



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 K. Breathitt
Commissioner

November 8, 2013

W. Randall Jones, Esq.
Rubin & Hays
Kentucky Home Trust Building
450 South Third Street
Louisville, Kentucky 40202

Ms. Trina Sartaine
Sandy Hook Water District
P. O. Box 726
Sandy Hook, Kentucky 41171

Re: Case No. 2013-00379
Sandy Hook Water District

Dear Ms. Sartaine and Mr. Jones:

The enclosed CD-ROM has been filed in the record of the above-referenced case. This CD-ROM contains the records of the Kentucky Division of Water regarding construction projects that are the subject of Sandy Hook Water District's application. An index to this CD-ROM and the electronic mail message traffic between Commission Staff and the Kentucky Division of Water are also enclosed and have also been filed in the record of the above-referenced case.

Any objections to these actions should be submitted to the Commission within five days of receipt of this letter.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeff Derouen".

Jeff Derouen
Executive Director

gw
Enclosures

INDEX

File No.	File Name	Contents
001	001_Application-Contract10.pdf	DOW Construction Application For Drinking Water Distribution – Letter from Sandy Hook Water District Official – Engineer’s Transmittal Letter – Preliminary Project Cost Estimate – Customer Meter List – Contract No. 10 Improvements Maps
002	002_Specifications-Contract10.pdf	Contract Documents and Specifications for Contract No. 10 Water System Improvements
003	003_Plans-Contract10.pdf	Plans for Contract No. 10 Water System Improvements
004	004_Application-Contract11.pdf	DOW Construction Application For Drinking Water Distribution
005	005_Specifications-Contract11.pdf	Contract Documents and Specifications for Contract No. 11 New Groundwater Well and Appurtenances
006	006_Plans-Contract11.pdf	Plans for Contract No. 11 New Groundwater Well and Appurtenances
007	007_HydraulicAnalyses.pdf	Hydraulic Analyses
008	008_DivisionOfWaterWorksheet.pdf	Division of Water Worksheet
009	009_DOWApprovalLetter.pdf	Letter from Mark Rasche, Supervisor, Water Infrastructure Branch, Division of Water, to Bernal P. Atkins, Chairman, Sandy Hook Water District (June 18, 2013)

From: [Taylor, David M \(EEC\)](#) on behalf of [DOWOpenRecords \(EEC\)](#)
To: [Wuetcher, Jerry \(PSC\)](#); [DOWOpenRecords \(EEC\)](#)
Cc: [Ashley, Stella G \(PSC\)](#)
Subject: RE: Request for Records UP Kentucky Open Records Act
Date: Wednesday, October 30, 2013 10:03:17 AM

Mr. Wuetcher,

The Division of Water received your request and I have placed your records on an FTP site at the following link:

<ftp://eecdow112944:EDCVfr45TGBN@ftp.cot.ky.gov/EECDOW112944/EECDOWDATA/foia/Jerry%20Wuetcher%20Folder%202010-30-13.zip>

Your records will remain here for you to view, download, etc. for the next 10 business days, after which they will be deleted from the server. You will need to use Internet Explorer as your browser when you access this site. Other browsers such as Google Chrome, Mozilla Firefox and Safari always seem to return error messages when they are used. If you have any problems or questions, please don't hesitate to let me know at the contact information below.

Thank you and have a great week.

Mike Taylor

Dept. for Environmental Protection
Division of Water
200 Fair Oaks Lane 1st Floor
DOWOpenrecords@ky.gov
(502) 564-8158 x-4979

From: Wuetcher, Jerry (PSC)
Sent: Tuesday, October 29, 2013 1:00 PM
To: DOWOpenRecords (EEC)
Cc: Ashley, Stella G (PSC)
Subject: Request for Records UP Kentucky Open Records Act

TO WHOM IT MAY CONCERN:

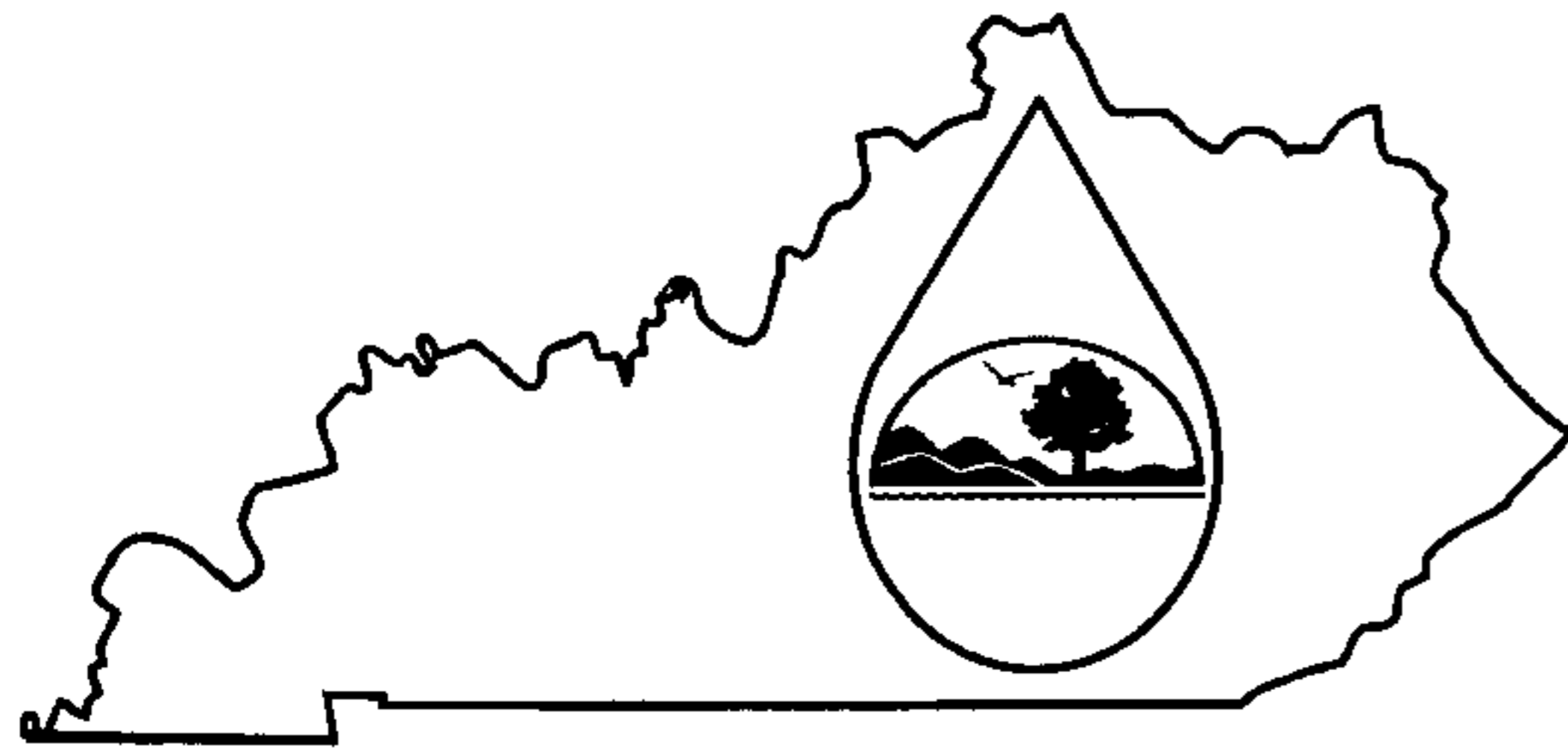
The Public Service Commission is reviewing Sandy Hook Water District's application for a Certificate of Public Convenience and Necessity to construct certain water improvements and the drilling of a ground well. Pursuant to the Open Records Act, the PSC requests all documents related to the Contract 10 and Contract 11 projects. The project engineer is Kentucky Engineering Group PLLC. The professional engineer who has prepared the final plans is James C. Thompson. The project was assigned WRIS No. WX21063010. Please provide all documents related to the project.

If possible, please provide these records in electronic form. If they cannot be transmitted by electronic mail due to their size or if a temporary FTP site cannot be created to permit the PSC to access the files, the PSC requests that they be placed on a CD-ROM and delivered to the PSC by state government messenger mail. If a charge must be assessed to the PSC for these records, the PSC requests that the charge be by inter-account bill. Please contact Ms. Stella Ashley for authorization to perform the inter-account billing.

I respectfully request that receipt of this request be acknowledged. Please direct any questions regarding this request to me. Thank you for your assistance.

Sincerely,

Gerald E. Wuetcher
Executive Advisor/Attorney
Public Service Commission of Kentucky
gerald.wuetcher@ky.gov
Office: (502) 564-3940
Direct: (502) 782-2590



Commonwealth of Kentucky
 Energy and Environment Cabinet
Division of Water

**Construction Application
 For Drinking Water Distribution**

See the instructions for more information about selected portions of this checklist.

Questions on completing this checklist? Contact the Water Infrastructure Branch at 502/564-3410 or visit our website at <http://www.water.ky.gov/dw> for more information.

I. Construction Project Information

Project Name: Contract No. 10 - Water System Improvements and Contract 11 - New Groundwater Well and Appurtenances

Project County: Elliott Estimated Project Cost: \$ 950,000

Project Latitude/Longitude (DMS): varies

11 Digit Hydrologic Unit Code (HUC): _____

Is this a federally funded project:

DWSRF

SPAP

Other: Rural Development Grant and Loan and State Coal Severance Grant

If yes, has an Environmental Information Document been reviewed and approved? Yes

If the project has been submitted to the State Clearinghouse for review, provide the SAI number: KY20111031-1309

Identify all other funding sources: Owner Contribution

Does the project contain any of the following:

Booster Pump Stations

Water Storage Tanks

Waterlines

Waterline Material	Waterline Size	Linear Feet
PVC	2"	1100
PVC	3"	8000
PVC	4"	2500
PVC	6"	4500

Provide a brief description of the work to be performed for waterlines less than 10,000 linear feet. All other distribution projects should be accompanied by a DETAILED project description. 1800 LF to replace existing AC pipe; Approximately 2800 LF of raw water line from new ground water well to plant; Approximately 11400 LF of new water main extensions.

Identify how the sanitary wastewater produced as a result of this project will be handled:

- Sanitary Sewer WWTP: _____
- Septic Tank
- Other: N/A

II. Utility Information

Utility Name: Sandy Hook Water District. PWSID: 0320383 AI # 996
Street Address: 1000 Howards Creek Road County: Elliott
City, State, Zip: Sandy Hook, Kentucky 41171
Phone: 606-738-6282 Fax: 606-738-6292 Email: sandyhookwater@yahoo.com

If another utility will serve any portion of the proposed project, provide the name and PWSID No.
Utility Name: N/A PWSID No. _____

If the utility serving the project purchases water from another utility, provide the name and PWSID No. and purchase contract amount.
Utility Name: _____ PWSID No. _____ Purchase Contract Amount: _____
Utility Name: _____ PWSID No. _____ Purchase Contract Amount: _____
Utility Name: _____ PWSID No. _____ Purchase Contract Amount: _____

Is the system currently under any type of waterline or sewer sanctions? No
 If yes, submit an exception request and attach supporting documentation to justify its approval.

III. Design Considerations

A. Plans and Specifications

Plans and specifications shall comply with **401 KAR 8:100** and “**Recommended Standards for Water Works**” (**Ten States’ Standards**). All plans must contain a P.E. seal, signature and date of signature with at least one set having an original seal and signature.

Plans and specifications submittals shall meet one of the following options:

- At least **two** printed sets of detailed plans (**no larger than 24” X 36”**) and a PDF copy of the plans and specifications on CD/DVD. The PDF copy shall contain a PE seal, signature and date. The plans on the CD/DVD shall be in a folder named “Engineering Plans” and the specifications manual shall be in a folder named “Specifications”.
(preferred)
- At least **2** printed sets of detailed plans (**one shall be no larger than 24” X 36” and the other set shall be 11” X 17”**) and **one** printed copy of the specifications manual.

B. Design Engineer

Name: Jim Thompson (10) Bryan Lovan (11) Firm: Kentucky Engineering Group, PLLC
Street Address: P.O. Box 1034, 161 North Locust Street
City, State, Zip: Versailles, Kentucky 40383
Phone #: 859-251-4127 Fax #: 859-251-4137 Email: blovan@kyengr.com

Design Capacities

Identify the number of new connections and the projected average daily demand: 12

Identify the number of existing residents, and their projected water demand, that may be served as a result of this project:

Identify the number of connections in the service area: 1075

Other Information to be Submitted with the Project

- 1. Provide a copy of the U.S.G.S. 7 ½ minute topographic map with the location(s) of the proposed project.
- 2. If the project includes a new or upgraded pump station(s), provide the pump sizing calculations and the proposed pump's characteristics curve along with the efficiency, horsepower and NPSHR data. Also, identify each pump station's locations coordinates (DMS).
- 3. If the project proposes the addition of storage tanks, provide engineering calculations which demonstrates a complete fill and drain cycle every 72 hours. Also, identify each storage tank's location coordinates (DMS).
- 4. Provide engineering calculations or an electronic model demonstrating the availability of 30 psig in the waterline under peak demand conditions.
- 5. Provide engineering calculations or an electronic model that demonstrates if the proposed waterlines are capable of a 2.5 ft/sec flow velocity and show associated residual system pressures.
- 6. Provide a signed letter of acceptance from the utility, which states that the utility has reviewed and approved the plans and specifications and agrees to serve the proposed project upon completion. If another utility will own, operate and maintain any portion of this project provide an acceptance letter from that utility as well.
- 7. If the utility is a purchaser and the project demand is over 10,000 gallons per day or the utility has exceeded 85% of its purchase contract, provide a valid acceptance letter from the seller.
- 8. If the project will provide water service to existing residences, provide the names and addresses of all existing residences to be served by the project, if known.
- 9. If the project is funded by a State Revolving Fund Loan (SRF) provide a completed SRF Plans and Specifications Checklist along with 1 complete printed copy of the project specifications.

IV. Environmental Benefits

Identify the environmental benefit(s) of the project by checking all that apply.

- Construction of new waterlines serving existing residences previously without public water.
- Modifies/upgrades existing waterlines:
 - Inadequately sized waterlines.
 - Leaks, breaks, restrictive flow.
 - Replaces lead, copper or asbestos cement waterlines.
 - Other: _____
- Provides fire protection.
- Replaces tanks/pumps due to age/condition.
- Installation of high efficiency/energy saving pumps.
- Other. Provide a brief description in the space below. _____

V. Fees

Check or money order must be made payable to "Kentucky State Treasurer" for the total amount. Fees do not apply to projects FUNDED by a municipality, water district, or other publicly owned utility.

Project Category: N/A Total Amount: \$ N/A

SANDY HOOK WATER DISTRICT

**P.O. Box 726
SANDY HOOK, KENTUCKY 41171**

April 11, 2013

Mr. Mark Rasche, Plan Review Section
Drinking Water Branch
Division of Water
14 Reilly Road
Frankfort, Kentucky 40601

Re: Letter of Acceptance from Utility
Contract 10 Water System Improvements
Contract 11 New Ground Water Well and Appurtenances

Dear Mr. Rasche:

Sandy Hook Water District has reviewed the above referenced plans which were prepared by Kentucky Engineering Group, PLLC, and found that the plans are "acceptable" as submitted. This project is funded by a Rural Development Grant and Loan, and a Legislative State Grant.

The Sandy Hook Water District will assume ownership of the facilities once construction is complete and will own, operate, and maintain the facilities.

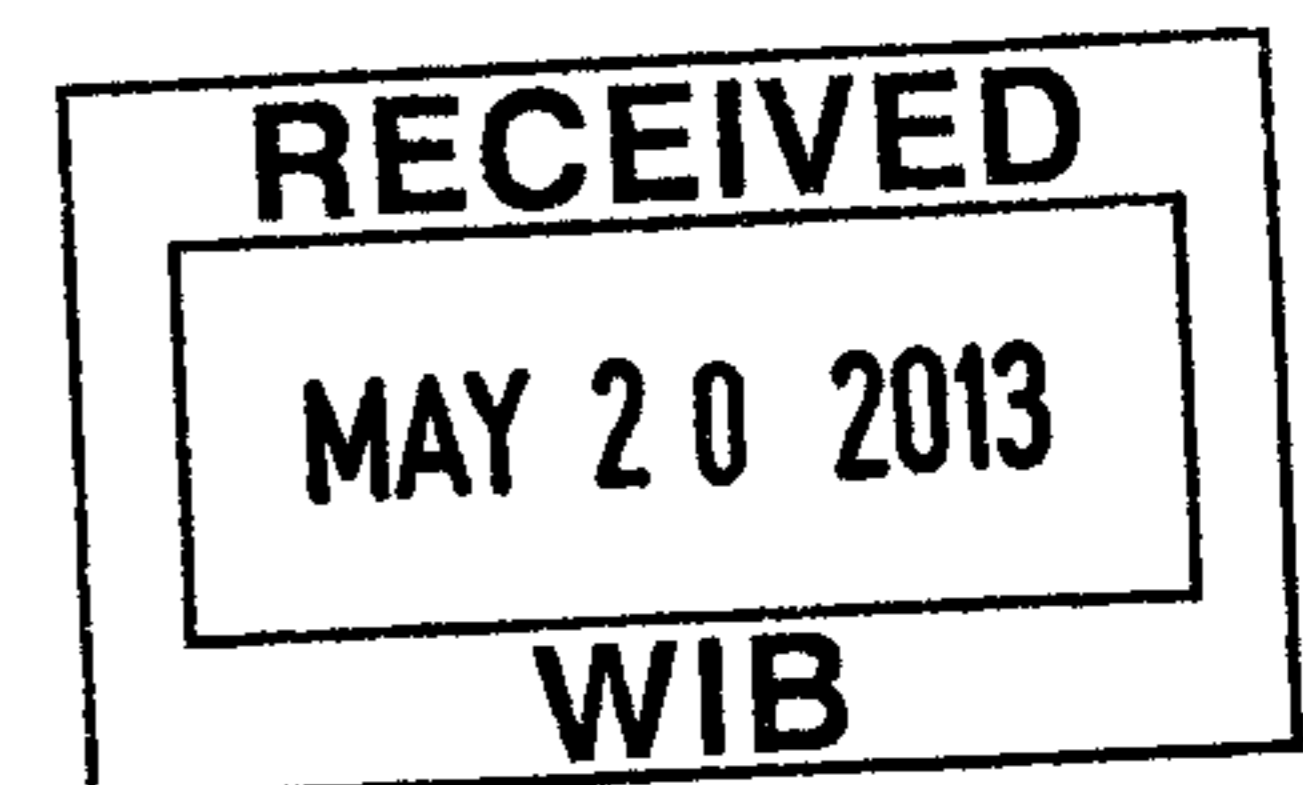
If you have additional questions or need additional information please contact me at (606) 738-6282 or Mr. Riley Sumner of Kentucky Engineering Group at (859) 684-7480.

Sincerely,

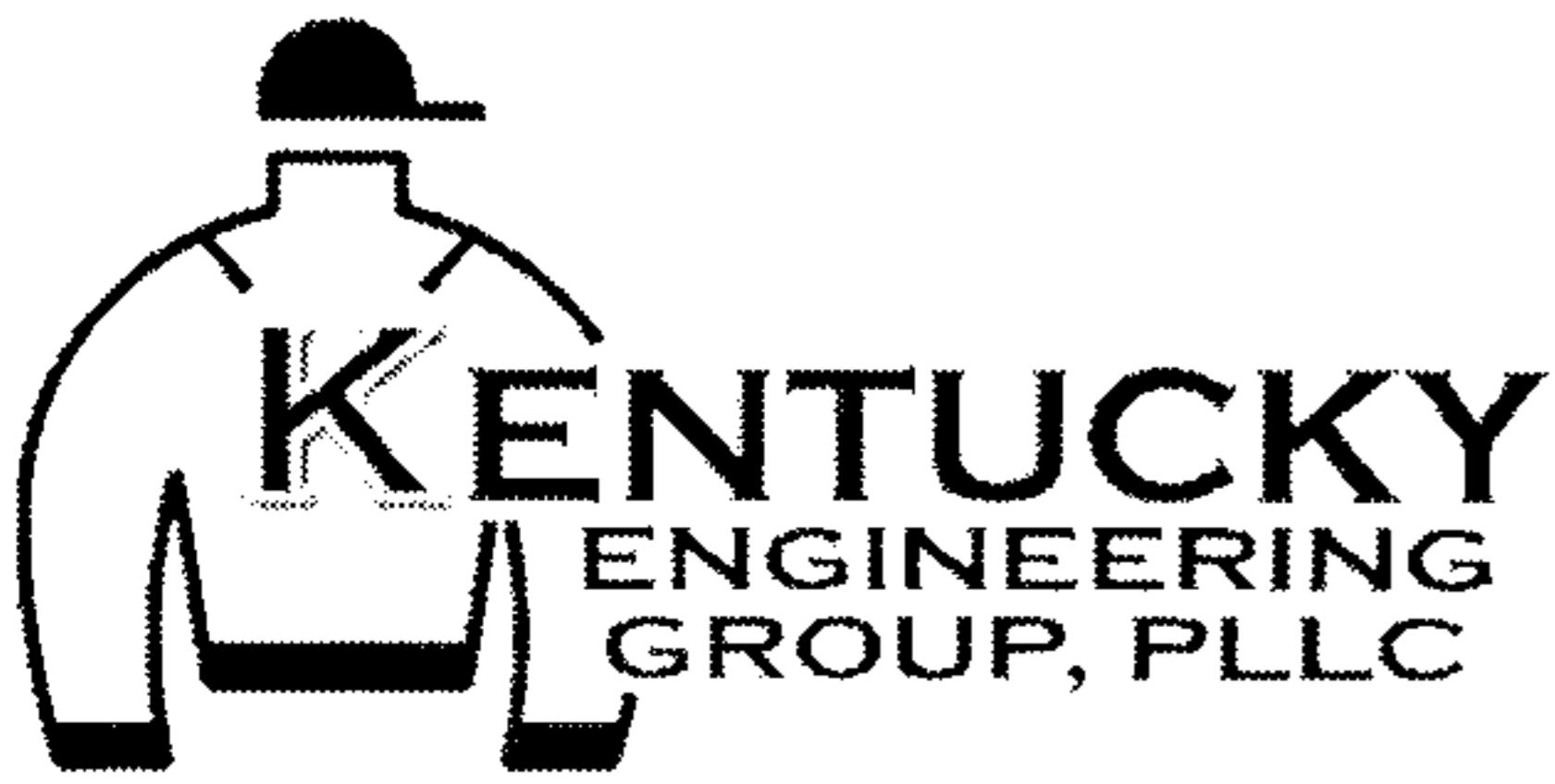

Bernal Atkins, Chairman

cc: Riley Sumner, Kentucky Engineering Group, PLLC
File

0320383-13-001



996APE20130001



TRANSMITTAL LETTER

To: Mr. Mark Rasche, Plan Review Section
 Drinking Water Branch
 Division of Water
 14 Reilly Road
 Frankfort, Kentucky 40601

Date: May 15, 2013

File: 11001

Re: Sandy Hook Water
 District – Contracts 10
 & 11

We are sending the following:

<input checked="" type="checkbox"/>	Attached	<input type="checkbox"/>	Under Separate Cover	
<input type="checkbox"/>	Shop Drawing(s)	<input type="checkbox"/>	Estimate(s)	<input type="checkbox"/> Plan(s)
<input type="checkbox"/>	Sample(s)	<input type="checkbox"/>	Specs	<input type="checkbox"/> Copy of Letter
<input type="checkbox"/>	Other:	<input type="text"/>		

Copies	Description
2 EA	Plans – Contracts 10 & 11
1 EA	Specifications – Contracts 10 & 11
1	DOW Application

The above inclusions are transmitted as checked below:

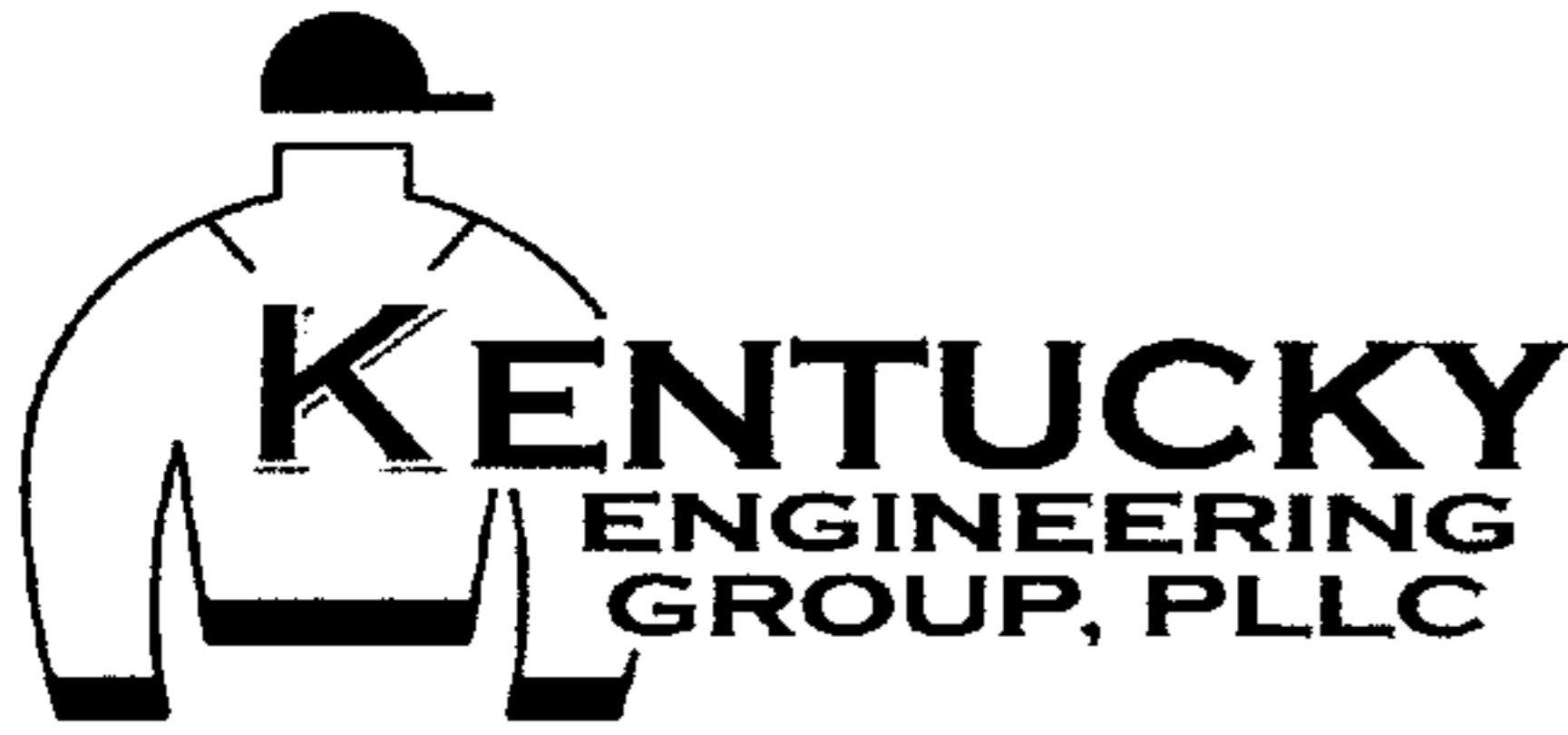
<input checked="" type="checkbox"/>	For Approval	<input type="checkbox"/>	Approved as Submitted		For Your Information/Filing For Your Necessary Action
<input type="checkbox"/>	For Your Use	<input type="checkbox"/>	Approved as Noted	<input type="checkbox"/>	
<input type="checkbox"/>	As Requested For Review and Comments	<input type="checkbox"/>	Returned for Corrections	<input type="checkbox"/>	

Remarks:

If you have any questions, please contact Bryan Lovan or myself at (859) 251-4127.

Riley Sumner

C: Trina Sartaine, SHWD
 File



Preliminary Project Cost Estimate

Project : Sandy Hook Water District

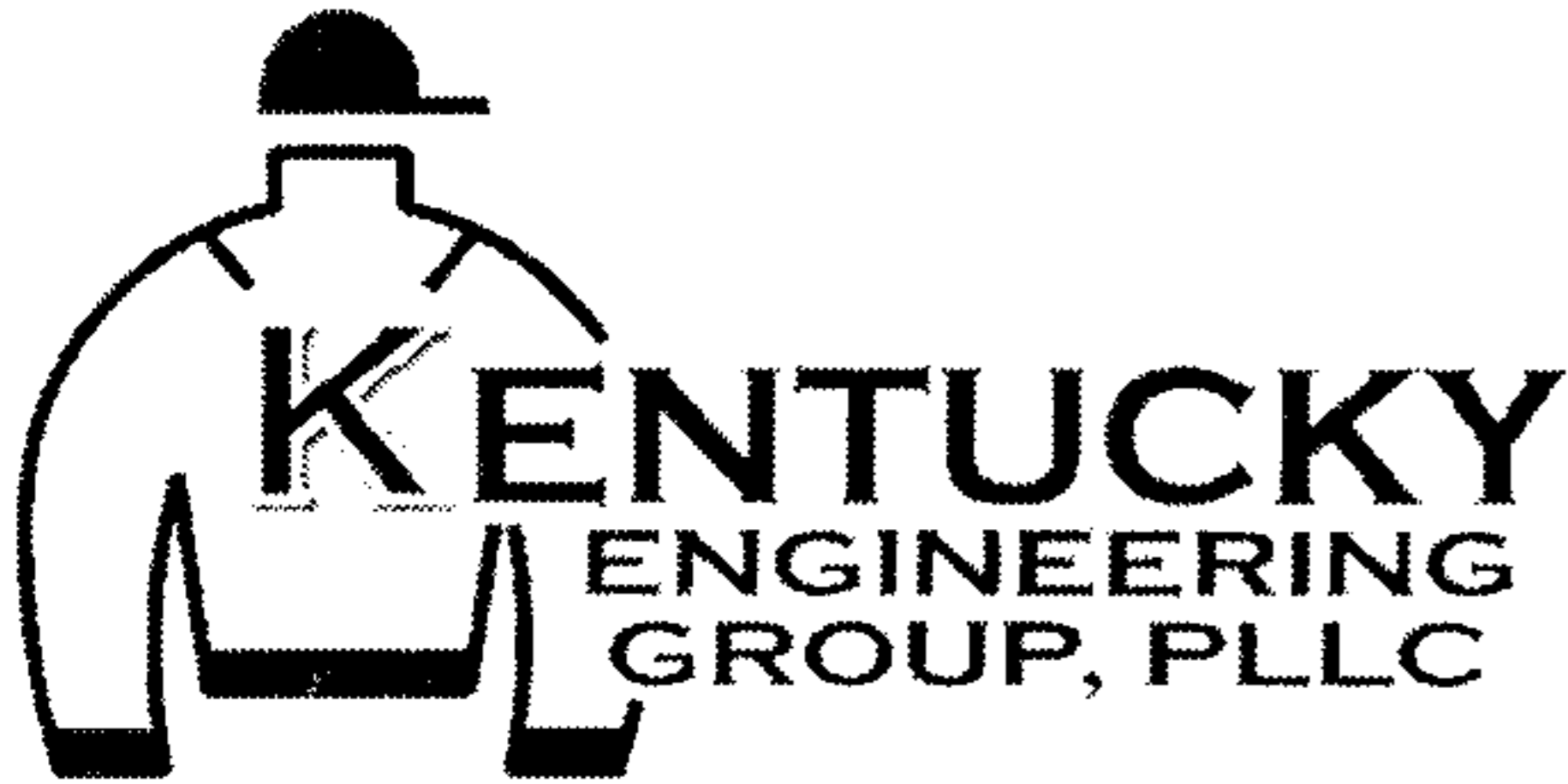
Date :

Job No. :

Revised : 04/09/13

Est. By: RS

ITEM NO.	SUMMARY OF: Contract 10	QUANTITY		COST PER UNIT	TOTAL COST
		NO. OF UNITS	UNIT MEAS.		
1	Water Lines Extensions and Replacements				
	Main Street - KY 7 Replacement				\$ 50,000.00
	Crestview Street Replacement				\$ 25,000.00
	Simmons Road Extension				\$ 22,000.00
	Prewitt Fork Extension				\$ 22,000.00
	Flat Rock Extension				\$ 25,000.00
	Middlefork Extension				\$ 20,000.00
	E.J. Adkins Extension				\$ 15,000.00
2	GIS Collection, Software, and Training				\$ 35,000.00
3	Update Existing Telemetry System				\$ 35,000.00
4	Replace't of Radio Read Meters (2013)				\$ 39,000.00
5	New Drilled Well and Appurtenances				\$ 230,000.00
6	Sand Gap Automatic Flushing Device				\$ 5,000.00
7	Equipment - 1 Ton Dump, Ecavator, Trailer				\$ 120,000.00
8	Well Inspection - Reimbursement				\$ 1,420.00
9	Tank Inspection -Cemetery, Wrigley, Town, Brown Ridge				\$ 20,000.00
10	Reimbursement Existing Well Modifications				\$ 35,000.00
11	Plant - Pressure Release Valve				\$ 10,000.00
12	Quick Connect Recepticle KY 7 PS and 39 KW Portable Generator				\$ 30,000.00
	SUBTOTAL AMOUNT				\$ 739,420.00
	10% CONST. CONTINGENCY				\$ 73,900.00
	ENGINEERING DESIGN		9.35%		\$ 69,150.00
	RESIDENT INSPECTION		6.24%		\$ 46,200.00
	LEGAL AND ADMINISTRATION				\$ 10,000.00
	ADDITIONAL SERVICES				\$ 20,000.00
	TOTAL ESTIMATED CONSTRUCTION COST				\$ 958,670.00



SANDY HOOK WATER DISTRICT
Contract 10 – Water System Improvements
Customer Meter List

MIDDLEFORK ROAD

1. Oney & Michelle Mitchell
57 Hurricane Circle
Sandy Hook, KY 41171
2. Sara Gibson Estate
c/o William Gibson
108 Grant St.
Fort Thomas, KY 41075

PRUETT'S FORK

1. Jason Ison
3860 Wells Creek Road
Sandy Hook, KY 41171
2. Raymond Smith
228 Ash Road
Sandy Hook, KY 41171
3. Estill & Dorothy Lewis
10800 Noble Road
New Venna, OH 45159

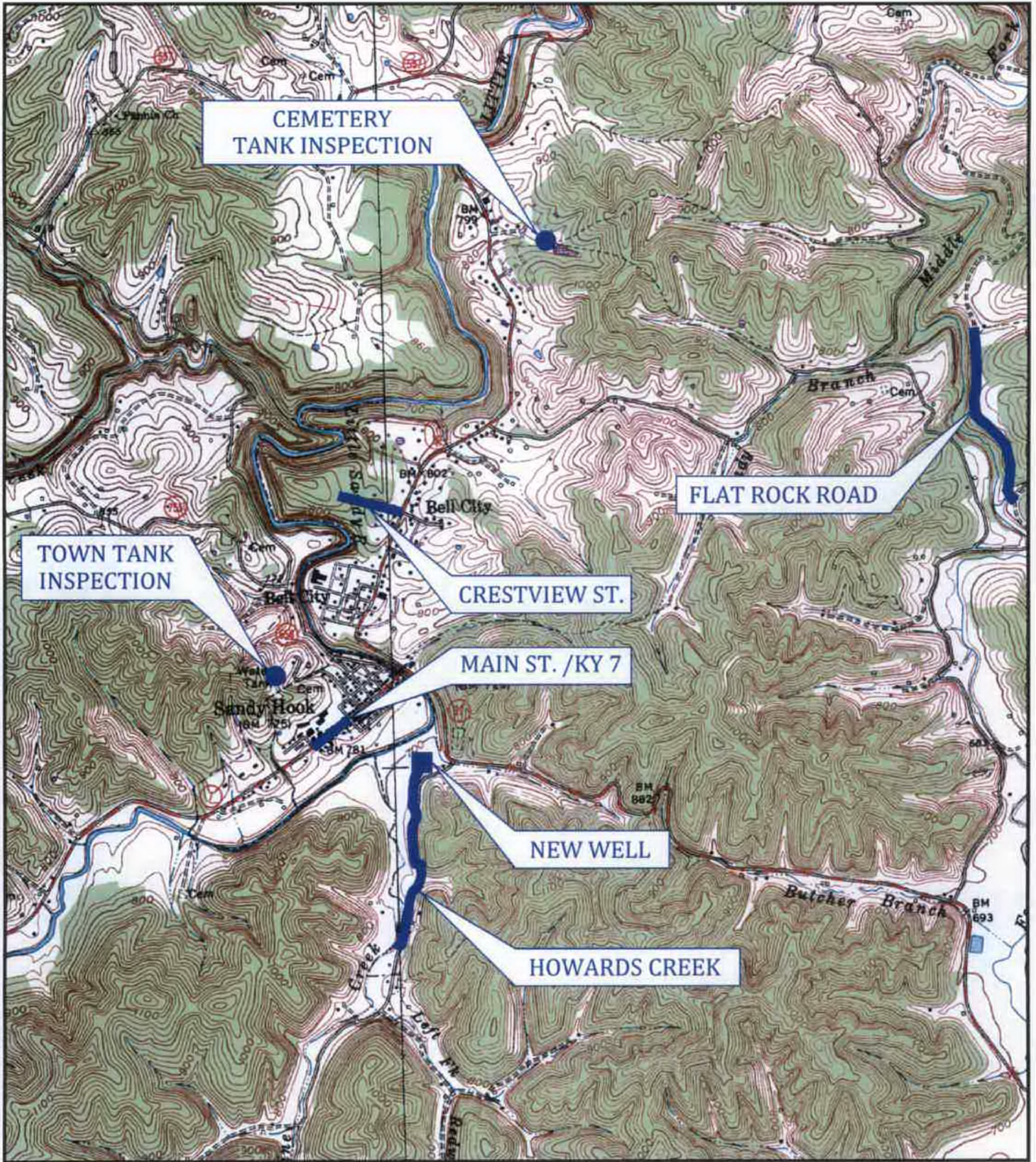
FLAT ROCK ROAD

1. Geneva Flannery
P.O. Box 200
Sandy Hook, KY 41171
2. Edward & Melissa Murray
7917 Highland Park
Ashland, KY 41102

E.J. ADKINS ROAD

1. Donnie Moore
E.J. Adkins Road
Sandy Hook, KY 41171
2. Daniel & Christie Akers
Box 11 N
Matewan, WV 25188
3. Marty & Lois Stevens
80 Poppy Mountain
Morehead, KY 40351

P.O. Box 1034
Versailles, Kentucky 40383
Phone: (859) 251.4127
Fax: (859) 251.4137
Email: info @ kyengr.com
www.kyengr.com



P.O. Box 1034
VERSAILLES, KENTUCKY 40383

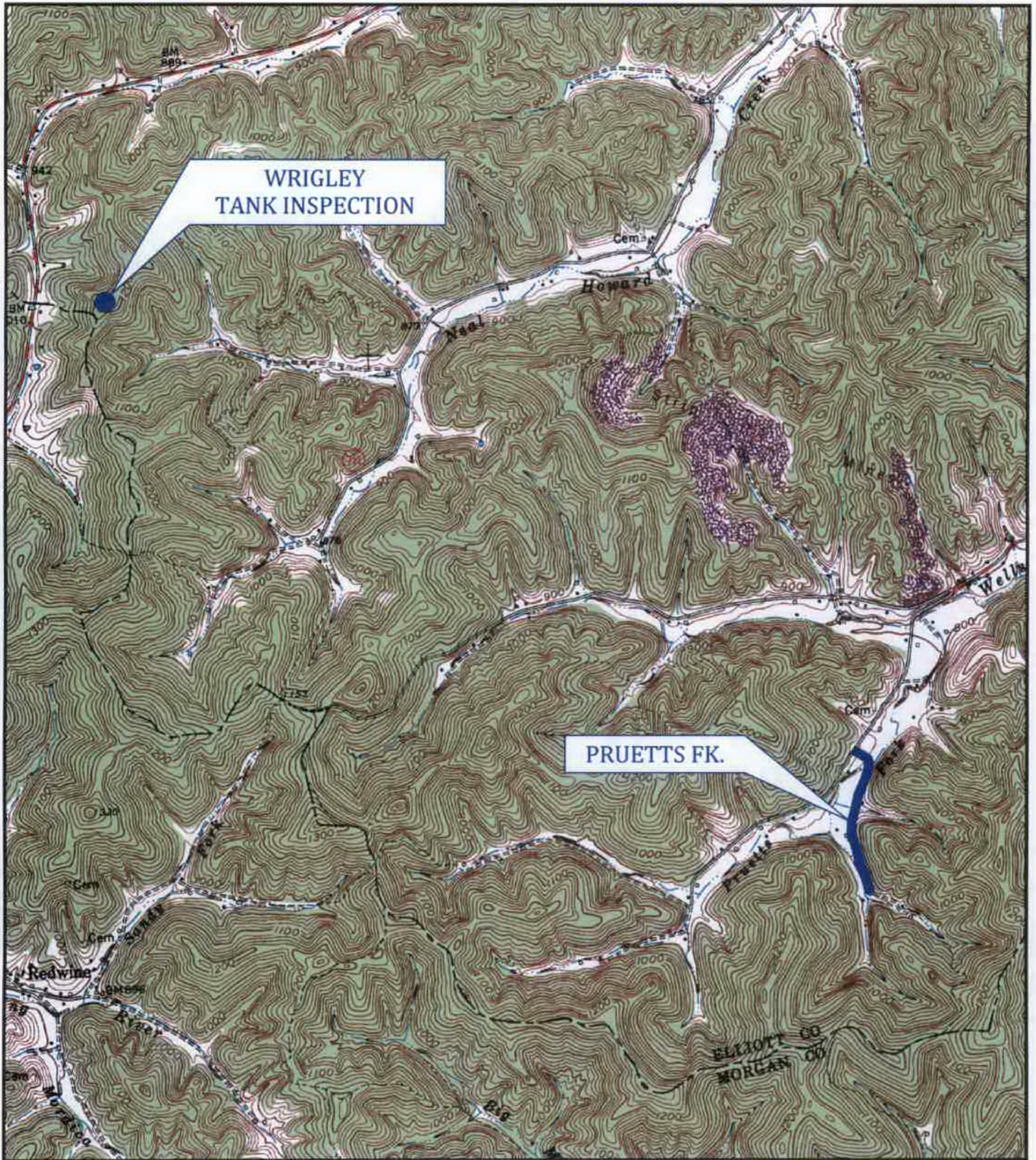
KENTUCKY
ENGINEERING
GROUP, PLLC

- Contract No. 10 -

**SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS**

CEMETERY TANK INSPECTION, FLAT ROCK ROAD,
CRESTVIEW STREET, TOWN TANK INSPECTION,
MAIN STREET/KY 7, NEW WELL and HOWARDS CREEK

Project No.	11001
Date	January 2013
Exhibit	1
Of	5



P.O. Box 1034
VERSAILLES, KENTUCKY 40383

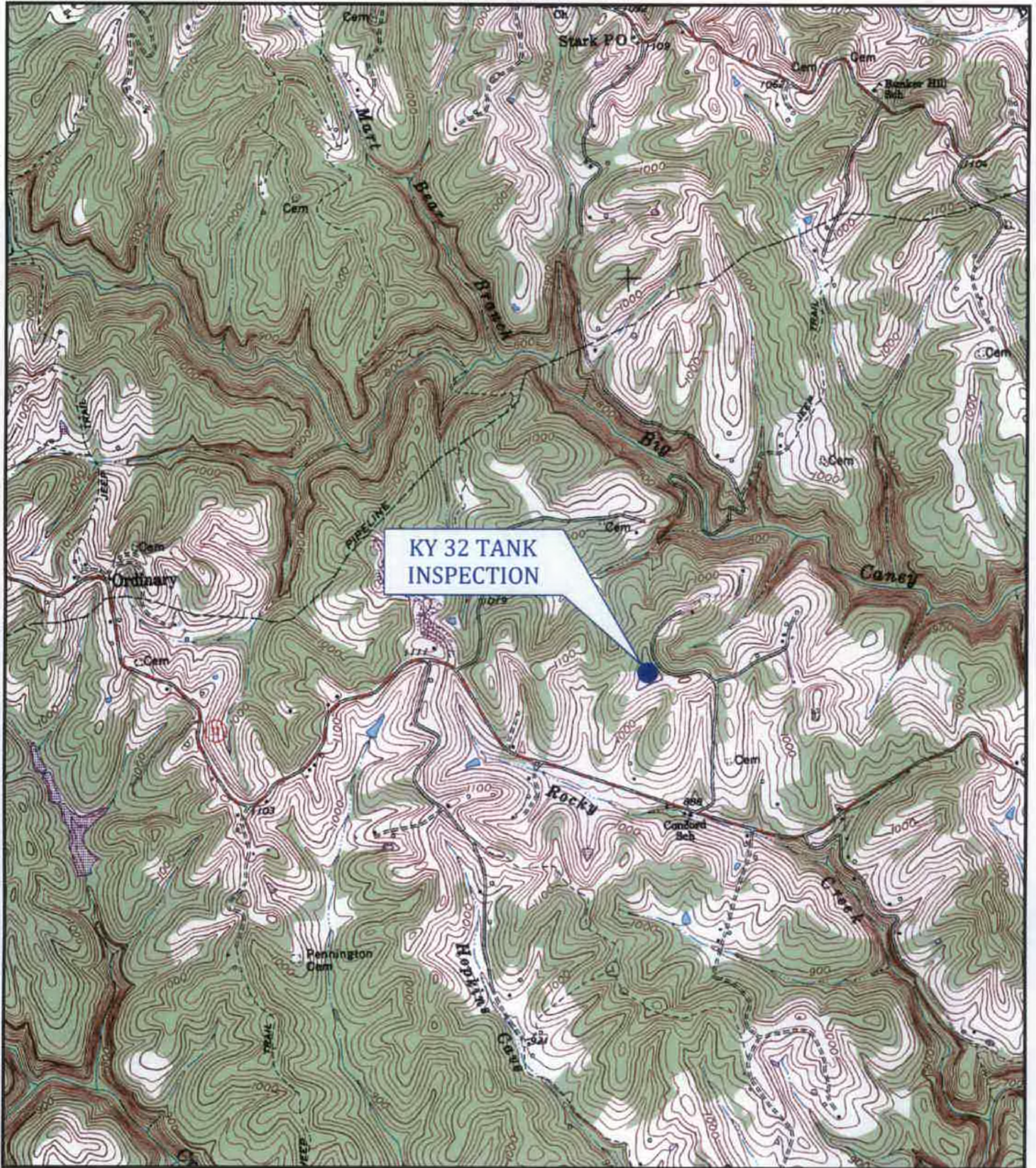
KENTUCKY
ENGINEERING
GROUP, PLLC

- Contract No. 10 -

**SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS**

PRUETTS FORK and
WRIGLEY TANK INSPECTION

Project No.	11001
Date	January 2013
Exhibit	2
of	5



P.O. Box 1034
VERSAILLES, KENTUCKY 40383

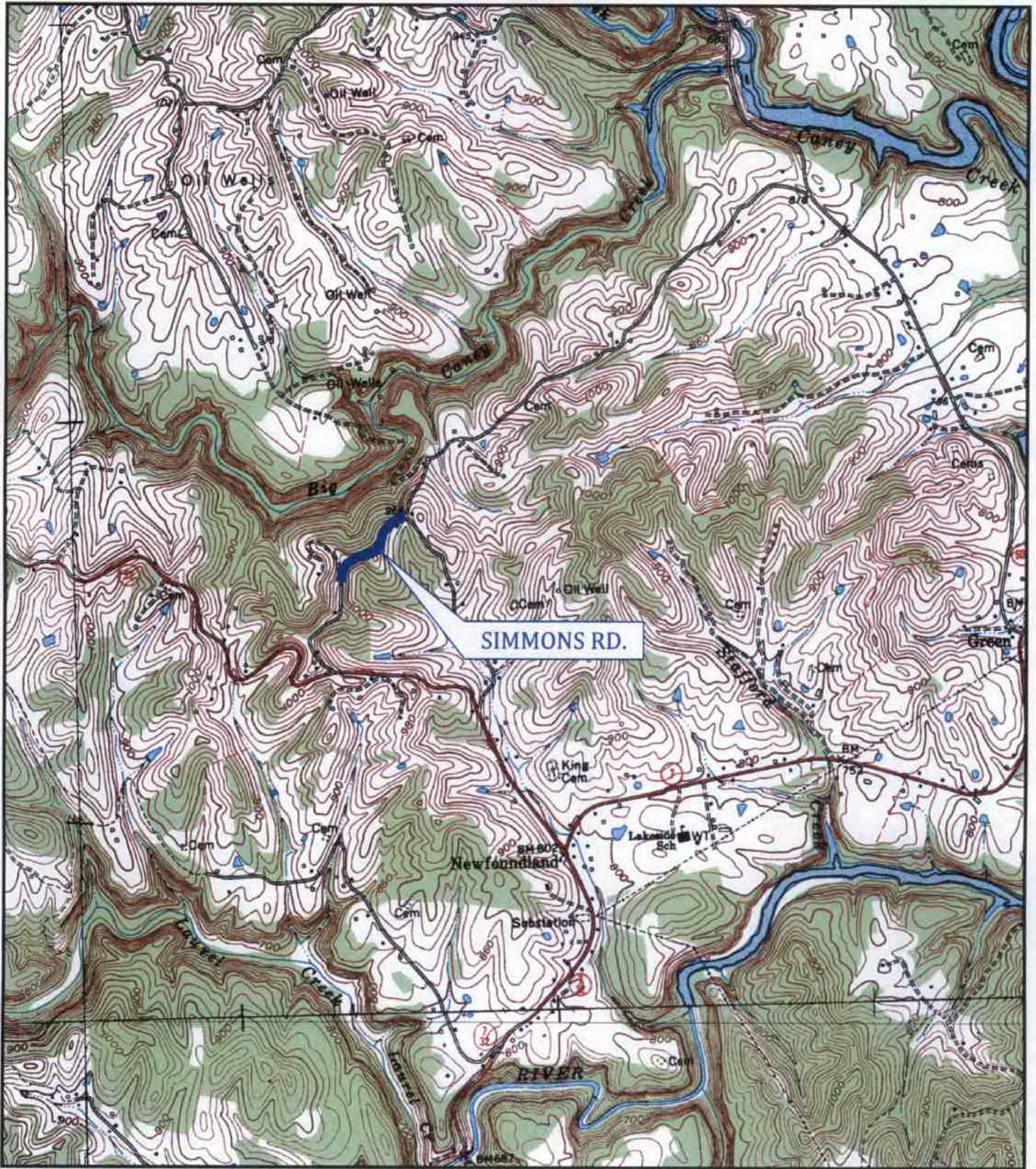
KENTUCKY
ENGINEERING
GROUP, PLLC

- Contract No. 10 -

**SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS**

KY 32 TANK INSPECTION

Project No.	11001
Date	January 2013
Exhibit	3
of	5



P.O. Box 1034
VERSAILLES, KENTUCKY 40383

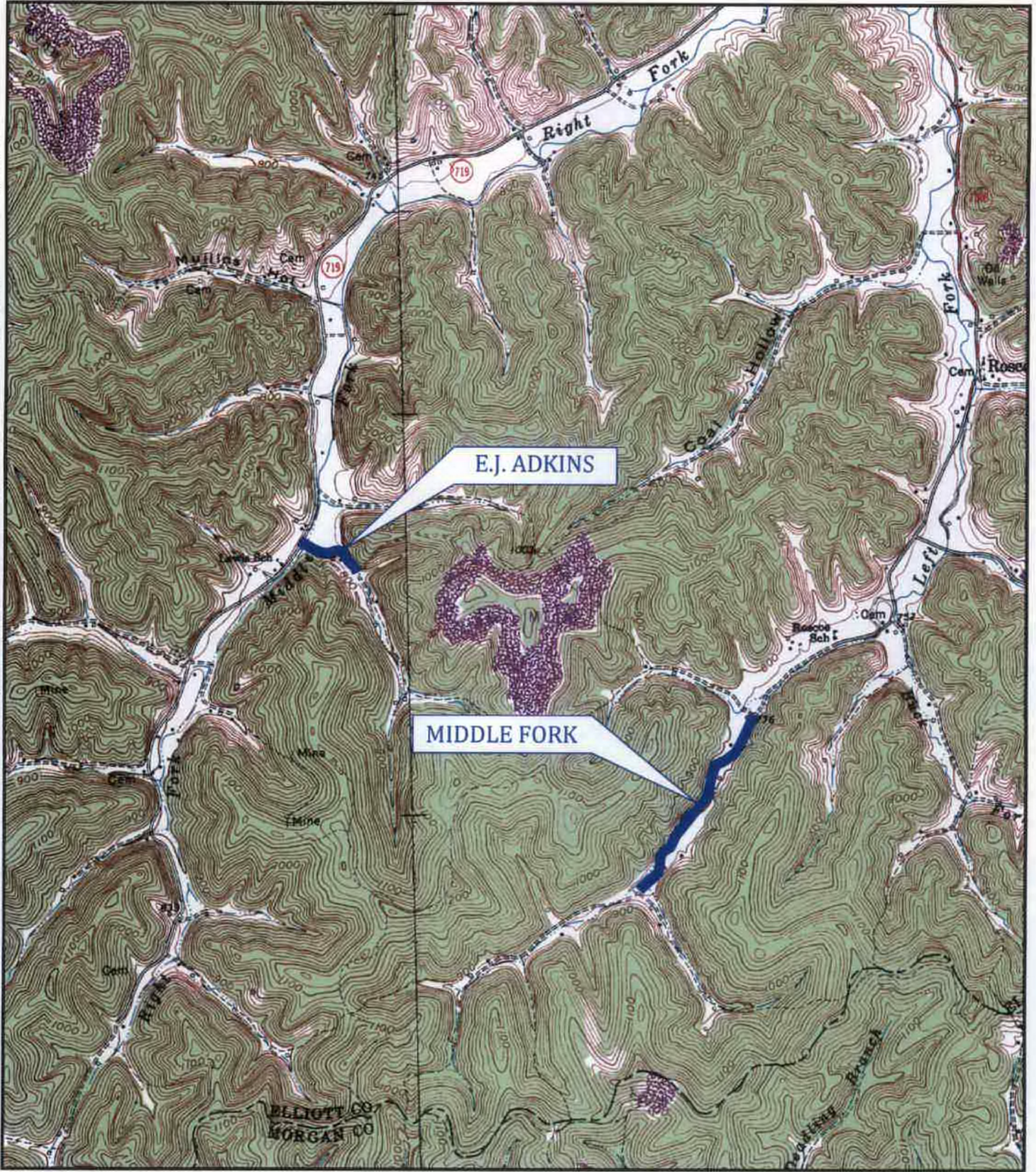
KENTUCKY
ENGINEERING
GROUP, PLLC

- Contract No. 10 -

**SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS**

SIMMONS ROAD

Project No.	11001
Date	January 2013
Exhibit	4
of	5



P.O. Box 1034
VERSAILLES, KENTUCKY 40383

KENTUCKY
ENGINEERING
GROUP, PLLC

- Contract No. 10 -

**SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS**

E.J. ADKINS and MIDDLE FORK

Project No.	11001
Date	January 2013
Exhibit	5
of	5

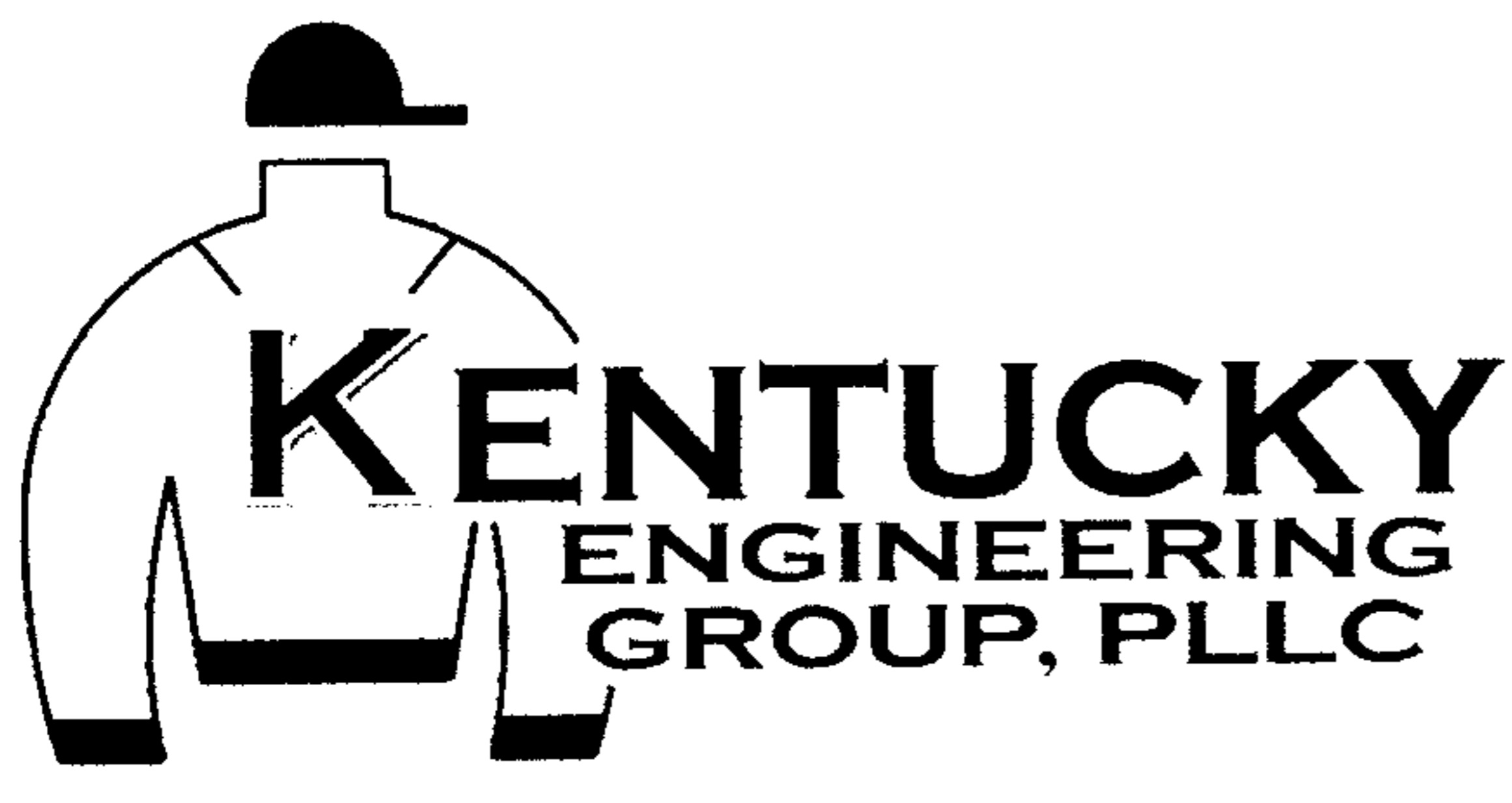
CONTRACT DOCUMENTS and SPECIFICATIONS

CONTRACT 10

WATER SYSTEM IMPROVMENTS

SANDY HOOK WATER DISTRICT

Elliott County, Kentucky



Kentucky Engineering Group, PLLC

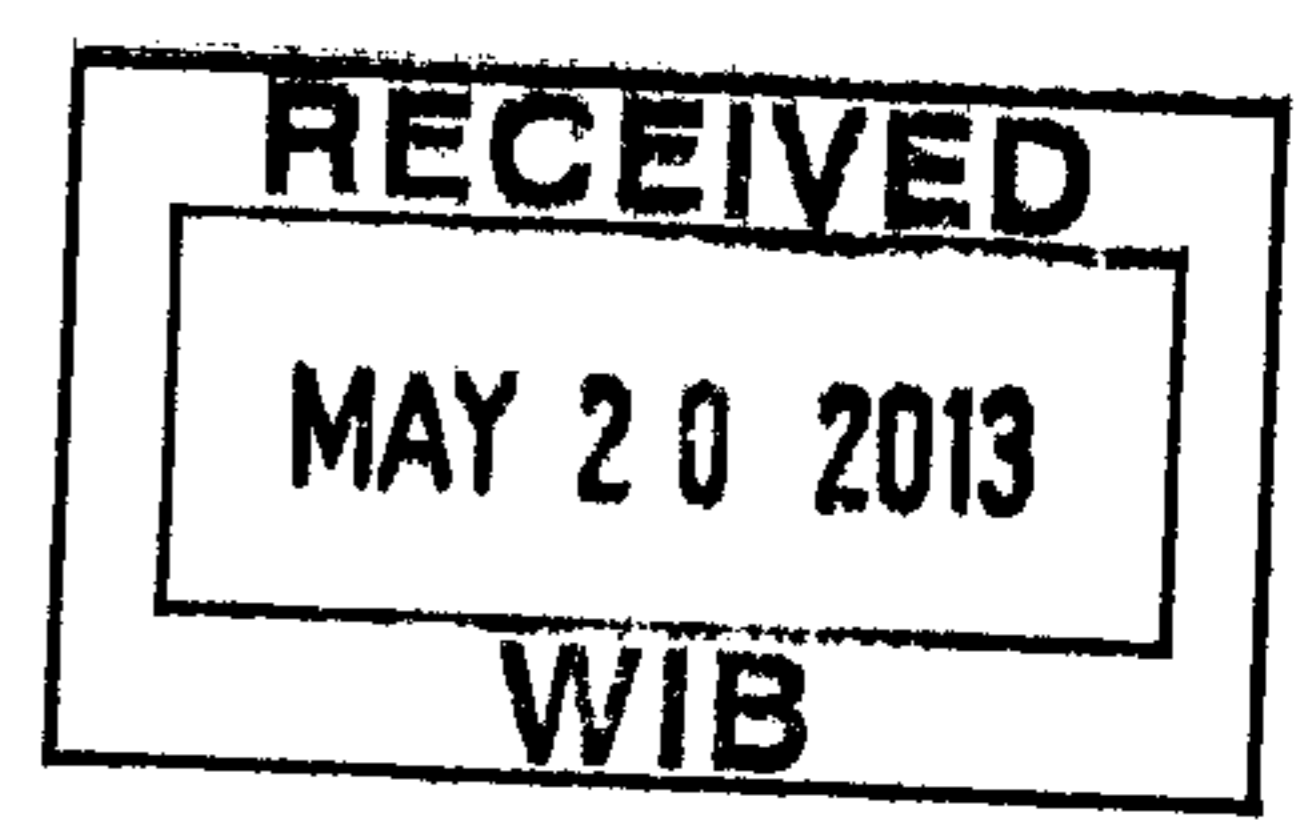
P.O. Box 1034

Versailles, Kentucky 40383

January, 2013

KEG Project No. 11001

0320383-13-001



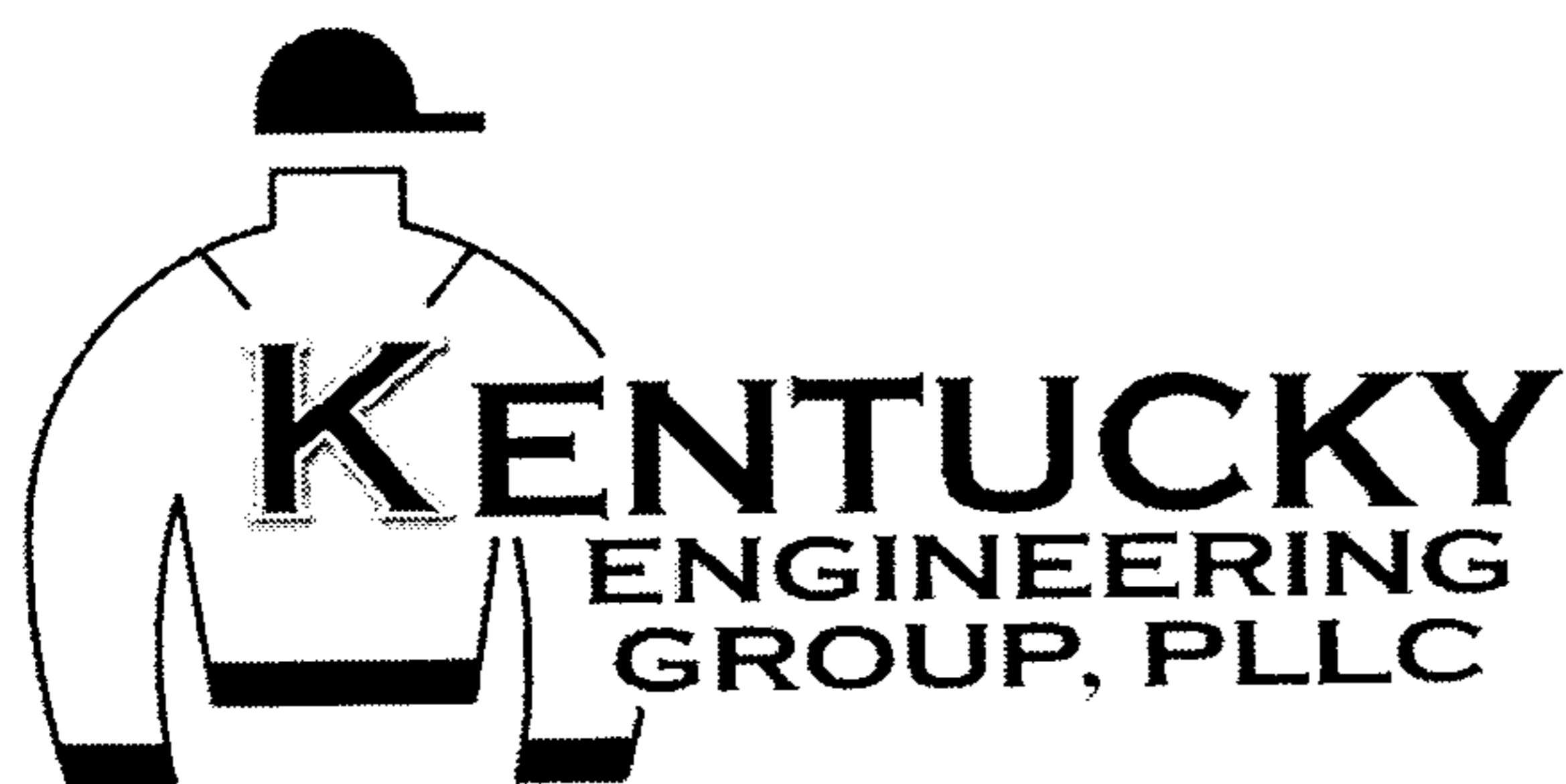
996APE 20130001

CONTRACT DOCUMENTS and SPECIFICATIONS

CONTRACT 10
WATER SYSTEM IMPROVMENTS

SANDY HOOK WATER DISTRICT

Elliott County, Kentucky



Kentucky Engineering Group, PLLC

P.O. Box 1034

Versailles, Kentucky 40383

January, 2013

KEG Project No. 11001

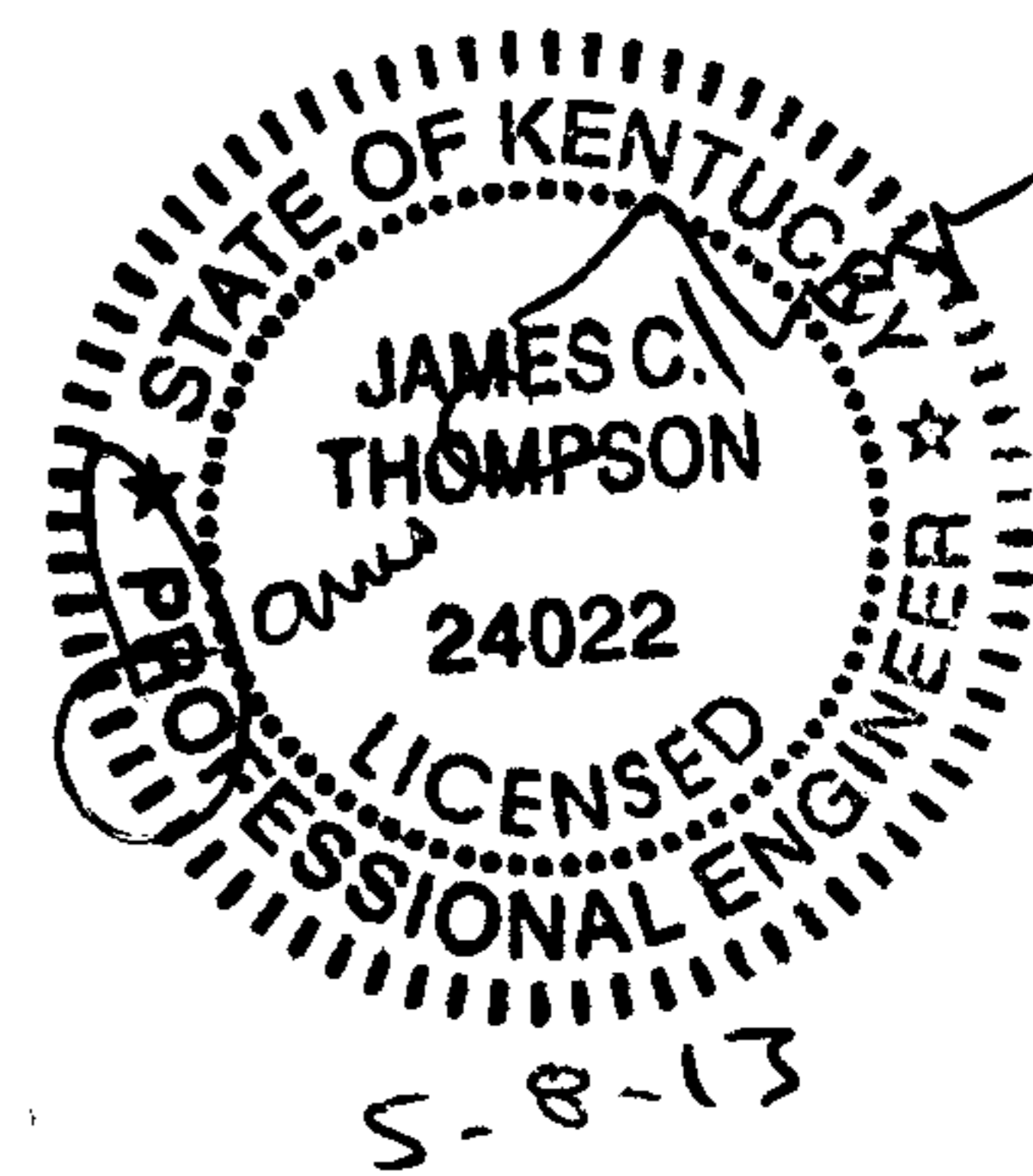


TABLE OF CONTENTS
 SANDY HOOK WATER DISTRICT
 CONTRACT 10 - WATER SYSTEM IMPROVEMENTS

TOC-1

PAGE

ADVERTISEMENT FOR BIDS

SECTION 1 - PRE BID INFORMATION 1-2
 SECTION 2 - INSTRUCTIONS TO BIDDERS 1-4
 SECTION 3 - BIDDING PROVISIONS & WAGE RATES 1-2

BID FORMS

SECTION 00410 - BID FORMS 1-9
 SECTION 00415 - SUPPLEMENTS TO BID FORM 1-10
 SECTION 00430 - BID BOND 1-2

AGREEMENT FORMS

SECTION 00510 - NOTICE OF AWARD 1
 SECTION 00521 - AGREEMENT FORMS 1-8
 SECTION 00550 - NOTICE TO PROCEED 1

BONDS

SECTION 00610 - BONDS AND CERTIFICATES 1-2
 SECTION 00615 - PAYMENT BONDS 1-3

RURAL DEVELOPMENT GENERAL CONDITIONS 1-57

RURAL DEVELOPMENT SUPPLEMENTAL GENERAL CONDITIONS 1-4

RURAL DEVELOPMENT CHANGE ORDER 1

RURAL DEVELOPMENT COMPLIANCE STATEMENT 1-2

RURAL DEVELOPMENT CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS 1

RURAL DEVELOPMENT CERTIFICATION REGARDING DEBARMENT 1-2

RURAL DEVELOPMENT CERTIFICATION OF SUBSTANTIAL COMPLETION 1

SECTION 00700 - GENERAL CONDITIONS 1-27

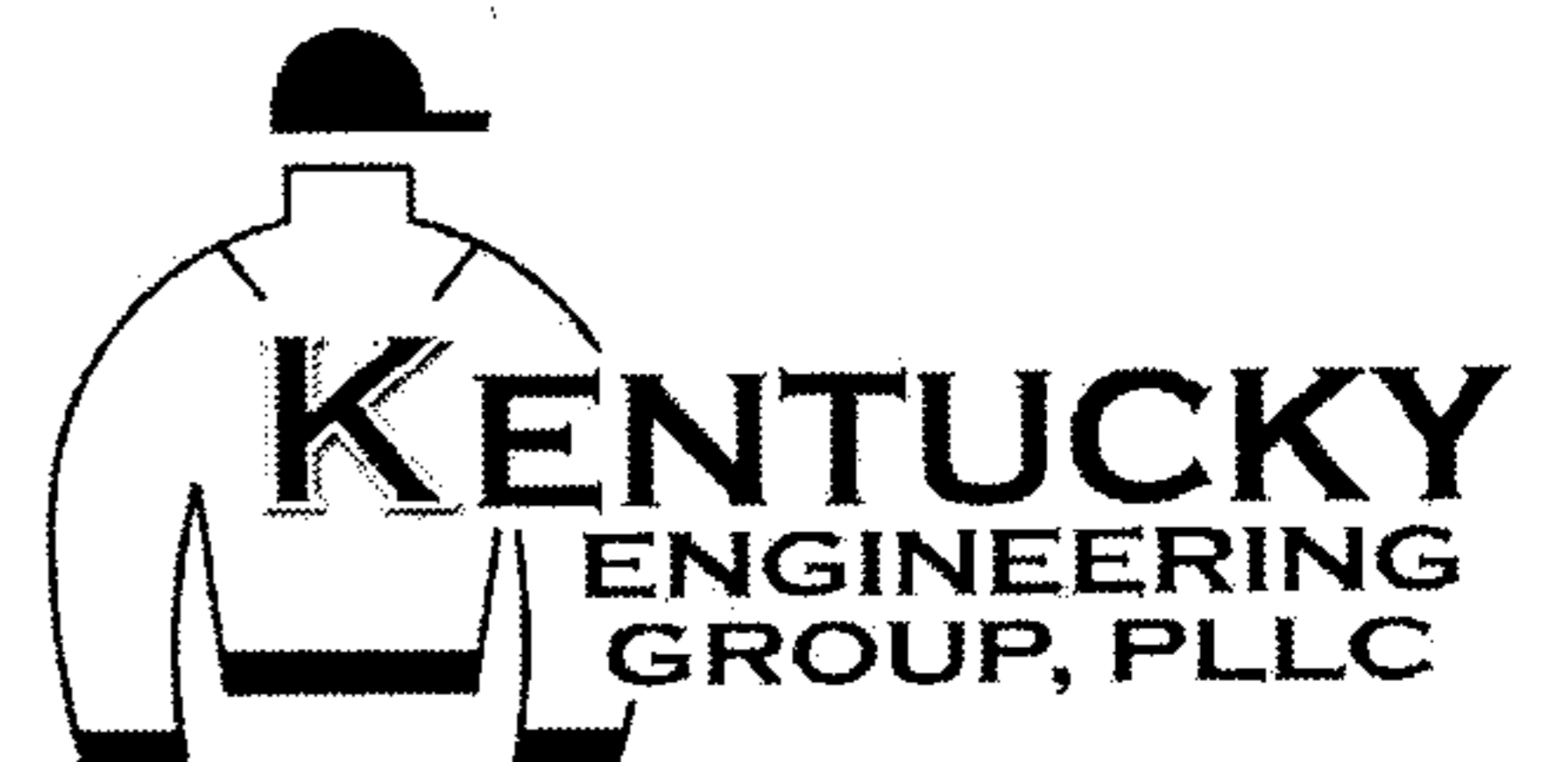
DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01010 - SUMMARY 1-2
 SECTION 01015 - WORK SEQUENCE 1
 SECTION 01016 - OCCUPANCY 1
 SECTION 01025 - MEASUREMENT AND PAYMENT 1-6
 SECTION 01030 - LABOR PROVISIONS 1
 SECTION 01040 - COORDINATION 1
 SECTION 01300 - SUBMITTALS 1-3
 SECTION 01380 - CONSTRUCTION PHOTOGRAPHY 1
 SECTION 01450 - QUALITY CONTROL 1
 SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS 1-3
 SECTION 01530 - BARRIERS 1
 SECTION 01540 - SECURITY 1

TABLE OF CONTENTS
 SANDY HOOK WATER DISTRICT
 CONTRACT 10 – WATER SYSTEM IMPROVEMENTS

	TOC-2
SECTION 01570 - TRAFFIC REGULATION	1-2
SECTION 01580 - PROJECT IDENTIFICATION AND SIGN	1-3
SECTION 01600 - MATERIAL AND EQUIPMENT	1-3
SECTION 01610 - TRANSPORTATION AND HANDLING.....	1
SECTION 01700 - PROJECT CLOSEOUT.....	1-3
SECTION 01710 - CLEANING	1-3
SECTION 01720 - PROJECT RECORD DOCUMENTS.....	1-2
SECTION 01740 - WARRANTIES AND BONDS	1-2
 DIVISION 2 - SITE WORK	
SECTION 02110 – SITE CLEARING.....	1-2
SECTION 02211 – ROUGH GRADING.....	1-2
SECTION 02220 - EARTHWORK.....	1-8
SECTION 02222 - EXCAVATION	1-2
SECTION 02226 – TRENCHING, BACKFILLING AND COMPACTING	1-3
SECTION 02228 – ROCK REMOVAL.....	1-3
SECTION 02270 – SLOPE PROTECTION AND EROSION CONTROL	1-2
SECTION 02302 – RAILROAD OR HIGHWAY CROSSINGS.....	1-4
SECTION 02502 – RESTORATION OF SURFACES	1-5
SECTION 02600 - PIPE, FITTINGS AND INSTALLATION	1-15
SECTION 02626 – CUSTOMER METER SERVICE AND SERVICE TUBING	1-5
SECTION 02630 - TAPPED CONNECTIONS	1-3
SECTION 02640 – VALVES.....	1-6
SECTION 02645 – HYDRANT ASSEMBLY	1-2
SECTION 02700 - SITE RESTORATION	1
 DIVISION 3 – CONCRETE	
SECTION 03300 – CAST IN PLACE CONCRETE.....	1-9
 DIVISION 10 – SPECIALITIES	
SECTION 10012 – TANK INSPECTIONS.....	1-2
 DIVISION 11 – EQUIPMENT	
SECTION 11000 – PLANT EQUIPMENT.....	1-2
 DIVISION 16 – ELECTRICAL	
SECTION 16000 – ELECTRICAL WORK.....	1-6
 DIVISION 17 – TELEMETRY	
SECTION 17000 – UPGRADE EXISTING SCADA SYSTEM.....	1-3

BIDDING INFORMATION



ADVERTISEMENT FOR BIDS

Sealed bids for Contract 10 – Water System Improvements and/or Contract 11 – New Groundwater Well and Appurtenances for the Sandy Hook Water District, Sandy Hook, Kentucky, will be received at the Sandy Hook Water District Office, 1000 Howards Creek Road, Sandy Hook, Kentucky, 41171 until ___ a.m., Local Time, _____ and then publicly opened and read aloud.

Contract No.10- The program of work for which bids are to be submitted consists of approximately 16,000 LF of water main extensions and replacements, upgrading existing telemetry, and all related appurtenances as described in the specifications and plans.

Contract No.11- The program of work for which bids are to be submitted consists of one new groundwater well and all related appurtenances as described in the specifications and plans.

The contract time allotted for the completion of each contract is one hundred and fifty (150) consecutive calendar days.

The work is located in Elliott County, Kentucky: Drawings, Specifications and Contract Documents may be examined at:

Kentucky Engineering Group, PLLC P.O. Box 1034, Versailles, Kentucky 40383

SANDY HOOK WATER DISTRICT 1000 Howards Creek Road, Sandy Hook, Kentucky 41171

AGC/McGraw Hill, 950 Contract St. Suite 100, Lexington, KY 40505

Reed Construction Data, 30 Technology Parkway South, Ste. 500, Norcross, GA 30092

Builders Exchange, 2300 Meadow Drive, Louisville, KY 40213

Copies of the Specifications, Plans, and Contract Documents may be obtained from Lynn Imaging., 328 Vine Street, Lexington, Kentucky 40507, Phone (859) 255-1021, upon receipt of a non-refundable amount of \$300.00 for contract 10 and \$200 for contract 11.

Federal and State Wage Rates apply

Hearing impaired individuals may call 1-800-247-2510 for information.

No Bidder may withdraw his Bid within ninety (90) days after the actual date of bid opening.

Bidders on this work will be required to comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, and the Contract Work Hours Standard Act.

Bidders must comply with the President's Executive Orders No. 11246 and No. 11375 and any amendments or supplements to those Executive Orders.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed under the contract, Section 3, Segregated Facility, Section 109 and E.O. 11246.

Bidders must certify they do not and will not maintain or provide for their employees any facilities that are segregated or based on race, color, creed, or national origin.

Minorities and small businesses are encouraged to submit bids on this project.

Sandy Hook Water District reserves the right to waive any bidding informalities and to reject any or all bids.

The sealed bid for this Project shall be clearly marked on the outside of the envelope: Sealed Bid for "Contract 10- Water System Improvements" and/or "Contract 11 - New Groundwater Well and Appurtenances". The bids may be mailed to: Sandy Hook Water District, 1000 Howards Creek, Sandy Hook, Kentucky 41171.

Sandy Hook Water District
Bernal Atkins, Chairman
Date: _____

INFORMATION FOR BIDDERS

SECTION 2

INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL INSTRUCTIONS AND INFORMATION

1.01 Each Bidder is responsible for inspecting the work site and for being thoroughly familiar with the Contract Documents, including Addenda. The Bidder shall in no way be relieved from any bidding obligation because of unfamiliarity with the site or documents. Neither the Owner nor Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

1.02 All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply throughout the Contract and they will be deemed to be included in the Contract the same as though herein written out in full.

1.03 The Owner of the Project is Sandy Hook Water District.

1.04 The Engineer of the Project is Kentucky Engineering Group, PLLC., P.O. Box 1034, Versailles, Kentucky 40383, Phone 859-251-4127, Mr. Riley Sumner, Project Manager.

1.05 The Contract Documents contain the provisions for construction of the Project. Information obtained from an officer, agent, or employee of the Owner, or from any other person, shall not affect the risk or obligation assumed by the Contractor or relieves the Contractor from fulfilling any of the conditions of the Contract.

1.06 The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any Bid if the evidence submitted by, or an investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Agreement and to complete the Work.

PART 2 - SPECIAL INSTRUCTIONS AND INFORMATION

2.01 The Contract will be awarded based on the lowest responsible bid.

2.02 Contractor **SHALL provide to the engineer along with performance and payment bonds an insurance certificate in the amount and types of insurance as stated in Section 00800. The amounts SHALL be at a minimum the amounts stated in Section 00800 RUS Supplementary Conditions or contracts will not be signed. Please note that Kentucky Engineering Group, PLLC must be added as an "additional" insured.**

PART 3 - BIDDING PROCEDURE

3.01 Bids will be received by Sandy Hook Water District until ___ A.M. (local time) _____, _____, 2012, and then publicly opened and read aloud at said office.

3.02 Each Bid must be submitted in a sealed envelope, addressed to Sandy Hook Water District, P.O. Box 726, Sandy Hook, Kentucky 41171. The bid may be mailed to: Sandy Hook Water District, P.O. Box 726, Sandy Hook, Kentucky 41171. Each envelope containing a Bid must be plainly marked on the outside as "Sealed Bid for Contract 10 - Water System Improvements, and/or Contract 11 - New Ground Water Well and Appurtenances" the envelope shall bear on the outside the Bidder's name, address and license number, if applicable, and date and time of opening. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to Sandy Hook Water District, P.O. Box 726, Sandy Hook, Kentucky 41171.

3.03 All Bids must be made on the required bid form. All blank spaces for Bid prices must be filled in, in ink or typewritten, and the Bid form must be fully completed and executed when submitted. Each bid must be submitted on the prescribed form and accompanied by the required certificates. All foregoing certifications must be fully completed and executed when submitted.

3.04 Each Bid must be accompanied by a separate Bid Bond for the Contract payable to the Owner for five (5) percent of the total amount of the Bid on the Contract. As soon as the Bid prices are compared, the Owner will return the Bonds of all except the three lowest responsible Bidders. When the Agreements are executed, the Bonds of the two remaining unsuccessful Bidders will be returned. The Bid Bonds of the successful Bidder will be retained until the Payment Bonds and Performance Bonds have been executed and approved, after which it will be returned. Certified checks payable to the Owner, equal to five (5) percent of the Bids, may be substituted for the Bid Bonds.

3.05 All bids must be made on the required Bid Form and must be fully completed and executed with original signatures and corporate seals. All Bid Bonds must be original forms and accompanied by the required certificates, original signatures and seals. Any Bids without original documents or a conditional or qualified Bid will not be accepted. All bidders must be listed on the Lynn Imaging Plan Holders List. Any entity that does not receive plans from Lynn Imaging will not be considered a responsible bidder and their bid will not be opened.

3.06 A Bid may be withdrawn prior to the scheduled time for the opening of Bids, or authorized postponement thereof. A Bid received after the time and date specified will not be considered. No Bidder may withdraw a Bid within ninety (90) days after the actual date of the opening. Should the Contract not be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the Bidder.

3.07 The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof. The Owner may waive any bidding informalities or minor defects or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered.

3.08 A conditional or qualified Bid will not be accepted.

3.09 The Bidder shall supply the names and addresses of major suppliers and subcontractors as part of the Bid Proposal.

3.10 The quantities listed in the Bid Schedule are estimates only. Final payment will be based on unit prices and actual or plan quantities of work performed.

3.11 The Owner reserves the right to add, delete or change any part or portion of the proposed work. Any changes made by the Owner that affect the work will be compensated for.

3.12 Any bidder may modify his/her bid by telegraphic communication at any time prior to the scheduled closing time for receipt of bids, provided such telegraphic communication is received by the Owner prior to the closing time, and provided further, the Owner is satisfied that a written confirmation of the telegraphic modification over the signature of the bidder was mailed prior to the closing time. The telegraphic communication should not reveal the bid price but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the bid is opened. If written confirmation is not received within two days from the closing time, no consideration will be given to the telegraphic modification.

3.13 The successful bidder, upon failure or refusal to execute and deliver the contract and bonds required within 10 days after receiving notice of the acceptance of their bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited (Bid Bond) with the bid.

3.14 Each bidder must inform themselves fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his/her obligation to

furnish all material and labor necessary to carry out the provisions of the contract. Insofar as possible, the contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of or interference with the work of any other Contractor.

3.15 No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally.

Every request for such interpretation should be in writing addressed to Mr. Riley Sumner, Kentucky Engineering Group PLLC, P.O. Box 1034, Versailles, Kentucky 40383, Phone 859-251-4127, and to be given consideration must be received at least five days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if used, will be mailed to all prospective bidders (at the respective addresses furnished for such purposes), not later than three days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his/her bid as submitted. All addenda so issued shall become part of the contract documents.

3.16 At the time of the opening of bids each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the plans and Contract Documents (including all addenda). The failure or omission of any bidder to examine any form, instrument or document shall in no way relieve any bidder from any obligation in respect of his/her bid.

PART 4 - AWARD OF CONTRACT (AGREEMENT)

4.01 Award of Contract will be made to the lowest responsible Bidder for the Contract unless all Bids are rejected. The Owner reserves the right to reject any and all bids, to waive any bidding informalities, and to disregard all nonconforming, non-responsive or conditional bids. Discrepancies between words and figures will be resolved in favor of words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

4.02 The Bidder to whom the Contract is awarded will be required to execute the Agreement and obtain the Performance Bond and Payment Bond within ten (10) calendar days from the date of the Notice of Award. The Notice of Award will be accompanied by the necessary Agreement and Bond forms. In case of failure of the Bidder to execute the Agreement, the Owner may consider the Bidder in default, in which case the Bid Bond accompanying the proposal shall become the property of the Owner.

4.03 A Performance Bond and a Payment Bond each in the amount of 100 percent (100%) of the Contract Price, with a corporate surety approved by the Owner, will be required for the faithful performance of the Contract. Such Bonds shall not be dated with a date earlier than the date of Agreement for the Contract (Project) being bonded.

4.04 Attorneys-in-fact who sign Bid Bonds or Payment Bonds and Performance Bonds must file with each Bond a certified and effective dated copy of their Power of Attorney.

4.05 The Owner within ten (10) calendar days of receipt of acceptable Performance Bond, Payment Bond and Agreement signed by the Bidder to whom the Agreement was awarded, shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the Owner not execute the Agreement within such period, the Bidder may, by written notice, withdraw the signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

4.06 The Notice to Proceed shall be issued by the Owner within ten (10) calendar days of the execution of the Agreement by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Owner and Contractor. If the Notice to Proceed has not been issued within the specified periods or the period mutually agreed upon, the Contractor may terminate the Agreement without further liability on the part of either party.

- END OF SECTION -

INFORMATION FOR BIDDERS

SECTION 3

BIDDING PROVISIONS

PART 1 - HOURS AND WAGES

1.01 No laborer, workman or mechanic in the employ of the Contractor, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by this Contract shall be permitted or required to work more than eight hours in any one calendar day or more than five days in any one week except in cases of extraordinary emergency, including fire, flood or danger to life or property.

1.02 Each laborer, workman or mechanic employed by the Contractor, Subcontractor or other person about or upon the work under this contract shall be paid no less than the prevailing rate of wages and shall be provided the supplements not less than the prevailing supplements as determined by the Fiscal Officer pursuant to Article 8 of the Labor Law. The prevailing rate schedule as determined by the Fiscal Officer follows this section and is a part of this Contract. Wage rates redetermined in accordance with the law will be transmitted, when received, to the Contractor and will become a part of this Contract at no cost to the Owner. Any person employed on the site of the work in an occupation not listed in the following prevailing rate schedule shall be paid not less than the minimum rate per hour and shall be provided not less than the supplements designated by the Fiscal Officer.

PART 2. DISCRIMINATION PROHIBITED

The Contractor agrees, in accordance with the applicable provisions of the Labor Law of the State of Kentucky:

2.01 That in the hiring of employees for the performance of work under this Contract or any subcontract hereunder, no Contractor, Subcontractor nor any person acting on behalf of such Contractor or Subcontractor, shall by reason of race, creed, color, national origin, or sex discriminate against any citizen of the State of Kentucky who is qualified and available to perform the work to which the employment relates;

2.02 That no Contractor, Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this Contract on account of race, creed, color, national origin, or sex;

2.03 That this Contract may be canceled or terminated by the Owner and all monies due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of this section of the Contract;

2.04 The aforesaid provisions of this section covering every contract for or on behalf of the State or a municipality for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of Kentucky.

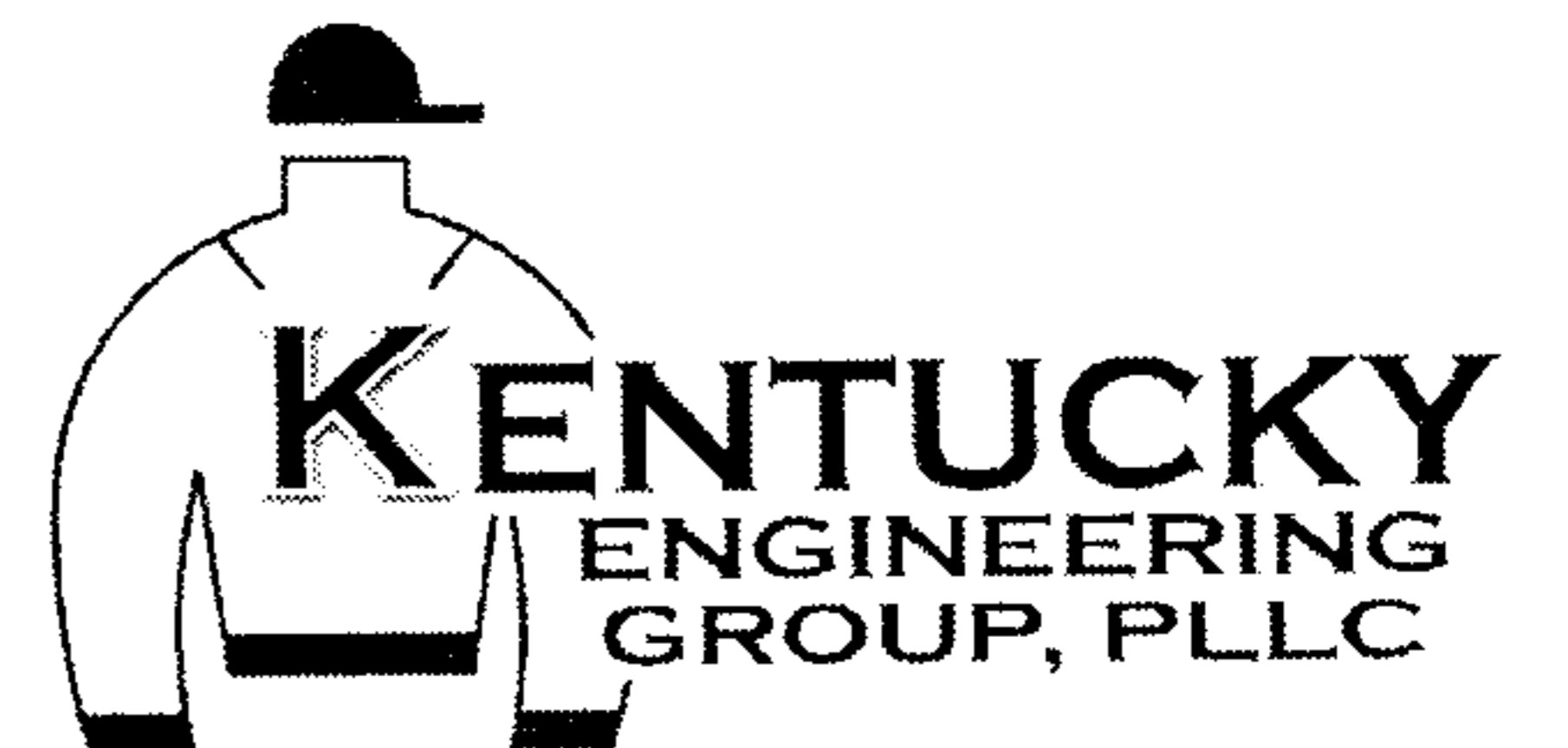
PART 3 - WORKER'S COMPENSATION

3.01 This Contract shall be void and of no effect unless the person or corporation making or performing such contract shall secure compensation for the benefit of, and keep insured during the life of such contract, such employees, in compliance with the provisions of the worker's compensation law.

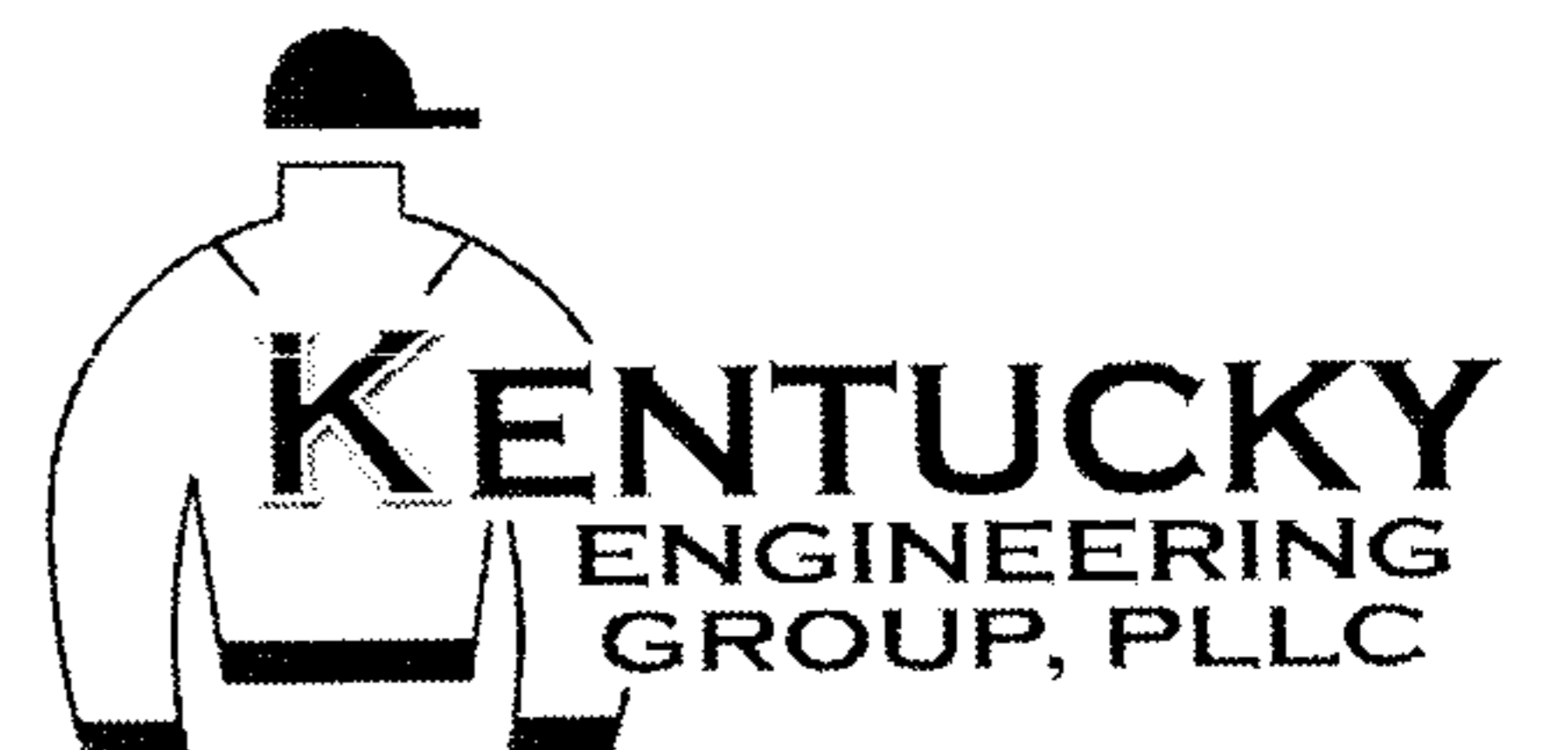
PART 4 - LIEN LAW

4.01 The attention of the Contractor is invited to the provisions of the Lien Law of the State of Kentucky, wherein funds received by a contractor for a public improvement are declared to constitute trust funds in the hands of such contractor to be applied first to the payment of certain claims.

