Control and Instrumentation Conductors: Compression crimp type fork tongue, insulated support type lugs on terminal strips. Do not splice.

2.07 WIRING DEVICES

A. Manufacturers:

1. Hubbell Wiring Device Division.

2. Pass and Seymour, Inc.

3. Appleton Electric Company.

4. "Crouse-Hinds Company.

B. Color: Ivory unless otherwise indicated or required by NEC.

C. Switches:

1. General Use Lighting Switches: 20 amp toggle, equal to Hubbell No. 1221-1 series.

2. Switches controlling equipment, operation of which is not evident from switch position, shall include flush neon pilot light in conjunction with proper switch. Each switch shall be complete with engraved plate to identify equipment being controlled (white letters on black, 1/8 in. high minimum).

D. Receptacles:

1. General use duplex receptacles: ;NEMA No. 5-20R, grounding type, 20 amp HubbelF No. 5362 Specification Grade.

2. Special purpose receptacles as shown on Drawings and schedules.

E. Ground-Fault Circuit Interrupter Receptacles (GFCI).

1. Ratings: 120 vac., 20 amp.

2. Tripping Requirement: UL Class A.

3. Construction:

   a. Shallow depth.

   b. Line and load terminal screws.

   c. Noise suppression.

   d. Feed through.

   e. Standard duplex wall plates shall fit.

   f. NEMA 5-20R configuration.

4. Meet requirements of UL 943 ground-fault circuit interrupters.

F. Wiring Device Plates and Covers:

1. Wall plates for wiring devices with ganging and cut-outs as indicated, provided with metal screws for securing plates to devices, screw heads colored to match finish of plate.

2. Plates for Flush Mounted Devices:

   a. Hubbell 302/304 stainless steel.

3. Device plates for surface mounted Type FS or FD boxes to be Type FSK galvanized steel.

4. Device plates for surface mounted, 4 in. sq boxes to be 1/2 in. raised galvanized steel covers.

5. Weatherproof plates and covers for exterior devices or devices in damp locations to be galvanized gray cast malleable with gasketed, lift cover plate.

6. Weatherproof plates and covers suitable for wet locations while in use.

   a. Hinged and gasketed cover/enclosure to maintain weather tight seal while the equipment is plugged into it. TayNac or equal.

G. Explosionproof Devices:

1. Wiring devices for use in hazardous areas shall be explosionproof approved for Class I, Division 1, GroupD areas.

2. Receptacles: Appletion Cat.No.EFS B175-2023M, Crouse-Hinds Cat No. ENR 2I20 or equal NEMA 5-20R.

3. Plugs: Match receptacles. Furnish 1 plug for each receptacle installed.

4. Switches: Appleton EPS series, Crouse-Hinds EDS series or equal.

2.08 MOTOR STARTERS

A. Manufacturers:

1. Eaton/Cutler-Hammer.

2. Square D.

3. Alien Bradley.

B. Enclosures:

1. NEMA 1in electrical equipment rooms

2. NEMA 4X stainless steel with watertight hubs for outdoor and wet locations.

3. NEMA 7 in hazardous classified locations.

4. As otherwise indicated and as required by NEC.

C. Manual Starters:

1. Minimum short circuit withstand rating in combination with motor circuit protective device shall be 10,000 symmetrical amps or as indicated on Drawings.

D. Manual Motor Starter Construction:

1. Quick make and break toggle action.

2. Double break silver alloy contacts.

3. 1-piece melting alloy type thermal overload units.

4. Starter inoperative unless thermal unit in position.

5. Padlock provision.

6. Pilot light.

7. NEMA standards for size and hp rating.

E. Magnetic Starters:'

1. Minimum short circuit withstand rating in combination with motor circuit protective device shall be 22,000 symmetrical amps or as indicated on Drawings.

F. Magnetic Motor Starter Construction:

1. Full voltage, nonreversing, across the line, unless otherwise indicated.

2. Mounted in vertical position, gravity dropout.

3. Double break silver alloy contacts.

4. Molded coil.

5. Contacts and coil replacement without removing starter from enclosure or power wiring from starter..

6. Straight-through wiring.

7. Overload Relay:

   a. Electronic solid state type with inverse-time-current characteristic, phase loss and phase unbalance protection for size 2 and larger.

   b. 1-piece thermal unit construction for size 1.

   c. 1 melting alloy type overload relay per phase, manually reset.

   d. Interchangeable thermal units.

   e. Thermal units must be in-place to operate starter.

   f. Replaceable overload relay circuit contacts.

   g. NEMA Class 20 heaters or sensors in each phase matched to riameplate full load current of motor, unless otherwise indicated.

8. NEMA standards for size and hp rating.

9. NEMA Size 1 minimum.

G. Combination Starter:

1. Combination Starters:

a. Thermal-magnetic circuit breaker type.

b. Three-pole, three-phase NEMA size as indicated with three melting alloy or solid state overload relays.

c. Hand-Off-Auto selector switch.

H. Control Circuits:

1. Voltage not to exceed 120 v.

2. Control transformer mounted in starter enclosure.

3. Fuses on one secondary line.

4. One secondary line grounded.

5. Transformer sized for device, accessories connected thereto, and 25% extra capacity minimum.

I. Controls:

1. Reset button mounted in enclosure cover.

2. Heavy duty, oiltight green push to test pilot lights mounted in enclosure cover when indicated.

3. Heavy duty, oiltight pushbuttons and selector switches mounted in enclosure when indicated.

4. 6-digit type elapsed time meters in tenths of hr mounted in enclosure cover when indicated.

2.09 MOTOR AND CIRCUIT DISCONNECTS

A. Manufacturers:

I. Eaton/Cutler-Hammer.

2. Square D.

B. Enclosed Circuit Breaker Construction:

1. Dual cover interlock.

2. External trip indication.

3. Provisions for control circuit interlock.

4. Padlock provisions for padlock in Off position.

5. Handle attached to box, not cover.

6. Handle position indicates On, Off or Tripped.

7. Provisions for insulated or groundable neutral.

C. Permanent Trip Circuit Breakers:

1. Thermal and magnetic protection.

2. Magnetic protection only in combination with motor starters and motor circuit protectors (MCP),

3. Single magnetic trip adjustment.

4. Single-handle common trip, 2 and 3 poles (handle ties not acceptable).

5 Push-to-trip test button.

6. Bolt-on type.

7. Quick make and break toggle action.

8. Handle trip indication.

9. Handle position indication, On, Off, and Tripped centered.

10. UL listed for type of wire specified.

11. UL listed short circuit rating (integrated equipment rating).

a. Up to 240 v: 10,000 RMS symmetrical amp minimum.

b. Up to 480 v: 14,000 RMS symmetrical amp minimum.

D. Safety Switches:

1. NEMA heavy duty Type HD.

2. Dual cover interlock.

3. Visible blades.

4. Provisions for control circuit interlock.:

5. Pin type hinges.

6. Tin plated current carrying parts.

7. Quick make and break operator mechanism.

8. Handle attached to box, not cover.

9. Handle position indication, On in up position and Off in down position.

10. Padlock provisions for up to 3 padlocks in Off position.

11. UL listed lugs for type and size of wire specified.

12. Spring reinforced fuse clips for Class R fuses.

13. Provisions for insulated or groundable neutral.

14. UL listed short circuit rating 200,000 RMS amp with Class R fuses.

E. Enclosures:

1. indicated and as required by NEC.

2.10 FUSES

A. Manufacturers:

1. Bussmann.

2. Gould Shawmut.

3. Littlefuse.

B. 250 v Fuses:

1. Class RK 1,1 -end rejection or to fit mountings specified, 1/10 to 600 amps, 200,000 amp interrupting rating.

a. Bussmann Low-Peak. LPN-R, dual element, time delay with short circuit protection for motor, transformer, welder, feeder, and main service protection.

C. 600 v Fuses:

1. Class IUC 1,1 -end rejection orto fit mountings specified, 1/10 to 600 amps, 200,000 amp interrupting.rating.

a. Bussmann Low-Peak. LPS-R, dual element, time delay with short circuit protection for motor, transformer, welder, feeder and main service protection.

2. Class CC, fast acting, single element, 1/10 to 30 amps, 200,000 amp interrupting rating.

   a. Bussmann Limitron. KTK-R, UL listed for motor control circuits, lighting ballasts, control transformers, and street lighting fixtures.

D. Spare Fuses:

1. 10%, minimum of 3, of each type and rating of installed fuses. TANELBOARDS"

2.11 PANELBOARDS

A. Manufacturers:

1. Eaton/Cutler-Hammer.

2. Square D.

B. Panelboard Ratings:

1. UL listed short circuit rating (integral equipment rating):

   a. Up to 240 v: 10,000 RMS symmetrical amp minimum.

   b. Up to 480 v: 14,000 RMS symmetrical amp minimum.

   c. As shown on Drawings.

C. Panelboard Construction:

1. Main breaker or main lugs only, per panelboard schedule.

2. Flush or surface mounted as indicated on panelboard schedule.

3. NEMA Type 1 enclosure, unless otherwise indicated on panelboard schedule.

4. Equipment ground bus adequate for feeder and branch-circuit equipment ground conductors," bonded to box.

5. Listed for use as service equipment for panelboards with main service disconnect.

6. Molded case circuit breakers.

7. Terminals:

a. UL listed for type of wire specified.
b. Anti-turn solderless compression type.

8. Bussing:

   a. Distributed phase sequence type.

   b. 225 amps, 98% conductivity hard drawn copper or as shown on panelboard schedule or Drawings.

   c. Copper.

   d. Bussing and mounting hardware behind all usable space.

9. Gutters adequate for wire size used, 4 in. minimum.

10. Boxes:

    a. Code gauge galvanized steel.

    b. Without knockouts.

11. Fronts:

    a. Rust inhibiting primer, baked enamel finish.

    b. Dead front safety type.

    c. Concealed hinges.

    d. Flush stainless steel cylinder tumbler type locks with spring loaded door pulls.

    e. Circuit Directory:

       1) Suitable for complete descriptions.

       2) Clear plastic cover.

       3) Typewritten card.

12. Special features as shown on Drawings.

13. Engraved laminated nameplate:

    a. Stock melamine plastic laminate.

    b. Legend in black letters on white face and punched for mechanical fasteners.

c. Except as otherwise indicated, provide single line of text, with 1/2 in. high lettering on 1-1/2 in. high label (2 in. high where two lines are required). Text shall match terminology and numbering of Contract Documents and Shop Drawings.

D. Panelboard Circuit Breakers:

1. Thermal and magnetic protection.

2. Single-handle common trip, 2 and 3 poles (handle ties not acceptable).

3. Bolt-on type unless otherwise noted on Drawings.

4. Quick make and break toggle action.

5. Handle trip indication.

6 Handle position indication, On, Off, and Tripped centered.

7. UL listed for type of wire specified.

8. UL listed short circuit rating (integrated equipment rating).

a. Up to 240 v: 10,000 RMS symmetrical amp minimum.

b. Up to 480 v; 14,000 RMS symmetrical amp minimum.

9. HACR breakers for air conditioning units.

10. UL SWDL switching duty on 120 v circuits for switched circuits.

2.12 TRANSFORMERS

A. Manufacturers:

1. Eaton/Cutler-Hammer.

2. Square D.

B. Materials and Equipment:

1. Dry type, air cooled.

2. Insulation

a. Below 30 kVa: Class F or better, having 115°C rise, average maximum over 40°C ambient temperature.

b. 30 kVa and Above: Class Her better, having 150°C rise, average maximum over 40°C ambient temperature.

3. Copper windings.

4. Cores: High grade, non-aging, sheet silicone steel laminations having core plating insulation on both sides of each lamination.

5. Terminal boards.

6. Taps: Two 2-1/2% taps above and below.

7. Overload Capacity: Not less that 10% for intermittent operation.

8. Size: kVa as indicated on Drawings and schedules.

9. Transformers shall be quiet type for installation in areas of low ambient noise levels. Maximum sound levels shall not exceed NEMA standards.

10. Cabinets: Sheet steel, phosphatized having one prime coat and two finish coats of baked enamel.

    a. Indoor, ventilated unless otherwise indicated.

    b. Wall mounting brackets through 75 kVa when indicated as wall mounted.

11. Nameplate: Metal nameplate listing manufacturer's name, serial number, type, class, kVa voltage, frequency, and showing internal wiring diagram.

12. Comply with UL 506.

PART 3 EXECUTION

3.01 RACEWAY SYSTEMS

A. Outdoors, Damp or Wet Locations: Use following wiring methods unless otherwise noted on Drawings:

1. Exposed: Galvanized rigid steel.

2. Concealed: Galvanized rigid steel.

3. Underground Power: As specified in Section 16135.

4. Underground Shielded Instrumentation Cables: As specified in

Section 16135.

5. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Liquidtight flexible metal conduit.

B. Indoor Dry Locations: 'Use following wiring methods unless otherwise noted on Drawings.'

1. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Liquidtight flexible metal conduit.

2. Exposed: Galvanized rigid steel conduit.

3. Concealed: Galvanized rigid steel conduit.

C. Hazardous Classified Locations: Use following wiring methods unless otherwise noted on Drawings. 1. Exposed and Concealed: Galvanized rigid steel conduit.

D. Use 3/4 in. minimum trade size conduit unless otherwise noted except conduit runs to room light switches may be 1/2 in.

E. In precast areas, run conduits in insulation space or in floor topping without crossing conduits, using 3/4 in. maximum conduit size.

F. Raceways Embedded in Slabs: Use galvanized rigid steel conduit. Install in middle third of slab thickness where practical, and leave at least 1 in. (25 mm) concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.'

2. Space raceways laterally to prevent voids in concrete.

3. Run conduit larger than 1 in; trade size parallel to or at right angles to main reinforcement and spaced on center of at least 3 times conduit trade dia. with minimum 2 in. concrete covering. Conduits over 1 in. may not be installed in slab without approval of ENGINEER.

4. When at right angles to reinforcement, place conduit close to slab support.

5. Conduits embedded in concrete frame shall comply with applicable provisions of ACI 31.

G. Examine surfaces to receive raceways, wireways, and fittings for compliance with installation tolerances and other conditions affecting

performance of raceway system.

H. Coordinate layout and installation of raceway and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

I. Complete conduit installation prior to installing cables.

J. Raceway systems shall be continuous from outlet to outlet and from outlets to cabinets, junction or pull. boxes.

K. Enter and secure to boxes ensuring electrical continuity from point of service to outlets.

L. Conduit shall be run concealed except exposed surface conduit may be installed where noted on Drawings or where concealment found to be impractical or impossible, and only with approval of ENGINEER.

M. Provide watertight conduit system where installed in wet places, underground or where buried in masonry or concrete.

1. Use threaded hubs when entering top of enclosures.
2. Use sealing type locknuts when entering sides or bottom of enclosures.

N. Conduit runs extending through areas of different temperature or atmospheric conditions or partly indoors and partly outdoors shall be sealed, drained, and installed in manner preventing drainage of condensed or entrapped moisture into cabinets, motors or equipment enclosures.

O. Cap conduits after installation to prevent entry of debris.

P. Connections to motors and equipment subject to vibration shall be maximum of 3 ft long. Locate where, least subject to physical abuse.

Q. Install conduit expansion fittings complete with bonding jumper in following locations.

1. Conduit runs crossing structural expansion joint.

2. Conduit runs attached to 2 separate structures.

3. Conduit runs where movement perpendicular to axis of conduit may be encountered.

R. Keep raceways at least 6 in. away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.

S, Install separate ground conductor inside flexible conduit connections.

T. Use approved flexible connections in hazardous locations.

U. Use explosionproof fittings and seals in hazardous areas in accordance with NEC.

V. PVC Coated Galvanized Rigid Steel Conduit: Use only fittings approved for use with that material. Patch nicks and scrapes inPVC coating after installing conduit.

W. Transition under floor conduit to galvanized rigid steel conduit before rising above floor. Wrap with plastic tape to provide 40 mil thick cover to height of 6 in. above floor.

3.02 BOXES

A. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.

B. Support and fasten items in accordance with Section 16070.

C. Do not bum holes, use knockout punches or saw.

D. Provide outlet box accessories as required for each installation such as mounting brackets, fixture studs, cable clamps, and metal straps for supporting outlet boxes compatible with outlet boxes being used and meeting 'requirements of individual wiring situations.'

E. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than sizes indicated.

F. Location of outlets and equipment shown on Drawings is approximate. Verify exact location.

G. Flush.outlets shall have edges or plaster flush with finished.wall or ceiling surfaces so plates can be drawn tightly to wall or ceiling surfaces.

H. Minor modification in location of outlets and equipment is considered incidental up to distance of 10 ft with no additional compensation, provided notification of modification is given prior to roughing in of outlet.