**KENTUCKY LABOR CABINET CURRENT PREVAILING WAGE
DETERMINATION**



BID FORMS



BID FORM
SANDY HOOK WATER DISTRICT
CONTRACT 10 – WATER SYSTEM IMPROVEMENTS

TABLE OF ARTICLES

<u>Article</u>	<u>Article No.</u>
Bid Recipient	1
Bidder's Acknowledgements	2
Bidder's Representations	3
Further Representations	4
Basis of Bid time of Completion	6
Attachments to this Bid	7
Defined Terms	8
Bid Submittal	9

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Sandy Hook Water District
P.O. Box 726
Sandy Hook, Kentucky 41171

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.

<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____
_____	_____
_____	_____

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 has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

- E. 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.
- F. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- G. Bidder has correlated 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. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- J. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.

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 In compliance with the Advertisement for Bids, BIDDER hereby proposes to furnish all equipment, materials and labor for the work required to construct **Contract 10 – Water System Improvements**, for Sandy Hook Water District, Sandy Hook, Kentucky, in strict accordance with the Contract Documents, within the time set forth therein, and at the price stated below. Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

BID SCHEDULE

ITEM NO.	APPROX. QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL BID AMOUNT
1	1100	LF	2-inch Water Main, PVC Pipe, Class 200 (ASTM 2241) SDR 21 with all appurtenances and fittings		
2	8000	LF	3-inch Water Main, PVC Pipe, Class 200 (ASTM D2241) SDR 21 with all appurtenances and fittings.		
3	1400	LF	4-inch Water Main, PVC Pipe, Class 250 (ASTM) SDR 17 with all appurtenances and fittings		
4	1100	LF	4-inch Water Main, PVC Pipe, Class 200 ASTM D2241) SDR 21 with all appurtenances and fittings.		
5	4500	LF	6-inch Water Main, PVC Pipe, Class 200 (ASTM D2241) SDR 17 with all appurtenances and fittings.		
6	1	EA	2-inch C.I. AWWA N.R.S. Gate Valve and Valve Box, Complete in Place.		
7	4	EA	3-inch C.I. AWWA N.R.S. Gate Valve and Valve Box. Complete in Place.		
8	1	EA	4-inch C.I. AWWA NRS Gate Valve and Valve Box. Complete in Place.		
9	5	EA	6-inch C.I. AWWA NRS Gate Valve and Valve Box. Complete in Place.		
10	1	EA	Tapping Sleeve and Valve. Complete in Place.		
11	2	EA	6-inch Flushing Hydrant Assembly. Complete in Place.		

ITEM NO.	APPROX. QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL BID AMOUNT
12	1	EA	Blow Off Assembly Hydrant. Complete in Place.		
13	5	EA	Blow Off Assembly. Complete in Place.		
14	9	EA	Connection to Existing Water Main. Complete in Place.		
15	1	EA	Cut and Plug Existing Water Main. Complete in Place.		
16	1	EA	3/4" Air Release Valve. Complete in Place.		
17	12	EA	New Meter Assembly w/Radio Read Meters. Complete in Place.		
18	1	EA	New Meter Assembly w/IPRV and Radio Read Meter. Complete in Place.		
19	21	EA	Reconnect Existing Meter to New Main. Complete in Place.		
20	500	LF	Additional 3/4" Service Line. Complete in Place.		
21	45	LF	12" Steel Casing Bored and Jacked -Complete in Place.		
22	70	LF	8" Steel Casing Bored and Jacked - Complete in Place.		
23	20	LF	6" Steel Casing Open Cut - Complete in Place.		
24	350	LF	PVC Casing - Open Cut. Complete in Place.		

ITEM NO.	APPROX. QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL BID AMOUNT
25	1	EA	Automatic Flushing Device in Existing Line. Complete in Place.		
26	1	EA	1" Setter w/By-Pass and PRV. Complete in Place.		
27	650	LF	Concrete Sidewalk Replacement. Complete in Place.		
28	320	LF	Directional Drill Creek Crossing w/DR 9 Polyethelene Pipe. Complete in Place.		
29	1	LS	Upgrade Existing Telemetry System and Software. Complete in Place.		
30	1	EA	Quick Connect Receptacle on KY 7 Pump Station. Complete in Place.		
31	1	LS	Pressure Relief Valve at Plant. Complete in Place.		
32	1	EA	Purchase and Delivery of New Portable 35 KW Generator.		
33	4	EA	Interior/Exterior Tank Inspections - Complete in Place.		
34	300	LF	Purchase and Delivery of Radio Read Meters to SHWD. Complete in Place.	\$110.00	\$33,000

TOTAL AMOUNT BID - (ABOVE ITEMS): _____ Dollars and
 _____ (Cents) (_____).

All specified cash allowances are included in the price(s) set forth above and have been computed in accordance with Paragraph 11.02 of the General Conditions. Unit Prices have been computed in accordance with paragraph 11.03.A of the General Conditions.

The above prices shall include all labor, materials, overhead, profit, insurance, excavation, clean-up and other costs necessary to cover the finished work of the several kinds called for a finished product. Changes in the work shall be processed in accordance with the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the contract Documents.

By submission of this Bid, the BIDDER certifies, and in the case of a joint Bid each party thereto certifies as to its own organization, that this Bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this Bid, with any other BIDDER or with any competitor.

Accompanying this Proposal is a certified check or standard Bid Bond in the sum of _____(Dollars) (\$_____) in accordance with the Instructions to Bidders. The BIDDER, by submittal of this Bid, agrees with the OWNER that the amount of the bid security deposited with this Bid fairly and reasonably represents the amount of damages the OWNER will suffer due to the failure of the BIDDER to fulfill his agreements as provided in this Proposal.

BIDDER acknowledges receipt of the following Addenda:

BIDDER agrees that the OWNER reserves the right to delete the whole or any part of the Project from the Contract.

BIDDER understands that the OWNER reserves the right to reject any or all Bids and to waive any informalities in the Bidding.

BIDDER agrees that this Bid shall be good and may not be withdrawn for a period of ninety (90) calendar days after the actual date of bid opening.

BIDDER agrees to perform all of the Work described in the Specifications and shown on the Plans for the amount stated above. Within ten (10) calendar days after receiving written notice of the acceptance of this Bid by the OWNER, the BIDDER will execute and deliver to the OWNER ten (10) copies of the Agreement and such other required Contract Documents.

ARTICLE 6 – TIME OF COMPLETION

TIME OF COMPLETION AND LIQUIDATED DAMAGES

The Time of Completion of the construction of this project is highly important to the OWNER. Should any CONTRACTOR neglect, refuse, or fail to complete his Contract within the Time of Completion specified herein, after giving effect to extensions of time is any, herein provided, then in that event and in view of the difficulty of estimating with exactness the full extent of damages to the OWNER caused by delays, the sums stated herein shall be assessed on the CONTRACTOR for each and every day his work is delayed in its completion beyond the specified Time of Completion and the amount of Liquidated Damages, plus such additional engineering and inspection expenses incurred by the Owner.

For the various Contracts of the project are stated as follows and as described in the Advertisement for Bids:

DESCRIPTION OF WORK	CALENDAR DAYS FOR COMPLETION	LIQUIDATED DAMAGES PER DAY
Contract 10 – Water System Improvements	150	\$750

The Contract completion time stipulated above includes an allowance for an average number of inclement weather days as follows:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOT
Precipitation	7	7	9	8	8	8	8	7	6	5	6	7	86
Freez. Temp.	10	6	1	0							1	5	23
Total	17	13	10	8	8	8	8	7	6	5	7	12	109

When number of days (including Saturdays, Sundays and Holidays) of Precipitation in excess of 0.1" per day or maximum daily temperature of 32 degrees F. exceed those shown above in any month, the CONTRACTOR shall be entitled to that number of additional days for contract completion.

- If, in the ENGINEER'S opinion, sustained bad weather conditions prevent satisfactory performance of the work, he may suspend operations for an executed 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.
- If the project is not completed within the specified time, the CONTRACTOR'S retainage may be used by the OWNER as one source of funds to compensate the ENGINEER for additional engineering services or legal fees required because of time delays.

ARTICLE 7 – ATTACHMENTS TO THIS BID

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

- E. Required Bid security in the form of 5%
- F. List of Proposed Subcontractors
- G. List of Proposed Suppliers
- H. List of Project References
- I. Required Bidder Qualification Statement with Supporting Data
- J. Affidavit of Non-Collusion
- K. (List other documents as pertinent)

ARTICLE 8 – DEFINED TERMS

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)

Attest _____

Date of Authorization to do business in *[State Where Project is Located]* 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 _____, 2013.

State Contractor License No. _____ (If applicable)

SECTION 00415

SUPPLEMENTS TO BID FORMS

ALL PARTS ARE REQUIRED TO BE COMPLETED AND MUST BE SUBMITTED WITH THE BID. FAILURE TO COMPLETE ALL FORMS MAY BE CAUSE FOR REJECTION OF THE BID.

PART 1 - BIDDER'S QUALIFICATIONS

A. The required names and addresses of all persons interested in the foregoing Bid, as Principals, are as follows:

B. The Bidder shall submit the requested information indicated and for work of a similar character in size and total contract price that is included in the proposed Contract and references to enable the Owner to judge the Bidder's experience, skill and business standing.

1. Number of years in business as a contractor under present business name:

2. Number of years of experience in type of construction required for this project:

3. Have you ever been declared in default or failed to complete work awarded to you? If yes, where and why? _____

4. Have you ever been cited by a regulatory agency for failure to comply with any of its contractual obligations? _____. If yes, where and why? _____

5. List and age of owned equipment available for this project: _____

6. List similar project experience with references where the Bidder was the prime contractor and percent work completed as prime and percent completed by subcontractors.

Project Name	Description of Work	Date Completed	Contract Amount	% Prime/ % Subcontract	Owner/Contact	Owner Phone No.
1.						
2.						
3.						
4.						
5.						

(Add supplementary pages if necessary)

PART 2 - SUBCONTRACTORS

All proposed subcontractors shall be listed below for each branch of work included in the proposed Contract. All subcontractors are subject to the approval of the Owner. Failure to submit a completed list may be cause for rejection of the Bid. Experience and references of all subcontractors shall be described on separate pages.

BRANCH OF WORK	NAME AND ADDRESS OF SUBCONTRACTOR
----------------	-----------------------------------

<u>Directional Drill</u>	
--------------------------	--

<u>Tank Inspections</u>	
-------------------------	--

<u>Telemetry Upgrades</u>	
---------------------------	--

(Other)	
---------	--

(Add supplementary pages if necessary)

NOTES:

1. The OWNER in no way implies acceptance of any proposed subcontractor by acceptance of the Bid.
2. The CONTRACTOR will not be allowed to substitute subcontractors not listed herein without prior written approval of OWNER.
3. The CONTRACTOR shall indicate the percent or amount of work proposed by subcontractors for the total project or each branch of work listed.

SUBCONTRACTORS' REFERENCES

List similar project experience with references for each subcontractor proposed and the percent work completed by the subcontractors.

Project Name	Description of Work	Date Completed	Contract Amount	% Prime/ % Subcontract	Owner/Contact	Owner Phone No.
1.						
2.						
3.						
4.						
5.						

(Add supplementary pages if necessary)

PART 3 - MANUFACTURER'S LIST

A. The Bidder proposes to furnish the following equipment contingent upon its conformity to the Specifications and review and acceptance by the ENGINEER and OWNER.

B. Only one manufacturer's name is to be listed.

NAME OF MANUFACTURER	DESCRIPTION OF MATERIAL
_____	PVC Pipe
_____	Telemetry
<u>Sensus Iperls</u>	Radio Read Meters
_____	Valves
_____	_____
_____	_____
_____	_____
_____	_____

(Add supplementary pages if necessary)

NOTES:

1. OWNER in no way implies acceptance of such listed equipment by acceptance of the Bid.
2. The CONTRACTOR will not be allowed to substitute manufacturers not listed for the units above without prior written approval of OWNER.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,

_____ as Principal, and

_____ as Surety, are hereby held and firmly bound unto

_____ as OWNER in the penal sum of _____ for

the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 2013. The Condition

of the above obligation is such that whereas the Principal has submitted to _____ a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for **Contract 10 - Water System Improvements**.

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attachment hereto (Properly completed in accordance with said BID) and shall furnish a BOND for faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

Page 2

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

(SEAL)

Principal (Legal Signature)

(SEAL)

Surety

By

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and authorized to transact business in the State where the project is located.

DEBARRED FIRMS

The undersigned hereby certifies that the firm of _____ has not and will not award a subcontract, in connection with any contract awarded to it as the result of this bid, to any firm that has been debarred for noncompliance with the Federal Labor Standards, Title VI of the Civil Rights Act of 1964, Executive Order 11246 as amended or any other Federal Law.

Name of Firm Submitting Bid

Signature of Authorized Official

Title

Date

CERTIFIED COPY OF CORPORATE RESOLUTION

(Name of Company)

I hereby certify that I am the duly elected and acting _____
 _____, a Corporation duly organized and
 existing under the laws of the State of _____; that on the _____ day of
 ____, 2013, the Board of Directors of said Corporation authorized and approved a certain Proposal to Sandy
Hook Water District for the construction of certain improvements for Contract 10 - Water System
Improvements by said Corporation and any contract resulting there from, and empowered the
 _____ (Insert Title of Officer) of said Corporation to execute said Proposal
 and Contract for and in behalf of said Corporation; that said authority is not contrary to any provision in the
 Articles of Incorporation or code of regulations or code of bylaws of said Corporation; ;that said authority has not
 been rescinded or modified; and that _____ (Insert Name of Signatory) is the duly elected and
 acting _____ (Insert Title of Office) of said Corporation.

IN WITNESS WHEREOF, I have hereunto subscribed my name on _____, 2013.

(Signature)

Subscribed and sworn to before me this _____ day of _____, 2013.

(SEAL)

NOTARY PUBLIC

NONCOLLUSION AFFIDAVIT

State of _____)

County of _____)

Bid Identification

Contractor,

being first duly sworn, deposes and says that he is

_____ (sole owner, a partner, president, secretary, etc.) of _____, the party making the foregoing bid; that such bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that such bid is genuine and not collusive or sham; that said bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that said bidder has not in any manner, directly or indirectly, sought by agreement, communication or conference with anyone to fix the bid price of said bidder or of any other bidder, or to fix any overhead, profit, or cost element of such bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract or anyone interested in the proposed contract; that all statements contained in such bid are true; and, further that said bidder has not, directly or indirectly, submitted his bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid and will not pay any fee in connection therewith, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, or to any other individual except to such person or persons as have a partnership or other financial interest with said bidder in his general business.

SIGNED

TITLE

Subscribed and sworn to before me this _____ day of _____, 2013.

(SEAL)

NOTARY PUBLIC

- END OF SECTION -

Notice of Award

Dated _____

Project: Water System Improvements	Owner: Sandy Hook Water District	Owner's Contract No.: Contract 10
Contract: Water System Improvements	Engineer's Project No.: 11001	

Bidder:

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

You are notified that your Bid dated _____, 2013 for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for Contract 10 – Water System Improvements

The Contract Price of your Contract is _____ (\$_____).

4 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 [15] days of the date you receive this Notice of Award.

1. Deliver to the Owner four [4] 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.

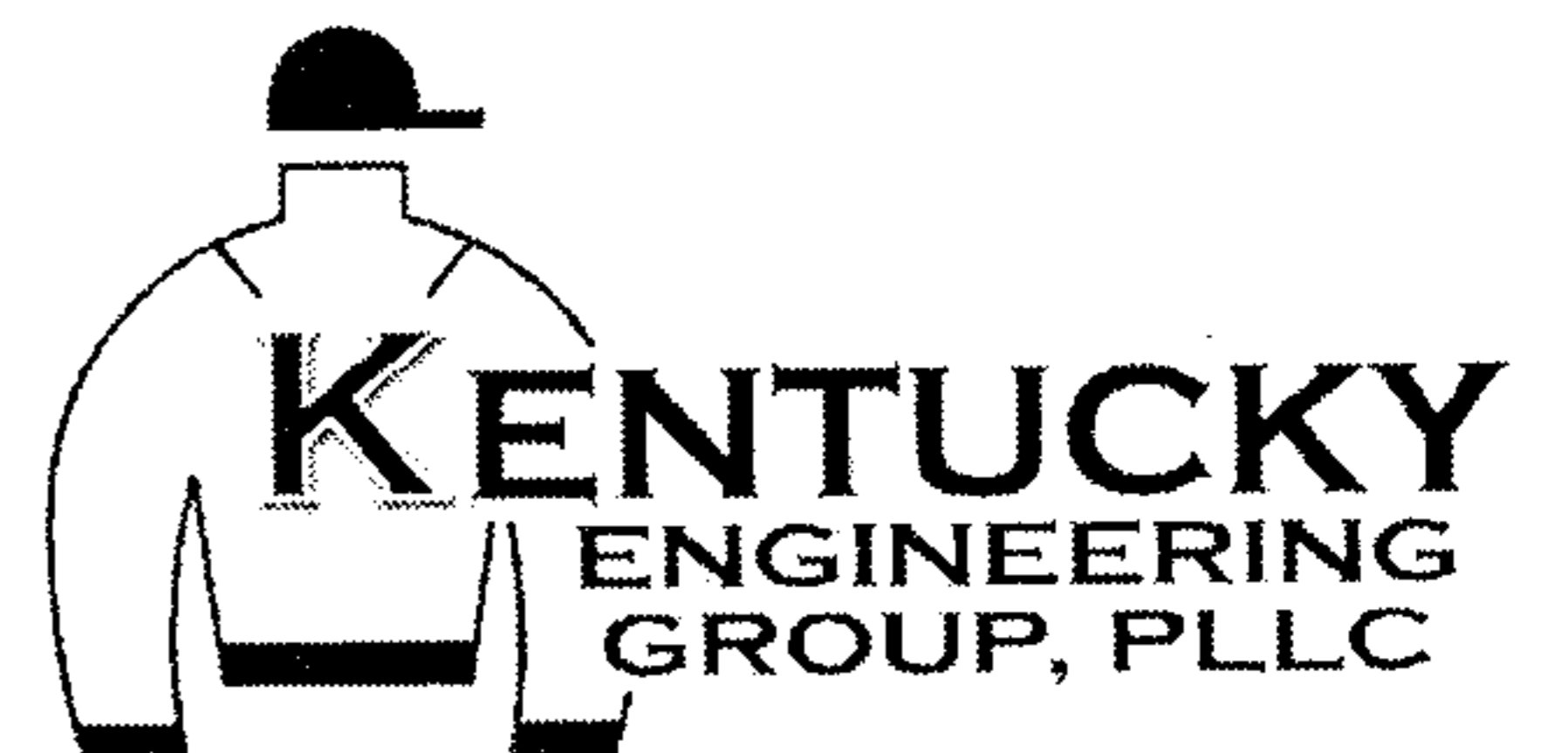
Sandy Hook Water District.
Owner

By: _____
Authorized Signature

Chairman
Title

Copy to Engineer

AGREEMENT FORMS
BONDS AND CERTIFICATES



This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification.

**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



PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN COUNCIL OF ENGINEERING COMPANIES

AMERICAN SOCIETY OF CIVIL ENGINEERS

This document has been approved and endorsed by



The Associated General Contractors of America



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

This Suggested Form of Agreement has been prepared for use with the Standard General Conditions of the Construction Contract, Funding Agency Edition (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 (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 (C-800, 2002 Edition).

Copyright © 2002, All Rights Reserved.

National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2715

American Council of Engineering Companies
1015 15th Street, N.W., Washington, DC 20005

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400

Introduction

This Suggested Form of Agreement between Owner and Contractor for Construction Contract, Funding Agency Edition (Stipulated Price) ("Agreement") has been prepared for use with the Guide to the Preparation of Instructions to Bidders ("Instructions")(C-200, 2002 Edition) and with the Standard General Conditions of the Construction Contract, Funding Agency Edition ("General Conditions")(C-710, 2002 Edition). Their provisions are interrelated, and a change in one may necessitate a change in the others. For guidance in the preparation of Supplementary Conditions and coordination with Instructions to Bidders, see Guide to the Preparation of Supplementary Conditions ("Supplementary Conditions")(C-800, 2002 Edition). See also Suggested Bid Form ("Bid Form") (C-410, 2002 Edition). The EJCDC has not prepared a suggested form of Advertisement or Invitation to Bid because such documents will vary widely to conform to statutory requirements.

This form and the other Bidding Documents prepared and issued by the EJCDC assume acceptance of the Project Manual concept of the Construction Specifications Institute which provides for an organizational format for location of all bound documentary information for a construction project, namely: Bidding Requirements (which term refers to the Advertisement or Invitation to Bid, the Instructions, and any Bid Form that may be suggested or prescribed, all of which provide information and guidance for all Bidders) and the Contract Documents (defined in Article 1 of the General Conditions), which include the Agreement, bonds and certificates, the General Conditions, the Supplementary Conditions, the Drawings, and the Specifications. The Bidding Requirements are not considered part of the Contract Documents because much of their substance pertains to the relationships prior to the award of the Contract and has little effect or impact thereafter and because many contracts are awarded without going through the bidding process. In some cases, however, the actual Bid may be attached as an exhibit to the Agreement to avoid extensive retyping. (The terms "Bidding Documents" and "Bidding Requirements" are defined in Article 1 of the General Conditions.) The Project Manual concept is explained in the Manual of Practice issued by the Construction Specifications Institute.

Suggested language is presented herein with "Notes to User" to assist in preparing the Agreement. Much of the language should be usable on most projects, but modifications and additional provisions will often be necessary. The suggested language has been coordinated with the other standard forms produced by the EJCDC. When modifying the suggested language or writing additional provisions, the user must check the other documents thoroughly for conflicts and coordination of language usage and make appropriate revisions in all affected documents.

Refer to the discussions in EJCDC's Recommended Competitive Bidding Procedures for Construction Projects ("Bidding Procedures") (No. 1910-9-D, 1987 Edition) (to be reissued in 2002) on the particular paragraphs of which frequent reference is made below. For brevity, referenced paragraphs of the Instructions to Bidders are referenced with the prefix "I," those of the Bid Form are referenced with the prefix "BF," and those of this Agreement are referenced with the prefix "A."

NOTES:

1. EJCDC publications may be ordered from:

NSPE headquarters
1420 King Street
Alexandria VA 22314-2715
703-684-2800
www.nspe.org

ASCE headquarters
1801 Alexander Bell Drive
Reston, VA 20191-4400
800-548-2723
www.asce.org

ACEC headquarters
1015 15th Street NW
Washington DC 20005
202-347-7474
www.acec.org

AGREEMENT FORMS

THIS AGREEMENT is by and between Sandy Hook Water District (Owner)

and _____ (Contractor).

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

ARTICLE 1 - WORK

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

Contract 10 – Water System Improvements – Installation of approximately 16,000 LF of water main, upgrade existing telemetry, new radio read meters and tank inspections .

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:

See above.

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by:

Kentucky Engineering Group, PLLC
P.O. Box 1034
Versailles, KY 40383

(Engineer), who is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

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 one hundred and Fifty (150) days after the date when the Contract Time commences to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment at the date determined by Owner, Contractor, and Engineer after substantial completion, based on remaining work, weather, and market conditions.

4.03 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence on this Project and that Owner will suffer financial loss if the Work is not substantially completed within the times specified in Paragraph 4.02 above, plus any extensions 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 a 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.

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, 5.01.B, and 5.01.C. All specific cash allowances are included in the prices and have been computed in accordance with Paragraph 11.02 of the General Conditions.

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

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

N/A _____ \$ _____
(use words)

B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in this Paragraph 5.01.B:

See SECTION 00410 – BID FROMS

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

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. Contractor shall submit Applications for Payment in accordance with Article 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 15th 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, plus any reduction in retainage that has been agreed upon by Owner, Contractor, and Engineer.

6.03 Final Payment

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

ARTICLE 7 - INTEREST

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

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

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

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

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

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

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 11, inclusive).
2. Performance bond (pages _____ to _____, inclusive).
3. Payment bond (pages _____ to _____, inclusive).
4. Other bonds (pages _____ to _____, inclusive).
 - a. _____ (pages _____ to _____, inclusive).
 - b. _____ (pages _____ to _____, inclusive).
 - c. _____ (pages _____ to _____, inclusive).
5. General Conditions (pages 1 to 57, inclusive).
6. Supplementary Conditions (pages 1 to 4, inclusive).
7. Specifications as listed in the table of contents of the Project Manual.
8. Drawings consisting of _____ sheets with each sheet bearing the following general title: Contract 10 – Water System Improvements
9. Addenda (numbers _____ to _____, inclusive).
10. Exhibits to this Agreement (enumerated as follows):
 - a. Notice to Proceed (pages 1 to 1, inclusive).
 - b. Contractor's Bid (pages 1 to 10, inclusive).
 - c. Documentation submitted by Contractor prior to Notice of Award (pages _____ to _____, inclusive).
 - d. _____
11. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed (pages 1 to 1, inclusive).
 - b. Work Change Directives.
 - c. Change Order(s).

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

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

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

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

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

10.02 Assignment of Contract

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

10.03 Successors and Assigns

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

10.04 Severability

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

10.05 Other Provisions.

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.

This Agreement will be effective _____ (which is the Effective Date of the Agreement). This Agreement shall not be effective unless and until Agency's designated representative concurs.

OWNER:

CONTRACTOR:

Sandy Hook Water District

By: _____

By: _____

Title: Chairman

Title: _____

[CORPORATE SEAL]

[CORPORATE SEAL]

Attest: _____

Attest: _____

Title: _____

Title: _____

Designated Representatives:

Designated Representatives:

Name: _____

Name: _____

Title: _____

Title: _____

Address for giving notices:

Address for giving notices:

Sandy Hook Water District

P.O. Box 726

Sandy Hook, Kentucky 41171

Phone: 606-738-6282 FAX: 606-788-6292

Phone: _____ FAX: _____

License No.: _____

(Where applicable)

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

Agent for service or 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: _____

Notice to Proceed

Dated

Project: Water System Improvements	Owner: Sandy Hook Water District.	Owner's Contract No.: Contract 10
---------------------------------------	--------------------------------------	--------------------------------------

Contract: Contract 10- Water System Improvements	Engineer's Project No.: 11001
---	----------------------------------

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 2013 . 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 2013 , and the number of days to achieve Substantial Completion is 2013 , and the number of days to achieve readiness for final payment is 60.

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]:

All Shop Drawings must be submitted and approved by the Engineer.

(Contractor)

Received by:

(Title)

(Date)

Sandy Hook Water District

Owner

Given by:

Authorized Signature

Chairman

Title

Date

Copy to Engineer

PERFORMANCE 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):
Sandy Hook Water District
P.O. Box 726
Sandy Hook, KY 41171

CONTRACT

Date:
Amount:
Description (Name and Location): Contract 10 – Water System Improvements. Approximately 17,000 LF of water main and various other appurtenances.

BOND

Bond Number:
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

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

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)
Name and Title:

Surety's Name and Corporate Seal (Seal)

By: _____
Signature and Title
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____
Signature and Title

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)
Name and Title:

Surety's Name and Corporate Seal (Seal)

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title:

1. 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.

2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.

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

3.1. Owner has notified Contractor and Surety, at the addresses described in Paragraph 10 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

3.2. 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 3.1; and

3.3. Owner has agreed to pay the Balance of the Contract Price to:

1. Surety in accordance with the terms of the Contract;
2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.

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

4.1. Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or

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

4.3. 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 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or

4.4. 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.

5. If Surety does not proceed as provided in Paragraph 4 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 4.4, 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.

6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 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 a 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:

6.1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;

6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of Surety under Paragraph 4; and

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

7. 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.

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

9. 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.

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

11. 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.

12. Definitions.

12.1. 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.

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

12.3. Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4. 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 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*):

Sandy Hook Water District
P.O. Box 726
Sandy Hook, Kentucky

CONTRACT

Effective Date of Agreement:

Amount:

Description (*Name and Location*): Contract No. 10 – Water System Improvements

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

Contractor's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By:

Signature

Print Name

Title

Attest:

Signature

Title

By:

Signature (Attach Power of Attorney)

Print Name

Title

Attest:

Signature

Title

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. Reserved.
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)*:

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

Instructions for Certification

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

COMPLIANCE STATEMENT

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

1. I have, ~~have not~~, participated in a previous contract or subcontract subject to Executive 11246 (regarding equal employment opportunity) or a preceding similar Executive Order.
2. If I have participated in such a contract or subcontract, I have, ~~have not~~, filed all compliance reports that have been required to file in connection with the contract or subcontract.

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

3. I have, ~~have not~~ previously had contracts subject to the written affirmative action programs requirements of the Secretary of Labor
4. If I have participated in such a contract or subcontract, I have, ~~have not~~ developed and placed on file at each establishment affirmative action programs as required by the rules and regulations of the Secretary of Labor.

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

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-0018. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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

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

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

DATE: _____

CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS

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

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

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

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

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

(name)

(date)

(title)

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):

Sandy Hook Water District
P.O. Box 726
Sandy Hook, Kentucky

BID

Bid Due Date:

Project (Brief Description Including Location):

Contract 10- Water System Improvements – Approximately 17000 LF of water main upgrades and extensions, including telemetry upgrades, tank inspections, and various other appurtenances.

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: _____
Signature and Title

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title

Attest: _____
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.

Certificate of Substantial Completion

Project:	Owner:	Owner's Contract No.:
Contract:	Date of Contract:	
Contractor:	Engineer's Project No.:	

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- All Work under the Contract Documents:
 The following specified portions:

_____ Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [revised tentative] [definitive] list of items to be completed or corrected, is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- Amended Responsibilities
 Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer	Date
Accepted by Contractor	Date
Accepted by Owner	Date

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

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL DEVELOPMENT AND
FARM SERVICE AGENCY

CONTRACT CHANGE ORDER

ORDER NO.
DATE
STATE
COUNTY

CONTRACT FOR

OWNER

To _____
(Contractor)

You are hereby requested to comply with the following changes from the contract plans and specifications:

Description of Changes (Supplemental Plans and Specifications Attached)	DECREASE in Contract Price	INCREASE in Contract Price
	\$ _____	\$ _____
	\$ _____	\$ _____
TOTALS	\$ _____	\$ _____
NET CHANGE IN CONTRACT PRICE	\$ _____	\$ _____

JUSTIFICATION:

The amount of the Contract will be (Decreased) (Increased) By The Sum Of: _____
_____ Dollars (\$ _____).

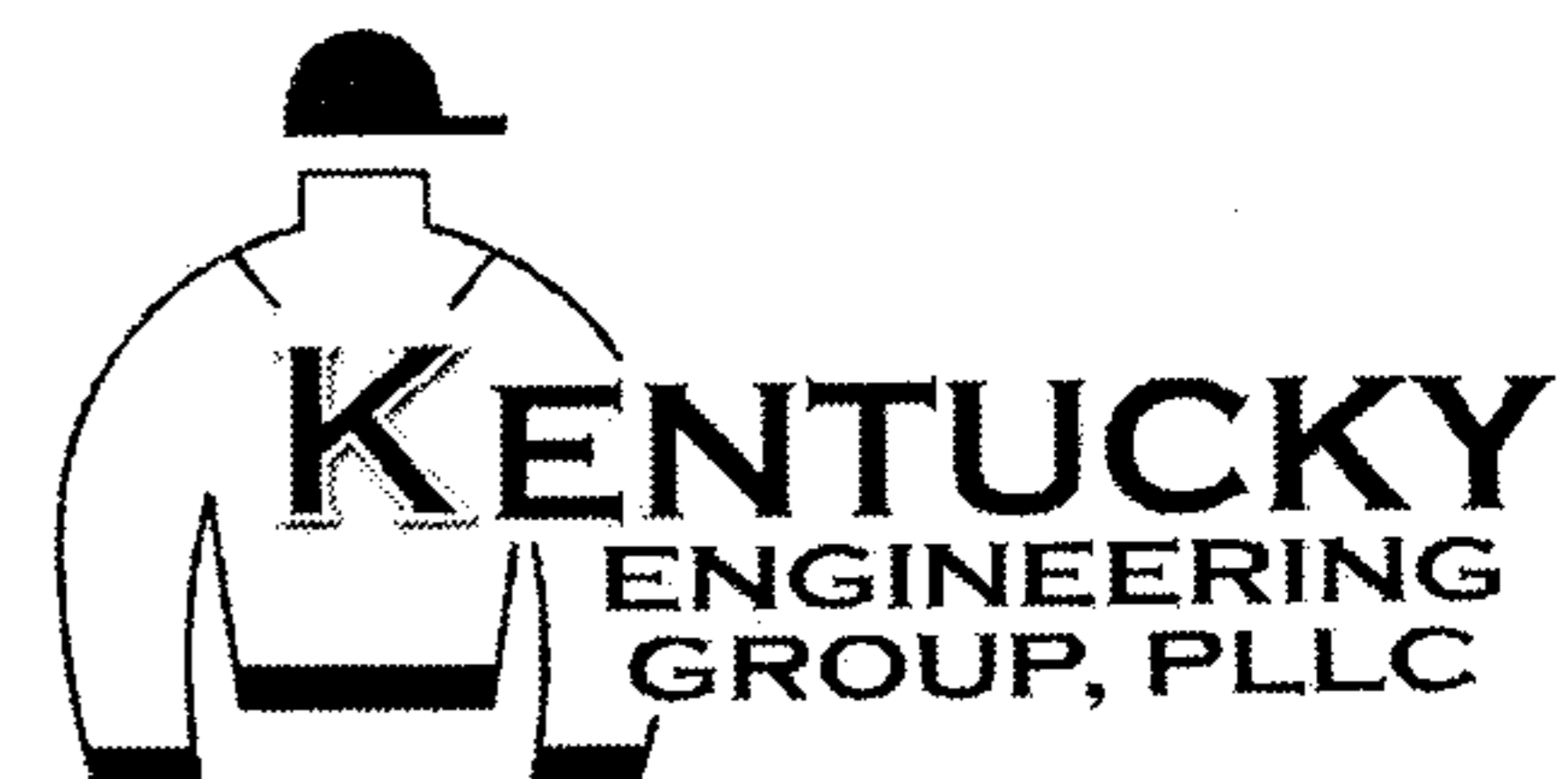
The Contract Total Including this and previous Change Orders Will Be: _____
_____ Dollars (\$ _____).

The Contract Period Provided for Completion Will Be (Increased) (Decreased) (Unchanged): _____ Days.
This document will become a supplement to the contract and all provisions will apply hereto.

Requested _____ (Owner)	_____ (Date)
Recommended _____ (Owner's Architect/Engineer)	_____ (Date)
Accepted _____ (Contractor)	_____ (Date)
Approved by Agency _____ (Name and Title)	_____ (Date)

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

RURAL DEVELOPMENT INFORMATION



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

AMERICAN COUNCIL OF ENGINEERING COMPANIES



**National Society of
Professional Engineers**
Professional Engineers in Private Practice

ASCE American Society
of Civil Engineers

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

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

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).

Copyright © 2002 National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	6
1.01 Defined Terms	6
1.02 Terminology	9
Article 2 – Preliminary Matters	10
2.01 Delivery of Bonds and Evidence of Insurance	10
2.02 Copies of Documents	10
2.03 Commencement of Contract Times; Notice to Proceed	10
2.04 Starting the Work	11
2.05 Before Starting Construction	11
2.06 Preconstruction Conference	11
2.07 Initial Acceptance of Schedules	11
Article 3 – Contract Documents: Intent, Amending, Reuse	11
3.01 Intent	11
3.02 Reference Standards	12
3.03 Reporting and Resolving Discrepancies	12
3.04 Amending and Supplementing Contract Documents	13
3.05 Reuse of Documents	13
3.06 Electronic Data	13
Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points	13
4.01 Availability of Lands	13
4.02 Subsurface and Physical Conditions	14
4.03 Differing Subsurface or Physical Conditions	14
4.04 Underground Facilities	15
4.05 Reference Points	16
4.06 Hazardous Environmental Condition at Site	16
Article 5 – Bonds and Insurance	18
5.01 Performance, Payment, and Other Bonds	18
5.02 Licensed Sureties and Insurers	18
5.03 Certificates of Insurance	18
5.04 Contractor’s Liability Insurance	18
5.05 Owner’s Liability Insurance	19
5.06 Property Insurance	20
5.07 Waiver of Rights	21
5.08 Receipt and Application of Insurance Proceeds	21
5.09 Acceptance of Bonds and Insurance; Option to Replace	21
5.10 Partial Utilization, Acknowledgment of Property Insurer	22
Article 6 – Contractor’s Responsibilities	22
6.01 Supervision and Superintendence	22
6.02 Labor; Working Hours	22
6.03 Services, Materials, and Equipment	22
6.04 Progress Schedule	23
6.05 Substitutes and “Or-Equals”	23
6.06 Concerning Subcontractors, Suppliers, and Others	25
6.07 Patent Fees and Royalties	26
6.08 Permits	26
6.09 Laws and Regulations	26
6.10 Taxes	27

6.11	Use of Site and Other Areas	27
6.12	Record Documents	27
6.13	Safety and Protection.....	28
6.14	Safety Representative	28
6.15	Hazard Communication Programs	28
6.16	Emergencies.....	28
6.17	Shop Drawings and Samples	29
6.18	Continuing the Work	30
6.19	Contractor's General Warranty and Guarantee.....	30
6.20	Indemnification.....	31
6.21	Delegation of Professional Design Services	31
Article 7 – Other Work at the Site.....		32
7.01	Related Work at Site.....	32
7.02	Coordination	32
7.03	Legal Relationships	33
Article 8 – Owner's Responsibilities.....		33
8.01	Communications to Contractor.....	33
8.02	Replacement of Engineer.....	33
8.03	Furnish Data.....	33
8.04	Pay When Due	33
8.05	Lands and Easements; Reports and Tests.....	33
8.06	Insurance	33
8.07	Change Orders	33
8.08	Inspections, Tests, and Approvals	33
8.09	Limitations on Owner's Responsibilities.....	34
8.10	Undisclosed Hazardous Environmental Condition	34
8.11	Evidence of Financial Arrangements	34
Article 9 – Engineer's Status During Construction.....		34
9.01	Owner's Representative.....	34
9.02	Visits to Site.....	34
9.03	Project Representative	34
9.04	Authorized Variations in Work	35
9.05	Rejecting Defective Work	35
9.06	Shop Drawings, Change Orders and Payments.....	35
9.07	Determinations for Unit Price Work	35
9.08	Decisions on Requirements of Contract Documents and Acceptability of Work	35
9.09	Limitations on Engineer's Authority and Responsibilities.....	36
Article 10 – Changes in the Work; Claims.....		36
10.01	Authorized Changes in the Work	36
10.02	Unauthorized Changes in the Work	36
10.03	Execution of Change Orders	37
10.04	Notification to Surety	37
10.05	Claims	37
Article 11 – Cost of the Work; Allowances; Unit Price Work		38
11.01	Cost of the Work.....	38
11.02	Allowances.....	40
11.03	Unit Price Work.....	40
Article 12 – Change of Contract Price; Change of Contract Times.....		41
12.01	Change of Contract Price.....	41
12.02	Change of Contract Times.....	42

12.03	Delays	42
Article 13	– Tests and Inspections; Correction, Removal or Acceptance of Defective Work	43
13.01	Notice of Defects	43
13.02	Access to Work	43
13.03	Tests and Inspections	43
13.04	Uncovering Work	43
13.05	Owner May Stop the Work	44
13.06	Correction or Removal of Defective Work	44
13.07	Correction Period	44
13.08	Acceptance of Defective Work	45
13.09	Owner May Correct Defective Work	45
Article 14	– Payments to Contractor and Completion	46
14.01	Schedule of Values	46
14.02	Progress Payments	46
14.03	Contractor’s Warranty of Title	48
14.04	Substantial Completion	48
14.05	Partial Utilization	49
14.06	Final Inspection	49
14.07	Final Payment	49
14.08	Final Completion Delayed	50
14.09	Waiver of Claims	51
Article 15	– Suspension of Work and Termination	51
15.01	Owner May Suspend Work	51
15.02	Owner May Terminate for Cause	51
15.03	Owner May Terminate For Convenience	52
15.04	Contractor May Stop Work or Terminate	52
Article 16	– Dispute Resolution	53
16.01	Methods and Procedures	53
Article 17	– Miscellaneous	53
17.01	Giving Notice	53
17.02	Computation of Times	53
17.03	Cumulative Remedies	53
17.04	Survival of Obligations	54
17.05	Controlling Law	54
17.06	Headings	54
Article 18	– Federal Requirements	54
18.01	Agency Not a Party	54
18.02	Contract Approval	54
18.03	Conflict of Interest	54
18.04	Gratuities	54
18.05	Audit and Access to Records	55
18.06	Small, Minority and Women’s Businesses	55
18.07	Anti-Kickback	55
18.08	Clean Air and Pollution Control Acts	55
18.09	State Energy Policy	55
18.10	Equal Opportunity Requirements	55
18.11	Restrictions on Lobbying	56
18.12	Environmental Requirements	56

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

32. *Petroleum* – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
33. *Progress Schedule* – A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
34. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
35. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
36. *Radioactive Material* – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
37. *Related Entity* – An officer, director, partner, employee, agent, consultant, or subcontractor.
38. *Resident Project Representative* – The authorized representative of Engineer who may be assigned to the Site or any part thereof.
39. *Samples* – Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
40. *Schedule of Submittals* – A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
41. *Schedule of Values* – A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
42. *Shop Drawings* – All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
43. *Site* – Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
44. *Specifications* – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
45. *Subcontractor* – An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
46. *Substantial Completion* – The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
47. *Successful Bidder* – The Bidder submitting a responsive Bid to whom Owner makes an award.

48. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.
49. *Supplier* – A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.
50. *Underground Facilities* – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
51. *Unit Price Work* – Work to be paid for on the basis of unit prices.
52. *Work* – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
53. *Work Change Directive* – A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and Agency upon recommendation of the Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

- A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.
- B. *Intent of Certain Terms or Adjectives*
 1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.
- C. *Day*
 1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*

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

E. *Furnish, Install, Perform, Provide*

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

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

2.02 *Copies of Documents*

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

2.03 *Commencement of Contract Times; Notice to Proceed*

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

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

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

2.06 *Preconstruction Conference*

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

2.07 *Initial Acceptance of Schedules*

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

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage

as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

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

3.02 *Reference Standards*

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

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

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

B. *Resolving Discrepancies*

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

3.04 *Amending and Supplementing Contract Documents*

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

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or
 - 2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.
- B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

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

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

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any,

of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and
 - 2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:
 - 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:
 - 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.

4.04 *Underground Facilities*

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

- c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and
- d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

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

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:
 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 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.

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

5.05 *Owner's Liability Insurance*

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

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (Contractor shall be responsible for any deductible or self-insured retention.). This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
 2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.
- B. Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Contractor as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

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

6.02 *Labor; Working Hours*

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

6.03 *Services, Materials, and Equipment*

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

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

6.04 *Progress Schedule*

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

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
 - 1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times, and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

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

- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor
 - 2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

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

6.07 *Patent Fees and Royalties*

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

6.08 *Permits*

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

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain

that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

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

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

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

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

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

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

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved

Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

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

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract

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

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.
1. *Shop Drawings*
 - a. Submit number of copies specified in the General Requirements.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
 2. *Samples*
 - a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Submittal Procedures*
1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:
 - a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
 - c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
 - d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
 3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review*

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

E. *Resubmittal Procedures*

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

6.18 *Continuing the Work*

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

6.19 *Contractor's General Warranty and Guarantee*

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

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

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:
 1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

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

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

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

7.02 *Coordination*

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

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

7.03 *Legal Relationships*

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

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

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

8.05 *Lands and Easements; Reports and Tests*

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

8.06 *Insurance*

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

8.07 *Change Orders*

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

8.08 *Inspections, Tests, and Approvals*

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

8.09 *Limitations on Owner's Responsibilities*

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

8.10 *Undisclosed Hazardous Environmental Condition*

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

8.11 *Evidence of Financial Arrangements*

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

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

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

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

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

9.04 *Authorized Variations in Work*

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

9.05 *Rejecting Defective Work*

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

9.06 *Shop Drawings, Change Orders and Payments*

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

9.07 *Determinations for Unit Price Work*

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

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

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

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

9.09 *Limitations on Engineer's Authority and Responsibilities*

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

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

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

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

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

10.04 *Notification to Surety*

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

10.05 *Claims*

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

- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

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

11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.
 - 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
 - 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 - 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
 - 4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
 - 5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressages, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

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

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

- C. **Contractor's Fee:** When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. **Documentation:** Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

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

11.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
1. the Bid price of a particular item of Unit Price Work amounts to more than 5 percent of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

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

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - 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.

12.02 *Change of Contract Times*

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

12.03 *Delays*

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

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

13.01 *Notice of Defects*

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

13.02 *Access to Work*

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

13.03 *Tests and Inspections*

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

13.04 *Uncovering Work*

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

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

13.05 *Owner May Stop the Work*

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

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.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

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

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

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

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

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

14.02 *Progress Payments*

A. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;

- b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
 3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due

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

D. *Reduction in Payment*

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

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Agency, Contractor, and Engineer shall make a prefinal inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

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

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.
 - 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;
 - 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 Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

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

15.02 *Owner May Terminate for Cause*

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

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

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

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion),
2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and
3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by

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

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

15.03 *Owner May Terminate For Convenience*

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

15.04 *Contractor May Stop Work or Terminate*

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

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. 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 shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 - 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or
 - 2. agrees with the other party to submit the Claim to another dispute resolution process, or
 - 3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

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

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

ARTICLE 18 – FEDERAL REQUIREMENTS

18.01 *Agency Not a Party*

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

18.02 *Contract Approval*

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

18.03 *Conflict of Interest*

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

18.04 *Gratuities*

- A. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner or Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.
- B. In the event this Contract is terminated as provided in paragraph 18.04.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an

amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

18.05 *Audit and Access to Records*

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

18.06 *Small, Minority and Women's Businesses*

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

18.07 *Anti-Kickback*

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

18.08 *Clean Air and Pollution Control Acts*

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

18.09 *State Energy Policy*

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

18.10 *Equal Opportunity Requirements*

- A. If this Contract exceeds \$10,000, Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."
- B. Contractor's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative active obligations required by the Standard Federal Equal Employment

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

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

18.11 *Restrictions on Lobbying*

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

18.12 *Environmental Requirements*

- A. When constructing a project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental constraints:
 - 1. Wetlands – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.
 - 2. Floodplains – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.
 - 3. Historic Preservation – Any excavation by Contractor that uncovers an historical or archaeological artifact shall be immediately reported to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the State Historic Preservation Officer (SHPO).
 - 4. Endangered Species – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.

EXHIBIT GC-A

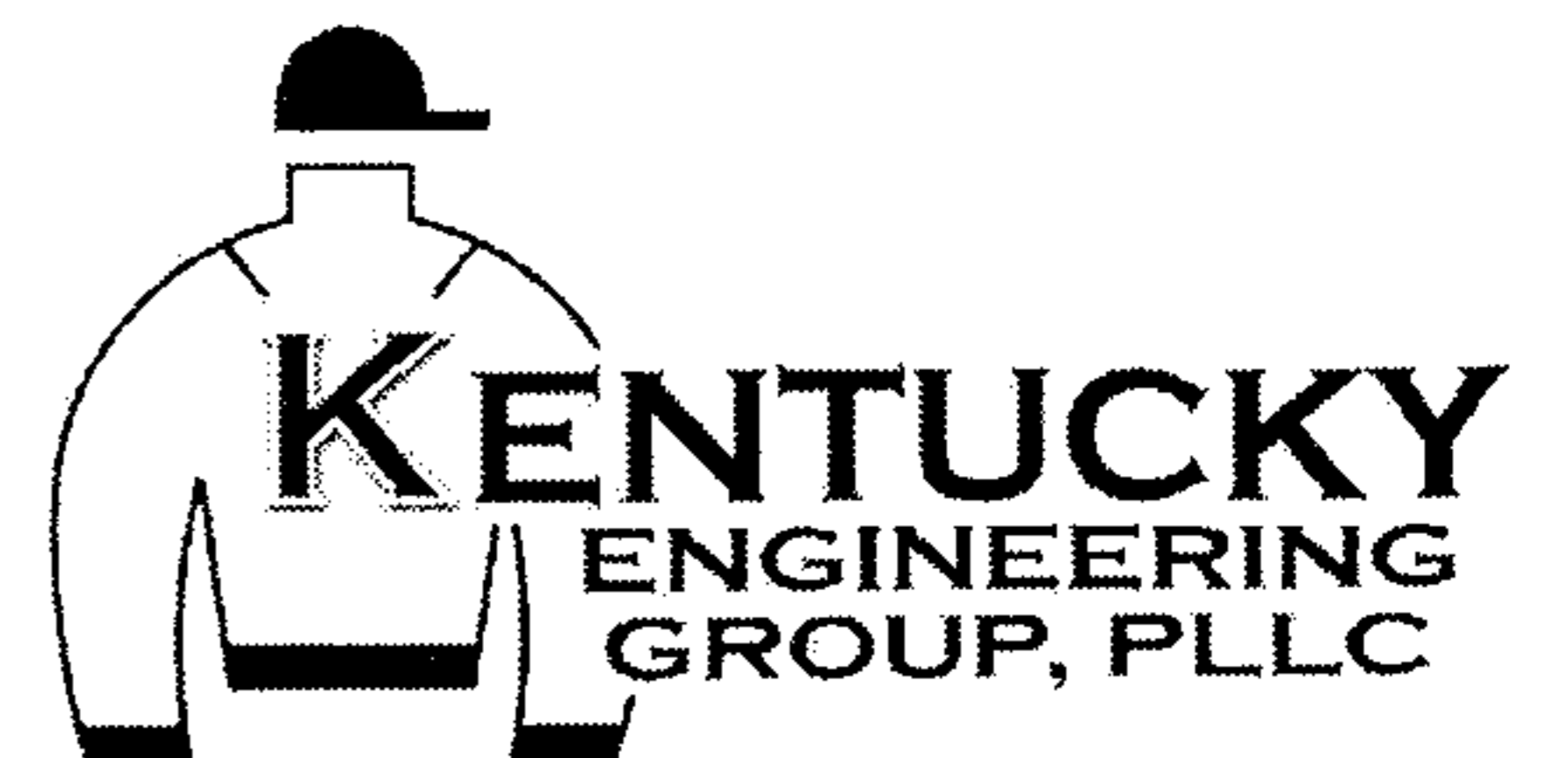
Certificate of Owner's Attorney

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: _____

RURAL DEVELOPMENT
SUPPLEMENTARY CONDITIONS



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 that are 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.

TABLE OF CONTENTS

		Page
SC-1.01.A.2	Agency	1
SC-1.01.A.4	Application for Payment	1
SC-1.01.A.10	Change Order	1
SC-1.01.A.21	Field Order	2
SC-2.03.A	Commencement of Contract Times; Notice to Proceed	2
SC-4.02	Subsurface and Physical Conditions	2
SC-5.03	Certificates of Insurance	2
SC-5.04	Contractor's Liability Insurance	2
SC-6.05.C	Substitutes and "Or-Equals", Engineer's Evaluation	3
SC-6.06	Concerning Subcontractors, Suppliers, and Others	3
SC-9.03	Project Representative	3
SC-14.02.A.3	Applications for Payment	4
SC-14.02.C.1	Payment Becomes Due	4
SC-18.08	Clean Air and Pollution Control Acts	4

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 USDA Rural Utilities Service pursuant to the Consolidated Farm and Rural Development Act (7 USC Section 1921 et seq.). The Rural Utilities Service programs are administered through the USDA Rural Development offices, therefore, the Agency for these documents is USDA Rural Development. *{add other funding sources and modify when necessary.}*

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 EJCDC No. C-620. 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 EJCDC No. C-941. Agency approval is required before Change Orders are effective.

SC-1.01.A.21. Add the following language to the end of Paragraph 1.01.A.21:

The Engineer's Consultants on this project are:

Kentucky Engineering Group, PLLC
P.O. Box 1034
Versailles, Kentucky 40383

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 to run 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.

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-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.

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 \$ 1,000,000

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

- a. General Aggregate \$ 3,000,000
- b. Products - Completed Operations Aggregate \$ 3,000,000
- c. Personal and Advertising Injury \$ 2,000,000
- d. Each Occurrence (Bodily Injury and Property Damage) \$ 2,000,000
- e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable. \$ 1,000,000
- 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. Owner and Engineer shall be named as additional insureds on policies under SC-5.04 - C.2. and SC-5.04 - C.3. above.

SC-6.05.C. Amend the paragraph by making two subparagraphs under the title C. Engineer's Evaluation. The paragraph text is retitled, 6.05.C.2 After Effective Date of Agreement. A new paragraph is added before this paragraph to read as follows:

1. During Bidding. The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or "or-equal" materials and equipment as defined in paragraph 6.05 of the General Conditions, or those substitute materials and equipment approved by the Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function, and quality to be met by any proposed substitute or "orequal" item. Request for Engineer's clarification of materials and equipment considered "or-equal" prior to the Effective Date of the Agreement must be received by the Engineer at least 5 days prior to the date for receipt of Bids. No item of material or equipment will be considered by Engineer as a substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each request shall conform to the requirements of Paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

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.

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.

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, place in escrow any funds that are required for retainage, or invest the retainage for the benefit of the Contractor.

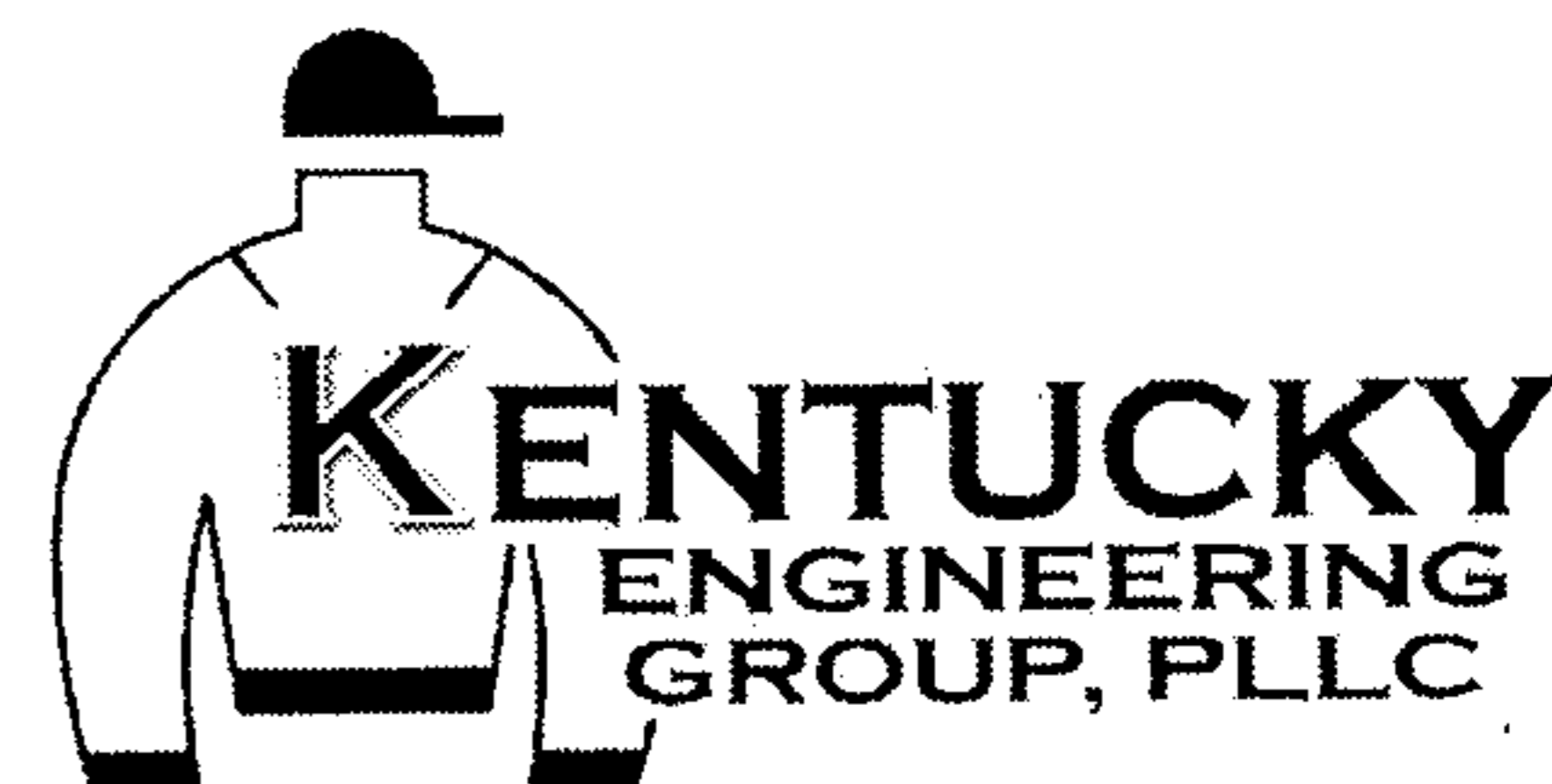
SC-14.02.C.1. Delete Paragraph 14.02.C.1 in its entirety and insert the following in its place:

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 ten 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).

**KENTUCKY ENGINEERING GROUP
GENERAL CONDITIONS**



SECTION 00700**GENERAL CONDITIONS****1. CONTRACT DOCUMENTS**

The Notice to Bidders, Instructions to Bidders, Bid, Bid Bond, Agreement, Performance and Payment Bonds, Certificate of Insurance, Notice of Award, Notice to Proceed, Change Order Form, Contractor's Affidavit to Accompany Partial Payment Estimate, General Conditions, Supplementary General Conditions, Drawings, Addenda and Specifications shall all be binding on the Contractor, and shall be fully a part of the Contract as if thereto attached or therein repeated in words and figures.

2. DEFINITIONS AND MEANINGS OF TERMS

Whenever in the Contract Documents the following terms or pronouns referring to them are used, the intent and meaning shall be interpreted as follows which shall be applicable to both the singular and plural thereof:

A. The CONTRACT shall mean the contract executed by the Owner and the Contractor, of which these General Conditions form a part; the terms CONTRACT and AGREEMENT are synonymous.

B. The terms OWNER and CONTRACTOR shall mean the respective parties to the Contract; the OWNER being a public or quasi-public body or authority, corporation, association, partnership, or individual for whom the work is to be performed; the CONTRACTOR being the individual, partnership or corporation with whom the Owner has executed the Contract.

C. The term ENGINEER shall mean Kentucky Engineering Group, PLLC., successor, or duly authorized representative.

D. ADDENDA shall mean written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions, deletions, clarifications or corrections.

E. BID shall mean the offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed; the terms BID and PROPOSAL are synonymous.

F. BIDDER shall mean any individual, partnership or corporation submitting a BID for the WORK.

G. BONDS shall mean Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.

H. CHANGE ORDER shall mean a written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

I. CONTRACT DOCUMENTS shall mean the contract, including NOTICE TO BIDDERS, INSTRUCTIONS TO BIDDERS, BID, BID BOND, AGREEMENT, PAYMENT BOND, PERFORMANCE BOND, CERTIFICATE OF INSURANCE, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, CONTRACTOR'S AFFIDAVIT TO ACCOMPANY PARTIAL PAYMENT ESTIMATE, DRAWINGS, GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS, ADDENDA and SPECIFICATIONS.

J. CONTRACT PRICE shall mean the total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

K. CONTRACT TIME shall mean the number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

L. DRAWINGS shall mean the part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.

M. FIELD ORDER shall mean a written order effecting a change on the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.

N. NOTICE OF AWARD shall mean the written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

O. NOTICE TO PROCEED shall mean written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with the WORK and establishing the date of commencement of the WORK.

P. PROJECT shall mean the undertaking to be performed as provided in the CONTRACT DOCUMENTS.

Q. RESIDENT PROJECT REPRESENTATIVE shall mean the authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

R. SHOP DRAWING shall mean all drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed; the terms SHOP DRAWINGS and SUBMITTALS are synonymous.

S. SPECIFICATIONS shall mean a part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

T. SUBCONTRACTOR shall mean individual, partnership or corporation having a direct contract with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

U. SUBSTANTIAL COMPLETION shall mean that date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.

V. SUPPLIERS shall mean any person, supplier or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site.

W. WORK shall mean labor necessary to produce the construction required by the CONTRACT DOCUMENTS, AND all materials and equipment incorporated or to be incorporated in the PROJECT.

X. WRITTEN NOTICE shall mean any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the WORK.

3. DRAWINGS AND SPECIFICATIONS

The intent of the Drawings and Specifications is that the Contractor shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the Work in accordance with the Contract

Documents and all incidental work necessary to complete the Project in an acceptable manner, ready for use, occupancy or operation by the Owner.

The Engineer, without charge, will furnish to the Contractor not more than eight (8) sets of the Drawings and Specifications. If additional sets of documents are required by the Contractor for the proper handling of the work, such documents will be furnished to the Contractor at cost.

The Contractor shall keep one set of the Drawings and Specifications on the site of the work. These prints shall be kept and maintained in good condition at the project site and a qualified representative of the Contractor shall enter upon these prints, from day-to-day, the actual "as-built" record of the construction progress. Entries and notations shall be made in a neat and legible manner and these prints shall be delivered to the Engineer upon completion of the construction. APPROVAL OF PARTIAL PAYMENTS AND FINAL PAYMENT WILL BE CONTINGENT UPON COMPLIANCE WITH THIS PROVISION.

The Drawings and Specifications are intended to be explanatory to each other, but should any discrepancy appear or any misunderstanding arise as to the importance of anything contained in either, the Engineer shall make the necessary interpretation. Corrections of errors or omissions in the Drawings or Specifications may be made by the Engineer when such corrections are necessary for the proper fulfillment of their intention as construed by the ENGINEER.

All work or materials shown on the Drawings and not mentioned in the Specifications, or any work specified and not shown on the Drawings, shall be furnished, performed, and done by the Contractor as if same were both mentioned in the Specifications and shown on the Drawings.

Should the Contractor in preparing his bid find anything necessary for the construction of the project that is not mentioned in the Specifications or shown on the Drawings, or find any other discrepancy in the Contract Documents, he shall notify the Engineer so that such discrepancies may be corrected by addendum prior to the bid opening. Should the Contractor fail to notify the Engineer of such discrepancies, it will be assumed that his bid included everything necessary for the complete construction in the spirit and intent of the designs shown.

The Contractor may be furnished additional instructions and detail drawings, by the Engineer, as necessary to carry out the Work required by the Contract Documents. The additional drawings and instructions thus supplied will become a part of the Contract Documents. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions.

4. SHOP DRAWINGS

The Contractor shall submit (in reproducible transparency form unless otherwise specified) shop and working drawings of concrete reinforcement, structural details, piping layout, wiring, materials fabricated especially for the Contract, and materials and equipment for which such drawings are specifically requested.

Such drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for the Contract.

When so specified or if considered by the Engineer to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted in place of shop and working drawings. In such case, the requirements shall be as specified for shop and working drawings, insofar as possible, except that the submission shall be in quadruplicate.

The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings so that there shall be no delay to the Work due to the absence of such drawings. Prior to the submittal of any shop drawings, the Contractor shall submit a schedule of proposed shop drawing transmittals. The schedule shall

identify the subject matter of each transmittal, the corresponding specification section number and the proposed date of submission. During the progress of the Work, the schedule shall be revised and resubmitted as necessary.

No material or equipment shall be purchased or fabricated especially for the Contract until the required shop and working drawings have been submitted as herein above provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.

Until the necessary review has been made, the Contractor shall not proceed with any portion of the Work (such as the construction of foundations), the design or details of work, materials, equipment or other features for which review is required.

All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24-in. by 36-in. sheets, except those which are made by changing existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner, Contractor, and building, equipment, or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by a letter of transmittal giving a list of the drawing numbers and the names mentioned above.

Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer; other drawings shall be returned for correction.

If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.

The review of shop and working drawings hereunder will be general only, and nothing contained in these GENERAL CONDITIONS shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance specified thereunder.

Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires and appurtenances, layout, etc., detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do all work necessary to make such modifications.

The marked-up reproducible of the shop and working drawings or one marked-up copy of catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when so requested. The Engineer will require approximately fifteen (15) days for review of shop drawings.

5. DISCREPANCIES IN DRAWINGS, SPECIFICATIONS AND SHOP DRAWINGS

In case of a discrepancy on the Drawings, figure dimensions shall govern over scale dimensions and large scale drawings shall govern over small scale drawings. In case of a discrepancy in the Specifications and Contract Documents, detailed technical specifications and special or supplementary conditions shall govern over general conditions and other sections of the Contract Documents. In case of a discrepancy between the Drawings and Specifications, the Specifications shall govern; addenda shall govern over all Drawings, Specifications and Contract Documents. Supplementary Conditions shall govern over these General Conditions.

In case of discrepancy between the shop drawings and the requirements of the Drawings, Specifications and Contract Documents, the provisions of the Drawings, Specifications, and Contract Documents shall prevail,

even though the shop drawings have been reviewed by the Engineer, unless the conflict therein has been specifically waived in writing by the Engineer.

Any discrepancies found between the Drawings and Specifications and site conditions or any inconsistencies or ambiguities in the Drawings or Specifications shall be immediately reported to the Engineer, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor's risk.

6. CONTRACTOR

Only one Contractor is recognized as a party to this Contract and where the term CONTRACTOR is used, the prime contractor who signed this Contract is referred to. For convenience, the Specifications may have been divided into separate headings or divisions to cover the various trades represented in the work, and where "Electrical Contractor", "Mechanical Contractor", "Plumbing Contractor" and other such "Contractors" are referred to, it is for convenience only.

It is understood and agreed that the Contractor has satisfied himself as to the nature and location of the work, the topography of the ground, the character and quality of materials to be encountered, the character of equipment or other facilities needed for the proper execution of the Work, the general and local conditions, and all other matters which in any way affect the work under the Contract. No verbal statement of any officer, agent or employee of the Owner or the Engineer, either before or after the execution of the Contract, shall affect or modify any of the terms or obligations contained herein.

7. NOTICE AND SERVICE THEREOF ON CONTRACTOR

The address given in the Proposal upon which this Contract is founded and the Contractor's office at or near the site of the work are hereby designated as places to either of which notices, letters and other communications to the Contractor shall be certified, mailed or delivered. The delivering at the above named places, or depositing in a postpaid wrapper directed to the first named place, in any post office box regularly maintained by the United States Postal Service, of any notice, letter or other communication to the Contractor shall be deemed sufficient service thereof upon the Contractor, and the date of said service shall be the date of delivery or mailing. The first named address may be changed at any time by an instruction in writing, executed and acknowledged by the Contractor and delivered to the Engineer and the Owner. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon the Contractor personally.

8. ASSIGNMENT OF CONTRACT

The Contractor shall not assign, sell, transfer or otherwise dispose of his contract or any monies due or that may become due thereunder, without the prior written consent of the Owner.

9. SUBLETTING CONTRACT

The Contractor may utilize the services of specialty Subcontractors on those parts of the Work which, under contracting practices, are performed by specialty Subcontractors. However, the Contractor will not be permitted to sublet any portion of his contract to any individual, co-partnership, or corporation without the prior written consent of the Owner and the approval of the Engineer. The Contractor shall not sublet more than fifty percent (50%) of the work without the consent of the Owner and the approval of the Engineer prior to the receipt of bids. The Contractor shall, if requested, notify the Owner in writing of the names of subcontractors proposed for the work.

The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to the Contractor by the terms of the General Conditions and other Contract Documents insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provisions of the Contract Documents.

Nothing contained in this contract shall create any contractual relation between any subcontractor and the Owner.

All subcontractors are subject to the approval of the Owner.

10. COMMENCEMENT AND COMPLETION OF WORK

The Contractor shall commence work on a date to be specified in a written order of the Owner, and shall fully complete all work under the Contract within the number of days set out in the Bid and Contract. As set forth in the Bid and Contract, the work under the Contract will be subject to liquidated damages in the event the work is not completed within the Contract Time.

11. PROSECUTION OF WORK

The Contractor shall give his personal superintendence to the work or shall have a competent superintendent, satisfactory to the Owner and the Engineer on the work at all times during its progress with full authority to act for him. The superintendent shall have been designated in writing by the Contractor as the Contractor's representative at the site. The Contractor may not change or substitute superintendent without written approval of the Owner. All communications given to the superintendent shall be as binding as if given to the Contractor. The Contractor shall also provide an adequate staff for properly coordinating and expediting his work. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction.

The Contractor shall be prepared to start the work as stipulated in the Proposal, but not until he has received official notice from the Owner to do so. Official notice will be in the form of a written Notice to Proceed. The work shall be prosecuted in a manner and with sufficient materials, equipment, and labor as is considered necessary to insure completion within the time set forth in the Contract. The Contractor shall not suspend the work or any portion of it without the written consent of the Owner and the approval of the Engineer.

12. CONTRACT TIME - DELAYS AND EXTENSIONS

The number of days in which the Contractor shall fully perform the proposed work has been set out in the Proposal and/or Contract. The date of beginning and the time for completion of the Work are essential conditions of the Contract.

In arriving at any credit due the Contractor for an extension of time on the Contract, the Owner, upon the recommendation of the Engineer, may allow such credit as in his judgement is deemed equitable and just for all delays occasioned by any act, or failure to act, on the part of the Contractor or caused by forces beyond the Contractor's control. Additional time will also be allowed the Contractor to cover approved over-runs or additions to the Contract in the same proportion that the said over-runs or additions in monetary value bears to the original contract amount. Delays caused by normal and ordinary weather conditions foreseeable at the time the work is bid will not be the basis for an extension of the Contract Time.

If the Contractor claims that any instructions by Drawings or otherwise involve an extension of time, 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.

The Contractor shall make no claim for extra compensation due to delays of the project beyond his control. Such delays may include those caused by any act of neglect on the part of the Owner or Engineer, or by any employee of either, or by any separate contractor employed by the Owner, or by changes ordered in the work, or by labor disputes, fire, unusual delays in transportation, adverse weather conditions not reasonably anticipatable, unavoidable casualties, or by delay authorized by the Owner pending arbitration, or by any other cause which the Engineer determines may justify the delay.

Time extensions may be granted upon proper justification by the Contractor. Any claim for time extensions under these provisions shall be submitted in writing to the Engineer not more than twenty (20) days following commencement of the delay; otherwise claim will be waived. With submission of claim, Contractor shall provide an estimate of the probable effect of such delay on the progress of the work.

Additional costs incurred in accelerating the work to compensate for such delays (as defined above) shall also not form the basis for extra compensation claims.

13. FAILURE TO COMPLETE WORK ON TIME

Should the Contractor fail or refuse to complete the work within the time specified in his Proposal and/or Contract (or extension of time granted by the Owner), the Contractor shall pay liquidated damages in an amount set out in said Proposal and/or Contract. The amount of liquidated damages shall in no event be considered as a penalty, nor other than an amount agreed upon by the Contractor and the Owner for damages, losses, additional engineering, additional resident inspection and other costs that will be sustained by the Owner, if the Contractor fails to complete the work within the specified time. Liquidated damages will be applied on a rate per day for each and every calendar day (Sundays and holidays included) beyond the contract expiration date stipulated in the Contract Documents, considering all time extensions granted.

14. CHARACTER OF WORKMEN, EQUIPMENT, AND MATERIAL

The Contractor shall employ only workmen skilled in their various duties and shall remove from the project, at the request of the Engineer, any person employed in, about, or upon the work, who misconducts himself or is incompetent or negligent in the performance of the duties assigned to him.

The Contractor shall at all times enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him. Any careless, untrustworthy, or incompetent workman shall be removed forthwith upon the request of the Engineer or his duly authorized representative. Particular application shall be to workmen who ignore quality specifications on pipe bedding, laying, and backfilling, below grade building, concrete pouring, and other work to be covered up or assuming an unalterable set.

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

Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the Work. Stored materials and equipment to be incorporated in the Work shall be located so as to facilitate prompt inspection. Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

Materials, supplies or equipment to be incorporated into the Work shall not be purchased by the Contractor or any Subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

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

15. ENGINEER'S STATUS

In rendering general engineering service, resident engineering and inspection of construction, the Engineer is not in charge of, and shall not be responsible for, the methods of construction, the construction forces or the construction equipment, construction safety procedures, or Contractor payment for labor and materials on the project.

The Engineer will inspect the work as the authorized representative of the Owner and will have authority to stop the work whenever, in his opinion, such action is necessary to insure the proper execution of the Contract. He will also have authority to reject work and materials which do not conform to the Drawings, Specifications and Contract Documents and to direct the place or places where work shall be prosecuted. The Engineer is the agent of the Owner only to the extent provided in the Specifications and Contract Documents, except in special instances when this authority is extended; in such latter instances he will, upon request, show the Contractor written proof of his authority.

The Engineer will also interpret the meaning and requirements of the Drawings, Specifications and Contract Documents, decide all engineering questions, and decide all disputes that may arise between the Owner and the Contractor. The Engineer's decisions on these matters will be final and binding on both the Contractor and the Owner unless the dispute is submitted to arbitration or either party resorts to legal action for settlement.

The Engineer is the interpreter of the conditions of the Contract and the judge of its performance. In this duty, he will not favor either the Owner or the Contractor but will use his authority under the Contract to insure and enforce its faithful performance by both parties.

In case of the termination of the employment of the Engineer, the Owner will appoint a capable and reputable Engineer, whose status under the Contract will be the same as that of the former Engineer; any dispute in connection with such appointment shall be subject to arbitration.

16. ENGINEER'S DECISIONS

The Engineer shall, within a reasonable time after their presentation to him, make decisions on all claims of the Owner or Contractor and on all matters relating to the execution and progress of the work or the interpretations of the Drawings, Specifications and Contract Documents.

Unless otherwise expressly provided in the Specifications and Contract Documents, all the Engineer's decisions are subject to arbitration, provided arbitration is agreed to by both the Owner and the Contractor.

If, however, the Engineer fails to render a decision within ten (10) days after the parties have presented their evidence, either party may then request arbitration. If the Engineer renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence but shall not disturb or interrupt such proceedings except where such decision is acceptable to the parties concerned.

17. INSPECTION OF WORK

The Engineer, his representatives and representatives of regulatory or sponsoring state or federal agencies shall at all times have full access to the work and to all materials intended for use in the work, as well as to plants where such materials are produced. The Contractor shall provide for such access and inspection. If the work shall be covered up without the knowledge or consent of the Engineer, it must, if directed by the Engineer, be uncovered for examination at the Contractor's expense.

18. INSPECTION OF WORK AWAY FROM THE SITE

If work to be done away from the construction site is to be inspected on behalf of the Owner during its fabrication, manufacture, or testing, or before shipment, the Contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in

writing and delivered to the Engineer in ample time so that the necessary arrangements for the inspection can be made.

19. STANDARD SPECIFICATIONS

Where standard specifications, such as those of the American Society for Testing and Materials, the American National Standards Institute, the American Water Works Association, the American Association of State Highway and Transportation Officials, the Federal Aviation Agency, the Federal Specifications, etc., are referred to in the Specifications and Contract Documents and on the Drawings, said references shall be construed to mean the latest amended and/or revised versions of the said standard or tentative specification.

20. SPECIFIC BRANDS, MAKES OR MANUFACTURERS

Wherever in the Specifications one or more specific brands, makes or manufacturers are set out and qualified by the "or equal" clause, it is intended to denote the quality standard of the article desired, but unless otherwise noted does not restrict the Contractor to the specific brand, make or manufacturer. In cases where one or more specific brands, makes or manufacturers are named and these names are not qualified by the "or equal" clause, it is intended that the Contractor be restricted to one of those named unless otherwise set out.

The Contractor may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the Specifications by reference to brand name or catalogue number, and if, in the opinion of the Engineer, such material, article, or piece of equipment is of equal substance and function to that specified, the Engineer may accept its substitution and use by the Contractor. Any cost differential shall be added or deducted from the Contract Price and the Contract Documents shall be appropriately modified by Change Order. The Contractor warrants that if substitutes are accepted, no major changes in the function or general design of the Project will result. Incidental changes or extra component parts required to accommodate the substitute shall be made by the Contractor without a change in the Contract Price or Contract Time.

21. "OR EQUAL" CLAUSE

Whenever the words "or approved equal", "or equal", or "similar to", etc., appear in the Specifications, they shall be interpreted to mean an item of material or equipment that, in the opinion of the Engineer, is similar to that named, suited to the same use, capable of performing the same function as that named, has a record of service equal to that named, and is equal in quality, capacity and/or efficiency to that named.

The Engineer's decision as to the equality of any material or equipment to that specified shall be final, but acceptance by the Engineer shall not relieve the Contractor from his responsibility concerning such materials or equipment or affect the guarantee covering the workmanship, materials and equipment.

22. PERMITS AND CODES

Unless otherwise set out in the Specifications or required by the agencies involved, the Contractor shall make application for, obtain and pay for all licenses and permits of a temporary nature necessary for the prosecution of the Work and shall pay for all fees and charges in connection therewith. Permits, licenses and easements for permanent structures or permanent changes in existing facilities will be secured and paid for by the Owner, unless otherwise specified. The Contractor shall be required to comply with all state or municipal ordinances, laws, and/or codes insofar as the same are binding on the Owner.

The intent of this Contract is that the Contractor shall base his bid upon the Drawings and Specifications, but that all work installed shall comply with all applicable codes and regulations as amended by any waivers. Before installing the work, the Contractor shall examine the Drawings and the Specifications for compliance with applicable codes and regulations bearing on the Work, and shall immediately report any discrepancy to the Engineer. Where the requirements of the Drawings and Specifications fail to comply with the applicable code or regulation, the Owner will adjust the Contract by change order to conform to the code or regulation (unless waivers in writing covering the differences have been granted by the governing authority) and shall make appropriate adjustment in the contract price. Should the Contractor fail to observe the foregoing provisions and

install work at variance with any applicable code or regulation as may be amended by waivers (notwithstanding the fact that such installation is in compliance with the Drawings and Specifications), the Contractor shall remove and/or replace such work without cost to the Owner, except that a change order will be issued to cover any additional cost the Contractor would have been entitled to receive if the change had been made before the Contractor commenced work on the items involved.

23. WAGES AND HOURS

The Contractor shall pay not less than the prevailing wage scale set out in these Specifications and Contract Documents, as amended, and shall comply in every respect to applicable rules, regulations and statutes pertaining to wages and hours.

24. NON-REBATE OF WAGES

The Contractor shall comply with the regulations, rulings and interpretations of the Secretary of Labor of the United States, pursuant to the Federal Anti-Kickback Act of June 13, 1934, as amended, 48 Stat. 948; 62 Stat. 74; 63 Stat. 108 (Title 18, U.S.C. Sec. 874 and Title 40 U.S.C. Sec. 276c) including all subsequent amendments which makes it unlawful to induce any person employed in the construction or repair of public buildings or public works to give up any part of the compensation to which he is entitled under his Contract of Employment; and the Contractor agrees to insert a like provision in all subcontracts hereunder. The Contractor may be required to execute an affidavit covering each weekly payroll and certifying compliance with said Anti-Kickback Act.

25. CONTRACT SECURITY OR PERFORMANCE AND PAYMENT BOND

The Contractor will be required to furnish the Owner with a Performance Bond and a Payment Bond to run for one year after the date of final acceptance of the Work by the Owner and the Engineer. The Bonds shall be executed by a surety company duly authorized to do business in the state in which the work is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular 570. Each Bond shall be in the amount not less than one hundred percent (100%) of the contract price, as security for the faithful performance of this contract and as security for the payment of all persons performing labor and furnishing materials in connection with this Contract. These Bonds must be executed in the form provided as a part of the Contract Documents, and the surety company shall hold a current certificate of authority, as issued by the Treasury Department, as an acceptable surety on Federal Bonds under an act of Congress approved July 30, 1947. The expense of these Bonds shall be borne by the Contractor.

If at any time a surety on any such Bond is declared bankrupt or loses its right to do business in the state in which the Work is to be performed or is removed from the list of Surety Companies acceptable on Federal Bonds, the Contractor shall within five (5) days after notice from the Owner to do so, substitute an acceptable Bond (or Bonds) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such Bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable Bond to the Owner.

26. SAFETY

The Contractor shall take all necessary precautions and provide all necessary safeguards to prevent personal injury and property damage. The Contractor shall provide protection for all persons including but not limited to his employees and employees of other contractors or subcontractors; members of the public; and employees, agents, and representatives of the Owner, the Engineer, and regulatory agencies that may be on or about the Work. The Contractor shall provide protection for all public and private property including but not limited to structures, pipes, and utilities, above and below ground.

The Contractor shall provide and maintain all necessary safety equipment such as fences, barriers, signs, lights, walkways, guards and fire prevention and fire-fighting equipment and shall take such other action as is required to fulfill his obligations under this subsection.

The Contractor shall comply with all federal, state and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property.

The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work. The safety provisions of applicable laws and building and construction codes, in addition to specific safety and health regulations described by Chapter XIII, Bureau of Labor Standards, Department of Labor, Part 1518, Safety and Health Regulations for Construction, as outlined in the Federal Register, Volume 36, No. 75, Saturday, April 17, 1971. Title 29 - LABOR, shall be observed and the Contractor shall take or cause to be taken, such additional safety and health measures as the Contracting Authority may determine to be reasonably necessary.

The Contractor shall also comply with 29 CFR Part 1926 as adopted by 803 KAR 2:400 through 2:425 with amendments, including 29 CFR Part 1910 General Industry Safety and Health Standards applicable to Construction and any supplement to 29 CFR Part 1926 as adopted by Kentucky Occupational Safety and Health Program, Kentucky Labor Cabinet.

The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This responsible person shall have the authority to take immediate action to correct unsafe or hazardous conditions and to enforce safety precautions and programs.

There shall be absolutely no alcoholic beverages or drugs on the site any time.

27. INSURANCE, CONTRACTOR'S COVERAGE AND CANCELLATION PROVISION

The Contractor will not be permitted to commence work until he has obtained all insurance required by these documents and such insurance has been approved by the Engineer and/or Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all insurance required has been so obtained and approved. Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work.

Such insurance shall be secured from an insurance company authorized to write casualty insurance in the state where the Work is located and shall protect the Contractor, his subcontractors, and the Owner from claims of bodily injury, death, property damage, fire and other risks set out herein.

Each policy of insurance covering the Contractor's operations under the Contract shall provide either in the body of the policy, or by appropriate endorsement (rider) to the policy, that such policy cannot be altered or cancelled in less than fifteen (15) days after the mailing of written notice of such alteration or cancellation to the Owner (insured) and the Engineer or not less than ten (10) days after actual receipt by the Owner (insured) and the Engineer, of written notice of such pending alteration or cancellation.

Certificates of Insurance coverage shall include a statement of alteration or cancellation provisions of the policy, sufficient to show definitely that such provisions comply with the requirements stated herein.

28. INSURANCE, WORKMEN'S COMPENSATION

The Contractor shall take out and maintain during the life of this Contract, Workmen's Compensation Insurance, as required by statute, for all of his employees employed at the site of the Project, and in case any work is sublet, for all the subcontractor's employees not otherwise insured. In case any class of employees engaged in hazardous work under this contract at the site of the project is not protected under the Workmen's Compensation Statute, the Contractor shall provide adequate coverage for the protection of the employees not otherwise protected.

29. INSURANCE, PUBLIC LIABILITY

The Contractor shall take out and maintain during the life of this Contract such Public Liability (Bodily Injury and Property Damage) Insurance as shall protect him and any subcontractor performing work covered by this Contract from claims for damages because of bodily injury, including accidental death and from claims for property damages, which may arise from operations under this Contract, whether such operations be by him or by any subcontractor, or by anyone directly or indirectly employed by either of them.

Liability coverage is to be written on a comprehensive general liability policy and must include: (a) premises-operations, manufacturers and contractors, and owners, landlords and tenants; (b) contractors protective; (c) products-completed operations; (d) contractual liability per Paragraph 34 of the General Conditions. General liability shall also include "underground property damage by mechanical equipment" and when blasting is done coverage must be provided for the explosion hazard.

Where work on railroad rights-of-way is involved, the Contractor shall also be covered by Railroad Protective Liability Insurance with limits of liability as required by the railroad company on whose property the work is being performed.

30. INSURANCE, BUILDERS RISK

The Contractor shall provide Builders Risk Insurance (fire and extended coverage) on all work in place and/or materials stored at the site. Such insurance shall provide coverage as set forth in Paragraph 31 hereinafter. The policy shall name as the insured the Contractor, the Engineer and the Owner.

31. MINIMUM INSURANCE LIMITS

The minimum amounts of insurance to be furnished by and for the general contractor and the subcontractors under this Contract are:

- a. Workmen's Compensation - Applicable State Statutes
Employers Liability - \$1,000,000 limit of liability
- b. Comprehensive General Liability:
 - Coverage A - Bodily Injury Liability -
\$2,000,000 each occurrence
\$2,000,000 aggregate
 - Coverage B - Property Damage Liability -
\$1,000,000 each occurrence
\$1,000,000 aggregate
- c. Comprehensive Automobile Liability:
 - Coverage A - Bodily Injury Liability -
\$1,000,000 each person
\$1,000,000 each occurrence
 - Coverage B - Property Damage Liability -
\$1,000,000 each occurrence
- d. Umbrella Excess Liability.....\$2,000,000
- e. Builders Risk Insurance - To include coverage for not less than the losses due to Fire, Explosion, Hail, Lightning, Vandalism, Malicious Mischief, Wind, Collapse, Riot, Aircraft, Smoke, Transportation and Extended Coverage for benefit of the Owner, Engineer, Contractor, and subcontractors as their interests may appear during the Contract Time and until the Work is accepted by the Owner.

100% of Insurable Value of Materials and Accessories to be used in conjunction with the Project.

- f. Railroad Protection Insurance - (where work to be within railroad right-of-way)

Loss of Life or Injury to Person - As required by Railroad
Property Damage - As required by Railroad

32. INSURANCE, PROOF OF CARRIAGE

The Contractor shall furnish the Owner and the Engineer with satisfactory proof of carriage of the insurance required by submitting completed Insurance Certificates.

33. ROYALTIES AND PATENT FEES

The Contractor shall pay license fees and royalties and assume all costs incident to the use of any invention, design, process or device which is the subject of patent rights or copyrights held by others. As set forth in Paragraph 34, hereinafter, he shall indemnify and hold harmless the Owner and all of its officers, agents and employees from and against all claims, damages, losses and expenses (including attorneys' fees) arising out of any infringement of such rights during or after completion of the work, and shall defend all such claims in connection with any alleged infringement of such rights.

34. RESPONSIBILITY FOR DAMAGE, CLAIMS, ETC.

The Contractor shall indemnify and save harmless the Owner, the Engineer and subconsultants and all of their officers, agents and employees, from all claims, damages, losses and expenses including attorneys' fees of any character, name and description brought for, or on account of any injuries or damages received or sustained by any person, persons, or property by or from the said Contractor or by or in consequence of any neglect in safeguarding the work or through the use of unacceptable materials used on construction or by or on account of any act or omission, neglect, or misconduct of the said Contractor or by or on account of any claims or amounts recovered from any infringement of patent, trademark or copyright, or from any claims or amounts arising or recovered under any law, ordinance, order, or decree, and so much of the money due the said Contractor under and by virtue of his contract as shall be considered necessary by the Owner may be retained for the use of the Owner, or in case no money is due, his surety shall be held until such suit or suits, action or actions, claim or claims for injuries or damages as aforesaid, shall have been settled and suitable evidence to that effect furnished to the Owner.

In any and all claims against the Owner or the Engineer, or any of their agents or employees, by any employee of the Contractor, and subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workmen's compensation acts, disability benefit acts or other employee benefit acts.

The obligation of the Contractor under this paragraph shall not extend to the liability of the Engineer, his agents or employees arising out of the preparation or approval of maps, Drawings, opinions, reports, surveys, Change Orders, designs or Specifications.

35. HANDLING AND DISTRIBUTION

The Contractor shall handle, haul, and distribute all materials and all surplus materials on the different portions of the Work, as necessary or required; shall provide suitable and adequate storage room for materials and equipment during the progress of the Work; and shall be responsible for the protection, loss of, or damage to materials and equipment furnished by him, until the final completion and acceptance of the Work.

Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

36. MATERIALS - SAMPLES - INSPECTION

Unless otherwise expressly provided on the Drawings or in any of the other Contract Documents, only new materials and equipment shall be incorporated in the Work. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection of the Engineer. No material shall be processed or fabricated for the Work or delivered to the Work site without prior concurrence of the Engineer.

As soon as possible after execution of the Agreement, the Contractor shall submit to the Engineer the names and addresses of the manufacturers and suppliers of all materials and equipment he proposes to incorporate into the Work. When shop and working drawings are required as specified below, the Contractor shall submit prior to the submission of such drawings, data in sufficient detail to enable the Engineer to determine whether the manufacturer and/or the supplier have the ability to furnish a product meeting the Specifications. The Contractor shall also submit data relating to the materials and equipment he proposes to incorporate into the Work in sufficient detail to enable the Engineer to identify and evaluate the particular product and to determine whether it conforms to the Contract requirements. Such data shall be submitted in a manner similar to that specified for submission of shop and working drawings.

Facilities and labor for the storage, handling, and inspection of all materials and equipment shall be furnished by the Contractor. Defective materials and equipment shall be removed immediately from the site of the Work.

If the Engineer so requires, either prior to or after commencement of the Work, the Contractor shall submit samples of materials for such special tests as the Engineer deems necessary to demonstrate that they conform to the Specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped by the Contractor as directed. The Contractor shall furnish suitable molds for making concrete test cylinders.

All samples shall be packed so as to reach their destination in good condition, and shall be labeled to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor submitting the sample. To ensure consideration of samples, the Contractor shall notify the Engineer by letter that the samples have been shipped and shall properly describe the samples in the letter. The letter of notification shall be sent separate from and should not be enclosed with the samples.

The Contractor shall submit data and samples, or place his orders, sufficiently early to permit consideration, inspection and testing before the materials and equipment are needed for incorporation in the Work. The consequences of his failure to do so shall be the Contractor's sole responsibility.

In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., the Contractor shall provide such samples of workmanship of wall, floor, finish, etc., as may be required.

When required, the Contractor shall furnish to the Engineer triplicate sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.

After review of the samples, data, etc., the materials and equipment used on the Work shall in all respects conform therewith.

37. PAYMENT FOR MATERIALS STORED AT SITE OF PROJECT

Payment for materials or equipment purchased and stored at the site of the Project will be allowed by the Owner at the cost of such materials or equipment, less the same percentage of retainage applicable to payment for completed work, upon specific recommendation of the Engineer. Such payment shall be conditional upon submission by the Contractor of bills of sale or such other procedure as will establish the Owner's title to such material or otherwise adequately protect the Owner's interest.

Only durable materials and equipment which in the opinion of the Engineer have been properly stored and protected shall be included in materials furnished in partial payment estimates. Clay pipe, brick and tile will be excluded. In the interest of simplification of checking and bookkeeping, miscellaneous supplies will also be excluded.

38. MATERIALS

A. Materials, Domestic and Foreign Manufacture: Unless otherwise specified, only such unmanufactured articles, materials and supplies as have been mined or produced in the United States of America, and only such manufactured articles, materials and supplies as have been manufactured in the United States of America substantially all from articles, materials, or supplies mined, produced, or manufactured -- as the case may be -- in the United States of America, shall be employed under this Contract in the construction of the Project.

B. Materials, Convict Manufacture: No materials manufactured or produced in a penal or correctional institution shall be incorporated in the Work under this Contract.

39. DEFECTIVE MATERIALS AND WORKMANSHIP

Materials brought to the site which are not in accordance with the Specifications shall be removed from the site of the Work by the Contractor at his own expense. Such material shall be so disposed of that there will be no probability of their being used on the work or in the construction.

Upon notice from the Engineer, all defective workmanship shall be immediately remedied by the Contractor, at his own expense.

If the Contractor fails to remove defective materials or to correct defective workmanship within a reasonable time, fixed in the notice from the Engineer, the Owner may remove the defective materials and/or correct the defective work and charge all the expense in connection therewith to the Contractor.

40. GUARANTY

The Contractor shall guarantee all materials and equipment furnished and Work performed for a period of one (1) year from the date of Substantial Completion. The Contractor warrants and guarantees for a period of one (1) year from the date of Substantial Completion of the system that the completed system is free from all defects due to faulty materials or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. Repairs made during the warranty period shall be guaranteed for one (1) year. The Owner will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments, or other Work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred. The Performance Bond shall remain in full force and effect through the guarantee period.

41. FIELD OFFICE

Each Contractor shall establish and maintain a field office on his project and have available at the office a responsible representative who can officially receive instructions from the Engineer. The Contractor shall have one complete, up-to-date set of Drawings, Specifications and Addenda in this office at all times.

Each office shall contain facilities for a Resident Project Representative, including a desk or table, chair and filing cabinet for his use.

Each office shall be provided with telephone service, facsimile machine, toilet facilities, light and heat; the cost of which shall be borne by the Contractor.

42. SANITARY FACILITIES

The Contractor shall provide adequate sanitary facilities for the use of those employed on the Work. Such facilities shall be made available when the first employees arrive on the site of the Work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the Work in suitable numbers and at such points and in such manner as may be required.

The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner, or on adjacent property.

43. EMPLOYMENT QUALIFICATIONS

No person under the age of eighteen (18) years and no convict labor shall be employed to perform any work under this Contract. No person whose age or physical condition is such as to make his employment dangerous to his health or safety or to the health or safety of others shall be employed to perform any work under this Contract, provided that this shall not operate against the employment of physically handicapped persons, otherwise employable, where such persons maybe safely assigned to work which they can ably perform. There shall be no discrimination because of race, creed, color, sex or political affiliation in the employment of persons for work under this Contract.

44. EMPLOYMENT SERVICES AND LABOR PREFERENCES

With respect to additional skilled, semi-skilled and unskilled workers employed to perform work on the Project, preference in employment shall be given first to persons who reside in the city in which the Work is to be performed, and second to persons residing in the county in which the Work is to be performed.

45. PAYMENT OF EMPLOYEES

The Contractor and each of his subcontractors shall pay each of his employees engaged in work on the Project in full (less deductions made mandatory by law) in cash or by check once each week.

46. SCHEDULES, REPORTS AND RECORDS

The Contractor shall submit to the Owner such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning Work performed or to be performed.

When required, the Contractor shall furnish the Owner with proof that all payrolls for services rendered and invoices for materials or equipment supplied have been duly paid. The Contractor shall provide all such other data as the Engineer and/or Owner may required.

In connection with all lump sum contracts or lump sum portions of unit price contracts, the Contractor shall furnish the Engineer a detailed breakdown on which to base partial payment estimates. The detailed breakdown shall be subject to review by the Engineer.

The Contractor shall furnish and keep current a progress chart or schedule showing the estimated and actual progress of the Work. The progress chart or schedule shall be subject to review by the Engineer.

The Contractor shall furnish all the necessary information for and assist in the preparation of, and/or prepare the partial payment estimates on forms furnished by the Engineer.

Record drawings and specifications shall be reviewed by the Engineer prior to submittal of partial payment estimates. Approval of partial or final payments will be contingent upon compliance with this provision.

47. PLANNING AND PROGRESS SCHEDULES

Before starting the Work and from time to time during its progress, as the Engineer may request, the Contractor shall submit to the Engineer a written description of the methods he plans to use in doing the Work and the various steps he intends to take. Within fifteen (15) days after the date of formal execution of the Agreement, the Contractor shall prepare and submit to the Engineer: (a) a written schedule fixing the dates on which additional drawings, if any, will be needed by the Contractor; and (b) a written schedule fixing the respective dates for the start and completion of various parts of the Work. Each such schedule shall be subject to review from time to time during the progress of the Work.

The Contractor shall also submit a schedule of payments that he anticipates he will earn during the course of the Work.

The Owner, or his authorized representatives and agents, shall be permitted to inspect all payroll, records of personnel, invoices for materials or equipment and other relevant data and records.

48. PAYMENTS BY CONTRACTOR

The Contractor shall pay: (a) for all transportation and utility services not later than the 20th day of the calendar month following the month in which such services are rendered; (b) for all materials, tools and other expendable equipment to the extent of ninety percent (90%) of the cost thereof, not later than the 20th day of the calendar month following the month in which such materials, tools and equipment are delivered at the site of the Project, and the balance of the cost thereof not later than the 30th day following completion of that part of the Work in or on which such materials, tools and equipment are incorporated or used; and (c) to each of his subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors, to the extent of each subcontractor's interest therein.

49. FUNDS FOR PARTIAL PAYMENT ESTIMATES

Funds for partial payment estimates have been provided by the Owner so that they may be paid in cash as set out herein. The Contractor must understand, however, that in handling the financing of such work, delays beyond the control of the Owner are liable to occur in meeting the partial payments, and a reasonable delay on the part of the Owner in making payment to the Contractor for any period shall not be construed as a breach of contract on the part of the Owner.

50. PARTIAL PAYMENT ESTIMATES

On or about the 15th of each calendar month, the Owner will make partial payment to the Contractor on the basis of a duly certified approved estimate of the Work performed during the preceding calendar month by the Contractor, but the Owner will retain not more than ten percent (10%) of the amount of each estimate until final completion and acceptance of all Work covered by this Contract, subject to possible modification as set out hereinafter.

The partial payment estimate shall be completed and signed by the Contractor and shall be supported by such data as the Engineer may reasonably require. The Contractor shall delineate on each partial payment estimate for each item in the bid form, the amounts associated with bond costs, overhead, insurance, labor and materials. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the Owner, as will establish the Owner's title to the material and equipment and protect his interest therein, including applicable insurance. The Engineer will, within ten days after receipt of each partial payment estimate, either indicate in writing his approval of payment or present the partial payment estimate to the Contractor indicating in writing his reasons for refusing to approve payment. In the latter case, the Contractor may make the necessary corrections and resubmit the partial payment estimate. The Owner will, within ten (10) days of presentation to him of an approved partial payment estimate, pay the Contractor a progress payment on the basis of the approved partial payment estimate.

The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.

All Work covered by partial payment made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor of the sole responsibility for the care and protection of the Work upon which payments have been made or the restoration of any damaged Work, or as a waiver of the right of the Owner to require the fulfillment of all terms of the Contract Documents.

Upon completion and acceptance of the Work, the Engineer shall issue a certificate attached to the final payment request that the Work has been accepted by him under the conditions of the Contract Documents. The entire balance found to be due the Contractor, including the retained percentages, but except such sums as may be lawfully retained by the Owner, shall be paid to the Contractor within thirty (30) days of completion and acceptance of the Work.

The Contractor will indemnify and save the Owner and the Owner's agents harmless from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the Work. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the Contractor fails to do so the Owner may, after having notified the Contractor, either pay unpaid bills or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed, in accordance with the terms of the Contract Documents, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Owner to either the Contractor, his Surety, or any third party. In paying any unpaid bills of the Contractor, any payment so made by the Owner shall be considered as a payment made under the Contract Documents by the Owner to the Contractor and the Owner shall not be liable to the Contractor for any such payments made in good faith.

If the Owner fails to make payment thirty (30) days after approval by the Engineer, in addition to other remedies available to the Contractor, there shall be added to each such payment interest at prime rate plus two (2) percentage points commencing on the first day after said payment is due and continuing until the payment is received by the Contractor.

51. OWNER'S RIGHT TO WITHHOLD PAYMENTS

In order to protect the Owner from loss, payment may be withheld which would otherwise be due the Contractor on account of:

- A. Defective work not remedied or defective materials not removed from site.
- B. Claims filed, or reasonable evidence indicating imminent filing of claims, against the Contractor.
- C. Failure of the Contractor to make payments properly to subcontractors or for material or labor.
- D. A reasonable doubt that the Contract can be completed for the balance then unpaid.
- E. Damage to another Contractor.
- F. Performance of work in violation of the terms of the Contract.
- G. Expiration of Contract Time.

Should the Owner withhold payment for any of the above reasons, the Owner will provide written notice to the Contractor giving reason for withholding payment.

52. DEDUCTIONS FOR UNCORRECTED WORK

If the Engineer and Owner deem it inexpedient to correct work damaged or not done in accordance with the Contract, a deduction from the Contract price may be negotiated.

53. PROTECTION OF WORK, PROPERTY AND PERSONS

The Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. He shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to all employees on the Work and other persons who may be affected thereby, all the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

The Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He shall erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection. He shall notify owners of adjacent utilities when prosecution of the Work may affect them. The Contractor shall remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any subcontractor of anyone directly and indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the Contract Documents or to the acts or omissions of the Owner or the Engineer or anyone employed by either of them or anyone for whose acts either of them maybe liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the Contractor.

In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, the Contractor with special instruction or authorization from the Engineer or Owner, shall act to prevent threatened damage, injury or loss. He shall give the Engineer prompt Written Notice of any significant changes in the Work or deviations from the Contract Documents caused thereby, and a Change Order shall thereupon be issued covering the changes and deviations involved.

54. WORK ON "PRIVATE PROPERTY"

Private property is defined as property other than that belonging to the Owner. Highway and railroad rights-of-way, public parks, school yards and other such properties shall be considered "private properties" for the purpose of this Paragraph.

In connection with water line, sewer line, gas line or similar work performed on "private property", the Contractor shall confine his equipment, the storage of materials and the operations of his workmen to the limits indicated on the Drawings, or to lands and rights-of-way provided for the Project by the Owner, and shall take every precaution to avoid damage to the buildings, grounds and facilities of the owners' of private property.

Fences, walls, hedges, shrubs, etc., shall be carefully removed, preserved, and replaced when the construction is completed. Grassed areas, other than lawns, shall be graded, fertilized and seeded when construction is completed and in accordance with the requirements of the technical Specifications. Where ditches or excavations cross lawns, the sod shall be removed carefully and replaced when the backfilling has been completed. If sod is damaged or not handled properly, it shall be replaced with new sod equal to existing sod at the Contractor's expense. When construction is completed, the facilities and grounds of the private property owners shall be restored to as good or better condition than found as quickly as possible at the Contractor's expense.

When directed by the Engineer, large trees or other facilities that cannot be preserved and replaced shall be removed by the Contractor. The Owner will assume the responsibility for settling with the property owner for the loss of said trees or facilities. The Contractor shall be solely and entirely responsible for any damage to all other trees or facilities.

Foundations, adjacent to where an excavation is to be made below the bottom of the foundation, shall be supported by shoring, bracing or underpinning as long as the excavation shall remain open, or thereafter if required to insure the stability of the foundation and the Contractor shall be held strictly responsible for any damage to said foundations.

55. LANDS FOR WORK

The Owner will provide the lands upon which the work under this Contract is to be done or the necessary easements over said lands to include sufficient space for the proper execution of the work, together with right of access to same. The Owner will provide the Contractor information which delineates and describes the lands owned and rights-of-way acquired. The Contractor shall, at his own expense and without liability to the Owner, provide land required for storage of his construction materials and for any temporary construction facilities for the storage of his equipment. The Contractor will construct at his own expense, any temporary roads or bridges necessary for his own use; he will also furnish his own power and water supply unless otherwise specifically set out herein.

56. INTERFERENCE WITH AND PROTECTION OF STREETS

The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefor from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the proper authorities.

Streets, roads, private ways, and walks not closed shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefor.

The Contractor shall, at least 24 hours in advance, notify the Police and Fire Departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. He shall cooperate with the Police Department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

57. EXISTING UTILITIES

Special precautions shall be taken by the Contractor to avoid damage to existing overhead and underground utilities owned and operated by the Owner or by public or private utility companies.

The available information concerning the location of existing underground utilities is shown on the Drawings. While it is believed that the locations shown are reasonably correct, neither the Engineer nor the Owner can guarantee the accuracy or adequacy of this information.

Before proceeding with the Work, the Contractor shall confer with all public or private companies, agencies or departments that own and operate utilities in the vicinity of the Construction Work. The purpose of the conference, or conferences, shall be to notify said companies, agencies or departments of the proposed construction schedule, verify the location of, and possible interference with, the existing utilities that are shown on the Drawings, arrange for necessary suspension of service, and make arrangements to locate and avoid interference with all utilities (including house connections) that are not shown on the Drawings. The Engineer and Owner have no objection to the Contractor arranging for the said utility companies, agencies, or departments to locate and uncover their own utilities; however, the Contractor shall bear the entire responsibility and cost for locating and avoiding, or repairing, damage to said existing utilities.

The Contractor shall locate all unknown metallic hazards, namely buried pipe, metals, etc., by using a pipe locator. The pipe locator shall immediately precede the trench ditching and all hazards located shall be marked in such manner as to notify the machine operator of such hazard.

Where existing utilities or appurtenant structures, either underground or above-ground, are encountered, they shall not be displaced or molested unless necessary, and in such case shall be replaced in as good or better condition than found as quickly as possible. Relocation and/or replacement of all utilities and appurtenant structures to accommodate the construction work shall be at the Contractor's expense, unless such relocation and/or replacement is by statute or agreement the responsibility of the owner of the utility.

58. ARBITRATION

A. Request for Arbitration

Any decision of the Engineer which is subject to arbitration may be submitted to arbitration only upon agreement of both parties to the dispute.

The Contractor shall not cause a delay of the Work because of pending arbitration proceedings, except with the written permission of the Engineer, and then only until the arbitrators shall have had an opportunity to determine whether or not the Work shall continue until they decide the matters in dispute.

The request for arbitration shall be delivered in writing to the Engineer and the adverse party, either personally or by registered mail to the last known address of each, within ten (10) days of the receipt of the Engineer's decision, and in no case after final payment has been accepted except as otherwise expressly stipulated in the Contract Documents. If the Engineer fails to make a decision within a reasonable time, a request for arbitration may be made as if his decision has been rendered against a requesting party.

B. Arbitrator

No one shall be nominated or act as an arbitrator who is in any way financially interested in this Contract or in the business affairs of the Owner, or the Contractor, or the Engineer or otherwise connected with any of them. Each arbitrator shall be a person in general familiar with the work or the problem involved in the dispute submitted to arbitration, preferably a recognized Engineer, experienced in the type of construction in question.

Unless otherwise provided by controlling statutes, the parties may agree upon one arbitrator; otherwise there shall be three, one named in writing by each party to this Contract, and a third chosen by these two arbitrators, or, if they should fail to select a third within fifteen (15) days, then he shall be appointed by the presiding officer, if a disinterested party, of the Bar Association nearest to the location of the Work. Should the party requesting arbitration fail to name an arbitrator within ten (10) days and upon his failure to do so then such arbitrator shall be appointed, on the petition of the party requesting arbitration, by a judge of the Federal Court in the District where such arbitration is to be held.

The said presiding officer shall have the power to declare the position of any arbitrator vacant by reason of refusal or inability to act, sickness, death, resignation, absence or neglect. Any vacancy shall be filled by the party making the original appointment, and unless so filled within five (5) days after the same has been declared vacant, it shall be filled by the said presiding officer. If testimony has been taken before a vacancy has been filled by the presiding officer, the matter must be reheard unless a rehearing is waived in the submission or by the written consent of the parties. If there be one arbitrator, his decision shall be binding; if three, the decision of any two shall be binding in respect to both the matters submitted and the procedure followed during the arbitration.

C. Arbitration Procedure

The arbitrators shall deliver a written notice to each of the parties and to the Engineer, either personally or by registered mail to the last known address of each, of the time and place for the beginning of the hearing of the matters submitted to them. Each party may submit to the arbitrators such evidence and argument as he may desire and the arbitrators may consider pertinent. The arbitrators shall, however, be the judge of all matters of law and fact relating to both the subject matter of and the procedure during arbitration and shall not be bound by technical rules of law or procedure. They may hear evidence in whatever form they desire. The parties may be represented before them by such person or persons as each may select, subject to the disciplinary power of the arbitrators if such representative shall not interfere with the orderly or speedy conduct of the proceedings.

Each party and the Engineer shall supply the arbitrators with such papers and information as they may request, or with any witness whose movements are subject to the respective control, and upon refusal to comply with such requests, the arbitrators may render their decision without the evidence which might have been elicited therefrom and the absence of such evidence shall afford no ground for challenge of the award by the party refusing or neglecting to comply with such demand.

The submission to arbitrators (the statement of the matters in dispute between the parties to be passed upon by the arbitrators) shall be in writing duly acknowledged before a notary. Unless waived in writing by both parties to the arbitration, the arbitrators, before hearing testimony, shall be sworn by an officer authorized by law to administer an oath, to faithfully and fairly hear and examine the matters in controversy and to make a just award according to the best of their understanding.

The arbitrators, if they deem the case demands it, are authorized to award to the party whose contention is sustained such sums as they shall consider proper for the time, expense and trouble incident to the arbitration, and if the arbitration was requested without reasonable cause, damages for delay and other losses. The arbitrators shall fix their own compensation, unless otherwise provided by agreement, and shall assess the costs and charges of the arbitration upon either or both parties.

The award of the arbitrators shall be in writing and acknowledged like a deed to be recorded, and a duplicate shall be delivered personally or by registered mail, forthwith upon its rendition, to each of the parties to the controversy and to the Engineer. Judgment may be rendered upon the award by the Federal Court or the highest State Court having jurisdiction to render same.

The award of the arbitrators shall not be open to objection on account of the form of proceedings or the award, unless otherwise provided by controlling statutes. In the event such statutes provide otherwise on any matter covered by this Article than hereinbefore specified, the method procedure throughout and the legal effect of the award shall be wholly in accord with said statutes, it being the intention hereby to lay down a principle of action to be followed, leaving its local application to be adapted to the legal requirements of the jurisdiction having authority over the arbitration.

The Engineer shall not be deemed a party to the dispute. He is given the right to appear before the arbitrators to explain the basis of his decision and give such evidence as they may require.

59. ALTERATION IN DRAWINGS AND SPECIFICATIONS

The Owner reserves the right to make such alteration in the Drawings and Specifications or in the character of the Work as may be considered by the Engineer necessary or desirable from time to time to complete the Project in an acceptable manner; provided that, if alterations are made, the general character of the Work as a whole is not changed thereby.

Such alterations shall not be considered as a waiver of any condition of the Contract nor to invalidate any of the provisions nor to release the bond thereof.

60. CHANGES IN THE WORK

The Owner may make changes in the work of the Contractor by making alterations therein, or by making additions thereto, or by omitting work therefrom, without invalidating the Contract, and without relieving or releasing the Contractor from any guarantee given by him pursuant to the Contract provisions, and without affecting the validity of the guaranty bonds, and without relieving or releasing the surety or sureties of said bonds. All such changes shall be in the form of a Change Order issued by the Engineer, and executed by the Owner and Contractor, under the conditions of the original Contract.

Except in an emergency endangering life or property, no change shall be made by the Contractor unless in pursuance of a written Change Order. No claim for an adjustment of the Contract Price or Time shall be valid unless so ordered.

The Engineer, also, may at any time, by issuing a field order, make changes in the details of the Work. The Contractor shall proceed with the performance of any changes in the Work so ordered by the Engineer unless the Contractor believes that such field order entitles him to a change in Contract Price or Time, or both, in which event he shall give the Engineer written notice thereof within fifteen (15) days after the receipt of the ordered change, and the Contractor shall not execute such changes pending the receipt of an executed Change Order or further instruction from the Owner.

Should the Contractor encounter or discover during the progress of the Work subsurface or latent conditions at the site materially differing from those shown on the Drawings or indicated in the Specifications, the attention of the Engineer shall immediately be called to such conditions before they are disturbed. If the Engineer finds that they so materially differ, he will at once make such changes in the Drawings or Specifications as he may find necessary. Any adjustment in the Contract Price or Time as may be justifiable shall be made by means of a written Change Order and must be negotiated with the owner, engineer and DOW/KIA as provided herein.

61. CLAIMS FOR EXTRA WORK

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.

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 topographical maps issued.

Any discrepancies which may be discovered between actual conditions and those represented by the topographical maps and 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.

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".

By execution of this Contract, the Contractor warrants that he has visited the site of the proposed work and fully acquainted himself with the conditions there existing 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.

62. DETERMINATION OF THE VALUE OF EXTRA (ADDITIONAL) OR OMITTED WORK

The value of extra (additional) or omitted work shall be determined in one or more of the following ways:

A. On the basis of the actual cost of all the items of labor (including on-the-job supervision), materials, and use of equipment, plus 15 percent which shall cover the Contractor's general supervision, overhead and profit. In case of subcontracts, the 15 percent is interpreted to mean the subcontractor's supervision, overhead and profit, and an additional 5 percent 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.

B. By estimate and acceptance in a lump sum.

C. By unit prices named in the Contract or subsequently agreed upon.

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.

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.

Except for over-runs in contract unit price items, no extra (additional) work shall be done except upon a written 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.

63. SEPARATE CONTRACTS

The Owner reserves the right to let other contracts in connection with this Work. The Contractor shall afford other contractors reasonable opportunity for ingress, egress, storage of their materials, the execution of their work, and shall properly connect and coordinate his work with theirs. The respective rights of various interests involved shall be established by the Engineer to secure proper completion of the various portions of the Work.

If the proper execution or results of any part of the Contractor's Work depends upon the work of any other Contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results.

64. OWNER'S RIGHT TO DO WORK

If the Contractor should neglect or fail to prosecute the Work properly or fail or refuse to perform any provision of the Contract, the Owner, after ten (10) days written notice to the Contractor, may without prejudice to any other remedy he may have, make good such deficiencies and may deduct the cost thereof from any monies due or which may thereafter become due to the Contractor.

65. SUSPENSION OF WORK

The Owner shall have authority to suspend the Work in whole or in part by giving five (5) days notice to the Contractor in writing. The written notice shall fix the date on which the Work shall be resumed, and the Contractor shall resume the Work on the date so fixed. The Owner shall reimburse the Contractor for expenses incurred by him in connection with the Work under this Contract as a result of such suspension if the suspension of the Work is caused through no fault of the Contractor himself.

66. RIGHT OF OWNER TO TERMINATE CONTRACT

If the Contractor fails to begin the Work under the Contract within the specified time, or fails to perform the Work with sufficient workmen and equipment or with sufficient materials to insure the prompt completion of said Work within the specified time, or shall, in the opinion of the Engineer, perform the Work improperly, or shall neglect or refuse to remove materials or perform anew such Work as shall be rejected as defective or unsuitable or shall be stopped by court order resulting from injunctive action, or shall become insolvent or be declared bankrupt or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against him unsatisfied for a period of five (5) days, or shall fail or refuse to remove within forty-eight (48) hours after receipt of proper notice, any employee or person engaged in work under the Contract, or shall make an assignment for the benefit of creditors or from any other cause whatsoever shall not carry out the Work in an acceptable manner, the Owner shall give notice in writing to the Contractor and his surety, of such delay, neglect, or default, specifying the same, and if the Contractor within a period of ten (10) days after such notice shall not proceed in accordance therewith, then the Owner shall, upon written certificate from the Engineer of the fact of such delay, neglect or default, and the Contractor's failure to comply with such notice, have full power and authority without violating the Contract to terminate the Contractor's right to proceed with the Work, to take over the prosecution of the work of said Contractor, to appropriate or use any and all materials and equipment on the ground as may be suitable and acceptable, and may enter into an agreement for the completion of said Contract according to the terms and provisions thereof, and use such other methods as in the Owner's opinion shall be required for the completion of said Contract in an acceptable manner. All costs and charges incurred by the Owner, together with the costs of completing the Work under Contract, shall be deducted from any monies due or which may become due said Contractor. In case the expense so incurred by the Owner shall be less than the sum which would have been payable under the Contract, if it had been completed by said Contractor, then the Contractor shall be entitled to receive the difference, and in case such expense shall exceed the sum which would have been payable under the

Contract, then the Contractor and/or his surety shall be liable and shall pay to the Owner the amount of said excess.

After ten (10) days from delivery of a Written Notice to the Contractor and the Engineer, the Owner may, without cause and without prejudice to any other right or remedy, elect to abandon the Project and terminate the Contract. In such case, the Contractor shall be paid for all Work executed and any expense sustained plus reasonable profit.

67. CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the Work shall be stopped under an order of any court, or other public authority, for a period of three (3) months, through no fault of the Contractor or of anyone employed by him, or if the Engineer should fail to issue any estimate of payment within thirty (30) days after it is due, or if the Owner shall fail to pay the Contractor within thirty (30) days of its maturity and presentation of any sum certified by the Engineer or award by arbitrators, then the Contractor may, upon fifteen (15) days written notice to the Owner and the Engineer, terminate this Contract and recover from the Owner payment for all work executed, plus loss sustained upon any plant or materials, plus reasonable profit and damages.

In addition and in lieu of terminating the Contract, if the Engineer has failed to make any payment as aforesaid, the Contractor may upon ten (10) days notice to the Owner and the Engineer stop the Work until he has been paid all amounts then due, in which event and upon resumption of the Work, Change Orders shall be issued for adjusting the Contract Price or extending the Contract Time or both to compensate for the costs and delays attributable to the stoppage of the Work.

68. USING COMPLETED PORTION OF WORK

The Owner shall have the right to take possession of and use any completed portion or portions of the Work even though the time of completing the entire work or such portions may not have expired. The possession and use by the Owner shall not be deemed an acceptance of any work not completed in accordance with the Contract. If such prior use increases the cost of or delays the Work, the Contractor shall be entitled to such extra compensation, or extension of time, or both as the Engineer may determine. The use by the Owner of any portion of the Work shall release the Contractor from his Builders Risk Insurance covering such portion used.

69. ACCEPTANCE AND FINAL PAYMENT

Upon written notice from the Contractor that the work is ready for final inspection, the Engineer will make such an inspection and subsequent inspections as required. When, in the Engineer's opinion, the Work is acceptable under the Contract, he will promptly issue a Certificate of Acceptance.

Upon acceptance of the Work by the Owner, the balance due the Contractor including the percentage retained during the construction period, will then be paid in approximately sixty (60) days, and said final payment shall evidence the Owner's acceptance of the Work unless the Owner has made acceptance or partial acceptance thereof in writing prior to said final payment.

Before the Owner makes final payment, the Contractor shall submit to the Owner a final release, as described hereinafter, stating that all payrolls, material bills, subcontractors, and other indebtedness connected with the Work have been paid and providing for handling claims that may be outstanding or that may arise after the settlement.

Any payment, however, final or otherwise, shall not release the Contractor or his sureties from any obligations under the Contract Documents or the Performance Bond and Payment Bond.

70. CONTRACTOR'S FINAL RELEASE

Before the Owner pays the Contractor his final payment on the Work, the Contractor will be required to sign a final release as set out hereinbefore. This final release shall be notarized and shall state that all claims against the Owner on the Contractor's part have been met in full; it shall further state that all accounts for labor performed, materials furnished, liens, judgments and claims of every nature against the Contractor have been satisfied by him. It shall further state that any obligation or lawsuit whatsoever arising from the Contractor's operations on the Project which may be presented or filed after the settlement shall be borne by the Contractor. In case the Contractor is unable to settle any claim that may be in dispute or litigation, the Owner may allow him to furnish a proper bond to indemnify the Owner against the claim and then release the final payment to him.

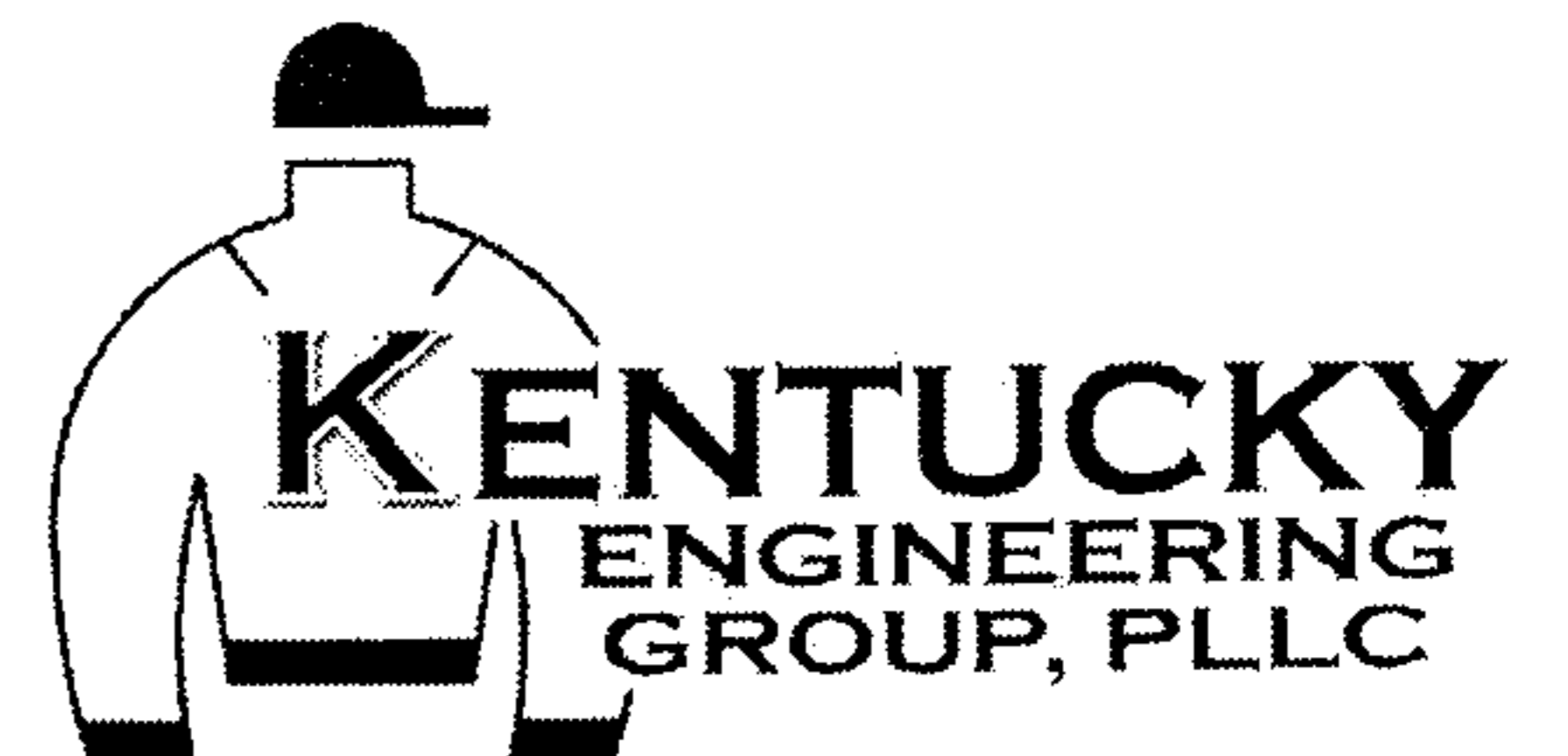
It is understood that the Contractor is to guarantee to the Owner all construction against defective materials, equipment and workmanship for a period of twelve (12) months after acceptance, and shall take immediate steps to correct or replace such defective materials, equipment or workmanship without cost to the Owner.

71. FINAL CLEAN-UP

The Work will not be considered as completed, and final payment will not be made, until all final clean up has been done by the Contractor in a manner satisfactory to the Engineer.

- END OF SECTION -

DIVISION 1
GENERAL REQUIREMENTS



SECTION 01010**SUMMARY****PART 1 - GENERAL****1.01 SUMMARY**

- A. This Section includes the following:
1. Work covered by the Contract Documents.
 2. Sequence of Operations.
 3. Utility Shutdowns
 4. Tie-ins and Disconnections
 5. Temporary Systems
 6. Use of premises.
 7. Specification formats and conventions.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Contractor shall provide all material, services, labor, tools and equipment, necessary to construct this project. The following is a brief description of the major work items included in the contract: Construction of approximately 16,000 LF of 2", 3", 4", and 6" water main, upgrading existing telemetry system, quick connect receptacle on KY 7 pump station, and 4 tank inspections including all related appurtenances as shown on the Drawings and described in the Specifications. **Please note that Howards Creek Water Main will not be installed until Contract 11 - New Ground Water Well contract has been completed or as directed by engineer.**

1.03 SEQUENCE OF OPERATIONS

- A. Water Mains are to be installed contiguously from beginning to end.
- B. Existing water lines must be kept in service until all meter reconnects have been completed and all branch lines have been tied into new water main. Sterilization, testing and sampling of the new water main will be completed prior to any meter reconnects being changed over to the new main.
- C. No existing branch lines can be tied into the new line until testing, sterilization and sampling have been successfully completed.

1.04 UTILITY SHUTDOWNS

- A. One-week advance notice to the Owner is required prior to performing any utility shutdown unless of an emergency in nature.
- B. Contractor shall know where all existing valves are located on all existing lines and shall be able to shut down expeditiously in case of line breaks.
- C. The existing water line is shown as an approximate location on the plans. The contractor shall use extreme caution while laying line not to break existing line and interrupt service to the Sandy Hook Water District. existing customers. The contractor is responsible for any repairs to the existing line that are caused by their

work. The contractor shall locate the existing line ahead of the installation of the new line to insure the installation is within the existing easement.

1.05 TIE-INS AND DISCONNECTIONS

- A. Contractor shall furnish all materials and shall provide excavation, de-watering, scaffolding and support operations to support tie-ins.

1.06 TEMPORARY SYSTEM (S)

- A. All temporary water lines and hoses shall be depressurized and all temporary electrical lines and equipment de-energized when not in use and at the end of each workday.

1.07 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Division and Sections using the 17-division format.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

Not used

END OF SECTION

SECTION 01015
WORK SEQUENCE

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall submit to the Engineer for review and acceptance a complete schedule of his proposed sequence of construction operations prior to commencement of work. However, the Engineer shall not accept a construction schedule that fails to utilize the entire time allocated for the construction of the water system extension. This schedule requirement in no way prevents the Contractor from completing the project in a shorter time frame than scheduled. The construction schedule shall be submitted and approved by the Owner prior to the submittal of the first partial payment request. A revised construction schedule shall be submitted with every subsequent partial payment request. This revised schedule must be approved by the Owner prior to payment. The contractor shall use the following sequence of construction while working on the new water mains for the Sandy Hook Water District, Contract 10 - Water System Improvements.

1. Locate all existing valves and make sure they are workable
2. Notify Sandy Hook Water District. a minimum of 48 hours prior to the connection of an existing line
3. Install new water line using extreme caution not to damage existing water lines or services
4. Upon installation of new line, 1) pressure test 2) sterilize and provide documentation to engineer of successful water quality tests.
5. Contractor shall not abandon existing water main until all reconnects have been completed.

1.02 RELATED WORK

- A. Section 01010 - Summary of Work.

1.03 ADDITIONAL INFORMATION

Any delays caused by the Contractor shall be at his expense and at no cost to the Owner or Engineer.

- END OF SECTION -

SECTION 01016**OCCUPANCY****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. The Contractor shall be aware that after each major portion of the project is completed, the Contractor shall notify the Engineer that those specific operations are complete and prior to replacing that portion of the work into service shall request an interim inspection of the work to be returned to or placed into service.

B. The interim inspection requested by the Contractor shall not preclude or supersede the final inspection of the project or reduce the Contractor's responsibility for the completed portion prior to final acceptance of the work by the Owner.

C. The Contractor shall provide all necessary temporary controls and other items required for operation of all work placed into service prior to final acceptance as required. At such time as new controls, etc. are complete and functioning, the Contractor shall remove all temporary installed items.

- 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, equipment, 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 prices for the following items.

1.02 PROGRESS AND PAYMENTS SCHEDULES

A. Within ten (10) 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 ten (10) 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 form the supplier is attached to the pay request. Further, no item whose value is less than \$1,000 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 clean up has been completed 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%) 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 retainage shall be an amount equal to 10% of said estimate. The retainage on the equipment items shall be 10% as defined hereinbefore.

I. If at any time thereafter when the progress of the WORK is not satisfactory or determine that the Contractor is not making satisfactory progress, additional amounts may be retained.

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 topographical maps issued.

C. Any discrepancies which may be discovered between actual conditions and those represented by the topographical maps and 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 conditions there existing 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 20% for added work or a minimum 20% for deleted work which shall cover the Contractor's general supervision, overhead and profit. In case of subcontracts, the sum of total overhead amounts of the subcontractors and Contractor, plus total profit amounts for the subcontracts and Contractor shall not exceed 25% of the cost. Subcontractors shall be limited to 15% and Contractors shall be limited to 10% for combined overhead and profit. The cost of labor shall include required insurance, taxes and fringe benefits. Contractor to provide detailed breakdown of all cost as justification of change in work. 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 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

2.01 WATER MAIN

A. Payment for installing the water main will be made at the contract unit price per linear foot, complete in place, which shall include compensation for furnishing pipe, trenching (including rock excavation), earth or Class I material bedding, copper wire, thrust blocking, earth backfill, grip rings, fittings, crushed stone pavement replacement, asphalt replacement, disinfection, clean up and restoration of all disturbed areas, including seeding and mulching as required, testing, bonding, and all appurtenances required. The quantity of water mains to be paid for shall be the length of the completed line as measured along its centerline without any deduction for lengths of fittings, valves or other appurtenances. Sidewalk replacement will be a separate bid item,

B. Casing for sewer main, and sewer lateral crossings, as described in the plan sheets will be incidental to laying the main water line. There will be no additional compensation for these pvc casings. Please figure these costs into the water line price.

C. Use of crushed stone bedding on the water main will be determined in the field by the engineer if quality bedding material is not available. Please figure bedding costs into the water line price.

D. **The contractor will be responsible for any damage to the existing line, including cost of replacement materials, and labor. The contractor will be responsible for excavating and locating the existing water line. Sandy Hook Water District can only provide an approximate location.**

E. Contractor shall include in his pipe price the following that are required on this project prior to starting construction: Three valve wrenches, and one portable restroom.

(NOTE: All Rock Excavation, Crushed Stone Bedding, and Asphalt Replacement shall be included in the per unit price of the pipe. No additional payment will be provided for these items.)

2.02 GATE VALVES AND BOXES

Payment for furnishing and installing gate valves and valve boxes with covers in water mains will be made at the contract unit price each, complete in place, which shall include compensation for furnishing, hauling, trenching (including rock excavation), bedding, laying, jointing, backfilling, concrete supports and concrete collars.

2.03 TAPPING SLEEVE AND VALVE

Payment for tapping sleeves and valves shall be made at the contract unit price each, complete in place including all excavation, material, tapping sleeve, tapping valve, box, concrete collar and other items required to make a complete and workable tap. There is no differential for size.

2.04 CONNECTION TO EXISTING WATER MAIN

Payment for connecting to an existing water main at the location listed shall include all materials and labor necessary for making a connection to the existing water main as shown on the plans. Payment will be made per connection and will include tees, grip rings, thrust blocks, fittings and a maximum of 20 LF of pipe. Valves at dry tie-ins will be paid separately under the gate valve price.

2.05 NEW METER ASSEMBLIES

Payment will be made per complete installation to include saddle, corporation stop, 1" CTS polyethylene service line, tandem setters, meter box and lid, excavation, casing pipe (if applicable) and all items necessary for a complete installation. New meter services shall be placed just inside the owners property. Same side services shall include twenty-five (25) feet of service line. Opposite side services shall also include a maximum of one hundred twenty five (125) feet of service line and all costs of boring or pushing the service line. **Contractor shall provide Sensus Radio Read Iperl brand meters.**

Customer Service with Pressure Reducing Valve:

Payment will be made per complete installation to include saddle, corporation stop, polyethylene service line, 5/8" x 3/4" meter, tandemsetter, meter box and lid, excavation, casing pipe (if applicable) and all items necessary for a complete installation. New meter services shall be placed in the same location as the existing meter assembly. Same side services shall include twenty five (25) feet of service line. Opposite side services shall also include a maximum of one hundred twenty five (125) feet of service line and all costs of boring or pushing the service line. Service lines that are longer than these limits, the difference will be paid in the line item service line section. No difference will be made for the boring of the service line.

Both items include the additional cost to provide a customer service with a 3/4" Wilkens 600 pressure reducing valve. The cost includes valve, tandem setter, meter box, meter and all other items necessary for a complete installation.

2.06 ADDITIONAL 3/4" SERVICE TUBING

Payment for additional polyethylene service pipe and fittings installed in open trench and backfilled will be made per linear foot in place. **This item will only be paid for when it covers those distances outside of the ranges of payment as described in 2.05 of this section.** Excavation is unclassified and included in this item.

2.07 HIGHWAY/DRIVEWAY BORE W/STEEL CASING

Payment for water mains crossing the highway, railroad, roadway, driveway or other areas shown on the plans shall include the respective encasement pipe bored under roadways and will be paid for at the contract unit price per linear foot of encasement pipe for the various sizes and types. This work shall include the encasement pipe, complete in place with fittings, spacers, skids, end seals, blocking, and all items necessary for its construction and installation. Carrier pipe is paid separately under item 2.01.

2.08 FLUSHING HYDRANT ASSEMBLY

Payment for flushing hydrant assemblies will be made at the unit price, complete in place, which shall include all piping, fittings, 6" fire hydrant, gate valve and valve box and cover, 6 feet of connecting pipe, concrete blocking and supporting pad, drainage bed, stainless steel all thread rods and nuts, wrenches, and all other materials and labor necessary to complete the installation. Additional connector pipe is not included in this item and will be paid separately under the pay item "Water Main".

2.09 AIR RELEASE VALVE ASSEMBLY

Payment for a 3/4" air release valve will be made at the contract unit price each, complete in place, including all excavation, material, meter box, saddles, fittings, ball valves, backfilling, and labor necessary to complete to complete the installation.

2.10 OPEN CUT DRIVEWAY/ROADWAY W/PVC or STEEL CASING

Payment for water mains crossing driveways or roadways as shown on the plans shall include the respective encasement pipe saw cut across driveways and will be paid for at the contract unit price per linear foot of encasement pipe for the various sizes and types. This work shall include the encasement pipe, complete in place with fittings, spacers, skids, blocking, and all items necessary for its construction and installation. Carrier pipe is paid separately under item 2.01. The casing pipe shall be 4" larger than the the carrier pipe. Asphalt replacement will be paid for in the water main price.

2.11 CUT AND PLUG EXISTING WATER MAIN

Payment for cutting and plugging the existing water main shall include all materials and labor necessary for completing the disconnection of the existing water line. This will be paid per cut and plug and will include piping, mechanical joint cap, grip rings, concrete blocking and other appurtenances required to complete the installation. Size of the piping will be paid as one price and will not be differentiated

2.12 BLOW OFF ASSEMBLY

Payment for the blow off as shown on the standard details will be paid as a unit price and include the gate valve, valve box, fittings, pipe, concrete pad, cap and any other items to make a complete installation. All sizes will be paid the same.

2.13 BLOW OFF HYDRANT ASSEMBLY

Payment for the blow off hydrant as shown on the standard details will be paid as a unit price and the gate valve, valve box, 3" hydrant, fittings, pipe, concrete pad, cap and any other items to make a complete installation.

2.14 AUTOMATIC FLUSH DEVICE

Payment shall be on a per unit basis and include all labor and materials, including the automatic flushing device, 1" water meter, meter box, curb stop 2" pvc water main, 2" corp stop and saddle. Flushing device shall be installed in an area that drains away from the flushing device.

2.15 RECONNECT EXISTING METER TO NEW MAIN

Payment for re-connecting an existing service line to a new main will be paid on a per unit basis. This shall include all materials and labor including service tubing, saddle, corporation stop, inserts and pushing under the existing road to complete the installation. Twenty- Five feet of service line shall be included with the reconnect. Open trench or push application will not be differentiated.

2.16 1" SETTER w/BY-PASS AND PRV

Payment shall be on a per unit basis and include all labor and materials, including a 1" setter with by-pass and 1" Pressure Reducing Valve and all service line, corp stops, box, lid, saddles, and all other items to make a complete and workable situation.

2.17 CONCRETE SIDEWALK REPLACEMENT

Payment shall be on a per foot basis and shall include all labor and materials to complete this work. Included in the payment are the concrete, forms, mesh, and excavation. The concrete sidewalk replacement also includes that all work be performed to meet all American Disabilities Act requirements. This includes but is not limited to slope walks and seeing impaired plates.

2.18 DIRECTIONAL DRILL CREEK CROSSINGS

Payment for water mains drilled as called for on the construction plans shall include excavation, HDPE pipe, drilling, chemicals, water, and any other items that are deemed necessary to make a complete and workable installation. Directional drill may also include creek crossings or highways. Please note that all HDPE pipe shall have fused Mechanical Joint Adapters. **Payment for directional drill is limited to the distances listed on the plans.** If it is thought that the distances will be greater it should be reflected in the unit price. **The payment distances will not be changed.**

2.19 UPGRADE EXISTING TELEMETRY SYSTEM

Payment shall be paid on a lump sum basis and include all labor and materials as shown on the plans and specifications. All work shall include the system set up, programming, configuration and installation. The existing system is a Honeywell Plantscape HMI software with Wonderware SCADAAlarm notification. The upgrade shall include but is not limited to a new processor, hard disk drive, optical drive, 23" panel monitor, Microsoft office, Windows 7, Ethernet converter, software and alarm notification software. Eight hours of training shall also be included in this price.

2.20 INSPECTION OF WRIGLEY, TOWN, KY 32 AND CEMETERY TANKS

Payment for inspecting the interior and exterior of all four (4) tanks described in the specifications shall include all labor, materials, and insurance etc. to complete a written report, including pictures and recommendations, and shall be on a lump sum basis. This work shall be done by a qualified tank inspection company that employs NACE trained commercial divers and adheres to AWWA, SSPC, and ASTM standards. The tanks shall remain in service during the inspection process.

2.21 QUICK CONNECT RECEPTACLE AT EXISTING KY 7 PUMP STATION

Payment shall be on a lump sum basis and include all work required to install a quick connect receptacle at the KY 7 Pump Station. This work shall include confirming all horse power, voltage and phase prior to any work taking place. This shall include all electrical work and any inspections that may be required. Contractor is responsible for testing the new receptacle.

2.22 PURCHASE/DELIVERY OF PORTABLE 35 KW GENERATOR

Payment shall be on a per unit basis and shall include the purchase and delivery of one new portable 35 KW Generator to the Sandy Hook Water District. This generator shall be used to test the quick connect at the KY 7 pump station. See 2.17.

2.23 PRESSURE RELIEF VALVE AT PLANT

Payment shall be on a lump sum basis and include the following:

(1) Labor and equipment to install one Pressure Relief Valve on the inlet line from the wells inside the plant. Also included are the outlet line from the valve shall be PVC pipe, Class 200 and extend thru the wall of the plant. A 3" casing shall be installed in the wall and insulated foam shall be placed between the casing and the pipe. The outlet pipe on the outside of the wall shall have a tideflex valve.

2.24 PURCHASE/DELIVERY OF RADIO READ METERS

Payment shall be on a per unit basis of \$115 per meter as set up in the bid form. Contractor shall be responsible for working with Sandy Hook Water District and ordering the 5/8" x 3/4" Sensus Iperl Radio Read meter from CI Thornburg, 4034 Altizer Ave., Huntington WV. Sandy Hook Water District currently has Sensus meters in their system that will be changed out. No installation of the meters is required by the contractor.

PART 3 - EXECUTION

3.01 PAY ITEMS

A. The pay items listed herein before refer to the items listed in the Bid Schedule and cover all of the pay items under the base bid for this contract.

B. Any and all other items of work listed in the specifications or shown on the Contract Drawings for this contract shall be considered incidental to and included in those pay items.

3.02 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 pipeline 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 length and quantities of pipeline 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 pipe or overrun of pipe ordered for the pipeline 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 01030
LABOR PROVISIONS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The Contractor shall conform to all provisions of the Kentucky Department of Labor, Wage Decisions (latest revisions), relative to minimum wages and hours as they may apply to the work to be accomplished under these specifications.

B. In addition to the above, certain Federal laws and regulations shall govern the work and shall supplement or supplant the Kentucky Department of Labor Wage Decisions cited above, as the case may be.

1.02 RELATED SECTIONS

A. Section 3 - Part 1 Hours and Wages

1.03 WAGE RATES

Prevailing wage rates apply to this job. The Contractor will utilize, when feasible, local labor and will pay them wages commensurate with the wages prevailing in the Community.

1.04 LABOR PREFERENCE

Where feasible, the Contractor will utilize local labor.

1.05 HOURS OF WORK

A. Hours of work shall be as set out in Kentucky Department of Labor Wage Decisions (latest revisions); that is, not more than eight (8) hours in one calendar day, nor more than forty (40) hours in one week, except in case of emergency caused by fire, flood or damage to life and property.

B. Any laborer, workman, mechanic, helper, assistant or apprentice working in excess of forty (40) hours per week, except in case of emergency, shall be paid not less than 1-1/2 times the wage rate. Whenever overtime work is scheduled, the Contractor shall give prior notice to the Owner.

- END OF SECTION -

SECTION 01040**COORDINATION****PART 1 - GENERAL****1.01 COORDINATION OF THE WORK**

The Contractor shall coordinate the work of all the crafts, trades and subcontractors engaged on the Work, and he shall have final responsibility as regards the schedule, workmanship and completeness of each and all parts of the Work.

All crafts, trades and subcontractors shall be made to cooperate with each other and with others as they may be involved in the installation of work which adjoins, incorporates, precedes or follows the work of another. It shall be the Contractor's responsibility to point out areas of cooperation prior to the execution of subcontract agreements and the assignment of the parts of the Work. Each craft, trade and subcontractor shall be made responsible to the Owner, for furnishing embedded items, giving directions for doing all cutting and fitting, making all provisions for accommodating the Work, and for protecting, patching, repairing and cleaning as required to satisfactorily perform the Work.

The Contractor shall be responsible for all cutting, digging and other action of his subcontractors and workmen. Where such action impairs the safety or function of any structure or component of the Project, the Contractor shall make such repairs, alterations and additions as will, in the opinion of the Engineer, bring said structure or component back to its original design condition at no additional cost to the Owner.

Each subcontractor is expected to be familiar with the General Requirements and all sections of the Detailed Specifications for all other trades and to study all Drawings applicable to his work to the end that complete coordination between trades will be affected. Each Contractor shall consult with the Engineer if conflicts exist on the Drawings.

The Contractor shall conduct testing of water lines in a timely manner. The Contractor shall make provisions to test all water lines regardless of whether or not planned pump stations have been delivered and/or installed.

- END OF SECTION -

SECTION 01300**SUBMITTALS****PART 1 - GENERAL****1.01 WORK INCLUDED**

Shop drawings, descriptive literature, project data and samples (when samples are specifically requested) for all manufactured or fabricated items shall be submitted by the Contractor to the Engineer for examination and review in the form and in the manner required by the Engineer. All SUBMITTALS shall be furnished in at least six (6) copies and shall be checked, reviewed and signed by the Contractor before submission to the Engineer. The review of the Drawings by the Engineer shall not be construed as a complete check but only for conformance with the design concept of the Project and for compliance with information given in the Contract Documents. Review of such drawings will not relieve the Contractor of the responsibility for any errors that may exist, as the Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. General Provision.
- B. Section 01720 - Project Record Documents (As-Built).

1.03 DEFINITIONS

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

1.04 GENERAL CONDITIONS

A. Review by the Engineer of shop drawings or SUBMITTALS of material and equipment shall not relieve the Contractor from the responsibilities of furnishing same of proper dimension, size, quality, quantity, materials and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. Review shall not relieve the Contractor from responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents.

B. Review of shop drawings shall not be construed as releasing the Contractor from the responsibility of complying with the Specifications.

1.05 GENERAL REQUIREMENTS FOR SUBMITTALS

- A. Shop Drawings:
 - 1. Shop drawings shall be prepared by a qualified detailer. Details shall be identified by reference to sheet and detail numbers shown on Contract Drawings. Where applicable, show fabrication, layout, setting and erection details.
 - 2. Shop drawings are defined as original drawings prepared by the Contractor, subcontractors, suppliers, or distributors performing work under this Contract. Shop drawings illustrate some portion of the work and show fabrication, layout, setting or

erection details of equipment, materials and components. The Contractor shall, except as otherwise noted, have prepared the number of reviewed copies required for his distribution plus two (2) which will be retained by the Engineer. Shop drawings shall be folded to an approximate size of 8-1/2" x 11" and in such manner that the title block will be located in the lower righthand corner of the exposed surface.

B. Project data shall include manufacturer's standard schematic drawings modified to delete information which is not applicable to the Project, and shall be supplemented to provide additional information applicable to the Project. Each copy of descriptive literature shall be clearly marked to identify pertinent information as it applies to the Project.

C. Where samples are required, they shall be adequate to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged. Provide sufficient size and quantity to clearly illustrate functional characteristics of product and material, with integrally related parts and attachment devices, along with a full range of color samples.

D. All submittals shall be referenced to the applicable item, section and division of the Specifications, and to the applicable Drawing(s) or Drawing schedule(s).

E. The Contractor shall review and check SUBMITTALS, and shall indicate his review by initials and date.

F. If the submittals deviate from the Contract Drawings and/or Specifications, the Contractor shall advise the Engineer, in letter of transmittal of the deviation and the reasons therefor. All changes shall be clearly marked on the submittal with a bold red mark. Any additional costs for modifications shall be borne by the Contractor.

G. In the event the Engineer does not specifically reject the use of material or equipment at variance to that which is shown on the Drawings or specified, the Contractor shall, at no additional expense to the Owner, and using methods reviewed by the Engineer, make any changes to structures, piping, controls, electrical work, mechanical work, etc., that may be necessary to accommodate this equipment or material. Should equipment other than that on which design drawings are based be accepted by the Engineer, shop drawings shall be submitted detailing all modification work and equipment changes made necessary by the substituted item.

H. Additional information on particular items, such as special drawings, schedules, calculations, performance curves, and material details, shall be provided when specifically requested in the technical Specifications.

I. Submittals for all electrically operated items (including instrumentation and controls) shall include complete wiring diagrams showing leads, runs, number of wires, wire size, color coding, all terminations and connections, and coordination with related equipment.

J. Equipment shop drawings shall indicate all factory or shop paint coatings applied by suppliers, manufacturers and fabricators; the Contractor shall be responsible for insuring the compatibility of such coatings with the field-applied paint products and systems.

K. Fastener specifications of manufacturer shall be indicated on equipment shop drawings.

L. Where manufacturers' brand names are given in the Specifications for building and construction materials and products, such as grout, bonding compounds, curing compounds, masonry cleaners, waterproofing solutions and similar products, the Contractor shall submit names and descriptive literature of such materials and products he proposes to use in this Contract.

M. No material shall be fabricated or shipped unless the applicable drawings or submittals have been reviewed by the Engineer and returned to the Contractor.

N. All bulletins, brochures, instructions, parts lists, and warranties packaged with and accompanying materials and products delivered to and installed in the Project shall be saved and transmitted to the Owner through the Engineer.

1.06 CONTRACTOR RESPONSIBILITIES

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

- END OF SECTION -

SECTION 01380**VIDEO TAPE****PART 1 - GENERAL****1.01 WORK INCLUDED**

The Contractor shall be responsible for video taping the entire project site both prior to construction and immediately after completion and acceptance of all work. Video tapes shall be produced by a videographer acceptable to the Engineer and of a professional quality.

1.02 VIDEO TAPE

The video tape shall be of a high quality VHS or DVD format. Video tapes shall show the time, date, and project location on screen during playback.

1.03 SUBMITTALS

The Contractor shall provide two copies of the project video tape or DVD with jackets. Both the video tapes or DVD's and jackets shall be clearly labeled with project name start date and completion date as shown below.

Project Name and Contract No.
Owner Name
Start Date: _____
Completion Date: _____

-END OF SECTION-

SECTION 01450
QUALITY CONTROL

PART 1 - GENERAL

1.01 QUALITY CONTROL

A. Work of all crafts and trades shall be laid out to lines and elevations as established by the Contractor from the Drawings or from instructions by the Engineer.

B. Unless otherwise shown, all work shall be plumb and level, in straight lines and true planes, parallel or square to the established lines and levels. The Work shall be accurately measured and fitted to tolerance as established by the best practices of the crafts and trades involved, and shall be as required to fit all parts of the Work carefully and neatly together.

C. All equipment, materials and articles incorporated into the Work shall be new and of comparable quality as specified. All workmanship shall be first-class and shall be performed by mechanics skilled and regularly employed in their respective trades.

1.02 TESTS, INSPECTIONS, AND CERTIFICATIONS OF MATERIALS

A. Tests, inspections and certifications of materials, equipment, subcontractors or completed work, as required by the various sections of the Specifications shall be obtained by the Contractor and all costs shall be included in the Contract Price.

B. The Contractor shall submit to the Engineer the name of testing laboratory to be used.

C. Contractor shall deliver written notice to the Engineer at least 24 hours in advance of any inspections or tests to be made at the Project site. All inspections, tests, samples for water quality or other procedures requiring the Engineer to attest to be conducted in the field shall be done in the presence of the Engineer or his representative.

D. Certifications by independent testing laboratories may be by copy of the attestation(s) and shall give scientific procedures and results of tests. Certifications by persons having interest in the matter shall be by original attest properly sworn to and notarized.

- END OF SECTION -

SECTION 01500**TEMPORARY FACILITIES AND CONTROLS****PART 1 - GENERAL****1.01 DESCRIPTION**

A. The Contractor shall make his own provisions for temporary electricity and water and maintain strict supervision of use of temporary utility services as follows:

1. Enforce compliance with applicable standards.
2. Enforce safety practices
3. Prevent abuse of services.
4. Pay all utility charges required.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. The Contractor shall obtain and pay for all permits as required by governing authorities.
- B. Obtain and pay for temporary easements required across property other than that of Owner or that is shown on the Contract Drawings.
- C. The Contractor shall comply with applicable codes.

1.03 REMOVAL

- A. The Contractor shall completely remove temporary materials, equipment, and offices upon completion of construction.
- B. The Contractor shall repair damage caused by installation and restore to specified or original condition.

1.04 TEMPORARY LIGHTING

- A. The Contractor shall furnish and install temporary lighting required for:
1. Construction needs.
 2. Safe and adequate working conditions.
 3. Public Safety.
 4. Security lighting.
 5. Temporary office and storage area lighting.
- B. Service periods for safety lighting shall be as follows:
1. Within construction area: All times that authorized personnel are present.
 2. Public areas: At all times.

C. Costs of Installation and Preparation: Contractor shall pay all installation, maintenance and removal costs of temporary lighting.

D. Maintenance of temporary lighting service (replacement of bulbs, etc.) shall be the sole responsibility of the General Contractor.

1.05 TEMPORARY WATER

The Contractor shall provide the water necessary for testing and disinfection. Water purchased from the owner for flushing and testing shall be paid for at the whole sale price by the contractor. The Contractor shall supply his own hoses, chlorine for disinfection, etc.

1.06 SANITARY FACILITIES

Contractor shall provide sanitary facilities as set forth in General Provisions (GP-2.04.Sanitary Regulations).

1.07 FIELD OFFICE (Office Trailer not Required for this Contract)

The Contractor shall make his own provisions for providing the electricity, telephone, gas, water, sewer, and other utilities to his office trailer that are required or as necessary for completion of the work.

The Contractor shall be responsible for all utility charges.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 IMPLEMENTATION

- B. The Contractor shall provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to storm drains, adjacent areas and walkways prior to the start of any site work.
- C. Straw bale dikes, silt fencing and synthetic filter fabric shall be used as necessary to protect adjacent lands, surface waters, and vegetation to achieve environmental objectives.
- D. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Soil deposited on pavement by construction and other contractor vehicles shall be removed and the pavement swept as required.
- F. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- G. Minimize amount of bare soil exposed at one time.
- H. Provide temporary measures such as berms, dikes, drains, hay bales, gabions, etc., as directed by the Engineer so as to minimize siltation due to runoff.

- I. Construct fill and waste areas by selective placement to avoid erosive exposed surface of silts or clays.
- J. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

3.02 OPERATION AND MAINTENANCE

- A. The Contractor shall inspect, repair, and maintain erosion and sediment control measures until final stabilization has been established.

3.03 REMOVAL OF FACILITIES

- A. The Contractor shall remove the temporary facilities after final stabilization has been established. Used devices (including old straw bales) shall be disposed of as Construction & Demolition debris.

3.04 DUST CONTROL

- A. Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

- END OF SECTION -

SECTION 01530

BARRIERS

PART 1 - GENERAL

1.01 WORK INCLUDED

Temporary Railing: Temporary railing shall be provided around open pits and other locations where needed, to prevent accidents or injury to persons.

1.02 COST

The Contractor shall pay all costs for temporary railing.

- END OF SECTION -

SECTION 01540

SECURITY

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide barricades, lanterns and other such signs and signals as may be necessary to warn of the dangers in connection with open excavation and obstructions.

B. Provide an adequate and approved system to secure the Project area at all times, especially during non-construction periods; the Contractor shall be solely responsible for taking proper security measures.

1.02 COSTS

Contractor shall pay all costs for protection and security systems.

- END OF SECTION -

SECTION 01570
TRAFFIC REGULATION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Construction parking control.
- B. Flagmen.
- C. Flares and lights.
- D. Haul routes.
- E. Traffic signs and signals.
- F. Removal.

1.02 RELATED REQUIREMENTS

- A. Section 01530 - Barriers.
- B. Section 01580 - Project Identification and Signs.

PART 2 - PRODUCTS

2.01 SIGNS, SIGNALS AND DEVICES

- A. Post-mounted and wall-mounted traffic control and informational signs as specified and required by local jurisdictions.
- B. Automatic Traffic Control Signals: As approved by local jurisdictions.
- C. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
- D. Flagman Equipment: As required by local jurisdictions.

PART 3 - EXECUTION

3.01 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in nondesignated areas.

3.02 TRAFFIC CONTROL

A. Whenever and wherever, in the Engineer's opinion, traffic is sufficiently congested or public safety is endangered, Contractor shall furnish uniformed officers to direct traffic and to keep traffic off the highway area affected by construction operations.

B. Contractor shall abide by City regulations governing utility construction work.

C. Traffic control shall be provided according to the Kentucky Department of Highways Manual on Uniform Traffic Control Devices for Streets and Highways.

3.03 FLAGMEN

Provide trained and equipped flagmen to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.04 FLARES AND LIGHTS

Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.05 HAUL ROUTES

A. Consult with authorities, establish public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.06 TRAFFIC SIGNS AND SIGNALS

A. At approaches to site and on site, install appropriate signs at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.

C. Relocate as work progresses, to maintain effective traffic control.

3.07 REMOVAL

Remove equipment and devices when no longer required. Repair damage caused by installation. Remove post settings to a depth of 2 feet.

- END OF SECTION -

SECTION 01580**PROJECT IDENTIFICATION AND SIGNS****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. The Contractor shall provide all signs required by these specifications near the site of the work. The sign shall set forth the description of the work and the names of the Owner, Engineer and Contractor as shown on the Plans or in these Specifications.

B. The Contractor shall furnish and install Two (2) signs on the Project. Each sign shall conform to the specifications and painted as shown on Figure I and II on the following pages. The location of signs shall be determined by the Owner and/or Engineer at the pre-construction meeting.

PART 2 - PRODUCT**2.01 SIGN**

The sign shall be constructed of 3/4" thick APA A-B Exterior grade or marine plywood. Posts shall be 4" x 4" of fencing type material. Prime all wood with white primer. Sign shall be as shown in Figure I and II.

PART 3 - EXECUTION**3.01 MAINTENANCE**

The sign shall be maintained in good condition until completion of the Project.

3.02 LOCATION

The location of the project signs shall be determined at the pre-construction conference after the contract has been awarded.

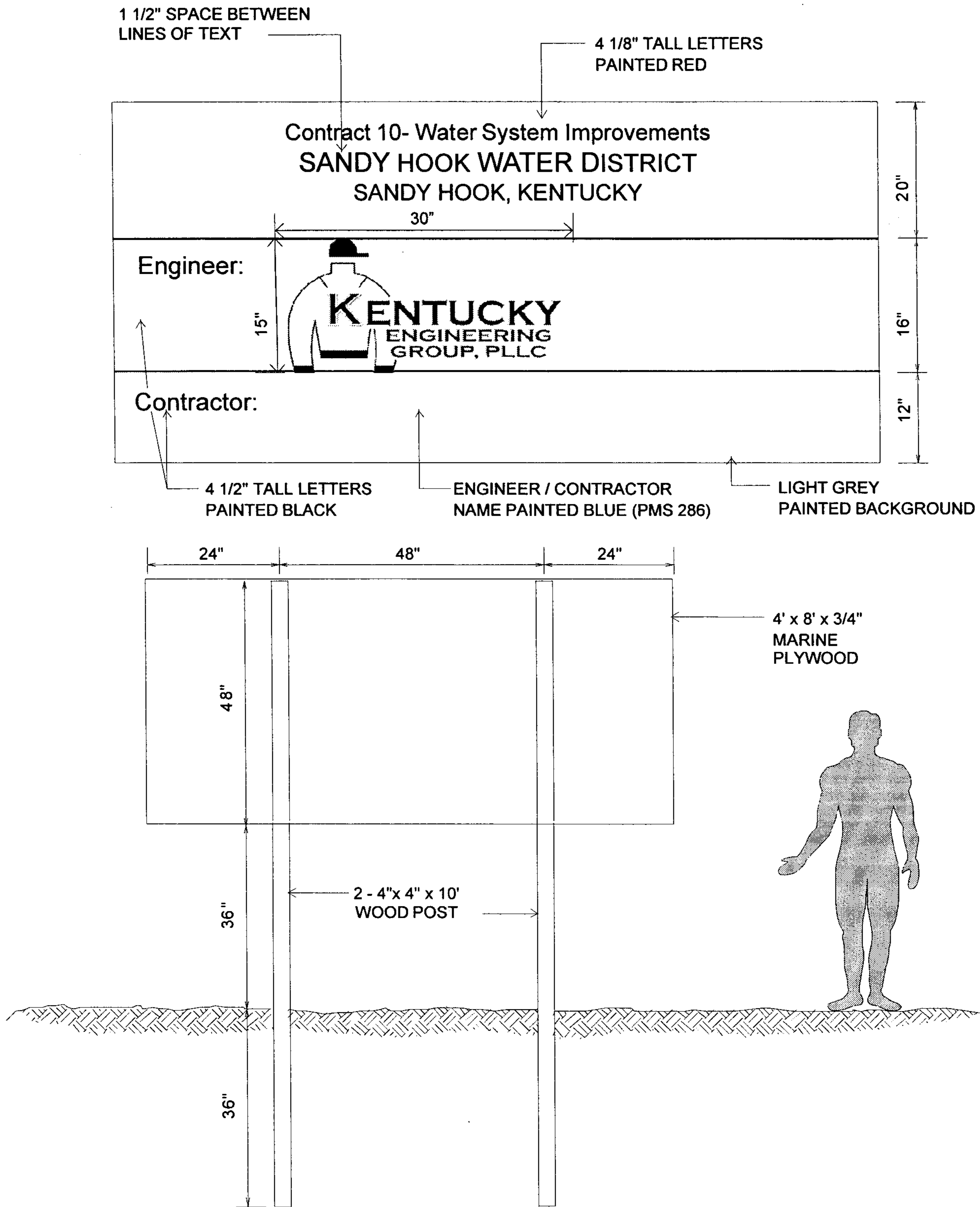


FIGURE 1
 01580-2

TEMPORARY CONSTRUCTION SIGN FOR USDA RURAL DEVELOPMENT PROJECTS

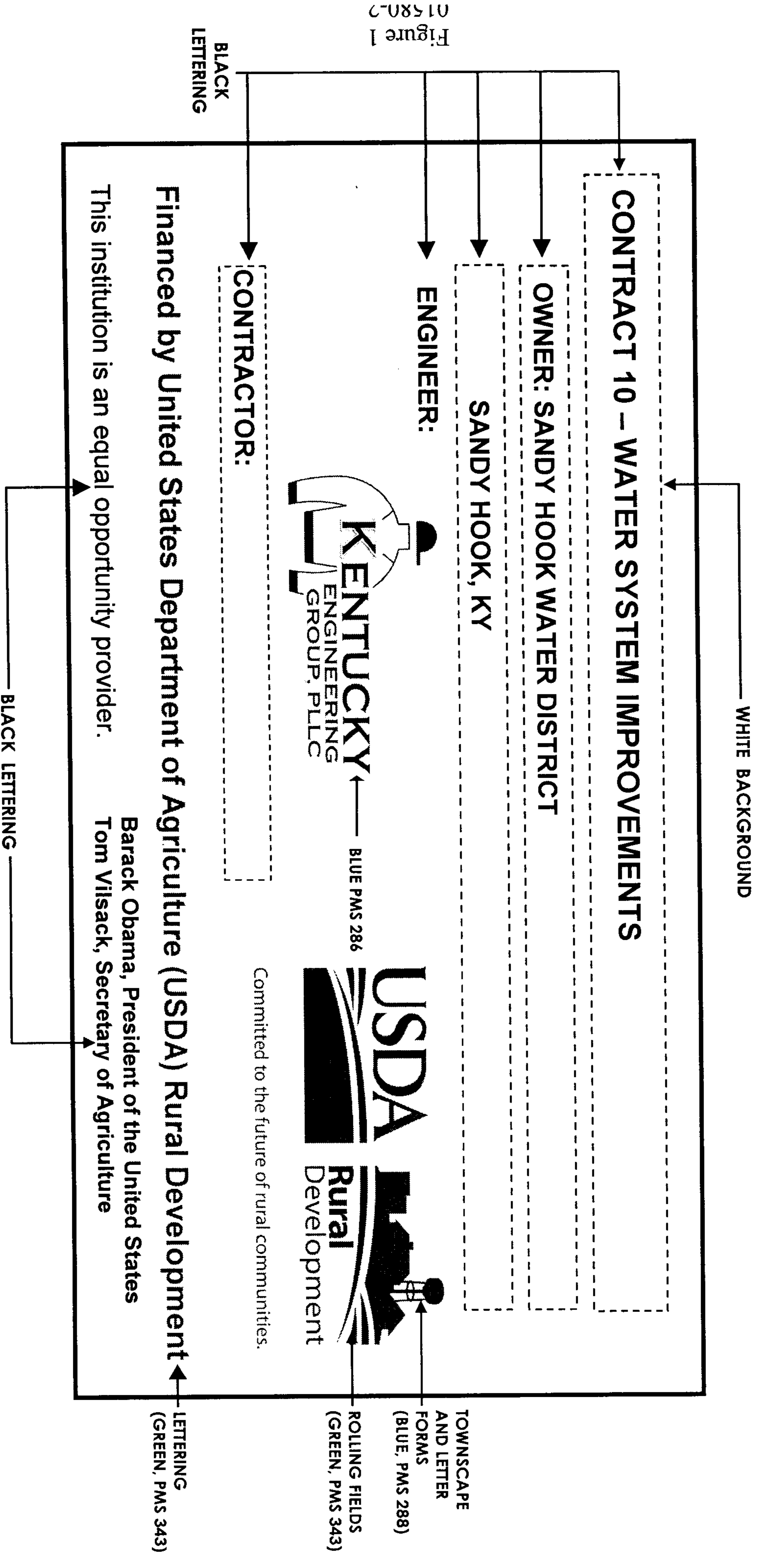


Figure 1
01580-2

SIGN DIMENSIONS: 1200 mm x 2400 mm x 19 mm (approx. 4' x 8' x 3/4")
PLYWOOD PANEL (APA RATED A-B GRADE-EXTERIOR)

SECTION 01600**MATERIAL AND EQUIPMENT****PART 1 - GENERAL****1.01 COMPLIANCE WITH SAFETY REGULATIONS**

The equipment items furnished shall comply with all governing Federal and State laws regarding safety, including all requirements of the Occupational Safety and Health Act of 1970 (OSHA).

PART 2 - PRODUCTS**2.01 REFERENCES**

- A. General Provisions: Section 10 Correction and Guarantee of Work, Section 13 Materials and Equipment.
- B. Section 02600 - Pipe, Fittings, and Installation
- C. Section 02640 - Valves.
- D. All material shall meet applicable American Water Works Association (AWWA), American Standard Testing Methods (ASTM), Underwriters Laboratories (UL), Factory Mutual (FM), National Sanitation Foundation (NSF) standards.

SANDY HOOK WATER DISTRICT

The following is a list of manufacturers for the materials that may be provided on the project. All material shall meet applicable AWWA, ASTM, Underwriters Laboratories, and Factory Mutual standards. The Owner and Engineer shall approve actual materials during shop drawing review.

MATERIAL/ITEM	APPROVED MANUFACTURER
Air Release Valve (Water and Sewer)	Apco, ARI, Primer Corp or Approved Equal
All Brass Fittings (AWWA brass)	Ford, or Approved Equal
Aluminum Hatch	Bil-Co or Approved Equal
Blowoff Hydrant Assembly	Hydrants shall be post type Model No. A-411 as manufactured by Mueller Co. or Approved Equal.
Blowoff Assembly (Underground)	Hydrants shall be Model No. A-412 as manufactured by Mueller Co. or Approved Equal.
Bolted Cast Couplings	Dresser, Smith & Blair, Ford, Viking-Johnson, JCM, Powerseal or Approved Equal
Brass Nipples and Pipe	State Origin

MATERIAL/ITEM	APPROVED MANUFACTURER
Brass Service Saddles	Ford or Approved Equal
Butterfly Valves (Class 150)	Mueller Lineseal III or Approved Equal
Butterfly Valves (Class 250)	Mueller Lineseal XP or Approved Equal
Casing Spacers	State Origin
Check Valve	Valve shall be those manufactured by Muller, Kennedy, American Flow Control, or Approved Equal.
Control Valve	Valve shall be Model 710 as manufactured by Bermad or Approved Equal.
Copper Tracing Wire 14 AWG	State Origin
Customer Individual Pressure Reducing Valve	Watts N55BUM1 or Approved Equal
Customer Meter	Sensus Radio Read (Iperl)
Customer Meter Box Cover	Mid States Plastic box w/ Raised CI lid
Customer Meter Setter	Ford or approved equal
DI and Cast Iron Full Body Tapping Sleeves	Mueller, Clow, US Pipe, American Flow or Approved Equal or Approved Equal
DI Double Strap Service Saddles	Mueller, Ford, Smith & Blair, JCM or Approved Equal
DI Pipe Class 350	Griffin, Clow, US Pipe, American DI Pipe or Approved Equal
Dual Disc Check Valve	Valve shall be Series #8800 (class 125) as manufactured by Val-Matic® Valve & Mfg. Corporation, Elmhurst, IL. USA. or Approved Equal.
Fire Hydrant	Mueller® Super Centurion 250 ® Model A-423 or Approved Equal
Flushing Hydrant Assembly	Mueller® - Super Centurion 250, Model No. A-423 or Approved Equal
Full Circle Repair Clamps (all stainless steel)	Mueller, Smith & Blair, Ford, Powerseal, Cascade or Approved Equal
Galvanized Compression Couplings	Smith & Blair, Dresser, JCM, Powerseal or Approved Equal
Gate Valves	Mueller Resilient Seat or Approved Equal
Individual Pressure Reducing Valve	Watts Model No. N55BUM1 or Approved Equal
Mainline Pressure Reducing Valve	
Manhole Ring and Cover	J. R. Hoe & Sons or Approved Equal
MJ Fittings Compact/Full Body MJ Packs	McWayne (Tyler/Union, Clow), Griffin, US Pipe, American DI Pipe or Approved Equal
Precast Concrete Manholes	Cloud, Sherman-Dixie or Approved Equal
PVC Couplings	JM Manufacturing, Harrington, Multi-Fittings or Approved Equal
PVC Pipe Class 200 or C900	Diamond, JM Manufacturing, Napco, Freedom, ETI, National, Pioneer or Approved Equal

MATERIAL/ITEM	APPROVED MANUFACTURER
Restraint Joint Collar Fittings	Mueller, McWayne, Ford, EBBA or Approved Equal
Service Tubing - Polyethylene Tubing (CTS Service Tubing)	Domestic
Service Tubing - Type K Copper Soft	Domestic
Steel Tapping Valves and Sleeves (Check Working Pressure)	Mueller, Kennedy, Ford or Approved Equal
Underground Blowoff Hydrant Assembly	Mueller Model No. A-412 or Approved Equal
Underground Detectable Tape	Shall be Lineguard brand encased aluminum foil, Type III. The identification tape is manufactured by Lineguard, Inc., P. O. Box 426, Wheaton, IL 60187 or Approved Equal

-END OF SECTION-

SECTION 01610**TRANSPORTATION AND HANDLING****PART 1 - GENERAL****1.01 WORK INCLUDED****A. Handling and Distribution:**

1. The Contractor shall handle, haul, and distribute all materials and all surplus materials on the different portions of the work, as necessary or required; shall provide suitable and adequate storage room for materials and equipment during the progress of the work, and be responsible for the protection, loss of, or damage to materials and equipment furnished by him, until the final completion and acceptance of the work.
2. Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

B. Storage of Materials and Equipment: All excavated materials and equipment to be incorporated in the work shall be placed so as not to injure any part of the work or the existing facilities and so that free access can be had at all times to all parts of the work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

- END OF SECTION -

SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Liquidated Damages: General Provisions-11.20. CHARGES FOR DELAY CAUSED BY THE CONTRACTOR

B. Cleaning: Section 01710.

C. Project Record Documents: Section 01720.

1.02 SUBSTANTIAL COMPLETION

A. Contractor:

1. Submit written certification to Engineer that project is substantially complete.
2. Submit list of major items to be completed or corrected.

B. Engineer will make an inspection within seven days after receipt of certification, together with Owner's Representative.

C. Should Engineer consider that work is substantially complete:

1. Contractor shall prepare, and submit to Engineer, a list of items to be completed or corrected, as determined by the inspection.
2. Engineer will prepare and issue a Certificate of Substantial Completion, containing:
 - a. Date of Substantial Completion.
 - b. Contractor's list of items to be completed or corrected, verified and amended by Engineer.
 - c. The time within which Contractor shall complete or correct work of listed items.
 - d. Time and date Owner will assume possession of work or designated portion thereof.
 - e. Responsibilities of Owner and Contractor for:
 - (1) Insurance
 - (2) Utilities
 - (3) Operation of mechanical, electrical and other systems.
 - (4) Maintenance and cleaning.
 - (5) Security

f. Signatures of:

- (1) Engineer.
- (2) Contractor.
- (3) Owner.

3. Owner occupancy of Project or Designated Portion of Project:

a. Contractor shall:

- (1) Obtain certificate of occupancy.
- (2) Perform final cleaning in accordance with Section 01710.

b. Owner will occupy Project, under provisions stated in Certificate of Substantial Completion.

4. Contractor shall complete work listed for completion or correction, within designated time.

D. Should Engineer consider that work is not substantially complete.

- 1. He shall immediately notify Contractor, in writing, stating reasons.
- 2. Contractor shall complete work, and send second written notice to Engineer, certifying that Project, or designated portion of Project is substantially complete.
- 3. Engineer will reinspect work.

1.03 FINAL INSPECTION

A. Contractor shall submit written certification that:

- 1. Contract Documents have been reviewed.
- 2. Project has been inspected for compliance with Contract Documents.
- 3. Work has been completed in accordance with Contract Documents.
- 4. Equipment and systems have been tested in presence of Owner's Representative and are operational.
- 5. Project is completed and ready for final inspection.

B. Engineer will make final inspection within seven (7) days after receipt of certification.

C. Should Engineer consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Contractor to make Project Closeout submittals.

D. Should Engineer consider that work is not finally complete:

- 1. He shall notify Contractor, in writing, stating reasons.
- 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.

3. Engineer will reinspect work.

1.04 FINAL CLEAN UP

The Work will not be considered as completed and final payment made until all final clean up has been done by the Contractor in a manner satisfactory to the Engineer. See Section 01710 for detailed requirements.

1.05 CLOSEOUT SUBMITTALS

Project Record Documents: To requirements of Section 01720.

1.06 FINAL APPLICATION FOR PAYMENT

Contractor shall submit final applications in accordance with requirements of GENERAL PROVISIONS.

1.07 FINAL CERTIFICATE FOR PAYMENT

A. Engineer will issue final certificate in accordance with provisions of GENERAL PROVISIONS.

B. Should final completion be materially delayed through no fault of Contractor, Engineer may issue a Semi-Final Certificate for Payment.

- END OF SECTION -

SECTION 01710**CLEANING****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. During its progress the work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.

B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes, structures, by work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat condition.

C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organics in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

D. The Contractor shall thoroughly clean all materials and equipment installed by him and his subcontractors, and on completion of the work shall deliver it undamaged and in fresh and new appearing condition.

E. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition equal or better than that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

1.02 DESCRIPTION

A. Related Requirements Specified Elsewhere:

1. Project Closeout: Section 01700.
2. Cleaning for Specific Products or Work: Specification Section for that work.

B. On a continuous basis, maintain premises free from accumulations of waste, debris, and rubbish, caused by operations.

C. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave Project clean and ready for occupancy.

1.03 SAFETY REQUIREMENTS

- A. Hazards Control:
1. Store volatile wastes in covered metal containers, and remove from premises daily.
 2. Prevent accumulation of wastes, which create hazardous conditions.
 3. Provide adequate ventilation during use of volatile or noxious substances.
- B. Conduct cleaning and disposal operations in compliance with local ordinances and anti-pollution laws.
1. Do not burn or bury rubbish and waste materials on Project site without written permission from the Owner.
 2. Do not dispose of volatile wastes such as mineral spirits, oil, or fuel in open drainage ditches or storm or sanitary drains.
 3. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS**2.01 MATERIALS**

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION**3.01 DURING CONSTRUCTION**

- A. Execute cleaning to ensure that grounds and public properties are maintained free from accumulations of waste materials and rubbish.
- B. Wet down dry materials and rubbish to minimize blowing dust.
- C. At reasonable intervals during progress of Work, clean site and public properties, and dispose of waste materials, debris and rubbish.
- D. Provide on-site containers for collection of waste materials, debris and rubbish.
- E. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off construction site.
- F. The Contractor shall thoroughly clean all materials and equipment installed.

3.02 FINAL CLEANING

- A. Employ experienced workmen, or professional cleaners, for final cleaning.
- B. In preparation for substantial completion, conduct final inspection of project area(s).
- C. Broom clean paved surfaces; rake clean other surfaces of grounds.
- D. Maintain cleaning until Project, or portion thereof, is accepted by Owner.

- END OF SECTION -

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall obtain from the Engineer, one (1) set of prints of the Contract Drawings. These prints shall be kept and maintained in good condition at the project site and a qualified representative of the Contractor shall enter upon these prints, from day-to-day, the actual "as-built" record of the construction progress. Entries and notations shall be made in a neat and legible manner and these prints shall be delivered to the Engineer upon completion of the construction. APPROVAL FOR FINAL PAYMENT WILL BE CONTINGENT UPON COMPLIANCE WITH THIS PROVISION.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE:

- A. Section 01300 - Submittals.
- B. General Provisions – Kentucky Engineering Group, PLLC

1.03 MAINTENANCE OF DOCUMENTS

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

1.04 MARKING DEVICES

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

1.05 RECORDING

- A. Label each document "PROJECT RECORD" in 2-inch high printed letters.

- B. Keep record documents current.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Contract Drawings: Legibly mark to record actual construction:
 - 1. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
 - 2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - 3. Field changes of dimension and detail.
 - 4. Changes made by Change Order or Field Order.
 - 5. Details not on original Contract Drawings.
- E. Specifications and Addenda: Legibly mark up each Section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - 2. Changes made by Change Order or Field Order.
 - 3. Other matters not originally specified.
- F. Shop Drawings: Maintain as record documents; legibly annotate Shop Drawings to record changes made after review.

1.06 SUBMITTAL

- A. At completion of project, deliver record documents to Engineer.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
 - 1. Date.
 - 2. Project Title and Number.
 - 3. Contractor's Name and Address.
 - 4. Title and Number of each Record Document.
 - 5. Certification that each Document as Submitted is Complete and Accurate.
 - 6. Signature of Contractor, or his authorized Representative.

- END OF SECTION -

SECTION 01740
WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Compile specified warranties and bonds.
- B. Compile specified service and maintenance contracts.
- C. Co-execute submittals when so specified.
- D. Review submittals to verify compliance with Contract Documents.
- E. Related requirements specified elsewhere:
 - 1. Bid Bond: Instructions to Bidders.
 - 2. Performance and Payment Bonds: General Provisions.
 - 3. Guaranty: General Provisions.
 - 4. General Warranty of Construction: General Provisions.
 - 5. Project Closeout: Section 01700.
 - 6. Warranties and Bonds required for specific products: As listed herein.
 - 7. Provisions of Warranties and Bonds, Duration: Respective specification sections for particular products.
 - 8. Operating and Maintenance Data: Section 01730.

1.02 SUBMITTALS REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Furnish two (2) original signed copies.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product, equipment or work item.
 - 2. Firm name, address and telephone number.
 - 3. Scope

4. Date of beginning of warranty, bond or service and maintenance contract.
5. Duration of warranty, bond or service and maintenance contract.
6. Provide information for Owner's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.
7. Contractor name, address and telephone number.

1.03 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 1. Size 8-1/2 in. x 11 in., punch sheets for 3-ring binder: Fold larger sheets to fit into binders.
 2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS".
List:
 - a. Title of Project.
 - b. Name of Contractor.
- C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.04 TIME OF SUBMITTALS

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

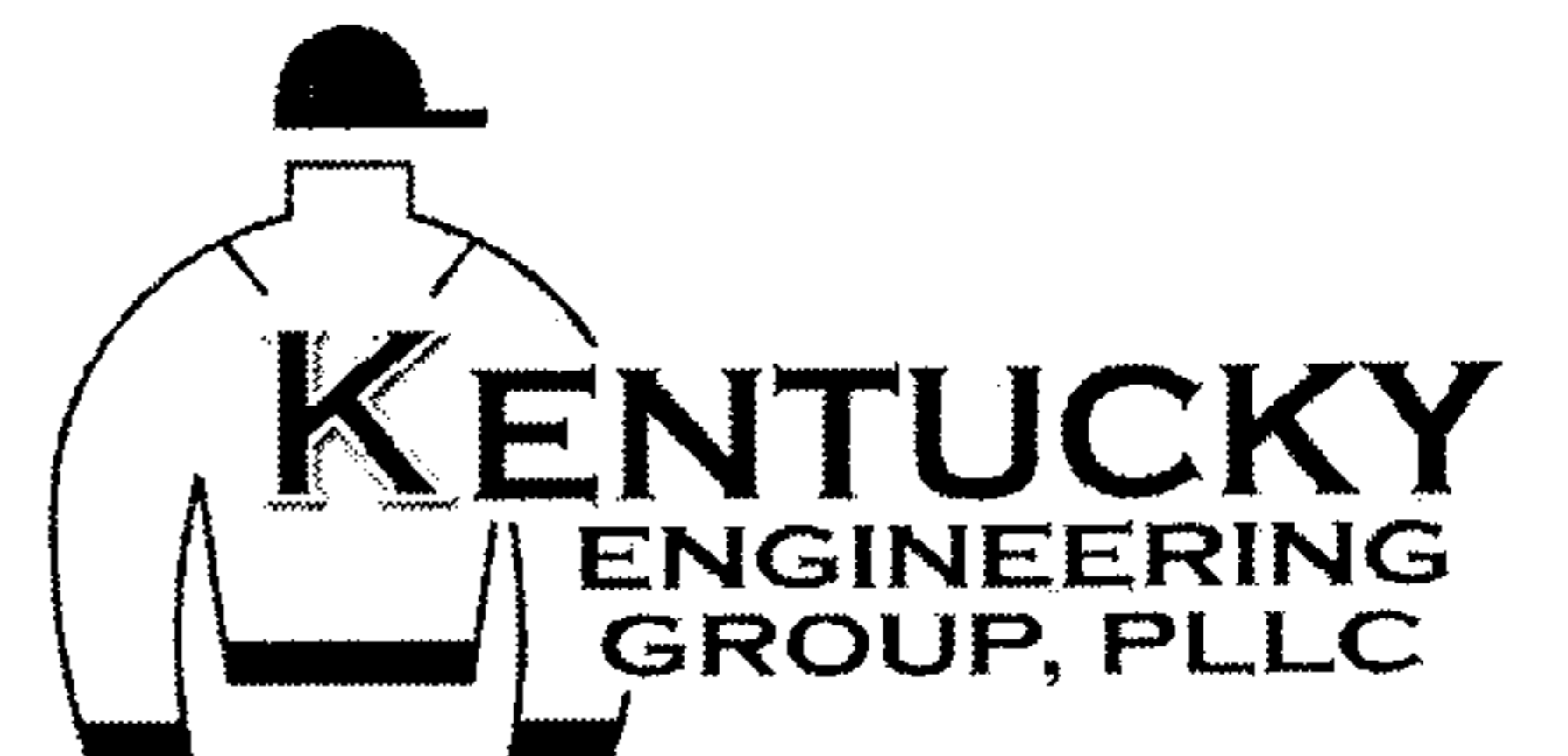
1.05 SUBMITTALS REQUIRED

Submit warranties, bonds, service and maintenance contracts as specified in the respective sections of the Specifications.

- END OF SECTION -

DIVISION 2

SITE WORK



SECTION 02110**SITE CLEARING****PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. Clear site within construction limits of plant life.
- B. Remove grass and topsoil in area of access road and foundation.
- C. Remove root system of trees and shrubs.
- D. Remove surface debris

1.02 RELATED WORK

- A. Section 02228 - Rock Removal.
- B. Section 02211 - Rough Grading.
- C. Section 02222 - Excavation.

1.03 REGULATORY REQUIREMENTS

Conform to applicable local codes and ordinances for disposal of debris.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION**3.01 CLEARING**

- A. Clear areas required for access to site and execution of work.
- B. Remove trees, shrubs, brush, and other vegetable matter such as snags, bark, and refuse.

3.02 PROTECTION

The Contractor shall not cut or injure any trees or other vegetation outside the easement lines and outside the areas to be cleared, as indicated on the Drawings, without written permission from the Engineer. The Contractor shall be responsible for all damage done outside these lines.

3.03 GRUBBING

From areas to be grubbed, the Contractor shall remove completely all stumps, remove to a depth of at least 24 inches below subgrade elevation all roots larger than 1 1/2 in. in diameter, and remove to a depth of 12 in. all roots larger than 1/2 in. in diameter. Such depths shall be measured from the existing ground surface, the proposed finished grade or subgrade, whichever is lower.

3.04 STRIPPING

All stumps, roots, foreign matter, topsoil, loam, and unsuitable earth shall be stripped from the ground surface. The topsoil and loam shall be utilized insofar as possible, for finished surfacing. Loam shall not be taken from the site.

3.05 DISPOSAL

A. All material resulting from clearing and grubbing and not scheduled for reuse or stockpiling shall become the property of the Contractor and shall be suitably disposed of off site, unless otherwise directed by the Engineer, in accordance with all applicable laws, ordinances, rules and regulations.

B. Such disposal shall be performed as promptly as possible after removal of the material and shall not be left until the final period of cleaning up.

3.06 FENCES

Wherever fences need to be removed to provide access to the work or are damaged during the progress of work, they shall be restored or repaired to as good a condition as existed prior to construction at the Contractor's expense.

- END OF SECTION -

SECTION 02211
ROUGH GRADING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Remove topsoil and stockpile for later reuse.
- B. Excavate subsoil and stockpile for later reuse as directed in Section 022110, Backfilling and Embankments.
- C. Grade and rough contour site.

1.02 RELATED WORK

- A. Geotechnical data as indicated in Appendix A of the specifications. (None provided or available for this Contract)
- B. Section 02228 - Rock Removal.
- C. Section 02222 - Excavation.
- D. Section 02220 - Earthwork.

1.03 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01720.
- B. Accurately record location of utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

1.04 PROTECTION

- A. Protect trees and other features remaining as portion of final landscaping.
- B. Protect bench marks, existing structures, fences, roads, sidewalks and other features not designated for demolition.
- C. Protect above or below grade utilities which are to remain.
- D. Contractor shall be responsible for repairing any damage to those items not designated for demolition or removal in a manner satisfactory to the Owner at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil: Excavated material, graded free of roots, rocks larger than one inch, subsoil, debris, and large weeds.

B. Subsoil: Excavated material, graded free of lumps larger than 12 inches, rocks larger than 12 inches, and debris.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Identify known below grade utilities. Stake and flag locations.
- C. Identify and flag above grade utilities.
- D. Maintain and protect existing utilities remaining which pass through work area.
- E. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Engineer.

3.02 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, and stockpile in area designated on site by the Engineer.
- B. Do not excavate wet topsoil.
- C. Stockpile topsoil to depth not exceeding 8 feet.

3.03 SUBSOIL EXCAVATION

- A. Excavate subsoil from indicated areas and stockpile in area designated on site. Excess subsoil may be reused according to Section 02220, Backfilling.
- B. Do not excavate wet subsoil.
- C. Stockpile subsoil to depth not exceeding 8 feet.
- D. When excavation through roots is necessary, perform work by hand and cut roots with a sharp axe.

3.04 TOLERANCES

Top Surface of Subgrade: Plus or minus three inches.

- END OF SECTION -

SECTION 02220**EARTHWORK****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes excavation and backfilling including the loosening, removing, refilling, transporting, storage and disposal of all materials classified as "earth" necessary to be removed for the construction and completion of all work under the Contract, and as shown on the Contract Drawings, specified or directed.

1.02 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards, and specifications, except where more stringent requirements have been specified herein:

1. American Society for Testing and Materials (ASTM)
 - a. A328 Specification for Steel Sheet Piling
 - b. D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³)
 - c. D1556 Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
 - d. D1760 Specification for Pressure Treatment of Timber Products
 - e. D2922 Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)

1.03 DEFINITIONS

- A. Excavation (or Trenching)
1. Grubbing, stripping, removing, storing and rehandling of all materials of every name and nature necessary to be removed for all purposes incidental to the construction and completion of all the work under construction.
 2. All sheeting, sheetpiling, bracing and shoring, and the placing, driving, cutting off and removing of the same.
 3. All diking, ditching, fluming, cofferdamming, pumping, bailing, draining, well pointing, or otherwise disposing of water.
 4. The removing and disposing of all surplus materials from the excavations in the manner specified.

5. The maintenance, accommodation and protection of travel and the temporary paving of highways, roads and driveways.
 6. The supporting and protecting of all tracks, rails, buildings, curbs, sidewalks, pavements, overhead wires, poles, trees, vines, shrubbery, pipes, sewers, conduits or other structures or property in the vicinity of the work, whether over- or underground or which appear within or adjacent to the excavations, and the restoration of the same in case of settlement or other injury.
 7. All temporary bridging and fencing and the removing of same.
- B. Earth
1. All materials such as sand, gravel, clay, loam, ashes, cinders, pavements, muck, roots or pieces of timber, soft or disintegrated rock, not requiring blasting, barring, or wedging from their original beds, and specifically excluding all ledge or bedrock and individual boulders or masonry larger than one-half cubic yard in volume.
- C. Backfill
1. The refilling of excavation and trenches to the line of filling indicated on the Contract Drawings or as directed using materials suitable for refilling of excavations and trenches; and the compacting of all materials used in filling or refilling by rolling, ramming, watering, puddling, etc., as may be required.
- D. Spoil
1. Surplus excavated materials not required or not suitable for backfills or embankments.
- E. Embankments
1. Fills constructed above the original surface of the ground or such other elevation as specified or directed.
- F. Limiting Subgrade
1. The underside of the pipe barrel for pipelines
 2. The underside of footing lines for structures
- G. Excavation Below Subgrade
1. Excavation below the limiting subgrades of structures or pipelines.
 2. Where materials encountered at the limiting subgrades are not suitable for proper support of structures or pipelines, the Contractor shall excavate to such new lines and grades as required.

PART 2 PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

A. Wood Sheeting and Bracing

1. Shall be sound and straight; free from cracks, shakes and large or loose knots; and shall have dressed edges where directed.
2. Shall conform to National Design Specifications for Stress Grade Lumber having a minimum fiber stress of 1200 pounds per square inch.
3. Sheeting and bracing to be left-in-place shall be pressure treated in accordance with ASTM D1760 for the type of lumber used and with a preservative approved by the Engineer.

B. Steel Sheeting and Bracing

1. Shall be sound
2. Shall conform to ASTM A328 with a minimum thickness of 3/8 inch.

PART 3 EXECUTION

3.01 UNAUTHORIZED EXCAVATION

- A. Whenever excavations are carried beyond or below the lines and grades shown on the Contract Drawings, or as given or directed by the Engineer, all such excavated space shall be refilled with special granular materials, concrete or other materials as the Engineer may direct. All refilling of unauthorized excavations shall be at the Contractor's expense.
- B. All material which slides, falls or caves into the established limits of excavations due to any cause whatsoever, shall be removed and disposed of at the Contractor's expense and no extra compensation will be paid the Contractor for any materials ordered for refilling the void areas left by the slide, fall or cave-in.

3.02 REMOVAL OF WATER

A. General

1. The Contractor shall at all times provide and maintain proper and satisfactory means and devices for the removal of all water entering the excavations, and shall remove all such water as fast as it may collect, in such manner as shall not interfere with the prosecution of the work or the proper placing of pipes, structures, or other work.
2. Unless otherwise specified, all excavations which extend down to or below the static groundwater elevations shall be dewatered by lowering and maintaining the groundwater beneath such excavations at all times when work thereon is in progress, during subgrade preparation and the placing of the structure or pipe thereon.
3. Water shall not be allowed to rise over or come in contact with any masonry, concrete or mortar, until at least 24 hours after placement, and no stream of water shall be allowed to flow over such work until such time as the Engineer may permit.
4. Where the presence of fine grained subsurface materials and a high groundwater table may cause the upward flow of water into the excavation with a resulting quick or unstable condition, the Contractor shall install and

operate a well point system to prevent the upward flow of water during construction.

5. Water pumped or drained from excavations, or any sewers, drains or water courses encountered in the work, shall be disposed of in a suitable manner without injury to adjacent property, the work under construction, or to pavements, roads, drives, and water courses. No water shall be discharged to sanitary sewers. Sanitary sewage shall be pumped to sanitary sewers or shall be disposed of by an approved method.
6. Any damage caused by or resulting from dewatering operations shall be the sole responsibility of the Contractor.

B. Work Included

1. The construction and removal of cofferdams, sheeting and bracing, and the furnishing of materials and labor necessary therefor.
2. The excavation and maintenance of ditches and sluiceways.
3. The furnishing and operation of pumps, well points, and appliances needed to maintain thorough drainage of the work in a satisfactory manner.

C. Well Point Systems

1. Installation
 - a. The well point system shall be designed and installed by or under the supervision of an organization whose principal business is well pointing and which has at least five consecutive years of similar experience and can furnish a representative list of satisfactory similar operations.
 - b. Well point headers, points and other pertinent equipment shall not be placed within the limits of the excavation in such a manner or location as to interfere with the laying of pipe or trenching operations or with the excavation and construction of other structures.
 - c. Detached observation wells of similar construction to the well points shall be installed at intervals of not less than 50 feet along the opposite side of the excavation from the header pipe and line of well points, to a depth of at least 5 feet below the proposed excavation. In addition, one well point in every 50 feet shall be fitted with a tee, plug and valve so that the well point can be converted for use as an observation well. Observation wells shall be not less than 1-½ inches in diameter.
 - d. Standby gasoline or diesel powered equipment shall be provided so that in the event of failure of the operating equipment, the standby equipment can be readily connected to the system. The standby equipment shall be maintained in good order and actuated regularly not less than twice a week.
2. Operation
 - a. Where well points are used, the groundwater shall be lowered and maintained continuously (day and night) at a level not less than 2 feet

below the bottom of the excavation. Excavation will not be permitted at a level lower than 2 feet above the water level as indicated by the observation wells.

- b. The effluent pumped from the well points shall be examined periodically by qualified personnel to determine if the system is operating satisfactorily without the removal of fines.
- c. The water level shall not be permitted to rise until construction in the immediate area is completed and the excavation backfilled.

3.03 STORAGE OF MATERIALS

A. Sod

- 1. Any sod cut during excavation shall be removed and stored during construction so as to preserve the grass growth. Sod damaged while in storage shall be replaced in like kind at the sole expense of the Contractor.

B. Topsoil

- 1. Topsoil suitable for final grading shall be removed and stored separately from other excavated material.

C. Excavated Materials

- 1. All excavated materials shall be stored in locations so as not to endanger the work, and so that easy access may be had at all times to all parts of the excavation. Stored materials shall be kept neatly piled and trimmed, so as to cause as little inconvenience as possible to public travel or to adjoining property holders.
- 2. Special precautions must be taken to permit access at all times to fire hydrants, fire alarm boxes, police and fire department driveways, and other points where access may involve the safety and welfare of the general public.
- 3.