I. Outlet Boxes and Fittings: Install outlet and device boxes and associated covers and fittings of materials and NEMA types for each location in conformance with following requirements unless otherwise noted on Drawings:

1. Interior Dry Locations: Sheet steel, NEMA type 1 for flush mounting and feraloy Type FS or PD cast boxes with threaded conduit hubs for surface mounting.

2. Locations Exposed to Weather or Dampness: Stainless steel, NEMA Type 4X.

3. Wet Locations: Stainless Steel, NEMA type 4X enclosures.

4. Corrosive 'Locations: Stainless "Steel, NEMA type 4X enclosures

5. Hazardous (Classified) Locations: NEMA type listed and labeled for location and class of hazard indicated.

J. Pull and Junction Boxes: Install pull and junction boxes of materials and NEMA types suitable for each location.

K. Mounting height as follows unless otherwise shown on Drawings:

1. Switches: 48 in. above floor.

2. ac Receptacles: 15 in. above floor in finished areas; 48 in. above floor in unfinished areas.

3. Pushbuttons: 48 in. above floor.

4. Motor Starters and Disconnect Switches: 60 in. above floor.

5. Thermostats: 60 in. above floor.

L. Do not install boxes back to back or through wall. Offset outlet boxes on opposite sides of wall, minimum 12 in.

3.03 WIRE AND CABLE

A. Install wires and cables as indicated, according to manufacturer's Written instructions and NECA "Standard of Installation".

B. Run wire and cable in conduit unless otherwise indicated on Drawings.

C. On branch circuits, use standard colors.

D. Run ground wire with power circuits; conduit shall not be grounding path.

E. Provide separate conduit systems for following.

1. Line voltage control.

2. Low voltage control.

3. Shielded instrumentation.

4. As required by NEC.

F. Where power cables and instrument/signal cables enter and pass through same distribution box, steel barrier or steel conduit separation shall be

maintained to avoid magnetic interaction between power cables and instrumentation conductors.

G. Run instrumentation cable into control cabinets or MCC only if terminated therein.

H. Terminate control, instrumentation, and communication cables on terminal strips in separate terminal cabinets located near conduit entrances of buildings or as shown on Drawings.

I. Color Coding: Conductors for lighting and power wiring as indicated below.

Phase	208/120 v	480/277 v
A	Black	Brown
B	Red	Orange
C	Blue	Yellow
Travlers	Pink	Purple
Neutrala	White	White with Non-green stripe
Ground	Green	Green

J. Color coding for intrinsically safe systems shall be light blue.

3.04 JOINTS, TAPS, AND SPLICES

A. Where pre-insulated spring connectors are used for motor and equipment connections, tape connector to wire to prevent loosening under vibration.

B. Each tap, joint or splice in conductors No. 8 AWG and larger shall be taped with 2 half-lap layers of vinyl plastic electrical tape and finish wrap of color coding tape where required by code.

C. Cable splices shall be made only in wireways, distribution boxes, and junction boxes,

3.05 WIRING DEVICES

A. Do not install devices until wiring is. Complete.

B. Do not use terminals on wiring devices (hot or neutral) for feed-through connections, looped or otherwise. Make circuit connections by using wire connectors and pigtails.

C. Install gasket plates for devices or system components having light emitting features such as switch with pilot light and dome lights. Where installed on rough textured surfaces, seal with black.self-adhesive polyfoam.

D. Ground receptacles with insulated green ground wire from device ground screw to bolted outlet box connection or as shown on Drawings.

E. Install GFCI receptacles as required by NEC.

3.06 MOTOR STARTERS

A. Examine .area to receive motor starters to ensure adequate clearance for starter installation.

B. Anchor firmly to wall or structural surface.

C. Support and fasten in accordance with Section 16070.

3.07 MOTOR AND CIRCUIT DISCONNECTS

A. Locate disconnect switches as shown on Drawings and required by NEC.

B. Provide control circuit interlock as required by NEC.

C. Overcurrent protective devices.

1. Install fuses just prior to energizing equipment

2. Locate circuit breakers as shown on Drawings.

D. Install on equipment rack or anchor firmly to wall or structural surface.

E. Support and fasten in accordance with Section 16070.

3.08 PANELBOARDS

A. Support panel cabinets independently to structure with no weight bearing on conduits.

B. Install panelboards so top breaker is not higher than 6 ft 0 in. above floor.

C. Adjacent panel cabinets shall be same size and mounted in horizontal alignment

D. Install typewritten directory in each panelboard, accurately indicating rooms or equipment being served after final circuit changes have been made to balance circuit loads.

E. Install filler plates in unused spaces.

3.09 TRANSFORMER

A. Install wall mounted transformers on prefabricated brackets designed for that purpose.

B. Install floor mounted transformers on 4 in. high concrete housekeeping pads.

C. Tighten bus connections and mechanical fasteners.

D. Adjust voltage taps for required system voltage and check grounding requirements.

3.10 FIELD QUALITY CONTROL

A. Control Circuits, Branch Circuits, Feeders, Motor Circuits, and Transformers:

1. Megger check of phase-to-phase and phase-to-ground insulation levels.

a. Do not megger check solid state equipment.

2. Continuity.

3. Short circuit.

4. Operational check.

B. Wiring Devices:

1. Test receptacles with Hubbell 5200, Woodhead 1750 or equal tester for correct polarity, proper ground connection, and wiring faults.

3.11 ADJUSTMENT AND CLEANING

A. Motor Starters and Disconnects:

1. Adjust covers and operating mechanisms for free mechanical movement.

2. Tighten wire and cable connections.

3. Verify overcurrent protection thermal unit size with motor nameplate to provide proper operation and compliance with NEC.

4. Clean interior of enclosures.

5. Touch up scratched or marred surfaces to match original finish.

B. Circuit Breakers:

1. Adjustable settings shall be set to provide selective coordination, proper operation, and compliance with NEC.

END OF SECTION

SECTION 16060 GROUNDING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Grounding of electrical systems and equipment and basic requirements for grounding for protection of life, equipment, circuits, and systems.

2. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.

1.02 SUBMITTALS

A. Report of Field Tests and Observations: Certified by CONTRACTOR.

B. Test Results:

1. Certified field tests and observation reports indicating and interpreting test reports for compliance with performance requirements.

C. Submit in accordance with Section 01340.

1.03 QUALITY ASSURANCE

A. Comply with UL 467.

B. Items provided under this section shall be listed or labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defmed in OSHA Regulation 1910.7.

2. erms "listed" and "labeled" shall be as defined in National Electrical Code, Article 100.

C. Regulatory Requirements:

1. National Electrical Code (NEC): Components and installation shall comply with National Fire Protection Association (NFPA) 70.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING PRODUCTS

A. Governing Requirements: _Where types, .sizes, ratings, .and quantities.. indicated _are. in .excess ,pf NEC.. requirements, more stringent requirements and greater size, rating, and quantity indications govern.

2.02 WIRE AND CABLE GROUNDING CONDUCTORS

A. Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.

1. Material: Copper.

B. Equipment Grounding Conductors: Insulated with green color insulation.

C. Grounding-Electrode Conductors: Stranded cable.

D. Underground Conductors: Bare, tinned, stranded, except as otherwise indicated.

E. Bare Copper Conductors:

1. Solid Conductors: ASTMB3.

2. Assembly of Stranded Conductors: ASTMB8.

3. Tinned Conductors: ASTMB3 3.

2.03 MISCELLANEOUS CONDUCTORS

A. Grounding Bus: Bare, annealed-copper bars of rectangular cross section.

B. Braided Bonding Junipers: Copper tape, braided No. 30 AWG bare copper wire, terminated with copper ferrules.

C. Bonding Straps: Soft copper, 0.05 in. (1 mm) thick and 2 in. (50 mm) wide, except as indicated.

2.04 CONNECTOR PRODUCTS

A. Pressure Connectors: High-conductivity-plated units.

B. Bolted Clamps: Heavy-duty type.

C. Exothermic-Welded Connections: Provided in kit form and selected per manufacturer's written instructions for specific types, sizes, and combinations of conductors and connected items.

2.05 GROUNDING ELECTRODES

A. Grounding Rods: Copper-clad steel.

1. Size: 3/4 in. by 120 in. (19 by 3000 mm).

PART 3 EXECUTION

3.01 APPLICATION

A. Equipment Grounding Conductors: Comply with NEC Article 250 for types, sizes, and quantities of equipment grounding conductors, except where specific types, larger sizes, or more conductors than required by NEC are indicated.

1. Install equipment grounding conductor with circuit conductors for items below in addition to those required by Code:

a. Feeders and branch circuits.

b. Lighting circuits.

c. Receptacle circuits.

d. Single-phase motor or appliance branch circuits. e. Three-phase motor or appliance branch circuits. f. Flexible raceway runs.

2. Nonmetallic Raceways: Install equipment grounding conductor in nonmetallic raceways unless they are designated for data cables.

B. Separately Derived Systems: Where NEC requires grounding , round according to NEC Paragraph 250-26.

C. Piping Systems and .Other Equipment: Comply with-NEC Article 250 for. bonding requirements.

3.02 INSTALLATION

A. Ground electrical systems and equipment according to NEC requirements, except where Drawings or Specifications exceed NEC requirements.

B. Grounding Rods: Locate minimum of 1 rod length from each other and at least same distance from any other grounding electrode.

1. Drive until tops are 2 in. (50 mm) below finished floor or final grade, except as otherwise indicated.

2. Interconnect with grounding-electrode conductors. Use exothermic welds, except as otherwise indicated. Make these connections

without damaging copper coating or exposing steel.

C. Grounding Conductors: Route along shortest and straightest paths possible, except as otherwise indicated. - Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

D. Underground Grounding Conductors: Use bare copper wire. Bury at least 24 in. (600 mm) below grade.

E. Metal Water Service Pipe: Provide insulated copper grounding conductors, sized as indicated, in conduit, ' from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding-clamp connectors. Where dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Do not install grounding jumper across dielectric fittings. Bond grounding-conductor conduit to conductor at each end.

F. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding-clamp connectors.

G. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.

3.03 CONNECTIONS

A. Make connections so possibility of galvanic action or electrolysis is minimized, Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will .be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to assure high conductivity and to make contact points closer in order of galvanic series.

2. Make connections with clean, bare metal at points of contact.

3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces."

B. Exothermic-Welded Connections: Use for connections to structural steel

and for underground connections. Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding-Wire Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Noncontact Metal Raceway Terminations: Where metallic raceways terminate at metal housings without mechanical and electrical connection to housirTg, terminate each conduit with'a grounding bushirigrCo.ririecf" grounding bushings with. bare grounding conductor to grounding bus or terminal-in housing. • Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and bare grounding conductors, except as otherwise indicated.

E. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL486AandUL486B.

F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing die code or other standard method to make visible indication that connector has been adequately compressed on grounding conductor.

G. Moisture Protection: Where insulated grounding conductors are connected to grounding rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.04 FIELD QUALITY CONTROL

A. Testing:

1. Subject completed grounding system to megger test at each location .where maximum . ground-resistance level is specified and at service disconnect enclosure grounding terminal. " "

2. Measure ground resistance not less than 2 full days after last trace of precipitation, and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

3. Perform tests by 2 point method according to Section 9.03 of IEEE 81.

B. Maximum grounding to resistance values are as follows:

1. Equipment Rated 500 RVA and Less: 10 ohms.

C. Excessive Ground Resistance: Where resistance to ground exceeds specified values, notify ENGINEER promptly and include recommendations to reduce ground resistance and to accomplish recommended work.

D. Report: Prepare certified test reports, of ground resistance at each test location; Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

3.05 RESTORATION

A. Restore surface features, including vegetation, at areas disturbed by work of this Section.

1. Re-establish original grades, except as otherwise indicated"

2. Where sod has been removed, replace it as soon as possible after backfilling is completed.

3. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition.

4. Include topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.

5. Maintain restored surfaces.

6. Restore disturbed paving.

END OF SECTION

SECTION 16070

SUPPORTING DEVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

I. Supports from building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

1.02 QUALITY ASSURANCE

A. Items provided under this section shall be listed and labeled by UL or other Nationally Recognized Testing laboratory (NRTL).

1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.

2. Terms "listed" and "labeled" shall be as defined in National Electrical Code, Article 100.

B. Regulatory requirements:

1. National Electrical Code (NEC): Components and installation shall comply with National Fire Protection Association (NFPA) 70.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel or malleable iron.

B. Aluminum where indicated.

C. Stainless steel where indicated.

2.02 COATINGS

A. Protect steel and malleable iron supports, support hardware, and fasteners with zinc coating.

B. Products for use outdoors.

C. Use PVC coating where indicated on Drawings.

2.03 MANUFACTURED SUPPORTING DEVICES

A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.

B. Fasteners: Types, materials, and construction features as follows:

1. Expansion Anchors: Carbon steel wedge or sleeve type.

2. Toggle Bolts: All steel springhead type.

3. Powder-Driven Threaded Studs: Heat-treated steel, designed specifically for intended service.

4. Nuts, Washers, and Bolts: Stainless steel in outdoor applications.

C. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws

D. U-Channel Systems: Channels, with 9/16-in. dia holes, at minimum *ot* 8 in. on center, in top surface. Provide fittings and accessories that mate and match with U-Channel and are of same manufacture.

2.04 FABRICATED SUPPORTING DEVICES

A. Shop- or field-fabricate supports or manufacture supports assembled from U-channel components.

B. Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.

C. Pipe Sleeves: Provide pipe sleeves of 1 of following:

1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate sleeves from following gage metal for sleeve diameter noted:

a. 3 in. and smaller: 20 ga.

b. 4 in. to 6 in.: 16 ga.

c. Over6in;: 14 ga.

2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe;

3. Plastic Pipe: Fabricate from Schedule 80 PVC plastic pipe.

2.05 FIRE RESISTANT JOINT SEALERS

A. Manufacturers:

1. "Dow Coming Fire Stop Foam," Dow Coming Corp.

2. "Pensil 851," General Electric Co.

3. Or equal.

B. Two-part, foamed-in-place, silicone sealant formulated for use in through-penetration fire-stopping around cables, conduit, pipes, and duct penetrations through fire-rated walls and floors.

C. Sealants and. accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with ASTME814, by Underwriters' Laboratories, Inc., or other testing and inspection agency acceptable to authorities having jurisdiction.

PART3 EXECUTION

3.01 INSTALLATION

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC-requirements.

B. Coordinate with structural system and with other electrical installation.

C. Raceway Supports: Comply with NEC and following requirements:

1. Conform to manufacturer's recommendations for selection and installation of supports.

2. Strength of each support shall be adequate to carry present and future load multiplied by safety factor of at least 4. Where this determination results in safety allowance of less than 200 Ibs, provide additional strength until there is minimum of 200 Ibs safety allowance in strength of each support. •.

3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support'. raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.

4. Support parallel runs of horizontal raceways together on trapeze-type hangers.

5. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1 in. and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4 in. dia or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.

D. Miscellaneous Supports: Support miscellaneous electrical components as required to produce same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

E. Sleeves: Install in concrete slabs and walls and other fire-rated floors and walls for raceways and cable installations. For sleeves through fire rated-wall or floor construction, apply UL listed firestopping sealant in-gaps between sleeves and enclosed conduits and cables.

F. Conduit Seals: Install seals for conduit penetrations of slabs below grade and exterior walls below grade and 'where indicated. Tighten sleeve seal screws until sealing grommels have expanded to form watertight seal.

G. Conduit extending through roof shall pass through ceiling box at roof line.

1. Provide 14 ga minimum copper box complete with watertight soldered seams and flanged to serve as pitch pocket for each conduit.

2. Install conduit and pitch pocket in advance of roofing work.

H. Fastening; Unless otherwise indicated, fasten electrical items and their supporting hardware securely to building structure, including but not limited to conduits, raceways, cables, cable trays, busways, cabinets, panelboards, transformers, boxes, disconnect switches, and control components in accordance with following:

1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Threaded studs driven by powder charge and provided with lock washers and huts may be used instead of expansion bolts and machine or wood screws. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In. partitions of light steel construction, use sheet metal screws.

2. Holes cut in concrete shall not cut main reinforcing bars. Fill holes that are not used.

3. Load applied to any fastener shall not exceed 25% of proof test load. Use vibration- and shock-resistant fasteners for attachments to concrete slabs.

END OF SECTION

SECTION 16075

ELECTRICAL IDENTIFICATION

PART I GENERAL

1.01 SUMMARY

A. Section Includes:

1. Identification of electrical materials, equipment, and installations.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements:

1. National Electrical Code: Components and installation shall comply with NFPA 70.

PART 2 PRODUCTS

2.01 - RACEWAY AND CABLE LABELS

A. Manufacturer's Standard Products: Where more than one type is listed for specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by • ANSI A13.1, NFPA 70; or as specified elsewhere.

B. Conform to ANSI Al3.I. Table 3 for minimum size of letters for legend and minimum length of color field for each raceway or cable size.