3.04 DISPOSAL OF MATERIALS

A. Spoil Material

- 1. All spoil materials shall be disposed of as required by the local, state or federal regulations pertaining to the area or as described in the Special Provisions or on the Contract Drawings.
- 2. The surface of all spoil areas shall be graded and dressed and no unsightly mounds or heaps shall be left on completion of the work.

3.05 SHEETING AND BRACING

A. Installation

- 1. The Contractor shall furnish, place and maintain such sheeting, bracing and shoring as may be required to support the sides and ends of excavations in such manner as to prevent any movement which could, in any way, injure the pipe, structures, or other work; diminish the width necessary for construction;

otherwise damage or delay the work of the Contract; endanger existing structures, pipes or pavements; or cause the excavation limits to exceed the right-of-way limits.

2. In no case will bracing be permitted against pipes or structures in trenches or other excavations.
3. Sheet piling shall be driven as the excavation progresses, and in such manner as to maintain pressure against the original ground at all times. The sheet piling shall be driven vertically with the edges tight together, and all bracing shall be of such design and strength as to maintain the sheet piling in its proper position. Seepage which carries fines through the sheet piling shall be plugged to retain the fines.
4. Where breast boards are used between soldier pile, the boards shall be back packed with soil to maintain support.
5. The Contractor shall be solely responsible for the adequacy of all sheet piling and bracing.

B. Removal

1. In general, all sheet piling and bracing, whether of steel, wood or other material, used to support the sides of trenches or other open excavations, shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheet piling extending below the top of a pipe or structural foundation shall not be withdrawn, unless otherwise directed, before more than 6 inches of earth is placed above the top of the pipe or structural foundation and before any bracing is removed. The voids left by the sheet piling shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.
2. The Contractor shall not remove sheet piling and bracing until the work has attained the necessary strength to permit placing of backfill.

C. Left in Place

1. If, to serve any purpose of his own, the Contractor files a written request for permission to leave sheet piling or bracing in the trench or excavation, the Engineer may grant such permission, in writing, on condition that the cost of such sheet piling and bracing be assumed and paid by the Contractor.
2. The Contractor shall leave in place all sheet piling, shoring and bracing which are shown on the Contract Drawings or specified to be left in place or which the Engineer may order, in writing, to be left in place. All shoring, sheet piling and bracing shown or ordered to be left in place will be paid for under the appropriate item of the Contract. No payment allowance will be made for wasted ends or for portions above the proposed cutoff level which are driven down instead of cut-off.
3. In case sheet piling is left in place, it shall be cut off or driven down as directed so that no portion of the same shall remain within 12 inches of the street subgrade or finished ground surface.

3.06 BACKFILLING

A. General

1. All excavations shall be backfilled to the original surface of the ground or to such other grades as may be shown, specified or directed.
2. Backfilling shall be done with suitable excavated materials which can be satisfactorily compacted during refilling of the excavation. In the event the excavated materials are not suitable, Special Backfill as specified or ordered by the Engineer shall be used for backfilling.
4. Any settlement occurring in the backfilled excavations shall be refilled and compacted.

B. Unsuitable Materials

1. Stones, pieces of rock or pieces of pavement greater than 1 cubic foot in volume or greater than 1.5 feet in any single dimension shall not be used in any portion of the backfill.
2. All stones, pieces of rock or pavement shall be distributed through the backfill and alternated with earth backfill in such a manner that all interstices between them shall be filled with earth.
3. Frozen earth shall not be used for backfilling.

C. Compaction and Density Control

1. The compaction shall be as specified for the type of earthwork, i.e., structural, trenching or embankment.
 - a. The compaction specified shall be the percent of maximum dry density.
 - b. The compaction equipment shall be suitable for the material encountered.
2. Where required, to assure adequate compaction, in-place density test shall at the expense of the Contractor be made by an approved testing laboratory.
 - a. The moisture-density relationship of the backfill material shall be determined by ASTM D698, Method D.
 - 1) Compaction curves for the full range of materials used shall be developed.
 - b. In-place density shall be determined by the methods of ASTM D1556 or ASTM D2922 and shall be expressed as a percentage of maximum dry density.
3. Where required, to obtain the optimum moisture content, the Contractor shall add, at his expense, sufficient water during compaction to assure the specified maximum density of the backfill. If, due to rain or other causes, the material exceeds the optimum moisture content, it shall be allowed to dry, assisted if necessary, before resuming compaction or filling efforts.

4. The Contractor shall be responsible for all damage or injury done to pipes, structures, property or persons due to improper placing or compacting of backfill.

3.07 OTHER REQUIREMENTS

A. Drainage

1. All material deposited in roadway ditches or other water courses shall be removed immediately after backfilling is completed and the section, grades and contours of such ditches or water courses restored to their original condition, in order that surface drainage will be obstructed no longer than necessary.

B. Unfinished Work

1. When, for any reason, the work is to be left unfinished, all trenches and excavations shall be filled and all roadways, sidewalks and watercourses left unobstructed with their surfaces in a safe and satisfactory condition. The surface of all roadways and sidewalks shall have a temporary pavement.

C. Hauling Material on Streets

1. When it is necessary to haul material over the streets or pavements, the Contractor shall provide suitable tight vehicles so as to prevent deposits on the streets or pavements. In all cases where any materials are dropped from the vehicles, the Contractor shall clean up the same as often as required to keep the crosswalks, streets and pavements clean and free from dirt, mud, stone and other hauled material.

D. Dust Control

1. It shall be the sole responsibility of the Contractor to control the dust created by any and all of his operations to such a degree that it will not endanger the safety and welfare of the general public.
2. Calcium chloride and petroleum products shall not to be used for dust control.

E. Test Pits

1. For the purpose of obtaining detail locations of underground obstructions, the Contractor shall make excavations in advance of the work. Payment for the excavations ordered by the Engineer will be made under an appropriate item of the Contract and shall include sheeting, bracing, pumping, excavation and backfilling.

- END OF SECTION -

SECTION 02226**TRENCHING, BACKFILLING AND COMPACTING****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes excavation and backfill as required for pipe installation or other construction in the trench, and removal and disposal of water, in accordance with the applicable provisions of the Section entitled "Earthwork" unless modified herein.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION**3.01 EXCAVATION**

- A. The trench excavation shall be located as shown on the Contract Drawings or as specified. Under ordinary conditions, excavation shall be by open cut from the ground surface. Where the depth of trench and soil conditions permit, tunneling may be required beneath cross walks, curbs, gutters, pavements, trees, driveways, railroad tracks and other surface structures. No additional compensation will be allowed for such tunneling over the price bid for open cut excavation of equivalent depths below the ground surface unless such tunnel excavation is specifically provided for in the Contract Documents.
- B. Trenches shall be excavated to maintain the depths as shown on the Contract Drawings or as specified for the type of pipe to be installed.
- C. The alignment and depth shall be determined and maintained by the use of a string line installed on batter boards above the trench, a double string line installed along side of the trench or a laser beam system.
- D. The minimum width of trench excavation shall be 6-inches on each side of the pipe hub for 21-inch diameter pipe and smaller and 12-inches on each side of the pipe hub for 24-inch diameter pipe and larger.
- E. Trenches shall not be opened for more than 300 feet in advance of pipe installation nor left unfilled for more than 100 feet in the rear of the installed pipe when work is in progress without the consent of the Engineer. Open trenches shall be protected and barricaded as required.
- F. Bridging across open trenches shall be constructed and maintained where required.

3.02 SUBGRADE PREPARATION FOR PIPE

- A. Where pipe is to be laid on undisturbed bottom of excavated trench, mechanical excavation shall not extend lower than the finished subgrade elevation at any point.

- B. Where pipe is to be laid on special granular material the excavation below subgrade shall be to the depth specified or directed. The excavation below subgrade shall be refilled with special granular material as specified or directed, shall be deposited in layers not to exceed 6 inches and shall be thoroughly compacted prior to the preparation of pipe subgrade.
- C. The subgrade shall be prepared by shaping with hand tools to the contour of the pipe barrel to allow for uniform and continuous bearing and support on solid undisturbed ground or embedment for the entire length of the pipe.
- D. Pipe subgrade preparation shall be performed immediately prior to installing the pipe in the trench. Where bell holes are required they shall be made after the subgrade preparation is complete and shall be only of sufficient length to prevent any part of the bell from becoming in contact with the trench bottom and allowing space for joint assembly.

3.03 STORAGE OF MATERIALS

- A. Traffic shall be maintained at all times in accordance with the applicable Highway Permits. Where no Highway Permit is required at least one-half of the street must be kept open for traffic.
- B. Where conditions do not permit storage of materials adjacent to the trench, the material excavated from a length as may be required, shall be removed by the Contractor, at his cost and expense, as soon as excavated. The material subsequently excavated shall be used to refill the trench where the pipe had been built, provided it be of suitable character. The excess material shall be removed to locations selected and obtained by the Contractor.
 - 1. The Contractor shall, at his cost and expense, bring back adequate amounts of satisfactory excavated materials as may be required to properly refill the trenches.
- C. If directed by the Engineer, the Contractor shall refill trenches with select fill or other suitable materials and excess excavated materials shall be disposed of as spoil.

3.04 REMOVAL OF WATER AND DRAINAGE

- A. The Contractor shall at all times provide and maintain proper and satisfactory means and devices for the removal of all water entering the trench, and shall remove all such water as fast as it may collect, in such manner as shall not interfere with the prosecution of the work.
- B. The removal of water shall be in accordance with the Section entitled "Earthwork".

3.05 PIPE EMBEDMENT

- A. All pipe shall be protected from lateral displacement and possible damage resulting from superimposed backfill loads, impact or unbalanced loading during backfilling operations by being adequately embedded in suitable pipe embedment material. To ensure adequate lateral and vertical stability of the installed pipe during pipe jointing and embedment operations, a sufficient amount of the pipe embedment material to hold the pipe in rigid alignment shall be uniformly deposited and thoroughly compacted on each side, and back of the bell, of each pipe as laid.
- B. Concrete cradle and encasement of the class specified shall be installed where and as shown on the Contract Drawings or ordered by the Engineer. Before any concrete is placed, the pipe shall be securely blocked and braced to prevent movement or flotation. The concrete cradle or encasement shall extend the full width of the trench as excavated unless otherwise authorized by the Engineer. Where concrete is to be placed in a sheeted trench it shall be

poured directly against sheeting to be left in place or against a bond-breaker if the sheeting is to be removed.

- C. Embedment materials placed above the centerline of the pipe or above the concrete cradle to a depth of 12 inches above the top of the pipe barrel shall be deposited in such manner as to not damage the pipe. Compaction shall be as required for the type of embedment being installed.

3.06 BACKFILL ABOVE EMBEDMENT

- A. The remaining portion of the pipe trench above the embedment shall be refilled with suitable materials compacted as specified.
 - 1. Where trenches are within the ditch-to-ditch limits of any street or road or within a driveway or sidewalk, or shall be under a structure, the trench shall be refilled in horizontal layers not more than 8 inches in thickness, and compacted to obtain 95% maximum density, and determined as set forth in the Section entitled "Earthwork".
 - 2. Where trenches are in open fields or unimproved areas outside of the ditch limits of roads, the backfilling may be by placing the material in the trench and mounding the surface.
 - 3. Hand tamping shall be required around buried utility lines or other subsurface features that could be damaged by mechanical compaction equipment.
- B. Backfilling of trenches beneath, across or adjacent to drainage ditches and water courses shall be done in such a manner that water will not accumulate in unfilled or partially filled trenches and the backfill shall be protected from surface erosion by adequate means.
 - 1. Where trenches cross waterways, the backfill surface exposed on the bottom and slopes thereof shall be protected by means of stone or concrete rip-rap or pavement.
- C. All settlement of the backfill shall be refilled and compacted as it occurs.
- D. Temporary pavement shall be placed as specified in the Section entitled "Restoration of Surfaces".

-END OF SECTION-

SECTION 02228**ROCK REMOVAL****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes removal to the widths and depths shown on the Contract Drawings or as directed by the Engineer, including the loosening, removing, transporting, storing and disposal of all materials requiring blasting, barring, or wedging for removal from their original beds, and backfill of rock excavations with acceptable materials
- B. Use of explosives for rock removal shall be used only with prior permission from both the Engineer and Owner. **Blasting will NOT be permitted in this project.**
- C. Rock removal is part of and incidental to unclassified excavation. No separate payment shall be made for rock removal.

1.02 SUBMITTALS

- A. In addition to those submittals identified in the General Provisions, the following items shall be submitted:
 - 1. Before any blasting operations begin the Contractor shall obtain all permits and licenses required.

1.03 DEFINITIONS

- A. Rock
 - 1. All pieces of ledge or bedrock, boulders or masonry larger than one-half cubic yard in volume.
 - 2. Any material requiring blasting, barring, or wedging for removal from its original bed.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION**3.01 BLASTING (Use of explosives for rock removal shall be used only with prior permission from both the Engineer and Owner.)**

- A. General
 - 1. Handling of explosives and blasting shall be done only by experienced persons.

2. Handling and blasting shall be in accordance with all Federal, State and local laws, rules and regulations relating to the possession, handling, storage and transportation and use of explosives.
3. All blasts in open cut shall be properly covered and protected with approved blasting mats.
4. Charges shall be of such size that the excavation will not be unduly large and shall be so arranged and timed that adjacent rock, upon or against which pipelines or structures are to be built, will not be shattered.
5. Blasting will not be permitted within 25 feet of pipelines or structures.
6. All existing pipes or structures exposed during excavation shall be adequately protected from damage before proceeding with the blasting.
7. NFPA 495 - Code for Manufacture, Transportation, Storage and Use of Explosive Materials.
8. Commonwealth of Kentucky Department of Mines and Minerals, Laws and Regulations Governing Explosives and Blasting.

B. Repair of Damages Due to Blasting

1. Any injury or damage to the work or to existing pipes or structures shall be repaired or rebuilt by the Contractor at his expense.
2. Whenever blasting may damage adjacent rock, pipes or structures, blasting shall be discontinued and the rock removed by drilling, barring, wedging or other methods.

C. Explosives

1. At no time shall an excessive amount of explosives be kept at the site of the work. Such explosives shall be stored, handled and used in conformity with all applicable laws and regulations.
2. Accurate daily records shall be kept showing the amounts of explosives on hand, both at the site and at any storage magazine, the quantities received and issued, and the purpose for which issued.
3. The Contractor shall be responsible for any damage or injury to any persons, property or structures as a result of his handling, storage or use of explosives.

D. Rock Clearance in Trenches

1. Ledge rock, boulders and large stones shall be removed from the sides and bottom of the trench to provide clearance for the specified embedment of each pipe section, joint or appurtenance; but in no instance shall the clearance be less than 6 inches. Additional clearance at the pipe bell or joint shall be provided to allow for the proper make-up of the joint.
2. At the transition from an earth bottom to a rock bottom the minimum bottom clearance shall be 12 inches for a distance of not less than 5 feet.

E. Rock Clearance at Structures

1. Concrete for structures shall be placed directly on the rock and the excavation shall be only to the elevations and grades shown on the Contract Drawings.

3.02 EXCAVATION AND BACKFILL

- A. Rock removal and backfilling shall be performed in accordance with the applicable provisions of the Section entitled "Earthwork".
- B. The rock excavated which cannot be incorporated into the backfill material, as specified, shall be disposed of as spoil and shall be replaced with the quantity of acceptable material required for backfilling.

-END OF SECTION-

SECTION 02270**SLOPE PROTECTION AND EROSION CONTROL****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. The Contractor shall do all work and take all measures necessary to control soil erosion resulting from construction operations, shall prevent the flow of sediment from the construction site, and shall contain construction materials (including excavation and backfill) within his protected working area so as to prevent damage to adjacent property.

B. The Contractor shall not employ any construction method that violates a rule, regulation, guideline or procedure established by Federal, State or local agencies having jurisdiction over the environmental effects of construction. The Contractor shall be responsible for obtaining all associated permits.

C. Pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage and other harmful waste shall not be discharged into or alongside of any body of water or into natural or man-made channels leading thereto.

PART 2 - PRODUCTS**2.01 MATERIALS**

A. Temporary Slope Protection and Erosion Control:

Bales may be hay or straw, and shall be reasonably clean and free of noxious weeds and deleterious materials. Filter fabric for sediment traps shall be of suitable materials acceptable to the Engineer.

B. Permanent Slope Protection and Erosion Control:

On slopes 2H:1V and steeper, and where shown on the drawings place Type A Dumped Rock Fill with a 24-inch minimum thickness over non-woven geotextile filter fabric.

PART 3 - EXECUTION**3.01 METHODS OF CONSTRUCTION**

A. The Contractor shall use any of the acceptable methods necessary to control soil erosion and prevent the flow of sediment to the maximum extent possible. These methods shall include, but not be limited to, the use of water diversion structures, diversion ditches and settling basins.

B. Construction operations shall be restricted to the areas of work indicated on the Drawings and to the area which must be entered for the construction of temporary or permanent facilities. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of the wetlands and adjacent watercourses. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, and use of temporary mulches, mats, or other control devices or methods as necessary to control erosion.

C. Excavated soil material shall not be placed adjacent to the wetlands or watercourses in a manner that will cause it to be washed away by high water or runoff. Earth berms or diversions shall be constructed to

intercept and divert runoff water away from critical areas. Diversion outlets shall be stable or shall be stabilized by means acceptable to the Engineer. If for any reason construction materials are washed away during the course of construction, the Contractor shall remove those materials from the fouled areas as directed by the Engineer.

D. For work within easements, all materials used in construction such as excavation, backfill, roadway, and pipe bedding and equipment shall be kept within the limits of the easements.

E. The Contractor shall not pump silt-laden water from trenches or other excavations into the wetlands, or adjacent watercourses. Instead, silt-laden water from his excavations shall be discharged within areas surrounded by baled hay or into sediment traps to ensure that only sediment-free water is returned to the watercourses. Damage to vegetation by excessive watering or silt accumulation in the discharge area shall be avoided.

F. Prohibited construction procedures include, but are not limited to, the following:

1. Dumping of spoil material into any streams, wetlands, surface waters, or unspecified locations.
2. Indiscriminate, arbitrary, or capricious operation of equipment in wetlands or surface waters.
3. Pumping of silt-laden water from trenches or excavations into surface waters, or wetlands.
4. Damaging vegetation adjacent to or outside of the construction area limits.
5. Disposal of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in wetlands, surface waters, or unspecified locations.
6. Permanent or unauthorized alteration of the flow line of any stream.
7. Open burning of debris from the construction work.

G. Any temporary working roadways required shall be clean fill approved by the Engineer. In the event fill is used, the Contractor shall take every precaution to prevent the fill from mixing with native materials of the site. All such foreign fill materials shall be removed from the site following construction.

3.02 EROSION CHECKS

The Contractor shall furnish and install baled hay or straw erosion checks in all locations indicated on the Drawings, surrounding the base of all deposits of stored excavated material outside of the disturbed area, and where indicated by the Engineer. Checks, where indicated on the Drawings, shall be installed immediately after the site is cleared and before trench excavation is begun at the location indicated. Checks located surrounding stored material shall be located approximately 6 ft. from that material. Bales shall be held in place with two 2 in. by 2 in. by 3 ft. wooden stakes. Each bale shall be butted tightly against the adjoining bale to preclude short circuiting of the erosion check.

- END OF SECTION -

SECTION 02302**RAILROAD OR HIGHWAY CROSSINGS****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes railroad or highway crossings including casing pipes for pipelines installed by (jacking), (tunneling) or (boring) method, and installation of the carrier pipe within the casing in the location(s) and to the limits as shown on the Contract Drawings.
- B. All work shall be performed in accordance with the applicable rules and regulations of the State and Federal Codes and with the terms and conditions of the permit issued by the railroad or highway having jurisdiction.

1.02 SUBMITTALS

- A. In addition to those submittals identified in the General Provisions, the following items shall be submitted:
 - 1. Method of Installation
 - a. Following the award of the Contract, the Contractor shall submit a description of the method and equipment which is proposed to be employed in installing the casing.
 - b. A Professional Engineer licensed in the State of Kentucky shall design all sheeting and bracing at the Contractor's expense. The seal of the Professional Engineer shall appear on all drawings and design sheets submitted for review.
 - 2. Materials
 - a. Drawings and manufacturer's data of the casing materials showing compliance with this specification.
 - 3. Contractor's Data
 - a. The Contractor shall submit such data as may be required as conditions of the Railroad or Highway Permit.

1.03 QUALITY ASSURANCE

- A. Contractor's Qualifications
 - 1. The casing shall be installed by a contractor who has experience in this field of construction and can furnish a record of satisfactory performance on at least three projects for work of comparable type.

PART 2 PRODUCTS**2.01 MATERIALS AND CONSTRUCTION****A. Casings**

1. The casing shall be of the size and type as shown on the Contract Drawings.
 - a. Steel pipe of the thickness specified shall have a minimum yield strength of 35,000 psi and a minimum ultimate strength of 60,000 psi. Steel casing pipe shall be uncoated.
 - b. Liner plate of the gauge specified shall be pressed steel, galvanized and bituminous coated.
 - c. Concrete pipe shall be designed for the purpose of jacking and shall be tongue and grooved.
 - d. All joints in the encasement pipe shall be of continuous solid weld.

TABLE OF MINIMUM WALL THICKNESS FOR STEEL CASING PIPE

<u>Minimum Thickness</u> <u>Inches</u>	<u>Normal Diameter</u> <u>Inches</u>
0.250	4 thru 12
0.312	14 thru 18
0.375	20 thru 24
0.500	26 thru 42

- B. The steel casing pipe for all highway crossings shall be as follows:

<u>Carrier Pipe Size</u>	<u>Casing Pipe Size</u>
2"	6"
3"	10"
4"	10"
6"	12"
8"	14"
10"	18"
12"	20"
14"	24"
16"	26"
20"	30"
24"	34"
30"	40"

B. Carrier Pipes

1. The carrier pipe shall be as specified on the Contract Drawings and in accordance with the Section for the type of pipe.

C. Signs

1. Signs shall be weatherproof.

PART 3 EXECUTION**3.01 INSTALLATION****A. General**

1. Unless otherwise shown or specified, the Contractor may employ any one of jacking, tunneling or boring methods within the limits shown for the installation of the casing.
 - a. The remaining portion of the casing may be constructed by open cut method in a sheeted trench.
2. Installation of the casing pipe shall be carried out without disturbance of the embankment, pavement, tracks or other railroad or highway facilities and without obstructing the passage of traffic at any time.
3. Once the jacking, tunneling or boring operation is started, it shall proceed on a 24-hour basis without interruption until completed.
4. The casing pipe shall be maintained accurately to line and grade during the installation operation.
5. The casing shall be advanced from the lower end.
6. The use of water or other liquid, except bentonite slurry with prior approval of the Engineer, to facilitate casing placement or spoil removal is prohibited.
7. Dewatering shall be in accordance with the Section entitled "Earthwork".

B. Jacking

1. The jacking force shall be properly distributed through the jacking frame to the casing and parallel with the axis.
2. The soil shall be trimmed with care and shall not precede the jacking operation, to insure a minimum disturbance to the natural soils adjacent to the casing.
 - a. No augering will be allowed.

C. Tunneling

1. Excavation shall be in such a manner that voids behind the liner plates shall be held to a minimum.
2. Poling plates shall be used as necessary to prevent caving of material above the tunnel prior to liner plate installation.
 - a. Poling plates shall not be driven into the unexcavated material.
3. Liner plates shall be installed as soon as excavation proceeds the necessary distance for the next set of plates.
4. Grout plugs shall be placed on approximately 4-foot centers, at the top, bottom and on the spring line.

- a. Grout holes shall be not less than 1-inch diameter.
 - b. Voids between the liner plates and the excavation shall be filled with a 1:6 cement grout placed under pressure.
 - c. Not more than 6 lineal feet of tunnel shall progress beyond the grouting.
5. Tunneled casings shall have a foundation of Class "C" concrete placed for the entire length of the interior of the casing.
- a. The leveling course shall be at such an elevation that the carrier pipe, when installed, shall be at the grade specified.
- D. Boring
- 1. Boring shall consist of pushing the casing with an auger rotating within to remove the spoil.
 - 2. The auger or cutting head shall not lead the casing and shall be removable from within the casing.
 - 3. The face of the cutting head shall be arranged to provide reasonable obstruction to the free flow of soft or poor materials.
- E. Pressure Carrier Pipe
- 1. No contact shall be permitted between the casing and the carrier pipe.
 - a. Casing spacers shall be used between the casing pipe and carrier pipe. Spacers shall be manufactured by Pipeline Seal & Insulator, Inc. (PSI) of Houston Texas, or equal and be of the type to separate dissimilar metals and keep the carrier pipe centered within the casing. The spacers shall be installed within the casing in the quantity and at the locations recommended by the manufacturer.
 - b. Both ends of the casing pipe shall be sealed with rubber boot "End Seals" by PSI or equal, held in place by stainless steel bands/clamps.
- F. Non-Pressure Carrier Pipe
- 1. No contact shall be permitted between the casing and the carrier pipe.
 - a. Casing spacers shall be used between the casing pipe and carrier pipe. Spacers shall be manufactured by Pipeline Seal & Insulator, Inc. (PSI) of Houston Texas, or equal and be of the type to separate dissimilar metals and keep the carrier pipe centered within the casing. The spacers shall be installed within the casing in the quantity and at the locations recommended by the manufacturer.
 - e. Both ends of the casing pipe shall be sealed with rubber boot "End Seals" by PSI or equal, held in place by stainless steel bands/clamps.

-END OF SECTION-

SECTION 02502
RESTORATION OF SURFACES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes restoration and maintenance of all types of surfaces, sidewalks, curbs, gutters, culverts and other features disturbed, damaged or destroyed during the performance of the work under or as a result of the operations of the Contract.
- B. The quality of materials and the performance of work used in the restoration shall produce a surface or feature equal to the condition of each before the work began.

1.02 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
 - 1. American Society for Testing and Materials (ASTM)
 - a. D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³)

1.03 SUBMITTALS

- A. In addition to those submittals identified in the General Provisions, the following items shall be submitted:
 - 1. A schedule of restoration operations. After an accepted schedule has been agreed upon it shall be adhered to unless otherwise revised with the approval of the Engineer.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 GENERAL

- A. In general, permanent restoration of paved surfaces will not be permitted until one month's time has elapsed after excavations have been completely backfilled as specified. A greater length of time, but not more than nine months may be allowed to elapse before permanent restoration of street surfaces is undertaken, if additional time is required for shrinkage and settlement of the backfill.
- B. The replacement of surfaces at any time, as scheduled or as directed, shall not relieve the Contractor of responsibility to repair damages by settlement or other failures.

3.02 TEMPORARY PAVEMENT

- A. Immediately upon completion of refilling of the trench or excavation, the Contractor shall place a temporary pavement over all disturbed areas of streets, driveways, sidewalks, and other traveled places where the original surface has been disturbed as a result of his operations.
- B. Unless otherwise specified or directed the temporary pavement shall consist of compacted run-of-crusher limestone to such a depth as required to withstand the traffic to which it will be subjected.
- C. Where concrete pavements are removed, the temporary pavement shall be surfaced with "cold patch". The surface of the temporary pavement shall conform to the slope and grade of the area being restored.
- D. For dust prevention, the Contractor shall treat all surfaces, not covered with cold patch, as frequently as may be required.
- E. The temporary pavement shall be maintained by the Contractor in a safe and satisfactory condition until such time as the permanent paving is completed. The Contractor shall immediately remove and restore all pavement as shall become unsatisfactory.

3.03 PERMANENT PAVEMENT REPLACEMENT

- A. The permanent and final repaving of all streets, driveways and similar surfaces where pavement has been removed, disturbed, settled or damaged by or as a result of performance of the Contract shall be repaired and replaced by the Contractor, by a new and similar pavement.
 - 1. The top surface shall conform with the grade of existing adjacent pavement and the entire replacement shall meet the current specifications of the local community for the particular types of pavement.
 - 2. Where the local community has no specification for the type of pavement, the work shall be done in conformity with the State Department of Transportation Standard which conforms the closest to the type of surfacing being replaced, as determined by the Engineer.

3.04 PREPARATION FOR PERMANENT PAVEMENT

- A. When scheduled and within the time specified, the temporary pavement shall be removed and a base prepared, at the depth required by the local community or Highway Permit, to receive the permanent pavement.
 - 1. The base shall be brought to the required grade and cross-section and thoroughly compacted before placing the permanent pavement.
 - 2. Any base material which has become unstable for any reason shall be removed and replaced with compacted base materials.
- B. Prior to placing the permanent pavement all service boxes, manhole frames and covers and similar structures within the area shall be adjusted to the established grade and cross-section.

- C. The edges of existing asphalt pavement shall be cut a minimum of 1 foot beyond the excavation or disturbed base whichever is greater.

- 1. All cuts shall be parallel or perpendicular to the centerline of the street.

3.05 ASPHALT PAVEMENT

- A. The permanent asphalt pavement replacement for streets, driveways and parking area surfaces shall be replaced with bituminous materials of the same depth and kind as the existing unless otherwise specified.
- B. Prior to placing of any bituminous pavement a sealer shall be applied to the edges of the existing pavement and other features.
- C. The furnishing, handling and compaction of all bituminous materials shall be in accordance with the State Department of Transportation Standards.

3.06 CONCRETE PAVEMENT AND PAVEMENT BASE

- A. Concrete pavements and concrete bases for asphalt, brick or other pavement surfaces shall be replaced with Class "B" Concrete, air-entrained.
- B. Paving slabs or concrete bases shall be constructed to extend 1 foot beyond each side of the trench and be supported on undisturbed soil. Where such extension of the pavement will leave less than 2 feet of original pavement slab or base, the repair of the pavement slab or base shall be extended to replace the slab to the original edge of the pavement or base unless otherwise indicated on the Contract Drawings.
- C. Where the edge of the pavement slab or concrete base slab falls within the excavation, the excavation shall be backfilled with Special Backfill compacted to 95% maximum dry density as determined by ASTM D 698 up to the base of the concrete.
- D. The new concrete shall be of the same thickness as the slab being replaced and shall contain reinforcement equal to the old pavement.
 - 1. New concrete shall be placed and cured in accordance with the applicable provisions of the State Department of Transportation Standards.

3.07 STONE OR GRAVEL PAVEMENT

- A. All pavement and other areas surfaced with stone or gravel shall be replaced with material to match the existing surface unless otherwise specified.
 - 1. The depth of the stone or gravel shall be at least equal to the existing.
 - 2. After compaction the surface shall conform to the slope and grade of the area being replaced.

3.08 CONCRETE WALKS, CURBS AND GUTTER REPLACEMENT

- A. Concrete walks, curbs and gutters removed or damaged in connection with or as a result of the construction operations shall be replaced with new construction.
 - 1. The minimum replacement will be a flag or block of sidewalk and 5 feet of curb or gutter.

- B. Walks shall be constructed of Class "B" concrete, air-entrained with KY-DOT #2 stone aggregate on a 4-inch base of compacted gravel or stone.
 - 1. The walk shall be not less than 4 inches in thickness or the thickness of the replaced walk where greater than 4 inches, shall have construction joints spaced not more than 25 feet apart, shall have expansion joints spaced not more than 50 feet apart and shall be sloped at right angles to the longitudinal centerline approximately inch per foot of width.
- C. 1/2-inch expansion joint material shall be placed around all objects within the sidewalk area as well as objects to which the new concrete will abut, such as valve boxes, manhole frames, curbs, buildings and others.
- D. Walks shall be hand-floated and broom-finished, edged and grooved at construction joints and at intermediate intervals matching those intervals of the walk being replaced.
 - 1. The intermediate grooves shall be scored a minimum of 1/4 of the depth of the walk.
 - 2. The lengths of blocks formed by the grooving tool, and distances between construction and expansion joints shall be uniform throughout the length of the walk in any one location.
- E. The minimum length of curb or gutter to be left in place or replaced shall be 5 feet. Where a full section is not being replaced, the existing curb or gutter shall be saw cut to provide a true edge.
 - 1. The restored curb or gutter shall be the same shape, thickness and finish as being replaced and shall be built of the same concrete and have construction and expansion joints as stated above for sidewalks.
- F. All concrete shall be placed and cured as specified in the Section for concrete.

3.09 LAWNS AND IMPROVED AREAS

- A. The area to receive topsoil shall be graded to a depth of not less than 4 inches or as specified, below the proposed finished surface.
 - 1. If the depth of existing topsoil prior to construction was greater than 4 inches, topsoil shall be replaced to that depth.
- B. The furnishing and placing of topsoil, seed and mulch shall be in accordance with the Section entitled "Topsoil and Seeding".
- C. When required to obtain germination, the seeded areas shall be watered in such a manner as to prevent washing out of the seed.
- D. Any washout or damage which occurs shall be regraded and reseeded until a good sod is established.
- E. The Contractor shall maintain the newly seeded areas, including regrading, reseeding, watering and mowing, in good condition.

3.10 CULTIVATED AREA REPLACEMENT

- A. Areas of cultivated lands shall be graded to a depth to receive topsoil of not less than the depth of the topsoil before being disturbed. All debris and inorganic material shall be removed prior to the placing of the topsoil.
- B. The furnishing and placing of topsoil shall be in accordance with the Section entitled "Topsoil and Seeding".
- C. After the topsoil has been placed and graded, the entire area disturbed during construction shall be cultivated to a minimum depth of 12-inches with normal farm equipment.
 - 1. Any debris or inorganic materials appearing shall be removed.
 - 2. The removal of stones shall be governed by the adjacent undisturbed cultivated area.
- D. Grass areas shall be reseeded using a mixture equal to that of the area before being disturbed, unless otherwise specified.

3.11 OTHER TYPES OF RESTORATION

- A. Trees, shrubs and landscape items damaged or destroyed as a result of the construction operations shall be replaced in like species and size.
 - 1. All planting and care thereof shall meet the standards of the American Association of Nurserymen.
- B. Water courses shall be reshaped to the original grade and cross-section and all debris removed. Where required to prevent erosion, the bottom and sides of the water course shall be protected.
- C. Culverts destroyed or removed as a result of the construction operations shall be replaced in like size and material and shall be replaced at the original location and grade. When there is minor damage to a culvert and with the consent of the Engineer, a repair may be undertaken, if satisfactory results can be obtained.
- D. Should brick pavements be encountered in the work, the restoration shall be as set forth in the Special Provisions or as directed.

3.12 MAINTENANCE

- A. The finished products of restoration shall be maintained in an acceptable condition for and during a period of one year following the date of Substantial Completion or other such date as set forth elsewhere in the Contract Documents.

-END OF SECTION-

SECTION 02520**SIDEWALKS****PART 1 - GENERAL****1.01 WORK INCLUDED**

Sidewalks.

1.02 RELATED WORK

- A. Section 02200 - Earthwork.
- B. Section 02255 - Crushed Stone and Dense Graded Aggregate.

1.03 PROTECTION

- A. Protect landscaping and other features remaining as final work.
- B. Protect existing structures, fences, roads, and paving.

PART 2 - PRODUCTS**2.01 MATERIALS**

The sidewalks shall consist of 4" of Class A concrete reinforced with wire mesh placed over the previously prepared stone base. The shapes and sizes of the sidewalks shall be as indicated on the Drawings. The materials and methods of construction shall conform in all respects to the applicable subsections under Section 712 of the Kentucky Department of Highways Standard Specifications, Latest Edition (KDOHSS). **Sidewalks must conform to all American Disabilities Act requirements.** Sidewalk work can only begin after water line has been tested and in service for a minimum of two weeks.

PART 3 - EXECUTION**3.01 INSPECTION**

- A. Verify site conditions and note irregularities affecting work of this Section.
- B. Beginning work of this Section means acceptance of existing conditions.

3.02 SUBSOIL PREPARATION

Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, in excess of 1" in size.

3.03 INSTALLATION

- A. Sidewalk surfaces shall be divided into rectangular areas by means of a jointer having a radius of 1/4" and forming a groove not less than 1" in depth for the full width of the walk. The length of the rectangles formed shall not exceed the width of the sidewalk being constructed.

B. The Contractor shall install 1/4" premolded expansion joint material extending entirely through and across the sidewalk at intervals not to exceed 24 feet.

C. Sidewalk shall be constructed to the same width, grade, and thickness (4" minimum) as shown on the Drawings.

3.04 TOLERANCES

Top of Sidewalk: Plus or minus 1".

- END OF SECTION -

SECTION 02600**PIPE, FITTINGS AND INSTALLATION****PART 1 - GENERAL****1.01 SCOPE**

- 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.
- C. Wherever the word pipe or piping is used it shall mean pipe and fittings unless otherwise noted. All ductile iron pipe (D.I.P.), fittings, glands and accessories shall be of the same manufacturer unless approved otherwise.

PART 2 - PRODUCTS**2.01 DUCTILE IRON PIPE (D.I.P.) AND FITTINGS**

- A. Ductile iron pipe (D.I.P.) shall conform to ANSI/AWWA C150/A21.50, ANSI/AWWA C151/A21.51 Standard. The pipe shall conform to thickness class 350 unless noted otherwise. All pipe, fittings and joints should be capable of accommodating pressure up to 350 psi. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.
- B. Ductile iron mechanical joint fittings shall have a body thickness and radii of curvature conforming to ANSI A21.10 and have joints in accordance with ANSI/AWWA C111/A21.11. Fittings and joints shall be supplied with all accessories.
- C. All pipe and fittings shall be tar coated outside and shall receive a standard cement lining with bituminous seal coat on the inside in accordance with ASA Specification A21.40 (AWWA-C104).
- D. Cement mortar lining and seal coating for pipe and fittings, where applicable, shall be in accordance with ANSI/AWWA C104/A21.4. Bituminous outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 for fittings.
- E. All ductile fittings shall be rated at 350 psi water working pressure plus water hammer. Ductile iron fittings shall be ductile cast-iron grade 80-60-03 per ASTM Specification A339-55.
- F. No separate pay item has been established for fittings and no determination of the number of fittings required on the job has been made. The Contractor, during the bidding phase, shall determine the number of fittings required on the job and include the cost of the fittings and installation in the unit price for pipe.
- G. Push-on type joints shall be single rubber gasket, with cast gasket socket and recessed bell with a tapered annular opening and flared socket and shall conform to ANSI/AWWA C111/A21.11. Plain spigot ends shall be suitably beveled to permit easy entry into the bell, centering and compressing the gasket.

H. Ductile iron flanged joint pipe shall conform to ANSI/AWWA C115/A 21.15 Standard and have a Class of 350. The pipe shall have a rated working pressure of 350 psi with Class 125 flanges. Gaskets shall be ring gaskets with a thickness of 1/8-inch. Flange bolts shall conform to ANSI B16.1.

I. Flanged fittings shall meet all requirements of ANSI/AWWA C110/A21.10 and have Class 125 flanges. Fittings shall accommodate a working pressure up to 350 psi and be supplied with all accessories.

2.02 POLYVINYL CHLORIDE (PVC) PIPE (SDR 21 AND SDR 17)

A. Polyvinyl chloride (PVC) pipe for water mains shall be Class 200 (SDR 21) or Class 250 (SDR 17) PVC pressure rated pipe as shown on the Drawings or indicated in the proposal form with either twin gasket joints or integral bell joints with rubber O-ring seals.

B. All PVC pipe shall conform to the latest revisions of ASTM D-1784 (PVC Compounds), ASTM D-2241 (PVC Plastic Pipe, SDR) and ASTM D-2672 (Bell-End PVC Pipe). Rubber gasketed joints shall conform to ASTM D-3139. The gaskets for the PVC pipe joint shall conform to ASTM F-477 and D-1869.

C. Couplings shall be furnished by the pipe manufacturer and shall accommodate the pipe for which they are used. Rubber gasket joints shall provide adequate expansion to allow for a 50 degree change in temperature on one length of pipe. Lubrication for rubber connected couplings shall be water soluble, non-toxic, be non-objectionable in taste and odor and have no deteriorating affect on the PVC or rubber gaskets and shall be as supplied by the pipe manufacturer. Couplings shall conform to ASTM D-3139; SDR-21, 200 psi.

D. All pipe and couplings shall bear identification markings that will remain legible during normal handling, storage and installation, which have been applied in a manner that will not reduce the strength of the pipe or coupling or otherwise damage them. Pipe and coupling markings shall include the normal size and OD base, material code designation, dimension ratio number, ASTM Pressure Class, ASTM designation number for this standard, manufacturer's name or trademark, seal (mark) of the testing agency that verified the suitability of the pipe material for potable-water service. Each marking shall be applied at intervals of not more than 5 feet for the pipe and shall be marked on each coupling.

2.03 POLYVINYL CHLORINE (PVC) PIPE - C.I. PIPE SIZE DR14 AND DR 18

A. Pipe shall meet the requirements of AWWA C-900 Polyvinyl Chlorine (PVC) Pressure Pipe. All Class 200 pipe shall meet the requirements of DR 14 and all Class 150 pipe shall meet the requirements of DR 18. Joints shall be integral bell or twin gasket joints with rubber O-ring seals.

B. All pipe shall be suitable for use as a pressure conduit. Provisions must be made for expansion and contractions at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a solid cross-section elastomeric ring which meets the requirements of ASTM D-1869 and F-477. The bell section shall be designed to be at least as strong as the pipe wall. Sizes and dimensions shall be as shown in this specification.

C. Gaskets and lubricants intended for use with PVC pipe and couplings shall be made from materials that are compatible with the plastic material and with each other when used together, will not support the growth of bacteria, and will not adversely affect the potable qualities of the water that is to be transported. Gaskets and lubricants shall be supplied by the pipe manufacturer.

D. Physical Requirements:

1. Standard Laying Lengths - Standard laying lengths shall be 20 ft. (plus or minus 1") for all sizes. The total footage of pipe of any class and size shall be furnished in standard lengths. Each length of pipe shall be tested to four times the class pressure of the pipe for minimum of 5 second. The integral bell shall be tested with the pipe.
2. Pipe Stiffness - The pipe stiffness using F/y for PVC class water pipe shall be as follows:

<u>Class</u>	<u>DR</u>	<u>F/y</u>
200	14	815
150	18	364

3. Quick Burst Test - Randomly selected tested in accordance with ASTM D-1599 shall withstand without failure pressures listed below when applied in 60 - 70 seconds. Class 150 shall have a minimum burst pressure of 755 psi and Class 200 shall have a minimum burst pressure of 986 psi at 73 degrees F. for all sizes.
4. Drop Impact Test - Pipe shall withstand without failure at 73 degrees F. an impact of 120 ft/lbs created by a falling 12 lb missile with a 2" radius nose without visible evidence of shattering or splitting.

E. All pipe and couplings shall bear identification markings that will remain legible during normal handling, storage and installation, which have been applied in a manner that will not reduce the strength of the pipe or coupling or otherwise damage them. Pipe and coupling markings shall include the nominal size and OD base, material code designation, dimension ratio number, AWWA Pressure Class, AWWA designation number for this standard, manufacturer's name or trademark, seal (mark) of the testing agency that verified the suitability of the pipe material for potable-water service. Each marking shall be applied at intervals of not more than 5 feet for the pipe and shall be marked on each coupling.

2.04 DUCTILE IRON MECHANICAL JOINT FITTINGS FOR PVC PIPE

A. General: Cast-iron mechanical joints shall conform to the latest revision of ANSI A21.11 for centrifugally cast-iron water pipe.

1. 3" to 12". All Working Pressures: Fittings shall conform to ASA Specification A21.10 for 250 psi water working pressure plus water hammer.
2. Fittings 12" and Over, for 150 psi and Less WWP: Fittings for use on 150 psi WWP pipe shall be AWWA Class D Pattern.
3. Fittings 12" and Larger, for 200 psi and Above WWP: Fittings shall be ductile iron or gray iron rated at 250 psi water working pressure plus water hammer. Ductile iron fittings only will be used with ductile iron pipe.

B. All ductile iron fittings shall be rated at 250 psi water working pressure plus water hammer. Ductile iron fittings shall be ductile cast-iron grad 80-60-03 per ASTM Specification A33955. All fittings for connection to PVC pipe-all classes, shall be ductile iron.

C. No separate pay item has been established for fittings and no determination of the number of fittings required on the job has been made. The Contractor, during the bidding phase, shall determine the number of fittings required on the job and include the cost of the fittings and installation in the unit price for pipe.

D. Lining and Coating: All mechanical joint fittings shall be cement lined and bituminous seal coated per Federal Specification WW-P-421b and ASA Specification A421.40 (AWWA C104). Bituminous outside coating shall be in accordance with ANSI/AWWA C110/A21.10.

PART 3 - EXECUTION

3.01 LAYING DEPTHS FOR WATER MAINS

In general, water mains shall be laid with a minimum cover of 36" above the top of the main, unless otherwise noted on the Drawings , i.e. for minimum separation between water main and other utilities, connections to existing mains, valve locations, or when required by Kentucky Department of Highways, i.e. ditch lines and borings shall be 42" minimum cover.

3.02 PIPE BEDDING

A. The foundation for pipes laid in trenches shall be prepared so that the entire load of the backfill on top of the pipe will be carried uniformly on the barrel of the pipe. Pipe bells shall not carry any of the load of the backfill.

B. The Contractor shall use the "Undercutting Method" of pipe bedding.

C. When the "Undercutting Method" is used in rock bottom trenches, Class I granular bedding (No.9 crushed stone aggregate) or earth shall be of such depth that the bottom of the barrel of the pipe will be at least 6" above the bottom of the trench as excavated. Pipe bedding required in this paragraph is NOT considered a separate pay item.

D. In wet, yielding and mucky locations where pipe is in danger of sinking below grade or floating out of line or grade, the pipe must be weighted or secured permanently in place by such means as will prove effective. In areas where a high water table exists, the Contractor is cautioned to exercise extreme care in the placement of the backfill material to prevent flotation of the pipe at any time.

E. Where an unstable (i.e., water, mud, etc.) trench bottom is encountered, stabilization of the trench bottom is required. This is to be accomplished by undercutting the trench depth and replacing to grade with a foundation of crushed stone aggregate. The depth of the foundations dependent upon the severity of the trench bottom. The size of stone aggregate used in the foundation will be determined by the condition of the unstable material. Once the trench bottom has been stabilized, the required Class I bedding can be placed. The amount of crushed stone aggregate required to bring the top of the foundation to the trench bottom prior to the removal of the unstable material will be considered a separate pay item following negotiation between the Contractor and Owner and constitute a change order item. No compensation will be made if the instability of the trench bottom is caused by the Contractor's neglect.

F. The Contractor shall use compacted earth material or Class I granular bedding (No.9 crushed stone aggregate) when the pipe is to be placed in the rock bottom trenches or in trenches with excavated rock present. This type of bedding material shall be placed 12" above and 6" below the pipe as shown on the Contract Drawings as "Class C Bedding Detail".

G. It should be noted that no pipe shall be laid on solid or blasted rock. No rock shall be allowed to rest against the pipe once it is placed in the trench.

H. Pipe bedding as required in Paragraphs C and D of this Article is NOT considered a separate pay item.

3.03 PIPE LAYING

A. All pipe shall be laid with ends abutting and true to the lines and grades indicated on the Plans. Pipe shall be fitted and matched so that when laid in the work, it will provide a smooth and uniform invert. Supporting of pipe shall be as set out hereinbefore under "Pipe Bedding" and in no case shall the supporting of pipe on blocks be permitted.

B. Fittings and specials for the water main shall be provided and laid as and where directed by the Engineer or as shown on the Plans.

C. Before each piece of pipe is lowered into the trench, it shall be thoroughly swabbed out to insure its being clean. Any piece of pipe or fitting which is known to be defective shall not be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, it shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.

D. The interior of the pipe, as the work progresses, shall be cleaned of dirt, jointing materials, and superfluous materials of every description. When laying of pipe is topped for any reason, the exposed end of such pipe shall be closed with a plywood plug fitted into the pipe bell so as to exclude earth or other material and precautions shall be taken to prevent flotation of pipe by runoff into trench.

E. No backfilling (except for securing pipe in place) over pipe will be allowed until the Engineer has had an opportunity to make an inspection of the joints, alignment and grade in the section laid, but such inspection shall not relieve the Contractor of further liability in case of defective joints, misalignment caused by backfilling and other such deficiencies that are noted later.

F. Anchorage of Bends, Tees, Plugs and Valves:

1. At all tees, plugs, caps and bends of 11-1/4 degrees and over, and at reducers or in fittings where changes in pipe diameter occur, movement shall be prevented by using suitable harness, thrust blocks or ballast. Valves shall be provided with similar protection. Thrust blocks and supports shall be as shown in the typical details, with sufficient volumes of concrete being provided; however, care shall be taken to leave weep holes unobstructed and allow for future tightening of all nearby joints. Unless otherwise directed by the Engineer, thrust blocks shall be placed so that the pipe and fitting joints will be accessible for repair. Thrust blocks shall bear on undisturbed earth or rock.
2. Bridles, harness or pipe ballasting shall meet with the approval of the Engineer. Steel rods and clamps shall be galvanized.
3. No extra pay shall be allowed for work on proper anchorage of pipe, fittings or other appurtenances; such items shall be included in the unit price bid for the supported item.

3.04 WATER MAINS PUSHED UNDER DRIVEWAYS

The Contractor may be required to tunnel or bore under a bituminous or concrete surface driveway instead of open trenching as requested by the property owner. The opening under the driveway shall be of the smallest diameter possible to accommodate the water main to minimize settlement of the driveway. Should settlement occur, the Contractor shall repair the driveway at his own expense in a manner satisfactory to the Engineer and the property owner.

3.05 JOINTING

Jointing shall be accomplished in accordance with the manufacturer's recommendation.

3.06 TYPES OF CRUSHED STONE MATERIAL

Two classes of crushed stone material are mentioned in the Detailed Specifications. The Type of material used in each class is as follows:

Class I	No. 9 Aggregate
Class II	Dense Graded Aggregate

3.07 BACKFILLING

A. Initial Backfill:

1. This backfill is defined as that material which is placed over the water main from the spring line in an earth trench to a point 6" above the top of the pipe or from the trench bottom in a rock trench to a point 12" above the top of the pipe. The initial backfill for Case I situations shall be earth material free of rocks, acceptable to the Engineer or Class I material (No. 9 crushed stone aggregate). The initial backfill for Case II, Case III and Case IV situations shall be compacted earth material or be Class I material (No.9 crushed stone aggregate).
2. In areas where large quantities of rock are excavated, and the excavated earth is insufficient, then the Contractor must either haul in earth or order crushed stone aggregate for backfilling over the top of the pipe. Neither earth nor the crushed stone aggregate used to fulfill the backfill requirements is considered a pay item.

B. Final Backfill: There are four cases where the method final backfilling varies. The various cases and their trench situations are as follows:

1. Case I: Areas not subject to vehicular traffic.
2. Case II: Gravel areas subject to light vehicular traffic such as residential driveways; church and commercial parking lots and entrances; and farm drives.
3. Case III: City and County gravel roads; gravel and bituminous road shoulders; all bituminous surface areas such as City and County streets, residential driveways, church and commercial parking lots, and entrances; City and County road shoulders.
4. Case IV: State maintained streets and roads; road shoulders for State roads and streets.

C. In all cases, walking or working on the completed pipelines, except as may be necessary in backfilling, will not be permitted until the trench has been backfilled to a point twelve (12) inches above the top of the pipe. The method of final backfilling for each of the above cases is as follows:

1. Case I - The trench shall be backfilled from a point 6" (12" for a rock trench) above the top of the pipe to a point 8" below the surface of the ground with earth material free from large rock (over one-half cubic foot in volume), acceptable to the Engineer. The remainder of the trench to existing grade shall be backfilled with earth material reasonably free of any rocks.

Earth backfill used in this Case is not a separate pay item but will be paid under the pay item "Water Main".

2. Case II - The trench shall be backfilled from a point 6" (12" for a rock trench) above the top of the pipe to a point 12" below the surface of the ground with Class I (No. 9 crushed stone aggregate) material. The trench shall be tamped to assure maximum possible

compaction (approximately 80 to 85 percent of Standard Proctor density). Extreme care shall be exercised to prevent damage to the pipe during tamping operation. The remainder of the trench to existing grade shall be backfilled with Class II (dense graded aggregate) material with the material being mounded over the trench. The trench shall be tamped again to assure additional compaction. The trench may be left with a slight mound if permitted by the Engineer.

Class I material used and method of backfilling used in this case is not a separate pay item and is considered incidental to the work and will be paid for under the item "Water Main".

Class II material used in this method of backfill is not a separate pay item and will be included in the unit price per linear foot under the item "Water Main".

Sufficient stockpiles of Class II material shall be placed throughout the project area to insure immediate replacement by the Contractor of any settled areas. No extra payment will be made for the filling of settled areas by the Contractor.

3. Case III - The trench shall be backfilled from a point 6" (12" for a rock trench) above the top of pipe to the height indicated in the "City and County Maintained Streets, Roads and Driveway Pavement Replacement" detail with Class I (No. 9 crushed stone aggregate) material. Said material shall be tamped as described for Case II. A 12-inch layer of Class II (dense graded aggregate) material shall be placed over the compacted backfill before bituminous or concrete surface is placed as shown in the previously mentioned details. The 12-inch layer of Class II material is NOT a separate pay item but such expense will be borne by the Contractor and is considered incidental to the bid items "Bituminous Surface Replacement" and "Concrete Surface Replacement". Also considered incidental is all temporary stone required for a temporary surface between backfilling and pavement replacement.

Sufficient stockpiles of Class II material shall be placed throughout the project area to insure immediate replacement by the Contractor of any settled areas. No extra payment will be made for the filling in of settled areas by the Contractor. Class II material used in this method of backfill is paid for as a support item under item "Bituminous Surface Replacement" or "Concrete Surface Replacement" as its unit price per linear foot.

Class I material used for backfilling is not a separate pay item and is considered incidental to the bid item "Water Main".

4. Case IV - The trench shall be backfilled from the spring line to a point one 12-inches above the top of the pipe with earth material free from rock and acceptable to the Engineer, it shall be carefully and solidly tamped by approved mechanical methods. The remainder of the trench shall be backfilled to the height indicated in the "State Maintained Streets and Roads Pavement Replacement Detail" in the Contract Drawings, with material free from rock and acceptable to the Engineer; said material shall be mechanically tamped in approximately six-inch layers to obtain the maximum possible compaction. The backfilling method is NOT a separate pay item. A 12-inch layer of dense graded aggregate shall be placed over the compacted earth backfill when a bituminous or concrete surface street or road has been trenched. The 12-inch layer of stone is not a separate pay item but such expense will be borne by the Contractor.

D. Excavated materials from trenches and tunnels, in excess of quantity required for trench backfill, shall be disposed of by the Contractor. The Contractor may contact the Owner regarding the location of a suitable disposal site; however, if the Owner cannot recommend a site, it shall be the responsibility of the Contractor to obtain locations or permits for the disposal of the waste material. Unit prices for the various pipe sizes shall

include the cost of disposing of excess excavated materials, as set forth herein, no additional compensation being allowed for hauling or overhaul.

3.08 CRUSHED STONE BACKFILL

A. The Class I granular material used in Case II and Case III backfill situations shall be No. 9 Crushed Stone aggregate (No.9 Stone). Granular material will not be paid for as a separate bid item.

B. The twelve inches 12-inch of crushed stone backfill that is required in "City and County Maintained Streets, Roads and Driveway Pavement Replacement" or "State Maintained Streets and Roads Pavement Replacement" will not be paid for under the provisions of this article.

3.09 BITUMINOUS PAVEMENT REPLACEMENT

A. Sections of pavement shall be replaced as required to install the pipelines under the work of this Section. Disturbed pavement shall be reconstructed to original lines and grades with bituminous binder as detailed on the Drawings and in such manner as to leave all such surfaces in fully as good or better condition than that which existed prior to these operations.

B. Prior to trenching, the pavement shall be scored or cut to straight edges along each side of the proposed trench to avoid unnecessary damage to the remainder of the paving. Edges of the existing pavement shall be recut and trimmed as necessary to square, straight edges after the pipe has been installed and prior to placement of the binder course.

C. Backfilling of trenches shall be in accordance with the applicable portions of this section.

D. Bituminous concrete binder shall be one course construction in accordance with applicable provisions of the Kentucky Department of Highways Standard Specifications, Section 402. Placement and compaction of binder course shall be in accordance with Section 402 of the Kentucky Department of Highways Standard Specifications. Minimum thickness after compaction shall be as shown on the Drawings.

E. Bituminous pavement replacement will not be paid for as a separate bid item.

3.10 CRUSHED STONE SURFACE REPLACEMENT

The Class II granular material used in Case II backfill situations shall be dense graded aggregate (D.G.A.). Granular material will be included in the unit price per linear foot for "Water Mains".

3.11 CONCRETE SEPARATOR FOR UTILITY CROSSING OR CASING PIPE WATER/SAN. SEWER CROSSING

A. At locations shown on the Contract Drawings, or as required by the Specifications and Contract Drawings, concrete separator shall be used when the clearance between the proposed water main and any existing non-contaminating utility pipe is one (1) foot or less. Utility pipe includes underground gas, telephone and electrical conduit, storm sewers, or any other underground utility pipe.

B. There are two cases of non-contaminating utility crossing encasement. Case I is applicable when the proposed water main is below the existing utility line. Case II is applicable when the proposed water main is laid above the utility line. In either case, the concrete shall extend to at least the spring line of each pipe involved.

C. When a water main crosses an existing sanitary sewer line, either above or below and less than two feet vertical or ten feet horizontal separation, the water main shall be encased as shown on the Standard Details, or as required by the Specifications and Contract Documents.

D. Concrete shall be Class B (2500 psi) and shall be mixed sufficiently wet to permit it to flow between the pipes to form a continuous bridge. In tamping the concrete, care shall be taken not to disturb the grade of line of either pipe or damage the joints.

3.12 CONCRETE FOR CREEK CROSSING (Polyethelene and Type C Creek Crossing)

A. At locations shown on the Contract Drawings, or as required by the Specifications and Contract Drawings, concrete encasement shall be used when the water main crosses a stream or creek which is in rock or as directed by the Engineer.

B. All creek crossings (Polyethelene and Type C) shall be constructed as per the detail shown on the Contract Drawings.

C. Concrete shall be Class B (3000 psi) and shall be mixed sufficiently wet to permit flow around the pipe and to form a continuous bed. In tamping the concrete, care shall be taken not to disturb the grade or line of the pipe or injure the joints. Concrete shall be protected from excess water.

D. Concrete placed outside the specified limits or without authorization from the Engineer will not be subject to payment. Concrete will be paid under the pay items "Polyethelene and Creek Crossing Type C."

3.13 TESTING OF WATER MAINS

The completed work shall comply with the provisions listed below, or similar requirements which will insure equal or better results:

A. Before any allowable leakage calculation are preformed the pipeline being tested must pass the hydrostatically test.

B. The pipe shall be hydrostatically tested at 1.5 times the design pressure at the point of testing. The duration of the test(s) shall be at least 2 hours during which time the pressure shall not fall more than 5 psi. The pipe shall be tested for allowable leakage according to AWWA C-600 (latest revision) concurrently with the pressure test.

C. Where practicable, pipelines shall be tested between line valves or plugs in lengths of not more than 3000 feet. Testing shall proceed from the source of water toward the termination of the line. The line shall be tested upon the completion of the first 3000 feet. After the completion of two consecutive tests without failure, the Contractor, at his option and with the Engineer's approval, may discontinue testing until the system is complete.

D. Duration of test shall be not less than 2 hours.

E. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with.

F. All pipe, fittings and other materials found to be defective under test shall be removed and replaced at the Contractor's expense.

G. Test pressures shall not be less than 1.5 times the working pressure at the highest point along the test section, not exceed pipe or thrust restraint design pressure, not vary more than ± 5 psi and not exceed twice the rated pressure of the valves when the pressure boundary of the test sections include closed gate valves.

H. Before applying the specified test pressure, air shall be expelled completely from the pipes and valves. If permanent air vents are not located at high points within the test section, the Contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water.

3.14 LEAKAGE TEST

A. The leakage shall be defined as the quantity of water that must be supplied to the tested section to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

B. The allowable leakage shall not be greater than that determined by the following formula:

$$L = \frac{SD(P)^{1/2}}{133,200}$$

Where L is the allowable leakage in gallons per hour; S is the length of the pipeline tested; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gage.

C. All visible leaks are to be repaired regardless of the amount of leakage.

3.15 DISINFECTION OF WATER LINES

A. New potable water lines shall not be placed into service, either temporarily or permanently, until they have been thoroughly disinfected in accordance with the following requirements and to the satisfaction of the OWNER.

B. After pressure testing, a solution of hypochlorite using HTH or equal shall be introduced into the section of the line being disinfected sufficient to insure a chlorine dosage of at least 50 parts per million (PPM) in the water main. While the solution is being applied, the water should be allowed to escape at the ends of the line until tests indicate that a chlorine concentration of at least 50 PPM has been obtained throughout the pipe. Open and close all valves and cocks while chlorinating agent is in the piping system. The chlorinated water shall remain in the pipe for 24 hours. Disinfection shall be repeated until a minimum chlorine residual of 25 PPM is measured after 24 hours. Once a chlorine residual of 25 PPM is obtained after 24 hours, the water main shall be thoroughly flushed until the residual chlorine content is not greater than 1.0 PPM.

C. Following disinfection of the line, bacteriological samples shall be collected and analyzed in accordance with the requirements of Kentucky Department of Natural Resources and Environmental Protection. When the samples have been tested and reported safe from contamination, the water line may be connected to the system. The Contractor shall provide to OWNER written documentation that the water sample passed the bacteriological test and is safe.

D. All sampling shall be taken in the presence of the Engineer or his representative.

E. The contractor shall compensate the owner for all water used in flushing, testing and sterilization.

3.16 PLACEMENT OF TRACING WIRE

Detectable underground copper tracing wire shall be installed with all utility lines. Insulated copper trace wire shall be attached to the top of the pipe with adhesive tape or other suitable devices. At each hydrant, valve, and end of new pipe installation, the trace wire shall be daylighted and the ends connected together with split bolt connectors covered with waterproof tape or wrap. For long runs of pipe, the maximum unbroken length of the trace wire shall be 2500 feet. Underground splicing shall be made using brass split bolt electrical connectors. The trace wire shall be #12 AWG THWN copper.

3.17 PLACEMENT OF IDENTIFICATION TAPE AND LINE MARKERS

A. The placement of detectable underground marking tape shall be installed over all utility lines. Care shall be taken to insure that the buried marking tape is not broken when installed. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

B. The identification tape shall bear the printed identification of the utility line below it, such as "CAUTION - BURIED WATER LINE BELOW". Tape shall be reverse printed, surface printing will not be acceptable. The tape shall be visible in all types and colors of soil and provide maximum color contrast to the soil. The tape shall meet the APWA color code, and shall be two (2) inches in width. Colors are: yellow - gas, green - sewer, red - electric, blue - water, orange - telephone, brown - force main.

C. The tape shall be the last equipment installed in the ditch so as to be first out. The tape shall be buried 4 - 6 inches below top of grade. After trench backfilling, the tape shall be placed in the backfill and allowed to settle into place with the backfill. The tape may be plowed in after final settlement, installed with a tool during the trench backfilling process, unrolled before final restoration or installed in any other way acceptable to the Owner or his agent or Engineer.

D. Line markers shall be installed at valves or where water main crosses the road. Please confer with owner prior to installation. Water markers shall be a flexstake EZ drive type.

3.18 CLEAN-UP

Upon completion of the installation of the piping and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from the work. The Contractor shall grade the ground along each side of pipe trenches in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

3.19 CONNECTING TO THE WATER SYSTEM

Unless otherwise directed by the OWNER, the CONTRACTOR shall connect the new water main to the existing water system. The CONTRACTOR shall notify the OWNER when the connection is to be made so that representatives of the OWNER may operate existing valves and witness the connection. A minimum notice of at least 24 hours in advance of the connection shall be given to the UTILITY. The Contractor shall coordinate all connections and other work which require disruption of water service so as to minimize the amount of time the affected water lines are out of service.

- END OF SECTION -

SECTION 02626**CUSTOMER METER SERVICE AND SERVICE TUBING****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes service pipelines constructed of CTS polyethelene tubing as shown on the Contract Drawings, complete with fittings and accessories.
- B. Certain features of the CTS tubing shall be as scheduled.
- C. The Contractor shall furnish all labor, tools, equipment, and materials necessary to complete the meter service connections as shown on the Contract Drawings and herein specified.

1.02 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. American Water Works Association (AWWA)

1.03 SUBMITTALS

- A. In addition to those submittals identified in the General Provisions, the following items shall be submitted:
 - 1. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.
 - 2. Layout drawings showing the location of copper tube including details of the support system, sleeves, unions and appurtenances.

PART 2 PRODUCTS**2.01 SERVICE CLAMPS**

All service connections of all sizes shall be made through the use of service clamps or saddles. Service saddles shall have ductile iron body, double strapped with O-ring resilient gasket, suitable for use on ductile iron pipe or PVC pipe, and tapped with same threads as the corporation stops. Saddles for all mains shall be double strap type saddles and have a maximum working pressure of 350 psi SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.02 CORPORATION STOPS

Corporation stops for use in service clamps shall be equal for 3/4", 1" and 2" service tubing and have a maximum working pressure of 350 psi. Corporation stops shall have iron pipe threads with compression coupling connection for copper tubing outlets. A rigid stainless steel insert stiffener shall be used inside the PE tubing, when encountered. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.03 SERVICE TUBING 3/4", 1" AND 2" POLYETHYLENE TUBING (CTS SERVICE TUBING)

A. Pipe shall be made from virgin, ultra-high molecular weight polyethylene resin meeting the requirements of Type III, Class C, Category P34 polyethylene as defined by ASTM D-1248, latest revision, "Polyethylene Plastics Molding and Extrusion Materials". **All service tubing for Sandy Hook Water District shall be 3/4" unless otherwise noted.**

B. Dimensions and tolerances shall meet the values as listed in AWWA C-901, latest revision, "Polyethylene (PE) Pressure Pipe Tubing and Fittings". Standard dimension ratio shall be DR-7.3 (OD base), Pressure Class 200 psi.

C. Pipe shall be rated for use with water at 73.4 degrees F. at a hydrostatic design stress of 630 psi and a maximum working pressure of 200 psi. The pipe shall sustain a water pressure as defined in ASTM D 1598 for 1000 hours with water at 73.4 degrees F.

D. Surface shall be homogeneous inside and out and completely free of irregularity. Random testing shall be performed at intervals during all production runs to assure uniformity in all respects. The tubing shall carry the National Sanitation Foundation seal of approval for drinking water.

E. Pipe shall be marked in lettering at intervals of not more than five (5) feet and such marking shall include nominal size; manufacturer's name or trademark; pressure rating for water at 73.4 degrees F., 200 psi; applicable ASTM specification; ASTM material specification, PE 3406; standard dimension ratio, DR-7.3; the National Sanitation Foundation Seal of Approval (NSF mark) and production code.

F. Pipe shall be guaranteed in writing against rot, corrosion and defects for 50 years from date of installation, with pipe replacement and labor cost warranted in writing for 25 years from date of installation.

2.04 COPPER SERVICE TUBING (not in this contract)

A. Buried, Exterior - Copper Pipe: Type K hard drawn copper per ASTM B-88. Fittings: Wrought copper or cast brass. Joints: Lead free, tin-silver solder.

B. Buried, Below Slab: Copper Pipe, 2" and Smaller: Type K soft drawn copper per ASTM B-88. Fittings and joints shall not be permitted below slab.

C. Buried: Copper Pipe, 2" and Smaller: Type K soft drawn copper per ASTM B-88. Fittings and joints shall not be permitted in the service tubing.

D. All solder joints shall be soldered with an approved, lead free tin-silver solder. Acid core solder shall not be used.

E. Copper tube shall be as specified herein unless otherwise shown on the Contract Drawings or in the pipe schedule.

F. Copper tube shall conform to the following standards:

	<u>ASTM</u>
Seamless Copper Water Tube	B88
Copper Drainage Tube (DWV)	B306
Seamless Copper Tube, Bright Annealed	B68

1. Seamless copper water tube shall be used for hot and cold water and compressed air.
 - a. Type K where installed in concrete, underground or when immersed in liquids.
 - b. Type L where exposed and in concealed locations inside structures.
 - c. Soft temper when installed in concrete or underground.
 - d. Hard temper when installed in exposed and concealed locations.
 2. Copper drainage tube will be permitted only for sanitary waste, drain and vent piping above ground and inside structures.
 3. Bright annealed seamless copper tube shall be used for liquid fuel and refrigerant and all small (3/8 inch and smaller) tubing unless otherwise specified.
- G. Wall thickness shall be at least equal to Type K seamless copper water tube unless heavier walls are specified.

2.05 METER SETTING EQUIPMENT

A. Meters shall be placed inside meter boxes using coppersetters with 3/4" or 1" saddle nut connection for the meter. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE. All coppersetters shall have a ball angle meter valve (lockable) stop at the meter inlet and dual check valve on the outlet. coppersetters shall be 12 inches in height with connections for the appropriate service tubing and have a maximum working pressure of 300 psi. **All meter settings shall be tandem setters.**

B. For larger meters (1-1/2" and 2") the meters shall be installed with ball meter valves on inlet side and the meter outlet side. Meters shall be placed on concrete block or equivalent support inside the meter box.

C. For individual meter with pressure reducing valves or more than one meter the coppersetters shall be the Tandem type coppersetters as manufactured by Ford, Mueller or Engineer approved equal and 12 inches in height and placed in meter boxes with 18" I.D.

E. A rigid stainless steel insert stiffener shall be used inside the PE tubing at all connections to the coppersetters.

2.06 SERVICE METERS

The service meter main body shall be of high grade bronze, with hinges, single lid cover and raised characters cast on the body indicating the direction of flow. Meter shall have a working pressure rating of

150 psi. The register shall be straight reading gallon type. The register unit shall be hermetically sealed, and driven by permanent magnets. The register shall have a center sweep hand and a test circle shall be divided into 100 equal parts and include a flow finder. The register shall carry a minimum 10-year warranty.

The meters shall be manufactured by **Sensus Iperl Radio Read**. The entire unit is to be pre-assembled in a workmanlike manner with all components fitted snugly into the box and fastened to prevent movement. All joints shall be sealed with Teflon tape. The inlet and outlet is to be equipped with compression couplings.

2.08 METER BOXES

Meter boxes shall be plastic or "Ultra-Rib" circular with dimension as shown on the Drawings. The meter box cover where installation is to be in roadways or sidewalks and shall have heavy duty lid for light vehicular traffic. The meter box where installation is to be roadways or sidewalks shall be of concrete construction for vehicular traffic. The meter box, cover and meter setting shall be constructed as shown on the drawings or as directed by the Owner or Engineer. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.08 ACCESSORIES

A. Fittings and Couplings

1. Fittings for copper tube shall be wrought copper or cast bronze for soldered joints and brass for flared joints.
2. Flexible couplings as shown or required for copper tube shall be flexible metal hose couplings.

B. Joints

1. Joints for seamless copper water tube to be installed in concrete and underground shall be flared type and shall have threads in accordance with AWWA C 800.
2. Joints for seamless copper water tube and copper drainage tube installed exposed and inside structures shall be soldered.
 - a. Solder and flux used in joints of water lines, shall contain no more than 0.2% lead.
 - b. Solder shall be Tin-Silver or approved equal.
 - c. Solder flux shall be as recommended by the solder manufacturer.
3. Joints for bright annealed seamless copper tube used in liquid fuel lines shall have flared joints, approved by Underwriter's Laboratories.
4. Joints for small tubing (3/8 inch and smaller) shall be of the locking type compression fittings or soldered as shown in the piping schedule and as directed.

PART 3 - EXECUTION

3.01 INSTALLATION OF METER SERVICES

All customer meter services shall be installed as shown on the Contract Drawings. The Owner reserves the right to change the location of the meter services prior to installation for ease of daily operation of the system and reading the individual meters. Existing customer services must be connected on customer side of meter.

3.02 INSTALLATION OF SERVICE TUBING

A. All service tubing installed beneath bituminous or concrete roads shall be jacked under the roads. When State maintained roads are being jacked and rock is encountered, permission to open cut the road shall be obtained by the Contractor from the Department of Transportation's District Permit Engineer. If permission is refused, the Contractor shall attempt to jack at another location and shall continue to do so until a successful crossing is obtained.

B. Minimum cover for all service lines shall be 36 inches (at all locations) when within the proposed and existing highway right-of-way and construction easements. Additional cover may be required at proposed drainage ditch, storm sewer, or other noted locations.

3.03 BACKFILLING SERVICE TUBING

When service tubing is laid in an open cut across a road of any type surface (crushed stone, bituminous or concrete), the backfill shall consist of Class II granular material (dense graded aggregate) and shall be placed full depth. Payment for Class II material used will not be paid as a separate pay item, but will be included in the price for installing the service tubing.

3.04 INSTALLATION OF COPPER TUBING (not in contract)

- A. Install copper tubing, fittings, specials, and accessories in accordance with the applicable configuration shown on the Contract Drawings and the provisions of the Sections entitled "Trenching, Backfilling and Compacting" and "Pipeline Installation".
- B. Exposed copper tube shall be carefully erected and neatly arranged.
1. Copper tube shall be run parallel with walls inside structures and shall be pitched to drain.
 2. Drain valves shall be installed at the low points of liquid filled systems.
 3. Valved fill connections shall be provided for closed systems.
- C. Copper tube installed for a compressed air or gas system shall be pitched in the direction of flow.
1. Connections shall be at the top of the main.
 2. Low points of the system shall have drip pipes not less than 12 inches long and drain pet-cocks unless automatic moisture traps are shown.
- D. Unions shall be provided on copper tube systems with soldered joints.
1. Unions shall be located at control valves, solenoid valves, moisture and steam traps, other items of connected equipment and as shown on Contract Drawings.
 2. Unions shall be of cast bronze or brass construction.
 3. Dielectric unions shall be used when connecting copper tube to ferrous metals.

- E. Copper tubing shall be supported and anchored in place by the use of copper or brass units spaced not greater than 10 feet on center and each side of each change of direction.

3.05 FIELD TESTING AND CHLORINATION

- A. Perform hydrostatic and leakage tests in accordance with the applicable provisions of the Section entitled "Leakage Tests", at the test pressure specified or scheduled.
- B. Disinfect piping and appurtenances in accordance with the Section entitled "Chlorination", where specified or scheduled.

-END OF SECTION-

SECTION 02630
TAPPED CONNECTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes tapping and installing of corporation stops and valves on existing or newly installed pipes without interruption of service, as shown on the Contract Drawings, complete with connections and accessories.
- B. Installing of curb stops and boxes where specified or directed.

1.02 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:
 - 1. American Water Works Association (AWWA)

1.03 SUBMITTALS

- A. In addition to those submittals identified in the General Provisions, the following items shall be submitted:
 - 1. Detail drawings for each size corporation stop, curb stop, tapping sleeve and valve, and service box.

PART 2 PRODUCTS

2.01 CORPORATION STOPS

- A. Corporation stops shall be threaded to conform to AWWA C800 with standard corporation stop thread at the inlet. The outlet shall be fitted with coupling nut for flared tube service unless otherwise specified.

SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.02 CURB STOPS

- A. Curb stops shall be threaded to conform to AWWA C 800 with coupling nuts for flared tube service.
1. $\frac{3}{4}$ -inch shall be of the inverted new type.
 2. 1-inch to 2-inch shall be of the plug-type with "O" ring seals to withstand a minimum working pressure of 175 psi.
 3. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.03 SERVICE CLAMPS

- A. Service clamps shall be designed for use on the type of pipe to which the connection is being made.
1. Ductile iron and asbestos-cement service clamps shall be the double strap type with neoprene gaskets.
 2. Polyvinyl chloride pipe service clamps shall be of a full circle design with a minimum width of 2 inches.
 3. Prestressed concrete pipe service clamps shall be made by or approved for use by the pipe manufacturer.
 4. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.04 SERVICE BOXES

- A. Service boxes shall be constructed of cast iron and sized for the curb stop upon which it is being installed.
1. Stationary shut-off rod shall be provided unless otherwise specified.
 2. Boxes shall be telescopic with a minimum of 1-foot adjustment.
 3. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.05 TAPPING SLEEVES AND VALVES

- A. Tapping sleeves and valves shall be used for connections larger than 2 inches.
1. Tapping sleeves shall be designed and sized in accordance with the recommendations of the manufacturer.
 2. Working pressure shall be 200 psi unless higher pressures are scheduled.
 3. The seal of the tapping sleeve shall be mechanical joint or low lead 2.5% or less. Low lead as conforming to current regulations.
 4. Valves for tapping sleeves shall be designed for the intended service and shall conform to the requirements of the Section entitled "Valves".
 5. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install connections and accessories under the direction of personnel who have performed at least ten similar connections in accordance with the configuration shown on the Contract Drawings and the applicable provisions of the referenced Standards.
1. Threaded taps shall be made using a machine designed for cutting, threading and inserting the corporation without interruption of service.
 - a. Teflon tape may be used on corporation threads.
 2. Tapping sleeve connections shall be made using a machine to cut and remove the segment through the valve without interruption of service.
- B. Service boxes shall be set plumb and shall be independently supported on two bricks so no weight will be transmitted to the curb stop or carrier pipe.
- C. Service clamps and tapping sleeves installed on prestressed concrete pipe shall be encased in a minimum of 2 inches of concrete mortar after installation.

-END OF SECTION-

SECTION 02640**VALVES****PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. The Contractor shall furnish and install valves and miscellaneous piping appurtenances, as indicated on the Drawings and as herein specified.
- B. The Drawings and Specifications direct attention to certain features of the equipment, but do not purport to cover all the details of their design. The equipment furnished shall be designed and constructed equal to the high quality equipment manufactured by such firms as are mentioned hereinafter, or as permitted by the Engineer. The Contractor shall furnish and install the equipment complete in all details and ready for operation.
- C. Electrical work and equipment specified herein shall conform to the requirements of the applicable electrical sections.
- D. Enclosures shall be of a suitable type for the atmospheres in which they are installed.
- E. Sizes and capacities not specified herein are indicated on the Drawings.
- F. Valves required within pre-engineered pump stations are not covered by this specification section.

PART 2 - PRODUCTS**2.01 BUTTERFLY VALVES (Not in Contract)**

- A. Butterfly valves and operators shall conform to the AWWA Standard Specifications for rubber seated butterfly valves, Designation C504, Class 150, except as hereinafter specified. Valves shall have a minimum 150 psi pressure rating.
- B. All butterfly valves shall be of cast iron body per ASTM A-126, Class B. Valve discs shall be of ductile iron per ASTM A-536 and provide uninterrupted 360 degree seating edge. Permanently self-lubricating body bushings shall be provided and shall be sized to withstand bearing loads. Valve shafts shall be Type 304 stainless steel with V-type packing. O-ring seals are not acceptable.
- C. Valve seats shall be full resilient seats of Buna - N or Hycar and retained in the body or on the disc edge. If the resilient seat is in the body, the disc shall conform to ASTM A-436 Type 1 (Ni-Resist) or gray/ductile iron with corrosion resistant seating surface. If the resilient seat is mounted on the disc edge, it shall be securely attached with Type 304 stainless steel retaining ring or pins. The disc seating edge shall be Type 316 stainless steel.
- D. Valve operators shall be electric actuators as specified elsewhere in the specifications. The valve shaft and actuators shall be designed for both torsional and shearing stresses when the valve is operated under its greatest torque.
- E. All valves shall conform with the latest revision of AWWA Standard for Butterfly Valves for Ordinary Water Service, AWWA C504. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.02 GATE VALVES AND BOXES

A. All gate valves shall be of the resilient seat wedge, iron body, non-rising stem, fully bronze mounted with O-ring seals. Valves shall be of standard manufacture and of the highest quality both as to materials and workmanship and shall conform to the latest revisions of AWWA Specification C-500. Valves shall have a rated working pressure of 250 psi.

B. Gate valves for buried service shall be furnished with mechanical joint end connections, unless otherwise shown on the plans or specified herein. The end connections shall be suitable to receive ductile iron or PVC pipe.

C. All gate valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working pressure cast on the body of the valve.

D. Buried service gate valves shall be provided with a 2" square operating nut and shall be opened by turning to the left (counterclockwise).

E. Buried service gate valves shall be installed in a vertical position with valve box as detailed on the plans. They shall be set vertically and properly adjusted so that the cover will be in the same plane as the finished surface of the ground or street.

F. Valve boxes shall be cast iron, two-piece, screw type (as shown on the drawings) with drop-cover marked "Water". They shall be set vertically and properly adjusted so that the cover will be in the same plane as the finished surface of the ground or street. A concrete pad shall be placed around the valve box cover as shown on the drawings.

G. The Contractor shall furnish two (2) T-operating wrenches in the lengths necessary to operate the buried gate valves for an operator of average height in a normal working position.

H. Gate valves for installation in building, drywells, pits or vaults shall be flanged ANSI B16.1, Class 125 with handwheel operator, non-rising stem or OS&Y as indicated on the drawings.

I. Gate valves installed with tapping sleeves shall have a mechanical joint outlet and a flanged joint connection to the sleeves.

J. All valves shall conform with the latest revision of AWWA Standard for Gate Valves for Ordinary Water Works Service, AWWA C500. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

K. All 24" or larger gate valves shall be supplied with spur gearing and grease case.

L. All gate valves shall receive a two part thermosetting epoxy protective coating both inside and outside of the valve and shall be listed for use as with potable water by the Federal EPA. The epoxy coating shall meet or exceed ANSI/AWWA C550 Standard and ASTM D1763 Standard.

2.03 CONTROL VALVE (Not in Contract)

A. The control valve is an automatic pilot controlled, hydraulically operated, diaphragm actuated globe valve in the oblique (Y) pattern design. A 3-way solenoid pilot valve either applies upstream pressure to the upper control chamber to close the main valve or vents the upper control chamber to atmosphere allowing the main valve to open. The solenoid and a limit switch assembly on the main valve are electrically synchronized with the telemetry controls to allow the valve to open or close to fill the tank.

B. In the event of a power failure the valve will open immediately, regardless of the operational mode of the valve at the time of the power failure.

C. The main valve shall be a center guided diaphragm actuated globe valve of oblique (Y) pattern design. The body and cover shall be cast iron, ASTM A 126 Class B, with bronze seat. The internal and external surfaces of the valve body shall be fusion bonded coated. End connections shall meet the ANSI, or other internationally recognized standard required. The body shall have a replaceable non-threaded seat ring that is held in place by set screws which tighten into a body groove. This seat should be accessible and serviceable without removing the valve from the pipeline. The seat area shall have a flow opening with no stem guides, bearings or supporting ribs.

D. The actuator assembly shall be a double chamber design with a separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly consisting of the seal disk, valve shaft, bearing, diaphragm assembly, separating partition and top cover must be removable from the valve as a single unit. The control chamber between the diaphragm and the separating partition shall be capable of being open to or isolated from the valve internal body pressure. The stainless steel valve shaft shall be guided throughout its travel by a bearing in the separating partition. The replaceable resilient seal shall be rectangular in cross section and contained on three and one half sides. A lip shall be provided on the seal disk outside edge to lock the seal in place. The actuator assembly must be capable of accepting a V-port throttling plug by simply bolting the device to the seal disk.

E. The electric solenoid valve shall be a 3-way solenoid with a manual override system to allow the valve to be operated manually should electrical power be unavailable. The solenoid and limit switch shall be properly rated for the intended service. Liquid to the pilot must be filtered and a cock valve must be provided to isolate the control loop.

F. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.04 DUAL DISK VALVE (Not in Contract)

A. Dual Disc Check Valves shall be suitable for pressures up to 250 psig water service. The check valve shall be of the dual disc, wafer style with torsion spring induced closure. The valves shall be provided for installation between ANSI B16.1 Class 125 iron flanges.

B. The body shall be of one piece construction incorporating a vulcanized synthetic seal. Seal design must allow for positive seating at both high and low pressures. This shall be achieved by a minimal seal contact at low pressure with progressively increased contact at higher pressures. The disc shall fully overlap the synthetic seal, preventing pressure indentations. Opening and closing of the valve must utilize a lift and

pivot action to prevent seal wear and ensure long seal life. The stop and pivot pins shall be stabilized by the use of synthetic spheres to prevent wear due to vibration during operating conditions.

C. The valve body shall be constructed of ASTM A536 Grade 65-45-12 ductile iron. The disc shall be constructed of ASTM B584, Alloy C83600 (2"-12") cast bronze or ASTM B148, Alloy C95200 (14" and larger) cast aluminum bronze. The disc pins and stop pins shall be Type 316 stainless steel. The torsion spring shall be ASTM A313 Type 316 stainless steel up to 16 in. sizes and ASTM A313 Type 17-7 PH on 18 in. and larger sizes. The seal shall be Buna - N per ASTM D2000-BG or Viton per D2000-CA.

D. End connections shall be full diameter threaded flanges.

E. The valves shall be hydrostatically tested at 1.5 times their rated cold working pressure. A seat closure test at the valve rating shall be conducted to demonstrate zero leakage. The manufacturer shall provide test certificates, dimensional drawings, parts list drawings, and operation and maintenance manuals.

F. The exterior of the valve shall be coated with a universal alkyd primer.

- G. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

2.05 CHECK VALVES (Not in Contract)

A. The check valves shall be a swing check valve with flanged ends; lever and weight and function to prevent reverse flow. The valve shall be tight seating when closed and full ported when open. The hinged shaft shall be completely out of the water way employing a disc with a convex shape facing the normal flow. The valve shall be manufactured where the closing of the valve will not cause water hammer and minimize disc slam. The valve shall be capable of a tight seal at pressures above 5 psi.

B. The valve body shall be cast iron with a bronze seat ring. The valve disc shall be cast iron and suspended from a non-corrosive shaft. Valves shall be rated at a minimum working pressure of 175 psi.

- C. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

2.06 TAPPING VALVES AND SLEEVES

A. Tapping valves and sleeves shall be installed in the locations shown the Contract Drawings. The valves shall be a resilient seat wedge, iron body, non-rising stem, gate valve with a mechanical joint outlet and a flanged joint connection to the sleeves. They shall be provided with a valve box, counterclockwise opening and installed as described in detail on the plans.

B. Tapping Sleeves: Tapping sleeves of the sizes indicated for connection to existing main shall be the cast gray, ductile, or malleable-iron, split-sleeve type with flanged outlet, and with bolts, follower rings and gaskets on each end of the sleeve. Construction shall be suitable for a maximum working pressure of 200 psi. Bolts shall have hexagonal heads and nuts. Longitudinal gaskets and mechanical joints with gaskets shall be as recommended by the manufacturer of the sleeve. When using grooved mechanical tee, it shall consist of an upper housing with full locating collar for rigid positioning which engages a machine-cut hole in pipe, encasing an elastomeric gasket which conforms to the pipe outside diameter around the hole and a lower housing with positioning lugs, secured together during assembly by nuts and bolts as specified, pretorqued to 50 foot-pound.

- C. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

- D. Tapping valves shall be suitable for a maximum working pressure of 200 psi with 125 lb. flanges

2.07 CUSTOMER SERVICE PRESSURE REDUCING VALVE

A. The individual customer service pressure reducing valve shall be hydraulically operated, spring loaded, diaphragm type control regulator. The valve shall be held open by the force of the compression spring above the diaphragm and shall maintain a constant delivery pressure downstream without shock or water hammer. Adjustments shall be made by an adjusting screw on top of the valve. Setting shall be as shown on the plans. The valve shall have a cast brass or bronze body and cover per ASTM B-62, stainless steel seat (Stainless Steel 303) and adjustment ranges of 40 to 300 psi.

B. The individual pressure reducing valve shall be equipped with a built-in by-pass to prevent a closed system on the customer's side of the meter service.

C. All valves shall be preceded by a strainer provided by the valve manufacturer and have a maximum working pressure the same as the pressure reducing valve.

- D. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

2.08 MAIN LINE PRESSURE REDUCING VALVE (not in contract)

A. The pressure reducing valve shall maintain a constant downstream pressure regardless of varying inlet pressure. This valve shall be a hydraulically operated, diaphragm actuated, globe pattern valve. It shall contain a resilient, synthetic rubber disc, having a rectangular cross section, contained on three and one-half sides by a disc retainer and forming a tight seal against a single removable seat insert. The diaphragm assembly containing a valve stem shall be fully guided at both ends by a bearing in the valve cover and integral bearing in the valve seat. This diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. The diaphragm shall consist of nylon fabric bonded with synthetic rubber and shall not be used as a seating surface. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the valve or pilot controls. All necessary repairs shall be possible without removing valve from the line.

B. The main valve body and cover shall be Cast Iron per ASTM A48, and the main valve trim shall be 303 stainless steel. The valve shall come equipped with a valve position indicator. The valve shall be equipped with a flow clean strainer, closing speed control, opening speed control and flow stabilizer. The valve shall be equipped with a V-port diaphragm plug for low flow conditions or approved equal by the Engineer.

C. The pilot control shall be a direct acting, adjustable, spring loaded, normally open, diaphragm valve, designed to permit flow when controlled pressure is less than the spring setting. The control system shall include a fixed orifice. The pilot control valve trim shall be 303 stainless steel.

D. The valve shall have a maximum working pressure rating as stated on the Drawings.

E. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

F. The main line pressure reducing valve shall be installed in a 2" Ford 70 Series Coppersetter with an outlet valve and by pass feature. All transition fittings shall be brass and capable of handling inlet pressures of 300 psi. The pressure reducing valve and coppersetter shall be installed in a 30" x 30" ultra rib meter box with flat cast iron lid. A pressure gauge shall be installed on the outlet side of the line that can register between 0-200 psi. This gauge shall be installed within the meter box.

2.09 AIR RELEASE VALVE

A. The valve shall have a 1" screwed inlet diameter with a 1" corporation stop and a minimum of 3/32" size orifice. The body and cover shall be constructed of cast iron while the float shall be stainless steel. All internal parts, such as lever pins, retaining rings, screws, etc. shall be of stainless steel or bronze construction. Valves shall be suitable for use in lines with an operating pressure up to 175 psi. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

B. A service clamp shall be used to connect the air release valve to the water main. Service clamps and corporation stops shall be those as previously specified in Section 02650, except the corporation stops shall have a female IP thread outlet.

C. The air release valve box shall be a standard meter box with dimensions of 18" I.D. and a height of 36". The valve box cover shall be a standard water meter box cover.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Valves shall be installed as nearly as possible in the positions indicated on the Drawings consistent with conveniences of operating the handwheel or wrench. All valves shall be carefully erected and supported in their respective positions free from all distortion and strain on appurtenances during handling and installation.

B. All material shall be carefully inspected for defects in workmanship and material, all debris and foreign material cleaned out of valve openings and seats, all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness.

C. Valves and other equipment which do not operate easily or are otherwise defective shall be repaired or replaced at the Contractor's expense.

D. Valves shall be set plumb and supported adequately in conformance with the instructions of the manufacturer. Valves mounted on the face of concrete shall be shimmed vertically and grouted in place. Valves in the control piping shall be installed so as to be easily accessible.

3.02 INTERIOR PIPING INSTALLATION

A. It shall be the Contractor's responsibility to furnish a complete system of pipe supports, to provide expansion joints and to anchor all piping. The pipe support system shall be installed complete with all necessary inserts, bolts, nuts, rods, washers, miscellaneous steel, and other accessories.

B. In some instances, expansion joints have been shown on the drawings, but no attempt has been made to indicate every expansion joint for piping included under this portion of the specifications. Portions of the piping are shown on the detail drawings. Some of the piping, however, is shown only on the schematics.

C. Reaction Anchorage and Blocking: All piping exposed in interior locations and subject to internal pressure in which flexible connectors are used shall be blocked, anchored, or harnessed, as shown on the drawings, or as directed by the Engineer to preclude separation of joints.

3.03 PAINTING

Field painting is specified in elsewhere in these specifications.

- END OF SECTION -

SECTION 02645**HYDRANT ASSEMBLY****PART 1 - GENERAL****1.01 SCOPE**

The Contractor shall furnish and install, where shown on the plans and additional locations as directed by the Owner, hydrant assemblies and blow-hydrants manufactured and equipped as described below.

PART 2 - PRODUCTS**2.01 FLUSHING HYDRANT ASSEMBLY**

A. Hydrants shall conform in all respects to the requirements of AWWA C502. All hydrants shall have 6-inch mechanical joint shoe connection, two (2) 2-1/2" hose outlets, one (1) 4-1/2" pumper nozzle with caps. Connection threads and operation nuts shall conform to National Standard Specifications as adopted by National Board of Fire Underwriters. The hydrant shall be equipped with safety flanges designed to prevent barrel breakage when struck by a vehicle and an auxiliary gate valve.

B. Each hydrant shall be fully bronze mounted with the main valve having a threaded bronze seat ring assembly of such design that it is easily removable by unscrewing from a threaded bronze drain ring. Bronze drain ring shall have multiple ports providing positive automatic drainage as the main valve is opened or closed. Drainage waterways shall be completely bronze to prevent rust or corrosion.

C. Operating stems shall be equipped with anti-friction thrust bearing to reduce operating torque and assure easy opening. Stops shall be provided to limit stem travel. Stem threads shall be enclosed in a permanently sealed lubricant reservoir protected from weather and the waterway with O-ring seals.

D. Hydrants shall be designed for 250 psi working pressure and shop tested to 400 psi pressure with main valve both opened and closed. Under test the valve shall not leak, the automatic drain shall function and there shall be no leakage into the bonnet. Hydrants shall have a UL/FM approved rating.

E. Each hydrant shall be installed with an auxiliary shut-off valve and valve box; valve box cover shall be marked "WATER" as required. Hydrants shall be secured to the shut-off valve by AWWA approved restraint joints, rodding with four (4) equally spaced all thread rods and "Duc-Lugs", or other equally approved method.

F. Inlet cover depth shall be 36" and the minimum dimension from ground to centerline of lowest opening shall be 18". Hydrants shall be supported on a poured-in-place concrete thrust block and provided with a drainage pit as indicated on Standard Detail Sheet.

G. All hydrants shall receive two (2) field coats of Koppers Company, Inc. Glamortex enamel (red). The Owner shall be furnished with two (2) hydrant barrel wrenches, four (4) spanner wrenches and two (2) operating nut wrenches.

H. Below ground hydrants shall be flush type with the upper barrel and nozzles contained in a cast iron box with a non locking lid.

I. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

J. Hydrant assemblies shall include the isolation valve and both valve and hydrant shall have a UL/FM approved rating.

2.02 UNDERGROUND BLOW-OFF ASSEMBLY

The underground blow off assembly shall be a gate valve, ninety degree fitting and pvc cap sized to fit the end of the pipe at surface level as shown on the standard detail drawings.

2.03 AUTOMATIC FLUSHING DEVICE

Automatic Flushing Device shall have a 2" Brass Inlet, leading vertically into a 2" Automatic solenoid valve. Automatic solenoid valve shall have a 150 psi rating. Each unit shall be furnished with a stand alone valve controller. Valve controller will not require a second hand held device for programming, must have a minimum of 12 possible flushing cycles per day at up to 6 hours of flush time per cycle, and shall be submersible to 12 feet, operate with a 9 volt battery. Compartment holds two batteries and have a double valve, all brass sampling point. Removal of the 2" solenoid valve shall be possible via and o-ring connector located under the valve after removal of the stainless steel access plate. Underground parts shall be housed in a PVC enclosure and each unit shall be self draining, non-freezing. All above ground components shall be contained within a UV-resistant locking domed cover, as manufactured by Kupferly Foundry Company, St. Louis, MO or approved equal. The model number is a #9400. The flushing device shall be accompanied by a 1" meter, box, corp stop, saddle, and setter to make a complete installation.

2.04 BLOW OFF HYDRANT ASSEMBLY

- A. 3-inch Hydrants shall be self-draining, non-freezing, compression type with 2 $\frac{1}{8}$ " main valve opening. Inlet connection shall be MJ. Outlet shall be 2" IP. Hydrants shall be post type SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.
- B. 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.
- C. Flushing assembly installation shall also include all excavation, backfill, thrust blocking, and #9 crushed stone.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Hydrants shall be located as shown on the drawings unless otherwise specified by the Owner. Each hydrant shall be connected to the main with a 6-inch branch line having at least as much cover as the distribution main. Hydrants shall be set plumb with pumper nozzle facing the roadway and the cast-iron valve box set flush with the finished surrounding grade. Except where approved otherwise, the backfill around hydrants shall be thoroughly compacted to the finished gradeline immediately after installation to obtain beneficial use of the hydrant as soon as practicable. All hydrants shall be provided with a shut-off valve in the hydrant lateral as shown. All hydrants shall be installed in accordance with the manufacturer's directions and as detailed on the Contract Drawings.

B. Blow-off hydrants shall be located as shown on the drawings unless otherwise specified by the Utility. Each blow-off hydrant shall be connected to the main with at least as much cover as the distribution main. Blow-off hydrants shall be set plumb with nozzle facing the roadway and with the box cover set flush with the finished surrounding grade. The backfill around each hydrant shall be thoroughly compacted to the finished gradeline immediately after installation to obtain beneficial use of the hydrant as soon as practicable. All blow-off hydrants shall be provided with a shut-off valve in the lateral as shown.

- END OF SECTION -

SECTION 02700
SITE RESTORATION

PART 1 - GENERAL**1.01 CLEAN-UP**

Upon completion of the installation of the water main and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from his work. The Contractor shall grade the ground along each side of the pipe trench and/or structure in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

PART 2 - PRODUCTS**2.01 SEEDING**

A. All graded areas shall be seeded at the rate of six (6) pounds of seed per 1,000 square feet. The mixture shall consist of:

Kentucky 31 Fescue	60%
Creeping Red Fescue	20%
Annual Rye Grass	20%

B. After seed has been distributed, the Contractor shall cover areas with straw to a depth of 1-1/2". Any necessary re-seeding or repairing shall be accomplished by the Contractor before final acceptance. Seeding is not a pay item.

PART 3 - EXECUTION**3.01 SITE RESTORATION**

A. After installation of water lines, the construction site will be restored to its original condition or better. All paved streets, roads, sidewalks, curbs, etc. removed or disturbed during construction shall be replaced, and all materials and workmanship shall conform to standard practices and specifications of the Owner, and/or to the Kentucky Department of Highways requirements, and specifications, whichever applies. Gravel, cinder or dirt streets, drives and shoulders shall be replaced and sufficiently compacted to provide a surface suitable for carrying the type of traffic normally imposed at the location.

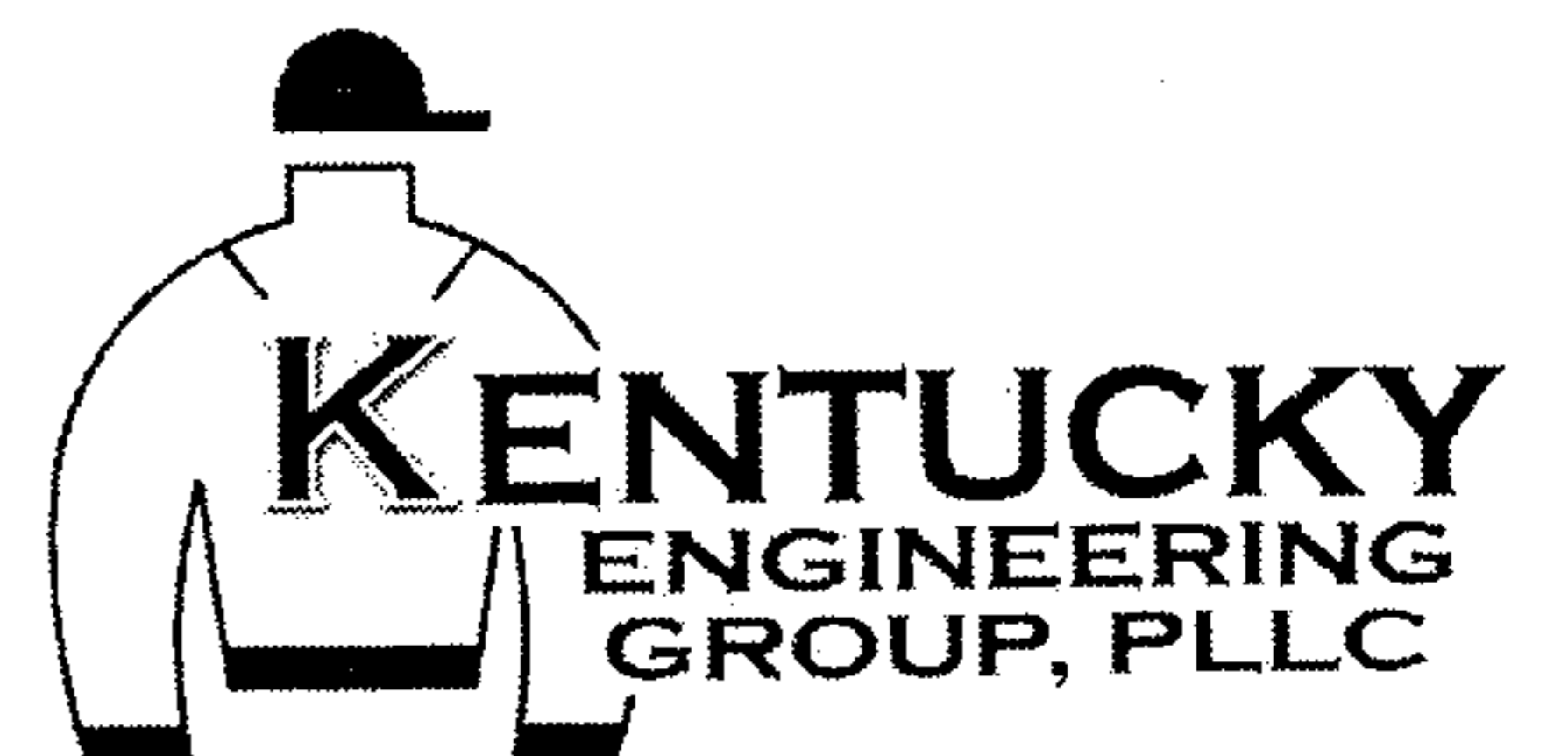
B. All seeded areas shall be watered daily during the germination period, unless rain supplies the required moisture. The Contractor shall replace, at his own expense, trees, shrubs, etc. disturbed during construction.

C. The Contractor shall remove from the site all equipment, unused materials and other items at his expense. The construction site shall be left in a neat, orderly condition, clear of all unsightly items, before the Work is finally accepted.

- END OF SECTION -

DIVISION 3

CONCRETE



SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

The work in this section shall include all formwork, shoring, bracing, anchorage, concrete reinforcement and accessories for cast-in-place concrete.

1.02 GENERAL REQUIREMENT

All concrete construction shall conform to all applicable requirements of ACI 301-84 Specifications for Structural Concrete for Buildings, except as modified by the supplemental requirements specified herein.

1.03 RELATED WORK

Section 05500 - Miscellaneous Metals.

1.04 REFERENCES

A. The Contractor shall obtain and have available in the field office at all times, the following references:

1. Specifications for Structural Concrete for Buildings ACI 301-84 (latest revision).
2. Field Reference Manual SP-15 (81).
3. Manual of Standard Practice - CRSI (latest revision).
4. Placing Reinforcing Bars - CRSI (latest revision).
5. Building Code Requirements for Reinforced Concrete ACI 318 (latest revision).

B. The following standard shall also apply to this work:

1. ASTM C-143
2. ASTM C-150
3. ASTM C-33
4. ASTM C-260
5. ASTM C-494
6. ASTM A-615
7. ASTM D-638
8. ASTM D-695
9. ASTM D-570
10. ASTM D-1252
11. ANSI A-116.1
12. ASTM A-120

13. ASTM C-94

14. ASTM D-2146
15. Federal Specifications FF-S~325

1.05 SUBMITTALS

- A. The Contractor shall submit the following data to the Engineer for review:
 1. Concrete mix designs, test results and curves plotted to establish water-cement ratio if Method 1 of ACI 301 is used.
 2. Proposed mix designs and all necessary substantiating data used to establish proposed mix designs if Method 2 of ACI 301 is used.
 3. Mix designs for all mixes proposed or required to be used, including all mixes containing admixtures.
 4. A certified copy of the control records of the proposed production facility establishing the standard deviation as defined in Paragraph 3.8.2.3 of ACI 301.
- B. Certification attesting that admixtures equal or exceeds the physical requirements of ASTM C-494 for Type A admixture and, when required, for Type D admixture.
- C. Drawings showing locations of all proposed construction joints.
- D. Shop drawing for reinforcing steel showing bar schedules, location, and splices.

PART 2 - PRODUCTS

2.01 CLASSES OF CONCRETE AND USAGE

- A. Structural concrete of the various classes required shall be proportioned by either Method 1 or 2 of ACI 301 to produce the following 28-day compressive strengths:
 1. Selection of Proportions for Class A Concrete:
 - a. 4,000 psi compressive for strength at 28 days.
 - b. Type I cement plus dispersing agent and air.
 - c. Maximum (water)/(cement and dispersing agent) ratio 0.50.
 - d. Minimum cement content = 564 lbs. (6.0 bags)/cu. yd. concrete.
 - e. Nominal maximum size coarse aggregate = No. 67 (3/4" maximum) or No. 57 (1/2" maximum). Walls with architectural treatment shall use No. 67 (3/4" maximum).
 - f. Air content = 5% plus or minus 1% by volume.
 - g. Slump = 211-311 in accordance with ASTM C-143.

2. Selection of Proportions for Class B Concrete:
 - a. 3,000 psi compressive strength at 28 days.
 - b. Type I cement plus dispersing agent and air.
 - c. Maximum (water)/(cement and dispersing agent) ratio 0.56.
 - d. Minimum cement content = 470 lbs. (5.0 bags)/cu. yd. concrete.
 - e. Nominal maximum size coarse aggregate = No. 67 (3/4" maximum) or No. 57 (111 maximum).
 - f. Air content = 6% plus or minus 1% by volume.
 - g. Slump - 311-411 in accordance with ASTM C-143.
- B. Concrete shall be used as follows:
 1. Class A concrete for all concrete work except as noted below.
 2. Class B concrete for fill concrete and thrust blocks, and where indicated on the Drawings.
- C. All testing shall be or have been performed by a recognized independent testing laboratory.
- D. Cement for exposed concrete shall have a uniform color classification.
- E. Coarse aggregate shall conform to all requirements of ASTM C-33.
- F. Manufactured sand shall not be used as fine aggregate in concrete.

2.02 ADMIXTURES

- A. An air entraining admixture shall be used on all concrete and shall be the neutralized vinsol resin type such as Master Builders MB-VR, or Euclid Chemical Co. AIR-MIX or equal. The admixture shall meet the requirements of ASTM C-260. Certification attesting to the percent of effective solids and compliance of the material with ASTM C-260 shall be furnished, if requested.
- B. A water-reducing, set controlling admixture (non-lignin type) shall be used in all concrete. The admixture shall be a combination of polyhydroxylated polymers including catalysts and components to produce the required setting time based on job site conditions, specified early strength development, finishing characteristics required, and surface texture, as determined by the Engineer.
- C. Certification shall be furnished attesting that the admixture exceeds the physical requirements of ASTM C-494, Type A, water-reducing and normal setting admixture, and when required, for ASTM C-494, Type D, water-reducing and retarding admixture when used with local materials with which the subject concrete is composed.
- D. The admixture manufacturer, when requested, shall provide a qualified concrete technician employed by the manufacturer to assist in proportioning concrete for optimum use. He shall also be available

when requested to advise on proper addition of the admixture to the concrete and on adjustment of the concrete mix proportions to meet changing job conditions.

E. The use of admixtures to retard setting of the concrete during hot weather, to accelerate setting during cold weather, and to reduce water content without impairing workability will be permitted if the following conditions are met:

The admixture shall conform to ASTM C-494 except that the durability factor for concrete containing the admixture shall be at least 100 percent of control, the water content a maximum of 90 percent of control and length change shall not be greater than control, as defined in ASTM C-494.

F. Where the Contractor finds it impractical to employ fully the recommended procedures for hot weather concreting, the Engineer may at his discretion require the use of a set retardant admixture for mass concrete 2.5 feet or more thick and for all concrete whenever the temperature at the time concrete is cast exceeds 80-F. The admixture shall be selected by the Contractor subject to the review of the Engineer. The admixture and concrete containing the admixture shall meet all the requirements of these Specifications. Preliminary tests of this concrete shall be required at the Contractor's expense.

G. Admixtures shall be used in concrete design mixes in the same manner and proportions as in the field so that the effects of the admixtures are included in preliminary tests submitted to the Engineer for review prior to the start of construction.

H. When more than one admixture is used, all admixtures shall be compatible. They should preferably be by the same manufacturer.

I. Calcium chloride will not be permitted as an admixture in any concrete.

2.03 REINFORCEMENT

A. The minimum yield strength of the reinforcement shall be 60,000 pounds per square inch. Bar reinforcement shall conform to the requirements of ASTM A-615. All bar reinforcement shall be deformed.

B. Smooth dowels shall be plain steel bars conforming to ASTM A-615, Grade 60, or steel pipe conforming to ASTM A-120, Schedule 80. Pipe, if used, shall be closed flush at each end with mortar or metal or plastic cap.

C. Reinforcement supports and other -accessories in contact with the forms for members which will be exposed to view in the finished work shall be of stainless steel or shall have approved high-density polyethylene tips so that the metal portion shall be at least one-quarter of an inch from the form or surface. Supports for reinforcement, when in contact with the ground or stone fill, shall be precast stone concrete blocks. Particular attention is directed to the requirements of Paragraph 5.5.3 of ACI Standard 301. These requirements apply to all reinforcement, whether in walls or other vertical elements, inclined elements or flatwork.

2.04 OTHER MATERIALS

A. Anchorage items shall be of standard manufacture and of type required to engage with the anchors to be installed therein under other sections of the Specifications and shall be subject to approval by the Engineer.

1. Slots shall be galvanized dovetail-type as specified in Section "Masonry Work".

2. Inserts shall be malleable iron or steel and of sturdy design adequate strength for the load to be carried. All inserts shall be galvanized. Adjustable wedge inserts shall have an integral loop or strap at the back or shall be provided with lugs to take reinforcing bars. They shall be slotted to receive a special-headed bolt not smaller than 5/8-inch in diameter and of the required length and fitted with hexagonal nut. Other inserts shall be either threaded or slotted as required by their usage. Threaded inserts shall have integral lugs to prevent running.
3. Concrete anchors shall be an approved expansion type conforming to Federal Specification FF-S-325, Groups I, II, III, or VIII and shall be installed in strict accordance with the manufacturer's recommendations.

Material for anchors shall be as specified in Section 05500 - Miscellaneous Metals. Anchors shall develop ultimate shear and pull out loads of not less than the following values in Class A concrete:

BOLT DIAMETER (INCHES)	MINIMUM SHEAR (POUNDS)	MINIMUM PULL-OUT LOAD (POUNDS)
1/2	4,500	4,600
5/8	6,900	7,700
3/4	10,500	9,900

B. Epoxy bonding adhesive used to bond fresh plastic concrete to sound, hardened concrete shall meet the following specification. Contractor shall furnish a notarized certification by the manufacturer that the proposed material meets the specification.

1. Material:

The epoxy material shall consist of a 2-component system whose components conform to the following requirements:

- a. Component A - Component A shall be a modified epoxy resin of the epichlorohydrin bisphenol A condensation type, containing suitable viscosity control agents and having an epoxide equivalent of 180-200.
- b. Component B - The B component shall be primarily a reaction product of one mole of an aliphatic polyamine and two moles of mono functional epoxide containing compounds modified with 2, 4, 6 tri(dimethylaminomethyl) phenol.
- c. The component ratio of B to A by volume shall be as specified by the manufacturer.

2. Properties of Mixed Components:

- a. Solids Content 100% by weight
- b. Pot Life 25-35 min. @
73 degrees F
- c. Tack-Free Time (thin Film) 4-5 1/2 hrs @
73 degrees F
- d. Final Cure ASTM D-695 3 days at

	(75% ultimate strength)	73 degrees F
e.	Initial Viscosity (A+B)	2,000 cps. min at 73 degrees F
f.	Color Mixed	Straw
3.	Properties of Cured Material (Neat Material):	
a.	Tensile Strength ASTM D-638	3,000 psi min. @ 14 days, 73 degrees F
b.	Tensile Elongation ASTM D-638, modified	1/2-2% at 14 days, 73 degrees F cure
c.	Compressive Strength ASTM D-695	12,500 psi min. at 73 degrees F cure
d.	Compressive Modulus ASTM D-695	470,000 psi min. at 28 days, 73 degrees F cure
e.	Compressive Strength ASTM D-695	5,500 psi min. at 24 days, 73 degrees F cure
f.	Water Pick-up ASTM D-570	1.5 max.

C. Flashing reglets shall be as specified in Section 07530. Reglets shall be correctly placed into forms prior to placing concrete in formwork.

D. Premolded expansion-joint filler strips shall conform to ASTM D-1752 and shall be 3/8-inch thick unless otherwise shown.

E. Joint sealants shall conform to ANSI A116.1. The following joint sealants are acceptable:

1. Colma by Sika Chemical Corporation.
2. Hornflex by A.C. Horn, Inc.
3. Sonolastic by Sonneborn Division of Contech, Inc.

F. Nonshrink grout shall be Embeco 885 grout by Master Builders Company, Euco Firmix grout by the Euclid Chemical Company, or equal. The approved product shall be delivered to the site of the work in the original sealed containers, each bearing the trade name of the material and the name of the manufacturer.

G. Porous fill shall be crushed rock or gravel of such size that all will pass a 1-1/2 inch screen and not more than 5 percent will pass a No. 4 screen, free from earth, clay or other foreign substances.

PART 3 - EXECUTION

3.01 FINISHES

A. Exposed to Public View Concrete Surfaces:

1. All concrete exposed to view in the completed structure shall be produced using materials and workmanship to such quality that only nominal finishing will be required. The provisions of paragraphs 13.3, 13.4, and 13.6 of ACI 301 shall apply to all exterior exposed to public view concrete surfaces, including the outside surfaces of tanks.
2. Forms for exposed concrete surfaces shall be exterior grade, high-density overlay plywood, steel, or wood forms with smooth tempered hard-board form-liners.
3. Forms shall be coated with an approved release agent before initial pour and between subsequent pours, in accordance with the manufacturer's printed instructions. Form boards shall not be wet water prior to placing concrete.
4. Recessed joints in concrete shall be formed using lacquer-coated wood battens or forms, milled to indicated profiles. Battens and corner strips shall be carefully inspected before concrete is placed and damaged pieces replaced.
5. Chamfer strips shall be 1 inch radius with leg, polyvinyl chloride strips by Gateway Building Products, Saf-T-Grip Specialties Corp., Vynlex Corp., or equal.
6. Particular attention is directed to the requirements of paragraphs 10.2.2 and 13.3 of ACI 301. Form panels shall be provided in the maximum sizes practicable in order to minimize form joints. Wherever practicable, form joints shall occur at recessed joints. All form joints in exterior exposed to view surfaces shall be carefully caulked with an approved nonstaining caulking compound. Joints shall not be taped. Form oil or other material which will impart a stain to the concrete shall not be allowed to contact concrete surfaces.
7. Care shall be taken to prevent chipping of corners or other damage to concrete when forms are removed. Exposed corners and other surfaces which may be damaged by ensuing operations shall be protected from damage by boxing, corner boards or other approved means until construction is completed.
8. Form ties shall remain in the walls and shall be equipped with a waterseal to prevent passage of water through the walls. Particular care shall be taken to bend tie wire ends away from exposed faces of beams, slabs and columns. In no case shall ends of tie wires project toward or touch formwork. Minimum set back of form ties shall be 1-1/2-inch from faces of wall. The hole left by removal of tie ends shall be sealed and grouted as per ACI Para. 9.3 and in accordance with the procedure described hereinafter in Para. 3.01.F. Form ties will be permitted to fall within as-cast areas of architecturally treated wall surfaces (ACI Chapter 13); this does not apply to walls receiving textured decorative waterproof masonry coating.
9. All formed exposed to public view concrete surfaces shall have a "smooth rubbed finish". Exterior vertical surfaces shall be rubbed to one foot below grade. Interior exposed to public view vertical surfaces of liquid containers shall be rubbed to one foot below the minimum liquid level that will occur during normal operations.

B. Patching of holes due to removal of tie ends and other repairable defective areas, shall be as follows: Entire contact area of hole shall be coated with two-part moisture insensitive epoxy bonding compound as specified in Para. 2.04.B. in accordance with manufacturer's specifications, and prior to placing of freshly mixed

patching mortar. Patching mortar shall be mixed and placed in general accordance with ACI Para. 9.2.2, 9.2.3, and 13.6.

C. For floors and slabs in which drains occur, special care shall be exercised to slope the floors uniformly to the drains. All floors with drains shall be sloped not less than 1/8 inch per foot unless otherwise shown. In all areas where quarry tile or other materials requiring more than 1/4 inch drop are to be overlaid, the concrete base slab shall be depressed as shown to provide a finished floor at the same elevation as surrounding areas.

D. Where not otherwise specified, finishes shall be in accordance with Paragraphs 10.4 and 11.8 of ACI 301.

3.02 TESTING

All testing shall be in accordance with provisions of ACI 301. Testing services listed in ACI Sections 16.3, 16.4 and 16.5 shall be performed by a testing agency acceptable to the Engineer. Testing services of ACI Section 16.5 shall be paid for by the Contractor at his expense. Test shall be made for each 50 cubic yards of concrete and/or each day concrete is placed.

3.03 ADDITIONAL REQUIREMENTS

A. Unless otherwise directed by the Engineer, the vertical surfaces of all footings shall be formed. Excavations and reinforcement for all footings shall have been inspected by the Engineer before any concrete is placed.

B. The installation of underground and embedded items shall be inspected before slabs are placed. Pipes and conduits shall be installed below the concrete unless otherwise indicated. Fill required to raise the subgrade shall be placed as specified in Section 02211 and 02223. Porous fill not less than 6 inches in compacted thickness shall be installed under all slabs, tank bottoms, and foundations. The fill shall be leveled and uniformly compacted to a reasonably true and even surface. The surfaces shall be clean, free from frost, ice, mud and water. Waterproof paper, polyethylene sheeting of nominal 4-mil minimum thickness, or polyethylene-coated burlap shall be laid over all surfaces receiving concrete.

C. Concrete shall be placed in layers not over 18 inches deep and each layer shall be compacted by mechanical internal-vibrating equipment supplemented by hand spading, rodding and tamping as directed. Vibrators shall not be inserted into lower courses that have begun to set.

D. Concrete mixed in stationary mixers and transported by nonagitating equipment shall be placed in the forms within 45 minutes from the time ingredients are charged into the mixing drum. Concrete that is truck mixed or transported in truck mixers or truck agitators shall be delivered to the site of the work and discharge completed in the forms within the time specified in Paragraph 10.7 of ASTM C-94, except that when the concrete temperature exceeds 85-F, the time shall be reduced to 45 minutes. Transit-mixed concrete that is completely mixed at the site of concrete placement or batched cement and aggregates transported to mixers shall be placed in the forms within 1-1/2 hours after cement has been added. Concrete shall be placed in the forms within 15 minutes after discharge from the mixer at the job site.

E. If concrete is placed by pumping, no aluminum shall be used in any parts of the pumping system which contact or might contaminate the concrete. Aluminum chutes and conveyors shall not be used. -

F. All concrete surfaces not in contact with forms shall be moist cured by the application of absorptive mats or double thicknesses of fabric kept continuously wet. Forms shall be kept continuously wet. Use of other curing methods will not be permitted unless written authorization is received from the Engineer.

G. Formwork for beam soffits and slabs and other parts that support the weight of concrete shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified or permitted.

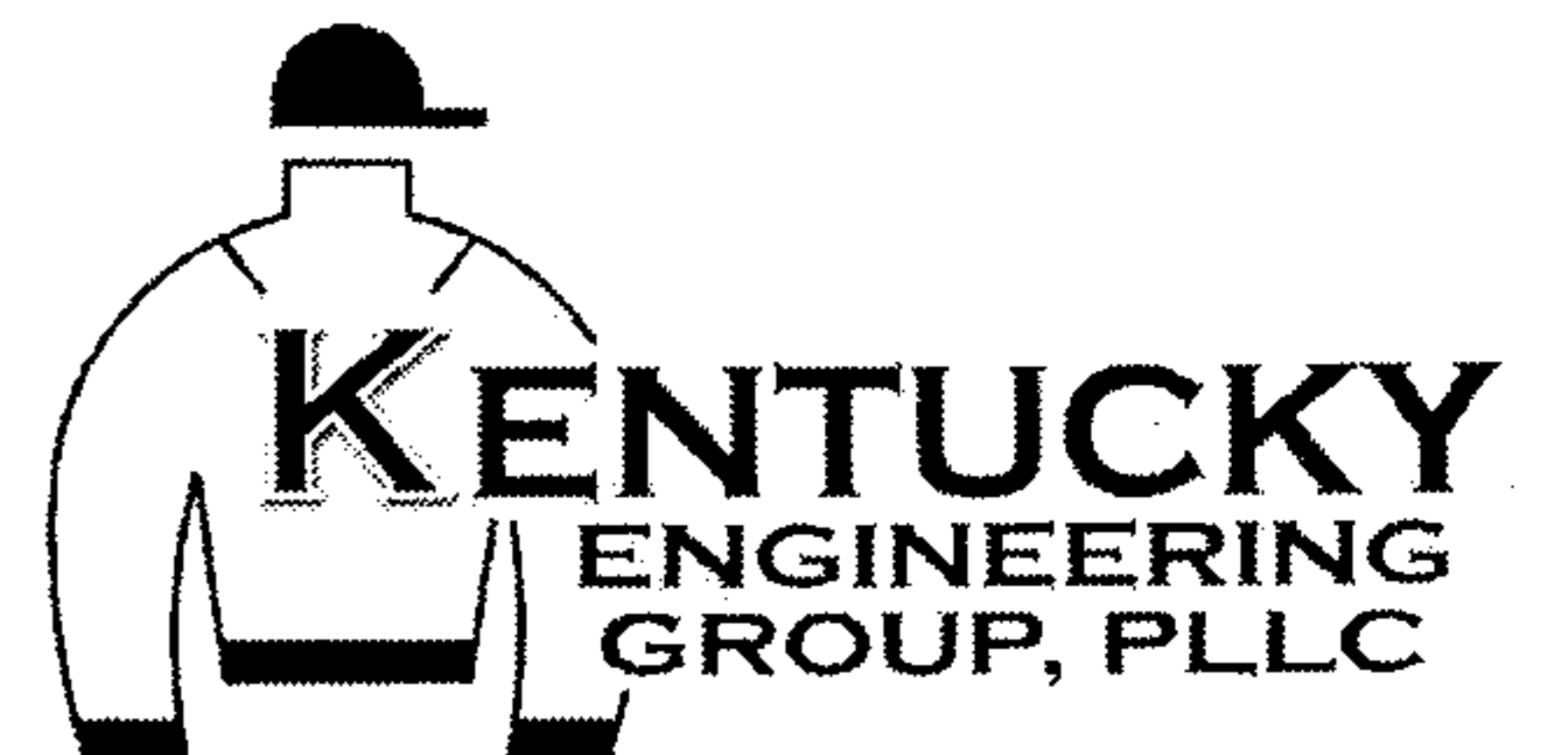
H. Column base plates, bearing plates for beams and similar structural members, machinery and equipment bases shall, after being plumbed and properly positioned, be provided with full bearing with nonshrink grout. Concrete surfaces shall be rough, clean, free of oil, grease and laitance and shall be moistened thoroughly immediately before grout is placed. Metal surfaces shall be clean and free of oil, grease and rust. Mixing and placing shall be in conformance with the material manufacturer's printed instructions.

I. Concrete which, in the opinion of the Engineer, has excessive honeycomb, aggregate pockets or depressions will be rejected and the Contractor shall, at his own expense, remove the entire section containing such defects and replace it with acceptable concrete.

J. Dowels shall be installed at right angles to construction joints and expansion joints. Dowels shall be accurately aligned parallel to the finished surface, and shall be rigidly held in place and supported during placing of the concrete. One end of dowels shall be oiled or greased or dowels shall be coated with high density polyethylene with a minimum thickness of 14 mils.

- END OF SECTION -

DIVISION 10
SPECIALITIES



SECTION 10012
TANK INSPECTIONS

PART 1 GENERAL

1.01 WORK INCLUDED

A. The contractor shall furnish and install materials and services to dive and inspect the Cemetery Tank, the Town Tank, KY 32 Tank and the Wrigley Tank, as indicated on the drawings and as herein specified. The contractor shall employ a qualified tank inspection company that has been in the tank inspection business a minimum of five years and that employs NACE trained commercial divers that adhere to AWWA, SSPC, and ASTM standards. All four tanks shall remain in service during the inspection process. Four (4) copies of the reports for each tank shall be provided to engineer. Each report shall include pictures and address the particular items herein specified. Only one tank shall be inspected at a time.

PART 2 PRODUCTS

2.01 The Cemetery and Wrigley Tanks are Glass Lined to Steel ground storage tanks. The Town Tank is ground storage welded steel, and the KY 32 Tank is a welded steel elevated tank. The following shall be included in the inspection reports:

INTERNAL

- A. Inspect concrete floor for cracks
- B. Condition of cathodic annodes on floor of tank
- C. Check mastic seal for signs of deterioration
- D. Check around all cut outs at piping and roof connections for damage or leakage
- E. Inspect the condition of the glass fused to steel surface for failures to glass and deterioration of steel.
- F. Check plastic bolt caps and sealant around bolts
- G. Check interior roofs
- H. Check all appurtenances to the tank: floats, cables, interior ladders, silt stops etc.
- I. Check for any sedimentation build up on floor of tank and if evident, depth of sedimentation
- J. Check for deterioration of welds and paint thickness. (town tank)

EXTERNAL

- J. Inspect concrete foundation for cracks or leaks
- K. Check mastic seal for signs of deterioration

- L. Inspect the condition of the glass fused to steel surface for failures to glass and deterioration of steel
- M. Check mastic sealant around seams and all bolts
- N. Inspect all wind stiffeners
- O. Check that all warning signs are present and legible on the tank
- P. Check conditions of flag sheet or logo's if applicable
- Q. Inspect all external or mounted fixtures, not limited to: ladders, manways, platforms valves, flap valves on overflow pipes, etc.
- R. Check site for drainage away from tank foundations, ie ponding of water near foundation
- S. Check interior for corrosion and paint failures

PART 3 EXECUTION

3.01 INSPECTION

A. Contractor shall notify owner a minimum of 5 working days prior to inspection of tanks.

B. Contractor shall be responsible for all safety for its employees and the general public and shall abide by all requirements involved with local, state and federal laws.

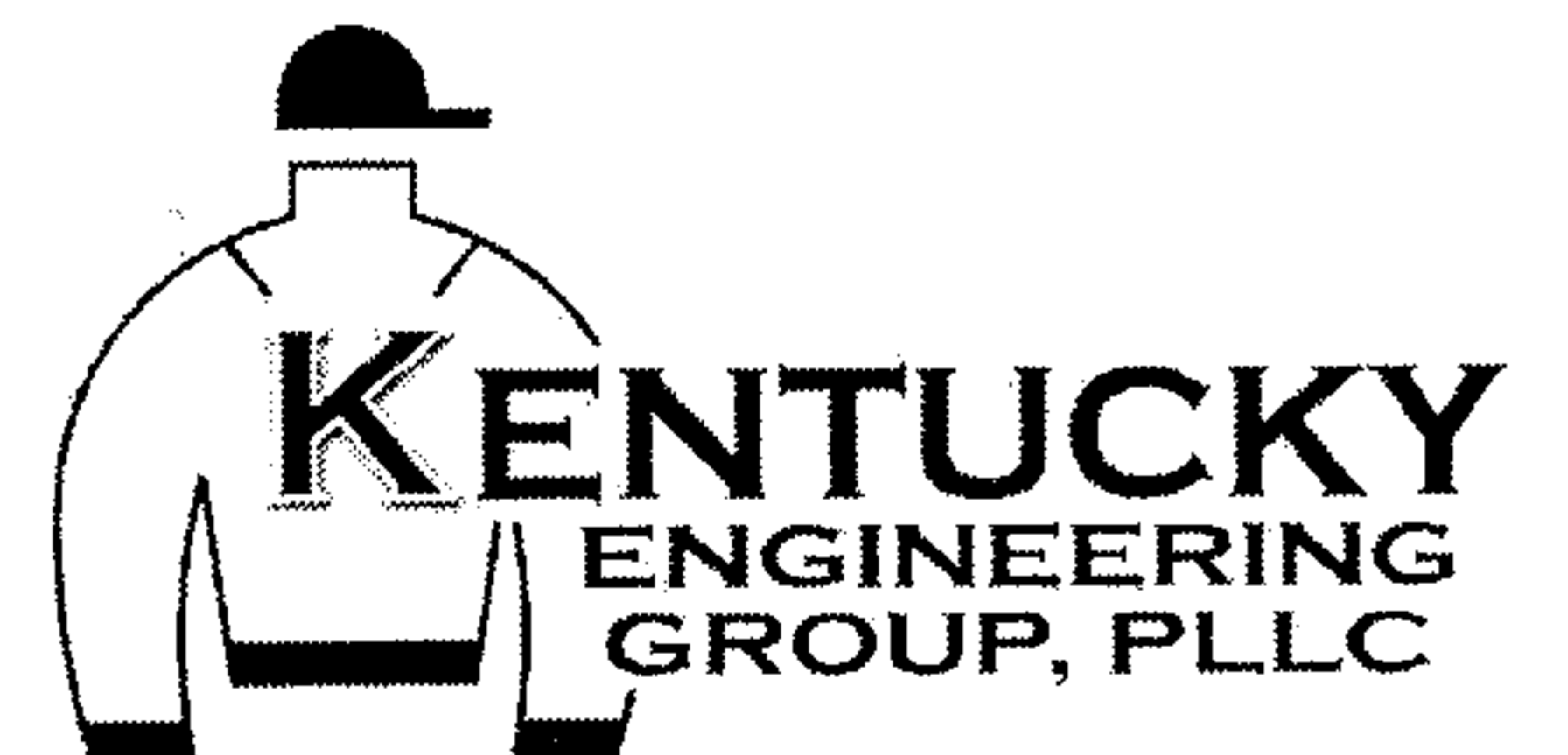
C. Contractor shall be NACE certified and employ trained and qualified divers

D. Any chlorination or testing of the potable water shall be done in strict conformance with the Kentucky Division of Water requirements and any KRS statutes.

END OF SECTION

DIVISION 11

EQUIPMENT



SECTION 11000**PLANT MODIFICATIONS/EQUIPMENT****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. The contractor shall furnish and install one 2 pressure relief valve, and appurtenances as shown on the plans and as specified herein. The pressure relief valve shall be complete with all necessary equipment for a complete and workable installation.

B. All bidders must recognize that, if any alternate equipment is used and does not meet or exceed the physical and dimensional standards nor perform as specified in the judgement of the project Engineer or Owner, the Contractor shall be required to modify or replace the alternate equipment with the original equipment at no additional cost to the Owner or Engineer.

1.02 QUALITY ASSURANCE

A. The equipment and materials covered by these specifications are intended to be standard equipment of proven reliability and as manufactured by reputable manufacturers having experience in the production of such equipment. The equipment furnished shall be designed, constructed, and installed in accordance with the best practices and methods and shall operate satisfactorily when installed as shown on the contract drawings and operated per manufacturer's recommendations.

1.03 SUBMITTAL

Equipment submittals shall be in accordance with Section 01300 and at a minimum shall be bound and a minimum of six (6) copies provide

PART 2 - PRODUCTS**PRESSURE RELIEF VALVE**

- A. Shall be a 2" Bermad 730 Series Quick Relief Valve or approved equal
- B. The valve shall be an angle pattern with threaded end and class 150 flanges
- C. The body shall be ductile iron with an NBR nylon fabric reinforced diaphragm.
- D. The control system shall consist of a 2-way adjustable direct acting, quick pressure relief pilot valve, a testing cock valve and a filter. All fittings shall be forged brass or stainless steel. The assembled valve shall be hydraulically tested and factory adjusted to customer requirements.
- E. The main valve shall be certified as a complete drinking water valve according to NSF, WRAS and other recognized standards.
- F. Included in the installation is 2" PVC Class 200 pipe to extend from the valve and thru the building.
- G. Also included is a 6"x 2" saddle with corp stop to be tapped on the inlet 6" line.
- H. A 3" casing shall be installed in the wall and insulated with foam between the casing and the pipe.
- I. The outlet pipe on the outside of the building shall have a flap valve and water shall be directed away from the existing plant building.

PART 3 - EXECUTION

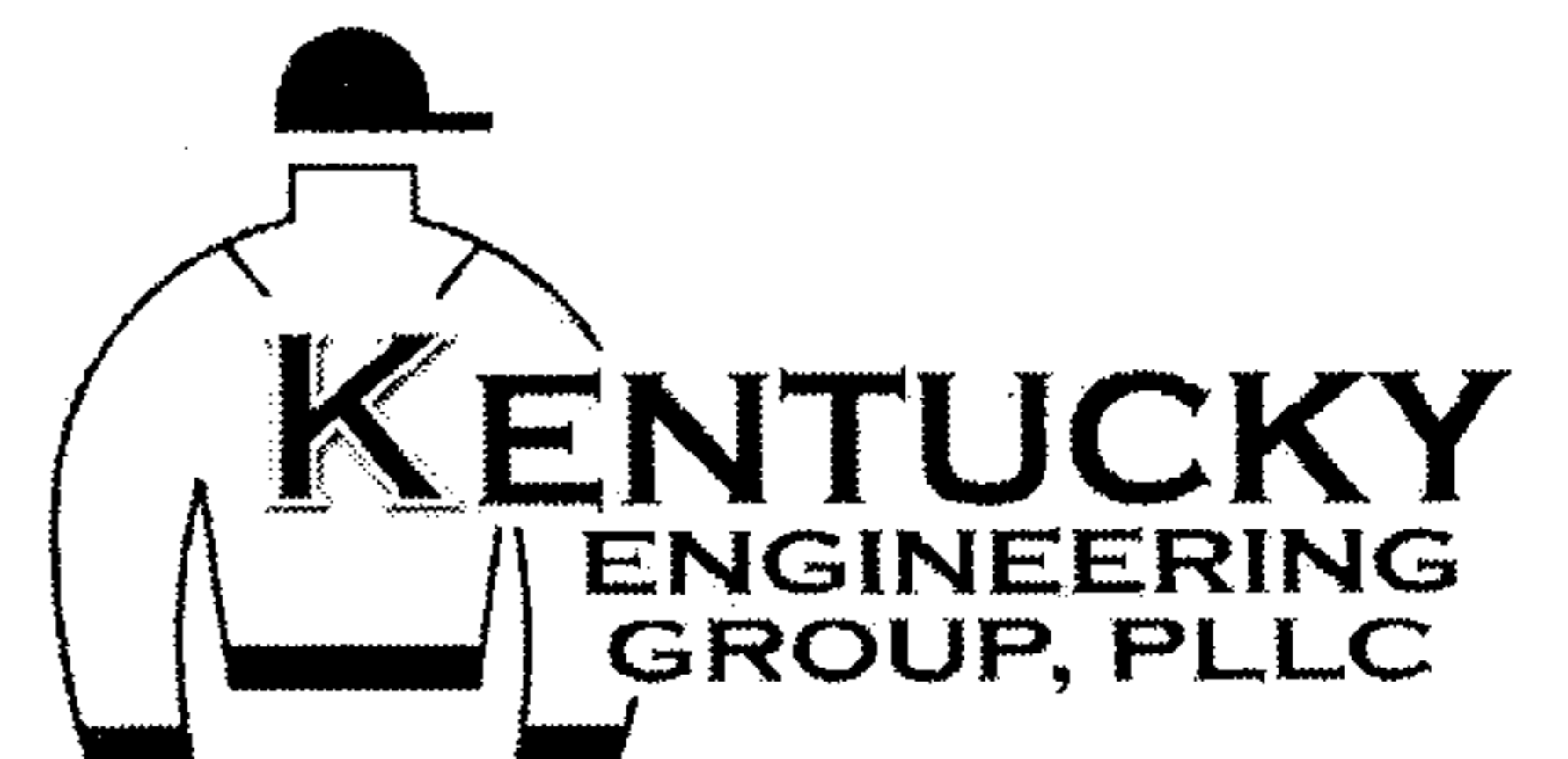
3.01 DELIVERY

- A. The contractor shall give the Sandy Hook Water District a minimum of 72 hours notice before performing any work.

- END OF SECTION -

DIVISION 16

ELECTRICAL



SECTION 16000**ELECTRICAL WORK****PART 1 - GENERAL****1.01 WORK INCLUDED**

The Instructions for Bidders, General Conditions, Supplementary Conditions, Division 1 and 16 of the Specifications and all Contract Documents shall apply and govern the work of all sections in this Division regardless of how the work may be apportioned to various trades or subcontractors.

1.02 SCOPE

The Contractor shall furnish all labor and materials and shall install complete and ready for use power and instrumentation system as shown on the Contract Drawings and specified herein. The Scope is as follows:

1. Furnish one New Atlas Copco QAS 45 Generator as provided by Wilson Equipment Co. 2180 Old Frankfort Pike, Lexington, Kentucky 40510 or approved equal. The generator shall be a trailer mounted mobile generator, Kubota V3600T, 4 cylinder, 52 HP @ 1600 rpm's, water cooled diesel engine; 70 gallon fuel tank allows for a 24 hour runtime w/ 35kW rated prime power 39 kW standby; Voltage 1: 120/240 V; Voltage 3: 208/240/480V; Noise level of 68 dba; Shall meet ISO 9001 quality assurance regulations.

2. Warranty shall be for one year or 1000 hours whichever comes first with full machine coverage.

1.03 SUBMITTALS

Shop drawings, clearly marked to show only items applicable to this specific contract, shall be submitted for review and shall include complete sizing of components and control schematics.

1.04 GUARANTEE

The Contractor shall refer to the article on Guarantees and Warranties in the General Conditions and Special Conditions to determine the extent of his guarantee periods.

1.05 CODES AND STANDARDS

All electrical equipment and details of installations shall comply with the requirements of the latest editions of the National Electrical Code (NFPA-70), the National Electrical Safety Code (ANSI C2) and all State and Local Codes.

1.06 APPROVAL AND MARKING OF EQUIPMENT

Electrical devices and materials shall be listed and/or labeled by the Underwriters' Laboratories, Inc.

1.07 PROTECTION OF ELECTRICAL EQUIPMENT

Electrical equipment shall be protected from the weather, especially from water dripping or splashing upon it, at all times during shipment, storage, and construction. Equipment shall not be stored outdoors even if its enclosure is rated as weatherproof, watertight, etc. Where equipment is installed or stored in moist areas, such as unheated buildings, etc., it shall be provided with an acceptable means of preventing moisture damage such as a uniformly distributed source of heat to prevent condensation.

1.08 DEFECTIVE OR DAMAGED EQUIPMENT

A. Should it be determined by the Contractor, Owner or Engineer that any equipment or material has been subjected to possible damage by water, it shall be thoroughly dried and put through a dielectric test as directed by the manufacturer, at the expense of the Contractor or shall be replaced by the Contractor without change in contract price. Any equipment found to be marginal or that fails to meet manufacturer's standards shall be replaced at no additional charge to the Owner or Engineer.

B. Any equipment damaged during shipment, while stored, or during construction shall be replaced at the Contractor's expense. Minor scratches on equipment cabinets, etc. may be repaired on site. Any current carrying parts, switch blades, operators, contacts, etc. which are damaged, shall be replaced at no cost to the Owner or Engineer.

1.09 PERMITS AND APPROVALS

A. The Contractor shall obtain all permits necessary. The Contractor shall furnish inspection by an agency licensed or otherwise qualified to perform electrical inspections in the Commonwealth of Kentucky, County of Scott.

B. The Contractor shall notify the Electrical Inspector, in writing, immediately upon the start of the work and A COPY OF THE NOTICE SHALL BE SENT TO THE ENGINEER.

C. All costs incidental to the electrical inspection shall be borne by the Contractor.

D. The Contractor shall furnish certificates of final approval by the Electrical Inspector and FINAL PAYMENT WILL BE WITHHELD UNTIL HE HAS PRESENTED THE ENGINEER WITH THE AFOREMENTIONED CERTIFICATE OF APPROVAL.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials and equipment installed shall be new and unused and shall be of the latest design of manufacturers regularly engaged in the manufacture of such products that conform with the requirements of the Contract Drawings and Specifications.

B. These Specifications, the associated Drawings, and other Contract Documents have been prepared with the intention of their yielding, through construction, electrical installations that are fully operable, safe, complete and in full compliance with the latest editions of the National Electrical Code, local codes and ordinances, and any other authority having jurisdiction over the work. The omission of miscellaneous electrical items or accessories not specifically called for in these Contract Documents which would detract from this intention shall not relieve the Contractor of the responsibility of furnishing and installing these items and accessories.

2.02 TESTS AND INSPECTIONS

The Contractor shall provide all tests as specified herein and all additional tests necessary to establish the adequacy, quality, safety, completed status and suitable operation of each system and components thereof. The final inspection will be made after the Engineer is satisfied that the work has been completely installed and that complete preliminary tests were made which indicate the adequacy, quality, completion and satisfactory operation of the system.

2.03 CONDUIT

A. No conduit smaller than 3/4 inch shall be used.

B. Rigid Conduit: Rigid conduit shall be standard weight, mild steel pipe. The conduit shall receive a protective zinc coating both inside and outside by means of hot-dip galvanizing. Threads shall not have any coating, which will reduce the conductivity of the joint. Couplings, bends, elbows, fittings, etc. shall be subject to the same requirements as for the straight lengths. All conduit and fittings shall be UL approved. Rigid conduit shall be delivered with plastic protectors on the threads.

C. Liquid tight flexible metallic conduit shall be constructed of flexible or spirally wound galvanized steel enclosed in light gray colored PVC outer jacket. Liquid tight flexible metallic conduit shall be equal to American Brass "Sealtite" Type "UA". Connectors shall be equal to Midwest Type LT.

D. Plastic conduit shall be schedule 40, PVC, rated for use with 90 degree C conductors and for use in direct sunlight, with chemical weld joints. This Contractor shall provide all fittings, adapters, etc., required for a complete installation as shown on the Drawings.

2.04 WIRE AND CABLE

A. All conductors shall be insulated so that they are rated at 600 volts.

B. No conductors smaller than AWG No. 12 shall be used except for signal systems, or where otherwise indicated.

C. All conductors shall be soft drawn, 98% conductivity copper conforming to the latest ASTM Specifications and the requirements of the National Electrical Code.

D. Single conductors shall be insulated with THW insulation and all conduits shown on the Drawings are sized accordingly. At the Contractor's option, THWN insulation may be substituted.

2.05 GROUNDING

A. The resistance value of the main grounding conductor measured between the main disconnect and a good earth ground shall not exceed twenty-five (25) ohms.

B. Ground Rods: Ground Rods shall be the copper clad steel type and shall be a minimum of 10 feet in length, 3/4 inch in diameter. Ground rods shall be equal to those as manufactured by Copperweld Steel Co.

C. Grounding electrode conductors shall be bare copper. Equipment grounding conductor shall be copper, THW insulated, green (or green with yellow tracer) in color, and rated at 600 volts.

D. Ground clamps for use on metallic pipes shall be of copper, brass or silicon bronze with a rigid metal base providing good contact by proper seating on the pipe. Strap type clamps shall not be used.

2.06 POWER DISTRIBUTION

A. Safety switches shall be heavy-duty, load break type with a quick-make, quick-break, switch mechanism, in a NEMA 4X enclosure. Padlocking capability shall be provided for locking the switch either in the closed (On) position or open (Off) position. Fuse clips shall be rejection type. Switches shall be provided with a cover-blade interlock so that the cover cannot be opened when the switch blades are closed, nor can the switch blades be closed with the cover open. Interlock bypassing devices shall be included for use by authorized personnel.

B. The Contractor shall provide fuses as called for on the Drawings. Where the fuse size is not indicated, the Contractor shall size the fuse for actual load installed. Where the fuse size is indicated on the Drawings, the Contractor shall verify the actual load installed and provide fusing accordingly. Unless otherwise indicated on the Drawings, all fuses shall be non-renewable, current limiting, dual element, time-lag type. The fuses shall have an interrupting capacity of at least 100,000 amperes RMS symmetrical.

C. The service pole(s) shall be southern pine, pressure creasote treated, roofed and galed before treatment and of the length and class as shown on the Drawings. Pole hardware shall be galvanized steel.

PART 3 - EXECUTION

3.01 INSTALLATIONS

A. Excavation, Backfilling and Grading:

1. The Contractor shall perform all earth and rock excavation, backfilling and grading required for this part of the work. Rock excavation shall be made to a depth of 4 inches below pipe and filled to subgrade with dense graded aggregate limestone. After the bid is submitted there will be no additional funds forthcoming for excavation work on this project. All excavation shall be bid as unclassified.
2. Trenches shall be maintained free of water until backfilling is completed.
3. Backfilling material in earth excavation shall be clean earth to a line at least 12 inches above the top of the conduit. From this line upward, rock not more than 6 inches in diameter may be used provided it is spaced at least 12 inches apart. Filling between rock shall be of clean earth, thoroughly tamped in 6-inch layers to the finished grade. All surplus rock and earth shall be removed from the site as directed by the Engineer.
4. Depth of bury for all conduit shall be as shown on the Drawings but a minimum of 24 inches below finished grade.

B. Conduit:

1. Rigid steel conduit shall be used for the 600 volt and below for emergence from underground, or from below slab-on-grade and where exposed. Schedule 40 PVC shall be used underground. Adapters shall be used and rigid steel extended above grade from PVC that is installed underground or below slab-on-grade. PVC shall not be used where exposed on the exterior nor where exposed to direct sunlight. Conduit shall be installed so as to insure against trouble from the collection of trapped condensation. This Contractor shall plan his work so that runs of conduit miss equipment by other trades. Conduit bushings shall have insulating material which has been permanently fastened to the fittings. All field bends shall be made with standard tools and bending equipment manufactured especially for this purpose. Bends in metallic conduit shall be made while cold and in no case shall the conduits be heated. Conduits shall not be bent through more than 90 degrees. Size of conduits shall not be less than that required by the National Electrical Code.
2. All conduit shall be run continuous between outlets with a minimum number of bends. Back-to-back 90 degree bends (180 degree change of direction) will not be acceptable. During construction, all new conduits shall be kept dry and free of moisture and debris. Before the wire is pulled in, all conduits shall be swabbed to clear all moisture and debris which may have unavoidably accumulated. Rigid conduits, where they entered cabinets, pull boxes or outlet boxes shall be secured in place by galvanized, double locknuts (one inside and one outside).

C. Wire and Cable:

1. Direct Burial Cable: No cable buried directly in the earth, not in raceway will be allowed on this project.
2. Wire shall not be installed until all work of any nature that may cause injury to the wire is completed. Mechanical means shall not be used in pulling in wires No. 8 or smaller. Approved wire pulling lubricant shall be used as required to prevent insulation damage and overstressing of the wire while pulling through conduit. In no case shall conductors be greased or coated with any substance injurious to the conductor insulation or sheath.
3. All wires connected to terminal boards, terminal blocks, or to other similar terminals shall terminate by means of pressure terminals. Where terminal boards, terminal blocks, etc. are designed and manufactured to accept bare wire and have a pressure plate on each side of the wire, no pressure terminals on the wire will be required. Where the wire would have to encircle the holding screw to make a proper connection, the wire terminals are required.
4. Where the wire is shown larger than that required for the load, it is done so for voltage drop or other purposes and must be installed as shown. Where the wire is stranded, the removal of strands in order to install the wire into a lug provided on any equipment will not be permitted. A larger lug shall be installed which will accept the wire size indicated.
5. All splices made in exterior boxes shall be made waterproof and shall be made with a splicing kit containing materials approved for making waterproof splices. Splice kits shall be as manufactured by 3M Company and properly sized for the wire being spliced. Kits shall employ the use of a pourable resin. The use of only a shrink type sleeve will not be acceptable.
6. Each wire shall be labeled at both termination points. Individual conductor or circuit identification shall be carried throughout, with circuit numbers or other identification clearly stamped on terminal boards and printed on directory cards in cabinets.
7. In all junction boxes, cabinets, control compartments and terminal boxes where no terminal board is provided, each wire, including all power wires, shall be properly identified by plastic coated, self-adhesive, wire marker. In cases similar to the above where the terminal boards are provided for the control wires, all wires shall be identified by wire markers as specified above. Equipment ground wire insulation shall be colored green or green with two or more yellow stripes. In general and unless otherwise shown on the drawings, no two wires of the same color shall be run in the same conduit except such as control wiring, switch legs, neutral, and ground. Where a conduit run is shown on the drawings to have two or more wires connected to the same phase and, therefore, are the same color, pressure sensitive, plastic marked wire marker identification tape shall be used wherever the wire is accessible (junction boxes, panels, device boxes, etc.).
8. Insulation on ungrounded conductors larger than AWG #10 and on grounded (neutral) and grounding (equipment ground) conductors larger than AWG #6 may be black with color coding accomplished with the use of colored plastic tape. Tape shall be installed on the conductors wherever they are visible and shall be wrapped at least three (3) turns around the conductor.

D. Boxes, Cabinets and Enclosures: The instrumentation cabinet shall be mounted as shown on the Drawings and as recommended by the equipment supplier.

PART 4 - ELECTRICAL FIELD ACCEPTANCE TESTS**4.01 WORK INCLUDED**

After the electrical installation is complete, tests shall be made to demonstrate that the entire system is in proper working order and in accordance with the Drawings and Specifications. The tests outlined herein shall be in addition to, and not substitution for, the tests of the individual items at the manufacturer's plant. Insulation and ground resistance tests shall be made before operating tests.

4.02 DEFECTIVE EQUIPMENT

All wiring and equipment found defective or failing to meet the specified requirements shall be replaced by the Contractor without charge, unless written permission for repair is given by the Engineer.

4.03 WITNESS

The Engineer shall be notified at least seven (7) calendar days in advance of each of the tests covered in this section of the Specifications so that he may arrange to witness the tests.

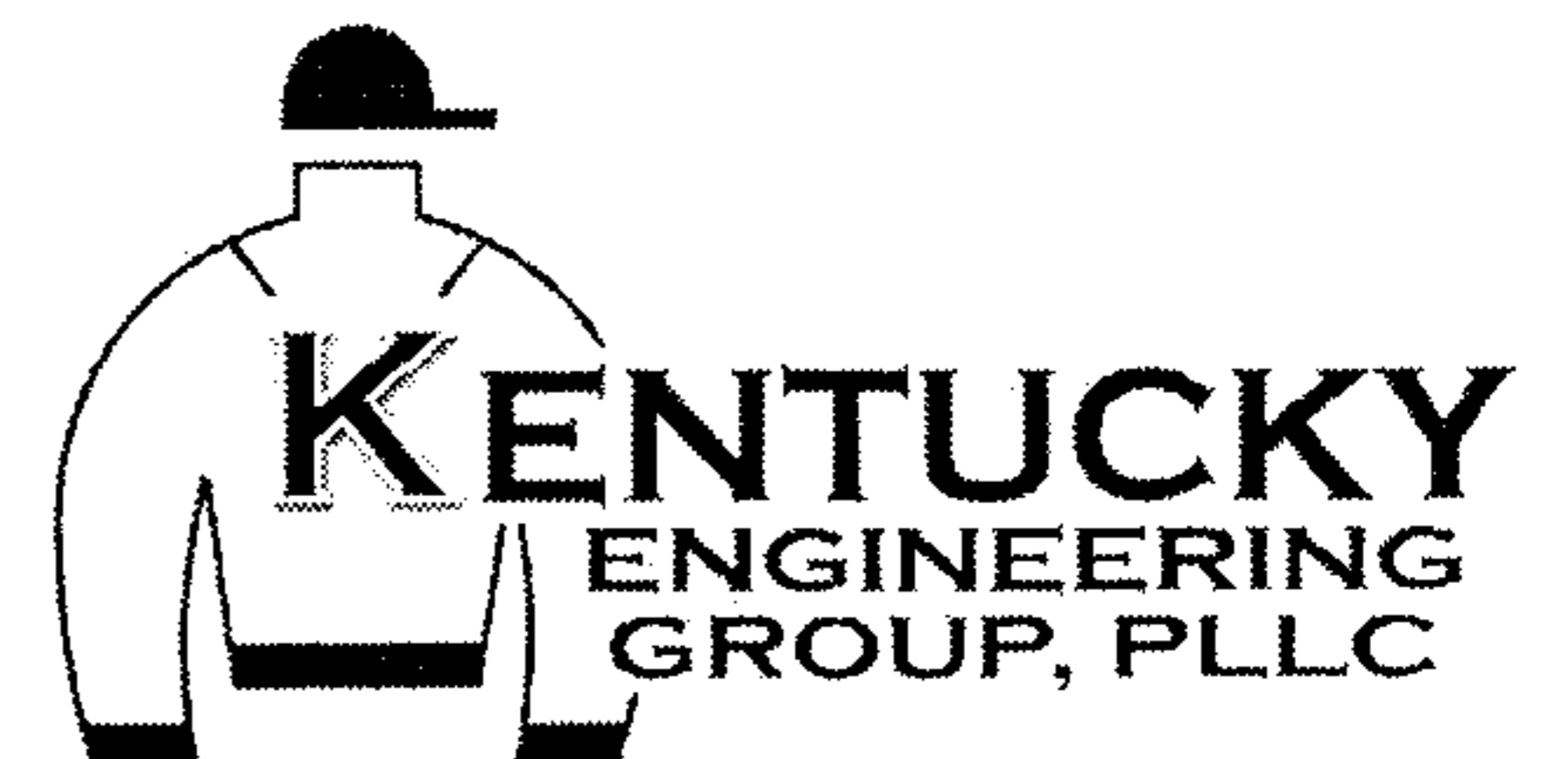
4.04 TEST RECORDS

Report: A record of all tests shall be delivered to the Engineer before final acceptance will be forthcoming.

- END OF SECTION -

DIVISION 17

TELEMETRY



SECTION 17000**INSTRUMENTATION AND CONTROL SYSTEM AND SUPERVISORY
CONTROL AND DATA ACQUISITION (SCADA) -UPGRADE OF EXISTING TELEMETRY SYSTEM****1.0 PART 1 - PROJECT DESCRIPTION****1.01. Description****A) Description of Work**

The work to be accomplished under this section shall consist of furnishing the equipment necessary to upgrade the existing SCADA control system to function as specified herein and as shown on the drawings.

B) Scope of Work

The Contractor shall furnish and install all materials, labor, tools, equipment, supplies and services required to furnish and/or upgrade the existing system for a complete, stand alone INSTRUMENT & CONTROL/SUPERVISORY CONTROL AND DATA ACQUISITION (I&C/SCADA) system. The current SCADA system used by Sandy Hook Water District is a Honeywell Plantscape HMI Software with Wonderware SCADAAlarm notification, as provided by C.I. Thornburg, Huntington WV. The HMI software will be changed to Inductive Automation

C) System Integrator Shall Supply:

- 1) Shop drawings prior to installation.
- 2) All the paper works and fees necessary to obtain any license in the name of the Owner.
- 3) All labor for installation and start-up of the system.
- 4) All equipment required by schedule.
- 5) All ancillary equipment, hardware, software, and appurtenances needed for proper installation and operation of equipment.
- 6) Provide spare parts and maintenance tools as described below.
- 7) Operations and maintenance manuals as detailed below.
- 8) System setup, programming, configuration, testing and installation
- 9) Dell Optiplex PC with Intel i7 Quad Core Processor
- 10) 8 GB RAM
- 11) 256 MB ATI Radeon Video Card
- 12) 1TB RAID 1 hard disk drive array
- 13) 16x DVD+-RW optical drive
- 14) 23" widescreen flat panel monitor
- 15) Windows 7 ultimate
- 16) Microsoft Office 2010 Professional
- 17) Modbus RTU to Ethernet Converter
- 18) Inductive Automation Ignition HMI Software
- 19) SCADAPhone alarm notification software
- 20) Eight hours of training

D) Owner Shall Supply:

- 1) Access as needed

1.02. Quality Assurance

A) Manufacturer's Qualifications

The system specified herein shall be the product of a manufacturer who can demonstrate at least ten (10) years of satisfactory experience in furnishing and installing comparable radio telemetry/control systems for water and wastewater installations.

The manufacturer of this system shall maintain a 24-hour available inventory of all replaceable modules to assure the Owner of prompt maintenance service and a single source of responsibility. The manufacturer shall certify this to the Engineer in writing at the time of bidder pre-qualification.

B) Prebid Approval

All "unapproved" manufactures are required to submit a prebid submittal (14) days prior to the bid date. Submissions that fail to include a complete submittal as detailed shall be deemed unresponsive. The Consulting Engineer and the Owner shall be the sole judge as to whether the alternate equipment is considered an approved equal. Approval of an alternate system by the Engineer will not relieve the alternate system of strict adherence to these specifications. The prebid submittal shall include the following:

- 1) Block diagrams for the various sites in the proposed system,
- 2) Sample electrical drawings for typical sites
- 3) A product performance data sheet shall be included for each proposed component in the system (i.e. antennas, radios, coaxial cables & arrestors, remote unit equipment, central terminal unit equipment, power supplies, time delays and relays, and the various sensors required).
- 4) Radio path study for each radio path in the system.
- 5) An installation list with the names and phone numbers of both the Owner and Consulting Engineer for at least ten projects of similar size and complexity.
- 6) A "statement of compliance" detailing paragraph by paragraph his compliance or exceptions to these specifications.

Bidders shall satisfy themselves that the necessary radio frequency can be obtained. The radio path study provided by each bidder shall utilize either:

- a) Computer generated techniques utilizing USGS terrain information to plot the path profiles for each radio path with elevation samples not more than 2000-foot increments.
- b) Actual field measurements to determine the necessary antenna heights, transmitter power, and antenna gains required to insure a 20db fade margin as detailed in Section 2.02 of these specifications.

The a physical path analysis shall be made using temporary equipment installations and an IFR 1000 or equal equipment to measure actual path margins. The bidder shall include in his bid, all the calculations used to extrapolate the measured data. The bidder is expected to obtain the necessary temporary FCC license for the study.

C) Codes & Standards

The control system and its components shall comply with all applicable requirements of the following:

- 1) Electrical Code Compliance (National & Local)
- 2) NEMA Compliance
- 3) IEEE Compliance
- 4) EIA Compliance
- 5) FCC Compliance

2.0 PART 4 - EXECUTION**2.01. System Start-up**

The manufacturer shall supply "Factory" personnel for start-up service as needed to insure satisfactory operation. Subsequent trips to the job site to correct defects shall be made at no charge to the Owner during the warranty period.

2.02. Training

The system manufacturer shall supply "factory" personnel to conduct an on-site training session; a minimum of one day of training is required.

2.03. Substantial Completion

The Engineer will grant substantial completion only after completion of the start-up and initial training phase of the project. The Engineer shall make an inspection of the system to determine the status of completion. Substantial completion will be awarded only when the system is providing usable service to the Owner. If the system is commissioned in phases, the Contractor may request substantial completion for the completed phases.

END OF SECTION

Contract No. 10

SANDY HOOK WATER DISTRICT WATER SYSTEM IMPROVEMENTS

FOR THE
SANDY HOOK WATER DISTRICT
ELLIOTT COUNTY, KENTUCKY

BOARD MEMBERS

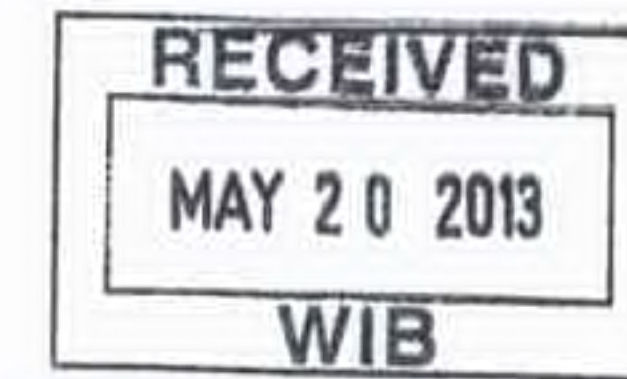
BERNAL ATKINS - CHAIRMAN
KIM CARROLL DALE HOWARD
REBECCA JOHNSTON IRA VEST

GENERAL MANAGER

TRINA SARTAIN

JANUARY 2013

0320383-13-001



996APE20130001



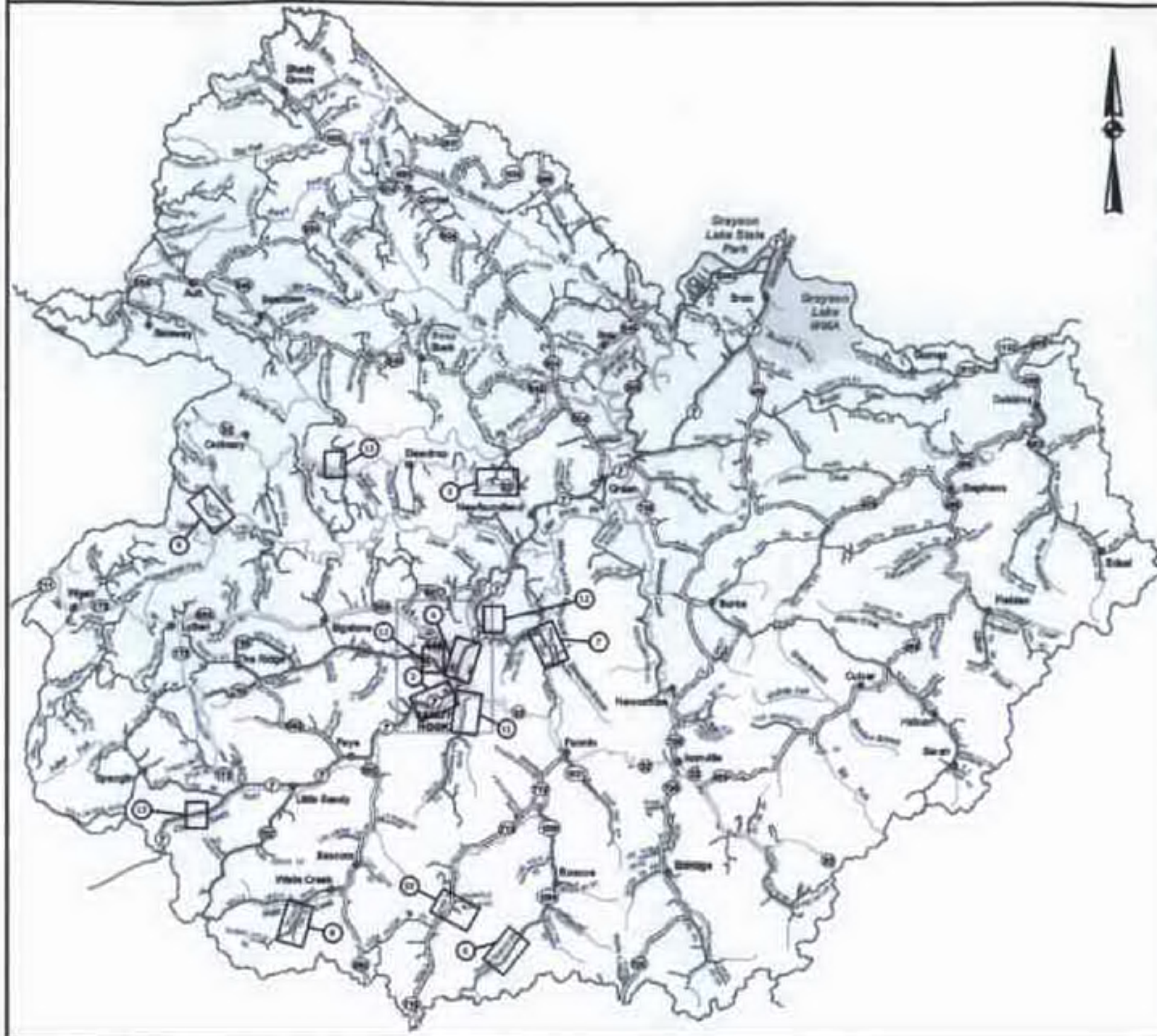
DOW SUBMITTAL
Not Approved for Construction



PROJECT No. 11001

SET NO. _____

PROJECT LOCATION MAP



INDEX OF DRAWINGS

SHT. NO.	DESCRIPTION
-	COVER
1	LOCATION MAP, LEGEND, UTILITY OWNERS and INDEX OF DRAWINGS
2	GENERAL NOTES
3	AERIAL PLAN - MAIN STREET
4	AERIAL PLAN - CRESTVIEW STREET
5	AERIAL PLAN - SIMMONS ROAD LOOP
6	AERIAL PLAN - MIDDLE FORK
7	AERIAL PLAN - FLAT ROCK ROAD
8	AERIAL PLAN - PRUETTS FORK
9	AERIAL PLAN - SAND GAP ROAD
10	AERIAL PLAN - E.J. ADKINS ROAD
11	AERIAL PLAN - HOWARDS CREEK
12	AERIAL PLAN - CEMETERY and TOWN TANKS
13	AERIAL PLAN - WRIGLEY and KY 32 TANKS
14	SANDY HOOK WATER PLANT and KY 7 PUMP STATION MODIFICATIONS
15	STANDARD DETAILS
16	STANDARD DETAILS
17	STANDARD DETAILS

LEGEND

EXISTING	PROPOSED	DESCRIPTION
PVC	PVC	POLYVINYL CHLORIDE
DIP	DIP	DUCTILE IRON PIPE
WM	WM	WATER MAIN
⊕	⊕	HYDRANT ASSEMBLY
⊕	⊕	FLUSHING/BLOWOFF ASSEMBLY
⊕	⊕	AIR RELEASE VALVE (ARV)
⊕	⊕	GATE VALVE (GV)
⊕	⊕	RECONNECT EXISTING METER
---	---	WATER MAIN (WM)
---	---	SPECIAL CROSSING OR CASING PIPE
---	---	WATER MAIN TO BE ABANDONED
---	---	RIGHT-OF-WAY LINE
---	---	CENTERLINE
---	---	PROPERTY LINE
OWNER	OWNER	BASEMENT ACQUIRED

UTILITIES

BUD - Before You Dig
1-800-752-6007
or DIAL 811

NOTE:
IN ACCORDANCE WITH KENTUCKY STATE LAW, ANY ACTIVITY THAT RESULTS IN MOVEMENT, PLACEMENT, BORING, PROBING OR DIGGING IN OR ON THE GROUND SHALL CONTACT THE ONE CALL CENTER FOR UNDERGROUND UTILITY LOCATIONS.

P:\PROJECTS\Sandy Hook\118011_Sandy Hook - Contract 10\Drawings\Contract 10\118011-10-01.dwg RBC 5/09/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

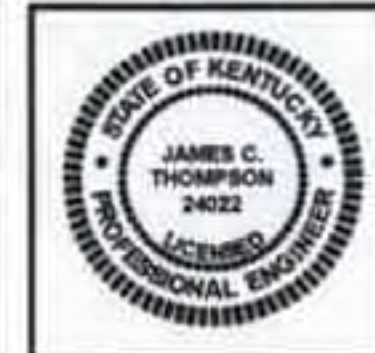
NO.	DATE	REVISIONS	BY

DATE:	JANUARY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	



Contract No. 10
**SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS**
ELLIOTT COUNTY, KENTUCKY

**PROJECT LOCATION MAP,
UTILITIES, LEGEND and
INDEX OF DRAWINGS**



PROJECT NO.	11001
SHEET NO.	1
OF 17	

WATER MAIN NOTES

- CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES AND THE ENGINEER TWO WORKING DAYS (MINIMUM) BEFORE BEGINNING CONSTRUCTION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF TRAFFIC IN ACCORDANCE WITH CITY, COUNTY AND STATE REQUIREMENTS.
- THE CONTRACTOR SHALL MAINTAIN A CURRENT SET OF CONSTRUCTION PLANS ON THE JOB SITE DURING ALL PHASES OF CONSTRUCTION.
- EXISTING UTILITIES, ESPECIALLY GAS LINES AND OIL LINES, MAY BE CATHODICALLY PROTECTED. THEREFORE, DUCTILE IRON PIPE, FITTINGS, GATE VALVES, AND/OR BOXES LAID WITHIN 100' OF LINES WITH CATHODIC PROTECTION SHALL BE WRAPPED IN POLYETHYLENE ENCASUREMENT. MATERIALS AND INSTALLATION SHALL MEET THE REQUIREMENTS OF AWWA'S LATEST REVISION.
- ALL CONSTRUCTION AND INSTALLATION OF MATERIALS BEING USED SHALL BE IN CONFORMANCE WITH THE PLANS AND SPECIFICATIONS. SUBSTITUTIONS AND DEVIATION SHALL BE PERMITTED ONLY WHEN WRITTEN APPROVAL HAS BEEN ISSUED BY THE ENGINEER.
- SHOP DRAWINGS OF ALL MATERIALS BEING USED SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.
- EXISTING UTILITIES HAVE NOT BEEN SHOWN. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UTILITIES. THE CONTRACTOR SHALL COORDINATE WITH A REPRESENTATIVE WHEN WORKING NEAR EXISTING UTILITIES.
- THE CONTRACTOR SHALL PROTECT ALL UTILITIES AND OTHER IMPROVEMENTS SHOWN ON THESE PLANS AND ALL OTHER UTILITIES AND OTHER IMPROVEMENTS NOT SHOWN. THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY FOR REPAIRS OF UTILITIES AND OTHER IMPROVEMENTS DAMAGED DURING CONSTRUCTION.
- UNLESS OTHERWISE NOTED, A SEPARATE BID ITEM HAS NOT BEEN ESTABLISHED FOR FITTINGS. THE FITTINGS INCLUDED BUT NOT LIMITED TO ARE: TEES, BENDS, PLUGS, REDUCERS, CROSSES, COUPLINGS, ETC. CONTRACTORS SHALL INCLUDE THE COST OF THESE ITEMS IN THE BID PRICE FOR THE PIPE.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE TEMPORARY REMOVAL/RELOCATION OF TRAILERS, BUILDINGS, FENCES, TREES, SHRUBS, ETC. AND REPLACEMENT OF SAID ITEMS AFTER CONSTRUCTION ACTIVITIES.
- CONTRACTOR IS TO COORDINATE WITH THE PROPERTY OWNERS AS TO WHETHER OR NOT TEMPORARY FENCING IS REQUIRED AND CONSTRUCT IF NECESSARY.
- ALL PIPING SHALL HAVE 36" MINIMUM COVER.
- WHERE UNSTABLE MATERIAL IS ENCOUNTERED OR WHERE THE DEPTH OF EXCAVATION IN EARTH EXCEEDS FIVE (5) FEET, THE SIDES OF THE TRENCH OR EXCAVATION SHALL BE SUPPORTED BY SUBSTANTIAL SHEETING, BRACING, SHORING OR THE TRENCH SIDES SLOPED. SLOPING THE SIDES OF THE DITCH WILL NOT BE PERMITTED IN STREETS, ROADS, NARROW RIGHTS-OF-WAY OR OTHER CONSTRICTED AREAS UNLESS OTHERWISE SPECIFIED. THE STANDARDS OF THE FEDERAL OCCUPATIONAL SAFETY AND HEALTH ACT AND THE KENTUCKY LABOR CABINET SHALL BE FOLLOWED.
- ALL EXCAVATION IS UNCLASSIFIED. COMPENSATION FOR ALL EXCAVATION SHALL BE INCLUDED IN LUMP SUM BID.
- REGRADE OF SITE SHALL BE SUCH THAT DRAINAGE IS AWAY FROM ALL STRUCTURES.
- BACKFILL AROUND ALL STRUCTURES SHALL BE SUFFICIENTLY COMPACTED TO PRECLUDE SETTLEMENT AND PONDING OF WATER AROUND STRUCTURES AND GRADED TO DIVERT RUNOFF AWAY FROM THE STRUCTURES.
- DIMENSIONS, DETAILS AND REINFORCEMENT MAY VARY WITH MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR SHALL OBTAIN AND MAINTAIN ON SITE, APPROVED SHOP DRAWINGS PRIOR TO BEGINNING CONSTRUCTION.
- ALL VALVES & HYDRANTS SHALL BE LOCATED AT THE BACKSIDE OF THE DITCHLINE.
- FINAL LOCATION OF SERVICES, VALVES, & HYDRANT ORIENTATION ARE TO BE FIELD LOCATED DURING CONSTRUCTION & APPROVED BY THE ENGINEER.
- AT THE CONTRACTOR'S OPTION, CLASS 350 DUCTILE IRON PIPE MAY BE SUBSTITUTED FOR ANY PIPE PARTICULARLY SPECIFIED, BUT AT NO ADDITIONAL COST TO THE OWNER.
- NO PAY ITEM FOR EXTRA TRENCH DEPTH HAS BEEN SET UP. CONTRACTOR SHALL INCLUDE THE COST OF THE ADDITIONAL DEPTH IN HIS BID PRICE.
- ROCK SOUNDINGS WERE NOT PERFORMED BY THE ENGINEER, THE CONTRACTOR SHALL TAKE APPROPRIATE ACTION TO DETERMINE SUBSURFACE CONDITIONS.
- CONTRACTOR TO DIG/EXPOSE EXISTING WATER MAIN FAR ENOUGH AHEAD OF NEW WATER MAIN CONSTRUCTION TO AVOID DAMAGE TO EXISTING WATER MAIN AND/OR INTERRUPTION OF EXISTING CUSTOMER SERVICES.
- THE MAXIMUM ALLOWABLE LENGTH OF SERVICE LINE FROM THE WATER MAIN TO THE CUSTOMER'S METER SERVICE SHALL BE AS FOLLOWS:

SERVICE LINE DIAMETER	MAXIMUM LENGTH
3/4 INCH	125 FEET
1 INCH	150 FEET
1-1/2 INCH	200 FEET
2 INCH	250 FEET

- CONNECTIONS TO EXISTING DISTRIBUTION SYSTEM SHALL BE MADE AS FOLLOWS:
 - CONNECT TO EXISTING (SIZE) W.M. (WET TAP) - CONTRACTOR SHALL PROVIDE, FURNISH AND INSTALL. ALL FITTINGS, VALVES AND APPURTENANCES TO CONNECT THE PROPOSED WATER MAIN TO THE EXISTING WATER MAIN UNDER PRESSURE.
 - CONNECT TO EXISTING (SIZE) W.M. - CONTRACTOR SHALL PROVIDE, FURNISH AND INSTALL. ALL FITTINGS AND APPURTENANCES TO CONNECT THE PROPOSED WATER MAIN TO THE EXISTING WATER MAIN. VALVES ARE A SEPARATE PAY ITEM.

FINAL CLEANUP AND RESTORATION

UNLESS SPECIFICALLY APPROVED BY THE OWNER AND ENGINEER, CLEANUP OF DISTURBED AREAS SHALL BE KEPT CURRENT WITH CONSTRUCTION AND RESTORATION EFFORTS BY THE CONTRACTOR INITIATED NO LONGER THAN SEVEN (7) DAYS AFTER THE TRENCH EXCAVATION WORK HAS STARTED. ALL EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILLING OF THE TRENCH AND ANY LARGE ROCKS, STONES OR DEBRIS SHALL BE REMOVED FROM THE SITE, AND SHALL NOT BE A BURDEN TO THE PROPERTY OWNER(S) AND/OR ADJACENT PROPERTIES. THE CONTRACTOR MAY WINDROW OR TRACK-IN THE EXCAVATED MATERIAL OVER THE TRENCH PRIOR TO FINAL CLEANUP TO ALLOW FOR AND TO ASSIST IN THE INITIAL SETTLEMENT OF THE TRENCH. ALL DISTURBED AREAS MUST BE SEEDED AT LEAST WITH A TEMPORARY SEED MIX IF FOR SOME REASON THE AREA CANNOT BE PERMANENTLY SEEDED WITHIN TWO (2) WEEKS.

GENERAL NOTES

- GENERAL PROJECT REQUIREMENTS** - IN THE EVENT OF A CONFLICT BETWEEN ANY PORTION OF THE CONTRACT DOCUMENTS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.
- PROJECT COMMUNICATIONS / INSPECTION** - THE ENGINEER SHALL BE THE OWNER'S DESIGNATED SITE REPRESENTATIVE. ALL COMMUNICATION FROM THE CONTRACTOR AND TO THE CONTRACTOR, SHALL BE THROUGH THE ENGINEER.
- SAFETY** - THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR SHALL SELECT THE MEANS, METHODS, SEQUENCES, AND TECHNIQUES OF CONSTRUCTION HE DEEMS APPROPRIATE FOR ACCOMPLISHING THE WORK IN A SAFE MANNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE TO PERSONS AND PROPERTY RESULTING FROM HIS ACTIVITIES.
- EMERGENCY SHUTOFF** - THE CONTRACTOR SHALL LOCATE EXISTING WATER AND GAS VALVES PRIOR TO STARTING WORK SO THAT IN THE EVENT OF AN EMERGENCY THE UTILITY SERVICE MAY BE QUICKLY SHUT OFF.
- EASEMENTS AND RIGHT-OF-WAY** - THE OWNER IS RESPONSIBLE FOR THE PROCUREMENT OF ALL PERMANENT EASEMENTS NECESSARY OR REQUIRED FOR THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR TEMPORARY EASEMENTS FOR HIS STAGING AREAS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBSERVE THE CONDITIONS OF THESE AGREEMENTS AND CONFINE HIS ACTIVITIES TO THE LIMITS OF THE EASEMENTS. CONTRACTOR TO OBTAIN COPIES OF EASEMENTS OBTAINED BY OWNER AND ABIDE BY THE CONDITIONS OF THESE EASEMENTS DURING CONSTRUCTION.
- EXCAVATION** - IT SHALL BE DISTINCTLY UNDERSTOOD THAT ANY REFERENCE TO ROCK, EARTH, OR ANY OTHER MATERIALS ON THE PLANS WHETHER IN NUMBERS, WORDS, LETTERS, OR LINES, IS SOLELY FOR THE OWNER'S INFORMATION AND SHALL NOT BE TAKEN AS AN INDICATION OF CLASSIFIED EXCAVATION OR THE QUANTITY OF EITHER ROCK, EARTH OR ANY OTHER MATERIAL INVOLVED. THE BIDDER MUST DRAW HIS OWN CONCLUSIONS AS TO THE CONDITIONS TO BE ENCOUNTERED. THE CONTRACTOR SHALL PERFORM ALL EXCAVATION NECESSARY OR REQUIRED FOR COMPLETION OF THE PROJECT. THIS WORK SHALL INCLUDE THE REMOVAL AND PROPER DISPOSAL OF ALL MATERIALS OF WHATEVER NATURE ENCOUNTERED. EXCAVATION FOR UTILITIES SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE WORK AND SHALL NOT BE MEASURED FOR PAYMENT.
- TOTAL SITE RESPONSIBILITY** - IN OCCUPYING THE SITE AND COMMENCING WORK IN ACCORDANCE WITH THE NOTICE TO PROCEED, THE CONTRACTOR ASSUMES TOTAL AND COMPLETE RESPONSIBILITY FOR THE WORK UNTIL FINAL PAYMENT AND RELEASE OF CLAIMS. ANY PORTION OF THE WORK DAMAGED IN THIS TIME PERIOD BY ACTS OF GOD, OR THE PUBLIC ENEMY, ACTS OF THE OWNER, ACTS OF OTHER CONTRACTORS, FIRES, FLOODS, EPIDEMICS, QUARANTINE, STRIKES, FREIGHT EMBARGOS, VANDALISM AND ABNORMAL WEATHER SHALL BE CORRECTED, REPAIRED, OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
- ACCESS TO WORK** - THE ENGINEER, HIS REPRESENTATIVES, AND REPRESENTATIVES OF THE OWNER SHALL HAVE FULL ACCESS TO THE WORK AT ALL TIMES.
- BLASTING** - NO BLASTING SHALL BE ALLOWED ON THIS PROJECT.
- BURNING** - BURNING SHALL CONFORM TO ALL APPLICABLE LOCAL, STATE, AND FEDERAL ORDINANCES.
- WASTE AREAS** - THE CONTRACTOR WILL NECESSARILY GENERATE WASTE MATERIALS IN THE FORM OF BRUSH CLIPPINGS, OVERSIZE BOULDERS, MUCK, ETC. THE CONTRACTOR SHALL SUBMIT A WRITTEN PLAN DETAILING THE MANNER IN WHICH WASTE MATERIALS WILL BE HANDLED. THE CONTRACTOR SHALL STRICTLY COMPLY WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS PERTAINING TO THE DISPOSITION OF CONSTRUCTION RELATED WASTE PRODUCTS. IN NO EVENT SHALL WASTE MATERIALS BE PLACED IN A REGULATORY FLOODWAY (OR FLOODPLAIN) WITHOUT A DOW PERMIT TO CONSTRUCT ALONG OR ACROSS A STREAM. OWNER WILL NOT ASSUME RESPONSIBILITY FOR WASTE AREAS.
- SILT CONTROL** - THE CONTRACTOR SHALL CONDUCT HIS WORK IN AN ENVIRONMENTALLY SOUND MANNER AND SHALL UTILIZE "BEST MANAGEMENT PRACTICES" TO MINIMIZE EROSION. THE CONTRACTOR SHALL HOLD HARMLESS THE OWNER FROM ANY VIOLATIONS ASSOCIATED WITH THE CLEAN WATER ACT.
- DRAINAGE** - CONTRACTOR SHALL MAINTAIN DRAINAGE WORK AREAS DURING ALL PHASES OF CONSTRUCTION. THE OWNER MAY DIRECT THE CONTRACTOR TO CONSTRUCT DITCHES OR BERMS TO ALLEVIATE SITE DRAINAGE PROBLEMS. CONSTRUCTION AND MAINTENANCE OF MINOR DRAINAGE WORKS SHALL BE CONSIDERED AN INTEGRAL PART OF THE OVERALL ACCOMPLISHMENTS OF THE PROJECT AND SHALL NOT BE MEASURED FOR SEPERATE PAYMENT.
- ADHERENCE TO PERMITS** - PERMITS REQUIRED BY THE OWNER ARE:
 - DIVISION OF WATER CONSTRUCTION PERMIT FOR WATER LINE EXTENSIONS.
 - DEPARTMENT OF HIGHWAYS ENCROACHMENT PERMIT.

THE CONTRACTOR SHALL CONDUCT HIS ACTIVITIES IN STRICT ACCORDANCE WITH THESE PERMITS AT ALL TIMES. IN PARTICULAR, THE CONTRACTOR SHALL STRICTLY OBSERVE THE 401 WATER QUALITIES CERTIFICATION KEY REQUIREMENTS OF THE 401 CERTIFICATION WHICH INCLUDE:

 - RE-VEGETATION AND CLEANUP OF AREA ADJACENT TO STREAMS SHALL OCCUR CONCURRENTLY WITH THE PROGRESS OF THE WORK. CONCURRENTLY IS HEREIN DEFINED TO MEAN THAT RE-VEGETATION AND CLEANUP.
 - BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED, TO MINIMIZE SEDIMENT RUNOFF AND SOIL EROSION TO THE WATER COURSE.
 - EXTREME CARE SHALL BE TAKEN TO PREVENT SPILLS OF FUELS AND LUBRICANT INTO WATERCOURSES. EQUIPMENT WORKS FROM THE STREAM BANK.
- EXISTING UTILITIES AND UNDERGROUND FACILITIES** - THE CONTRACTOR'S ATTENTION IS CALLED TO THE PRESENCE OF EXISTING UTILITIES IN CLOSE PROXIMITY TO THE PROJECT SITE. THE CONTRACTOR IS ADVISED TO CAREFULLY REVIEW THE PROJECT REQUIREMENTS REGARDING UTILITY RELOCATIONS. THE CONTRACTOR CAN CALL 1-800-752-6007 A MINIMUM OF TWO AND NO MORE THAN TEN BUSINESS DAYS PRIOR TO EXCAVATION FOR INFORMATION ON THE LOCATION OF EXISTING UNDERGROUND UTILITIES WHICH SUBSCRIBE TO THE BEFORE-U-DIG (BUD) SERVICE. ALL UTILITY REPAIR AND RELOCATION WORK SHALL BE INCIDENTAL TO OTHER ITEMS OF WORK. THE EXISTING CONTRACTOR MUST MAKE DILIGENT EFFORT TO MAINTAIN THE SERVICE OF EXISTING UTILITIES. THE CONTRACTOR SHALL PROVIDE BY-PASS PUMPING OF WASTEWATER TO THE NEAREST PUBLIC SANITARY SEWER WHENEVER HIS ACTIVITIES INTERRUPT THE FLOW OF AN EXISTING SANITARY WASTEWATER DISPOSAL FACILITY (SEWER, SEPTIC TANK, LEACH FIELD, ETC.) BY-PASS PUMPING SHALL BE CONSIDERED AN INCIDENTAL PART OF THE PIPE LAYING ACTIVITY AND SHALL NOT BE MEASURED FOR SEPERATE PAYMENT.

GENERAL NOTES (continued)

- REPLACEMENT OF EXISTING FACILITIES** - THE CONTRACTOR SHALL REPLACE EXISTING ENTRANCE PIPES, RETAINING WALLS, CATCH BASINS, FENCES AND OTHER PROPERTY IMPROVEMENTS, DITCHES, ETC., THAT ARE DAMAGED BY CONSTRUCTION UNLESS SAID FACILITIES ARE SPECIFICALLY SHOWN TO BE REMOVED. IN PARTICULAR, ALL DRAINAGE DITCHES SHALL BE RESTORED TO A CONDITION EQUAL OR BETTER THAN THAT WHICH EXISTED PRIOR TO CONSTRUCTION. UNLESS SAID FACILITY REPLACEMENT IS IDENTIFIED AS A PAY ITEM IN THE DESIGN DRAWINGS OR TECHNICAL SPECIFICATIONS, THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE COST OF LAYING PIPE AND SHALL NOT BE MEASURED FOR PAYMENT.
- DAMAGE TO GUARDRAILS, SIGNS, FENCES, STORM DRAINS, ETC.** - ALL GUARDRAIL, SIGNS, FENCES, STORM DRAINS, ETC., DAMAGED AS A RESULT OF THE CONSTRUCTION SHALL BE RESTORED IN LIKE KIND AND CHARACTER TO THE SATISFACTION OF THE OWNER. UNLESS SAID REPLACEMENT IS IDENTIFIED AS A PAY ITEM IN THE DESIGN DRAWINGS OR TECHNICAL SPECIFICATIONS, THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE COST OF LAYING PIPE AND SHALL NOT BE MEASURED FOR PAYMENT.
- STREAM CROSSING - DIRECTIONAL DRILL REQUIRED.**
- THRUST BLOCKS - CONCRETE THRUST BLOCKS OR 'KICKER' BLOCKS** SHALL BE INSTALLED IN ALL PRESSURIZED LINES AT INTERSECTION AND CHANGES OF DIRECTION TO RESIST FORCES ACTING UPON THE PIPELINE. THRUST BLOCKS ARE CONSIDERED INCIDENTAL TO THE PIPELINE.
- ANCHORS - CONCRETE ANCHORS** SHALL BE PROVIDED WHEN THE PIPE SLOPE IS TWENTY (20) PERCENT OR GREATER. ANCHORS ARE CONSIDERED INCIDENTAL TO THE PIPELINE INSTALLATION.
- SEPERATION OF WATER AND SEWER** - HORIZONTAL- SEWERS SHALL BE LAID AT LEAST TEN (10) FEET HORIZONTALLY FROM ANY EXISTING OR PROPOSED WATER MAIN. THIS DISTANCE SHALL BE MEASURED EDGE TO EDGE. IF FIELD CONDITIONS DO NOT ALLOW THIS SEPERATION, THE SEWER SHALL BE LOCATED SUCH THAT THE CROWN OF THE SEWER PIPE IS EIGHTEEN (18) INCHES BELOW THE INVERT OF THE WATER LINE. IF FIELD CONDITIONS DO NOT ALLOW THIS CONDITION TO BE MET THEN THE SEWER SHALL BE CONSTRUCTED OF MECHANICAL JOINT DUCTILE IRON PIPE (PRESSURE TESTED TO 150 PSI) AND ENCASED IN CONCRETE.
- CROSSING - WATER MAIN SHALL CROSS UNDER SEWER** WITH A MINIMUM OF EIGHTEEN (18) INCHES OF SEPERATION BETWEEN THE CROWN OF THE SEWER AND THE INVERT OF THE WATER MAIN. IF FIELD CONDITIONS ARE SUCH THAT THIS SEPERATION CAN NOT BE MAINTAINED, THE SEWER SHALL BE CONSTRUCTED OF MECHANICAL JOINT DUCTILE IRON PIPE WHICH SHALL BE PRESSURE TESTED TO 150 PSI. THE DUCTILE IRON PIPE MUST BE CENTERED ON THE CROSSING SO THAT THE JOINTS ARE AT LEAST TEN (10) FEET ON EITHER SIDE OF THE CROSSING. NO SEPERATE PAYMENT SHALL BE MADE FOR WORK TO INSURE COMPLIANCE WITH THIS SEPERATION CRITERION. MAINTENANCE OF ADEQUATE SEPERATION SHALL BE CONSIDERED AN INTEGRAL PART OF THE UNIT PRICE BID FOR SEWER PIPE.
- TESTING** - THE WATER LINES SHALL BE TESTED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS IN THE PRESENCE OF THE ENGINEER AND THE OWNER.
- NOTICE** - THE CONTRACTOR SHALL NOT MOVE EQUIPMENT OR MATERIAL TO THE WORK SITE, NOR BEGIN ANY CONSTRUCTION PRIOR TO THE DATE SPECIFIED IN THE 'NOTICE TO PROCEED'. THE CONTRACTOR MUST NOTIFY THE OWNER AND ENGINEER PRIOR TO OCCUPYING THE SITE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
- TRAFFIC CONTROL** - THE CONTRACTOR'S WORK WILL DISTURB NUMEROUS PRIVATE DRIVEWAYS AND SUBSTANTIAL PORTIONS OF PUBLIC THOROUGHFARES. THE TERRAIN DOES NOT LEND ITSELF TO DETOURS. CONSEQUENTLY, THE CONTRACTOR MUST OBSERVE THE FOLLOWING TRAFFIC PRINCIPLES:
 - ACCESS TO RESIDENCE DRIVE MAY NOT BE INTERRUPTED FOR MORE THAN THREE (3) HOURS AT ANY ONE TIME.
 - ACCESS TO ALL DRIVEWAYS AND PUBLIC THOROUGHFARES MUST BE RESTORED AT THE END OF EACH WORKDAY.
 - WORK WITHIN THE LIMITS OF PUBLIC THOROUGHFARE MAY ONLY BE CONDUCTED BETWEEN THE HOURS OF 8:30 A.M. AND 12:00 NOON, BETWEEN 12:30 P.M. AND 3:30 P.M., AND BETWEEN 6:00 P.M. AND 9:30 P.M. THE CONTRACTOR MUST POST SIGNS ADJACENT TO THE WORK STATING THE ROADWAY WILL BE CLOSED DURING THE POSTED HOURS AT LEAST ONE (1) DAY IN ADVANCE OF THE PROPOSED ROAD CLOSURE.
 - THE CONTRACTOR MUST MAKE SPECIAL PROVISIONS FOR ACCESS FOR EMERGENCY VEHICLES: POLICE, FIRE AND AMBULANCE.
 - THE CONTRACTOR SHALL PROVIDE ALL NECESSARY SAFETY DEVICES IN THE FORM OF SIGNS, FLASHERS, BARRICADES, ETC. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CLAIMS ARISING FROM THE PUBLIC WITH RESPECT TO HIS TRAFFIC CONTROL ACTIVITIES.
- SEEDING** - ALL DISTURBED AREAS SHALL BE SEEDED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
- PROTECTION OF TREES** - 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 THE BRANCHES SHALL BE TRIMMED OF THOSE BRANCHES TO IMPROVE THE APPEARANCE OF THE TREE. TREE TRUNKS RECEIVING DAMAGE FROM EQUIPMENT SHALL BE TREATED WITH A TREE DRESSING.
- TREE REMOVAL** IN PROJECT AREA IS RESTRICTED TO LESS THAN 4" IN DIAMETER UNLESS APPROVAL IS GRANTED BY U.S. FISH AND WILDLIFE.

KYDOH NOTES

- ALL EFFECTED KYTC DITCHLINES SHALL REMAIN FREE OF EXCESS SILT OR EROSION AND CONSTRUCTED TO THE NORMAL TYPICAL SECTION OF THE ROADWAY WITH A MINIMUM DEPTH OF 18 INCHES FROM THE SHOULDER BREAK POINT.
- ALL NECESSARY STEPS SHALL BE TAKEN TO PREVENT EROSION OR SILTATION OF THE PUBLIC RIGHT-OF-WAY, ADJOINING PROPERTY AND WATERWAYS.
- ALL VALVES TO BE FLUSH W/ EXISTING GRADE.
- ALL WATER LINE LOCATED WITHIN STATE HIGHWAY R.O.W. SHALL BE CONSTRUCTED OUT AND AROUND THE END OF ALL EXISTING CULVERTS AND HEADWALLS.
- UNDERGROUND UTILITIES INSTALLED INSIDE STATE RIGHT-OF-WAY SHALL BE LOCATED WITHIN 3-5 FEET FROM THE EDGE OF THE RIGHT-OF-WAY UNLESS OTHERWISE SHOWN ON THE PLANS.
- UNDERGROUND UTILITIES SHOWN MORE THAN 5 FEET FROM THE EDGE OF THE RIGHT-OF-WAY SHALL BE INSTALLED WITH A MINIMUM DEPTH OF COVER OF 42 INCHES WITH PRIOR APPROVAL ON A CASE BY CASE BASIS.
- UNDERGROUND UTILITIES CROSSING ANY ENTRANCE OR CROSSROAD PAVED WITH CONCRETE OR ASPHALT SURFACE INSIDE STATE RIGHT-OF-WAY SHALL BE INSTALLED BY BORING UNLESS WRITTEN PERMISSION TO OPEN CUT IS OBTAINED FROM THE PROPERTY OWNER AND APPROVED BY THE KYTC DISTRICT PERMITS ENGINEER.
- UNDERGROUND UTILITIES SHALL NOT BE INSTALLED IN EMBANKMENT FILLS OR BETWEEN EDGE OF PAVEMENT AND DITCHLINE UNLESS SPECIFICALLY NOTED ON PERMITTED PLANS.
- FIRE HYDRANTS OR UTILITY SERVICE BOXES SHALL BE LOCATED WITHIN 2 FEET FROM THE EDGE OF RIGHT-OF-WAY LINE, OR OFF RIGHT-OF-WAY.
- CONTACT THE DISTRICT PERMITS ENGINEER AT KYC-DOH #9, FLEMINGSBURG, KY AT (606) 845-2551 OR 1-800-617-2551 PRIOR TO BEGINNING WORK.