1. Color: Black legend on orange field.

2. Legend: Indicates voltage.

C. Adhesive Labels: Preprinted, flexible, self adhesive vinyl. Legend is overlaminated with clear, wear and chemical resistant coating.

D. Pretensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color coded, acrylic bands sized to suit diameter of line it identifies and arranged to stay in place by pretensioned gripping action when placed in position.

E. Colored Adhesive Tape: Self adhesive" vinyl tape hot less than 3 mils thick by 1 to 2 in: wide (O."08 mm thick by 25 to 51 mm wide).

F. Underground Line Warning Tape: Permanent, bright colored, continuous printed, vinyl tape with following features:

1. Size: Not less than 6 in. wide by 4 mils thick (152 mm wide by 0.102 mm thick).

2. Compounded for permanent direct burial service.

3. Embedded continuous metallic strip or core.

4. Printed Legend: Indicates type of underground line.

G. Tape Markers: Vinyl or vinyl cloth, self adhesive, wraparound type with preprinted numbers and letters.

H. Aluminum, Wraparound Marker Bands: Bands cut from 0.014 in. (0.4 mm) thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.

I. Plasticized Card Stock Tags: Vinyl cloth with preprinted and field printed legends. Orange background except as otherwise indicated with eyelet for fastener.

J. Aluminum Faced Card Stock Tags: Wear resistant, 18 point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 in. (0.05 mm) thick, laminated with moisture resistant acrylic adhesive, and punched for fastener. Preprinted legends suit each application.

K. Brass or Aluminum Tags: Metal tags with stamped legend, punched for fastener. Dimensions: 2 by 2 in. (51 by 51 mm) by 0.05 in. (1.3 mm).

2.02 ENGRAVED NAMEPLATES AND SIGNS

A. Manufacturer's Standard Products: Where more than one type is listed for specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, or as specified elsewhere.

B. Engraving stock, melamine plastic laminate, 1/16 in. (1.6 mm) minimum thick for signs up to 20 sq in. (129 sq cm), 1/8 in. (3.2 mm) thick for larger sizes.

1. Engraved Legend: Black letters on white face.

2. Punched for mechanical fasteners.

C. Baked Enamel Signs for Interior Use: Preprinted aluminum signs, punched for fasteners, with colors, legend, and size as indicated or as otherwise required for application. 1/4 in. (6.4 mm) grommets in comers for mounting.

D. Exterior, Metal Backed, Butyrate Signs: Wear resistant, nonfading,

preprinted, cellulose acetate butyrate signs with 0.0396 in. (1 mm), galvanized steel backing, with colors, legend, and size appropriate to application. 1/4 in. (6.4 mm) grommets in comers for mounting.

E. Fasteners for Plastic Laminated and Metal Signs: Self tapping stainless steel screws or No. 10/32 stainless steel machine screws with nuts, flat washers and lock washers.

2.03 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self extinguishing, I piece, self locking. Type 6/6 nylon cable ties with following features:

1. Minimum Width: 3/16 in. (5 mm).

2. Tensile Strength: 50 lb (22.3 kg) minimum.

3. Temperature Range: Minus 40 to 185°F (-4 to 85°C).

4. Color: As indicated where used for color coding.

B. Paint: Alkyd-urethane enamel. Primer as recommended by enamel manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install identification devices according to manufacturer's written instructions.

B. Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

C. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and or designations used for 'electrical identification with corresponding designations used in Contract Documents or required by codes and standards. Use consistent designations throughput Project.

D. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

E. Self Adhesive Identification Products: Clean surfaces of dust, loose material, and oily films before applying.

F. Install painted identification as follows:

1. Clean surfaces of dust, loose material, and oily films before

painting.

2. Prime Surfaces: For galvanized metal, use single component, acrylic vehicle coating formulated for galvanized surfaces. For concrete masonry units, use heavy duty, acrylic resin block filler. For concrete surfaces, use clear, alkali resistant, alkyd binder type sealer.

3. Apply 1 intermediate and 1 finish coat of silicone alkyd enamel.

4. Apply primer and finish materials according to manufacturer's instructions.

G. Identify Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communications lines, install continuous underground plastic line marker located directly above line at 6 to 8 in. (150 to 200 mm) below finished grade. Where multiple lines installed in common trench'or. concrete envelope do not exceed an overall width of 16 in. (400 mm), use singleline marker. ^

1. Install line marker for underground wiring, both direct buried and in raceway.

H. Color Code Conductors: Secondary service, feeder, and branch circuit conductors throughout secondary electrical system.

1. Field applied, color coding methods may be used in lieu of factory coded wire for sizes larger than No. 1O AWG.

a. Colored, pressure sensitive plastic tape in half lapped turns for distance of 6 in. (150 mm) from terminal points and in boxes where splices or taps are made. Apply last 2 turns of tape with no tension to prevent possible unwinding. Use 1 in. (25 mm) wide tape in colors as specified. Adjust tape bands to avoid obscuring cable identification markings.

b. Colored cable ties applied in groups of 3 ties of specified color to each wire at each terminal or splice point starting 3 in. (76 mm) from terminal and spaced 3 in. (76 mm) apart. Apply with special tool or pliers,. tighten to snug fit, and cut off excess length.

2. 208/120-V System: As follows:

a. Phase A: Black.

b. Phase B: Red.

c. Phase C: Blue.

d. Neutral: White.

e. Ground: Green.

3. 480/277 - System: As follows:

a. Phase A: Brown.

b. Phase B: Orange.

c. Phase C: Yellow.

d. Neutral: White with non-green stripe.

e. Ground: Green.

I. Power Circuit Identification:-Use metal tags or. aluminum wraparound marker bands for cables, feeders, and. power circuits in vaults, pull boxes, junction boxes, manholes, and switchboard rooms. • ••':•..

1. Legend: 1 /4 in. (6.4 mm) steel letter and number stamping or embossing with legend corresponding to indicated circuit designations.

2. Fasten tags with nylon cable ties; fasten bands using integral ears.

J. Apply identification to conductors as follows:

1. Conductors to Be Extended in Future: Indicate source and circuit numbers.

2. Multiple Power or Lighting Circuits in Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color coding for voltage and phase indication of secondary circuit.

3. Multiple Control and Communications Circuits in Same Enclosure: Identify each conductor by its system and circuit designation. Use consistent system of tags, color coding, or cable marking tape.

K. Apply warning, caution, and instruction signs and stencils as follows:

1. Install warning, caution, and instruction signs where indicated or required to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved, plastic laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs/with metal backing for outdoor items.

2. Emergency Operating Signs:. Install engraved laminate signs with white legend on red background; with minimum 3/8. in. (9 mm) high lettering for emergency instructions on power transfer, load shedding, and or emergency operations.

L. Install identification as follows:

1. Apply equipment identification labels of engraved plastic laminate on each major unit of equipment, including central or master unit of each system. This includes communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Except as otherwise indicated, provide single line of text with 1/2 in. (13 mm) high lettering on 1-1/2 in. (38 mm) high label; where 2 tines of text are required, use lettering 2 in. (51 mm) high. Use black lettering on white field. Apply labels for each unit of following categories of equipment.

   a. Panelboards, electrical cabinets, and enclosures.

   b. Access doors and panels for .concealed electrical items.

   c. Motor starters.

   d. Push button stations.

   e. Control devices.

   f. Transformers.

2. Apply designation labels of engraved plastic laminate for disconnect switches, breakers, push buttons, pilot lights, and similar-items for power distribution and control components above, except panelboards and alarm/signal components where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

END OF SECTION

SECTION 16100

GENERAL PROVISIONS

PART 1 GENERAL

1.01 The General and Special Conditions and all other CONTRACT DOCUMENTS are applicable to WORK under this section of the SPECIFICATIONS. All the WORK under this section of the SPECIFICATIONS shall be governed by any alternates and unit prices called for in the FORM OF PROPOSAL insofar as they affect this portion of the WORK.

1.02 Include furnishing of all labor, materials, equipment and other related items required to complete the WORK called for and indicated on the CONTRACT DRAWINGS and specified for a complete system, including excavation, backfilling and tamping. Classification of excavation and payment for same shall be in accordance with applicable provisions of these SPECIFICATIONS.

1.03 Abbreviations of organizations and publications:

NEC	-	National Electrical Code
UL	-	Underwriters Laboratories, Inc.
IPCEA	-	Insulated Power Cable Engineers Association
ANSI	-	American National Standards Institute
OSHA	-	Occupational Safety Health Act

1.04 All materials shall be new and the best of their respective kinds unless otherwise specified and shall be listed by the UL and shall be so labeled. All equipment shall conform to the latest approved standards of the IEEE, NEMA, ANSI and OSHA.

PART 2 COOPERATION

2.01 Check with other trades on the scope of their WORK and coordinate on all locations of various items of equipment and outlets before they are finally placed and connected. Any relocation of material or equipment necessitated by failure to coordinate WORK shall be at no cost to the OWNER.

2.02 Do not cut the WORK of any other trade without first consulting the ENGINEER'S representative. Repair any WORK damaged employing the services of the trade whose WORK is damaged.

PART 3 SCOPE

3.01 The WORK covered by this section of the CONTRACT shall include the furnishing of all labor, materials, tools and equipment necessary to complete the electrical WORK as herein specified, or implied and as shown or implied on the CONTRACT DRAWINGS.

3.02 The CONTRACTOR shall note that most of the electrical conduit, boxes and wiring are existing. The CONTRACTOR shall visit the site prior to BID and satisfy themselves as to the extent of existing WORK and new WORK required to complete the project as indicated. Submission of a BID will be interpreted that the visit has been done and no extra will be allowed for additional WORK as a result of not doing the inspection of existing conditions.

PART 4 DRAWINGS AND SPECIFICATIONS

4.01 The CONTRACT DRAWINGS and SPECIFICATIONS are intended to cover all WORK enumerated under the respective headings. Examine all CONTRACT DRAWINGS and SPECIFICATIONS to determine any references to WORK of an electrical nature and be guided accordingly in prosecuting the electrical WORK. The CONTRACT DRAWINGS are diagrammatic only, as far as final location is concerned. Any item of WORK not clearly included, specified or shown, and any errors or conflict between CONTRACT DRAWINGS, SPECIFICATIONS, codes and field conditions shall be clarified by a written request to the ENGINEER prior to bidding, otherwise all labor and materials required to make good any damage or defect in finished WORK caused by such error, omission or conflict shall be provided at no additional cost to the OWNER.

PART 5 CODE COMPLIANCE, INSPECTION AND CERTIFICATES

5.01 The minimum standards for all electrical WORK shall be the 1996 revision of the NEC. Whenever and wherever OSHA and/or federal, state and/or local laws or regulations and/or design require higher standards than the NEC, then these laws and/or regulations and/or design shall be followed.

5.02 Furnish electrical inspection by a licensed electrical inspector. Notify the electrical inspector in writing, immediately upon the start of the WORK with a copy of the notice to the ENGINEER. The inspector shall be scheduled for rough as well as finished WORK. Approval from the electrical inspector will not be allowed as reason for deviation from the CONTRACT DRAWINGS and SPECIFICAITONS. All cost incidental to the electrical inspection shall be borne by the CONTRACTOR.

PART 6 CLEANING

6.01 At the completion of the WORK required under this contract and just prior to acceptance by the OWNER, thoroughly clean all exposed equipment fittings, fixtures and accessories.

PART 7 CONNECTIONS TO EQUIPMENT BY OTHERS

7.01 Provide all conduit, boxes and wire with required connections, including any disconnect switches required by NEC to all electrically powered or controlled equipment furnished and set in place by others. Examine all divisions of the SPECIFICATIONS and all CONTRACT DRAWINGS to determine location and size of all electrically powered or controlled equipment.

PART 8 PHASING

8.01 Verify the rotation of all three phase motors with the trade furnishing equipment. These motors shall be "bumped" or run uncoupled in the presence of the trade furnishing the equipment to insure proper rotation.

PART 9 SPECIAL NOTE

9.01 All openings in electrical equipment, enclosures, cabinet outlets and junction boxes shall be by means of standard knockouts or shall be sawed or drilled. The use of a cutting torch is prohibited.

PART 10 PIPE SLEEVES AND FIRE RATING OF OPENINGS

10.01 Wherever conduit pass through floor slabs in other than slab on grade construction, steel sleeves shall be provided for each conduit. Sleeves shall project 3/8" above slab and spaces between conduit and sleeves shall be caulked with a material which will provide a fire rating substantially the same as the unpierced floor.

10.02 Holes through walls and ceilings, chases, shafts, etc., for the passage of cable or conduit shall be made so as to substantially preserve the integrity of the fire rating of such surfaces or passages in accordance with NEC 300-21.

10.03 Where conduit penetrates the roof, such penetration shall be through an opening approved by manufacturer of the roof.

PART 11 EXCAVATION AND BACKFILLING

11.01 Perform all excavation and backfilling required for completion of WORK indicated on the CONTRACT DRAWINGS and specified herein. Classification of excavation and prices for excavation shall be in accordance with the applicable division of these SPECIFICATIONS.

11.02 Backfill material for conduit or direct bury cable unless otherwise specified and/or noted on the DRAWINGS shall be clean earth, free from rock and debris, thoroughly tamped in six inch (6") layers to the finished grade.

11.03 During the progress of the project, the premises shall be kept reasonably clean and free from accumulate rubbish and debris. Proper care shall be exercised to protect all trees, shrubbery, and etc., in the vicinity of the work. All surplus earth shall be disposed of as directed by the ENGINEER.

11.04 Compaction of backfill in place shall be 95% of maximum density.

PART 12 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

12.01 At completion of the CONTRACT, the OWNER shall be provided with two (2) bound copies of operations and maintenance instructions for the various items of the electrical equipment, including existing motor control center, new panelboards, service equipment, lighting fixtures, etc.

12.02 In addition to manufacturer's approved SHOP DRAWINGS, manual shall include: (a) A listing of equipment (identified in accordance with the DRAWINGS nomenclature, e.g. LF-1, M.D.P. etc.) and distribution or supplier of the equipment. In case of lighting fixtures, the type replacement lamp including recommended voltage and other necessary designation shall be included.

12.03 Instructions shall be included for routine checking of circuit breakers and fused switches.

PART 13 LABELING

13.01 All lighting and power panels, telephone cabinets, switches in distribution equipment, safety switches for remote equipment and all other items noted for labeling shall be properly identified in accordance with the designations shown on the DRAWINGS or the function they perform. This paragraph applies to both new and existing equipment.

13.02 Labels shall be 1/4" high, white letters on laminated phenolic engraving stock suitably cemented to the inside of the recessed panels and on the face of surface mounted panels and other equipment.

PART 14 FISH WIRE

14.01 All conduit required under this contract which do not receive conductors, shall be provided with a 14 gauge galvanized steel fish wire or approved nylon wire.

PART 15 "OR EQUAL" CLAUSE

15.01 The SPECIFICATIONS covering this WORK are open; wherever a specific manufacturer's item is specified, it is intended as a standard to be met and items which are approved equal or superior will be accepted.

PART 16 WARRANTY

16.01 CONTRACTOR shall include in BID price the warranty of all labor and equipment that is a part of this CONTRACT, including existing equipment that is reused, for a period of one year from the date of final completion.

END OF SECTION

SECTION 16200

GENERAL MATERIALS AND INSTALLATION

PART 1 GENERAL

1.01 In general, conduit shall be zinc-coated, rigid steel conduit and shall meet in all respects, the UL Standards for Rigid Steel Conduit. The conduit shall be metallized, galvanized, sherardized, or approved equal.

1.02 Rigid thick wall conduit or IMC shall be installed underground, as required or noted and in all concrete construction. Schedule 40 PVC conduit may be used below grade on exterior and below slab on interior of building. Exterior below grade PVC shall be concrete encased. Interior below slab PVC shall have 3" of cover between slab and conduit. If rock is present, provide 4" pad of same material as backfill. All risers through slab shall be with rigid steel elbows and extensions. Electrical metallic tubing may be used in other places unless otherwise noted. All thick wall terminals shall be capped with insulating bushings. Electrical metallic tubing shall be terminated with connectors with insulated throat. Metallined terminating fittings will not be acceptable. All terminating fittings shall be secured to box or cabinet with double lock-nut type of construction. Couplings and connectors for electrical metallic tubing shall be steel and shall be of the compression type. Set screw and indentation type connectors will not be acceptable, except that approved type steel set screw connectors may be used on EMT 2 –1/2" or larger and on rigid conduit unless otherwise noted.