CONTAMINATION PREVENTION REQUIREMENTS

- ALL PIPING, VALVES, FITTINGS, ETC. DELIVERED TO THE JOB SITE SHALL BE STORED ELEVATED ABOVE THE GROUND AND SHALL BE COVERED WITH PLASTIC, TARPS OR SIMILAR MEANS TO PROTECT FROM EXPOSURE TO DUST AND DEBRIS.
- ALL PIPING, FITTINGS AND VALVES SHALL BE THOROUGHLY CLEANED OF DUST, DIRT AND DEPOSITS BY SWABBING OR OTHER MEANS ACCEPTABLE. EACH COMPONENT SHALL BE CLEANED ON THE SAME DAY IT IS TO BE INSTALLED.
- ALL OPENINGS IN THE PIPELINE SHALL BE CLOSED WITH AN APPROVED WATERTIGHT PLUG AT THE END OF EACH DAY WHEN PIPE LAYING HAS STOPPED, OR FOR OTHER REASONS SUCH AS REST OR MEAL BREAKS.

P:\PROJECTS\Sandy Hook\11001_Sandy Hook - Contract 10 Drawings\Contract 10\1001-10-02.dwg REG 5/06/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE:	JANUARY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
© 2013 Kentucky Engineering Group, PLLC	



P.O. Box 1034
VERSAILLES, KENTUCKY 40383

Contract No. 10

**SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS**

ELLIOTT COUNTY, KENTUCKY

GENERAL NOTES



PROJECT NO.	11001
SHEET NO.	2
OF 17	



P:\PROJECTS\Sandy Hook\11001 - Sandy Hook - Contract 10\Drawings\Contract 10\11001-10-03.dwg KEG 5/06/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE:	JANUARY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	



Contract No. 10

SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS
 ELLIOTT COUNTY, KENTUCKY

AERIAL PLAN
MAIN STREET



PROJECT NO.	11001
SHEET NO.	3
OF 17	



P:\PROJECTS\Sandy Hook\11001\Sandy Hook - Contract 10 Drawings\Contract 10\11001-10-4.dwg KEG 5/06/13

ALL LINE TO BE LAY
WITHIN CITY R/W UNLESS
OTHERWISE NOTED

CAUTION: EXISTING SANITARY SEWER
AND BURIED ELECTRIC CABLE

ALL PIPE THIS SHEET
SHALL BE PVC, CLASS 200



IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE: JANUARY 2013
 PROJECT MGR: LRS
 DRAWN BY: CDS
 CHECKED BY: LRS
 SCALE: AS NOTED
 2013 © Kentucky Engineering Group, PLLC



Contract No. 10

**SANDY HOOK WATER DISTRICT
 WATER SYSTEM IMPROVEMENTS**

ELLIOTT COUNTY, KENTUCKY

**AERIAL PLAN
 CRESTVIEW STREET**



PROJECT NO.
11001

SHEET NO.
4

OF 17



P:\PROJECTS\Sandy Hook\11001 - Sandy Hook - Contract 10\Drawings\Contract 10\11001-10-05.dwg 8/6/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

 THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE:	JANUARY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	

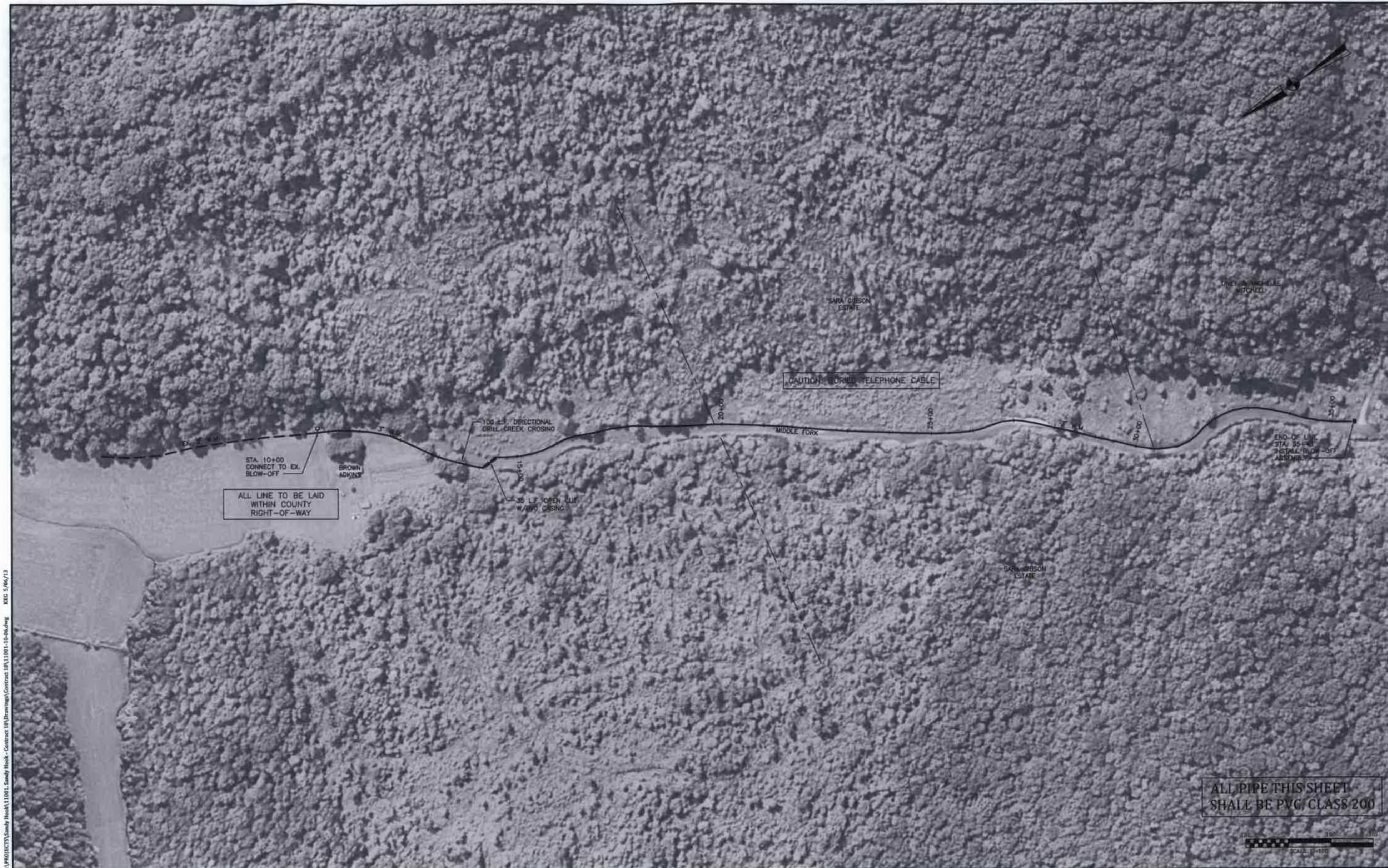


Contract No. 10
SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS
 ELLIOTT COUNTY, KENTUCKY

AERIAL PLAN
SIMMONS ROAD LOOP

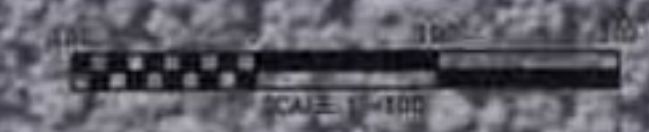


PROJECT NO.	11001
SHEET NO.	5
OF 17	



P:\PROJECTS\Sandy Hook\11001 - Sandy Hook - Contract 10\Drawings\Contract 10\11001-10-06.dwg REC 5/06/13

ALL PIPE THIS SHEET SHALL BE PVC, CLASS 200



IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE:	JANUARY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	



Contract No. 10

SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS
 ELLIOTT COUNTY, KENTUCKY

AERIAL PLAN
MIDDLE FORK



PROJECT NO.	11001
SHEET NO.	6
OF 17	



P:\PROJECTS\Sandy Hook\11001 - Sandy Hook - Contract 10\Drawings\Contract 10\11001-10-07.dwg KEG 5/06/13

**ALL PIPE THIS SHEET
 SHALL BE PVC CLASS 200**



IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE: JANUARY 2013
 PROJECT MGR: LRS
 DRAWN BY: CDS
 CHECKED BY: LRS
 SCALE: AS NOTED
 2013 © Kentucky Engineering Group, PLLC



Contract No. 10
**SANDY HOOK WATER DISTRICT
 WATER SYSTEM IMPROVEMENTS**
 ELLIOTT COUNTY, KENTUCKY

**AERIAL PLAN
 FLAT ROCK**



PROJECT NO.
 11001

SHEET NO.
 7

OF 17



P:\PROJECTS\Sandy Hook\11001_Sandy Hook - Contract 10\Drawings\Contract 10\11001-10-08.dwg KEG 5/06/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.
 THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE: JANUARY 2013
 PROJECT MGR: LRS
 DRAWN BY: CDS
 CHECKED BY: LRS
 SCALE: AS NOTED
 2013 © Kentucky Engineering Group, PLLC



Contract No. 10
SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS
 ELLIOTT COUNTY, KENTUCKY

AERIAL PLAN
PRUETTS FORK



PROJECT NO.
 11001
 SHEET NO.
 8
 OF 17



P:\PROJECTS\Sandy Hook\11001 - Sandy Hook - Contract 10 Drawings\Contract 10\11001-10-09.dwg KEG 5/06/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.
 THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE:	JANUARY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	

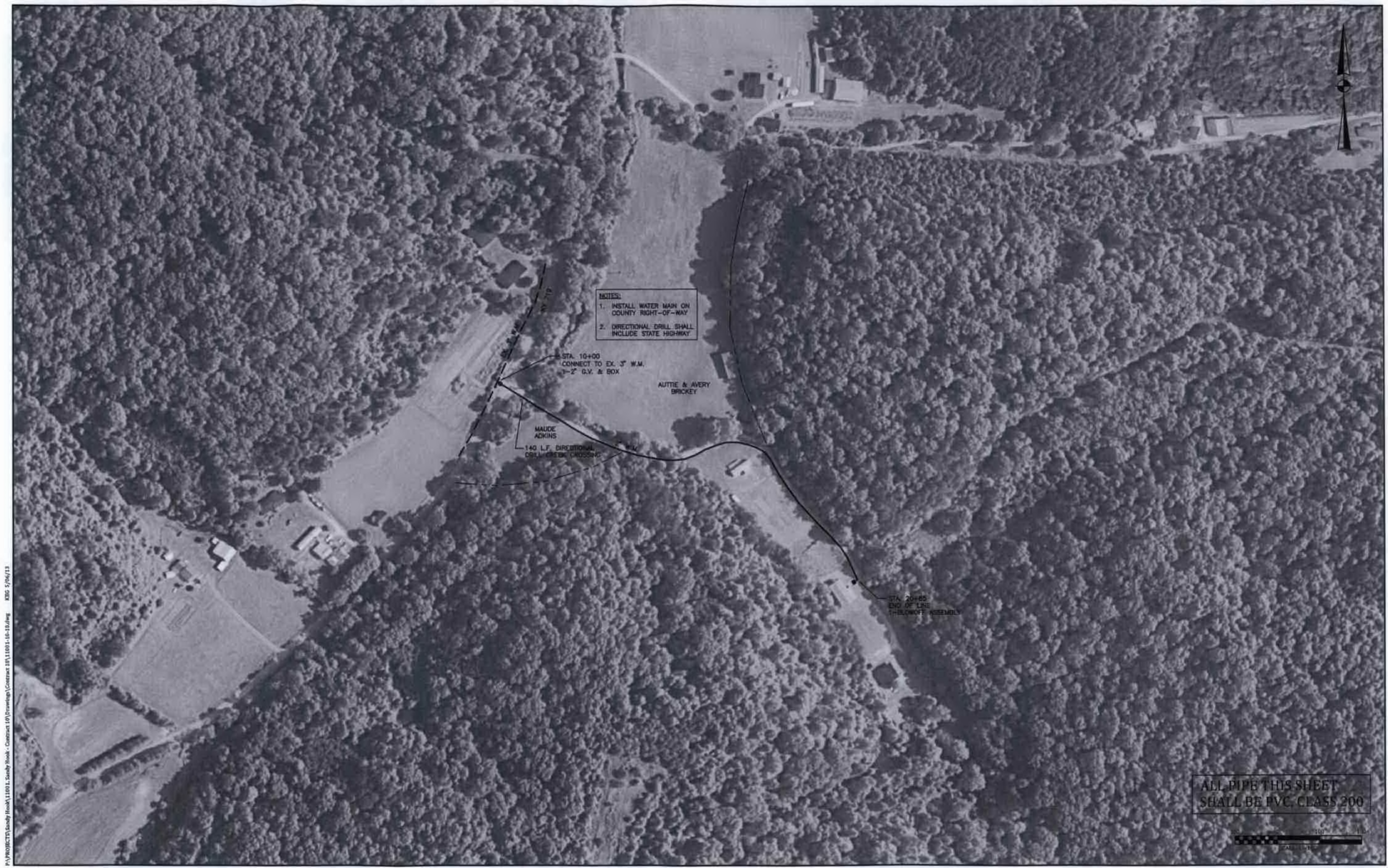


Contract No. 10
**SANDY HOOK WATER DISTRICT
 WATER SYSTEM IMPROVEMENTS**
 ELLIOTT COUNTY, KENTUCKY

**AERIAL PLAN
 SAND GAP ROAD**



PROJECT NO.	11001
SHEET NO.	9
OF 17	



NOTES:
 1. INSTALL WATER MARK ON COUNTY RIGHT-OF-WAY
 2. DIRECTIONAL DRILL SHALL INCLUDE STATE HIGHWAY

STA. 10+00
 CONNECT TO EX. 3" W.M.
 1-2" G.V. & BOX

MAUDE ADKINS
 140 L.F. DIRECTIONAL
 DRILL CREEK CROSSING

AUTTE & AVERY
 BRICKY

STA. 20+85
 END OF LINE
 THROUGH ASSEMBLY

ALL PIPE THIS SHEET
 SHALL BE PVC CLASS 200

P:\PROJECTS\Sandy Hook\11001 L. Sandy Hook - Contract 10\Drawings\Contract 10\11001-10-10.dwg KBG 5/06/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE: JANUARY 2013
 PROJECT MGR: LRS
 DRAWN BY: CDS
 CHECKED BY: LRS
 SCALE: AS NOTED
 2013 © Kentucky Engineering Group, PLLC



P.O. Box 1034
 VERSAILLES, KENTUCKY 40383

Contract No. 10

**SANDY HOOK WATER DISTRICT
 WATER SYSTEM IMPROVEMENTS**
 ELLIOTT COUNTY, KENTUCKY

**AERIAL PLAN
 E.J. ADKINS ROAD**



PROJECT NO.
 11001

SHEET NO.
 10

OF 17



P:\PROJECTS\Sandy Hook\11001_Sandy Hook - Contract 10\Drawings\Contract 10\11001-10-1.dwg KEG 2/06/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.
 THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

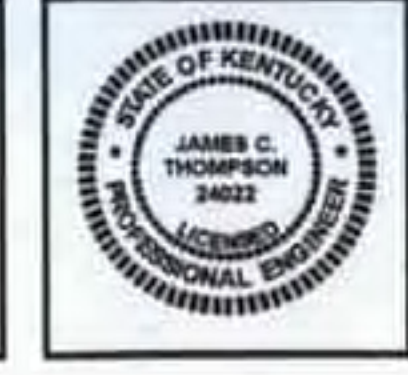
NO.	DATE	REVISIONS	BY

DATE:	JANUARY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	



Contract No. 10
SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS
 ELLIOTT COUNTY, KENTUCKY

AERIAL PLAN
HOWARDS CREEK ROAD



PROJECT NO.	11001
SHEET NO.	11
OF 17	

P:\PROJECTS\Sandy Hook\11801_Sandy Hook - Contract 10\Drawings\Contract 10\11801-10-12.dwg KEG 5/26/13



TANK INSPECTION NOTES:

1. 28" DIA x 37' SIDEWALL TANK (150,000 GALLONS)
2. GLASS LINED BOLTED STEEL TANK
3. PROVIDE INSPECTION REPORT - (SEE SPECIFICATIONS)
4. INSPECTION TEAM SHALL EMPLOY NAEC TRAINED COMMERCIAL DIVERS AND ADHERE TO AWWA, SSPL, & ASTM STANDARDS
5. TANK SHALL REMAIN IN SERVICE DURING INSPECTION



TANK INSPECTION NOTES:

1. 28" DIA x 35' SIDEWALL TANK (101,000 GALLONS)
2. WELDED STEEL GROUND STORAGE TANK
3. PROVIDE INSPECTION REPORT - (SEE SPECIFICATIONS)
4. INSPECTION TEAM SHALL EMPLOY NAEC TRAINED COMMERCIAL DIVERS AND ADHERE TO AWWA, SSPL, & ASTM STANDARDS
5. TANK SHALL REMAIN IN SERVICE DURING INSPECTION



IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE: JANUARY 2013
 PROJECT MGR: LRS
 DRAWN BY: CDS
 CHECKED BY: LRS
 SCALE: AS NOTED
 2013 © Kentucky Engineering Group, PLLC



Contract No. 10
**SANDY HOOK WATER DISTRICT
 WATER SYSTEM IMPROVEMENTS**
 ELLIOTT COUNTY, KENTUCKY

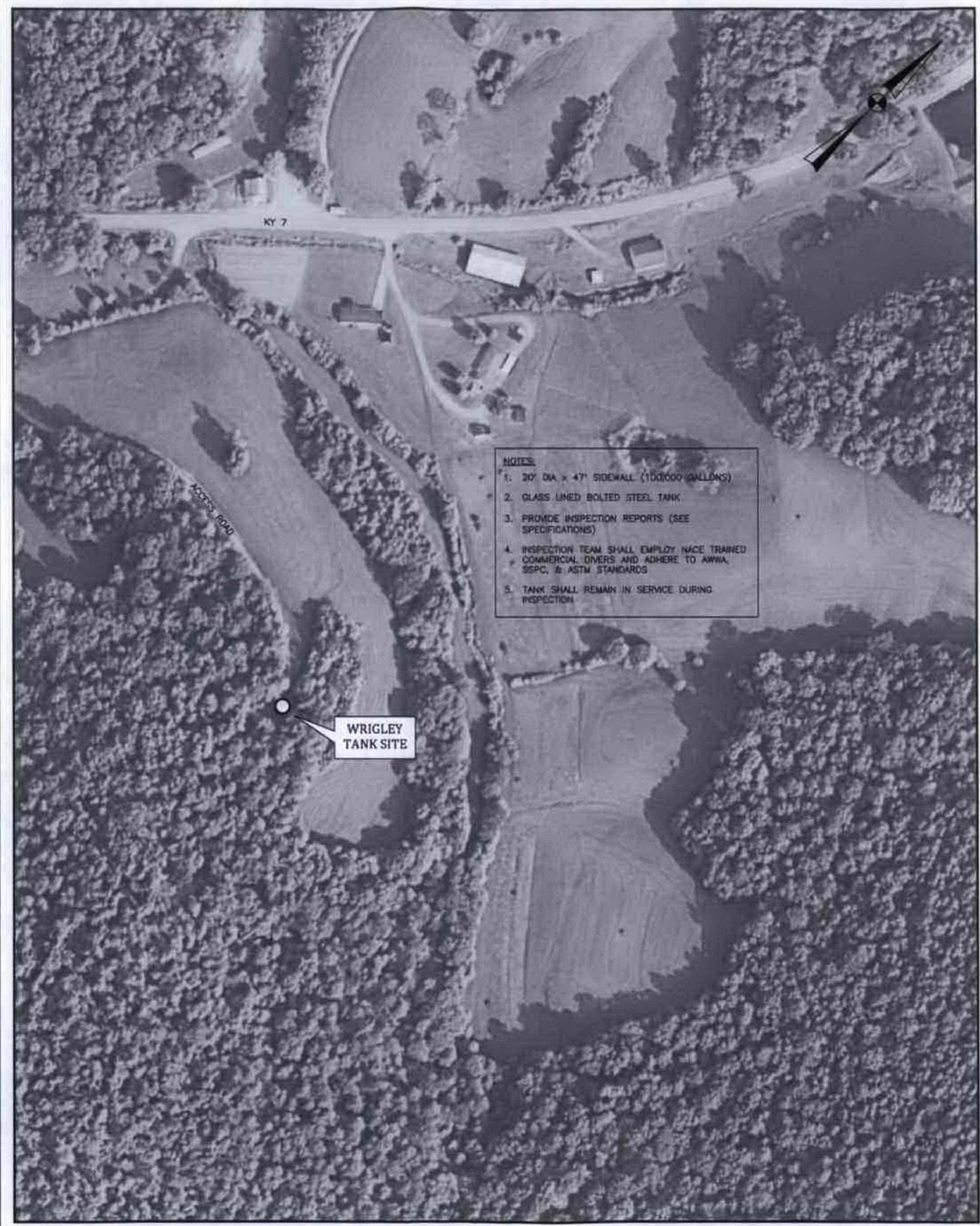
**AERIAL PLAN
 CEMETERY and TOWN
 TANK SITES**



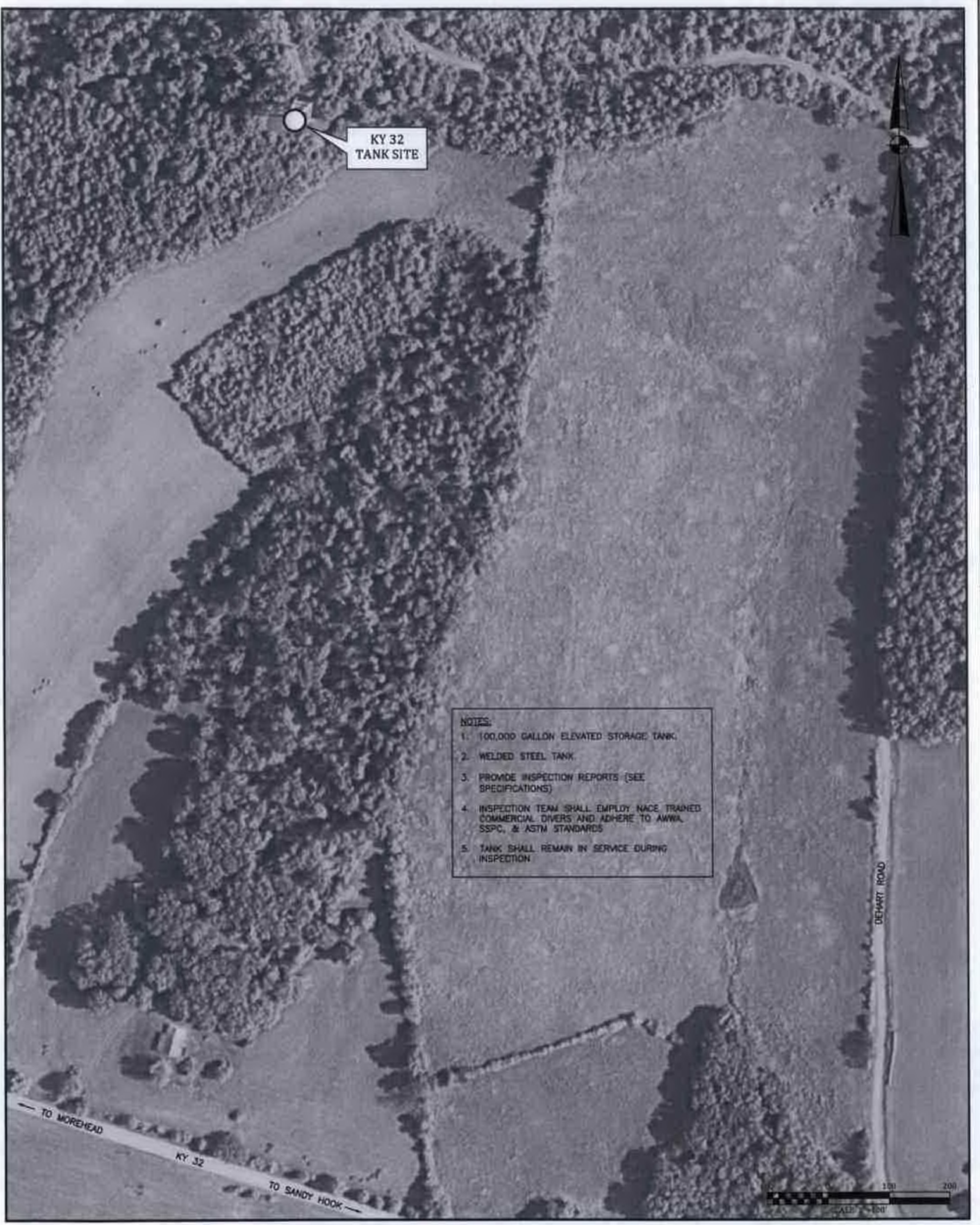
PROJECT NO.
11001

SHEET NO.
12

OF 17



- NOTES:**
1. 20' DIA x 47' SIDEWALL (100,000 GALLONS)
 2. GLASS LINED BOLTED STEEL TANK
 3. PROVIDE INSPECTION REPORTS (SEE SPECIFICATIONS)
 4. INSPECTION TEAM SHALL EMPLOY NACE TRAINED COMMERCIAL DIVERS AND ADHERE TO AWWA, SSPC, & ASTM STANDARDS
 5. TANK SHALL REMAIN IN SERVICE DURING INSPECTION



- NOTES:**
1. 100,000 GALLON ELEVATED STORAGE TANK
 2. WELDED STEEL TANK
 3. PROVIDE INSPECTION REPORTS (SEE SPECIFICATIONS)
 4. INSPECTION TEAM SHALL EMPLOY NACE TRAINED COMMERCIAL DIVERS AND ADHERE TO AWWA, SSPC, & ASTM STANDARDS
 5. TANK SHALL REMAIN IN SERVICE DURING INSPECTION

P:\PROJECTS\Sandy Hook\11001_Sandy Hook - Contract 10\Drawings\Contract 10\11001-10-13.dwg KEG 5/06/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE: JANUARY 2013
 PROJECT MGR: LRS
 DRAWN BY: CDS
 CHECKED BY: LRS
 SCALE: AS NOTED
 2013 © Kentucky Engineering Group, PLLC



Contract No. 10
**SANDY HOOK WATER DISTRICT
 WATER SYSTEM IMPROVEMENTS**
 ELLIOTT COUNTY, KENTUCKY

**AERIAL PLAN
 WRIGLEY TANK SITE**



PROJECT NO.
11001

SHEET NO.
13

OF 17

P:\PROJECTS\Sandy Hook\11001_Sandy Hook - Contract 10\Drawings\Contract 10\11001-10-14.dwg KEG 5/06/13



SANDY HOOK WATER PLANT

NOTE 1:

- a. INSTALL (1) 2" RELIEF VALVE W/6"x2" SADDLE & BALL VALVE.
- b. INSTALL 2" PVC, CLASS 200 PIPE FROM VALVE THRU WALL W/TIDEFLEX RED VALVE.
- c. INSTALL FOAM INSULATION BETWEEN WALL & PIPE.



KY 7 PUMP STATION

NOTES:

- 1. PROVIDE AND INSTALL A QUICK CONNECT PROVISION FOR A PORTABLE GENERATOR.
- 2. HOOK-UP SHALL CONSIST OF A MANUAL OR AUTOMATED SWITCH.
- 3. EXISTING PUMP STATION:
3 PHASE, 208-230/480 VOLTS, 10 hp, 3450 RPM, 27-25/12.5 AMPS
- 4. CONTRACTOR SHALL TEST NEW 35KW GENERATOR AFTER QUICK CONNECT HAS BEEN COMPLETED.

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE:	JANUARY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	

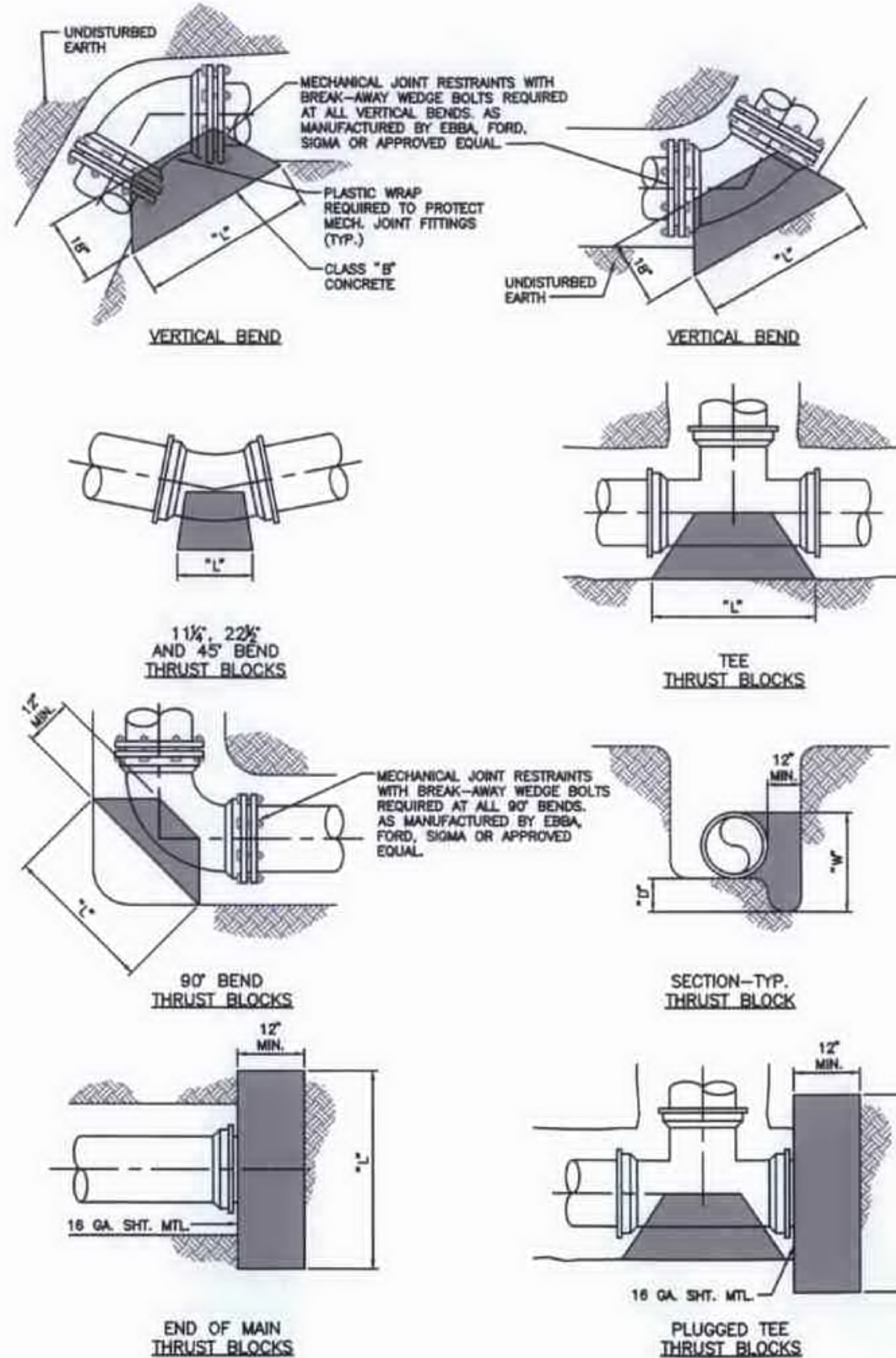


Contract No. 10
**SANDY HOOK WATER DISTRICT
 WATER SYSTEM IMPROVEMENTS**
 ELLIOTT COUNTY, KENTUCKY

**SANDY HOOK WATER
 TREATMENT PLANT
 and KY 7 PUMP STATION
 MODIFICATIONS**



PROJECT NO.	11001
SHEET NO.	14
OF 17	



(SEE THRUST BLOCK SCHEDULE FOR DIMENSIONS OF BLOCKING)
THRUST-BLOCKING DETAIL
 NOT TO SCALE

THRUST BLOCK SCHEDULE - CLASS 200 PVC

SOIL TYPE - SAND & GRAVEL
 BEARING STRENGTH = 3000 PSF

PIPE SIZE	90° BEND			45° BEND			22 1/2° BEND			11 1/2° BEND			TEE & DEAD ENDS		
	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W
4"	1.78	0.07	12"	1.00	0.04	12"	0.50	0.02	12"	0.25	0.01	8"	1.30	0.08	12"
6"	4.00	0.15	12"	2.35	0.08	12"	1.33	0.08	12"	0.86	0.01	8"	3.00	0.11	12"
8"	7.80	0.48	18"	4.00	0.22	18"	2.00	0.11	18"	1.00	0.04	12"	5.00	0.38	18"
10"	11.87	0.85	18"	6.35	0.35	18"	3.33	0.19	18"	1.67	0.07	12"	8.75	0.40	18"
12"	18.00	0.88	18"	9.00	0.50	18"	5.00	0.38	18"	2.32	0.08	12"	14.00	0.78	18"
14"	22.50	1.47	24"	12.25	0.91	24"	6.35	0.46	24"	3.33	0.19	18"	17.50	1.30	24"
16"	30.00	2.22	24"	16.00	1.19	24"	9.00	0.67	24"	4.00	0.22	18"	20.00	1.48	24"

THRUST BLOCK SCHEDULE - CLASS 250 PVC

SOIL TYPE - SAND & GRAVEL
 BEARING STRENGTH = 3000 PSF

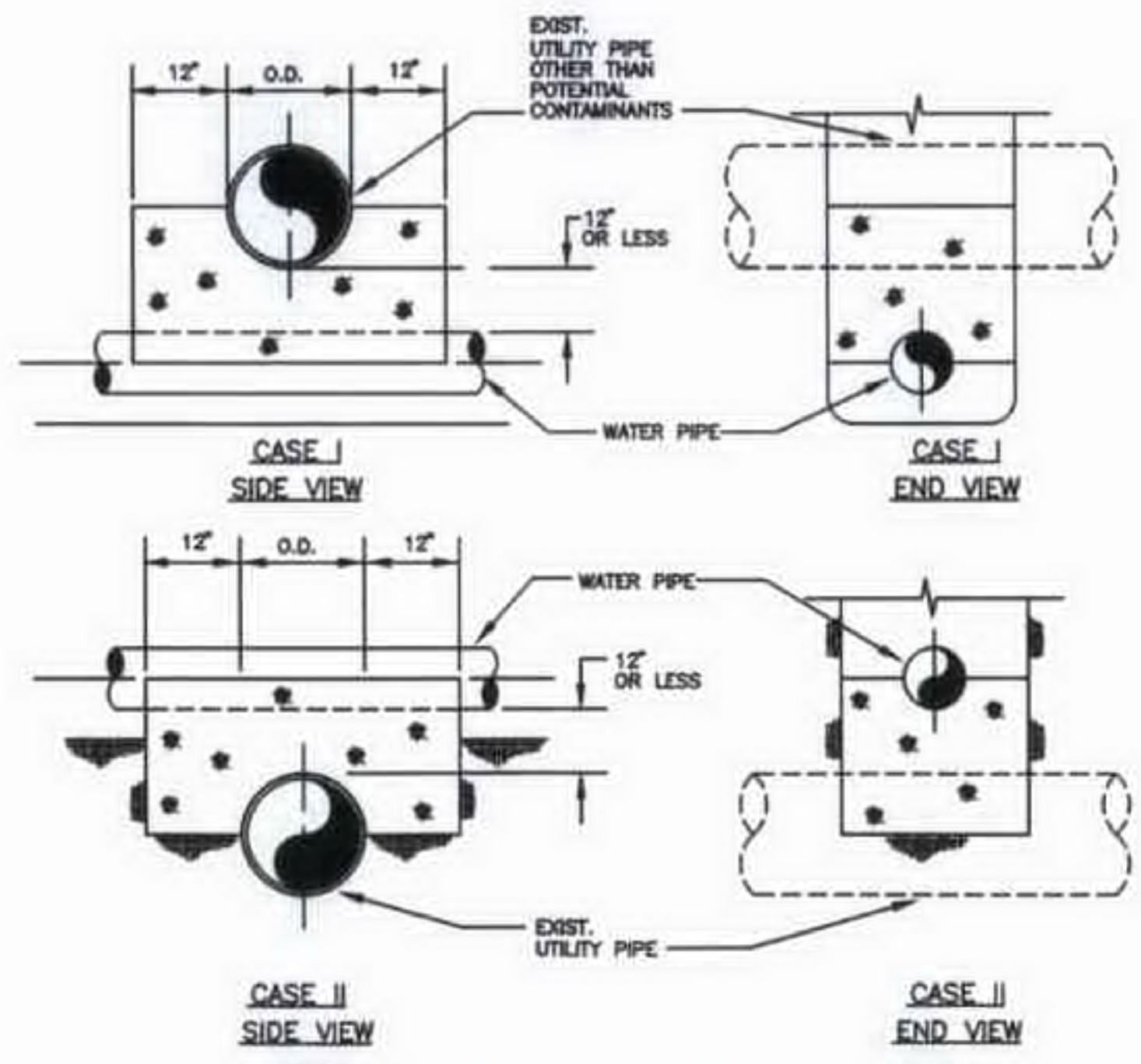
PIPE SIZE	90° BEND			45° BEND			22 1/2° BEND			11 1/2° BEND			TEE & DEAD ENDS		
	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W
4"	2.687	.10	12"	1.500	.08	12"	.750	.03	12"	.375	.01	8"	1.087	.08	12"
6"	5.000	.19	12"	3.000	.11	12"	1.500	.08	12"	.750	.01	8"	4.000	.15	12"
8"	8.000	.30	18"	5.000	.28	18"	3.000	.17	18"	1.500	.08	12"	7.000	.39	18"
10"	12.250	.58	18"	7.500	.42	18"	4.167	.33	18"	2.083	.18	12"	10.500	.58	18"
12"	13.327	1.11	18"	8.000	.67	18"	4.000	.33	18"	2.000	.11	12"	14.000	.78	18"
14"	18.138	2.00	24"	10.750	1.17	24"	5.375	.58	24"	2.688	.33	18"	18.000	1.48	24"
16"	23.892	2.88	24"	14.000	1.48	24"	7.000	.78	24"	3.500	.38	18"	24.000	2.00	24"

THRUST BLOCK SCHEDULE - CLASS 350 D.I.P.

SOIL TYPE - SAND & GRAVEL
 BEARING STRENGTH = 3000 PSF

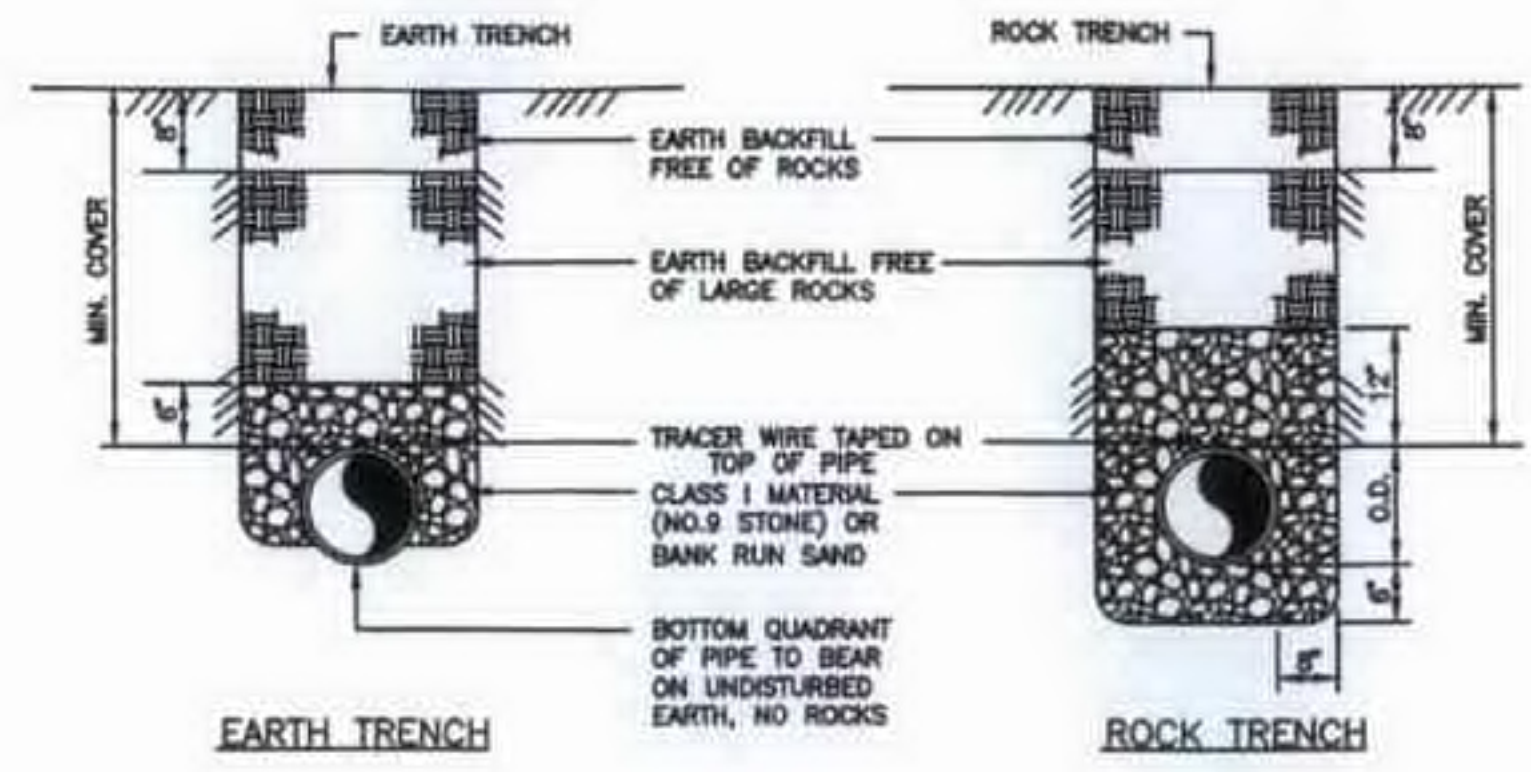
PIPE SIZE	90° BEND			45° BEND			22 1/2° BEND			11 1/2° BEND			TEE & DEAD ENDS		
	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W	MIN. W. OF CONC.	D	W
4"	3.750	.21	18"	1.750	.10	18"	1.000	.08	18"	.500	.02	12"	2.250	.13	18"
6"	7.000	.39	18"	3.750	.21	18"	2.000	.11	18"	1.000	.04	12"	5.000	.28	18"
8"	12.250	.81	24"	4.2	7.500	.58	24"	3.0	6.000	.30	24"	2.000	.11	18"	9.000
10"	20.000	1.48	24"	6.0	10.500	.78	24"	4.2	8.000	.44	24"	3.000	.17	18"	14.000
12"	30.000	2.78	30"	7.2	15.750	1.48	30"	5.4	12.000	.89	30"	4.000	.30	24"	20.000
14"	39.000	4.33	36"	7.2	20.000	2.22	36"	6.0	15.000	1.17	36"	4.0	36"	27.500	
16"	49.000	6.35	42"	8.4	27.500	3.58	42"	8.4	21.000	1.81	42"	4.8	36"	37.500	

THRUST-BLOCKING SCHEDULE
 NOT TO SCALE



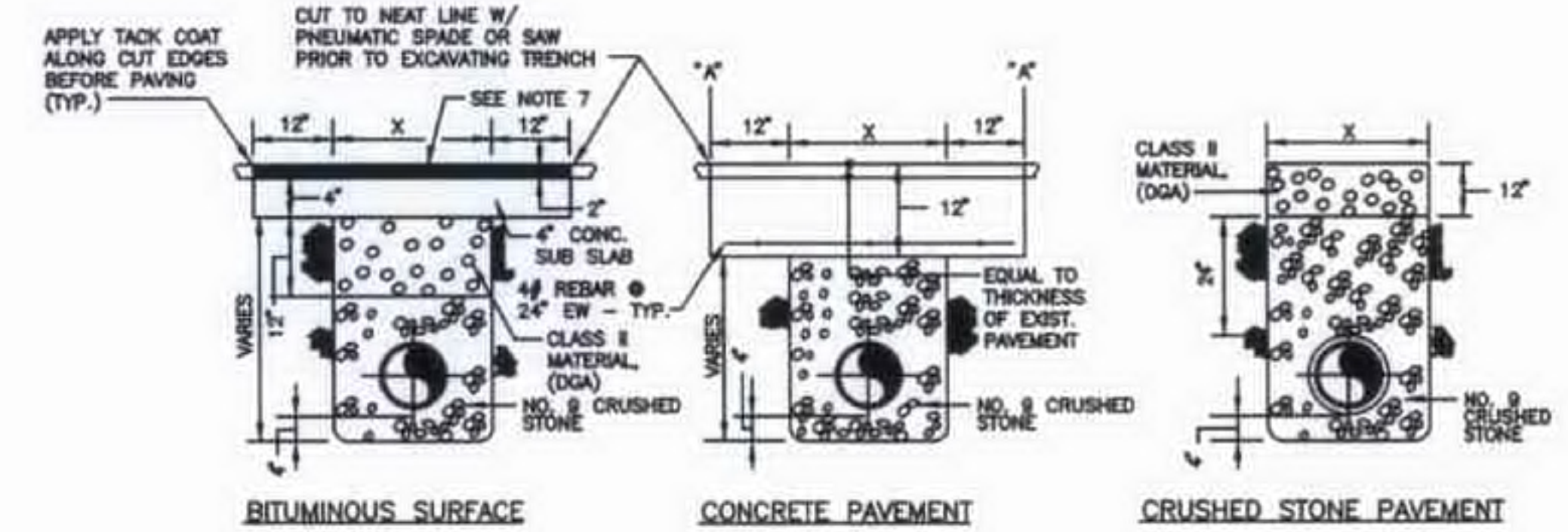
- NOTES:**
- CONCRETE SEPARATOR SHALL BE USED WHEN CLEARANCE BETWEEN WATER LINE AND UTILITY PIPE IS 12" OR LESS.
 - "UTILITY PIPE" INCLUDES UNDERGROUND WATER, NATURAL GAS, TELEPHONE, ELECTRICAL CONDUITS, STORM SEWER OR TYPICALLY NON-CONTAMINATING FACILITIES, WHEN CROSSING SANITARY SEWER OR POTENTIAL CONTAMINANTS SEE DETAIL "WATER/SANITARY SEWER CROSSING".

UTILITY CROSSING CONCRETE SEPARATOR
 NOT TO SCALE



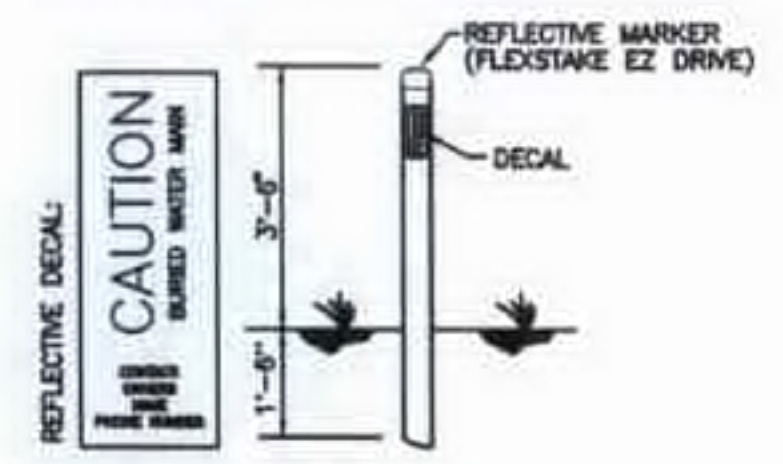
TYPICAL BEDDING and BACKFILL
 NOT TO SCALE

- NOTES:**
- REPLACE BITUMINOUS PAVEMENT WITH SAME TYPE AND THICKNESS (2" MIN.) AS EXISTING PAVEMENT.
 - IF ROCK IS ENCOUNTERED, A MINIMUM OF 6" NO. 9 CRUSHED STONE MUST BE PLACED UNDER THE ENCASING PIPE.
 - X = MAX. WIDTH OF TRENCH AT SURFACE UNDER NORMAL CONDITIONS (3X + PIPE O.D.)
 - FROM POINTS "A" TO NEAREST JOINT OR BREAK IN PAVEMENT MUST BE AT LEAST 6' OR MORE. IF LESS THAN 6' REMOVE PAVEMENT TO JOINT OR BREAK AND REPLACE ENTIRE SLAB.
 - NO. 610 CRUSHED STONE MAY BE SUBSTITUTED FOR MECHANICALLY TAMPED EARTH BACKFILL WITH PRIOR APPROVAL OF THE ENGINEER.
 - 1" SAW CUT OUTSIDE OF TRENCH LINES, BITUMINOUS PATCH PLACED IN 2" LIFTS WITH TACK COAT ON EACH SIDE, EACH LIFT COMPACTED WITH SMALL ROLLER.



PAVEMENT REPLACEMENT
 NOT TO SCALE

NOTE:
 WATER MARKERS SHALL BE PLACED WHENEVER A ROAD CROSSING IS MADE AT EACH SIDE OF THE ROAD AND AT EACH VALVE OR SET OF VALVES.



WATER MARKER DETAIL
 NOT TO SCALE

P:\PROJECTS\Study Hook\116011_Sandy Hook - Contract 10\Drawings\Contract 10\116011-10-15.dwg XBG 5/26/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE: JANUARY 2013
 PROJECT MGR: LRS
 DRAWN BY: CDS
 CHECKED BY: LRS
 SCALE: AS NOTED
 © 2013 Kentucky Engineering Group, PLLC



Contract No. 10
SANDY HOOK WATER DISTRICT
 WATER SYSTEM IMPROVEMENTS
 ELLIOTT COUNTY, KENTUCKY

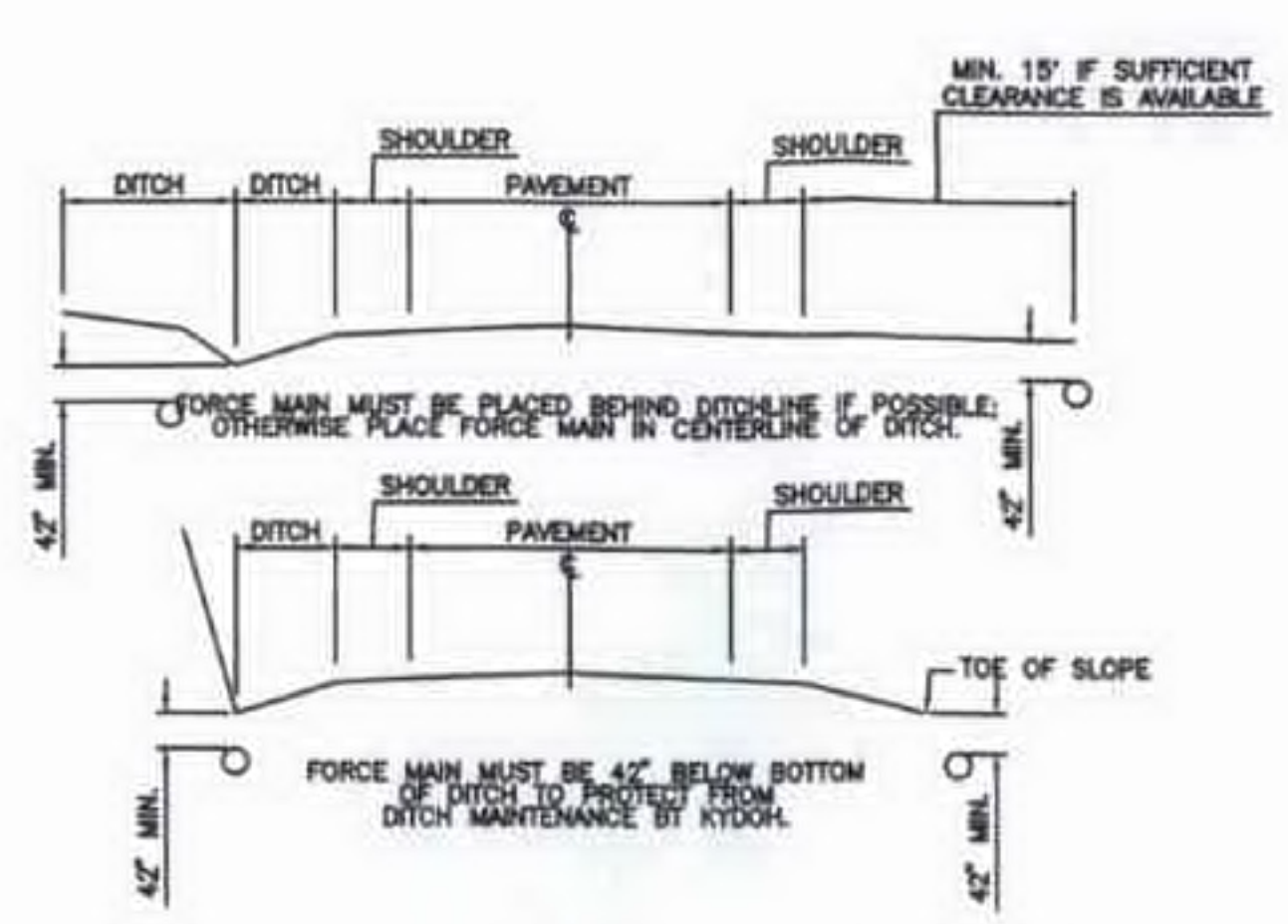
STANDARD DETAILS



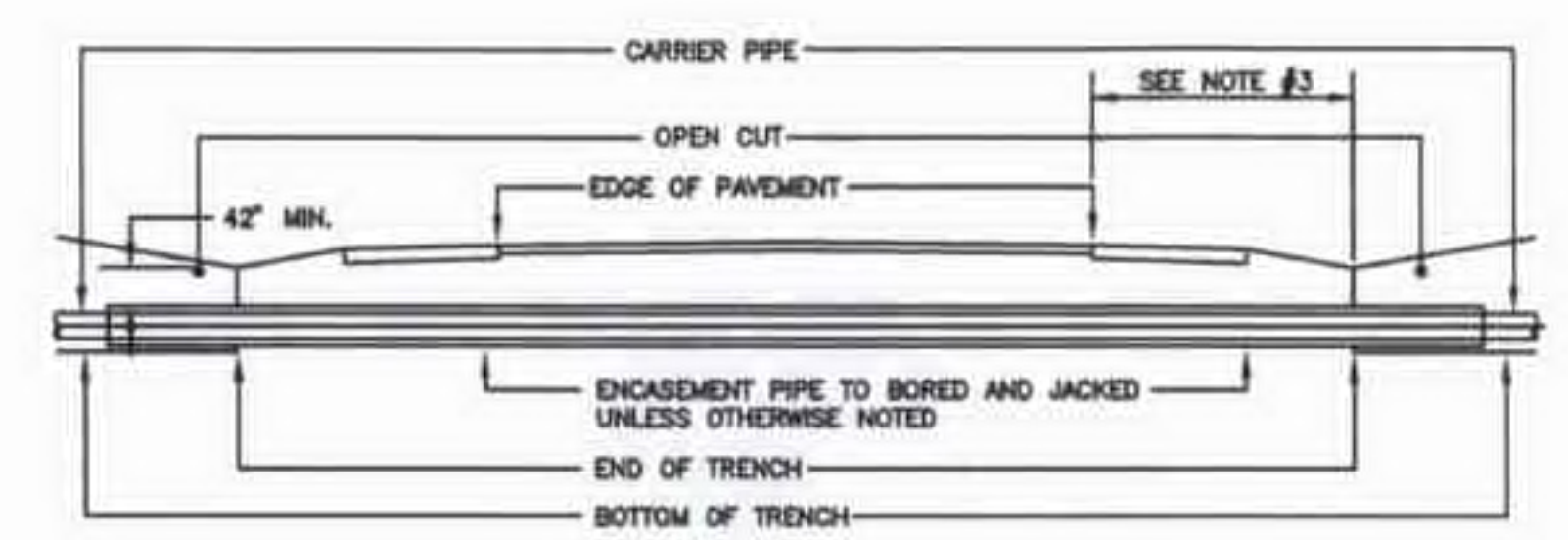
PROJECT NO.
 11001

SHEET NO.
 15

OF 17



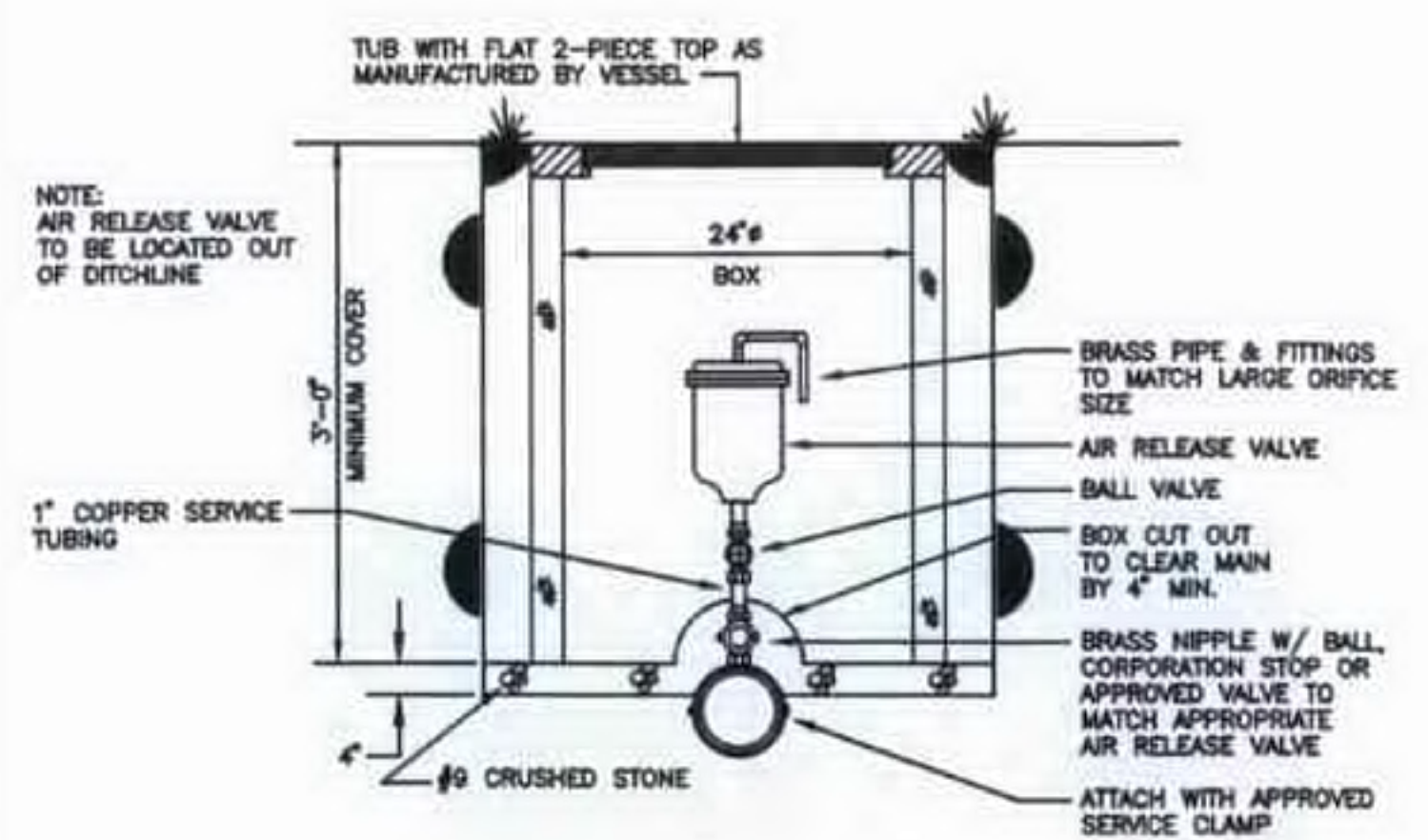
TYPICAL CONSTRUCTION ON KYDOH RIGHT-OF-WAY
NOT TO SCALE



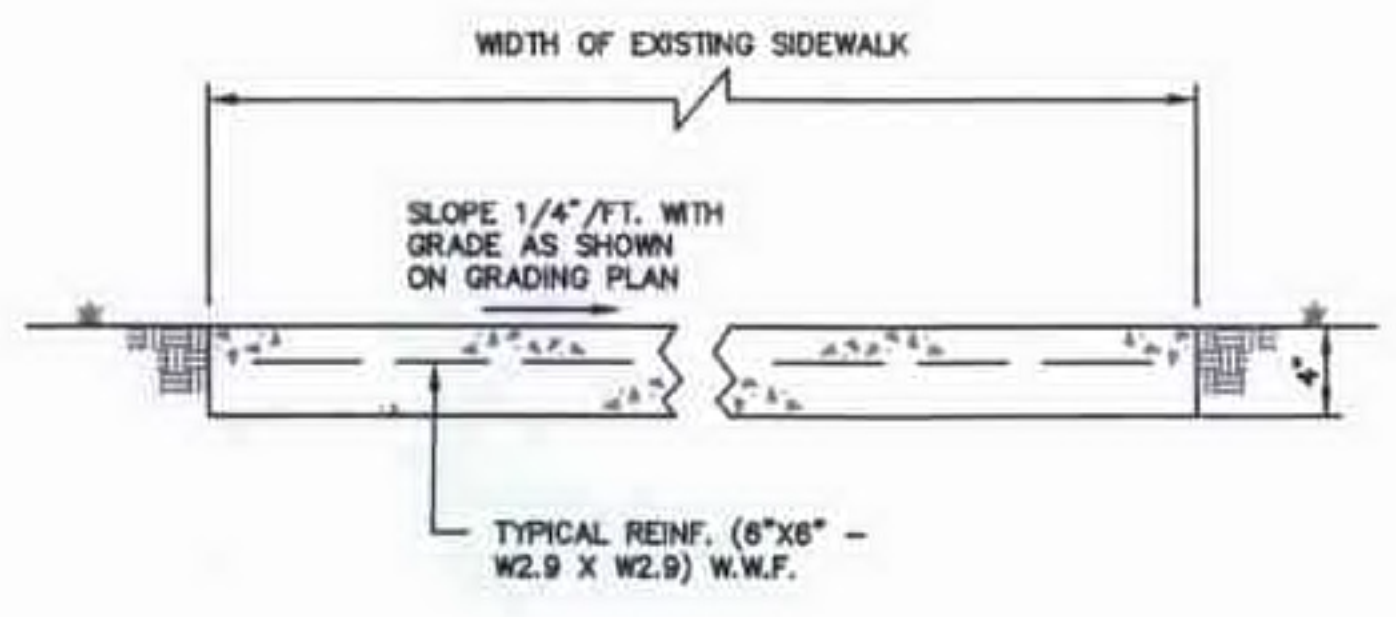
NOTE: SEE DETAIL A FOR PLACEMENT OF CARRIER PIPE IN CASING PIPE.

- NOTES:
1. ALL JOINTS SHALL BE SOLIDLY WELDED. END OF CASING SHALL BE SEALED AFTER LINE HAS BEEN INSTALLED AND TESTED.
 2. MINIMUM DEPTHS MAY INCREASE IN AREAS WHICH REQUIRE MINIMUM SEPARATION WITH OTHER FACILITIES.
 3. OPEN TRENCH NO CLOSER THAN THE DITCHLINE OR TOE OF FILL FROM THE EDGE OF THE PAVEMENT OR AS DIRECTED BY THE SPECIFICATIONS.
 4. HIGHWAY CROSSINGS SHALL UTILIZE STEEL CASING PIPE. STEEL CASING PIPES 4" AND LESS SHALL BE NEW SCHEDULE 40. STEEL CASING PIPES LARGER THAN 4" SHALL HAVE MINIMUM WALL THICKNESS OF 0.25". ALL BORED AND JACKED ENCASEMENT PIPE SHALL BE INSTALLED IN BORE HOLES NO LARGER THEN THE OUTSIDE DIAMETER OF THE ENCASEMENT PIPE.

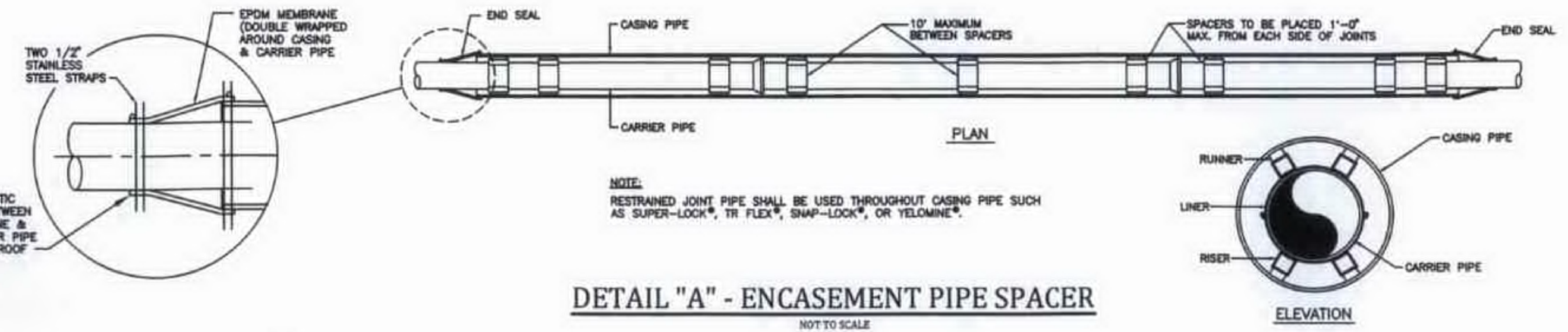
CROSS SECTION OF ENCASED ROAD CROSSING - TYPICAL
NOT TO SCALE



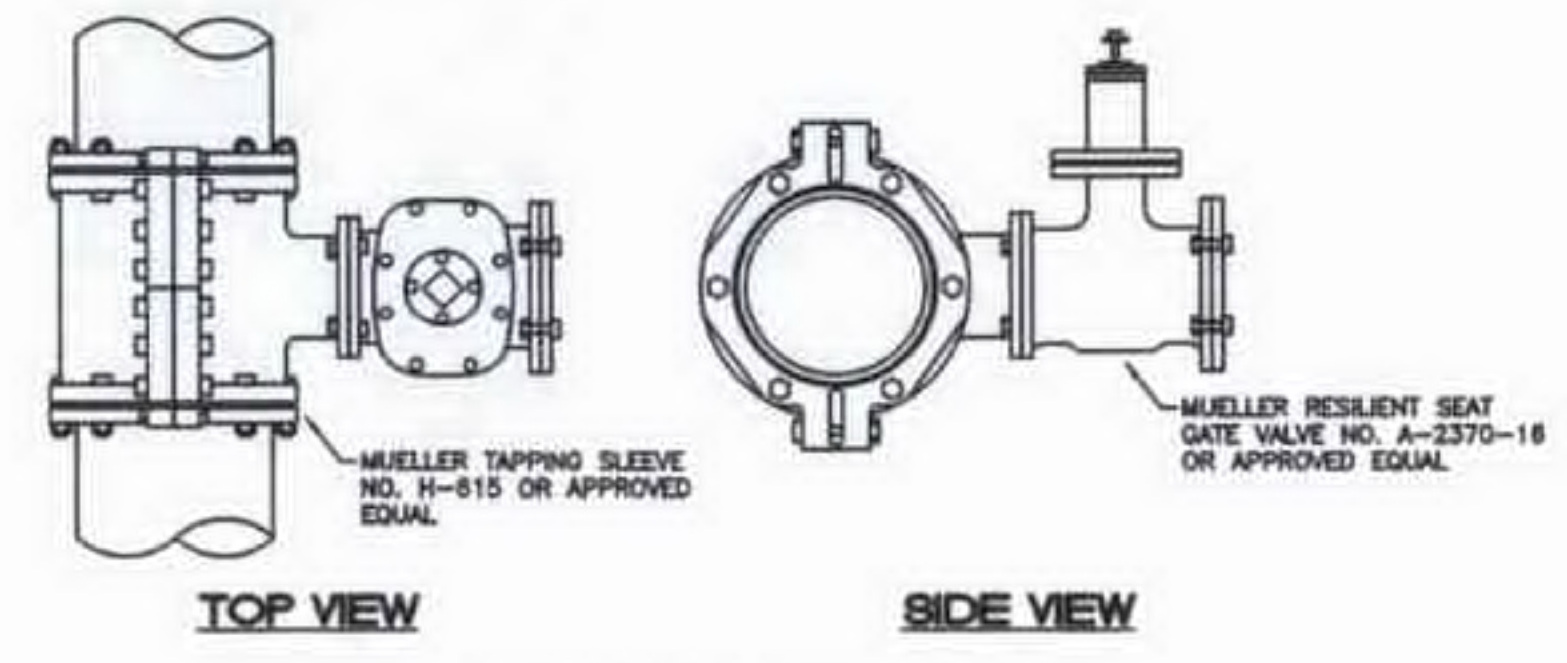
AIR RELEASE VALVE
NOT TO SCALE



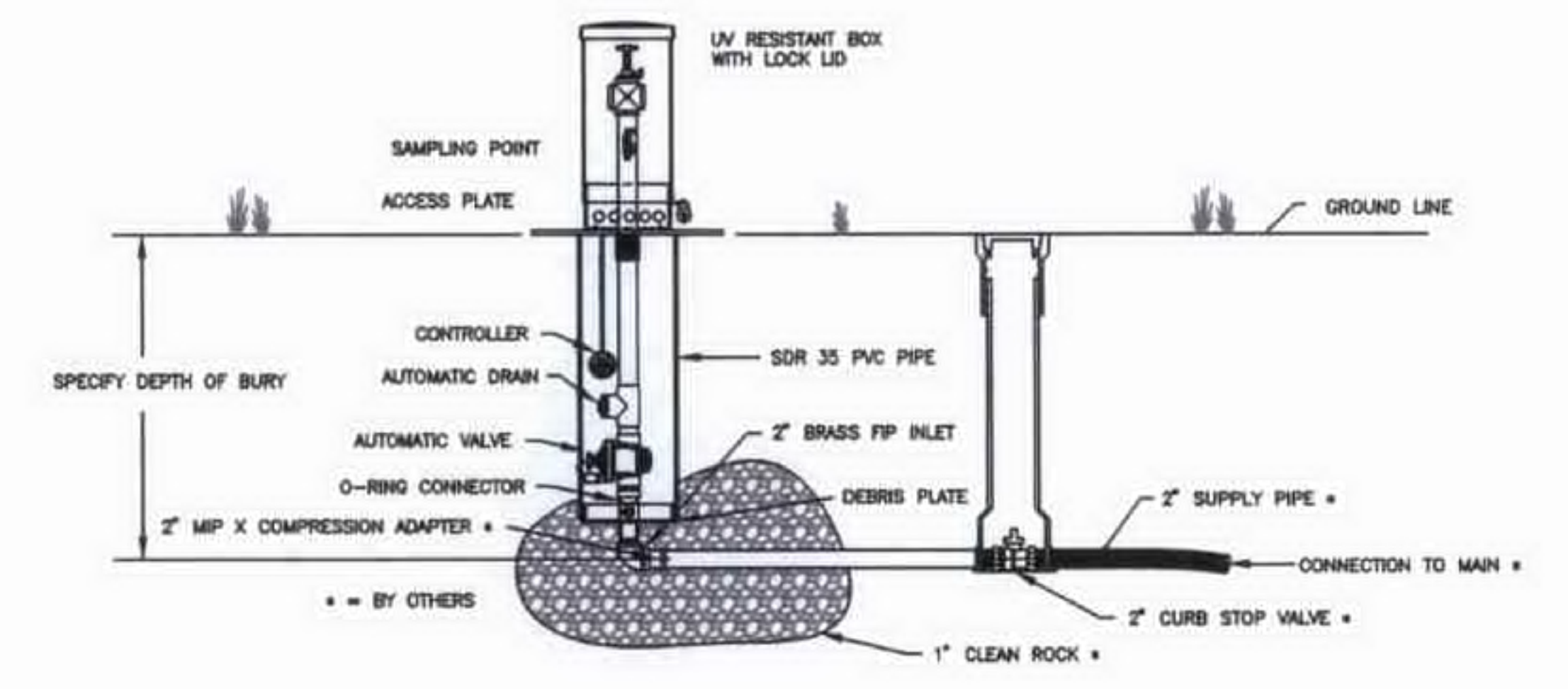
CONCRETE SIDEWALK
NOT TO SCALE



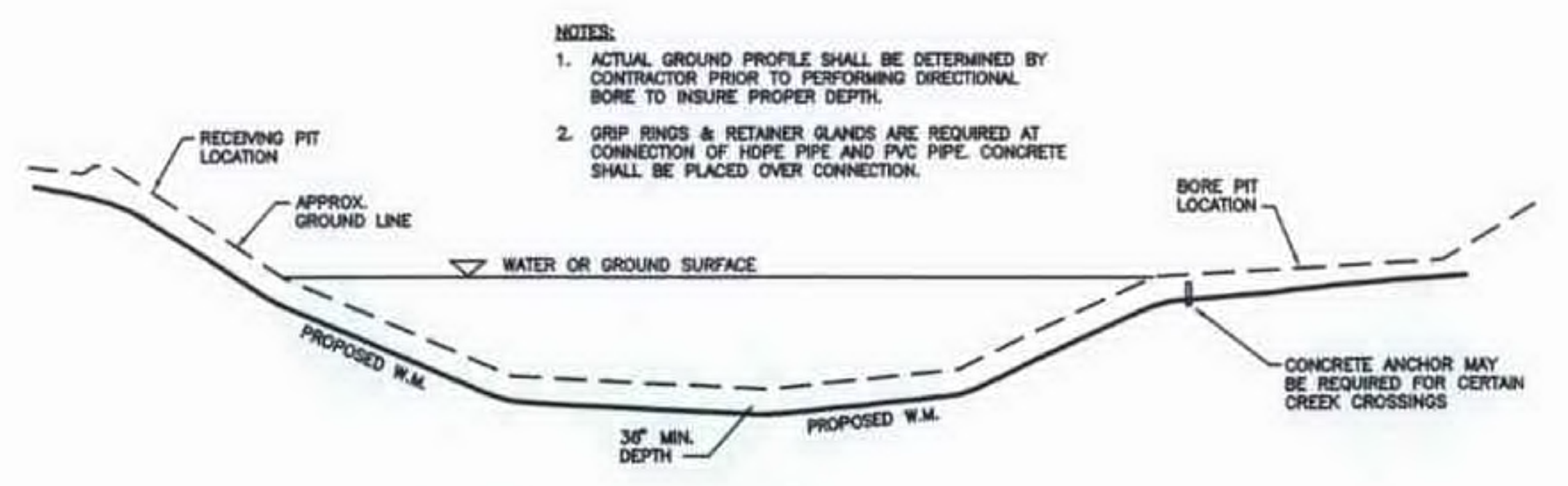
DETAIL "A" - ENCASEMENT PIPE SPACER
NOT TO SCALE



TYPICAL - WET TAP
NOT TO SCALE



NOTE: FLUSH WATERLINES FREE OF DEBRIS BEFORE INSTALLATION
AUTOMATIC FLUSHING DEVICE
NOT TO SCALE



TYPICAL CREEK/SURFACE DIRECTIONAL BORE DETAIL
NOT TO SCALE

P:\PROJECTS\Sandy Hook\11011\Sandy Hook - Contract 10\Drawings\Contract 10\11011-10-16.dwg KEB 5/26/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE: JANUARY 2013
PROJECT MGR: LRS
DRAWN BY: CDS
CHECKED BY: LRS
SCALE: AS NOTED
2013 © Kentucky Engineering Group, PLLC



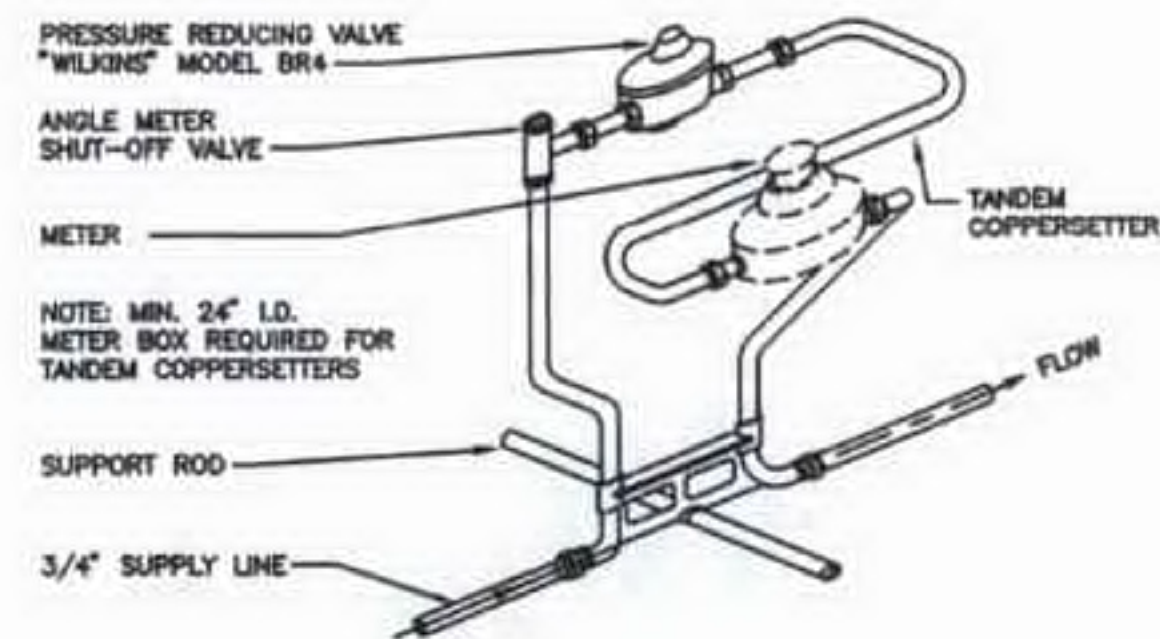
Contract No. 10
SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS
ELLIOTT COUNTY, KENTUCKY

STANDARD DETAILS

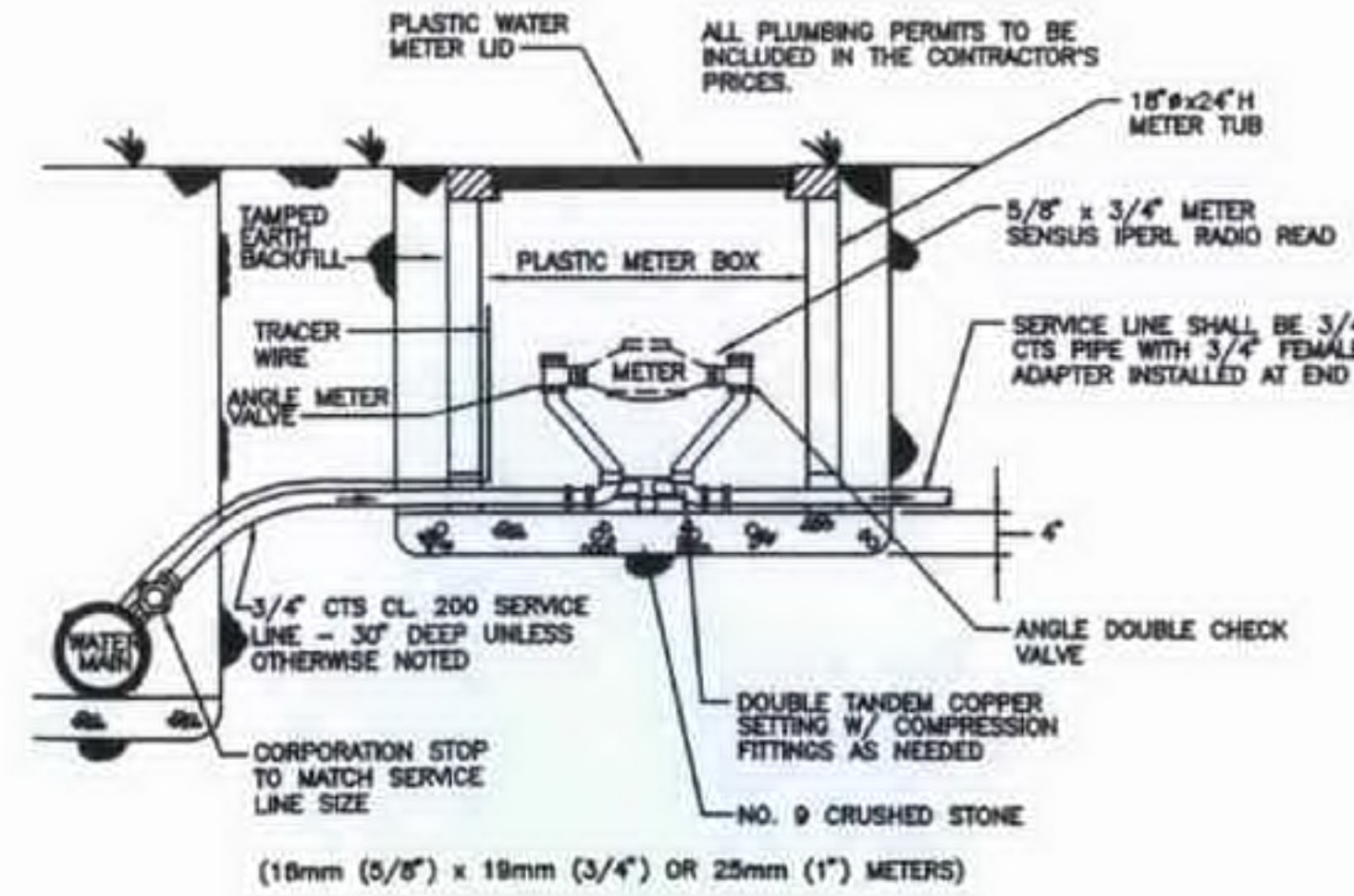


PROJECT NO. 11001
SHEET NO. 16
OF 17

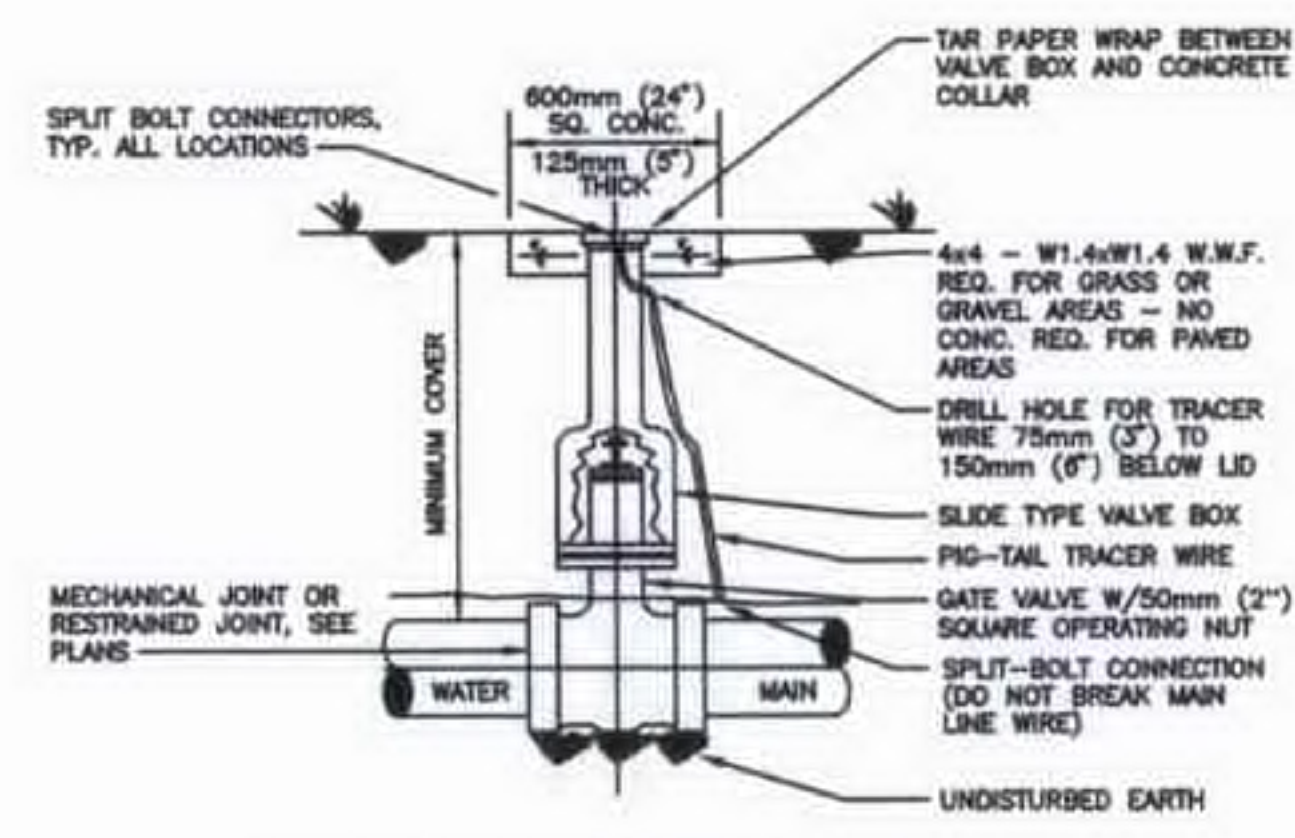
P:\PROJECTS\Sandy Hook\11001_Sandy Hook - Contract 10\Drawings\Contract 10\11001-10-17.dwg REV: 5/26/13



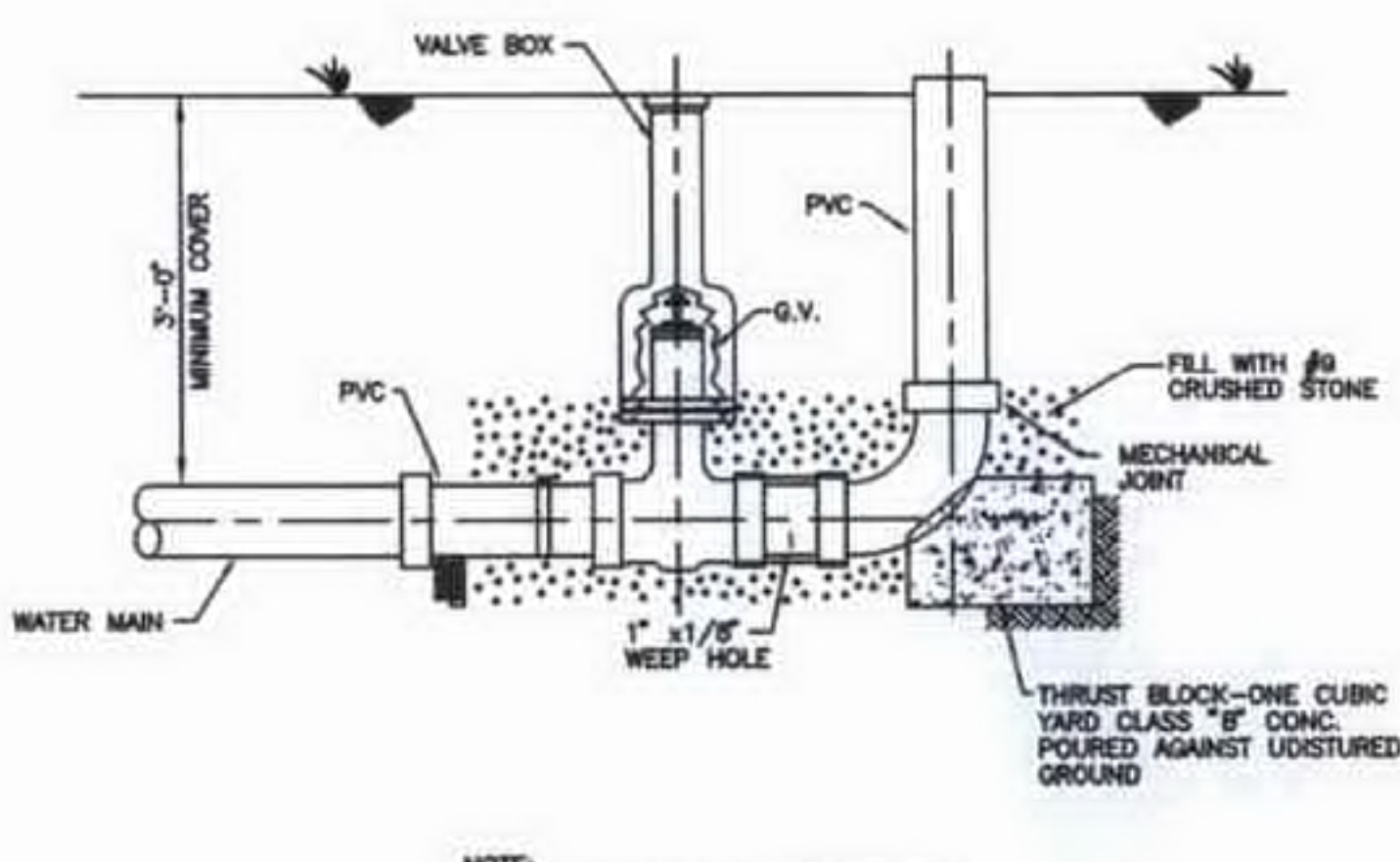
TYPICAL PRESSURE REDUCING VALVE and CUSTOMER METER SERVICE
NOT TO SCALE



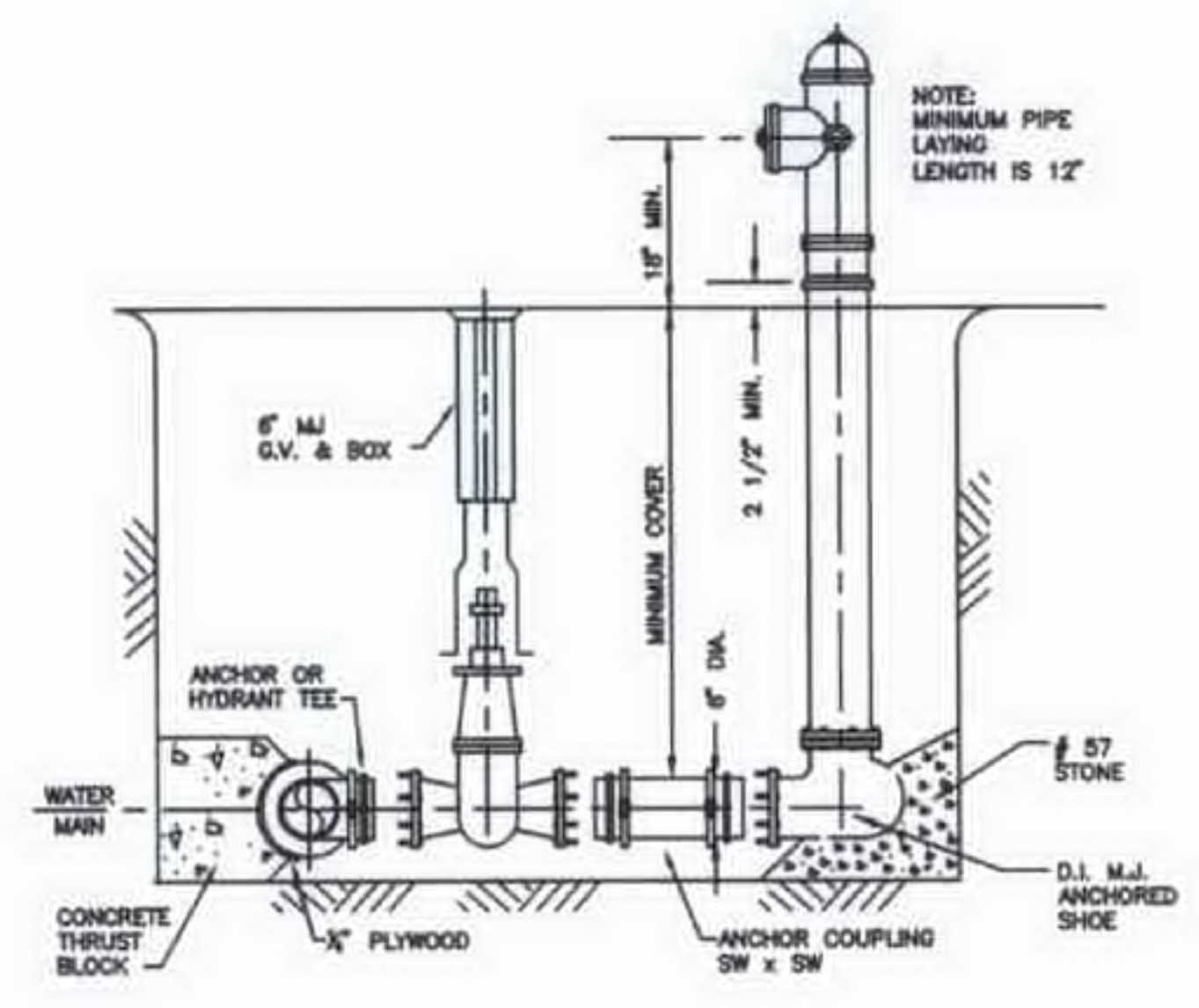
TYPICAL SERVICE CONNECTION
NOT TO SCALE



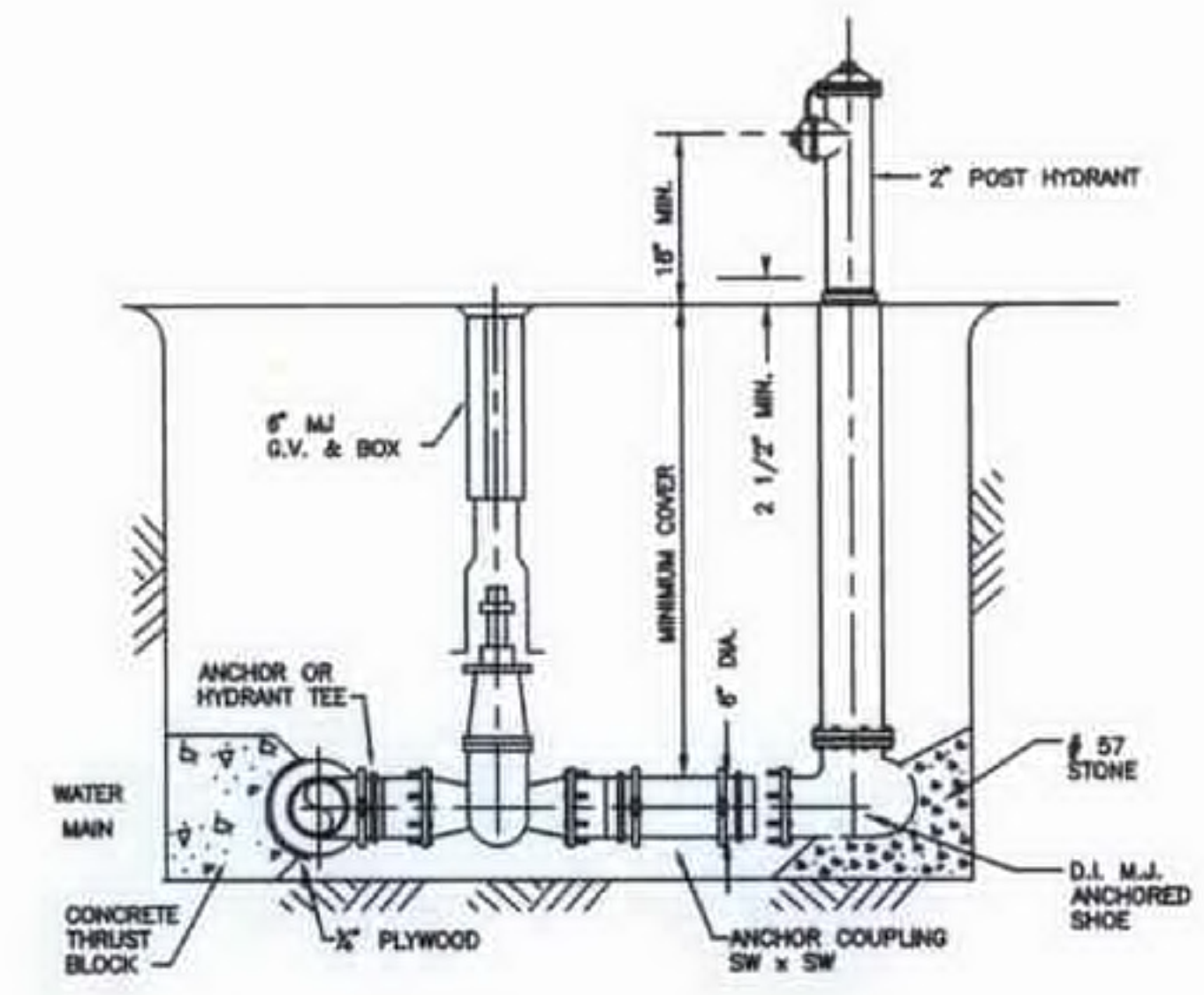
GATE VALVE INSTALLATION
NOT TO SCALE



BLOWOFF ASSEMBLY
NOT TO SCALE



FLUSHING HYDRANT ASSEMBLY
NOT TO SCALE



BLOWOFF HYDRANT ASSEMBLY
NOT TO SCALE

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE: JANUARY 2013
PROJECT MGR: LRS
DRAWN BY: CDS
CHECKED BY: LRS
SCALE: AS NOTED
2013 © Kentucky Engineering Group, PLLC



Contract No. 10
SANDY HOOK WATER DISTRICT
WATER SYSTEM IMPROVEMENTS
ELLIOTT COUNTY, KENTUCKY

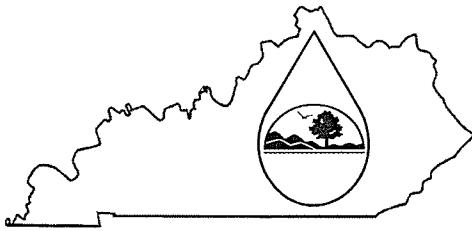
STANDARD DETAILS



PROJECT NO.
11001

SHEET NO.
17

OF 17



Commonwealth of Kentucky
Energy and Environment Cabinet
Division of Water

**Construction Application
For Drinking Water Treatment**

See the instructions for more information about selected portions of this application.