1.03 Runs of conduit or tubing shall have supports spaced in accordance with the NEC, and exposed conduit shall be installed with runs parallel or perpendicular to walls, structural members on intersections of vertical planes and ceilings, with right angle turns consisting of cast metal fittings or symmetrical bends. Bends or offsets shall be avoided where possible but where necessary shall be made with an approved conduit bending machine. Conduit or tubing which has been crushed or deformed in any way shall not be installed. Expansion fittings or other approved devices shall be used to provide for expansion or contraction where conduit or tubing crosses expansion joints. Conduit and tubing shall be supported on an approved type of ceiling trapeze, beam clamps, strap hangers, or pipe straps, secured by means of toggle bolts on hollow masonry units, expansion shields in concrete or brick and machine screws on metal surfaces. The use of tie wire for suspending conduits or securing same to joists, purlins, beams, etc., will not be allowed. Conduit and tubing shall be installed in such manner as to insure against trouble from the collection of trapped condensation, and all runs shall be arranged so as to be devoid of traps wherever possible. All necessary precautions to prevent the lodgment of dirt, plaster, or trash in conduit or tubing, fittings and boxes during construction shall be taken. A run of conduit or tubing which has become clogged shall be entirely freed of these accumulations or shall be replaced. Conduit shall be securely fastened to all sheet metal outlets, junction and pull boxes with double galvanized locknuts and

insulating bushings. All conduit in floors or below grade shall be swabbed free of debris or moisture before wires are pulled.

1.04 All underground metal conduit and conduit below slab shall be protected with (2) heavy coats of asphaltum paint.

1.05 The final 18 inch section of conduit connecting each motor shall be liquid tight flexible type.

1.06 All conduit shall be installed concealed unless otherwise noted or shown on the drawings.

1.07 No conduit smaller than 3/4" shall be used except as noted.

1.08 All conduit required under this contract, which do not receive conductors, shall be provided with 14 gauge copper or galvanized steel pull wires for future installation of the conductors by others.

1.09 No flexible conduit smaller than 1/2" shall be used except as permitted by NEC 350-3.

PART 2 OUTLET BOXES

2.01 Outlets shall be installed in the locations shown on the CONTRACT DRAWINGS. The general building PLANS shall be studied in relation to the spaces surrounding each outlet in order that WORK under this division of the SPECIFICATIONS may fit the WORK required under other divisions. When necessary, outlets shall be relocated so that when fixtures or other fittings are installed they will be symmetrically located according to room layout and will not interfere with other WORK or equipment. Only zinc-coated or cadmium plated, sheet-steel boxes according to NEC, of a class to satisfy the conditions for each outlet shall be used in concealed WORK. Boxes shall be installed in a rigid and satisfactory manner either by wood screws on wood, expansion shields on masonry, or machine screws on steel. Fixture outlet boxes in concrete ceilings shall be four (4") inch octagonal, concrete type, set flush with finished surfaces. Fixture outlet boxes on ceilings shall not be less than 4 inch octagonal.

2.02 All supports required for outlet boxes in addition to that furnished under the general building construction, shall be furnished and installed under this division of the SPECIFICATIONS. All supports shall be steel.

2.03 For masonry or drywall construction square cornered boxes measuring 3-3/4" high by approximately 2" wide and having interior device mounting holes shall be used.

2.04 Single gang boxes for devices shall be not less than 2-1/2" deep unless limited by depth of construction and shall accommodate up to five #12 conductors. When construction depth permits, 3-1/2" deep boxes shall be used for devices where the number of conductors entering a single gang outlet is 6 to 8. Where more than 8 conductors enter an outlet housing a single device, boxes shall be 4" square by 2-1/8" deep to accommodate a maximum of 14 conductors and shall

be provided with single device, square cornered tile wall covers of a suitable depth. Where construction depth is limited or to facilitate installation in cavity walls, 4" square boxes 1-1/2" deep may be used with single gang square cornered tile wallcovers in lieu of single gang, 2-1/2" or 3-1/2" deep boxes. Such installation shall be increased to conform with NEC requirements for conductors larger than #12 AWG.

2.05 Where two or more devices are to be ganged at one outlet, 3-3/4" high boxes as specified above and with the required number of gangs shall be used. Each gang shall be subject to the same "fill" limitations as for single gang installation.

2.06 Partitions shall be provided in ganged boxes as required for conformity with NEC 380-8.

2.07 Where tile covers are used they shall be of sufficient depth to bring the box opening within 1/4" of the finished wall surface.

2.08 Provide blank metal coverplates for all boxes which do not receive devices.

PART 3 WIRES AND CABLES (CONDUCTORS)

3.01 LOW VOLTAGE (0-600V)

3.1.1 Branch circuit conductors shall be not smaller than No. 12 A.W.G. Conductors for signal and pilot control circuits may be No. 14 A.W.G. Conductors shall be continuous from outlet to outlet and no splices shall be made except within outlet or junction boxes. Junction boxes may be utilized where required. Wire connectors of insulating materials or solderless pressure connectors properly insulated shall be utilized for all splices and wiring where possible. Rubber and friction tape shall conform to NEC and be UL approved. Vinyl plastic tape will be acceptable in lieu of rubber and friction tape. For branch circuit wires sizes #6 and smaller, and for fixture wiring, all splices shall be made with approved type crimp-on sleeves with separate outer insulating cap. In lieu of this, preinsulated, twist on torsion spring type connectors "Scotchlok" may be utilized. The use of threaded connectors with integral insulation of bakelite or other material will not be allowed.

3.1.2 Insulation unless otherwise noted shall be thermoplastic Type THHN-THWN. The color code shall be in accordance with the National Electrical Code.

3.1.3 All building wires shall be as manufactured by Paranite, General Electric, General Cable, Anconda, Simplex, Phelps-Dodge, Reynolds or approved equal.

3.1.4 All conductors shall be copper unless otherwise specified.

3.1.5 All existing conductors as well as new conductors shall be megged to level recommended by manufacturer to assure that the conductors and

insulation are not damaged or deteriorated. The engineer shall be furnished a copy of the report. Any conductors which do not meet standards shall be replaced.

PART 4 JUNCTION BOXES AND TERMINAL CABINETS

4.01 All junctions and terminals cabinets used under this contract shall be constructed of code gauge, galvanized steel and shall be as manufactured by B & C, Metal Stamping Company, Columbia Manufacturing Company, Boss or approved equal.

END OF SECTION

SECTION 16300

ELECTRICAL SERVICE

PART I GENERAL

1.01 The conduit system and neutral conductors of the wiring system shall be grounded in accordance with NEC. Grounding conductors of the electrical system shall be as shown on the contract drawings and shall be extended in conduit to the water service. Connection to the water pipe shall be made by approved ground clamps. All unions, valves, meters, etc., in the water line shall be bonded in accordance with the NEC, from the point of ground connection to the point where the water pipe enters the ground. The grounding system shall be installed in a workmanlike manner and shall be inconspicuous. Continuity of the ground shall be maintained throughout the building. Continuity of equipment and raceway ground shall be insured by the use of double locknuts and insulated grounding bushings bonded to enclosures in accordance with NEC Article 250-79 and Table 250-95 at service equipment at all panelboards, safety switches, pull boxes, etc., and at the terminations of all conduit which (1) house the supply conductors to the main bus or main breaker of a panelboard; (2) house the conductors of any branch or feeder circuit protected at 60 amperes or more. Convenience outlets shall be grounded by means of a bonding wire attached to the outlet box in a manner approved NEC Article 250-114. Service ground shall be run in non-metallic conduit. All equipment or device grounds at panelboards, service or distribution equipment shall be connected to ground bars in such equipment with set screw connectors.

PART 2 ELECTRIC SERVICE

2.01 SECONDARY ELECTRIC SERVICE

Furnish and install cable and conduit from weatherhead to a termination point in the building service equipment. Conduit shall be rigid steel with Type THW insulated copper conductors.

2.02 METERING

Install meter base as furnished by the Utility Company and extend 1- 1/4" conduit from the current transformers cabinet to the meter base location. Current transformer cabinet shall be furnished and installed as required by American Electric Power Company.

PART 3 SERVICE AND DISTRIBUTION EQUIPMENT

3.01 GENERAL

Furnish and install a complete system of service and distribution equipment as shown on the contract drawings and described herein.

3.02 MAIN SERVICE DEVICES

This shall be a molded case circuit breaker, 200 ampere frame size with the indicated trip rating. Unit shall be General Electric, Square "D", Westinghouse, ITE or approved equal. Circuit breaker shall be complete with quick-make, quick-break manual operator. Construction shall include interpole phase barriers, contact position indicator and operating handle. Breaker shall be equipped with dual magnetic, adjustable long-time delay short-time instantaneous trips.

3.03 BRANCH DEVICES

These shall be molded circuit breakers, Square D, Westinghouse, General Electric, ITE or equal.

3.04 All devices shall be mounted in wall mounted panelboard construction.

PART 4 EXISTING MOTOR CONTROL CENTER

4.01 Existing motor control center (N4CC) is Furnas System 89. New combination starters as scheduled on drawing shall be type FVNR with circuit breakers, hand-off automatic switch, start-stop push buttons and red running light.

4.02 All starters requiring repair parts shall be repaired with original equipment parts.

4.03 In some instances wiring has been damaged. Replace wiring with original equipment conductors and test for proper operation.

END OF SECTION 16300

SECTION 16400

DISTRIBUTON SYSTEM

PART 1 CIRCUIT BREAKER PANELBOARDS

1.01 Furnish and install where indicated on the CONTRACT DRAWINGS, automatic circuit breaker panelboards. The panelboards shall be of the dead front type and shall be in accordance with the Underwriters Laboratories, Inc., "Standards for Panelboards", and "Standards for Cabinets and Boxes", and shall be so labeled. Cabinets shall be of sufficient size to provide a minimum gutter space of 4" on all sides. Boxes shall be made of code gauge galvanized steel. Fronts shall be of sheet metal with door and directory card, combination lock and catch with two (2) milled type keys. The directory cards shall be filled in (typewritten) showing circuit numbers and description for both new and existing panelboards. The circuit breakers shall be of the indicating type providing "ON", "OFF" and "TRIP" positions of the indicating handle. All multi-pole breakers shall be so designed that an overload on one pole automatically causes all poles to open. Single pole breakers with handle ties will not be accepted. The circuit breakers shall be of the quick-make, quick-break on manual as well as automatic type rated 10000 AIC sym. 208/120 and 240.120 panelboards shall be General Electric Type NLAB, Square D Type NQOB, Cutler-Hammer or approved equal. Each panel shall have a factory installed ground bus.

PART 2 SAFETY SWITCHES

2.01 In general, safety switches shall be quick-make, quick-break, fused or unfused as required or specified, rated 240 or 600 volts as required and shall be Type A, Heavy Duty, General Electric, Square D, Bulldog, Cutler-Hammer or approved equal. Each switch shall have the capacity indicated. Exterior switches shall be NEMA 4X, stainless steel.

2.02 Each motor shall be provided with a disconnecting means where required by the NEC, even though not indicated on the CONTRACT DRAWINGS. A circuit breaker in a panelboard will be accepted as a disconnect means if located within sight of the motor. A quick-break, quick-make, general use tumbler or snap switch shall be acceptable for capacity less than 30 amperes, provided the ampere rating of the switch is at least double the rating of the controlled equipment and provided the required running protection is supplied by other means.

2.03 Safety switches for single phase motors not having thermal overload shall be as manufactured by General Electric, Square D or approved equal, single or two pole as required. Each switch shall be provided with a thermal heater of the correct size for the motor on which installed. All shall be of one manufacture insofar as possible.

PART 3 WIRING DEVICES

3.01 SWITCHES

3.1.1 All switches shall be of the flush tumbler type. All wall switches shall be rated at 20 ampere, 125 volts.

3.1.2 Switches shall be as follows, or approved equal:

	GENERAL ELECTRIC	HUBBELL	BRYANT
20A Single Pole	5951	1221	4901
20A Three Way	5953	1223	4903

3.1.3 Provide key operated switches where indicated.

3.02 RECEPTACLES

3.2.1 Convenience outlets shall be 20 amp rated, Hubbell No. 5352, G.E. 5362, or Bryant 5362 of the grounding type.

3.2.2 GFI weatherproof duplex outlets shall be No. GF 5352 with a Hubbell WP26M (cast aluminum) or approved equal cover.

3.2.3 All wiring devices shall be of one manufacturer and shall be grey.

3.03 PLATES

All plates for concealed devices shall be stainless steel series 97000.

PART 4 FUSES

4.01 Fuses shall not be installed in safety switches or panelboards until equipment is ready to be energized.

4.02 Fuses 600 amperes and less shall be current limiting with an interrupting capacity of 200,000 amperes and time delay of 10 seconds at 500% rating. They shall be Bussman Fusetron dual element fuses or approved equal.

END OF SECTION

EXISTING BCWD
WATERLINE

PROPOSED BCWD
WATERLINE

EXISTING BCWD
WATERLINE

PROPOSED BCWD
WATERLINE REPLACEMENT

BREATHITT COUNTY
PERRY COUNTY

EXISTING BUCKHORN
WATERLINE

EXISTING BUCKHORN
WATERLINE

RECEIVED
MAR 5 2013
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nesbitt engineering, inc. *providing proven solutions since 1976*	KY 1110/28 WATERLINE INTERCONNECTION Breathitt County Water District Breathitt County, Kentucky		
	drawn by: mms	disk/file name: \-03 Design\Dwgs\plan sheets.dwg	job no : 998-37
	date: 2/12/13	last plot date:	scale: NTS

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BREATHITT COUNTY WATER DISTRICT

KY 1110/28 WATERLINE INTERCONNECTION

FUNDED BY

MULTI COUNTY COAL SEVERANCE FUNDS

BREATHITT COUNTY, KENTUCKY

NOVEMBER, 2012

BREATHITT COUNTY JUDGE EXECUTIVE

JASON RICHARDSON

WATER COMMISSIONERS

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SAMMIE TURNER - VICE CHAIRMAN

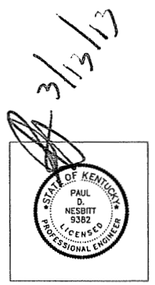
EVA FUGATE - SECRETARY

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3/13/13



BID SET: JANUARY 2013



KENTUCKY



VICINITY MAP
1" = 4000'

ABBREVIATIONS

A.F.F.	ABOVE FINISHED FLOOR
ALUM	ALUMINUM
APPROX	APPROXIMATE
BIT	BITUMINOUS
BLDG	BUILDING
BLK	BLOCK
B.M	BENCH MARK
B'FLY	BUTTERFLY
BOTT	BOTTOM
CHEM	CHEMICAL
C I	CAST IRON
C I S P	CAST IRON SOIL PIPE
℄	CENTERLINE
CONC.	CONCRETE
CHLOR	CHLORINE
CL	CLEARANCE
C.W	COLD WATER
CU	COPPER
C.O	CLEANOUT
CONT	CONTINUATION
DGA	DENSE GRADED AGGRAGATE
D.I.	DUCTILE IRON
DISCH	DISCHARGE
D I M J.	DUCTILE IRON MECHANICAL JOINT
D I P.E.	DUCTILE IRON PLAIN END
D.I.P.	DUCTILE IRON PIPE
DEMO	DEMOLITION
DIAG	DIAGONAL
EFFL	EFFLUENT
E.F.	EACH FACE
ELC	ELECTRICAL
EL	ELEVATION
EQUIP	EQUIPMENT
E.W.	EACH WAY
EXIST	EXISTING
EXT	EXTERIOR
F D	FLOOR DRAIN
F.F.	FINISHED FLOOR
FLG	FLANGE
FL	FENCELINE
FLOC	FLOCCULATOR
GD	GRADE
DIP	DUCTILE IRON PIPE
H.B.	HOSE BIBB
H	HEIGHT
H.W	HOT WATER
INFL	INFLUENT
INV.	INVERT
LAV	LAVATORY
L	LENGTH
LOAD'G	LOADING
LNG	LONG
MH	MANHOLE
M.J.	MECHANICAL JOINT
MIN.	MINIMUM
MTD.	MOUNTED
MAX.	MAXIMUM
NO.	NUMBER
NRS	NONRISING STEM
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
O.D.	OVERALL DIMENSION
OPER	OPERATOR
OP'NG	OPENING
PE	POLYETHYLENE
P.E.	PLAIN END
PL	PLATE
PROP	PROPOSED
PVC	POLYVINYL CHLORIDE
PRV	PRESSURE RELIEF VALVE
PRESS	PRESSURE
PRV	PRESSURE RELIEF VALVE
PRESS	PRESSURE
REDUC	REDUCING
RED	REDUCER
REINF.	REINFORCING
REFRIG	REFRIGERATOR
RM	ROOM
SAN	SANITARY
SCH.	SCHEDULE
SECT	SECTION
SED	SEDIMENTATION
SEW	SEWER
SHT	SHEET
SOL	SOLUTION
SPEC'S.	SPECIFICATION'S
SQ.	SQUARE
S.S	STAINLESS STEEL
ST	STEEL TUBE
STL	STEEL
STN.	STAINLESS
SURF	SURFACE
SVCS	SERVICES
T	THICK
T.O.C	TOP OF CONCRETE
TYP.	TYPICAL
TRANS	TRANSITION
VAC	VACUUM
VAL	VALVE
VTR	VENT THRU ROOF
VERT	VERTICAL
WD	WOOD
W.C	WATER CLOSET
W/	WITH
W.L.	WATER LEVEL
W.S.E	WATER SURFACE ELEVATION
WWF	WOVEN WIRE FENCE

CALL THE KENTUCKY ONE CALL BEFORE DIGGING:
KENTUCKY UNDERGROUND PROTECTION, INC. 1-800-752-6007
A FEDERAL LAW NOW IN EFFECT STATES THAT ANY PERSON WHO ENGAGES IN EXCAVATION ACTIVITIES WITHOUT FIRST USING AN AVAILABLE ONE-CALL NOTIFICATION SYSTEM TO DETERMINE LOCATIONS OF UNDERGROUND FACILITIES; OR WITHOUT HEEDING LOCATION INFORMATION OR MARKINGS AND SUBSEQUENTLY DAMAGES A PIPELINE FACILITY SHALL BE SUBJECT TO A FINE, IMPRISONMENT, OR BOTH. THE LAW ALSO STATES THAT OSHA MAY BE NOTIFIED OF ANY ACCIDENT CAUSED BY AN EXCAVATOR.
NATIONAL ONE-CALL REFERRAL NUMBER 1-800-258-0808

GENERAL NOTES:

1. DIMENSIONS OF EXISTING STRUCTURES, EQUIPMENT, ETC. SHALL BE FIELD CONFIRMED BY THE CONTRACTOR. WHERE CRITICAL DIMENSIONS FOR INSTALLATION OF PROPOSED EQUIPMENT ARE INDICATED ON THE DRAWINGS, THE CONTRACTOR SHALL CONFIRM THESE DIMENSIONS FOR ACTUAL EQUIPMENT FURNISHED ALL KNOWN DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER.