Questions on completing this application? Contact the Water Infrastructure Branch at 502/564-3410, by e-mail at WIBEngineering@ky.gov or visit our website at <http://water.ky.gov> for more information.

I. Treatment Project Information

Project Name: Contract 11 - New Groundwater Well and Appurtenances

Project County: Elliott Estimated Project Cost: \$250,000

Project Latitude/Longitude (DMS): _____

Is this a federally funded project:

DWSRF

SPAP

Other: USDA Rural Development

If yes, has an Environmental Information Document (EID) been reviewed and approved? Yes

If the project has been submitted to the State Clearinghouse for review, provide the SAI number: KY20111031-1309

Identify all other funding sources: State Coal Severance Grant & Owner Contribution

Does this project modify an existing water treatment plant? No

Provide a DETAILED description of work to be performed for this project. Attach additional sheets as necessary:
Installation of a new groundwater well and appurtenances to supply the raw water to the existing WTP.

Identify how the sanitary wastewater produced as a result of this project will be handled:

Sanitary Sewer WWTP: _____

Septic Tank

Other: _____

II. Utility Information

Utility Name: Sandy Hook Water District PWSID: 0320383

Street Address: 1000 Howards Creek Road County: Elliott

City, State, Zip: Sandy Hook, Kentucky 41171

Phone #: 606-738-6282 Fax #: 606-738-6292 Email: sandyhookwater@yahoo.com

Is the system currently under any type of waterline sanctions or Agreed Orders? No

If yes, will this project satisfy the terms of or alleviate an agreed order, water budget or any other form of sanction? _____
If yes, describe: _____

III. Design Considerations

A. Plans and Specifications

Plans and specifications shall comply with **401 KAR 8:100** and “**Recommended Standards for Water Works**” 2007 **Edition (Ten States’ Standards)**. All plans must contain a P.E. seal, signature and date of signature with at least one set having an original seal and signature. Provide detailed plans (**no larger than 24” X 36”**) which must comply with **401 KAR 8:100**. See the instructions for additional details.

B. Design Engineer

Name: Bryan Lovan Firm: Kentucky Engineering Group, PLLC
Street Address: PO Box 1034, 161 North Locust Street
City, State, Zip: Versailles, Kentucky 40383
Phone #: 859-251-4127 Fax #: 859-251-4137 Email: blovan@kyengr.com

C. Design Capacities

Communities Served: _____
Identify the number of connections in the service area: 1075
Current Treatment Plant Design Capacity: _____ Proposed Treatment Plant Design Capacity: _____
Has a Preliminary Engineering Report been submitted and approved? _____
Have Water Withdrawal and KPDES permits been updated? _____
KPDES Permit # _____ Water Withdrawal Permit # _____

What type of treatment is/will be used:

- Conventional
- Ballasted Flocculation
- Membrane
- Dissolved Air Flotation
- Other: _____

Is pilot study data provided? _____

D. Other Information to be Submitted with Project

1. Site

Provide a copy of the U.S.G.S. 7 ½ minute topographic map with the location(s) of the proposed project.

What is the 100 year flood elevation for the project site? 720'

What is the 500 year flood elevation or flood of record for the project site? _____

2. Intake and Raw Water Transmission

Provide the Latitude and Longitude (DMS) of the intake and River Mile Index if known:

Latitude: 38° 5' 1" Longitude: -83° 7' 24" River Mile Index: N/A

What is the raw water source? Groundwater Wells

Provide water level elevations for surface water sources:

Low Level: _____

Normal Level: _____

Flood Level: _____

For surface water sources, what type of intake will be used?

- Floating
- Screened
- Wet Well
- Other: _____

Does the intake have the capability to draw from multiple levels? _____ If yes, explain: _____

Is the intake screened? _____

Is a method for cleaning provided? _____ If yes, describe: _____

Where is the raw water sample tap located? _____

Are any chemicals fed at the intake? _____ If yes, list: _____

Is the intake more than 5 miles downstream or 1,000 ft upstream of any sewage outfall? _____

What is the flow rate into the intake? _____

If a groundwater source is used:

Number of Wells: 1 Well Capacities: _____

Provide water quality and quantity data for test wells.

Raw Water Pump Data:

Number of Pumps	Capacity (GPM)	TDH	Power (HP)
1	250	300	25

Are variable frequency drives (VFD) to be used? no

Provide proposed pump's characteristic curve along with the efficiency, horsepower and NPSHR data.

Raw Water Transmission Main Data:

Waterline Material	Waterline Size	Linear Feet
PVC	6-inch	2,350

Are any chemicals fed in the raw water transmission main or wet-well? no

If yes, list: _____

3. Pretreatment/Equalization

Basin Volume: _____ Dimensions: _____

Purpose: _____

Are any chemicals fed here? _____ List the chemicals fed along with the feed locations: _____

Is aeration used? _____ If yes, purpose and type: _____

Are provisions to feed carbon provided? _____ Rate: _____

4. Rapid Mix

Type of Rapid Mix:

Static Mixer

Conventional Rapid Mix

Other: _____

Number of Mixing Basins: _____ Volume: _____ Dimension: _____

Retention Time: _____ Velocity Gradient (G): _____

5. Flocculation

Number of trains: _____ Number of Stages: _____

Basin Volume: _____ Dimensions: _____

Detention Time: _____ Flow through Rate: _____

Mixer Speed (sec): _____ Is the flocculation speed tapered through the process? _____

6. Sedimentation

Flow Velocity from Flocculation to Sedimentation: _____

Volume: _____ Dimensions: _____

Flow Through Velocity: _____ Detention Time: _____

Overflow Rate (gpm/ft²): _____ Weir Loading Rate (gpd/ft): _____

Are tube settlers to be used? _____ Dimensions: _____

Are Plate Settlers Used? _____ Dimensions: _____

What percentage of the projected horizontal plate area is the overflow rate for plate settlers based? _____

Is a sludge collection system provided? _____ Describe: _____

Is Ballasted Flocculation used? _____

If yes, provide the following:

Number of trains: _____ Capacity: _____ Basin Volumes: _____

Basin Dimensions: _____ Retention Time: _____

Number of Hydrocyclones: _____ Hydrocyclone Capacity (GPM): _____

Number of Recycle Pumps: _____ Recycle Pump Capacity (GPM): _____

Overflow Rate (GPM/ft²): _____ Number of Contact Basins: _____

Contact Basin Volume: _____ Contact Basin Dimensions: _____

Contact Time: _____

7. Filtration

Granular Media

Type of Filtration: _____ Number of Filters: _____

Filter Area: _____ Total Filter Box Depth: _____

Media	Depth	Effective Size	Uniformity Coefficient

Filtration Rate at Design Capacity: _____

Number of Backwash Pumps	Capacity	TDH	Power (HP)

Backwash Rate: _____

What is the source of the wash water supply? _____

Is air scouring or surface wash utilized? _____ Which? _____

Number of Backwash Troughs: _____ Dimensions: _____

Design Flow (gpm): _____ Distance from media surface to bottom of backwash trough: _____

Are rate of flow controllers provided for backwashing? _____

Is filter-to-waste capability provided? _____

Turbidimeter Locations:

- Raw Water
- Top of Filter
- Individual Filter Effluent (prior to filter-to-waste)
- Combined Filter Effluent
- Other: _____

Membranes

Type of membrane: _____ Capacity: _____ # of Skids: _____

Water Flux Rate (gpd/ft²): _____ Permeate Recovery (%): _____

Operating Pressure (psi): _____ Design Temperature (°F): _____

What cleaning agent will be used? _____ Cleaning Frequency: _____

Provide capacity calculations used to size membrane filters.

8. Clearwell

Number of Clearwells	Capacity	Dimensions	Baffled (yes/no)

If an offsite tank is used as a clearwell, provide location, coordinates and capacity: _____

Provide Contact Time (CT) Calculations.

9. High Service Pumps

Number of Pumps	Capacity (GPM)	TDH	Power (HP)

Are variable frequency drives (VFD) to be used? _____

Provide proposed pump's characteristic curve along with the efficiency, horsepower and NPSHR data.

10. Disinfection

Check all forms of disinfection to be used:

- Chlorine Gas
- Hypochlorite
- Chloramines
- UV
- Other: _____

List the locations of all disinfectant injection points: _____

Chlorine Room Information:

- Exhaust Fan Capacity (cfm): _____ Air Exchange Rate: _____
- Are air inlet louvers near the ceiling? _____ Do ventilation fans take suction near the floor? _____
- Is the chlorine room equipped with panic hardware and alarms? _____
- Is a bottle of Ammonium Hydroxide provided? _____
- Does the chlorine room have a shatterproof inspection window? _____
- Is SCBA equipment meeting NIOSH requirements located outside of the chlorine room? _____
- Are separate switches for fans and lights provided outside of the chlorine room? _____
- Is a gas scrubber provided? _____

UV Information:

- UV Wavelength: _____ Dosage (MJ/cm²): _____
- Are the bulbs protected? _____
- Is the UV assembly accessible for cleaning and replacement of the bulbs, jackets, etc? _____
- Is a sensor provided to ensure UV light is being delivered at the appropriate wavelength and dosage? _____

Ammonia Information:

- Exhaust Fan Motor Capacity (cfm): _____ Air Exchange Rate: _____
- Is ammonia room equipped with panic hardware and alarms? _____
- Does the ammonia room have a shatterproof inspection window? _____
- Are separate switches for fans and lights provided outside of the room? _____

Is a gas scrubber provided? _____

11. Other Chemicals

Provide information about chemicals to be used in the treatment process below:

Chemical	Purpose	Feed Location	Bulk Tank (gal)	Day Tank (gal)	Feed Rate at Design Capacity

Will Carbon be added as a premixed slurry or dry feed? _____

If dry feed, what is the hopper capacity? _____

Are fireproof/explosion proof precautions provided? _____ Describe: _____

Are floor drains and containment provided? _____

Chemical	Containment Capacity

12. Treatment Wastewater

Disposal Method for Treatment Wastewater:

- Lagoons
- Dewatering
- Other: _____

How much treatment wastewater does the water treatment plant produce? _____

Lagoon capacity: _____

Where does the decant water discharge? _____

13. General

- Provide a process flow schematic.
- Provide a signed letter of acceptance from the utility, which states that the utility has reviewed and approved the plans and specifications.
- If the project is funded by a State Revolving Fund Loan (SRF) provide a completed SRF Plans and Specifications Checklist along with 1 complete printed copy of the project specifications.

IV. Fees

Check or money order must be made payable to "Kentucky State Treasurer" for the total amount. Fees do not apply to projects FUNDED by a municipality, water district, or other publicly owned utility.

Project Category: Water District Total Amount: \$ 0.00

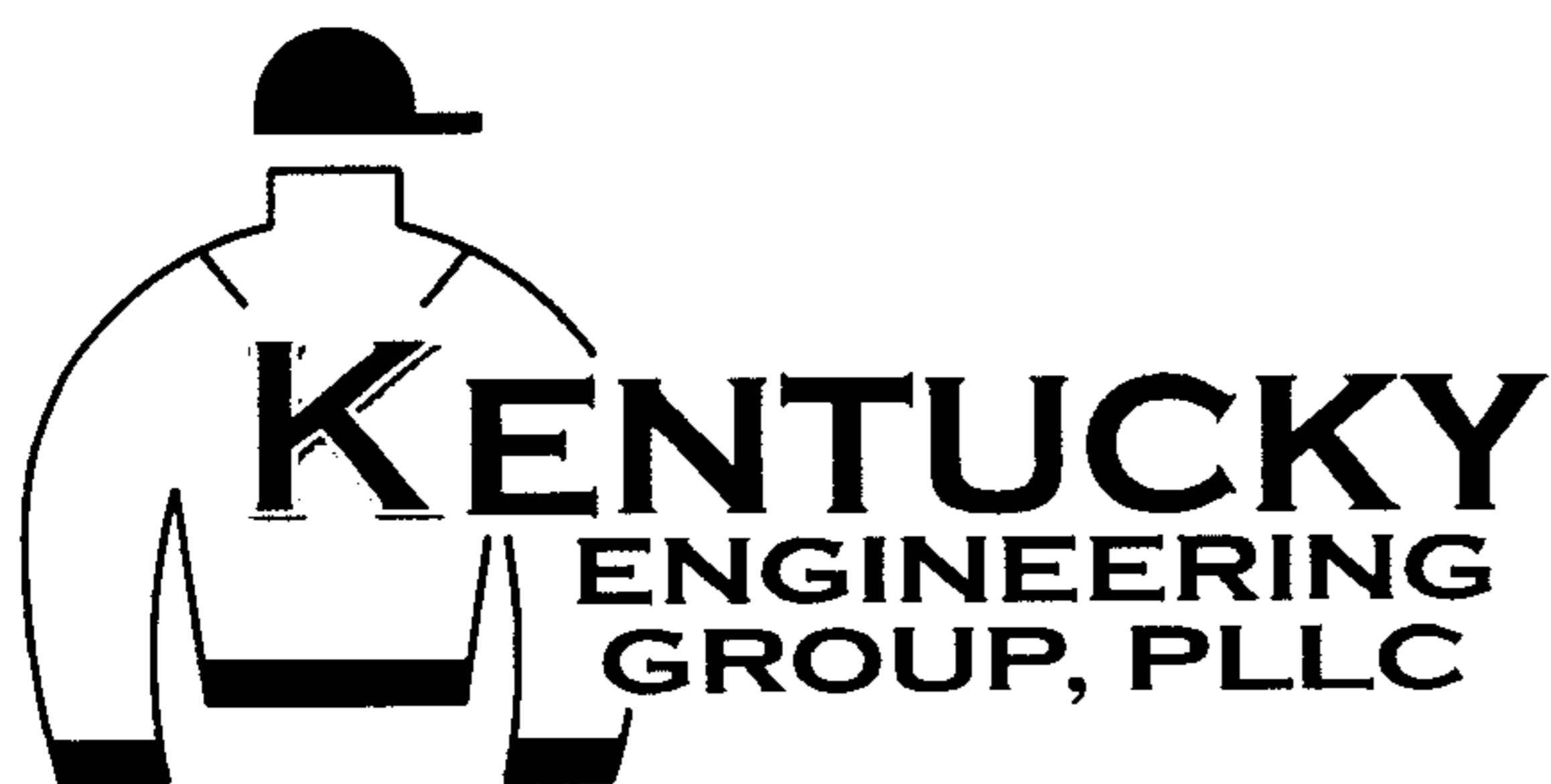
CONTRACT DOCUMENTS and SPECIFICATIONS

CONTRACT 11

**NEW GROUNDWATER WELL AND
APPURTENANCES**

SANDY HOOK WATER DISTRICT

Elliott County, Kentucky



Kentucky Engineering Group, PLLC

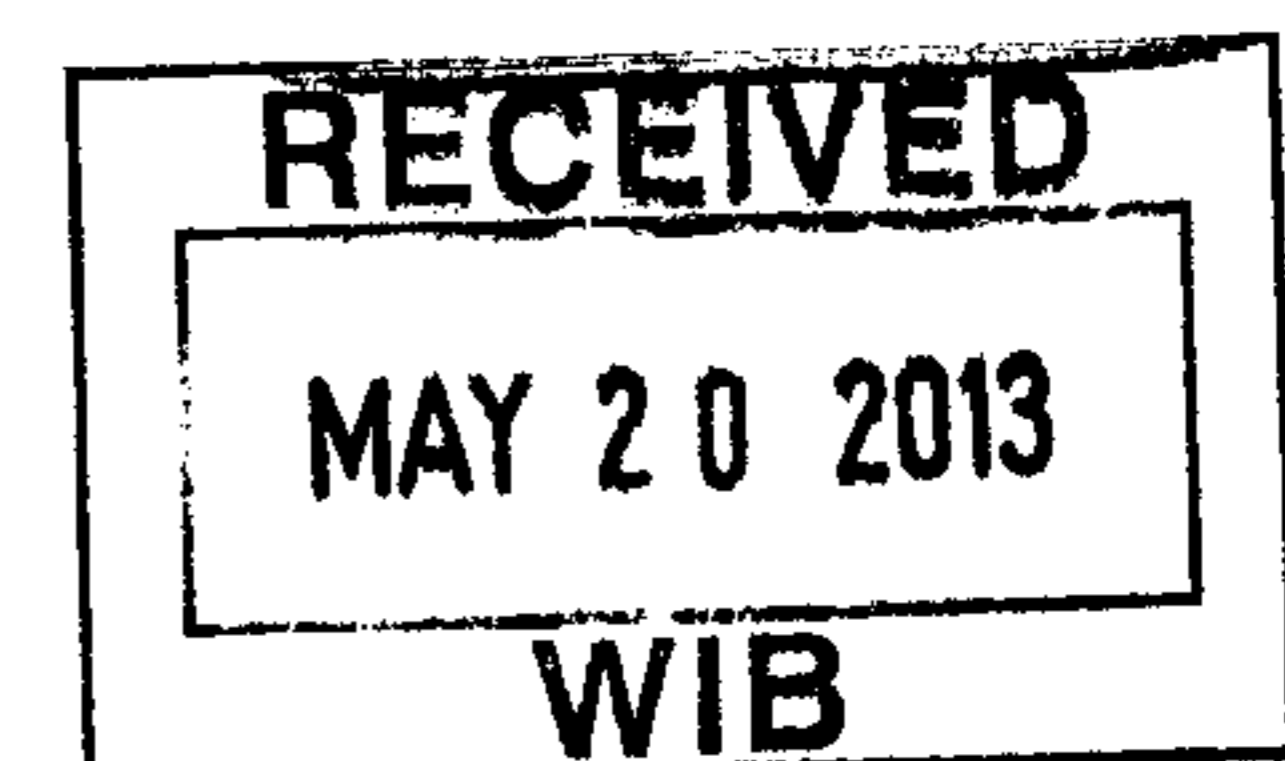
P.O. Box 1034

Versailles, Kentucky 40383

January, 2013

KEG Project No. 11001

0320383-13-001



996APE20130001

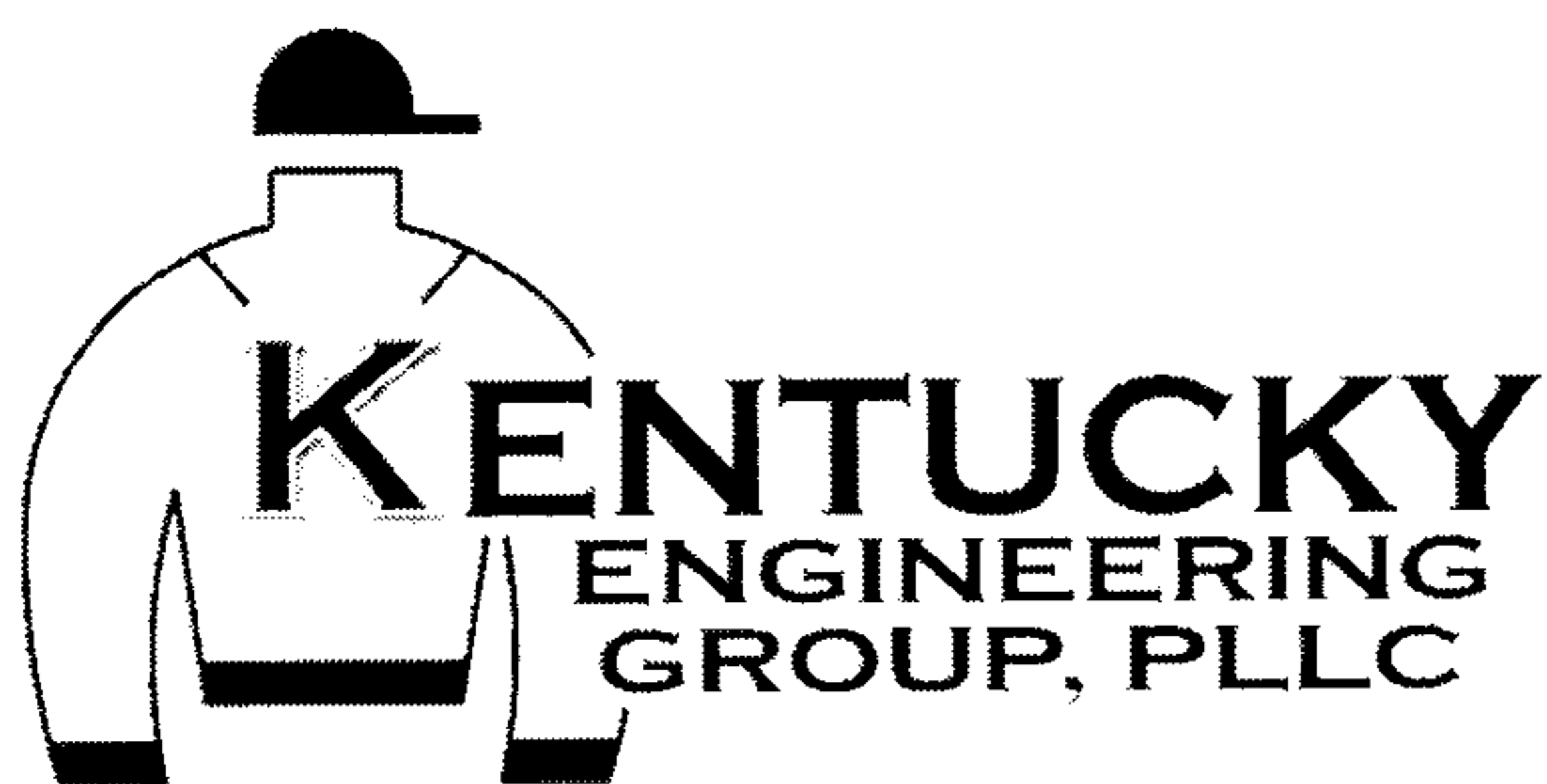
CONTRACT DOCUMENTS and SPECIFICATIONS

CONTRACT 11

**NEW GROUNDWATER WELL AND
APPURTENANCES**

SANDY HOOK WATER DISTRICT

Elliott County, Kentucky



Kentucky Engineering Group, PLLC

P.O. Box 1034

Versailles, Kentucky 40383

January, 2013

KEG Project No. 11001

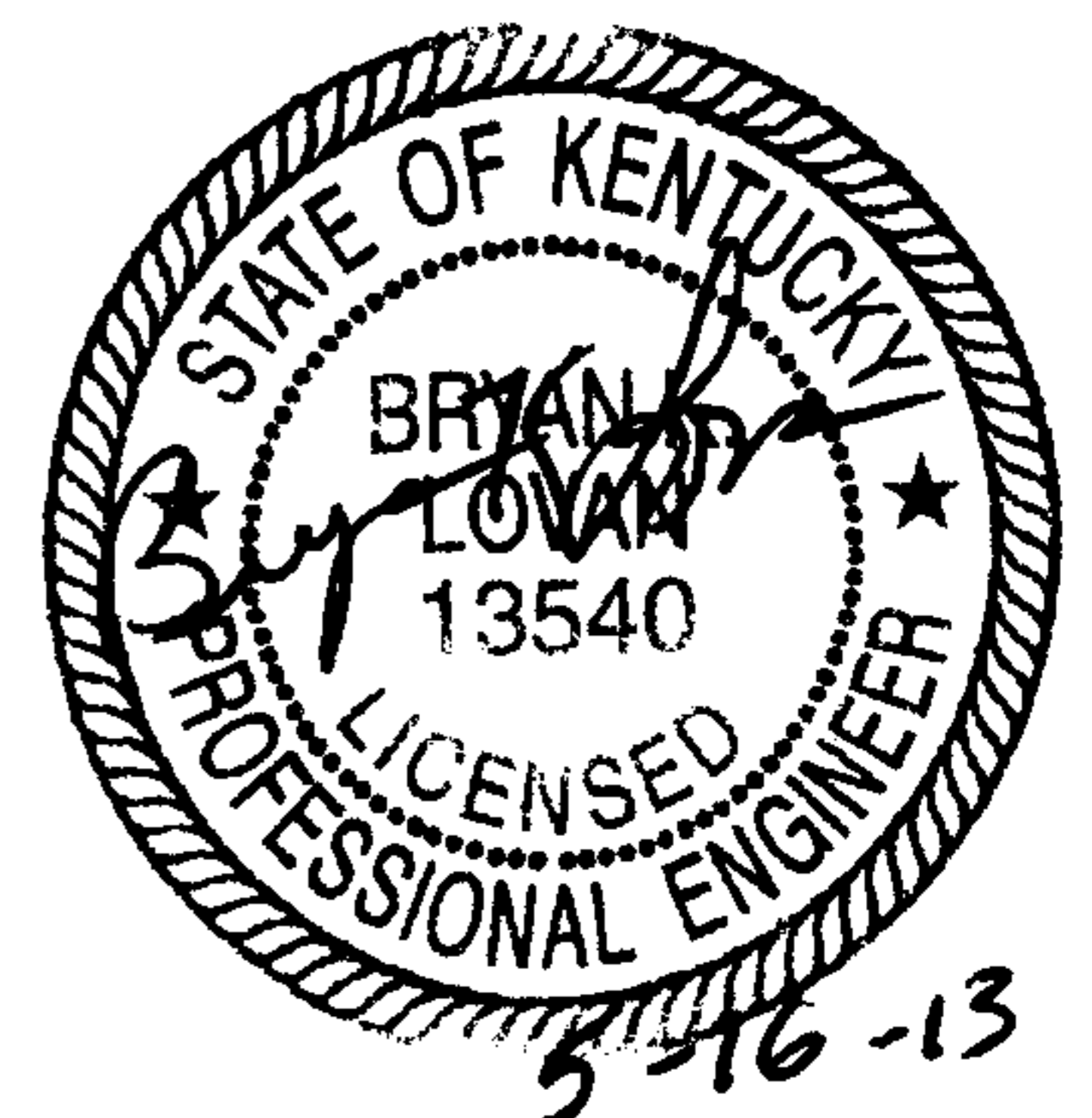


TABLE OF CONTENTS
 SANDY HOOK WATER DISTRICT
 CONTRACT 11 - NEW GROUNDWATER WELL AND APPURTENANCES

TOC-1

PAGE

ADVERTISEMENT FOR BIDS	
SECTION 1 - PRE BID INFORMATION	1-2
SECTION 2 - INSTRUCTIONS TO BIDDERS	1-4
SECTION 3 - BIDDING PROVISIONS & WAGE RATES.....	1-2
 BID FORMS	
SECTION 00410 - BID FORMS.....	1-9
SECTION 00415 - SUPPLEMENTS TO BID FORM.....	1-10
SECTION 00430 - BID BOND	1-2
 AGREEMENT FORMS	
SECTION 00510 - NOTICE OF AWARD	1
SECTION 00521 - AGREEMENT FORMS.....	1-8
SECTION 00550 - NOTICE TO PROCEED	1
 BONDS	
SECTION 00610 - BONDS AND CERTIFICATES.....	1-2
SECTION 00615 - PAYMENT BONDS	1-3
 RURAL DEVELOPMENT GENERAL CONDITIONS.....	 1-57
 RURAL DEVELOPMENT SUPPLEMENTAL GENERAL CONDITIONS.....	 1-4
 RURAL DEVELOPMENT CHANGE ORDER	 1
 RURAL DEVELOPMENT COMPLIANCE STATEMENT	 1-2
 RURAL DEVELOPMENT CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS	 1
 RURAL DEVELOPMENT CERTIFICATION REGARDING DEBARMENT.....	 1-2
 RURAL DEVELOPMENT CERTIFICATION OF SUBSTANTIAL COMPLETION.....	 1
 SECTION 00700 - GENERAL CONDITIONS.....	 1-27
 DIVISION 1 - GENERAL REQUIREMENTS	
SECTION 01010 - SUMMARY	1-2
SECTION 01015 - WORK SEQUENCE.....	1
SECTION 01016 - OCCUPANCY	1
SECTION 01025 - MEASUREMENT AND PAYMENT	1-6
SECTION 01030 - LABOR PROVISIONS	1
SECTION 01040 - COORDINATION	1
SECTION 01300 - SUBMITTALS.....	1-3
SECTION 01380 - CONSTRUCTION PHOTOGRAPHY	1
SECTION 01450 - QUALITY CONTROL	1
SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS.....	1-3
SECTION 01530 - BARRIERS.....	1
SECTION 01540 - SECURITY	1

TABLE OF CONTENTS
 SANDY HOOK WATER DISTRICT
 CONTRACT 11 – NEW GROUNDWATER WELL AND APPURTENANCES

	TOC-2
SECTION 01570 - TRAFFIC REGULATION	1-2
SECTION 01580 - PROJECT IDENTIFICATION AND SIGN	1-3
SECTION 01600 - MATERIAL AND EQUIPMENT	1-3
SECTION 01610 - TRANSPORTATION AND HANDLING	1
SECTION 01700 - PROJECT CLOSEOUT	1-3
SECTION 01710 - CLEANING	1-3
SECTION 01720 - PROJECT RECORD DOCUMENTS	1-2
SECTION 01740 - WARRANTIES AND BONDS	1-2

DIVISION 2 - SITE WORK

SECTION 02110 – SITE CLEARING	1-2
SECTION 02220 - EARTHWORK	1-8
SECTION 02222 - EXCAVATION	1-2
SECTION 02226 – TRENCHING, BACKFILLING AND COMPACTING	1-3
SECTION 02228 – ROCK REMOVAL	1-3
SECTION 02270 – SLOPE PROTECTION AND EROSION CONTROL	1-2
SECTION 02525 – GROUNDWATER SUPPLY WELL	1-19
SECTION 02600 - PIPE, FITTINGS AND INSTALLATION	1-15
SECTION 02626 – CUSTOMER METER SERVICE AND SERVICE TUBING	1-5
SECTION 02630 - TAPPED CONNECTIONS	1-3
SECTION 02640 – VALVES	1-6
SECTION 02700 - SITE RESTORATION	1
SECTION 02830 – CHAIN LINK FENCE AND GATE	1-5

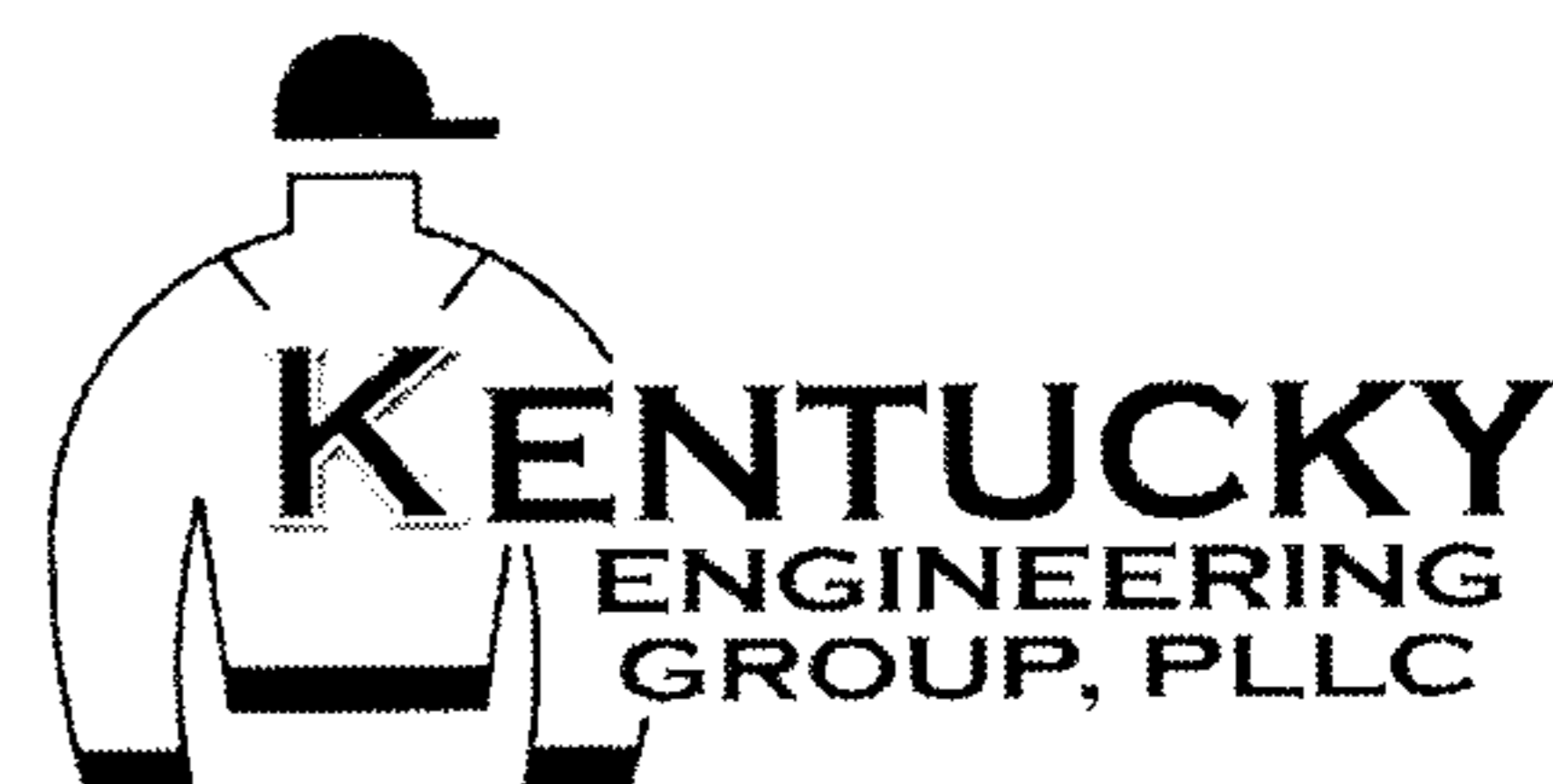
DIVISION 11 - EQUIPMENT

SECTION 11210 – SUBMERSIBLE VERTICAL TURBINE PUMPS AND MOTORS	1-12
---	------

DIVISION 17 - TELEMETRY

SECTION 17000 – INSTRUMENTATION AND CONTROL SYSTEM AND SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) – TELEMETRY SYSTEM	1-2
--	-----

BIDDING INFORMATION



ADVERTISEMENT FOR BIDS

Sealed bids for Contract 10 – Water System Improvements and/or Contract 11 – New Groundwater Well and Appurtenances for the Sandy Hook Water District, Sandy Hook, Kentucky, will be received at the Sandy Hook Water District Office, 1000 Howards Creek Road, Sandy Hook, Kentucky, 41171 until ___ a.m., Local Time, _____ and then publicly opened and read aloud.

Contract No.10- The program of work for which bids are to be submitted consists of approximately 16,000 LF of water main extensions and replacements, upgrading existing telemetry, and all related appurtenances as described in the specifications and plans.

Contract No.11- The program of work for which bids are to be submitted consists of one new groundwater well and all related appurtenances as described in the specifications and plans.

The contract time allotted for the completion of each contract is one hundred and fifty (150) consecutive calendar days.

The work is located in Elliott County, Kentucky: Drawings, Specifications and Contract Documents may be examined at:

Kentucky Engineering Group, PLLC P.O. Box 1034, Versailles, Kentucky 40383

SANDY HOOK WATER DISTRICT 1000 Howards Creek Road, Sandy Hook, Kentucky 41171

AGC/McGraw Hill, 950 Contract St. Suite 100, Lexington, KY 40505

Reed Construction Data, 30 Technology Parkway South, Ste. 500, Norcross, GA 30092

Builders Exchange, 2300 Meadow Drive, Louisville, KY 40213

Copies of the Specifications, Plans, and Contract Documents may be obtained from Lynn Imaging., 328 Vine Street, Lexington, Kentucky 40507, Phone (859) 255-1021, upon receipt of a non-refundable amount of \$300.00 for contract 10 and \$200 for contract 11.

Federal and State Wage Rates apply

Hearing impaired individuals may call 1-800-247-2510 for information.

No Bidder may withdraw his Bid within ninety (90) days after the actual date of bid opening.

Bidders on this work will be required to comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, and the Contract Work Hours Standard Act.

Bidders must comply with the President's Executive Orders No. 11246 and No. 11375 and any amendments or supplements to those Executive Orders.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed under the contract, Section 3, Segregated Facility, Section 109 and E.O. 11246.

Bidders must certify they do not and will not maintain or provide for their employees any facilities that are segregated or based on race, color, creed, or national origin.

Minorities and small businesses are encouraged to submit bids on this project.

Sandy Hook Water District reserves the right to waive any bidding informalities and to reject any or all bids.

The sealed bid for this Project shall be clearly marked on the outside of the envelope: Sealed Bid for "Contract 10- Water System Improvements" and/or "Contract 11 - New Groundwater Well and Appurtenances". The bids may be mailed to: Sandy Hook Water District, 1000 Howards Creek, Sandy Hook, Kentucky 41171.

Sandy Hook Water District
Bernal Atkins, Chairman
Date: _____

INFORMATION FOR BIDDERS

SECTION 2

INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL INSTRUCTIONS AND INFORMATION

1.01 Each Bidder is responsible for inspecting the work site and for being thoroughly familiar with the Contract Documents, including Addenda. The Bidder shall in no way be relieved from any bidding obligation because of unfamiliarity with the site or documents. Neither the Owner nor Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

1.02 All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply throughout the Contract and they will be deemed to be included in the Contract the same as though herein written out in full.

1.03 The Owner of the Project is Sandy Hook Water District.

1.04 The Engineer of the Project is Kentucky Engineering Group, PLLC., P.O. Box 1034, Versailles, Kentucky 40383, Phone 859-251-4127, Mr. Riley Sumner, Project Manager.

1.05 The Contract Documents contain the provisions for construction of the Project. Information obtained from an officer, agent, or employee of the Owner, or from any other person, shall not affect the risk or obligation assumed by the Contractor or relieves the Contractor from fulfilling any of the conditions of the Contract.

1.06 The Owner may make such investigations as deemed necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any Bid if the evidence submitted by, or an investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Agreement and to complete the Work.

PART 2 - SPECIAL INSTRUCTIONS AND INFORMATION

2.01 The Contract will be awarded based on the lowest responsible bid.

2.02 Contractor **SHALL provide to the engineer along with performance and payment bonds an insurance certificate in the amount and types of insurance as stated in Section 00800. The amounts SHALL be at a minimum the amounts stated in Section 00800 RUS Supplementary Conditions or contracts will not be signed. Please note that Kentucky Engineering Group, PLLC must be added as an "additional" insured.**

PART 3 - BIDDING PROCEDURE

3.01 Bids will be received by Sandy Hook Water District until ___ A.M. (local time) _____, _____, 2012, and then publicly opened and read aloud at said office.

3.02 Each Bid must be submitted in a sealed envelope, addressed to Sandy Hook Water District, P.O. Box 726, Sandy Hook, Kentucky 41171. The bid may be mailed to: Sandy Hook Water District, P.O. Box 726, Sandy Hook, Kentucky 41171. Each envelope containing a Bid must be plainly marked on the outside as "Sealed Bid for Contract 11 -- New Groundwater Well and Appurtenances, the envelope shall bear on the outside the Bidder's name, address and license number, if applicable, and date and time of opening. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to Sandy Hook Water District, P.O. Box 726, Sandy Hook, Kentucky 41171.

3.03 All Bids must be made on the required bid form. All blank spaces for Bid prices must be filled in, in ink or typewritten, and the Bid form must be fully completed and executed when submitted. Each bid must be submitted on the prescribed form and accompanied by the required certificates. All foregoing certifications must be fully completed and executed when submitted.

3.04 Each Bid must be accompanied by a separate Bid Bond for the Contract payable to the Owner for five (5) percent of the total amount of the Bid on the Contract. As soon as the Bid prices are compared, the Owner will return the Bonds of all except the three lowest responsible Bidders. When the Agreements are executed, the Bonds of the two remaining unsuccessful Bidders will be returned. The Bid Bonds of the successful Bidder will be retained until the Payment Bonds and Performance Bonds have been executed and approved, after which it will be returned. Certified checks payable to the Owner, equal to five (5) percent of the Bids, may be substituted for the Bid Bonds.

3.05 All bids must be made on the required Bid Form and must be fully completed and executed with original signatures and corporate seals. All Bid Bonds must be original forms and accompanied by the required certificates, original signatures and seals. Any Bids without original documents or a conditional or qualified Bid will not be accepted. All bidders must be listed on the Lynn Imaging Plan Holders List. Any entity that does not receive plans from Lynn Imaging will not be considered a responsible bidder and their bid will not be opened.

3.06 A Bid may be withdrawn prior to the scheduled time for the opening of Bids, or authorized postponement thereof. A Bid received after the time and date specified will not be considered. No Bidder may withdraw a Bid within ninety (90) days after the actual date of the opening. Should the Contract not be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the Bidder.

3.07 The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof. The Owner may waive any bidding informalities or minor defects or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered.

3.08 A conditional or qualified Bid will not be accepted.

3.09 The Bidder shall supply the names and addresses of major suppliers and subcontractors as part of the Bid Proposal.

3.10 The quantities listed in the Bid Schedule are estimates only. Final payment will be based on unit prices and actual or plan quantities of work performed.

3.11 The Owner reserves the right to add, delete or change any part or portion of the proposed work. Any changes made by the Owner that affect the work will be compensated for.

3.12 Any bidder may modify his/her bid by telegraphic communication at any time prior to the scheduled closing time for receipt of bids, provided such telegraphic communication is received by the Owner prior to the closing time, and provided further, the Owner is satisfied that a written confirmation of the telegraphic modification over the signature of the bidder was mailed prior to the closing time. The telegraphic communication should not reveal the bid price but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the bid is opened. If written confirmation is not received within two days from the closing time, no consideration will be given to the telegraphic modification.

3.13 The successful bidder, upon failure or refusal to execute and deliver the contract and bonds required within 10 days after receiving notice of the acceptance of their bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited (Bid Bond) with the bid.

3.14 Each bidder must inform themselves fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his/her obligation to furnish all material and labor necessary to carry out the provisions of the contract. Insofar as possible, the contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of or interference with the work of any other Contractor.

3.15 No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally.

Every request for such interpretation should be in writing addressed to Mr. Riley Sumner, Kentucky Engineering Group PLLC, P.O. Box 1034, Versailles, Kentucky 40383, Phone 859-251-4127, and to be given consideration must be received at least five days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if used, will be mailed to all prospective bidders (at the respective addresses furnished for such purposes), not later than three days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his/her bid as submitted. All addenda so issued shall become part of the contract documents.

3.16 At the time of the opening of bids each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the plans and Contract Documents (including all addenda). The failure or omission of any bidder to examine any form, instrument or document shall in no way relieve any bidder from any obligation in respect of his/her bid.

PART 4 - AWARD OF CONTRACT (AGREEMENT)

4.01 Award of Contract will be made to the lowest responsible Bidder for the Contract unless all Bids are rejected. The Owner reserves the right to reject any and all bids, to waive any bidding informalities, and to disregard all nonconforming, non-responsive or conditional bids. Discrepancies between words and figures will be resolved in favor of words. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

4.02 The Bidder to whom the Contract is awarded will be required to execute the Agreement and obtain the Performance Bond and Payment Bond within ten (10) calendar days from the date of the Notice of Award. The Notice of Award will be accompanied by the necessary Agreement and Bond forms. In case of failure of the Bidder to execute the Agreement, the Owner may consider the Bidder in default, in which case the Bid Bond accompanying the proposal shall become the property of the Owner.

4.03 A Performance Bond and a Payment Bond each in the amount of 100 percent (100%) of the Contract Price, with a corporate surety approved by the Owner, will be required for the faithful performance of the Contract. Such Bonds shall not be dated with a date earlier than the date of Agreement for the Contract (Project) being bonded.

4.04 Attorneys-in-fact who sign Bid Bonds or Payment Bonds and Performance Bonds must file with each Bond a certified and effective dated copy of their Power of Attorney.

4.05 The Owner within ten (10) calendar days of receipt of acceptable Performance Bond, Payment Bond and Agreement signed by the Bidder to whom the Agreement was awarded, shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the Owner not execute the Agreement within such period, the Bidder may, by written notice, withdraw the signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

4.06 The Notice to Proceed shall be issued by the Owner within ten (10) calendar days of the execution of the Agreement by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Owner and Contractor. If the Notice to Proceed has not been issued within the specified periods or the period mutually agreed upon, the Contractor may terminate the Agreement without further liability on the part of either party.

- END OF SECTION -

INFORMATION FOR BIDDERS

SECTION 3

BIDDING PROVISIONS

PART 1 - HOURS AND WAGES

1.01 No laborer, workman or mechanic in the employ of the Contractor, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by this Contract shall be permitted or required to work more than eight hours in any one calendar day or more than five days in any one week except in cases of extraordinary emergency, including fire, flood or danger to life or property.

1.02 Each laborer, workman or mechanic employed by the Contractor, Subcontractor or other person about or upon the work under this contract shall be paid no less than the prevailing rate of wages and shall be provided the supplements not less than the prevailing supplements as determined by the Fiscal Officer pursuant to Article 8 of the Labor Law. The prevailing rate schedule as determined by the Fiscal Officer follows this section and is a part of this Contract. Wage rates redetermined in accordance with the law will be transmitted, when received, to the Contractor and will become a part of this Contract at no cost to the Owner. Any person employed on the site of the work in an occupation not listed in the following prevailing rate schedule shall be paid not less than the minimum rate per hour and shall be provided not less than the supplements designated by the Fiscal Officer.

PART 2. DISCRIMINATION PROHIBITED

The Contractor agrees, in accordance with the applicable provisions of the Labor Law of the State of Kentucky:

2.01 That in the hiring of employees for the performance of work under this Contract or any subcontract hereunder, no Contractor, Subcontractor nor any person acting on behalf of such Contractor or Subcontractor, shall by reason of race, creed, color, national origin, or sex discriminate against any citizen of the State of Kentucky who is qualified and available to perform the work to which the employment relates;

2.02 That no Contractor, Subcontractor, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under this Contract on account of race, creed, color, national origin, or sex;

2.03 That this Contract may be canceled or terminated by the Owner and all monies due or to become due hereunder may be forfeited, for a second or any subsequent violation of the terms or conditions of this section of the Contract;

2.04 The aforesaid provisions of this section covering every contract for or on behalf of the State or a municipality for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of Kentucky.

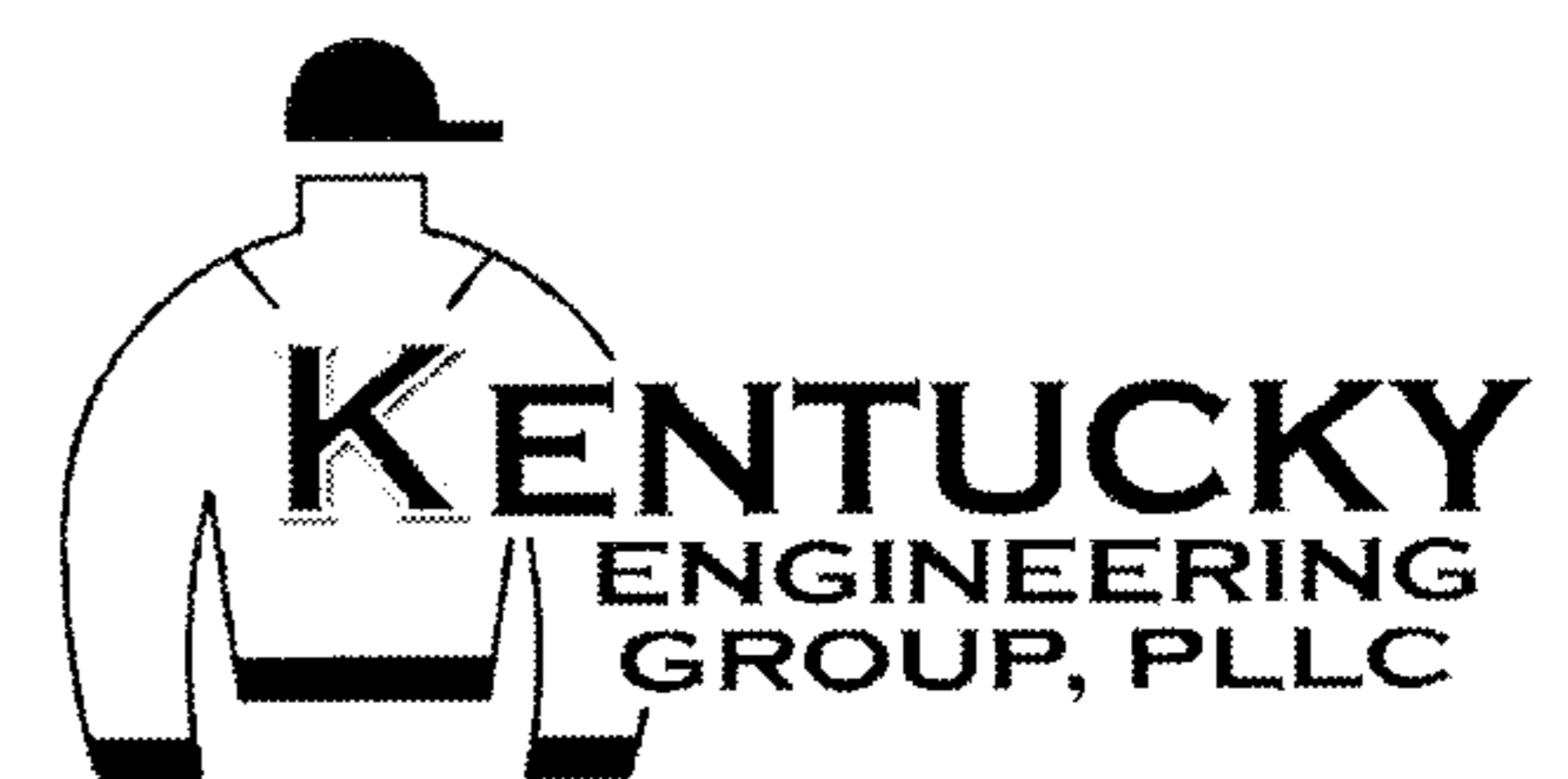
PART 3 - WORKER'S COMPENSATION

3.01 This Contract shall be void and of no effect unless the person or corporation making or performing such contract shall secure compensation for the benefit of, and keep insured during the life of such contract, such employees, in compliance with the provisions of the worker's compensation law.

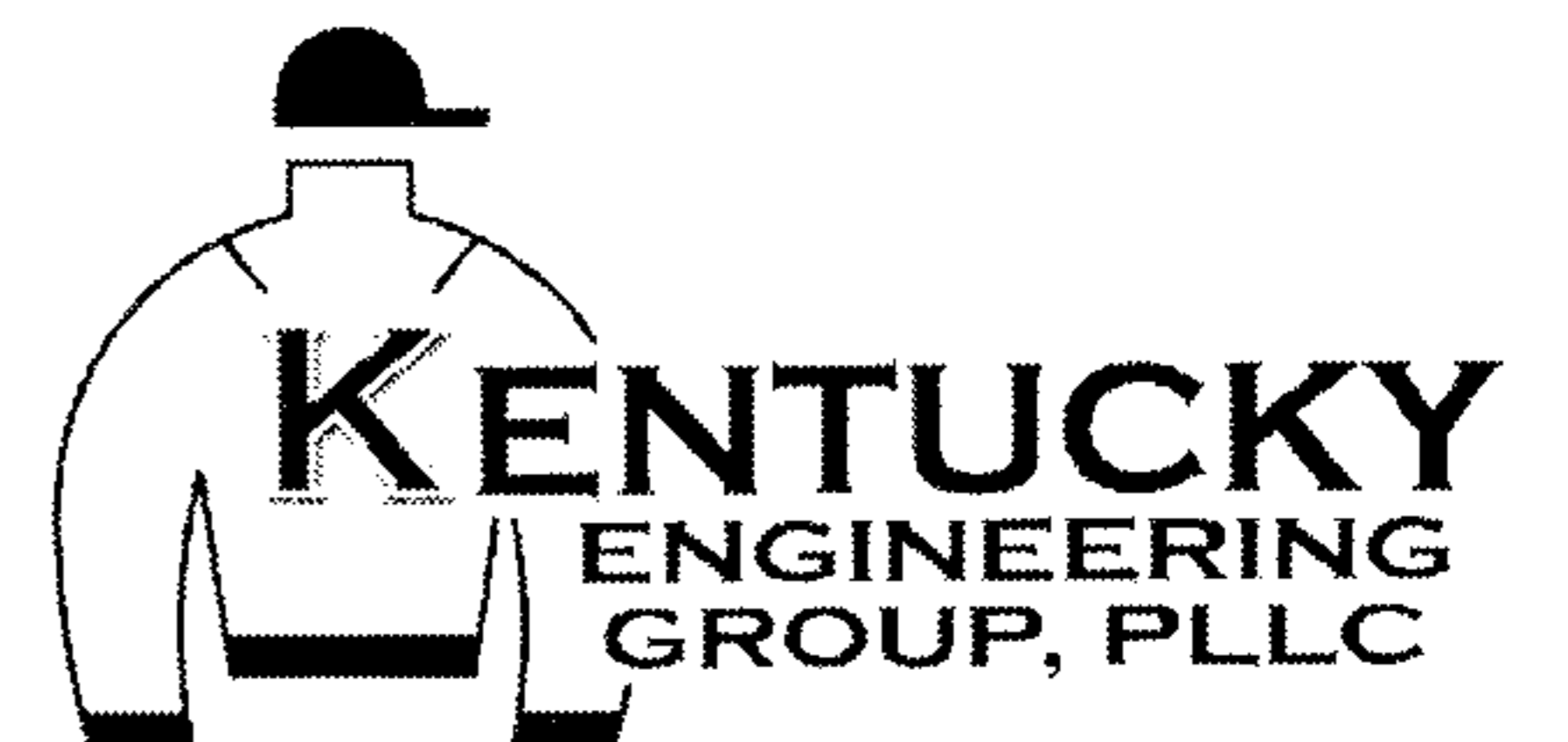
PART 4 - LIEN LAW

4.01 The attention of the Contractor is invited to the provisions of the Lien Law of the State of Kentucky, wherein funds received by a contractor for a public improvement are declared to constitute trust funds in the hands of such contractor to be applied first to the payment of certain claims.

**KENTUCKY LABOR CABINET CURRENT PREVAILING WAGE
DETERMINATION**



BID FORMS



BID FORM
SANDY HOOK WATER DISTRICT
CONTRACT 11 – NEW GROUNDWATER WELL AND APPURTENANCES

TABLE OF ARTICLES

<u>Article</u>	<u>Article No.</u>
Bid Recipient	1
Bidder's Acknowledgements	2
Bidder's Representations	3
Further Representations	4
Basis of Bid time of Completion	6
Attachments to this Bid	7
Defined Terms	8
Bid Submittal	9

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Sandy Hook Water District
P.O. Box 726
Sandy Hook, Kentucky 41171

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.

<u>Addendum No.</u>	<u>Addendum Date</u>
_____	_____
_____	_____
_____	_____

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 has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

E. 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.

- F. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- G. Bidder has correlated 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. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- J. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.

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 In compliance with the Advertisement for Bids, BIDDER hereby proposes to furnish all equipment, materials and labor for the work required to construct **Contract 11 – New Groundwater Well and Appurtenances**, for Sandy Hook Water District, Sandy Hook, Kentucky, in strict accordance with the Contract Documents, within the time set forth therein, and at the price stated below. Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

BID SCHEDULE

ITEM NO.	APPROX. QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL BID AMOUNT
1	1	LS	New Groundwater Well No. 8 – Drilling with 8” Steel Casing Pipe. Complete in Place.		

ITEM NO.	APPROX. QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL BID AMOUNT
2	1	LS	Submersible well pump, electric and all Appurtenances. Complete in Place.		
3	1	LS	Well Station valve vault and all Appurtenances. Complete in Place.		
4	1	LS	New Groundwater Well No. 8 - Testing and Data Collection. Complete in Place.		
6	1	LS	Site Work - Including fencing, crushed stone and access road. Complete in Place.		
7	1	LS	Transfer RTU Telemetry from Existing Well No. 7 to New Groundwater Well. Complete in Place.		

TOTAL AMOUNT BID - (ABOVE ITEMS): _____ Dollars and
 _____ (Cents) (_____).

All specified cash allowances are included in the price(s) set forth above and have been computed in accordance with Paragraph 11.02 of the General Conditions. Unit Prices have been computed in accordance with paragraph 11.03.A of the General Conditions.

The above prices shall include all labor, materials, overhead, profit, insurance, excavation, clean-up and other costs necessary to cover the finished work of the several kinds called for a finished product. Changes in the work shall be processed in accordance with the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the contract Documents.

By submission of this Bid, the BIDDER certifies, and in the case of a joint Bid each party thereto certifies as to its own organization, that this Bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this Bid, with any other BIDDER or with any competitor.

Accompanying this Proposal is a certified check or standard Bid Bond in the sum of _____ (Dollars) (\$ _____) in accordance with the Instructions to Bidders. The BIDDER, by submittal of this Bid, agrees with the OWNER that the amount of the bid security deposited with this Bid fairly and reasonably represents the amount of damages the OWNER will suffer due to the failure of the BIDDER to fulfill his agreements as provided in this Proposal.

BIDDER acknowledges receipt of the following Addenda:

BIDDER agrees that the OWNER reserves the right to delete the whole or any part of the Project from the Contract.

BIDDER understands that the OWNER reserves the right to reject any or all Bids and to waive any informalities in the Bidding.

BIDDER agrees that this Bid shall be good and may not be withdrawn for a period of ninety (90) calendar days after the actual date of bid opening.

BIDDER agrees to perform all of the Work described in the Specifications and shown on the Plans for the amount stated above. Within ten (10) calendar days after receiving written notice of the acceptance of this Bid by the OWNER, the BIDDER will execute and deliver to the OWNER ten (10) copies of the Agreement and such other required Contract Documents.

ARTICLE 6 – TIME OF COMPLETION

TIME OF COMPLETION AND LIQUIDATED DAMAGES

The Time of Completion of the construction of this project is highly important to the OWNER. Should any CONTRACTOR neglect, refuse, or fail to complete his Contract within the Time of Completion specified herein, after giving effect to extensions of time is any, herein provided, then in that event and in view of the difficulty of estimating with exactness the full extent of damages to the OWNER caused by delays, the sums stated herein shall be assessed on the CONTRACTOR for each and every day his work is delayed in its completion beyond the specified Time of Completion and the amount of Liquidated Damages, plus such additional engineering and inspection expenses incurred by the Owner.

For the various Contracts of the project are stated as follows and as described in the Advertisement for Bids:

DESCRIPTION OF WORK	CALENDAR DAYS FOR COMPLETION	LIQUIDATED DAMAGES PER DAY
Contract 11 – New Groundwater Well	150	\$750

The Contract completion time stipulated above includes an allowance for an average number of inclement weather days as follows:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOT
Precipitation	7	7	9	8	8	8	8	7	6	5	6	7	86
Freez. Temp.	10	6	1	0							1	5	23
Total	17	13	10	8	8	8	8	7	6	5	7	12	109

When number of days (including Saturdays, Sundays and Holidays) of Precipitation in excess of 0.1" per day or maximum daily temperature of 32 degrees F. exceed those shown above in any month, the CONTRACTOR shall be entitled to that number of additional days for contract completion.

- If, in the ENGINEER'S opinion, sustained bad weather conditions prevent satisfactory performance of the work, he may suspend operations for an executed 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.

- If the project is not completed within the specified time, the CONTRACTOR'S retainage may be used by the OWNER as one source of funds to compensate the ENGINEER for additional engineering services or legal fees required because of time delays.

ARTICLE 7 – ATTACHMENTS TO THIS BID

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

- E. Required Bid security in the form of 5%
- F. List of Proposed Subcontractors
- G. List of Proposed Suppliers
- H. List of Project References
- I. Required Bidder Qualification Statement with Supporting Data
- J. Affidavit of Non-Collusion
- K. (List other documents as pertinent)

ARTICLE 8 – DEFINED TERMS

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)

Attest _____

Date of Authorization to do business in *[State Where Project is Located]* 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 _____, 2013.

State Contractor License No. _____ (If applicable)

SECTION 00415

SUPPLEMENTS TO BID FORMS

ALL PARTS ARE REQUIRED TO BE COMPLETED AND MUST BE SUBMITTED WITH THE BID. FAILURE TO COMPLETE ALL FORMS MAY BE CAUSE FOR REJECTION OF THE BID.

PART 1 - BIDDER'S QUALIFICATIONS

A. The required names and addresses of all persons interested in the foregoing Bid, as Principals, are as follows:

B. The Bidder shall submit the requested information indicated and for work of a similar character in size and total contract price that is included in the proposed Contract and references to enable the Owner to judge the Bidder's experience, skill and business standing.

1. Number of years in business as a contractor under present business name:

2. Number of years of experience in type of construction required for this project:

3. Have you ever been declared in default or failed to complete work awarded to you? If yes, where and why? _____

4. Have you ever been cited by a regulatory agency for failure to comply with any of its contractual obligations? _____. If yes, where and why? _____

5. List and age of owned equipment available for this project: _____

6. List similar project experience with references where the Bidder was the prime contractor and percent work completed as prime and percent completed by subcontractors.

Project Name	Description of Work	Date Completed	Contract Amount	% Prime/ % Subcontract	Owner/Contact	Owner Phone No.
1.						
2.						
3.						
4.						
5.						

(Add supplementary pages if necessary)

PART 2 - SUBCONTRACTORS

All proposed subcontractors shall be listed below for each branch of work included in the proposed Contract. All subcontractors are subject to the approval of the Owner. Failure to submit a completed list may be cause for rejection of the Bid. Experience and references of all subcontractors shall be described on separate pages.

BRANCH OF WORK

NAME AND ADDRESS OF SUBCONTRACTOR

(Other)

(Add supplementary pages if necessary)

NOTES:

1. The OWNER in no way implies acceptance of any proposed subcontractor by acceptance of the Bid.
2. The CONTRACTOR will not be allowed to substitute subcontractors not listed herein without prior written approval of OWNER.
3. The CONTRACTOR shall indicate the percent or amount of work proposed by subcontractors for the total project or each branch of work listed.

SUBCONTRACTORS' REFERENCES

List similar project experience with references for each subcontractor proposed and the percent work completed by the subcontractors.

Project Name	Description of Work	Date Completed	Contract Amount	% Prime/ % Subcontract	Owner/Contact	Owner Phone No.
1.						
2.						
3.						
4.						
5.						

(Add supplementary pages if necessary)

PART 3 - MANUFACTURER'S LIST

A. The Bidder proposes to furnish the following equipment contingent upon its conformity to the Specifications and review and acceptance by the ENGINEER and OWNER.

B. Only one manufacturer's name is to be listed.

NAME OF MANUFACTURER	DESCRIPTION OF MATERIAL
_____	Telemetry

_____	_____
_____	_____
_____	_____

(Add supplementary pages if necessary)

NOTES:

1. OWNER in no way implies acceptance of such listed equipment by acceptance of the Bid.
2. The CONTRACTOR will not be allowed to substitute manufacturers not listed for the units above without prior written approval of OWNER.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,

_____ as Principal, and

_____ as Surety, are hereby held and firmly bound unto

_____ as OWNER in the penal sum of _____ for

the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 2013. The Condition

of the above obligation is such that whereas the Principal has submitted to _____ a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for **Contract 11- New Groundwater Well and Appurtenances**.

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attachment hereto (Properly completed in accordance with said BID) and shall furnish a BOND for faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

Page 2

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

(SEAL)

Principal (Legal Signature)

(SEAL)

Surety

By

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and authorized to transact business in the State where the project is located.

DEBARRED FIRMS

The undersigned hereby certifies that the firm of _____ has not and will not award a subcontract, in connection with any contract awarded to it as the result of this bid, to any firm that has been debarred for noncompliance with the Federal Labor Standards, Title VI of the Civil Rights Act of 1964, Executive Order 11246 as amended or any other Federal Law.

Name of Firm Submitting Bid

Signature of Authorized Official

Title

Date

CERTIFIED COPY OF CORPORATE RESOLUTION

(Name of Company)

I hereby certify that I am the duly elected and acting _____
 _____, a Corporation duly organized and
 existing under the laws of the State of _____; that on the _____ day of
 ____, 2013, the Board of Directors of said Corporation authorized and approved a certain Proposal to **Sandy**
Hook Water District for the construction of certain improvements for **Contract 11 - New Groundwater Well**
and Appurtenances by said Corporation and any contract resulting there from, and empowered the
 _____ (Insert Title of Officer) of said Corporation to execute said
 Proposal and Contract for and in behalf of said Corporation; that said authority is not contrary to any provision in
 the Articles of Incorporation or code of regulations or code of bylaws of said Corporation; ;that said authority has
 not been rescinded or modified; and that _____ (Insert Name of Signatory) is the duly elected
 and acting _____ (Insert Title of Office) of said Corporation.

IN WITNESS WHEREOF, I have hereunto subscribed my name on _____, 2013.

(Signature)

Subscribed and sworn to before me this _____ day of _____, 2013.

(SEAL)

NOTARY PUBLIC

NONCOLLUSION AFFIDAVIT

State of _____)

County of _____)

Bid Identification

Contractor,

being first duly sworn, deposes and says that he is

_____ (sole owner, a partner, president, secretary, etc.) of _____, the party making the foregoing bid; that such bid is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that such bid is genuine and not collusive or sham; that said bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that said bidder has not in any manner, directly or indirectly, sought by agreement, communication or conference with anyone to fix the bid price of said bidder or of any other bidder, or to fix any overhead, profit, or cost element of such bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract or anyone interested in the proposed contract; that all statements contained in such bid are true; and, further that said bidder has not, directly or indirectly, submitted his bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid and will not pay any fee in connection therewith, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, or to any other individual except to such person or persons as have a partnership or other financial interest with said bidder in his general business.

SIGNED

TITLE

Subscribed and sworn to before me this _____ day of _____, 2013.

(SEAL)

NOTARY PUBLIC

- 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):

Sandy Hook Water District
P.O. Box 726
Sandy Hook, Kentucky

BID

Bid Due Date:

Project (Brief Description Including Location):

Contract 11 – New Groundwater Well and Appurtenances

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: _____
Signature and Title

By: _____
Signature and Title
(Attach Power of Attorney)

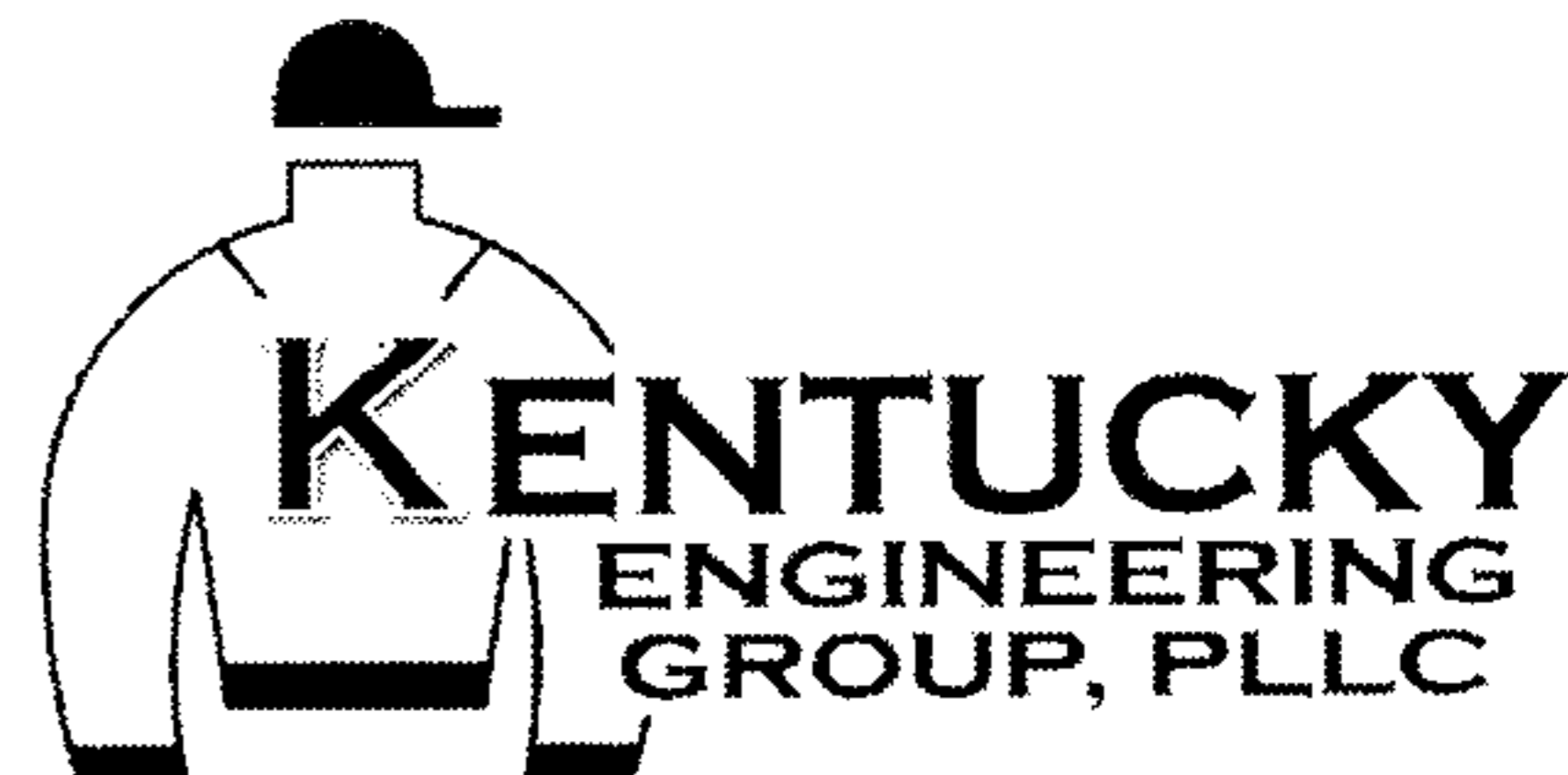
Attest: _____
Signature and Title

Attest: _____
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.

AGREEMENT FORMS
BONDS AND CERTIFICATES



Notice of Award

Dated _____

Project: New Groundwater Well and Appurtenances	Owner: Sandy Hook Water District	Owner's Contract No.: Contract 11
Contract: Contract 11 – New Groundwater Well and Appurtenances		Engineer's Project No.: 11001
Bidder:		

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

You are notified that your Bid dated _____, 2013 for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for Contract 11 – New Groundwater Well and Appurtenances.

The Contract Price of your Contract is _____
(\$_____).

4 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 [15] days of the date you receive this Notice of Award.

1. Deliver to the Owner four [4] 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.

Sandy Hook Water District.

Owner

By: _____

Authorized Signature

Chairman

Title

Copy to Engineer

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 one hundred and Fifty (150) days after the date when the Contract Time commences to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment at the date determined by Owner, Contractor, and Engineer after substantial completion, based on remaining work, weather, and market conditions.

4.03 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence on this Project and that Owner will suffer financial loss if the Work is not substantially completed within the times specified in Paragraph 4.02 above, plus any extensions 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.

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, 5.01.B, and 5.01.C. All specific cash allowances are included in the prices and have been computed in accordance with Paragraph 11.02 of the General Conditions.

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

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

N/A _____ \$ _____
(use words)

B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in this Paragraph 5.01.B:

See SECTION 00410 – BID FROMS

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

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 Progress Payments; Retainage shall be 10%.

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 15th 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:

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification.

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



PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

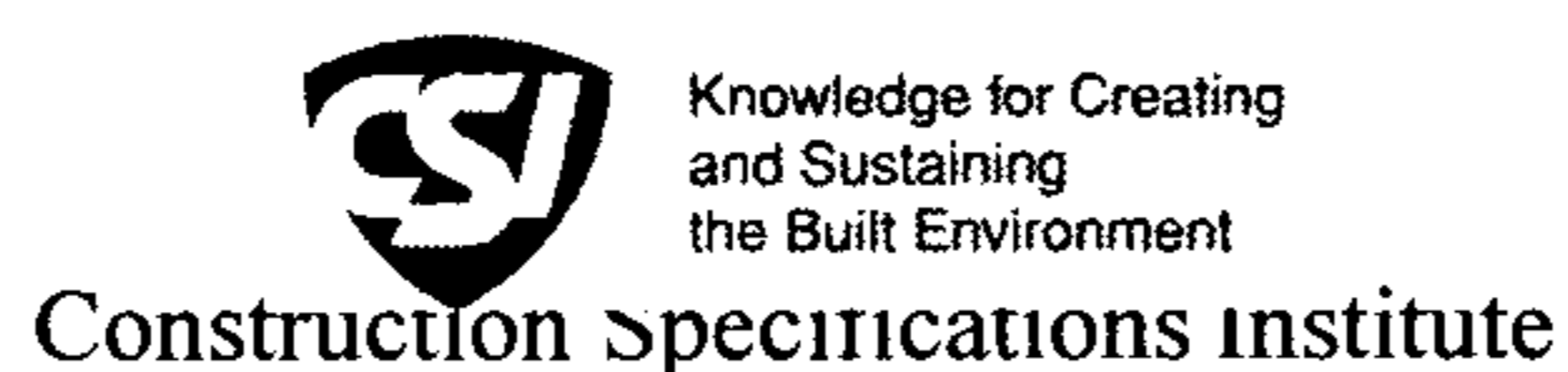
AMERICAN COUNCIL OF ENGINEERING COMPANIES

AMERICAN SOCIETY OF CIVIL ENGINEERS

This document has been approved and endorsed by



The Associated General Contractors of America



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

This Suggested Form of Agreement has been prepared for use with the Standard General Conditions of the Construction Contract, Funding Agency Edition (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 (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 (C-800, 2002 Edition).

Copyright © 2002, All Rights Reserved.

National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2715

American Council of Engineering Companies
1015 15th Street, N.W., Washington, DC 20005

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400

Introduction

This Suggested Form of Agreement between Owner and Contractor for Construction Contract, Funding Agency Edition (Stipulated Price) ("Agreement") has been prepared for use with the Guide to the Preparation of Instructions to Bidders ("Instructions")(C-200, 2002 Edition) and with the Standard General Conditions of the Construction Contract, Funding Agency Edition ("General Conditions")(C-710, 2002 Edition). Their provisions are interrelated, and a change in one may necessitate a change in the others. For guidance in the preparation of Supplementary Conditions and coordination with Instructions to Bidders, see Guide to the Preparation of Supplementary Conditions ("Supplementary Conditions")(C-800, 2002 Edition). See also Suggested Bid Form ("Bid Form") (C-410, 2002 Edition). The EJCDC has not prepared a suggested form of Advertisement or Invitation to Bid because such documents will vary widely to conform to statutory requirements.

This form and the other Bidding Documents prepared and issued by the EJCDC assume acceptance of the Project Manual concept of the Construction Specifications Institute which provides for an organizational format for location of all bound documentary information for a construction project, namely: Bidding Requirements (which term refers to the Advertisement or Invitation to Bid, the Instructions, and any Bid Form that may be suggested or prescribed, all of which provide information and guidance for all Bidders) and the Contract Documents (defined in Article 1 of the General Conditions), which include the Agreement, bonds and certificates, the General Conditions, the Supplementary Conditions, the Drawings, and the Specifications. The Bidding Requirements are not considered part of the Contract Documents because much of their substance pertains to the relationships prior to the award of the Contract and has little effect or impact thereafter and because many contracts are awarded without going through the bidding process. In some cases, however, the actual Bid may be attached as an exhibit to the Agreement to avoid extensive retyping. (The terms "Bidding Documents" and "Bidding Requirements" are defined in Article 1 of the General Conditions.) The Project Manual concept is explained in the Manual of Practice issued by the Construction Specifications Institute.

Suggested language is presented herein with "Notes to User" to assist in preparing the Agreement. Much of the language should be usable on most projects, but modifications and additional provisions will often be necessary. The suggested language has been coordinated with the other standard forms produced by the EJCDC. When modifying the suggested language or writing additional provisions, the user must check the other documents thoroughly for conflicts and coordination of language usage and make appropriate revisions in all affected documents.

Refer to the discussions in EJCDC's Recommended Competitive Bidding Procedures for Construction Projects ("Bidding Procedures") (No. 1910-9-D, 1987 Edition) (to be reissued in 2002) on the particular paragraphs of which frequent reference is made below. For brevity, referenced paragraphs of the Instructions to Bidders are referenced with the prefix "I," those of the Bid Form are referenced with the prefix "BF," and those of this Agreement are referenced with the prefix "A."

NOTES:

1. EJCDC publications may be ordered from:

NSPE headquarters
1420 King Street
Alexandria VA 22314-2715
703-684-2800
www.nspe.org

ASCE headquarters
1801 Alexander Bell Drive
Reston, VA 20191-4400
800-548-2723
www.asce.org

ACEC headquarters
1015 15th Street NW
Washington DC 20005
202-347-7474
www.acec.org

AGREEMENT FORMS

THIS AGREEMENT is by and between Sandy Hook Water District (Owner)

and _____ (Contractor).

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

ARTICLE 1 - WORK

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

Contract 11 – New Groundwater Well and Appurtenances

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:

See above.

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by:

Kentucky Engineering Group, PLLC
P.O. Box 1034
Versailles, KY 40383

(Engineer), who is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

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 one hundred and Fifty (150) days after the date when the Contract Time commences to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment at the date determined by Owner, Contractor, and Engineer after substantial completion, based on remaining work, weather, and market conditions.

4.03 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence on this Project and that Owner will suffer financial loss if the Work is not substantially completed within the times specified in Paragraph 4.02 above, plus any extensions 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 \$ 300.00 for each day that expires after the time specified in Paragraph 4.02 for Substantial Completion until the work is substantially complete.

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, 5.01.B, and 5.01.C. All specific cash allowances are included in the prices and have been computed in accordance with Paragraph 11.02 of the General Conditions.

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

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

N/A _____ \$ _____
(use words)

B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in this Paragraph 5.01.B:

See SECTION 00410 – BID FROMS

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

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. Contractor shall submit Applications for Payment in accordance with Article 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 15th 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, plus any reduction in retainage that has been agreed upon by Owner, Contractor, and Engineer.

6.03 Final Payment

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

ARTICLE 7 - INTEREST

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

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

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

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

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

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

D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in Paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions as provided in Paragraph 4.06 of the General Conditions.

E. Contractor has obtained and carefully studied (or assumes responsibility for doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.

F. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

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

H. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

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

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

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 11, inclusive).
2. Performance bond (pages _____ to _____, inclusive).
3. Payment bond (pages _____ to _____, inclusive).
4. Other bonds (pages _____ to _____, inclusive).
 - a. _____ (pages _____ to _____, inclusive).
 - b. _____ (pages _____ to _____, inclusive).
 - c. _____ (pages _____ to _____, inclusive).
5. General Conditions (pages 1 to 57, inclusive).
6. Supplementary Conditions (pages 1 to 4, inclusive).
7. Specifications as listed in the table of contents of the Project Manual.
8. Drawings consisting of _____ sheets with each sheet bearing the following general title: Contract 11 – New Groundwater Well and Appurtenances
9. Addenda (numbers _____ to _____, inclusive).
10. Exhibits to this Agreement (enumerated as follows):
 - a. Notice to Proceed (pages 1 to 1, inclusive).
 - b. Contractor's Bid (pages 1 to 10, inclusive).
 - c. Documentation submitted by Contractor prior to Notice of Award (pages _____ to _____, inclusive).
 - d. _____
11. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed (pages 1 to 1, inclusive).
 - b. Work Change Directives.
 - c. Change Order(s).

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

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

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

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

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

10.02 Assignment of Contract

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

10.03 Successors and Assigns

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

10.04 Severability

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

10.05 Other Provisions.

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.

This Agreement will be effective _____ (which is the Effective Date of the Agreement). This Agreement shall not be effective unless and until Agency's designated representative concurs.

OWNER:

CONTRACTOR:

Sandy Hook Water District

By: _____

By: _____

Title: Chairman

Title: _____

[CORPORATE SEAL]

[CORPORATE SEAL]

Attest: _____

Attest: _____

Title: _____

Title: _____

Designated Representatives:

Designated Representatives:

Name: _____

Name: _____

Title: _____

Title: _____

Address for giving notices:

Address for giving notices:

Sandy Hook Water District.

P.O. Box 726

Sandy Hook, Kentucky 41171

Phone: 606-738-6282 FAX: 606-788-6292

Phone: _____ FAX: _____

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

License No.: _____ (Where applicable)

Agent for service or 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: _____

Notice to Proceed

Dated

Project: New Groundwater Well and Appurtenances	Owner: Sandy Hook Water District.	Owner's Contract No.: Contract 11
Contract: Contract 11 – New Groundwater Well and Appurtenances		Engineer's Project No.: 11001
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 _____ 2013. 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 _____, 2013, and the number of days to achieve Substantial Completion is _____ 2013, and the number of days to achieve readiness for final payment is 60].

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]:

All Shop Drawings must be submitted and approved by the Engineer.

(Contractor)

Received by: _____

(Title)

(Date)

Sandy Hook Water District

Owner

Given by: _____

Authorized Signature

Chairman

Title

Date

Copy to Engineer

PERFORMANCE 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):
Sandy Hook Water District
P.O. Box 726
Sandy Hook, KY 41171

CONTRACT

Date:
Amount:
Description (Name and Location): Contract 11 – New Groundwater Well and Appurtenances

BOND

Bond Number:
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

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

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)
Name and Title:

Surety's Name and Corporate Seal (Seal)

By: _____
Signature and Title
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____
Signature and Title

CONTRACTOR AS PRINCIPAL

SURETY

Company:

Signature: _____ (Seal)
Name and Title:

Surety's Name and Corporate Seal (Seal)

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title:

EJCDC No. C-610 (2002 Edition)

Originally prepared through the joint efforts of the Surety Association of America, Engineers Joint Contract Documents Committee, the Associated General Contractors of America, and the American Institute of Architects.

1. 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.
2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.
3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
 - 3.1. Owner has notified Contractor and Surety, at the addresses described in Paragraph 10 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
 - 3.2. 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 3.1; and
 - 3.3. Owner has agreed to pay the Balance of the Contract Price to:
 1. Surety in accordance with the terms of the Contract;
 2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.
4. When Owner has satisfied the conditions of Paragraph 3, Surety shall promptly and at Surety's expense take one of the following actions:
 - 4.1. Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
 - 4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
 - 4.3. 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 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
 - 4.4. 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.
5. If Surety does not proceed as provided in Paragraph 4 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 4.4, 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.
6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 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 a 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:
 - 6.1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;
 - 6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of Surety under Paragraph 4; and
 - 6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.
7. 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.
8. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.
9. 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.
10. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.
11. 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.
12. Definitions.
 - 12.1. 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.
 - 12.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
 - 12.3. Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
 - 12.4. 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 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*):

Sandy Hook Water District
P.O. Box 726
Sandy Hook, Kentucky

CONTRACT

Effective Date of Agreement:

Amount:

Description (*Name and Location*): Contract No. 11 – New Groundwater Well and Appurtenances

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)
Contractor's Name and Corporate Seal

(Seal)
Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

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. Reserved.
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.

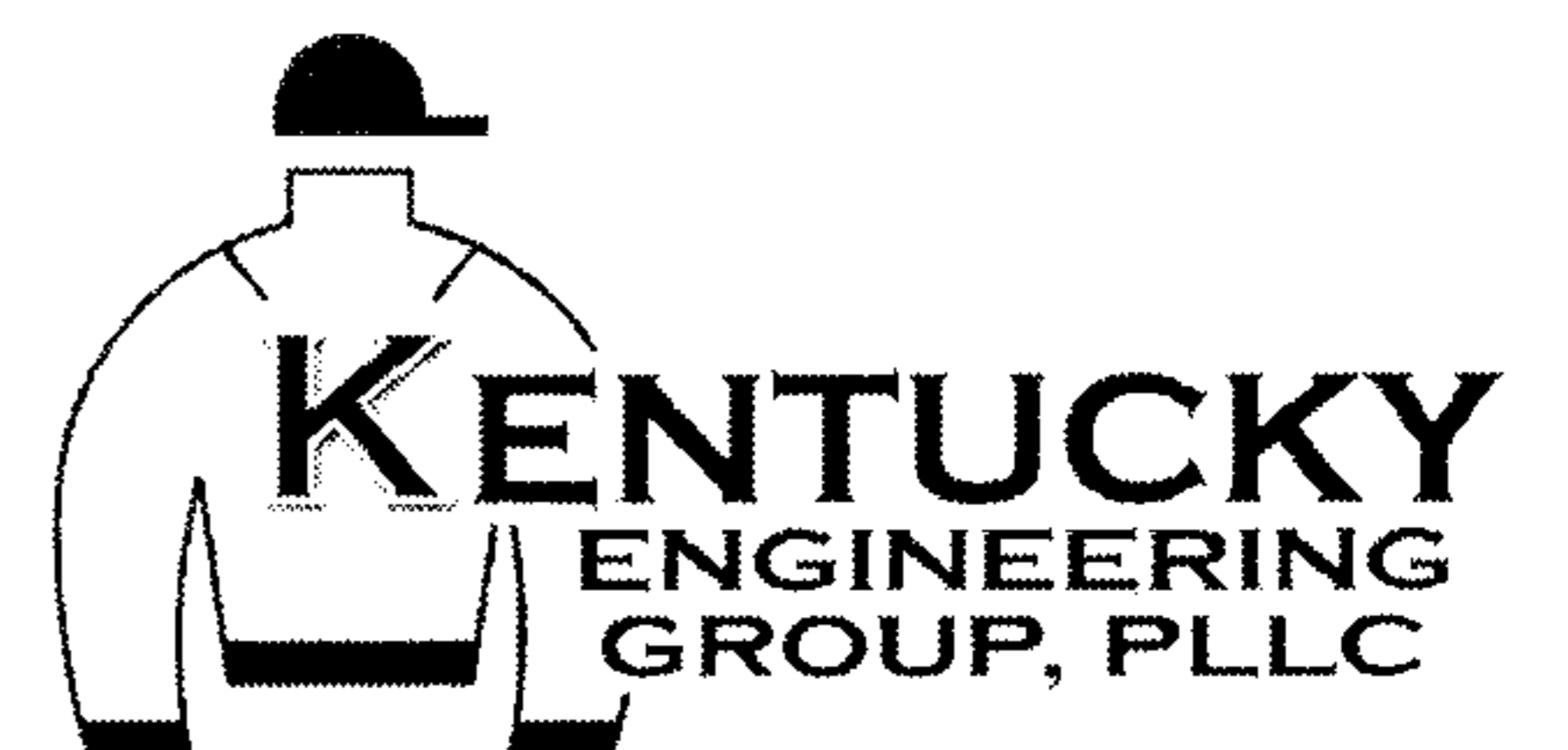
15.3 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

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

Surety Agency or Broker:

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

RURAL DEVELOPMENT INFORMATION



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



PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN COUNCIL OF ENGINEERING COMPANIES

AMERICAN SOCIETY OF CIVIL ENGINEERS

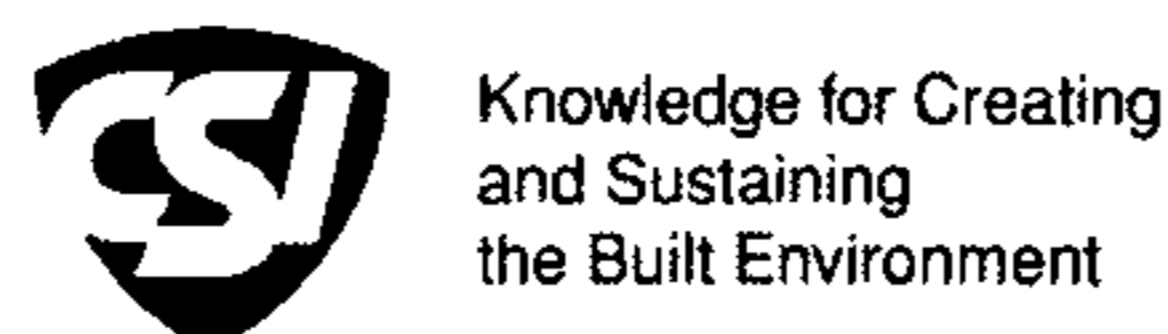
This document has been approved and endorsed by

The Associated General Contractors of America



and the

Construction Specification Institute



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. G-800, 2002 Edition).

Copyright © 2002 National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	6
1.01 Defined Terms	6
1.02 Terminology	9
Article 2 – Preliminary Matters	10
2.01 Delivery of Bonds and Evidence of Insurance	10
2.02 Copies of Documents	10
2.03 Commencement of Contract Times; Notice to Proceed	10
2.04 Starting the Work	11
2.05 Before Starting Construction	11
2.06 Preconstruction Conference	11
2.07 Initial Acceptance of Schedules	11
Article 3 – Contract Documents: Intent, Amending, Reuse	11
3.01 Intent	11
3.02 Reference Standards	12
3.03 Reporting and Resolving Discrepancies	12
3.04 Amending and Supplementing Contract Documents	13
3.05 Reuse of Documents	13
3.06 Electronic Data	13
Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points	13
4.01 Availability of Lands	13
4.02 Subsurface and Physical Conditions	14
4.03 Differing Subsurface or Physical Conditions	14
4.04 Underground Facilities	15
4.05 Reference Points	16
4.06 Hazardous Environmental Condition at Site	16
Article 5 – Bonds and Insurance	18
5.01 Performance, Payment, and Other Bonds	18
5.02 Licensed Sureties and Insurers	18
5.03 Certificates of Insurance	18
5.04 Contractor’s Liability Insurance	18
5.05 Owner’s Liability Insurance	19
5.06 Property Insurance	20
5.07 Waiver of Rights	21
5.08 Receipt and Application of Insurance Proceeds	21
5.09 Acceptance of Bonds and Insurance; Option to Replace	21
5.10 Partial Utilization, Acknowledgment of Property Insurer	22
Article 6 – Contractor’s Responsibilities	22
6.01 Supervision and Superintendence	22
6.02 Labor; Working Hours	22
6.03 Services, Materials, and Equipment	22
6.04 Progress Schedule	23
6.05 Substitutes and “Or-Equals”	23
6.06 Concerning Subcontractors, Suppliers, and Others	25
6.07 Patent Fees and Royalties	26
6.08 Permits	26
6.09 Laws and Regulations	26
6.10 Taxes	27

6.11	Use of Site and Other Areas	27
6.12	Record Documents	27
6.13	Safety and Protection.....	28
6.14	Safety Representative	28
6.15	Hazard Communication Programs	28
6.16	Emergencies.....	28
6.17	Shop Drawings and Samples	29
6.18	Continuing the Work	30
6.19	Contractor's General Warranty and Guarantee.....	30
6.20	Indemnification.....	31
6.21	Delegation of Professional Design Services	31
Article 7 – Other Work at the Site.....		32
7.01	Related Work at Site.....	32
7.02	Coordination	32
7.03	Legal Relationships	33
Article 8 – Owner's Responsibilities.....		33
8.01	Communications to Contractor.....	33
8.02	Replacement of Engineer.....	33
8.03	Furnish Data.....	33
8.04	Pay When Due	33
8.05	Lands and Easements; Reports and Tests.....	33
8.06	Insurance.....	33
8.07	Change Orders	33
8.08	Inspections, Tests, and Approvals.....	33
8.09	Limitations on Owner's Responsibilities.....	34
8.10	Undisclosed Hazardous Environmental Condition	34
8.11	Evidence of Financial Arrangements	34
Article 9 – Engineer's Status During Construction.....		34
9.01	Owner's Representative.....	34
9.02	Visits to Site.....	34
9.03	Project Representative	34
9.04	Authorized Variations in Work	35
9.05	Rejecting Defective Work	35
9.06	Shop Drawings, Change Orders and Payments.....	35
9.07	Determinations for Unit Price Work	35
9.08	Decisions on Requirements of Contract Documents and Acceptability of Work	35
9.09	Limitations on Engineer's Authority and Responsibilities.....	36
Article 10 – Changes in the Work; Claims.....		36
10.01	Authorized Changes in the Work	36
10.02	Unauthorized Changes in the Work	36
10.03	Execution of Change Orders	37
10.04	Notification to Surety	37
10.05	Claims	37
Article 11 – Cost of the Work; Allowances; Unit Price Work		38
11.01	Cost of the Work.....	38
11.02	Allowances.....	40
11.03	Unit Price Work.....	40
Article 12 – Change of Contract Price; Change of Contract Times.....		41
12.01	Change of Contract Price.....	41
12.02	Change of Contract Times.....	42

12.03	Delays	42
Article 13	– Tests and Inspections; Correction, Removal or Acceptance of Defective Work.....	43
13.01	Notice of Defects	43
13.02	Access to Work.....	43
13.03	Tests and Inspections.....	43
13.04	Uncovering Work	43
13.05	Owner May Stop the Work.....	44
13.06	Correction or Removal of Defective Work.....	44
13.07	Correction Period.....	44
13.08	Acceptance of Defective Work	45
13.09	Owner May Correct Defective Work	45
Article 14	– Payments to Contractor and Completion	46
14.01	Schedule of Values	46
14.02	Progress Payments.....	46
14.03	Contractor’s Warranty of Title	48
14.04	Substantial Completion.....	48
14.05	Partial Utilization.....	49
14.06	Final Inspection	49
14.07	Final Payment	49
14.08	Final Completion Delayed.....	50
14.09	Waiver of Claims.....	51
Article 15	– Suspension of Work and Termination	51
15.01	Owner May Suspend Work	51
15.02	Owner May Terminate for Cause	51
15.03	Owner May Terminate For Convenience.....	52
15.04	Contractor May Stop Work or Terminate	52
Article 16	– Dispute Resolution	53
16.01	Methods and Procedures	53
Article 17	– Miscellaneous	53
17.01	Giving Notice.....	53
17.02	Computation of Times	53
17.03	Cumulative Remedies	53
17.04	Survival of Obligations.....	54
17.05	Controlling Law.....	54
17.06	Headings	54
Article 18	– Federal Requirements.....	54
18.01	Agency Not a Party.....	54
18.02	Contract Approval	54
18.03	Conflict of Interest.....	54
18.04	Gratuities.....	54
18.05	Audit and Access to Records.....	55
18.06	Small, Minority and Women’s Businesses.....	55
18.07	Anti-Kickback.....	55
18.08	Clean Air and Pollution Control Acts	55
18.09	State Energy Policy.....	55
18.10	Equal Opportunity Requirements	55
18.11	Restrictions on Lobbying.....	56
18.12	Environmental Requirements	56

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

32. *Petroleum* – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
33. *Progress Schedule* – A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
34. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
35. *Project Manual* – The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
36. *Radioactive Material* – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
37. *Related Entity* – An officer, director, partner, employee, agent, consultant, or subcontractor.
38. *Resident Project Representative* – The authorized representative of Engineer who may be assigned to the Site or any part thereof.
39. *Samples* – Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
40. *Schedule of Submittals* – A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
41. *Schedule of Values* – A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
42. *Shop Drawings* – All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
43. *Site* – Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
44. *Specifications* – That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
45. *Subcontractor* – An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
46. *Substantial Completion* – The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
47. *Successful Bidder* – The Bidder submitting a responsive Bid to whom Owner makes an award.

48. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.
49. *Supplier* – A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.
50. *Underground Facilities* – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
51. *Unit Price Work* – Work to be paid for on the basis of unit prices.
52. *Work* – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
53. *Work Change Directive* – A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and Agency upon recommendation of the Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

- A. The following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following meaning.
- B. *Intent of Certain Terms or Adjectives*
 1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered”, “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.
- C. *Day*
 1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective*

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

E. *Furnish, Install, Perform, Provide*

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

2.02 *Copies of Documents*

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

2.03 *Commencement of Contract Times; Notice to Proceed*

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

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

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

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

2.06 *Preconstruction Conference*

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

2.07 *Initial Acceptance of Schedules*

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

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage

as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to Owner.