2. THE CONTRACTOR SHALL USE ALL POSSIBLE CARE DURING EXCAVATION ON THIS PROJECT SO AS NOT TO DISTURB ANY EXISTING UTILITY WHETHER SHOWN ON PLANS OR NOT. ANY UTILITY DISTURBED OR DAMAGED BY THE CONTRACTOR DURING HIS CONSTRUCTION OPERATIONS SHALL BE REPAIRED BY THE CONTRACTOR AT NO EXTRA COST TO THE OWNER.

3. THE CONTRACTOR SHALL CONFINE ALL CONSTRUCTION ACTIVITY TO THE AREA WITHIN EXISTING EASEMENTS AND CONSTRUCTION LIMITS, UNLESS OTHERWISE APPROVED IN WRITING BY THE OWNER.

4. THE CONTRACTOR WILL BE SOLELY LIABLE FOR ANY WORK HE PERFORMS OUTSIDE OF LEGAL EASEMENTS OR CONSTRUCTION LIMITS.

5. THE CONTRACTOR MUST CONTACT ALL UTILITY OWNERS AND HAVE THEM FIELD LOCATE THEIR EXISTING LINES PRIOR TO ANY CONSTRUCTION ACTIVITY.

6. EFFORTS HAVE BEEN MADE TO INDICATE ACCURATE LOCATIONS OF SOME EXISTING STRUCTURES, PIPING AND UTILITIES. HOWEVER THE CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE SITE AND OTHER EXISTING CONDITIONS AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN INFORMATION DEPICTED BY THE CONSTRUCTION DRAWINGS AND ACTUAL FIELD CONDITIONS WHICH WOULD SIGNIFICANTLY ALTER THE DESIGN INTENT OF THE CONSTRUCTION DRAWINGS PRIOR TO COMMENCING HIS CONSTRUCTION OPERATIONS. DIMENSIONS OF EXISTING STRUCTURES AND/OR SITE RESTRICTIONS ARE APPROXIMATE, IT IS THE CONTRACTORS RESPONSIBILITY TO OBTAIN AND CONFIRM ALL DIMENSIONS AND ELEVATIONS OF EXISTING STRUCTURES AND TOPOGRAPHY IN THE FIELD NECESSARY FOR HIS CONSTRUCTION OPERATION.

7. THE CONTRACTOR SHALL USE ALL POSSIBLE CARE DURING EXCAVATION ON THIS PROJECT SO AS NOT TO DISTURB OR DAMAGE ANY EXISTING UTILITY OR STRUCTURE NOT SCHEDULED FOR DEMOLITION WHETHER DEPICTED OR NOT IN THE CONSTRUCTION DRAWINGS. ANY DAMAGE TO THE AFORE MENTIONED ITEMS CAUSED DIRECTLY OR INDIRECTLY BY THE CONTRACTOR SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT NO COST TO THE OWNER TO A CONDITION EQUAL TO OR BETTER THAN THAT WHICH EXISTED PRIOR TO BEING DAMAGED.

8. THE CONTRACTOR SHALL CONTACT AND OBTAIN THE PERMISSION OF EXISTING UTILITY OWNERS 48 HOURS (MIN.) PRIOR TO ANY CONSTRUCTION ACTIVITY INTERRUPTING OPERATION OF SAID UTILITY.

9. UNLESS OTHERWISE NOTED, ALL BURIED PIPES SHALL HAVE 30" (MIN.) COVER AS MEASURED FROM FINISHED GRADE TO THE OUTSIDE SURFACE OF THE PIPE.

10. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO WORK ALL APPLICABLE DRAWINGS AND THE APPROPRIATE SPECIFICATIONS AS A UNIT. ANY OMISSIONS, DELETIONS, OR CONFLICTS ARISING AS A RESULT OF FAILURE TO INCORPORATE ALL DRAWINGS AND SPECIFICATIONS WHICH APPLY SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDED COST TO THE OWNER.

CONSTRUCTION ON STATE RIGHT-OF-WAY NOTES:

1. WATER MAIN/SEWER LINES TO BE CONSTRUCTED WITHIN THE KENTUCKY TRANSPORTATION CABINET RIGHT-OF-WAY:
TRENCHES SHALL BE OF A DEPTH SUFFICIENT TO PROVIDE A MINIMUM COVER OF 42" FROM THE EXISTING GROUND SURFACE TO THE TOP OF THE PIPE AND BE LOCATED APPROXIMATELY AS SHOWN UNLESS OTHERWISE NOTED. SEE INDIVIDUAL SHEETS FOR DETAILS.

2. ALL BORES UNDER STATE HIGHWAYS RIGHT-OF-WAY:
SHALL BE A MINIMUM OF 42" DEPTH UNDER BOTTOM OF DITCH LINE TO TOP OF THE PROPOSED BORE AND/OR CASING PIPE ON BOTH SIDES OF THE HIGHWAY.

3. ROCK BLASTING:
THERE SHALL BE NO BLASTING WITHIN STATE RIGHT-OF-WAY WITHOUT WRITTEN CONSENT FROM THE KENTUCKY TRANSPORTATION CABINET.

4. PROTECTION OF EXISTING PAVING:
CARE SHALL BE TAKEN BY THE CONTRACTOR TO AVOID CRACKING OR BREAKING THE BITUMINOUS PAVING. ALL DAMAGE TO THE EXISTING PAVING CAUSED BY THE CONTRACTOR'S OPERATION SHALL BE REPAIRED BY THE CONTRACTOR AT NO COST TO THE OWNER. PAVING PROTECTION SHALL BE ACCOMPLISHED BY THE USE OF RUBBER AND STREET PADDED MACHINERY OR OTHER APPROVED EQUIPMENT WELL SUITED FOR THIS TYPE OF CONSTRUCTION.

5. BANK AND DITCH PROTECTION EXCAVATION:
DURING CONSTRUCTION, ALL EMBANKMENTS, REFILLS AND EXCAVATIONS SHALL BE KEPT SHAPED AND DRAINED BY THE CONTRACTOR. DITCHES AND DRAINS ALONG THE HIGHWAYS SHALL BE MAINTAINED IN SUCH A MANNER AS TO DRAIN EFFECTIVELY AT ALL TIMES.

6. PRIVATE ENTRANCE ROAD:
ALL ROADWAYS AND DRIVEWAYS WITHIN THE WORK LIMITS OF STATE RIGHT-OF-WAYS SHALL BE REFILLED TO THE NATURAL SURFACE OF THE GROUND WITH APPROVED MATERIAL. THE MATERIAL SHALL BE PLACED AND COMPACTED TO A SMOOTHNESS SUITABLE FOR TRAFFIC. THE CONTRACTOR SHALL BE TOTALLY RESPONSIBLE FOR MAINTAINING THESE ROADWAYS UNTIL THE RESTORATION IS APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL NOTE THAT ALL PRIVATE BUSINESSES AND RESIDENCES ALONG THE ROUTE OF THE PROPOSED WATER MAIN/SEWER LINE CONSTRUCTION MUST HAVE ACCESS TO THEIR PROPERTIES AT ALL TIMES DURING CONSTRUCTION.

7. PROTECTION OF EXISTING DRAINAGE CULVERTS:
ALL LOCATIONS WHERE THE PROPOSED WATER MAIN/SEWER LINE IS PARALLEL WITH OR CROSSING AN EXISTING STORM SEWER, THE COST OF RELAYING EXISTING CULVERT PIPES OR THE EXTRA DEPTH REQUIRED TO AVOID THE EXISTING CULVERT IS CONSIDERED INCIDENTAL TO THE CONSTRUCTION AND IS NOT A PAY ITEM.

8. SOME EXISTING UTILITIES HAVE NOT BEEN SHOWN:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES. THE CONTRACTOR SHALL COORDINATE WITH THE REPRESENTATIVES OF THE VARIOUS UTILITIES WHEN WORKING NEAR ANY EXISTING UTILITY. NO ADDITIONAL PAYMENT TO THE CONTRACTOR WILL BE MADE FOR EXTRA DEPTH REQUIRED TO AVOID ANY EXISTING UTILITY.

SHEET INDEX

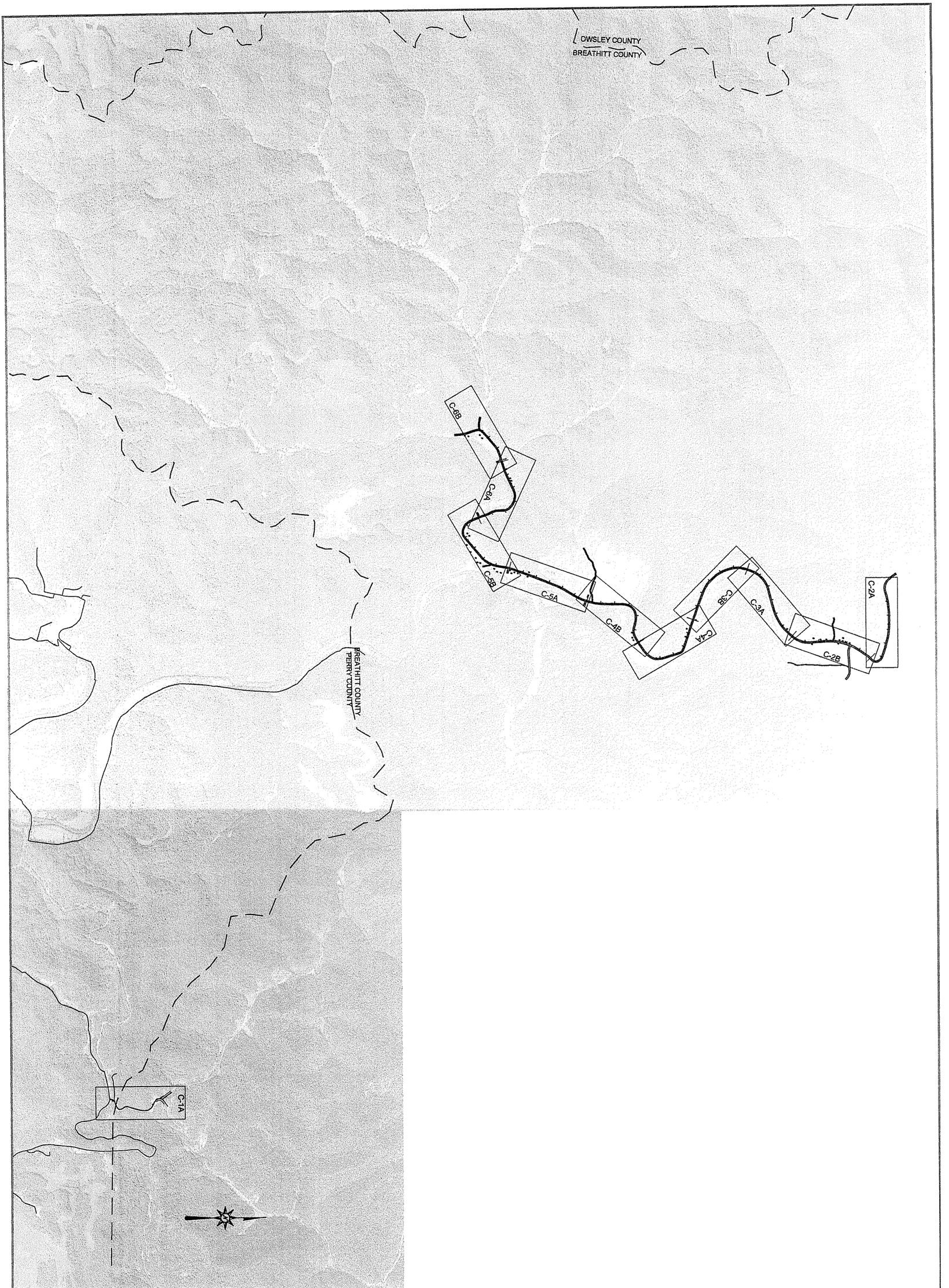
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C-2	LINE B	STA.	0+00	TO	STA.	60+00
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C-5	LINE B	STA.	180+00	TO	STA.	240+00
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D-3	CREEK CROSSING DETAILS					
D-4	MASTER METER & TIE-IN DETAILS					
D-5	PRESSURE REDUCING VALVE VAULT DETAILS					

3/13/13

nesbitt engineering, inc.
227 N. Upper Street
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STATE OF KENTUCKY
PAUL D. NESBITT 9382
LICENSED PROFESSIONAL ENGINEER



INDEX

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KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM

drawn by:	job no.:	scale:
MMS	998-37	NTS
date:	file name:	
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COMMONWEALTH OF KENTUCKY
JEFFREY D. NESBITT
LICENSED PROFESSIONAL ENGINEER

3/13/13

KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM
BREATHITT COUNTY WATER DISTRICT
Breathitt County, Kentucky

INDEX

revisions:

last plotted: 1/29/2013 - 11:53

A

LAST PLOTTED: 11/20/2012
LAST SAVED: 11/20/2012 13:58:0

NOTE:
CONTRACTOR IS TO KEEP ALL CUSTOMERS IN SERVICE DURING CONSTRUCTION AND CONNECT ALL SERVICES TO NEW SYSTEM AS DIRECTED BY THE WATER DISTRICT EXISTING 4" LINES TO BE ABANDONED IN PLACE.

EXISTING 2" WATERLINE

STA. 23+20
CONNECT TO EXISTING 8" WATERLINE
CONTRACTOR TO FIELD VERIFY LOCATION, SIZE & MATERIAL

KY 28

STA. 22+50
CONNECT TO EXISTING WATERLINE
END NEW 8" PVC WATERLINE

STA. 22+19
INSTALL MASTER METER & VAULT

STA. 22+15
INSTALL NEW FLUSHING HYDRANT ASSEMBLY, TYPE 1
INSTALL 8" D.I.M.J. GATE VALVE & BOX

STA. 21+32
CONNECT TO EXISTING WATERLINE
CONTRACTOR TO FIELD VERIFY LOCATION, SIZE & PIPE MATERIAL

STA. 22+70
INSTALL 45 LF OF 14" API 5L
GRADE B STL. CASING
BORE & JACK

STA. 21+35
INSTALL 25 LF OF 14" API 5L
GRADE B STL. CASING
BORE & JACK

20+00

15+00

NEW 8" PVC WATERLINE

10+00

KY 1110

EXISTING 4" WATERLINE
TO BE ABANDONED

STA. 2+31
END NEW 8" D.I. WATERLINE W/ NITRILE GASKETS
BEGIN NEW 8" PVC WATERLINE

5+00

STA. 2+29
INSTALL 8" D.I.M.J. GATE VALVE & BOX
INSTALL NEW FLUSHING HYDRANT ASSEMBLY, TYPE 1

STA. 0+05
INSTALL 30 LF OF 14" API 5L
GRADE B STL. CASING
BORE & JACK

R 200'

GAS STATION

KY 1566

EXISTING 8" WATERLINE

STA. 0+00
CONNECT TO EXISTING 8" D.I. WATERLINE
CONTRACTOR TO FIELD VERIFY LOCATION, SIZE & MATERIAL

KY 1110

THELMA DRIVE

100 0 100 200
GRAPHIC SCALE: 1" = 100'

KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM
BREATHITT COUNTY WATER DISTRICT
Breathitt County, Kentucky

LINE A

3/13/13

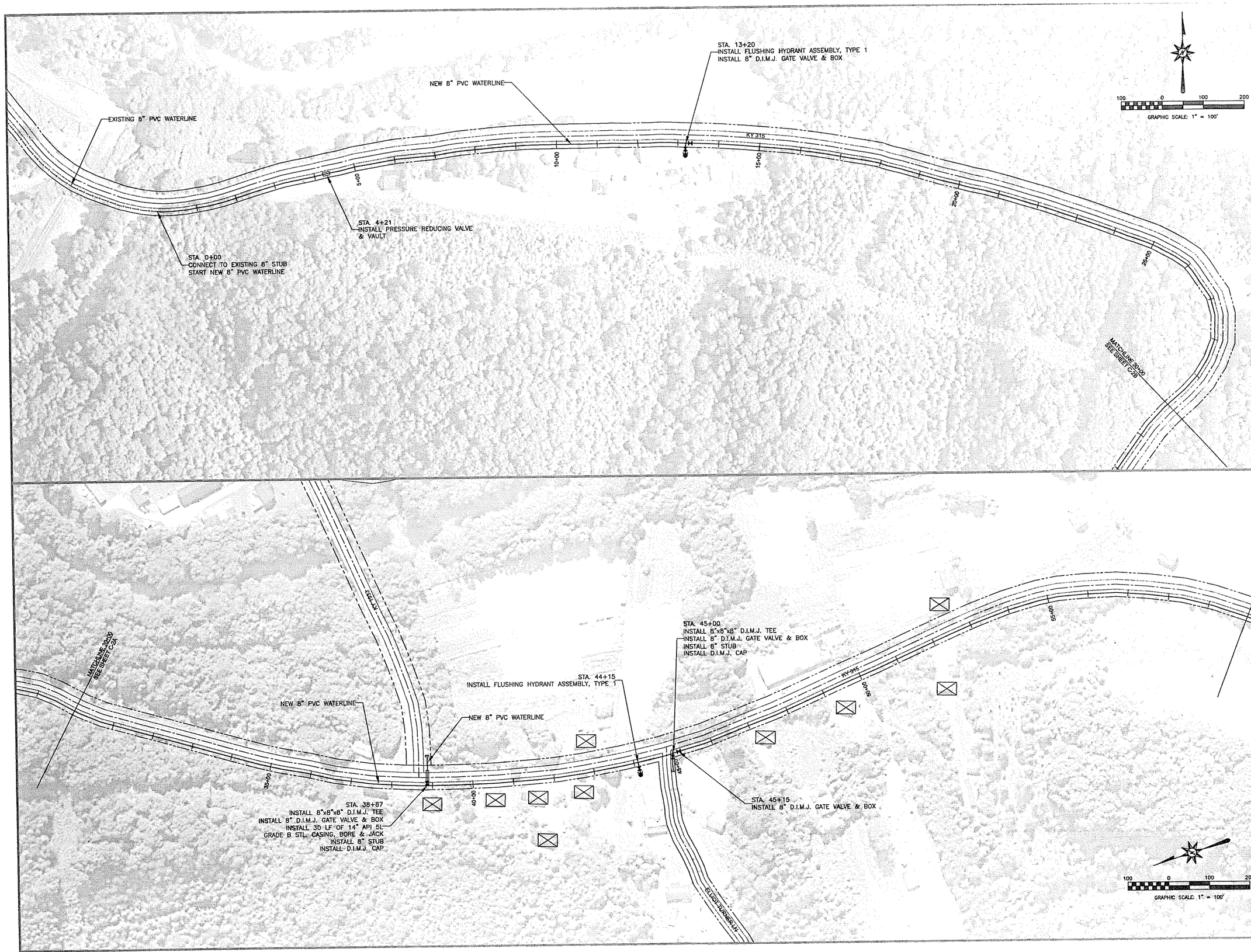
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job no.:	998.37
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scale:	1" = 100'

sheet no
C–1



A

B

LAST PLOTTED: 11/26/2012
LAST SAVED: 11/26/2012 16:20:55

KY 1110 / 2B WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM
Breathitt COUNTY WATER DISTRICT
Breathitt County, Kentucky

LINE B

3/12/13

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KY 1110 / 2B WATERLINE INTERCONNECTION
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sheet no.
C-2

A

B

MATCHLINE 60+00
SEE SHEET C-2B

65+00

70+00

KY 315

NEW 8" PVC WATERLINE

75+00

STA. 85+20
INSTALL FLUSHING HYDRANT ASSEMBLY, TYPE 1
INSTALL 8" D.I.M.J. GATE VALVE & BOX

80+00

85+00

MATCHLINE 85+00
SEE SHEET C-2B

100 0 100 200
GRAPHIC SCALE: 1" = 100'

MATCHLINE 90+00
SEE SHEET C-3A

95+00

NEW 8" PVC WATERLINE

100+00

KY 315

105+00

110+00

STA. 115+43
INSTALL FLUSHING HYDRANT ASSEMBLY, TYPE 1
INSTALL 8" D.I.M.J. GATE VALVE & BOX

115+00

MATCHLINE 115+00
SEE SHEET C-3A

100 0 100 200
GRAPHIC SCALE: 1" = 100'

LAST PLOTTED: 11/26/2012
LAST SAVED: 11/26/2012 16:21:33

KY 1110 / 2B WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM
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Breathitt County, Kentucky

LINE B

3/13/13

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KY 1110 / 2B WATERLINE INTERCONNECTION
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sheet no.
C-3

LAST PLOTTED: 11/28/2012
LAST SAVED: 11/28/2012 13:51:47

A

NEW 8" PVC WATERLINE

130+00

135+00

KY 376

140+00

STA. 141+37
INSTALL FLUSHING HYDRANT ASSEMBLY, TYPE 1
INSTALL 8" D.I M.J. GATE VALVE & BOX

125+00

145+00

MATCHLINE 125+00
SEE SHEET C-4A

MATCHLINE 150+00
SEE SHEET C-4B

100 0 100 200
GRAPHIC SCALE: 1" = 100'

B

MATCHLINE 150+00
SEE SHEET C-4A

155+00

NEW 8" PVC WATERLINE

160+00

165+00

STA. 174+44
INSTALL FLUSHING HYDRANT ASSEMBLY, TYPE 1
INSTALL 8" D.I.M.J. GATE VALVE & BOX

175+00

KY 345

170+00

MATCHLINE 180+00
SEE SHEET C-4A

CROCKETT RIDGE ROAD

100 0 100 200
GRAPHIC SCALE: 1" = 100'

LINE B

KY 1110 / 2B WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM
BREATHITT COUNTY WATER DISTRICT
Breathitt County, Kentucky

11/28/12

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C-4

LAST PLOTTED: 11/26/2012
LAST SAVED: 11/26/2012 13:48:39

A

MATCHLINE 180+00
SEE SHEET C-4B

STA. 183+85
INSTALL 350 LF OF 10" HDPE
DIRECTIONALLY DRILLED UNDER STONE WALL

NEW 8" PVC WATERLINE

STA. 200+76
INSTALL FLUSHING HYDRANT ASSEMBLY, TYPE 1
INSTALL 8" D.I.M.J. GATE VALVE & BOX

MATCHLINE 210+00
SEE SHEET C-5B

185+00
190+00
195+00
200+00
205+00

KY 315

CROOKETSVILLE ROAD

100 0 100 200
GRAPHIC SCALE: 1" = 100'

B

KY 315

220+00
225+00
230+00
235+00

STA. 228+72
INSTALL FLUSHING HYDRANT ASSEMBLY, TYPE 1
INSTALL 8" D.I.M.J. GATE VALVE & BOX

STA. 216+68
INSTALL 8"x8"x4" D.I.M.J TEE
INSTALL 4" D.I.M.J. GATE VALVE & BOX
INSTALL 30 LF OF 10.75" API 5L GRADE B STL. CASING
BORE & JACK
INSTALL 4" STUB
INSTALL D.I.M.J. CAP

NEW 8" PVC WATERLINE

MATCHLINE 210+00
SEE SHEET C-5A

MATCHLINE 240+00
SEE SHEET C-6A

100 0 100 200
GRAPHIC SCALE: 1" = 100'

KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM
BREATHITT COUNTY WATER DISTRICT
Breathitt County, Kentucky

LINE B

3/13/13

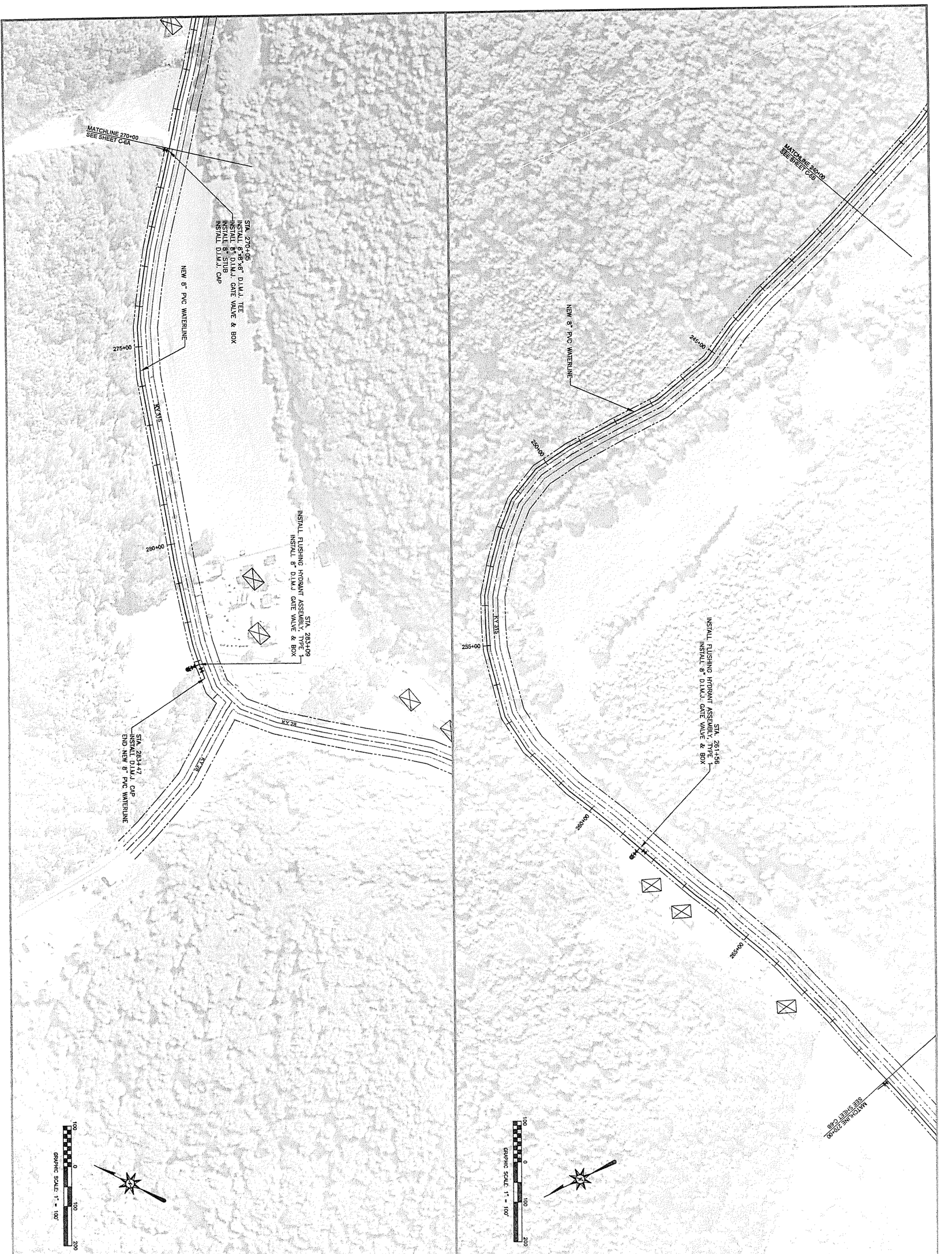
COMMONWEALTH OF KENTUCKY
PAUL D. NESBITT
19360
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PROFESSIONAL ENGINEER

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KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM

drawn by: MMS
date: 11/26/12
job no.: 998.37
scale: 1" = 100'
file name: P:\Breathitt\998-37 Buckhorn\-03 Design\Dwgs\Plan Sheets.dwg

sheet no.
C-5



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KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM

drawn by:	job no.:	scale:
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KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM
BREATHITT COUNTY WATER DISTRICT
Breathitt County, Kentucky

LINE B

3/13/13

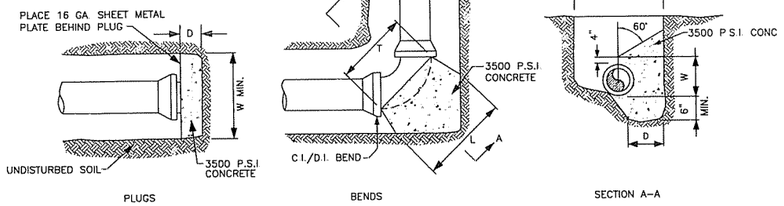
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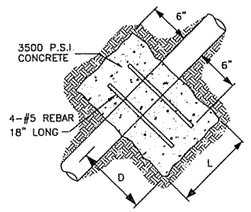
C-6

NOTE: SIDES OF TRENCH TO BE UNDISTURBED SOIL

NOTE: FOR BACKFILL DETAILS SEE THIS SHEET



PLUGS BENDS SECTION A–A

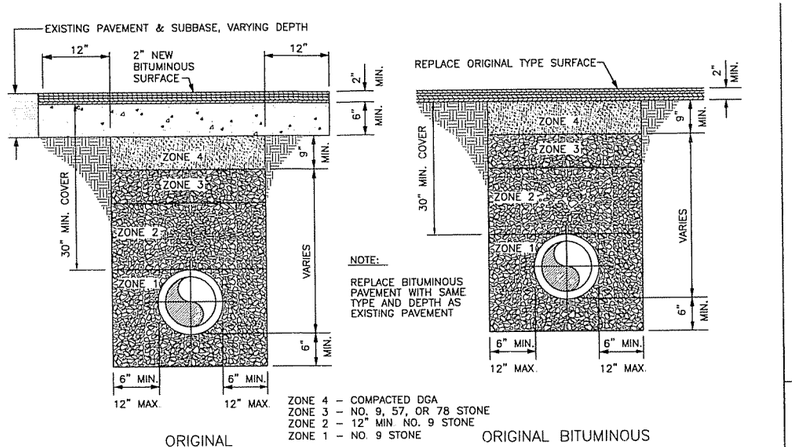


STRAIGHT PIPE

NOTE: DEPTH (D) MAY NOT BE SMALLER THAN SPECIFIED TO ALLOW FOR WORKING SPACE, PIERS SHALL BE PLACED AGAINST UNDISTURBED SOIL. PLACE CONCRETE ANCHORS 25'–0" c/c.

DIMENSIONS FOR THRUST AND ANCHOR BLOCKS									
PIPE SIZE	3"	4"	6"	8"	10"	12"	14"	18"	24"
PLUGS									
D	6"	6"	6"	6"	6"	6"	6"	6"	6"
L&W	16"	18"	20"	22"	24"	26"	28"	32"	38"
EIGHT BEND (45°), 1/16 BEND (22–1/2°)									
D	6"	6"	6"	6"	6"	6"	6"	6"	6"
L	14"	16"	18"	20"	22"	24"	26"	30"	36"
T	12"	14"	16"	18"	20"	22"	24"	28"	34"
W	6"	8"	12"	14"	16"	18"	20"	24"	30"
QUARTER BEND (90°)									
D	6"	6"	8"	10"	10"	10"	12"	12"	14"
L	18"	21"	24"	27"	30"	33"	36"	38"	44"
T	12"	14"	16"	18"	20"	22"	24"	28"	34"
W	6"	8"	12"	16"	18"	20"	22"	26"	32"
VERTICAL BEND & STRAIGHT PIPE									
D	12"	12"	15"	15"	18"	18"	20"	24"	30"
L	18"	18"	24"	24"	30"	30"	32"	36"	42"
T	12"	14"	16"	18"	20"	22"	24"	28"	34"

NOTE: SEE PLAN SHEETS FOR SIZE AND LOCATION OF PIPE

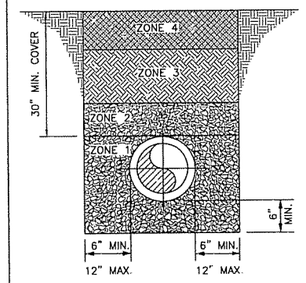


NOTE:
REPLACE BITUMINOUS PAVEMENT WITH SAME TYPE AND DEPTH AS EXISTING PAVEMENT

ZONE 4 – COMPACTED DGA
ZONE 3 – NO. 9, 57, OR 78 STONE
ZONE 2 – 12" MIN NO. 9 STONE
ZONE 1 – NO. 9 STONE

ORIGINAL BITUMINOUS SURFACING OVER 2"

ORIGINAL BITUMINOUS SURFACING 2" OR LESS AND TRAFFIC BOUND MACADAM



PIPE LAID IN ROCK OR EARTH TRENCH

NOTES:

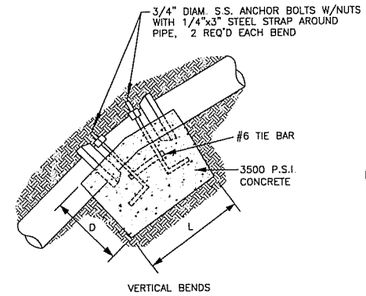
1. COVER UP TO AND INCLUDING ZONE 4 SHALL BE ESTABLISHED BEFORE TRENCH EXCAVATION.

2. ZONE 4 – 6" MIN CONSOLIDATION EARTH BACKFILL INCLUDING TOPSOIL, NO ROCK ALLOWED.

3. ZONE 3 – CONSOLIDATED SOIL, (NO ROCK GREATER THAN 6" DIAMETER) NO 9, 57 OR 78 STONE

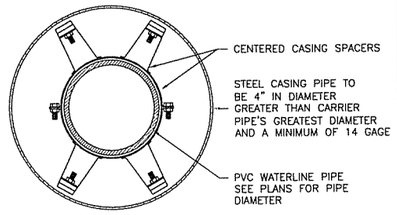
4. ZONE 2 – FROM THE SPRINGLINE OF THE PIPE TO A DISTANCE 12 INCHES ABOVE THE PIPE, THE CONTRACTOR SHALL USE THE SAME MATERIAL AS SPECIFIED FOR BEDDING. COMPACTION IS REQUIRED IN AREAS SUBJECT TO TRAFFIC.

5. ZONE 1 – BEDDING MATERIAL, IN EARTH EXCAVATION AREAS, SHALL BE CLEAN EARTH, FREE FROM ROCKS, DEBRIS OR OTHER FOREIGN MATERIAL. THE CONTRACTOR SHALL USE CRUSHED STONE, SAND OR GRAVEL AS BEDDING MATERIAL WHERE ROCK EXCAVATION IS ENCOUNTERED.



CONCRETE ANCHOR BLOCKS

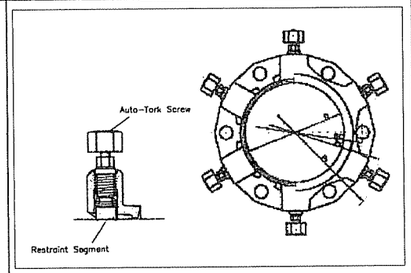
NOTE: RAILROAD BORE CASING PIPE SHALL BE A 16" DIAMETER, API 5L – GRADE B STEEL PIPE WITH A MINIMUM WALL THICKNESS OF 0.25" AS SHOWN ON THE PLANS.



NOTE: CARRIER PIPE SHALL BE INSTALLED WITHIN CASING PIPE USING MODEL CI POLYETHYLENE CASING SPACERS AS MANUFACTURED BY ADVANCE PRODUCT & SYSTEMS, INC. OR ENGINEER APPROVED EQUAL. SIZE AND SPACING PER MANUFACTURERS RECOMMENDATIONS

END SEALS SHALL BE MODEL AC PULL–ON OR AW WRAP–AROUND END SEALS AS MANUFACTURED BY ADVANCE PRODUCT & SYSTEMS, INC OR ENGINEER APPROVED EQUAL.

CASING SPACER DETAIL



MJ Retainer Gland Joint Restraint

NOTE:
1. MJ RETAINER GLAND JOINT RESTRAINTS SHALL BE USED ALONG WITH CONCTETE ANCHOR BLOCKS AT ALL FITTINGS AS REQUIRED

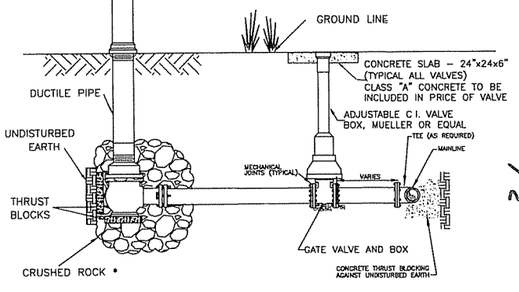
Hydrants shall be self–draining, non–freezing, compression type with 2–3/16" main valve opening. Outlet shall be 2–1/2"

Hydrants shall have a ductile iron pipe riser with a cast iron stock top, and non–turning operating rod. Principal interior operating parts shall be brass and removable from the hydrant for servicing without excavating the hydrant.

Hydrants shall be set in 4 cubic feet of crushed stone to allow for proper drainage of the hydrant. Recommendations of the AWWA should be followed when installing the hydrants.

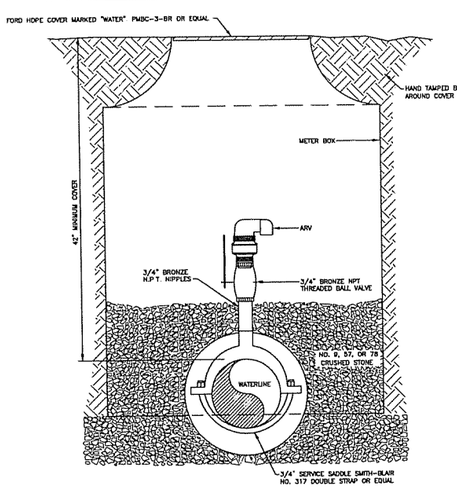
Post hydrants shall be Eclipse No. 2 Post Hydrants as manufactured by John C. Kupferle Foundry Company, St. Louis, MO. OR APPROVED EQUAL

HYDRANT SHALL INCLUDE A SECURITY LOCKING DEVICE COMPATIBLE WITH THE INSTALLED HYDRANT. THE LOCK IS TO BE KEYED THE SAME AS THE DISTRICT'S EXISTING LOCKS

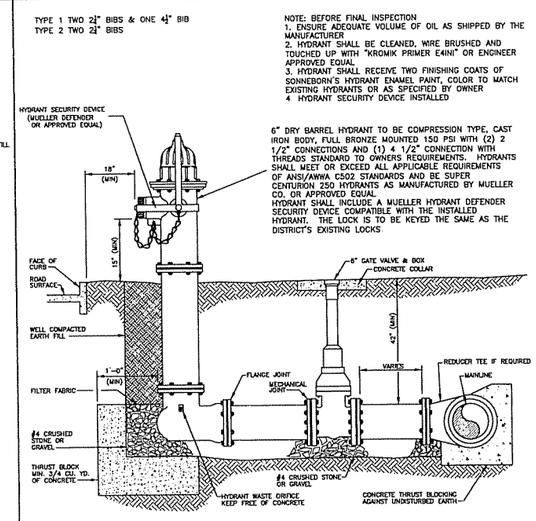


FLUSHING HYDRANT ASSEMBLY, TYPE 3

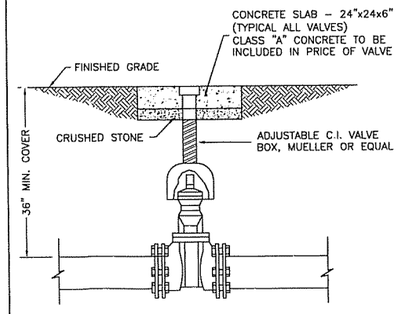
ARV	¾" A.R.I. FLOW CONTROL MODEL D–040 COMBINATION AIR VALVE "BARAK" OR APRROVED EQUAL



TYPICAL AIR RELIEF VALVE ASSEMBLY



FLUSHING HYDRANT ASSEMBLY, TYPE 1 & 2



NOTE: SEE TYPICAL BACKFILL DETAILS FOR BEDDING

TYPICAL GATE VALVE ASSEMBLY

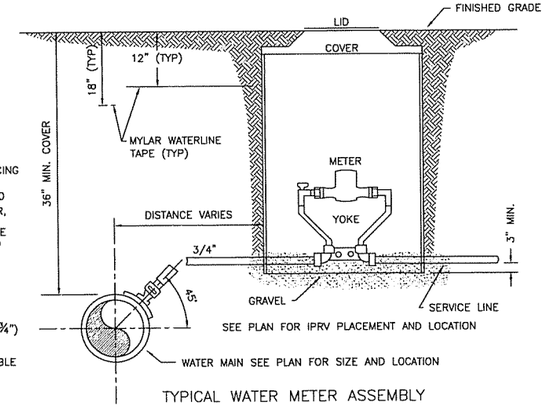
METER SETTING

1. YOKE–5/8"x3/4" MUELLER H–1400 WITH METER STOP OR APPROVED EQUAL
2. METER BOX–18"øx30" DEEP, MID–STATE PLASTICS, INC. ROUND METER BOX, B SERIES OR APPROVED EQUAL
3. COVER–18"ø FORD HDPE PMBC–3–BR LOCKING LID OR APPROVED EQUAL
4. METER–SEE SPECIFICATIONS
5. INDIVIDUAL PRESSURE REDUCING VALVE (IPRV) WATTS MODEL 25AUB(2"), WILKENS MODEL 600 (¾"–1") BOTH W/S.S. STRAINER, ADJUSTABLE PRESSURE RANGE 25–75 P.S.I., OUTLET PRESSURE SET AT 50 P.S.I. OR APPROVED EQUAL

TIE TO WATER MAIN

GROUND KEY CORPORATION
STOP–MUELLER H–15000 (⅜"x¾") OR APPROVED EQUAL

SERVICE SADDLE–BRONZE DOUBLE STRAP MUELLER H–16000 OR APPROVED EQUAL



SEE PLAN FOR IPRV PLACEMENT AND LOCATION

TYPICAL WATER METER ASSEMBLY

LAST PLOTTED: 11/29/2012
LAST SAVED: 11/29/2012 13:23:12

DESIGNER:

KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM
BREATHITT COUNTY WATER DISTRICT
Breathitt County, Kentucky

STANDARD DETAILS

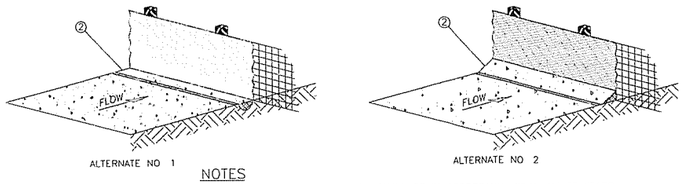
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KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM

drawn by: JAF | job no.: 998–37 | scale: N.T.S. | date: 11/26/12 | file name: P:\Breathitt\998–37 Backcon\–01 Design\Dwg\02 STANDARD DETAILS.dwg

sheet no.
D–1



ALTERNATE NO 1 ALTERNATE NO 2

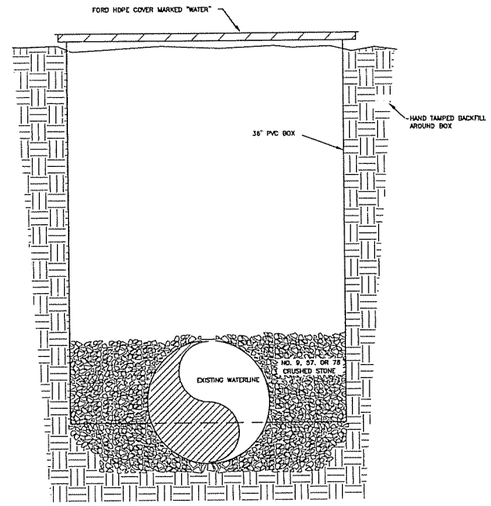
NOTES

1 MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS

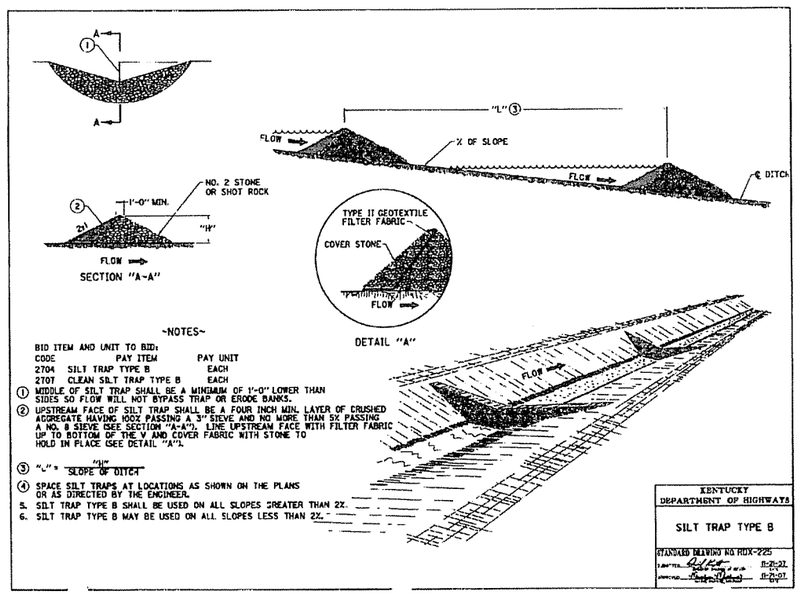
2 THE BOTTOM 12 INCHES OF FABRIC SHALL BE BURIED IN A 6 INCH TRENCH CUT INTO THE GROUND OR COVERED BY 6 INCHES OF FILL MATERIAL, TO PREVENT SEDIMENT ESCAPING UNDER FENCE ALL EARTHWORK SHALL BE ON THE UPSTREAM SIDE OF FENCE

SILT CHECK FENCE SEDIMENTATION CONTROL

NOT TO SCALE



FLOW MONITORING PIT



~NOTES~

BID ITEM AND UNIT TO BID:

CODE	PAY ITEM	PAY UNIT
2704	SILT TRAP TYPE B	EACH
2707	CLEAN SILT TRAP TYPE B	EACH

1. MIDDLE OF SILT TRAP SHALL BE A MINIMUM OF 1'-0" LOWER THAN SIDES SO FLOW WILL NOT BYPASS TRAP OR ERODE BANKS.
2. UPSTREAM FACE OF SILT TRAP SHALL BE A FOUR INCH MIN. LAYER OF CRUSHED AGGREGATE HAVING 100% PASSING A 3" SIEVE AND NO MORE THAN 5% PASSING A NO. 8 SIEVE (SEE SECTION "A-A"). LINE UPSTREAM FACE WITH FILTER FABRIC UP TO BOTTOM OF THE V AND COVER FABRIC WITH STONE TO HOLD IN PLACE (SEE DETAIL "A").
3. "L" = "SLOPE OF DITCH"
4. SPACE SILT TRAPS AT LOCATIONS AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
5. SILT TRAP TYPE B SHALL BE USED ON ALL SLOPES GREATER THAN 2%.
6. SILT TRAP TYPE B MAY BE USED ON ALL SLOPES LESS THAN 2%.

KENTUCKY DEPARTMENT OF HIGHWAYS

SILT TRAP TYPE B

STANDARD DRAWING NO. RDX-225

LAND SURVEYOR — DATE 11-21-07

DIRECTOR — DATE 11-21-07

LAST PLOTTED:
LAST SAVED:

DIVISIONS

KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM
BREATHITT COUTNY WATER DISTRICT
Breathitt County, Kentucky

STANDARD DETAILS 2

3/13/13

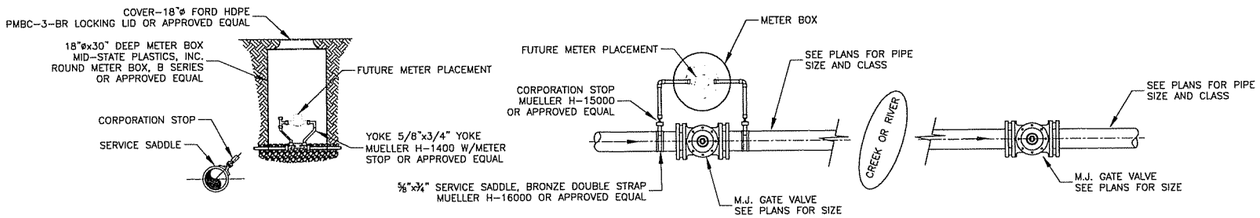
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CONTRACT 1 – DISTRIBUTION SYSTEM

drawn by: JKF
job no: 998-37
scale: NOT TO SCALE
date: 11/28/12
file name: 998-32 Dwgs Hobbs\03 design\CONTRACT 1\02 STANDARD DETAILS.dwg

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D–2

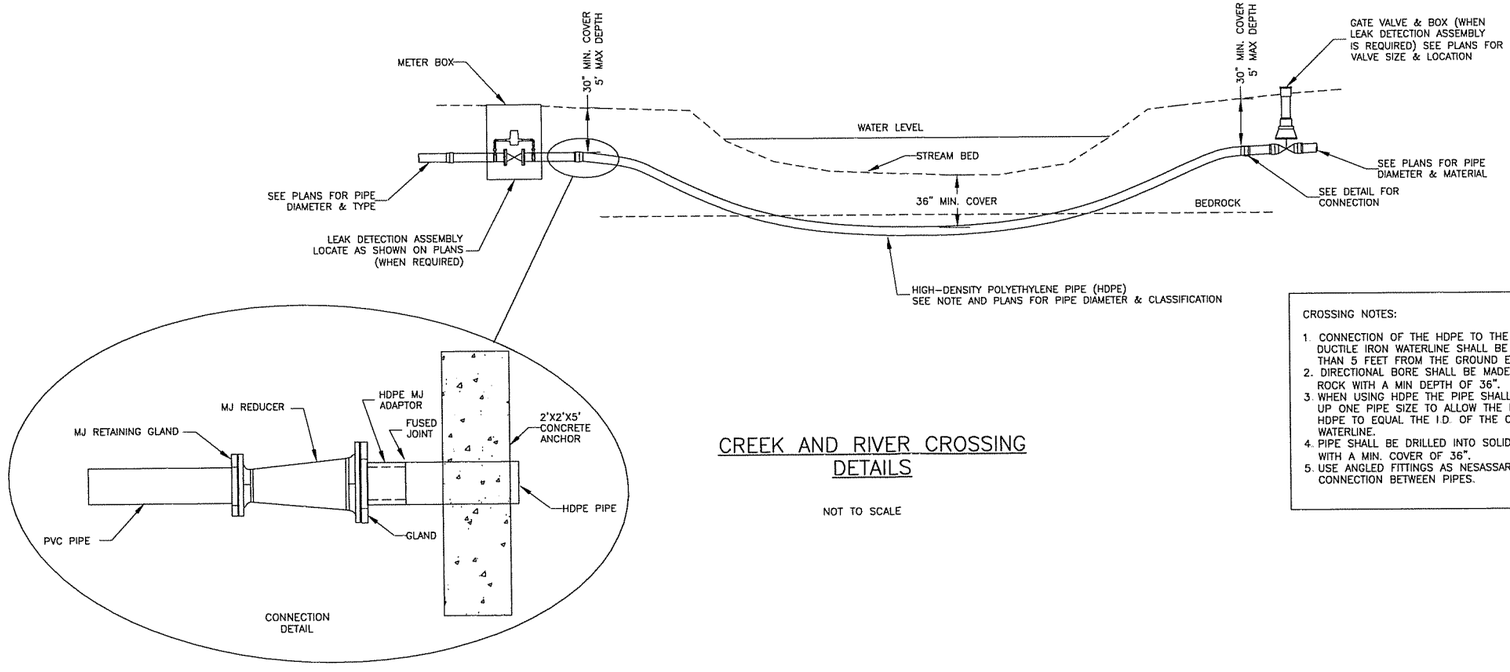


ELEVATION

PLAN

LEAK DETECTION ASSEMBLY

NOT TO SCALE



CREEK AND RIVER CROSSING DETAILS

NOT TO SCALE

CROSSING NOTES:

1. CONNECTION OF THE HDPE TO THE PVC OR DUCTILE IRON WATERLINE SHALL BE NO DEEPER THAN 5 FEET FROM THE GROUND ELEVATION.
2. DIRECTIONAL BORE SHALL BE MADE IN BED ROCK WITH A MIN DEPTH OF 36".
3. WHEN USING HDPE THE PIPE SHALL BE SIZED UP ONE PIPE SIZE TO ALLOW THE I.D. OF THE HDPE TO EQUAL THE I.D. OF THE CONNECTING WATERLINE.
4. PIPE SHALL BE DRILLED INTO SOLID BEDROCK WITH A MIN. COVER OF 36".
5. USE ANGLED FITTINGS AS NESASSARY TO MAKE CONNECTION BETWEEN PIPES.

LAST PLOTTED:
LAST SAVED:

REVISIONS:

KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM
BREATHITT COUNTY WATER DISTRICT
Breathitt County, Kentucky

CREEK CROSSING DETAILS

3/13/13

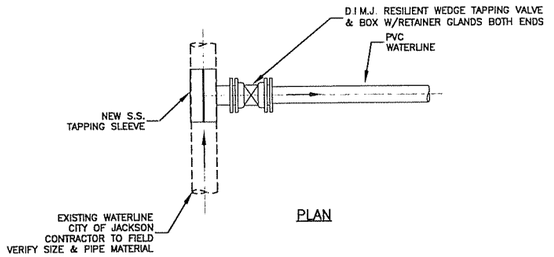
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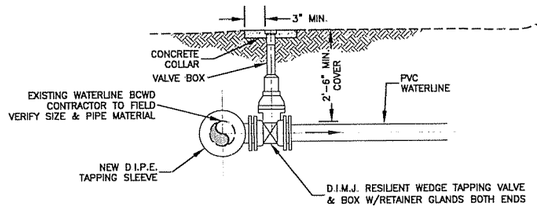
KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 – DISTRIBUTION SYSTEM

DRAWN BY: JKF
DATE: 11/28/12
JOB NO.: 998-37
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SHEET NO.
D-3



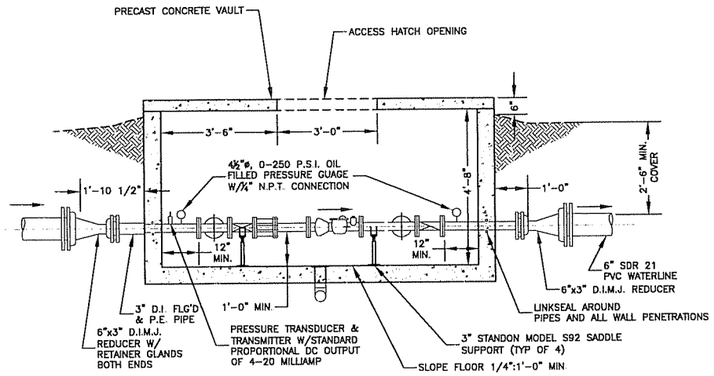
PLAN



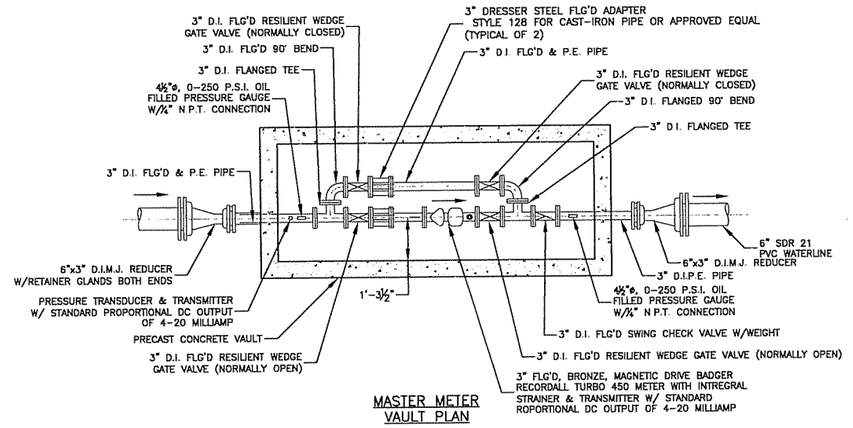
ELEVATION

TIE-IN DETAILS

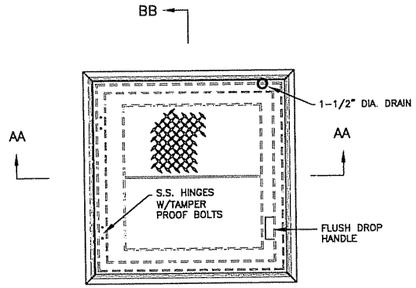
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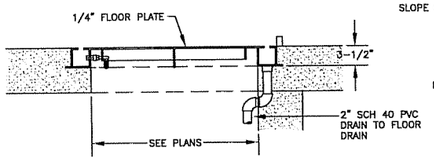
MASTER METER VAULT ELEVATION



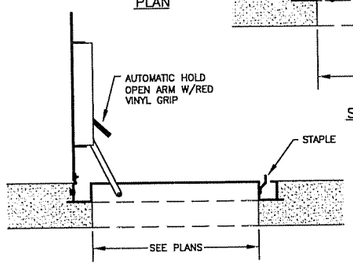
MASTER METER VAULT PLAN



PLAN



SECTION BB-BB



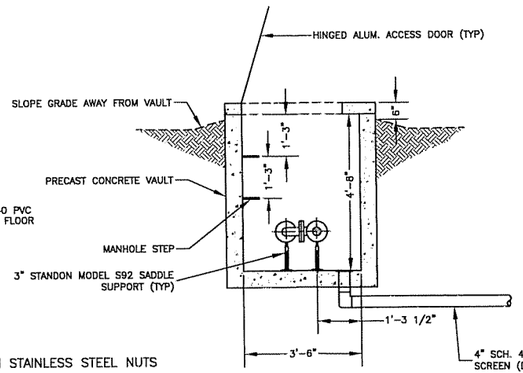
SECTION AA-AA

TYPICAL WATERPROOF ACCESS HATCH DETAIL

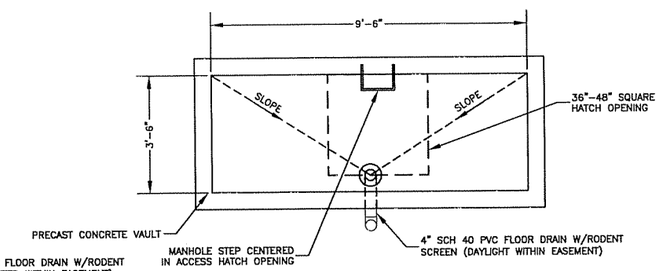
NOT TO SCALE

NOTES:

1. MATERIAL: ALUMINUM WITH STAINLESS STEEL NUTS AND HINGES
2. LOADING: 300 LBS. PER SQ. FOOT HATCH FOR DOUBLE CHECK VALVE ASSEMBLY MUST BE H20 LOADING CAPABLE.
3. BILCO TYPE J



MASTER METER VAULT ELEVATION



MASTER METER VAULT PLAN

MASTER METER & DOUBLE CHECK VALVE ASSEMBLY DETAILS

SCALE: ½" = 1'-0"

LAST PLOTTED: 11/29/2012
LAST SAVED: 11/29/2012 14:55:42

revisions

KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 - DISTRIBUTION SYSTEM
BREATHITT COUTNY WATER DISTRICT
Breathitt County, Kentucky

MASTER METER & TIE-IN DETAILS

3/13/13

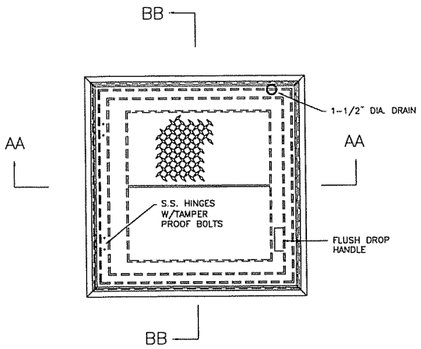
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planning-permit solutions since 1976

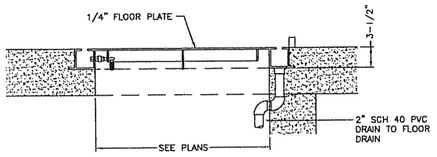
KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 - DISTRIBUTION SYSTEM

scale: N.T.S.
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drawn by: JKF
date: 11/28/12

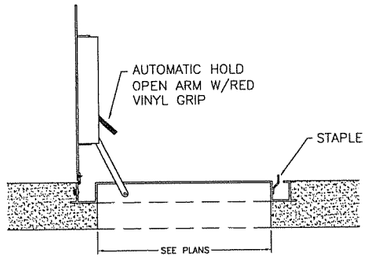
sheet no.
D-4



PLAN



SECTION BB-BB



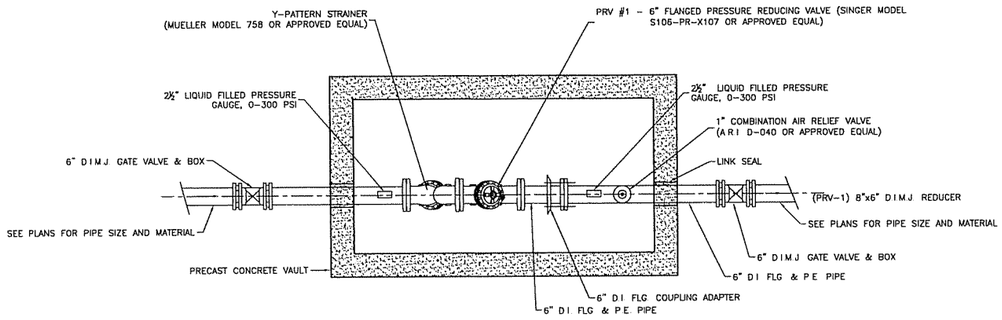
SECTION AA-AA

NOTES:

1. MATERIAL: ALUMINUM WITH STAINLESS STEEL NUTS AND HINGES
2. LOADING: 300 LBS. PER SQ. FOOT
3. HALLIDAY PRODUCTS, INC. MODEL SIS3648 OR APPROVED EQUAL

TYPICAL WATERPROOF ACCESS HATCH DETAIL

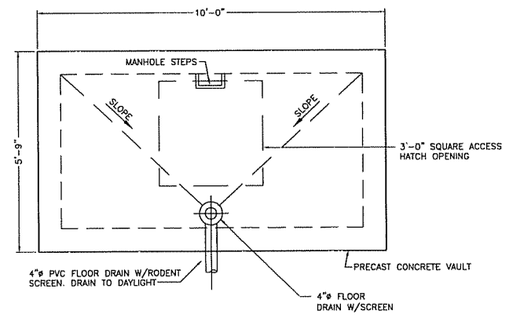
NOT TO SCALE



PIPING & VAULT PLAN

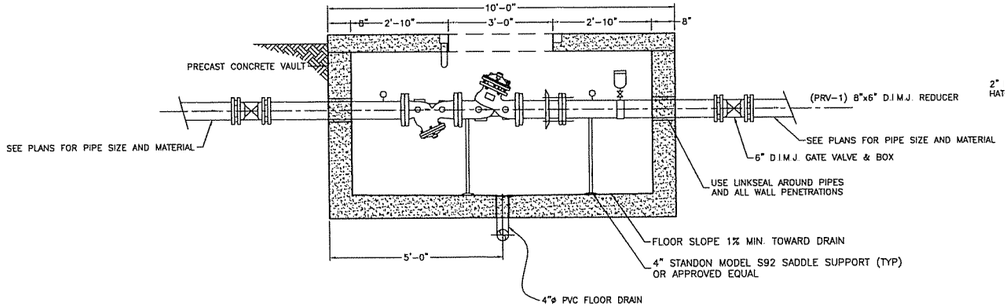
SCALE: 1/2" = 1'-0"

ALL VALVES SHALL BE CONSTRUCTED USING STAINLESS STEEL PILOT VALVE TUBING



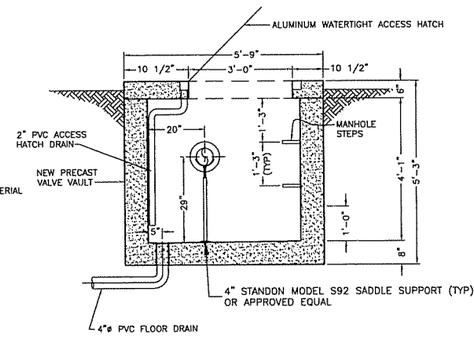
VAULT PLAN

SCALE: 1/2" = 1'-0"



VAULT ELEVATION

SCALE: 1/2" = 1'-0"



VAULT SECTION

SCALE: 1/2" = 1'-0"

VALVE VAULT DETAIL

LAST PLOTTED:
LAST SAVED:

revisions:

KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 - DISTRIBUTION SYSTEM
Breathitt County, Kentucky

PRESSURE REDUCING VALVE VAULT DETAILS

3/13/12

STATE OF KENTUCKY PAUL D. NESBITT 9382 LICENSED PROFESSIONAL ENGINEER

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KY 1110 / 28 WATERLINE INTERCONNECTION
CONTRACT 1 - DISTRIBUTION SYSTEM

drawn by: JKF
date: 11/28/12
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scale: 1/2" = 1'-0"
file name: \03 design\dwgs\ D5 PRV VAULT.DWG

sheet no.
D-5