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

3.02 *Reference Standards*

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

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

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies

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

B. Resolving Discrepancies

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

3.04 *Amending and Supplementing Contract Documents*

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

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or Engineer's consultants, including electronic media editions; or
 - 2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaption by Engineer.
- B. The prohibition of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

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

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

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any,

of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and
 - 2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:
 - 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:
 - 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.

4.04 *Underground Facilities*

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

- c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction, and
- d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

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

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their Related Entities with respect to:
 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 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.

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

5.05 *Owner's Liability Insurance*

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

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (Contractor shall be responsible for any deductible or self-insured retention.). This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
 2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.
- B. Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insured or additional insured (and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Contractor as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them.

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

6.02 *Labor; Working Hours*

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

6.03 *Services, Materials, and Equipment*

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

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

6.04 *Progress Schedule*

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

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
 - 1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times, and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items

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

- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity, nor
 - 2. shall anything in the Contract Documents create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

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

6.07 *Patent Fees and Royalties*

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

6.08 *Permits*

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

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's primary responsibility to make certain

that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

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

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

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

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

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

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

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved

Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

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

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract

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

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.
1. *Shop Drawings*
 - a. Submit number of copies specified in the General Requirements.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
 2. *Samples*
 - a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Submittal Procedures*
1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:
 - a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
 - c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
 - d. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
 3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review*

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

E. *Resubmittal Procedures*

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

6.18 *Continuing the Work*

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

6.19 *Contractor's General Warranty and Guarantee*

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

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

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, partners, employees, agents, consultants and subcontractors arising out of:
 1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

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

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

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

7.02 *Coordination*

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

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

7.03 *Legal Relationships*

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

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

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

8.05 *Lands and Easements; Reports and Tests*

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

8.06 *Insurance*

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

8.07 *Change Orders*

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

8.08 *Inspections, Tests, and Approvals*

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

8.09 *Limitations on Owner's Responsibilities*

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

8.10 *Undisclosed Hazardous Environmental Condition*

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

8.11 *Evidence of Financial Arrangements*

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

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

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

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

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

9.04 *Authorized Variations in Work*

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

9.05 *Rejecting Defective Work*

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

9.06 *Shop Drawings, Change Orders and Payments*

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

9.07 *Determinations for Unit Price Work*

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

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

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believe that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

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

9.09 *Limitations on Engineer's Authority and Responsibilities*

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

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

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

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

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

10.04 *Notification to Surety*

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

10.05 *Claims*

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

- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

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

11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.
 - 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
 - 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 - 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
 - 4. Costs of special consultants (including but not limited to Engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
 - 5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are

consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

- c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressages, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

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

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

- C. **Contractor's Fee:** When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. **Documentation:** Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

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

11.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
1. the Bid price of a particular item of Unit Price Work amounts to more than 5 percent of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

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

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - 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.

12.02 *Change of Contract Times*

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

12.03 *Delays*

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

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

13.01 *Notice of Defects*

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

13.02 *Access to Work*

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

13.03 *Tests and Inspections*

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

13.04 *Uncovering Work*

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

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

13.05 *Owner May Stop the Work*

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

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.
 - C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
 - D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
 - E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

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

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

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

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

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

14.02 *Progress Payments*

A. *Applications for Payments*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations on the Site of the executed Work as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;

- b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
 3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due

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

D. *Reduction in Payment*

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

14.03 *Contractor's Warranty of Title*

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

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Agency, Contractor, and Engineer shall make a prefinal inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within 14 days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said 14 days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

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

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions.
 - 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;
 - 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 Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

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

15.02 *Owner May Terminate for Cause*

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

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

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

15.03 *Owner May Terminate For Convenience*

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

15.04 *Contractor May Stop Work or Terminate*

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

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. 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 shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 - 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions, or
 - 2. agrees with the other party to submit the Claim to another dispute resolution process, or
 - 3. gives written notice to the other party of their intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

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

17.02 *Computation of Times*

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

17.03 *Cumulative Remedies*

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

17.04 *Survival of Obligations*

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

ARTICLE 18 – FEDERAL REQUIREMENTS

18.01 *Agency Not a Party*

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

18.02 *Contract Approval*

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

18.03 *Conflict of Interest*

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

18.04 *Gratuities*

- A. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner or Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.
- B. In the event this Contract is terminated as provided in paragraph 18.04.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an

amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

18.05 *Audit and Access to Records*

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

18.06 *Small, Minority and Women's Businesses*

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

18.07 *Anti-Kickback*

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

18.08 *Clean Air and Pollution Control Acts*

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

18.09 *State Energy Policy*

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

18.10 *Equal Opportunity Requirements*

- A. If this Contract exceeds \$10,000, Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."
- B. Contractor's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative active obligations required by the Standard Federal Equal Employment

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

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

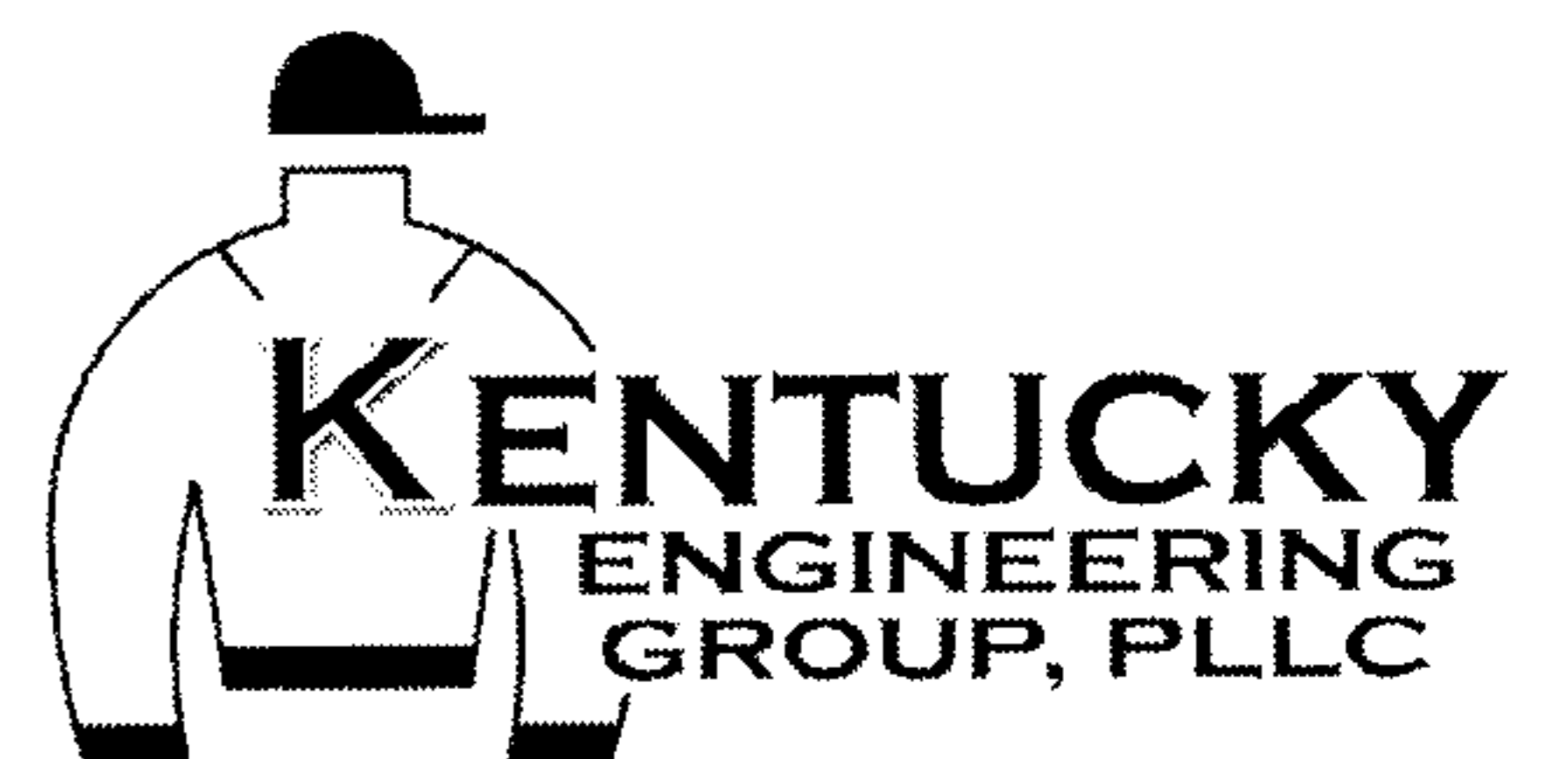
18.11 *Restrictions on Lobbying*

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

18.12 *Environmental Requirements*

- A. When constructing a project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental constraints:
 1. Wetlands – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.
 2. Floodplains – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.
 3. Historic Preservation – Any excavation by Contractor that uncovers an historical or archaeological artifact shall be immediately reported to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the State Historic Preservation Officer (SHPO).
 4. Endangered Species – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.

RURAL DEVELOPMENT
SUPPLEMENTARY CONDITIONS



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.

TABLE OF CONTENTS

	Page
SC-1.01.A.2 Project Financing	00710-6
SC-1.01.A.4 Application for Payment	00710-6
SC-1.01.A.10 Change Order	00710-6
SC-1.01.A.15 Contract Times	00710-7
SC-2.03.A Commencement of Contract Times; Notice to Proceed	00710-11
{SC-4.02 Subsurface and Physical Conditions}	00710-14
{SC-4.06 Hazardous Environmental Condition at Site}	00710-17
SC-5.03 Certificates of Insurance	00710-19
SC-5.04 Contractor's Liability Insurance	00710-19
{SC-5.06.A Property Insurance }	00710-20
{SC-5.06.A.1 Property Insurance}	00710-20
SC-6.06 Concerning Subcontractors, Suppliers, and Others	00710-26
{SC-7.02.A.1 Coordination }	00710-33
SC-9.03 Project Representative	00710-35
SC-14.02.A.3 Applications for Payment	00710-47
SC-14.02.C.1 Payment Becomes Due	00710-48
SC-18.08 Clean Air and Pollution Control Acts	00710-56

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 Abandoned Mine Lands pursuant to the Consolidated Farm and Rural Development Act (7 USC Section 1921 et seq.). *{add other funding sources and modify when necessary.}*

Coal Severance Tax & Bond

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 Facilities) 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 (40CFR Part 15).

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

UNITED STATES DEPARTMENT OF AGRICULTURE
RURAL DEVELOPMENT AND
FARM SERVICE AGENCY

CONTRACT CHANGE ORDER

CONTRACT FOR

OWNER

ORDER NO.

DATE

STATE

COUNTY

To

(Contractor)

You are hereby requested to comply with the following changes from the contract plans and specifications:

Description of Changes (Supplemental Plans and Specifications Attached)	DECREASE in Contract Price	INCREASE in Contract Price
	\$ _____	\$ _____
TOTALS	\$ _____	_____
NET CHANGE IN CONTRACT PRICE	\$ _____	_____

JUSTIFICATION:

The amount of the Contract will be (Decreased) (Increased) By The Sum Of: _____ Dollars (\$ _____).

The Contract Total Including this and previous Change Orders Will Be: _____ Dollars (\$ _____).

The Contract Period Provided for Completion Will Be (Increased) (Decreased) (Unchanged): _____ Days.

This document will become a supplement to the contract and all provisions will apply hereto.

Requested _____ (Owner) _____ (Date)

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

Accepted _____ (Contractor) _____ (Date)

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

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

COMPLIANCE STATEMENT

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

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

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

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

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

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

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

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0575-0018. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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

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

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

DATE: _____

CERTIFICATION FOR CONTRACTS, GRANTS AND LOANS

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

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

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

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

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

(name)

(date)

(title)

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

Instructions for Certification

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

Certificate of Substantial Completion

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- All Work under the Contract Documents:
 The following specified portions:

_____ Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [revised tentative] [definitive] list of items to be completed or corrected, is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- Amended Responsibilities
 Not Amended

Owner's Amended Responsibilities:

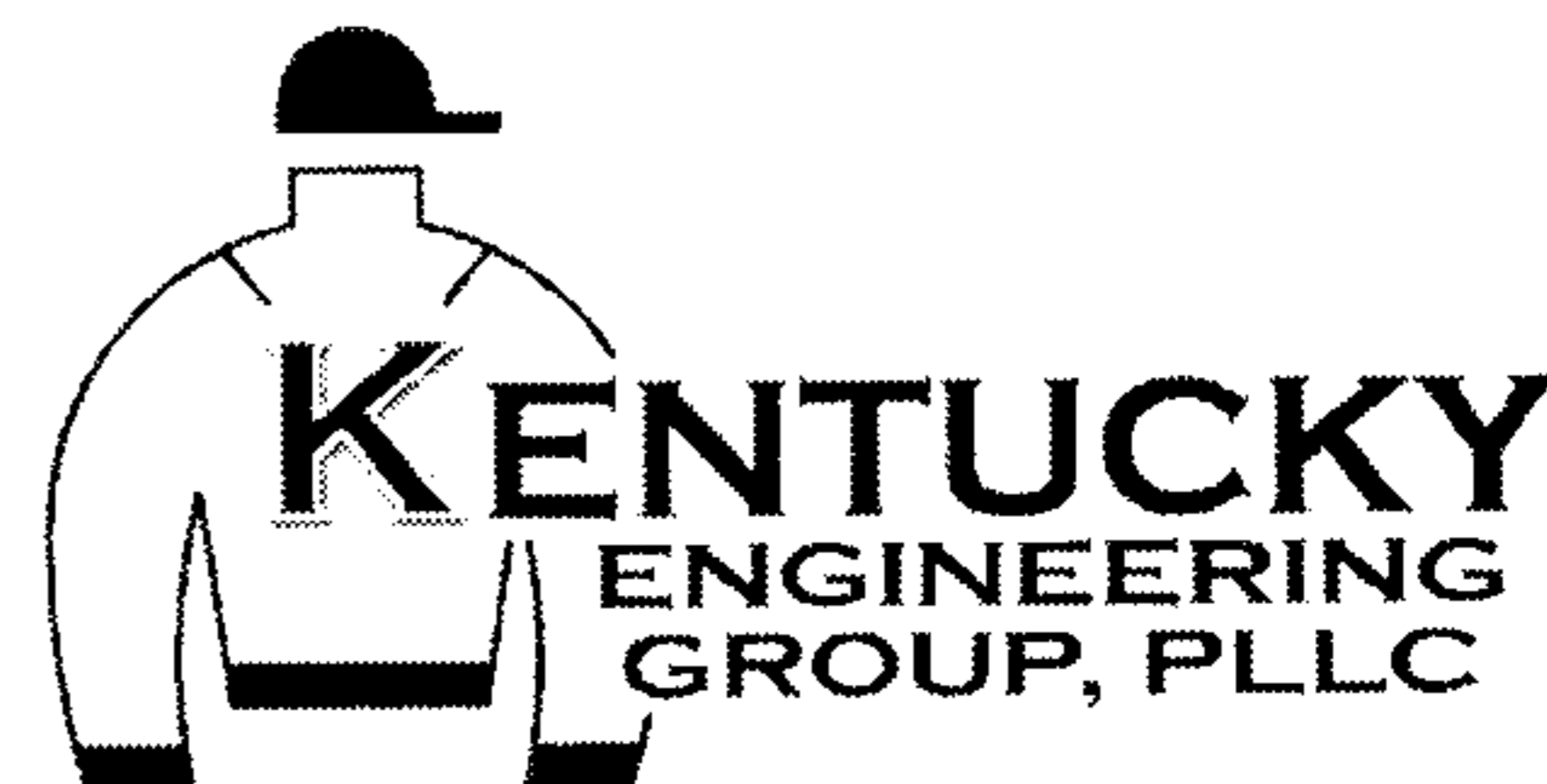
Contractor's Amended Responsibilities:

The following documents are attached to and made part of this Certificate:

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by Engineer	Date
Accepted by Contractor	Date
Accepted by Owner	Date

**KENTUCKY ENGINEERING GROUP
GENERAL CONDITIONS**



SECTION 00700**GENERAL CONDITIONS****1. CONTRACT DOCUMENTS**

The Notice to Bidders, Instructions to Bidders, Bid, Bid Bond, Agreement, Performance and Payment Bonds, Certificate of Insurance, Notice of Award, Notice to Proceed, Change Order Form, Contractor's Affidavit to Accompany Partial Payment Estimate, General Conditions, Supplementary General Conditions, Drawings, Addenda and Specifications shall all be binding on the Contractor, and shall be fully a part of the Contract as if thereto attached or therein repeated in words and figures.

2. DEFINITIONS AND MEANINGS OF TERMS

Whenever in the Contract Documents the following terms or pronouns referring to them are used, the intent and meaning shall be interpreted as follows which shall be applicable to both the singular and plural thereof:

A. The CONTRACT shall mean the contract executed by the Owner and the Contractor, of which these General Conditions form a part; the terms CONTRACT and AGREEMENT are synonymous.

B. The terms OWNER and CONTRACTOR shall mean the respective parties to the Contract; the OWNER being a public or quasi-public body or authority, corporation, association, partnership, or individual for whom the work is to be performed; the CONTRACTOR being the individual, partnership or corporation with whom the Owner has executed the Contract.

C. The term ENGINEER shall mean Kentucky Engineering Group, PLLC., successor, or duly authorized representative.

D. ADDENDA shall mean written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions, deletions, clarifications or corrections.

E. BID shall mean the offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed; the terms BID and PROPOSAL are synonymous.

F. BIDDER shall mean any individual, partnership or corporation submitting a BID for the WORK.

G. BONDS shall mean Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.

H. CHANGE ORDER shall mean a written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

I. CONTRACT DOCUMENTS shall mean the contract, including NOTICE TO BIDDERS, INSTRUCTIONS TO BIDDERS, BID, BID BOND, AGREEMENT, PAYMENT BOND, PERFORMANCE BOND, CERTIFICATE OF INSURANCE, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, CONTRACTOR'S AFFIDAVIT TO ACCOMPANY PARTIAL PAYMENT ESTIMATE, DRAWINGS, GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS, ADDENDA and SPECIFICATIONS.

J. CONTRACT PRICE shall mean the total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

K. **CONTRACT TIME** shall mean the number of calendar days stated in the **CONTRACT DOCUMENTS** for the completion of the **WORK**.

L. **DRAWINGS** shall mean the part of the **CONTRACT DOCUMENTS** which show the characteristics and scope of the **WORK** to be performed and which have been prepared or approved by the **ENGINEER**.

M. **FIELD ORDER** shall mean a written order effecting a change on the **WORK** not involving an adjustment in the **CONTRACT PRICE** or an extension of the **CONTRACT TIME**, issued by the **ENGINEER** to the **CONTRACTOR** during construction.

N. **NOTICE OF AWARD** shall mean the written notice of the acceptance of the **BID** from the **OWNER** to the successful **BIDDER**.

O. **NOTICE TO PROCEED** shall mean written communication issued by the **OWNER** to the **CONTRACTOR** authorizing him to proceed with the **WORK** and establishing the date of commencement of the **WORK**.

P. **PROJECT** shall mean the undertaking to be performed as provided in the **CONTRACT DOCUMENTS**.

Q. **RESIDENT PROJECT REPRESENTATIVE** shall mean the authorized representative of the **OWNER** who is assigned to the **PROJECT** site or any part thereof.

R. **SHOP DRAWING** shall mean all drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the **CONTRACTOR**, a **SUBCONTRACTOR**, manufacturer, **SUPPLIER** or distributor, which illustrate how specific portions of the **WORK** shall be fabricated or installed; the terms **SHOP DRAWINGS** and **SUBMITTALS** are synonymous.

S. **SPECIFICATIONS** shall mean a part of the **CONTRACT DOCUMENTS** consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

T. **SUBCONTRACTOR** shall mean individual, partnership or corporation having a direct contract with the **CONTRACTOR** or with any other **SUBCONTRACTOR** for the performance of a part of the **WORK** at the site.

U. **SUBSTANTIAL COMPLETION** shall mean that date as certified by the **ENGINEER** when the construction of the **PROJECT** or a specified part thereof is sufficiently completed, in accordance with the **CONTRACT DOCUMENTS**, so that the **PROJECT** or specified part can be utilized for the purposes for which it is intended.

V. **SUPPLIERS** shall mean any person, supplier or organization who supplies materials or equipment for the **WORK**, including that fabricated to a special design, but who does not perform labor at the site.

W. **WORK** shall mean labor necessary to produce the construction required by the **CONTRACT DOCUMENTS**, AND all materials and equipment incorporated or to be incorporated in the **PROJECT**.

X. **WRITTEN NOTICE** shall mean any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the **WORK**.

3. DRAWINGS AND SPECIFICATIONS

The intent of the Drawings and Specifications is that the Contractor shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the Work in accordance with the Contract

Documents and all incidental work necessary to complete the Project in an acceptable manner, ready for use, occupancy or operation by the Owner.

The Engineer, without charge, will furnish to the Contractor not more than eight (8) sets of the Drawings and Specifications. If additional sets of documents are required by the Contractor for the proper handling of the work, such documents will be furnished to the Contractor at cost.

The Contractor shall keep one set of the Drawings and Specifications on the site of the work. These prints shall be kept and maintained in good condition at the project site and a qualified representative of the Contractor shall enter upon these prints, from day-to-day, the actual "as-built" record of the construction progress. Entries and notations shall be made in a neat and legible manner and these prints shall be delivered to the Engineer upon completion of the construction. APPROVAL OF PARTIAL PAYMENTS AND FINAL PAYMENT WILL BE CONTINGENT UPON COMPLIANCE WITH THIS PROVISION.

The Drawings and Specifications are intended to be explanatory to each other, but should any discrepancy appear or any misunderstanding arise as to the importance of anything contained in either, the Engineer shall make the necessary interpretation. Corrections of errors or omissions in the Drawings or Specifications may be made by the Engineer when such corrections are necessary for the proper fulfillment of their intention as construed by the ENGINEER.

All work or materials shown on the Drawings and not mentioned in the Specifications, or any work specified and not shown on the Drawings, shall be furnished, performed, and done by the Contractor as if same were both mentioned in the Specifications and shown on the Drawings.

Should the Contractor in preparing his bid find anything necessary for the construction of the project that is not mentioned in the Specifications or shown on the Drawings, or find any other discrepancy in the Contract Documents, he shall notify the Engineer so that such discrepancies may be corrected by addendum prior to the bid opening. Should the Contractor fail to notify the Engineer of such discrepancies, it will be assumed that his bid included everything necessary for the complete construction in the spirit and intent of the designs shown.

The Contractor may be furnished additional instructions and detail drawings, by the Engineer, as necessary to carry out the Work required by the Contract Documents. The additional drawings and instructions thus supplied will become a part of the Contract Documents. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions.

4. SHOP DRAWINGS

The Contractor shall submit (in reproducible transparency form unless otherwise specified) shop and working drawings of concrete reinforcement, structural details, piping layout, wiring, materials fabricated especially for the Contract, and materials and equipment for which such drawings are specifically requested.

Such drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for the Contract.

When so specified or if considered by the Engineer to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted in place of shop and working drawings. In such case, the requirements shall be as specified for shop and working drawings, insofar as possible, except that the submission shall be in quadruplicate.

The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings so that there shall be no delay to the Work due to the absence of such drawings. Prior to the submittal of any shop drawings, the Contractor shall submit a schedule of proposed shop drawing transmittals. The schedule shall

identify the subject matter of each transmittal, the corresponding specification section number and the proposed date of submission. During the progress of the Work, the schedule shall be revised and resubmitted as necessary.

No material or equipment shall be purchased or fabricated especially for the Contract until the required shop and working drawings have been submitted as herein above provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.

Until the necessary review has been made, the Contractor shall not proceed with any portion of the Work (such as the construction of foundations), the design or details of work, materials, equipment or other features for which review is required.

All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24-in. by 36-in. sheets, except those which are made by changing existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner, Contractor, and building, equipment, or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by a letter of transmittal giving a list of the drawing numbers and the names mentioned above.

Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer; other drawings shall be returned for correction.

If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.

The review of shop and working drawings hereunder will be general only, and nothing contained in these GENERAL CONDITIONS shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and performance specified thereunder.

Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires and appurtenances, layout, etc., detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do all work necessary to make such modifications.

The marked-up reproducible of the shop and working drawings or one marked-up copy of catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when so requested. The Engineer will require approximately fifteen (15) days for review of shop drawings.

5. DISCREPANCIES IN DRAWINGS, SPECIFICATIONS AND SHOP DRAWINGS

In case of a discrepancy on the Drawings, figure dimensions shall govern over scale dimensions and large scale drawings shall govern over small scale drawings. In case of a discrepancy in the Specifications and Contract Documents, detailed technical specifications and special or supplementary conditions shall govern over general conditions and other sections of the Contract Documents. In case of a discrepancy between the Drawings and Specifications, the Specifications shall govern; addenda shall govern over all Drawings, Specifications and Contract Documents. Supplementary Conditions shall govern over these General Conditions.

In case of discrepancy between the shop drawings and the requirements of the Drawings, Specifications and Contract Documents, the provisions of the Drawings, Specifications, and Contract Documents shall prevail,

even though the shop drawings have been reviewed by the Engineer, unless the conflict therein has been specifically waived in writing by the Engineer.

Any discrepancies found between the Drawings and Specifications and site conditions or any inconsistencies or ambiguities in the Drawings or Specifications shall be immediately reported to the Engineer, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor's risk.

6. CONTRACTOR

Only one Contractor is recognized as a party to this Contract and where the term CONTRACTOR is used, the prime contractor who signed this Contract is referred to. For convenience, the Specifications may have been divided into separate headings or divisions to cover the various trades represented in the work, and where "Electrical Contractor", "Mechanical Contractor", "Plumbing Contractor" and other such "Contractors" are referred to, it is for convenience only.

It is understood and agreed that the Contractor has satisfied himself as to the nature and location of the work, the topography of the ground, the character and quality of materials to be encountered, the character of equipment or other facilities needed for the proper execution of the Work, the general and local conditions, and all other matters which in any way affect the work under the Contract. No verbal statement of any officer, agent or employee of the Owner or the Engineer, either before or after the execution of the Contract, shall affect or modify any of the terms or obligations contained herein.

7. NOTICE AND SERVICE THEREOF ON CONTRACTOR

The address given in the Proposal upon which this Contract is founded and the Contractor's office at or near the site of the work are hereby designated as places to either of which notices, letters and other communications to the Contractor shall be certified, mailed or delivered. The delivering at the above named places, or depositing in a postpaid wrapper directed to the first named place, in any post office box regularly maintained by the United States Postal Service, of any notice, letter or other communication to the Contractor shall be deemed sufficient service thereof upon the Contractor, and the date of said service shall be the date of delivery or mailing. The first named address may be changed at any time by an instruction in writing, executed and acknowledged by the Contractor and delivered to the Engineer and the Owner. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon the Contractor personally.

8. ASSIGNMENT OF CONTRACT

The Contractor shall not assign, sell, transfer or otherwise dispose of his contract or any monies due or that may become due thereunder, without the prior written consent of the Owner.

9. SUBLETTING CONTRACT

The Contractor may utilize the services of specialty Subcontractors on those parts of the Work which, under contracting practices, are performed by specialty Subcontractors. However, the Contractor will not be permitted to sublet any portion of his contract to any individual, co-partnership, or corporation without the prior written consent of the Owner and the approval of the Engineer. The Contractor shall not sublet more than fifty percent (50%) of the work without the consent of the Owner and the approval of the Engineer prior to the receipt of bids. The Contractor shall, if requested, notify the Owner in writing of the names of subcontractors proposed for the work.

The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to the Contractor by the terms of the General Conditions and other Contract Documents insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provisions of the Contract Documents.

Nothing contained in this contract shall create any contractual relation between any subcontractor and the Owner.

All subcontractors are subject to the approval of the Owner.

10. COMMENCEMENT AND COMPLETION OF WORK

The Contractor shall commence work on a date to be specified in a written order of the Owner, and shall fully complete all work under the Contract within the number of days set out in the Bid and Contract. As set forth in the Bid and Contract, the work under the Contract will be subject to liquidated damages in the event the work is not completed within the Contract Time.

11. PROSECUTION OF WORK

The Contractor shall give his personal superintendence to the work or shall have a competent superintendent, satisfactory to the Owner and the Engineer on the work at all times during its progress with full authority to act for him. The superintendent shall have been designated in writing by the Contractor as the Contractor's representative at the site. The Contractor may not change or substitute superintendent without written approval of the Owner. All communications given to the superintendent shall be as binding as if given to the Contractor. The Contractor shall also provide an adequate staff for properly coordinating and expediting his work. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction.

The Contractor shall be prepared to start the work as stipulated in the Proposal, but not until he has received official notice from the Owner to do so. Official notice will be in the form of a written Notice to Proceed. The work shall be prosecuted in a manner and with sufficient materials, equipment, and labor as is considered necessary to insure completion within the time set forth in the Contract. The Contractor shall not suspend the work or any portion of it without the written consent of the Owner and the approval of the Engineer.

12. CONTRACT TIME - DELAYS AND EXTENSIONS

The number of days in which the Contractor shall fully perform the proposed work has been set out in the Proposal and/or Contract. The date of beginning and the time for completion of the Work are essential conditions of the Contract.

In arriving at any credit due the Contractor for an extension of time on the Contract, the Owner, upon the recommendation of the Engineer, may allow such credit as in his judgement is deemed equitable and just for all delays occasioned by any act, or failure to act, on the part of the Contractor or caused by forces beyond the Contractor's control. Additional time will also be allowed the Contractor to cover approved over-runs or additions to the Contract in the same proportion that the said over-runs or additions in monetary value bears to the original contract amount. Delays caused by normal and ordinary weather conditions foreseeable at the time the work is bid will not be the basis for an extension of the Contract Time.

If the Contractor claims that any instructions by Drawings or otherwise involve an extension of time, 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.

The Contractor shall make no claim for extra compensation due to delays of the project beyond his control. Such delays may include those caused by any act of neglect on the part of the Owner or Engineer, or by any employee of either, or by any separate contractor employed by the Owner, or by changes ordered in the work, or by labor disputes, fire, unusual delays in transportation, adverse weather conditions not reasonably anticipatable, unavoidable casualties, or by delay authorized by the Owner pending arbitration, or by any other cause which the Engineer determines may justify the delay.

Time extensions may be granted upon proper justification by the Contractor. Any claim for time extensions under these provisions shall be submitted in writing to the Engineer not more than twenty (20) days following commencement of the delay; otherwise claim will be waived. With submission of claim, Contractor shall provide an estimate of the probable effect of such delay on the progress of the work.

Additional costs incurred in accelerating the work to compensate for such delays (as defined above) shall also not form the basis for extra compensation claims.

13. FAILURE TO COMPLETE WORK ON TIME

Should the Contractor fail or refuse to complete the work within the time specified in his Proposal and/or Contract (or extension of time granted by the Owner), the Contractor shall pay liquidated damages in an amount set out in said Proposal and/or Contract. The amount of liquidated damages shall in no event be considered as a penalty, nor other than an amount agreed upon by the Contractor and the Owner for damages, losses, additional engineering, additional resident inspection and other costs that will be sustained by the Owner, if the Contractor fails to complete the work within the specified time. Liquidated damages will be applied on a rate per day for each and every calendar day (Sundays and holidays included) beyond the contract expiration date stipulated in the Contract Documents, considering all time extensions granted.

14. CHARACTER OF WORKMEN, EQUIPMENT, AND MATERIAL

The Contractor shall employ only workmen skilled in their various duties and shall remove from the project, at the request of the Engineer, any person employed in, about, or upon the work, who misconducts himself or is incompetent or negligent in the performance of the duties assigned to him.

The Contractor shall at all times enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him. Any careless, untrustworthy, or incompetent workman shall be removed forthwith upon the request of the Engineer or his duly authorized representative. Particular application shall be to workmen who ignore quality specifications on pipe bedding, laying, and backfilling, below grade building, concrete pouring, and other work to be covered up or assuming an unalterable set.

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

Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the Work. Stored materials and equipment to be incorporated in the Work shall be located so as to facilitate prompt inspection. Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

Materials, supplies or equipment to be incorporated into the Work shall not be purchased by the Contractor or any Subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

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

15. ENGINEER'S STATUS

In rendering general engineering service, resident engineering and inspection of construction, the Engineer is not in charge of, and shall not be responsible for, the methods of construction, the construction forces or the construction equipment, construction safety procedures, or Contractor payment for labor and materials on the project.

The Engineer will inspect the work as the authorized representative of the Owner and will have authority to stop the work whenever, in his opinion, such action is necessary to insure the proper execution of the Contract. He will also have authority to reject work and materials which do not conform to the Drawings, Specifications and Contract Documents and to direct the place or places where work shall be prosecuted. The Engineer is the agent of the Owner only to the extent provided in the Specifications and Contract Documents, except in special instances when this authority is extended; in such latter instances he will, upon request, show the Contractor written proof of his authority.

The Engineer will also interpret the meaning and requirements of the Drawings, Specifications and Contract Documents, decide all engineering questions, and decide all disputes that may arise between the Owner and the Contractor. The Engineer's decisions on these matters will be final and binding on both the Contractor and the Owner unless the dispute is submitted to arbitration or either party resorts to legal action for settlement.

The Engineer is the interpreter of the conditions of the Contract and the judge of its performance. In this duty, he will not favor either the Owner or the Contractor but will use his authority under the Contract to insure and enforce its faithful performance by both parties.

In case of the termination of the employment of the Engineer, the Owner will appoint a capable and reputable Engineer, whose status under the Contract will be the same as that of the former Engineer; any dispute in connection with such appointment shall be subject to arbitration.

16. ENGINEER'S DECISIONS

The Engineer shall, within a reasonable time after their presentation to him, make decisions on all claims of the Owner or Contractor and on all matters relating to the execution and progress of the work or the interpretations of the Drawings, Specifications and Contract Documents.

Unless otherwise expressly provided in the Specifications and Contract Documents, all the Engineer's decisions are subject to arbitration, provided arbitration is agreed to by both the Owner and the Contractor.

If, however, the Engineer fails to render a decision within ten (10) days after the parties have presented their evidence, either party may then request arbitration. If the Engineer renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence but shall not disturb or interrupt such proceedings except where such decision is acceptable to the parties concerned.

17. INSPECTION OF WORK

The Engineer, his representatives and representatives of regulatory or sponsoring state or federal agencies shall at all times have full access to the work and to all materials intended for use in the work, as well as to plants where such materials are produced. The Contractor shall provide for such access and inspection. If the work shall be covered up without the knowledge or consent of the Engineer, it must, if directed by the Engineer, be uncovered for examination at the Contractor's expense.

18. INSPECTION OF WORK AWAY FROM THE SITE

If work to be done away from the construction site is to be inspected on behalf of the Owner during its fabrication, manufacture, or testing, or before shipment, the Contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in

writing and delivered to the Engineer in ample time so that the necessary arrangements for the inspection can be made.

19. STANDARD SPECIFICATIONS

Where standard specifications, such as those of the American Society for Testing and Materials, the American National Standards Institute, the American Water Works Association, the American Association of State Highway and Transportation Officials, the Federal Aviation Agency, the Federal Specifications, etc., are referred to in the Specifications and Contract Documents and on the Drawings, said references shall be construed to mean the latest amended and/or revised versions of the said standard or tentative specification.

20. SPECIFIC BRANDS, MAKES OR MANUFACTURERS

Wherever in the Specifications one or more specific brands, makes or manufacturers are set out and qualified by the "or equal" clause, it is intended to denote the quality standard of the article desired, but unless otherwise noted does not restrict the Contractor to the specific brand, make or manufacturer. In cases where one or more specific brands, makes or manufacturers are named and these names are not qualified by the "or equal" clause, it is intended that the Contractor be restricted to one of those named unless otherwise set out.

The Contractor may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the Specifications by reference to brand name or catalogue number, and if, in the opinion of the Engineer, such material, article, or piece of equipment is of equal substance and function to that specified, the Engineer may accept its substitution and use by the Contractor. Any cost differential shall be added or deducted from the Contract Price and the Contract Documents shall be appropriately modified by Change Order. The Contractor warrants that if substitutes are accepted, no major changes in the function or general design of the Project will result. Incidental changes or extra component parts required to accommodate the substitute shall be made by the Contractor without a change in the Contract Price or Contract Time.

21. "OR EQUAL" CLAUSE

Whenever the words "or approved equal", "or equal", or "similar to", etc., appear in the Specifications, they shall be interpreted to mean an item of material or equipment that, in the opinion of the Engineer, is similar to that named, suited to the same use, capable of performing the same function as that named, has a record of service equal to that named, and is equal in quality, capacity and/or efficiency to that named.

The Engineer's decision as to the equality of any material or equipment to that specified shall be final, but acceptance by the Engineer shall not relieve the Contractor from his responsibility concerning such materials or equipment or affect the guarantee covering the workmanship, materials and equipment.

22. PERMITS AND CODES

Unless otherwise set out in the Specifications or required by the agencies involved, the Contractor shall make application for, obtain and pay for all licenses and permits of a temporary nature necessary for the prosecution of the Work and shall pay for all fees and charges in connection therewith. Permits, licenses and easements for permanent structures or permanent changes in existing facilities will be secured and paid for by the Owner, unless otherwise specified. The Contractor shall be required to comply with all state or municipal ordinances, laws, and/or codes insofar as the same are binding on the Owner.

The intent of this Contract is that the Contractor shall base his bid upon the Drawings and Specifications, but that all work installed shall comply with all applicable codes and regulations as amended by any waivers. Before installing the work, the Contractor shall examine the Drawings and the Specifications for compliance with applicable codes and regulations bearing on the Work, and shall immediately report any discrepancy to the Engineer. Where the requirements of the Drawings and Specifications fail to comply with the applicable code or regulation, the Owner will adjust the Contract by change order to conform to the code or regulation (unless waivers in writing covering the differences have been granted by the governing authority) and shall make appropriate adjustment in the contract price. Should the Contractor fail to observe the foregoing provisions and

install work at variance with any applicable code or regulation as may be amended by waivers (notwithstanding the fact that such installation is in compliance with the Drawings and Specifications), the Contractor shall remove and/or replace such work without cost to the Owner, except that a change order will be issued to cover any additional cost the Contractor would have been entitled to receive if the change had been made before the Contractor commenced work on the items involved.

23. WAGES AND HOURS

The Contractor shall pay not less than the prevailing wage scale set out in these Specifications and Contract Documents, as amended, and shall comply in every respect to applicable rules, regulations and statutes pertaining to wages and hours.

24. NON-REBATE OF WAGES

The Contractor shall comply with the regulations, rulings and interpretations of the Secretary of Labor of the United States, pursuant to the Federal Anti-Kickback Act of June 13, 1934, as amended, 48 Stat. 948; 62 Stat. 74; 63 Stat. 108 (Title 18, U.S.C. Sec. 874 and Title 40 U.S.C. Sec. 276c) including all subsequent amendments which makes it unlawful to induce any person employed in the construction or repair of public buildings or public works to give up any part of the compensation to which he is entitled under his Contract of Employment; and the Contractor agrees to insert a like provision in all subcontracts hereunder. The Contractor may be required to execute an affidavit covering each weekly payroll and certifying compliance with said Anti-Kickback Act.

25. CONTRACT SECURITY OR PERFORMANCE AND PAYMENT BOND

The Contractor will be required to furnish the Owner with a Performance Bond and a Payment Bond to run for one year after the date of final acceptance of the Work by the Owner and the Engineer. The Bonds shall be executed by a surety company duly authorized to do business in the state in which the work is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular 570. Each Bond shall be in the amount not less than one hundred percent (100%) of the contract price, as security for the faithful performance of this contract and as security for the payment of all persons performing labor and furnishing materials in connection with this Contract. These Bonds must be executed in the form provided as a part of the Contract Documents, and the surety company shall hold a current certificate of authority, as issued by the Treasury Department, as an acceptable surety on Federal Bonds under an act of Congress approved July 30, 1947. The expense of these Bonds shall be borne by the Contractor.

If at any time a surety on any such Bond is declared bankrupt or loses its right to do business in the state in which the Work is to be performed or is removed from the list of Surety Companies acceptable on Federal Bonds, the Contractor shall within five (5) days after notice from the Owner to do so, substitute an acceptable Bond (or Bonds) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such Bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable Bond to the Owner.

26. SAFETY

The Contractor shall take all necessary precautions and provide all necessary safeguards to prevent personal injury and property damage. The Contractor shall provide protection for all persons including but not limited to his employees and employees of other contractors or subcontractors; members of the public; and employees, agents, and representatives of the Owner, the Engineer, and regulatory agencies that may be on or about the Work. The Contractor shall provide protection for all public and private property including but not limited to structures, pipes, and utilities, above and below ground.

The Contractor shall provide and maintain all necessary safety equipment such as fences, barriers, signs, lights, walkways, guards and fire prevention and fire-fighting equipment and shall take such other action as is required to fulfill his obligations under this subsection.

The Contractor shall comply with all federal, state and local laws, ordinances, rules and regulations and lawful orders of all authorities having jurisdiction for the safety of persons and protection of property.

The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work. The safety provisions of applicable laws and building and construction codes, in addition to specific safety and health regulations described by Chapter XIII, Bureau of Labor Standards, Department of Labor, Part 1518, Safety and Health Regulations for Construction, as outlined in the Federal Register, Volume 36, No. 75, Saturday, April 17, 1971. Title 29 - LABOR, shall be observed and the Contractor shall take or cause to be taken, such additional safety and health measures as the Contracting Authority may determine to be reasonably necessary.

The Contractor shall also comply with 29 CFR Part 1926 as adopted by 803 KAR 2:400 through 2:425 with amendments, including 29 CFR Part 1910 General Industry Safety and Health Standards applicable to Construction and any supplement to 29 CFR Part 1926 as adopted by Kentucky Occupational Safety and Health Program, Kentucky Labor Cabinet.

The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This responsible person shall have the authority to take immediate action to correct unsafe or hazardous conditions and to enforce safety precautions and programs.

There shall be absolutely no alcoholic beverages or drugs on the site any time.

27. INSURANCE, CONTRACTOR'S COVERAGE AND CANCELLATION PROVISION

The Contractor will not be permitted to commence work until he has obtained all insurance required by these documents and such insurance has been approved by the Engineer and/or Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all insurance required has been so obtained and approved. Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work.

Such insurance shall be secured from an insurance company authorized to write casualty insurance in the state where the Work is located and shall protect the Contractor, his subcontractors, and the Owner from claims of bodily injury, death, property damage, fire and other risks set out herein.

Each policy of insurance covering the Contractor's operations under the Contract shall provide either in the body of the policy, or by appropriate endorsement (rider) to the policy, that such policy cannot be altered or cancelled in less than fifteen (15) days after the mailing of written notice of such alteration or cancellation to the Owner (insured) and the Engineer or not less than ten (10) days after actual receipt by the Owner (insured) and the Engineer, of written notice of such pending alteration or cancellation.

Certificates of Insurance coverage shall include a statement of alteration or cancellation provisions of the policy, sufficient to show definitely that such provisions comply with the requirements stated herein.

28. INSURANCE, WORKMEN'S COMPENSATION

The Contractor shall take out and maintain during the life of this Contract, Workmen's Compensation Insurance, as required by statute, for all of his employees employed at the site of the Project, and in case any work is sublet, for all the subcontractor's employees not otherwise insured. In case any class of employees engaged in hazardous work under this contract at the site of the project is not protected under the Workmen's Compensation Statute, the Contractor shall provide adequate coverage for the protection of the employees not otherwise protected.

29. INSURANCE, PUBLIC LIABILITY

The Contractor shall take out and maintain during the life of this Contract such Public Liability (Bodily Injury and Property Damage) Insurance as shall protect him and any subcontractor performing work covered by this Contract from claims for damages because of bodily injury, including accidental death and from claims for property damages, which may arise from operations under this Contract, whether such operations be by him or by any subcontractor, or by anyone directly or indirectly employed by either of them.

Liability coverage is to be written on a comprehensive general liability policy and must include: (a) premises-operations, manufacturers and contractors, and owners, landlords and tenants; (b) contractors protective; (c) products-completed operations; (d) contractual liability per Paragraph 34 of the General Conditions. General liability shall also include "underground property damage by mechanical equipment" and when blasting is done coverage must be provided for the explosion hazard.

Where work on railroad rights-of-way is involved, the Contractor shall also be covered by Railroad Protective Liability Insurance with limits of liability as required by the railroad company on whose property the work is being performed.

30. INSURANCE, BUILDERS RISK

The Contractor shall provide Builders Risk Insurance (fire and extended coverage) on all work in place and/or materials stored at the site. Such insurance shall provide coverage as set forth in Paragraph 31 hereinafter. The policy shall name as the insured the Contractor, the Engineer and the Owner.

31. MINIMUM INSURANCE LIMITS

The minimum amounts of insurance to be furnished by and for the general contractor and the subcontractors under this Contract are:

- a. Workmen's Compensation - Applicable State Statutes
Employers Liability - \$1,000,000 limit of liability
- b. Comprehensive General Liability:
 - Coverage A - Bodily Injury Liability -
\$2,000,000 each occurrence
\$2,000,000 aggregate
 - Coverage B - Property Damage Liability -
\$1,000,000 each occurrence
\$1,000,000 aggregate
- c. Comprehensive Automobile Liability:
 - Coverage A - Bodily Injury Liability -
\$1,000,000 each person
\$1,000,000 each occurrence
 - Coverage B - Property Damage Liability -
\$1,000,000 each occurrence
- d. Umbrella Excess Liability.....\$2,000,000
- e. Builders Risk Insurance - To include coverage for not less than the losses due to Fire, Explosion, Hail, Lightning, Vandalism, Malicious Mischief, Wind, Collapse, Riot, Aircraft, Smoke, Transportation and Extended Coverage for benefit of the Owner, Engineer, Contractor, and subcontractors as their interests may appear during the Contract Time and until the Work is accepted by the Owner.

100% of Insurable Value of Materials and Accessories to be used in conjunction with the Project.

- f. Railroad Protection Insurance - (where work to be within railroad right-of-way)

Loss of Life or Injury to Person - As required by Railroad
Property Damage - As required by Railroad

32. INSURANCE, PROOF OF CARRIAGE

The Contractor shall furnish the Owner and the Engineer with satisfactory proof of carriage of the insurance required by submitting completed Insurance Certificates.

33. ROYALTIES AND PATENT FEES

The Contractor shall pay license fees and royalties and assume all costs incident to the use of any invention, design, process or device which is the subject of patent rights or copyrights held by others. As set forth in Paragraph 34, hereinafter, he shall indemnify and hold harmless the Owner and all of its officers, agents and employees from and against all claims, damages, losses and expenses (including attorneys' fees) arising out of any infringement of such rights during or after completion of the work, and shall defend all such claims in connection with any alleged infringement of such rights.

34. RESPONSIBILITY FOR DAMAGE, CLAIMS, ETC.

The Contractor shall indemnify and save harmless the Owner, the Engineer and subconsultants and all of their officers, agents and employees, from all claims, damages, losses and expenses including attorneys' fees of any character, name and description brought for, or on account of any injuries or damages received or sustained by any person, persons, or property by or from the said Contractor or by or in consequence of any neglect in safeguarding the work or through the use of unacceptable materials used on construction or by or on account of any act or omission, neglect, or misconduct of the said Contractor or by or on account of any claims or amounts recovered from any infringement of patent, trademark or copyright, or from any claims or amounts arising or recovered under any law, ordinance, order, or decree, and so much of the money due the said Contractor under and by virtue of his contract as shall be considered necessary by the Owner may be retained for the use of the Owner, or in case no money is due, his surety shall be held until such suit or suits, action or actions, claim or claims for injuries or damages as aforesaid, shall have been settled and suitable evidence to that effect furnished to the Owner.

In any and all claims against the Owner or the Engineer, or any of their agents or employees, by any employee of the Contractor, and subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workmen's compensation acts, disability benefit acts or other employee benefit acts.

The obligation of the Contractor under this paragraph shall not extend to the liability of the Engineer, his agents or employees arising out of the preparation or approval of maps, Drawings, opinions, reports, surveys, Change Orders, designs or Specifications.

35. HANDLING AND DISTRIBUTION

The Contractor shall handle, haul, and distribute all materials and all surplus materials on the different portions of the Work, as necessary or required; shall provide suitable and adequate storage room for materials and equipment during the progress of the Work; and shall be responsible for the protection, loss of, or damage to materials and equipment furnished by him, until the final completion and acceptance of the Work.

Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

36. MATERIALS - SAMPLES - INSPECTION

Unless otherwise expressly provided on the Drawings or in any of the other Contract Documents, only new materials and equipment shall be incorporated in the Work. All materials and equipment furnished by the Contractor to be incorporated in the Work shall be subject to the inspection of the Engineer. No material shall be processed or fabricated for the Work or delivered to the Work site without prior concurrence of the Engineer.

As soon as possible after execution of the Agreement, the Contractor shall submit to the Engineer the names and addresses of the manufacturers and suppliers of all materials and equipment he proposes to incorporate into the Work. When shop and working drawings are required as specified below, the Contractor shall submit prior to the submission of such drawings, data in sufficient detail to enable the Engineer to determine whether the manufacturer and/or the supplier have the ability to furnish a product meeting the Specifications. The Contractor shall also submit data relating to the materials and equipment he proposes to incorporate into the Work in sufficient detail to enable the Engineer to identify and evaluate the particular product and to determine whether it conforms to the Contract requirements. Such data shall be submitted in a manner similar to that specified for submission of shop and working drawings.

Facilities and labor for the storage, handling, and inspection of all materials and equipment shall be furnished by the Contractor. Defective materials and equipment shall be removed immediately from the site of the Work.

If the Engineer so requires, either prior to or after commencement of the Work, the Contractor shall submit samples of materials for such special tests as the Engineer deems necessary to demonstrate that they conform to the Specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed, and shipped by the Contractor as directed. The Contractor shall furnish suitable molds for making concrete test cylinders.

All samples shall be packed so as to reach their destination in good condition, and shall be labeled to indicate the material represented, the name of the building or work and location for which the material is intended, and the name of the Contractor submitting the sample. To ensure consideration of samples, the Contractor shall notify the Engineer by letter that the samples have been shipped and shall properly describe the samples in the letter. The letter of notification shall be sent separate from and should not be enclosed with the samples.

The Contractor shall submit data and samples, or place his orders, sufficiently early to permit consideration, inspection and testing before the materials and equipment are needed for incorporation in the Work. The consequences of his failure to do so shall be the Contractor's sole responsibility.

In order to demonstrate the proficiency of workmen, or to facilitate the choice among several textures, types, finishes, surfaces, etc., the Contractor shall provide such samples of workmanship of wall, floor, finish, etc., as may be required.

When required, the Contractor shall furnish to the Engineer triplicate sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, equipment performance ratings, and concrete data.

After review of the samples, data, etc., the materials and equipment used on the Work shall in all respects conform therewith.

37. PAYMENT FOR MATERIALS STORED AT SITE OF PROJECT

Payment for materials or equipment purchased and stored at the site of the Project will be allowed by the Owner at the cost of such materials or equipment, less the same percentage of retainage applicable to payment for completed work, upon specific recommendation of the Engineer. Such payment shall be conditional upon submission by the Contractor of bills of sale or such other procedure as will establish the Owner's title to such material or otherwise adequately protect the Owner's interest.

Only durable materials and equipment which in the opinion of the Engineer have been properly stored and protected shall be included in materials furnished in partial payment estimates. Clay pipe, brick and tile will be excluded. In the interest of simplification of checking and bookkeeping, miscellaneous supplies will also be excluded.

38. MATERIALS

A. Materials, Domestic and Foreign Manufacture: Unless otherwise specified, only such unmanufactured articles, materials and supplies as have been mined or produced in the United States of America, and only such manufactured articles, materials and supplies as have been manufactured in the United States of America substantially all from articles, materials, or supplies mined, produced, or manufactured -- as the case may be -- in the United States of America, shall be employed under this Contract in the construction of the Project.

B. Materials, Convict Manufacture: No materials manufactured or produced in a penal or correctional institution shall be incorporated in the Work under this Contract.

39. DEFECTIVE MATERIALS AND WORKMANSHIP

Materials brought to the site which are not in accordance with the Specifications shall be removed from the site of the Work by the Contractor at his own expense. Such material shall be so disposed of that there will be no probability of their being used on the work or in the construction.

Upon notice from the Engineer, all defective workmanship shall be immediately remedied by the Contractor, at his own expense.

If the Contractor fails to remove defective materials or to correct defective workmanship within a reasonable time, fixed in the notice from the Engineer, the Owner may remove the defective materials and/or correct the defective work and charge all the expense in connection therewith to the Contractor.

40. GUARANTY

The Contractor shall guarantee all materials and equipment furnished and Work performed for a period of one (1) year from the date of Substantial Completion. The Contractor warrants and guarantees for a period of one (1) year from the date of Substantial Completion of the system that the completed system is free from all defects due to faulty materials or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. Repairs made during the warranty period shall be guaranteed for one (1) year. The Owner will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments, or other Work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred. The Performance Bond shall remain in full force and effect through the guarantee period.

41. FIELD OFFICE

Each Contractor shall establish and maintain a field office on his project and have available at the office a responsible representative who can officially receive instructions from the Engineer. The Contractor shall have one complete, up-to-date set of Drawings, Specifications and Addenda in this office at all times.

Each office shall contain facilities for a Resident Project Representative, including a desk or table, chair and filing cabinet for his use.

Each office shall be provided with telephone service, facsimile machine, toilet facilities, light and heat; the cost of which shall be borne by the Contractor.

42. SANITARY FACILITIES

The Contractor shall provide adequate sanitary facilities for the use of those employed on the Work. Such facilities shall be made available when the first employees arrive on the site of the Work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the Work in suitable numbers and at such points and in such manner as may be required.

The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner, or on adjacent property.

43. EMPLOYMENT QUALIFICATIONS

No person under the age of eighteen (18) years and no convict labor shall be employed to perform any work under this Contract. No person whose age or physical condition is such as to make his employment dangerous to his health or safety or to the health or safety of others shall be employed to perform any work under this Contract, provided that this shall not operate against the employment of physically handicapped persons, otherwise employable, where such persons maybe safely assigned to work which they can ably perform. There shall be no discrimination because of race, creed, color, sex or political affiliation in the employment of persons for work under this Contract.

44. EMPLOYMENT SERVICES AND LABOR PREFERENCES

With respect to additional skilled, semi-skilled and unskilled workers employed to perform work on the Project, preference in employment shall be given first to persons who reside in the city in which the Work is to be performed, and second to persons residing in the county in which the Work is to be performed.

45. PAYMENT OF EMPLOYEES

The Contractor and each of his subcontractors shall pay each of his employees engaged in work on the Project in full (less deductions made mandatory by law) in cash or by check once each week.

46. SCHEDULES, REPORTS AND RECORDS

The Contractor shall submit to the Owner such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning Work performed or to be performed.

When required, the Contractor shall furnish the Owner with proof that all payrolls for services rendered and invoices for materials or equipment supplied have been duly paid. The Contractor shall provide all such other data as the Engineer and/or Owner may require.

In connection with all lump sum contracts or lump sum portions of unit price contracts, the Contractor shall furnish the Engineer a detailed breakdown on which to base partial payment estimates. The detailed breakdown shall be subject to review by the Engineer.

The Contractor shall furnish and keep current a progress chart or schedule showing the estimated and actual progress of the Work. The progress chart or schedule shall be subject to review by the Engineer.

The Contractor shall furnish all the necessary information for and assist in the preparation of, and/or prepare the partial payment estimates on forms furnished by the Engineer.

Record drawings and specifications shall be reviewed by the Engineer prior to submittal of partial payment estimates. Approval of partial or final payments will be contingent upon compliance with this provision.

47. PLANNING AND PROGRESS SCHEDULES

Before starting the Work and from time to time during its progress, as the Engineer may request, the Contractor shall submit to the Engineer a written description of the methods he plans to use in doing the Work and the various steps he intends to take. Within fifteen (15) days after the date of formal execution of the Agreement, the Contractor shall prepare and submit to the Engineer: (a) a written schedule fixing the dates on which additional drawings, if any, will be needed by the Contractor; and (b) a written schedule fixing the respective dates for the start and completion of various parts of the Work. Each such schedule shall be subject to review from time to time during the progress of the Work.

The Contractor shall also submit a schedule of payments that he anticipates he will earn during the course of the Work.

The Owner, or his authorized representatives and agents, shall be permitted to inspect all payroll, records of personnel, invoices for materials or equipment and other relevant data and records.

48. PAYMENTS BY CONTRACTOR

The Contractor shall pay: (a) for all transportation and utility services not later than the 20th day of the calendar month following the month in which such services are rendered; (b) for all materials, tools and other expendable equipment to the extent of ninety percent (90%) of the cost thereof, not later than the 20th day of the calendar month following the month in which such materials, tools and equipment are delivered at the site of the Project, and the balance of the cost thereof not later than the 30th day following completion of that part of the Work in or on which such materials, tools and equipment are incorporated or used; and (c) to each of his subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors, to the extent of each subcontractor's interest therein.

49. FUNDS FOR PARTIAL PAYMENT ESTIMATES

Funds for partial payment estimates have been provided by the Owner so that they may be paid in cash as set out herein. The Contractor must understand, however, that in handling the financing of such work, delays beyond the control of the Owner are liable to occur in meeting the partial payments, and a reasonable delay on the part of the Owner in making payment to the Contractor for any period shall not be construed as a breach of contract on the part of the Owner.

50. PARTIAL PAYMENT ESTIMATES

On or about the 15th of each calendar month, the Owner will make partial payment to the Contractor on the basis of a duly certified approved estimate of the Work performed during the preceding calendar month by the Contractor, but the Owner will retain not more than ten percent (10%) of the amount of each estimate until final completion and acceptance of all Work covered by this Contract, subject to possible modification as set out hereinafter.

The partial payment estimate shall be completed and signed by the Contractor and shall be supported by such data as the Engineer may reasonably require. The Contractor shall delineate on each partial payment estimate for each item in the bid form, the amounts associated with bond costs, overhead, insurance, labor and materials. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the Owner, as will establish the Owner's title to the material and equipment and protect his interest therein, including applicable insurance. The Engineer will, within ten days after receipt of each partial payment estimate, either indicate in writing his approval of payment or present the partial payment estimate to the Contractor indicating in writing his reasons for refusing to approve payment. In the latter case, the Contractor may make the necessary corrections and resubmit the partial payment estimate. The Owner will, within ten (10) days of presentation to him of an approved partial payment estimate, pay the Contractor a progress payment on the basis of the approved partial payment estimate.

The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.

All Work covered by partial payment made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor of the sole responsibility for the care and protection of the Work upon which payments have been made or the restoration of any damaged Work, or as a waiver of the right of the Owner to require the fulfillment of all terms of the Contract Documents.

Upon completion and acceptance of the Work, the Engineer shall issue a certificate attached to the final payment request that the Work has been accepted by him under the conditions of the Contract Documents. The entire balance found to be due the Contractor, including the retained percentages, but except such sums as may be lawfully retained by the Owner, shall be paid to the Contractor within thirty (30) days of completion and acceptance of the Work.

The Contractor will indemnify and save the Owner and the Owner's agents harmless from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the Work. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the Contractor fails to do so the Owner may, after having notified the Contractor, either pay unpaid bills or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed, in accordance with the terms of the Contract Documents, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Owner to either the Contractor, his Surety, or any third party. In paying any unpaid bills of the Contractor, any payment so made by the Owner shall be considered as a payment made under the Contract Documents by the Owner to the Contractor and the Owner shall not be liable to the Contractor for any such payments made in good faith.

If the Owner fails to make payment thirty (30) days after approval by the Engineer, in addition to other remedies available to the Contractor, there shall be added to each such payment interest at prime rate plus two (2) percentage points commencing on the first day after said payment is due and continuing until the payment is received by the Contractor.

51. OWNER'S RIGHT TO WITHHOLD PAYMENTS

In order to protect the Owner from loss, payment may be withheld which would otherwise be due the Contractor on account of:

- A. Defective work not remedied or defective materials not removed from site.
- B. Claims filed, or reasonable evidence indicating imminent filing of claims, against the Contractor.
- C. Failure of the Contractor to make payments properly to subcontractors or for material or labor.
- D. A reasonable doubt that the Contract can be completed for the balance then unpaid.
- E. Damage to another Contractor.
- F. Performance of work in violation of the terms of the Contract.
- G. Expiration of Contract Time.

Should the Owner withhold payment for any of the above reasons, the Owner will provide written notice to the Contractor giving reason for withholding payment.

52. DEDUCTIONS FOR UNCORRECTED WORK

If the Engineer and Owner deem it inexpedient to correct work damaged or not done in accordance with the Contract, a deduction from the Contract price may be negotiated.

53. PROTECTION OF WORK, PROPERTY AND PERSONS

The Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. He shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to all employees on the Work and other persons who may be affected thereby, all the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

The Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He shall erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection. He shall notify owners of adjacent utilities when prosecution of the Work may affect them. The Contractor shall remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any subcontractor of anyone directly and indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the Contract Documents or to the acts or omissions of the Owner or the Engineer or anyone employed by either of them or anyone for whose acts either of them maybe liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the Contractor.

In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, the Contractor with special instruction or authorization from the Engineer or Owner, shall act to prevent threatened damage, injury or loss. He shall give the Engineer prompt Written Notice of any significant changes in the Work or deviations from the Contract Documents caused thereby, and a Change Order shall thereupon be issued covering the changes and deviations involved.

54. WORK ON "PRIVATE PROPERTY"

Private property is defined as property other than that belonging to the Owner. Highway and railroad rights-of-way, public parks, school yards and other such properties shall be considered "private properties" for the purpose of this Paragraph.

In connection with water line, sewer line, gas line or similar work performed on "private property", the Contractor shall confine his equipment, the storage of materials and the operations of his workmen to the limits indicated on the Drawings, or to lands and rights-of-way provided for the Project by the Owner, and shall take every precaution to avoid damage to the buildings, grounds and facilities of the owners' of private property.

Fences, walls, hedges, shrubs, etc., shall be carefully removed, preserved, and replaced when the construction is completed. Grassed areas, other than lawns, shall be graded, fertilized and seeded when construction is completed and in accordance with the requirements of the technical Specifications. Where ditches or excavations cross lawns, the sod shall be removed carefully and replaced when the backfilling has been completed. If sod is damaged or not handled properly, it shall be replaced with new sod equal to existing sod at the Contractor's expense. When construction is completed, the facilities and grounds of the private property owners shall be restored to as good or better condition than found as quickly as possible at the Contractor's expense.

When directed by the Engineer, large trees or other facilities that cannot be preserved and replaced shall be removed by the Contractor. The Owner will assume the responsibility for settling with the property owner for the loss of said trees or facilities. The Contractor shall be solely and entirely responsible for any damage to all other trees or facilities.

Foundations, adjacent to where an excavation is to be made below the bottom of the foundation, shall be supported by shoring, bracing or underpinning as long as the excavation shall remain open, or thereafter if required to insure the stability of the foundation and the Contractor shall be held strictly responsible for any damage to said foundations.

55. LANDS FOR WORK

The Owner will provide the lands upon which the work under this Contract is to be done or the necessary easements over said lands to include sufficient space for the proper execution of the work, together with right of access to same. The Owner will provide the Contractor information which delineates and describes the lands owned and rights-of-way acquired. The Contractor shall, at his own expense and without liability to the Owner, provide land required for storage of his construction materials and for any temporary construction facilities for the storage of his equipment. The Contractor will construct at his own expense, any temporary roads or bridges necessary for his own use; he will also furnish his own power and water supply unless otherwise specifically set out herein.

56. INTERFERENCE WITH AND PROTECTION OF STREETS

The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefor from the proper authorities. If any street, road or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the proper authorities.

Streets, roads, private ways, and walks not closed shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefor.

The Contractor shall, at least 24 hours in advance, notify the Police and Fire Departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. He shall cooperate with the Police Department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

57. EXISTING UTILITIES

Special precautions shall be taken by the Contractor to avoid damage to existing overhead and underground utilities owned and operated by the Owner or by public or private utility companies.

The available information concerning the location of existing underground utilities is shown on the Drawings. While it is believed that the locations shown are reasonably correct, neither the Engineer nor the Owner can guarantee the accuracy or adequacy of this information.

Before proceeding with the Work, the Contractor shall confer with all public or private companies, agencies or departments that own and operate utilities in the vicinity of the Construction Work. The purpose of the conference, or conferences, shall be to notify said companies, agencies or departments of the proposed construction schedule, verify the location of, and possible interference with, the existing utilities that are shown on the Drawings, arrange for necessary suspension of service, and make arrangements to locate and avoid interference with all utilities (including house connections) that are not shown on the Drawings. The Engineer and Owner have no objection to the Contractor arranging for the said utility companies, agencies, or departments to locate and uncover their own utilities; however, the Contractor shall bear the entire responsibility and cost for locating and avoiding, or repairing, damage to said existing utilities.

The Contractor shall locate all unknown metallic hazards, namely buried pipe, metals, etc., by using a pipe locator. The pipe locator shall immediately precede the trench ditching and all hazards located shall be marked in such manner as to notify the machine operator of such hazard.

Where existing utilities or appurtenant structures, either underground or above-ground, are encountered, they shall not be displaced or molested unless necessary, and in such case shall be replaced in as good or better condition than found as quickly as possible. Relocation and/or replacement of all utilities and appurtenant structures to accommodate the construction work shall be at the Contractor's expense, unless such relocation and/or replacement is by statute or agreement the responsibility of the owner of the utility.

58. ARBITRATION

A. Request for Arbitration

Any decision of the Engineer which is subject to arbitration may be submitted to arbitration only upon agreement of both parties to the dispute.

The Contractor shall not cause a delay of the Work because of pending arbitration proceedings, except with the written permission of the Engineer, and then only until the arbitrators shall have had an opportunity to determine whether or not the Work shall continue until they decide the matters in dispute.

The request for arbitration shall be delivered in writing to the Engineer and the adverse party, either personally or by registered mail to the last known address of each, within ten (10) days of the receipt of the Engineer's decision, and in no case after final payment has been accepted except as otherwise expressly stipulated in the Contract Documents. If the Engineer fails to make a decision within a reasonable time, a request for arbitration may be made as if his decision has been rendered against a requesting party.

B. Arbitrator

No one shall be nominated or act as an arbitrator who is in any way financially interested in this Contract or in the business affairs of the Owner, or the Contractor, or the Engineer or otherwise connected with any of them. Each arbitrator shall be a person in general familiar with the work or the problem involved in the dispute submitted to arbitration, preferably a recognized Engineer, experienced in the type of construction in question.

Unless otherwise provided by controlling statutes, the parties may agree upon one arbitrator; otherwise there shall be three, one named in writing by each party to this Contract, and a third chosen by these two arbitrators, or, if they should fail to select a third within fifteen (15) days, then he shall be appointed by the presiding officer, if a disinterested party, of the Bar Association nearest to the location of the Work. Should the party requesting arbitration fail to name an arbitrator within ten (10) days and upon his failure to do so then such arbitrator shall be appointed, on the petition of the party requesting arbitration, by a judge of the Federal Court in the District where such arbitration is to be held.

The said presiding officer shall have the power to declare the position of any arbitrator vacant by reason of refusal or inability to act, sickness, death, resignation, absence or neglect. Any vacancy shall be filled by the party making the original appointment, and unless so filled within five (5) days after the same has been declared vacant, it shall be filled by the said presiding officer. If testimony has been taken before a vacancy has been filled by the presiding officer, the matter must be reheard unless a rehearing is waived in the submission or by the written consent of the parties. If there be one arbitrator, his decision shall be binding; if three, the decision of any two shall be binding in respect to both the matters submitted and the procedure followed during the arbitration.

C. Arbitration Procedure

The arbitrators shall deliver a written notice to each of the parties and to the Engineer, either personally or by registered mail to the last known address of each, of the time and place for the beginning of the hearing of the matters submitted to them. Each party may submit to the arbitrators such evidence and argument as he may desire and the arbitrators may consider pertinent. The arbitrators shall, however, be the judge of all matters of law and fact relating to both the subject matter of and the procedure during arbitration and shall not be bound by technical rules of law or procedure. They may hear evidence in whatever form they desire. The parties may be represented before them by such person or persons as each may select, subject to the disciplinary power of the arbitrators if such representative shall not interfere with the orderly or speedy conduct of the proceedings.

Each party and the Engineer shall supply the arbitrators with such papers and information as they may request, or with any witness whose movements are subject to the respective control, and upon refusal to comply with such requests, the arbitrators may render their decision without the evidence which might have been elicited therefrom and the absence of such evidence shall afford no ground for challenge of the award by the party refusing or neglecting to comply with such demand.

The submission to arbitrators (the statement of the matters in dispute between the parties to be passed upon by the arbitrators) shall be in writing duly acknowledged before a notary. Unless waived in writing by both parties to the arbitration, the arbitrators, before hearing testimony, shall be sworn by an officer authorized by law to administer an oath, to faithfully and fairly hear and examine the matters in controversy and to make a just award according to the best of their understanding.

The arbitrators, if they deem the case demands it, are authorized to award to the party whose contention is sustained such sums as they shall consider proper for the time, expense and trouble incident to the arbitration, and if the arbitration was requested without reasonable cause, damages for delay and other losses. The arbitrators shall fix their own compensation, unless otherwise provided by agreement, and shall assess the costs and charges of the arbitration upon either or both parties.

The award of the arbitrators shall be in writing and acknowledged like a deed to be recorded, and a duplicate shall be delivered personally or by registered mail, forthwith upon its rendition, to each of the parties to the controversy and to the Engineer. Judgment may be rendered upon the award by the Federal Court or the highest State Court having jurisdiction to render same.

The award of the arbitrators shall not be open to objection on account of the form of proceedings or the award, unless otherwise provided by controlling statutes. In the event such statutes provide otherwise on any matter covered by this Article than hereinbefore specified, the method procedure throughout and the legal effect of the award shall be wholly in accord with said statutes, it being the intention hereby to lay down a principle of action to be followed, leaving its local application to be adapted to the legal requirements of the jurisdiction having authority over the arbitration.

The Engineer shall not be deemed a party to the dispute. He is given the right to appear before the arbitrators to explain the basis of his decision and give such evidence as they may require.

59. ALTERATION IN DRAWINGS AND SPECIFICATIONS

The Owner reserves the right to make such alteration in the Drawings and Specifications or in the character of the Work as may be considered by the Engineer necessary or desirable from time to time to complete the Project in an acceptable manner; provided that, if alterations are made, the general character of the Work as a whole is not changed thereby.

Such alterations shall not be considered as a waiver of any condition of the Contract nor to invalidate any of the provisions nor to release the bond thereof.

60. CHANGES IN THE WORK

The Owner may make changes in the work of the Contractor by making alterations therein, or by making additions thereto, or by omitting work therefrom, without invalidating the Contract, and without relieving or releasing the Contractor from any guarantee given by him pursuant to the Contract provisions, and without affecting the validity of the guaranty bonds, and without relieving or releasing the surety or sureties of said bonds. All such changes shall be in the form of a Change Order issued by the Engineer, and executed by the Owner and Contractor, under the conditions of the original Contract.

Except in an emergency endangering life or property, no change shall be made by the Contractor unless in pursuance of a written Change Order. No claim for an adjustment of the Contract Price or Time shall be valid unless so ordered.

The Engineer, also, may at any time, by issuing a field order, make changes in the details of the Work. The Contractor shall proceed with the performance of any changes in the Work so ordered by the Engineer unless the Contractor believes that such field order entitles him to a change in Contract Price or Time, or both, in which event he shall give the Engineer written notice thereof within fifteen (15) days after the receipt of the ordered change, and the Contractor shall not execute such changes pending the receipt of an executed Change Order or further instruction from the Owner.

Should the Contractor encounter or discover during the progress of the Work subsurface or latent conditions at the site materially differing from those shown on the Drawings or indicated in the Specifications, the attention of the Engineer shall immediately be called to such conditions before they are disturbed. If the Engineer finds that they so materially differ, he will at once make such changes in the Drawings or Specifications as he may find necessary. Any adjustment in the Contract Price or Time as may be justifiable shall be made by means of a written Change Order and must be negotiated with the owner, engineer and DOW/KIA as provided herein.

61. CLAIMS FOR EXTRA WORK

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.

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 topographical maps issued.

Any discrepancies which may be discovered between actual conditions and those represented by the topographical maps and 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.

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".

By execution of this Contract, the Contractor warrants that he has visited the site of the proposed work and fully acquainted himself with the conditions there existing 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.

62. DETERMINATION OF THE VALUE OF EXTRA (ADDITIONAL) OR OMITTED WORK

The value of extra (additional) or omitted work shall be determined in one or more of the following ways:

A. On the basis of the actual cost of all the items of labor (including on-the-job supervision), materials, and use of equipment, plus 15 percent which shall cover the Contractor's general supervision, overhead and profit. In case of subcontracts, the 15 percent is interpreted to mean the subcontractor's supervision, overhead and profit, and an additional 5 percent 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.

B. By estimate and acceptance in a lump sum.

C. By unit prices named in the Contract or subsequently agreed upon.

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.

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.

Except for over-runs in contract unit price items, no extra (additional) work shall be done except upon a written 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.

63. SEPARATE CONTRACTS

The Owner reserves the right to let other contracts in connection with this Work. The Contractor shall afford other contractors reasonable opportunity for ingress, egress, storage of their materials, the execution of their work, and shall properly connect and coordinate his work with theirs. The respective rights of various interests involved shall be established by the Engineer to secure proper completion of the various portions of the Work.

If the proper execution or results of any part of the Contractor's Work depends upon the work of any other Contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution and results.

64. OWNER'S RIGHT TO DO WORK

If the Contractor should neglect or fail to prosecute the Work properly or fail or refuse to perform any provision of the Contract, the Owner, after ten (10) days written notice to the Contractor, may without prejudice to any other remedy he may have, make good such deficiencies and may deduct the cost thereof from any monies due or which may thereafter become due to the Contractor.

65. SUSPENSION OF WORK

The Owner shall have authority to suspend the Work in whole or in part by giving five (5) days notice to the Contractor in writing. The written notice shall fix the date on which the Work shall be resumed, and the Contractor shall resume the Work on the date so fixed. The Owner shall reimburse the Contractor for expenses incurred by him in connection with the Work under this Contract as a result of such suspension if the suspension of the Work is caused through no fault of the Contractor himself.

66. RIGHT OF OWNER TO TERMINATE CONTRACT

If the Contractor fails to begin the Work under the Contract within the specified time, or fails to perform the Work with sufficient workmen and equipment or with sufficient materials to insure the prompt completion of said Work within the specified time, or shall, in the opinion of the Engineer, perform the Work improperly, or shall neglect or refuse to remove materials or perform anew such Work as shall be rejected as defective or unsuitable or shall be stopped by court order resulting from injunctive action, or shall become insolvent or be declared bankrupt or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against him unsatisfied for a period of five (5) days, or shall fail or refuse to remove within forty-eight (48) hours after receipt of proper notice, any employee or person engaged in work under the Contract, or shall make an assignment for the benefit of creditors or from any other cause whatsoever shall not carry out the Work in an acceptable manner, the Owner shall give notice in writing to the Contractor and his surety, of such delay, neglect, or default, specifying the same, and if the Contractor within a period of ten (10) days after such notice shall not proceed in accordance therewith, then the Owner shall, upon written certificate from the Engineer of the fact of such delay, neglect or default, and the Contractor's failure to comply with such notice, have full power and authority without violating the Contract to terminate the Contractor's right to proceed with the Work, to take over the prosecution of the work of said Contractor, to appropriate or use any and all materials and equipment on the ground as may be suitable and acceptable, and may enter into an agreement for the completion of said Contract according to the terms and provisions thereof, and use such other methods as in the Owner's opinion shall be required for the completion of said Contract in an acceptable manner. All costs and charges incurred by the Owner, together with the costs of completing the Work under Contract, shall be deducted from any monies due or which may become due said Contractor. In case the expense so incurred by the Owner shall be less than the sum which would have been payable under the Contract, if it had been completed by said Contractor, then the Contractor shall be entitled to receive the difference, and in case such expense shall exceed the sum which would have been payable under the

Contract, then the Contractor and/or his surety shall be liable and shall pay to the Owner the amount of said excess.

After ten (10) days from delivery of a Written Notice to the Contractor and the Engineer, the Owner may, without cause and without prejudice to any other right or remedy, elect to abandon the Project and terminate the Contract. In such case, the Contractor shall be paid for all Work executed and any expense sustained plus reasonable profit.

67. CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the Work shall be stopped under an order of any court, or other public authority, for a period of three (3) months, through no fault of the Contractor or of anyone employed by him, or if the Engineer should fail to issue any estimate of payment within thirty (30) days after it is due, or if the Owner shall fail to pay the Contractor within thirty (30) days of its maturity and presentation of any sum certified by the Engineer or award by arbitrators, then the Contractor may, upon fifteen (15) days written notice to the Owner and the Engineer, terminate this Contract and recover from the Owner payment for all work executed, plus loss sustained upon any plant or materials, plus reasonable profit and damages.

In addition and in lieu of terminating the Contract, if the Engineer has failed to make any payment as aforesaid, the Contractor may upon ten (10) days notice to the Owner and the Engineer stop the Work until he has been paid all amounts then due, in which event and upon resumption of the Work, Change Orders shall be issued for adjusting the Contract Price or extending the Contract Time or both to compensate for the costs and delays attributable to the stoppage of the Work.

68. USING COMPLETED PORTION OF WORK

The Owner shall have the right to take possession of and use any completed portion or portions of the Work even though the time of completing the entire work or such portions may not have expired. The possession and use by the Owner shall not be deemed an acceptance of any work not completed in accordance with the Contract. If such prior use increases the cost of or delays the Work, the Contractor shall be entitled to such extra compensation, or extension of time, or both as the Engineer may determine. The use by the Owner of any portion of the Work shall release the Contractor from his Builders Risk Insurance covering such portion used.

69. ACCEPTANCE AND FINAL PAYMENT

Upon written notice from the Contractor that the work is ready for final inspection, the Engineer will make such an inspection and subsequent inspections as required. When, in the Engineer's opinion, the Work is acceptable under the Contract, he will promptly issue a Certificate of Acceptance.

Upon acceptance of the Work by the Owner, the balance due the Contractor including the percentage retained during the construction period, will then be paid in approximately sixty (60) days, and said final payment shall evidence the Owner's acceptance of the Work unless the Owner has made acceptance or partial acceptance thereof in writing prior to said final payment.

Before the Owner makes final payment, the Contractor shall submit to the Owner a final release, as described hereinafter, stating that all payrolls, material bills, subcontractors, and other indebtedness connected with the Work have been paid and providing for handling claims that may be outstanding or that may arise after the settlement.

Any payment, however, final or otherwise, shall not release the Contractor or his sureties from any obligations under the Contract Documents or the Performance Bond and Payment Bond.

70. CONTRACTOR'S FINAL RELEASE

Before the Owner pays the Contractor his final payment on the Work, the Contractor will be required to sign a final release as set out hereinbefore. This final release shall be notarized and shall state that all claims against the Owner on the Contractor's part have been met in full; it shall further state that all accounts for labor performed, materials furnished, liens, judgments and claims of every nature against the Contractor have been satisfied by him. It shall further state that any obligation or lawsuit whatsoever arising from the Contractor's operations on the Project which may be presented or filed after the settlement shall be borne by the Contractor. In case the Contractor is unable to settle any claim that may be in dispute or litigation, the Owner may allow him to furnish a proper bond to indemnify the Owner against the claim and then release the final payment to him.

It is understood that the Contractor is to guarantee to the Owner all construction against defective materials, equipment and workmanship for a period of twelve (12) months after acceptance, and shall take immediate steps to correct or replace such defective materials, equipment or workmanship without cost to the Owner.

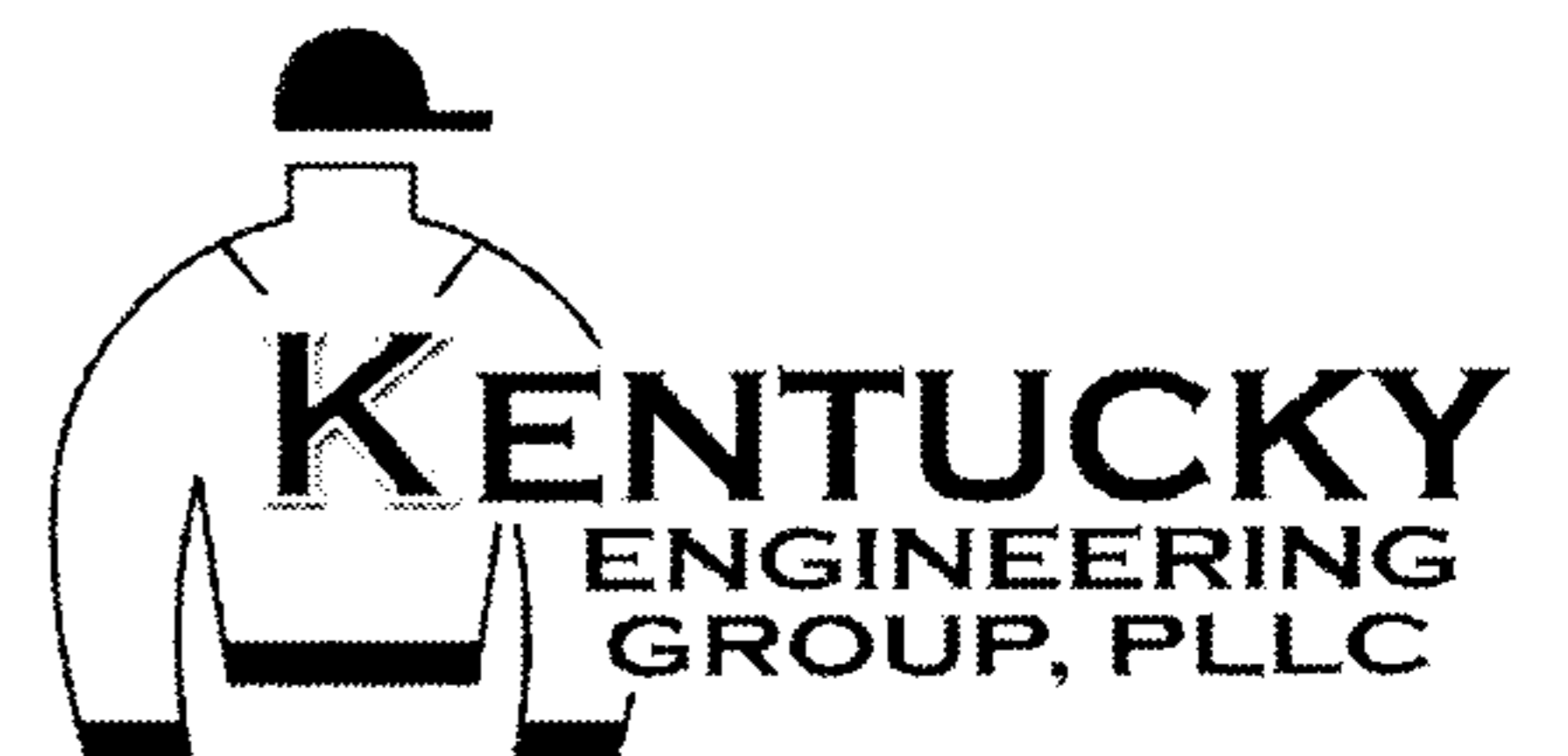
71. FINAL CLEAN-UP

The Work will not be considered as completed, and final payment will not be made, until all final clean up has been done by the Contractor in a manner satisfactory to the Engineer.

- END OF SECTION -

DIVISION 1

GENERAL REQUIREMENTS



SECTION 01010**SUMMARY****PART 1 - GENERAL****1.01 SUMMARY**

- A. This Section includes the following:
1. Work covered by the Contract Documents.
 2. Sequence of Operations.
 3. Utility Shutdowns
 4. Tie-ins and Disconnections
 5. Temporary Systems
 6. Use of premises.
 7. Specification formats and conventions.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Contractor shall provide all material, services, labor, tools and equipment, necessary to construct this project. The following is a brief description of the major work items included in the contract: Construction of one (1) new groundwater well including all related appurtenances and site work as shown on the Drawings and described in the Specifications.

1.03 SEQUENCE OF OPERATIONS

- A. Contractor is to drill a test well at site no.1. Determination of flow will be determined by the engineer. If flow is adequate and quality is acceptable, new well can be continued on same site.
- B. If flow is inadequate or quality is unacceptable at site no 1, then contractor will proceed to site no. 2 and drill another test well. If this site is too deemed unacceptable then contractor will proceed to site no.3 and drill a third test well.
- C. Contractor shall give owner and engineer a minimum of 72 hours prior to starting any test wells on any three of the given sites.

1.04 UTILITY SHUTDOWNS

- A. One-week advance notice to the Owner is required prior to performing any utility shutdown unless of an emergency in nature.
- B. Contractor shall know where all existing valves are located on all existing lines and shall be able to shut down expeditiously in case of line breaks.
- C. The existing water line is shown as an approximate location on the plans. The contractor shall use extreme caution while laying line not to break existing line and interrupt service to the Sandy Hook Water District. existing customers. The contractor is responsible for any repairs to the existing line that are caused by their work. The contractor shall locate the existing line ahead of the installation of the new line to insure the installation is within the existing easement.

1.05 TIE-INS AND DISCONNECTIONS

- A. Contractor shall furnish all materials and shall provide excavation, de-watering, scaffolding and support operations to support tie-ins.

1.06 TEMPORARY SYSTEM (S)

- A. All temporary water lines and hoses shall be depressurized and all temporary electrical lines and equipment de-energized when not in use and at the end of each workday.

1.07 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Division and Sections using the 17-division format.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

Not used

END OF SECTION

SECTION 01015**WORK SEQUENCE****PART 1 - GENERAL****1.01 WORK INCLUDED**

The Contractor shall submit to the Engineer for review and acceptance a complete schedule of his proposed sequence of construction operations prior to commencement of work. However, the Engineer shall not accept a construction schedule that fails to utilize the entire time allocated for the construction of the water system extension. This schedule requirement in no way prevents the Contractor from completing the project in a shorter time frame than scheduled. The construction schedule shall be submitted and approved by the Owner prior to the submittal of the first partial payment request. A revised construction schedule shall be submitted with every subsequent partial payment request. This revised schedule must be approved by the Owner prior to payment. The contractor shall use the following sequence of construction while working on the new water well for the Sandy Hook Water District, Contract 11 – New Groundwater Well and Appurtenances.

1. Contractor is to drill a test well at site no. 1. If flow or quality is unacceptable then contractor will move to site no.2. If test well is acceptable at 1, then well can be drilled.
2. Contractor would then proceed to test well 2 and the same process will be exercised as one.
3. If test well no.2 is unacceptable then contractor would then proceed to test well no.3

1.02 RELATED WORK

- A. Section 01010 - Summary of Work.

1.03 ADDITIONAL INFORMATION

Any delays caused by the Contractor shall be at his expense and at no cost to the Owner or Engineer.

- END OF SECTION -

SECTION 01016**OCCUPANCY****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. The Contractor shall be aware that after each major portion of the project is completed, the Contractor shall notify the Engineer that those specific operations are complete and prior to replacing that portion of the work into service shall request an interim inspection of the work to be returned to or placed into service.

B. The interim inspection requested by the Contractor shall not preclude or supersede the final inspection of the project or reduce the Contractor's responsibility for the completed portion prior to final acceptance of the work by the Owner.

C. The Contractor shall provide all necessary temporary controls and other items required for operation of all work placed into service prior to final acceptance as required. At such time as new controls, etc. are complete and functioning, the Contractor shall remove all temporary installed items.

- 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, equipment, 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 prices for the following items.

1.02 PROGRESS AND PAYMENTS SCHEDULES

A. Within ten (10) 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 ten (10) 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 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 clean up has been completed 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%) 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 retainage shall be an amount equal to 10% of said estimate. The retainage on the equipment items shall be 10% as defined hereinbefore.

I. If at any time thereafter when the progress of the WORK is not satisfactory or determine that the Contractor is not making satisfactory progress, additional amounts may be retained.

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 topographical maps issued.

C. Any discrepancies which may be discovered between actual conditions and those represented by the topographical maps and 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 conditions there existing 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 20% for added work or a minimum 20% for deleted work which shall cover the Contractor's general supervision, overhead and profit. In case of subcontracts, the sum of total overhead amounts of the subcontractors and Contractor, plus total profit amounts for the subcontracts and Contractor shall not exceed 25% of the cost. Subcontractors shall be limited to 15% and Contractors shall be limited to 10% for combined overhead and profit. The cost of labor shall include required insurance, taxes and fringe benefits. Contractor to provide detailed breakdown of all cost as justification of change in work. 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 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

2.01 WATER MAIN (Not in Contract)

A. Payment for installing the water main will be made at the contract unit price per linear foot, complete in place, which shall include compensation for furnishing pipe, trenching (including rock excavation), earth or Class I material bedding, copper wire, thrust blocking, earth backfill, grip rings, fittings, crushed stone pavement replacement, asphalt replacement, disinfection, clean up and restoration of all disturbed areas, including seeding and mulching as required, testing, bonding, and all appurtenances required. The quantity of water mains to be paid for shall be the length of the completed line as measured along its centerline without any deduction for lengths of fittings, valves or other appurtenances.

B. Casing for sewer main, and sewer lateral crossings, as described in the plan sheets will be incidental to laying the main water line. There will be no additional compensation for these pvc casings. Please figure these costs into the water line price.

C. Use of crushed stone bedding on the water main will be determined in the field by the engineer if quality bedding material is not available. Please figure bedding costs into the water line price.

D. **The contractor will be responsible for any damage to the existing line, including cost of replacement materials, and labor. The contractor will be responsible for excavating and locating the existing water line. Sandy Hook Water District can only provide an approximate location.**

(NOTE: All Rock Excavation, Crushed Stone Bedding, and Asphalt Replacement shall be included in the per unit price of the pipe. No additional payment will be provided for these items.)

2.02 GATE VALVES AND BOXES (Not in Contract)

Payment for furnishing and installing gate valves and valve boxes with covers in water mains will be made at the contract unit price each, complete in place, which shall include compensation for furnishing, hauling, trenching (including rock excavation), bedding, laying, jointing, backfilling, concrete supports and concrete collars.

2.03 NEW GROUNDWATER WELL - DRILLING WITH 10" STEEL CASING PIPE

Payment shall be on a per foot basis and shall include all labor and materials to make a complete and workable installation. This work shall include the mobilization, demobilization, drilling, grouting, casing pipe and disposal of all drilling materials.

2.04 SUBMERSIBLE WELL PUMP AND APPURTENANCES

Payment shall be on a lump sum basis and include all labor and materials to make a complete and workable installation. This work shall include the submersible well pumps, cables, strainers, level indicators, pitless adapter, probes and electric service. Also included are the control panel and disconnect.

2.05 WELL STATION VALVE VAULT

Payment shall be on a lump sum basis and include all labor and materials to make a complete and workable installation. This work shall include the concrete valve vault, aluminum hatch, valves, piping, and meter.

2.06 NEW GROUNDWATER WELL - TESTING AND DATA COLLECTION

Payment shall be on a lump sum basis and include all labor and materials to test the new well. This shall include all pumping materials and information required to put the new well into service.

2.07 RELOCATE EXISTING RTU FROM EXISTING WELL SITE NO.7 TO NEW WELL SITE

Payment shall be on a lump sum basis and include all labor and materials to transfer the existing telemetry RTU to the new well site. This shall include any path studies, electrical work, connections, and installing a new antenna at the new site. This pay item shall include any and all work required to make a complete and operable installation.

2.08 SITE WORK

Payment will be on a lump sum basis and include all grade work, access road, 6" of No. 57's within 30' x 30' site, and chain link fencing w/10' double gate. This pay item shall include any and all work required to make a complete installation.

PART 3 - EXECUTION

3.01 PAY ITEMS

A. The pay items listed herein before refer to the items listed in the Bid Schedule and cover all of the pay items under the base bid for this contract.

B. Any and all other items of work listed in the specifications or shown on the Contract Drawings for this contract shall be considered incidental to and included in those pay items.

3.02 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 pipeline 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 length and quantities of pipeline 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 pipe or overrun of pipe ordered for the pipeline 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 01030**LABOR PROVISIONS****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. The Contractor shall conform to all provisions of the Kentucky Department of Labor, Wage Decisions (latest revisions), relative to minimum wages and hours as they may apply to the work to be accomplished under these specifications.

B. In addition to the above, certain Federal laws and regulations shall govern the work and shall supplement or supplant the Kentucky Department of Labor Wage Decisions cited above, as the case may be.

1.02 RELATED SECTIONS

A. Section 3 - Part 1 Hours and Wages

1.03 WAGE RATES

Prevailing wage rates apply to this job. The Contractor will utilize, when feasible, local labor and will pay them wages commensurate with the wages prevailing in the Community.

1.04 LABOR PREFERENCE

Where feasible, the Contractor will utilize local labor.

1.05 HOURS OF WORK

A. Hours of work shall be as set out in Kentucky Department of Labor Wage Decisions (latest revisions); that is, not more than eight (8) hours in one calendar day, nor more than forty (40) hours in one week, except in case of emergency caused by fire, flood or damage to life and property.

B. Any laborer, workman, mechanic, helper, assistant or apprentice working in excess of forty (40) hours per week, except in case of emergency, shall be paid not less than 1-1/2 times the wage rate. Whenever overtime work is scheduled, the Contractor shall give prior notice to the Owner.

- END OF SECTION -

SECTION 01030**LABOR PROVISIONS****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. The Contractor shall conform to all provisions of the Kentucky Department of Labor, Wage Decisions (latest revisions), relative to minimum wages and hours as they may apply to the work to be accomplished under these specifications.

B. In addition to the above, certain Federal laws and regulations shall govern the work and shall supplement or supplant the Kentucky Department of Labor Wage Decisions cited above, as the case may be.

1.02 RELATED SECTIONS

A. Section 3 - Part 1 Hours and Wages

1.03 WAGE RATES

Prevailing wage rates apply to this job. The Contractor will utilize, when feasible, local labor and will pay them wages commensurate with the wages prevailing in the Community.

1.04 LABOR PREFERENCE

Where feasible, the Contractor will utilize local labor.

1.05 HOURS OF WORK

A. Hours of work shall be as set out in Kentucky Department of Labor Wage Decisions (latest revisions); that is, not more than eight (8) hours in one calendar day, nor more than forty (40) hours in one week, except in case of emergency caused by fire, flood or damage to life and property.

B. Any laborer, workman, mechanic, helper, assistant or apprentice working in excess of forty (40) hours per week, except in case of emergency, shall be paid not less than 1-1/2 times the wage rate. Whenever overtime work is scheduled, the Contractor shall give prior notice to the Owner.

- END OF SECTION -

SECTION 01040**COORDINATION****PART 1 - GENERAL****1.01 COORDINATION OF THE WORK**

The Contractor shall coordinate the work of all the crafts, trades and subcontractors engaged on the Work, and he shall have final responsibility as regards the schedule, workmanship and completeness of each and all parts of the Work.

All crafts, trades and subcontractors shall be made to cooperate with each other and with others as they may be involved in the installation of work which adjoins, incorporates, precedes or follows the work of another. It shall be the Contractor's responsibility to point out areas of cooperation prior to the execution of subcontract agreements and the assignment of the parts of the Work. Each craft, trade and subcontractor shall be made responsible to the Owner, for furnishing embedded items, giving directions for doing all cutting and fitting, making all provisions for accommodating the Work, and for protecting, patching, repairing and cleaning as required to satisfactorily perform the Work.

The Contractor shall be responsible for all cutting, digging and other action of his subcontractors and workmen. Where such action impairs the safety or function of any structure or component of the Project, the Contractor shall make such repairs, alterations and additions as will, in the opinion of the Engineer, bring said structure or component back to its original design condition at no additional cost to the Owner.

Each subcontractor is expected to be familiar with the General Requirements and all sections of the Detailed Specifications for all other trades and to study all Drawings applicable to his work to the end that complete coordination between trades will be affected. Each Contractor shall consult with the Engineer if conflicts exist on the Drawings.

The Contractor shall conduct testing of water lines in a timely manner. The Contractor shall make provisions to test all water lines regardless of whether or not planned pump stations have been delivered and/or installed.

- END OF SECTION -

SECTION 01300**SUBMITTALS****PART 1 - GENERAL****1.01 WORK INCLUDED**

Shop drawings, descriptive literature, project data and samples (when samples are specifically requested) for all manufactured or fabricated items shall be submitted by the Contractor to the Engineer for examination and review in the form and in the manner required by the Engineer. All SUBMITTALS shall be furnished in at least six (6) copies and shall be checked, reviewed and signed by the Contractor before submission to the Engineer. The review of the Drawings by the Engineer shall not be construed as a complete check but only for conformance with the design concept of the Project and for compliance with information given in the Contract Documents. Review of such drawings will not relieve the Contractor of the responsibility for any errors that may exist, as the Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. General Provision.
- B. Section 01720 - Project Record Documents (As-Builts).

1.03 DEFINITIONS

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

1.04 GENERAL CONDITIONS

A. Review by the Engineer of shop drawings or SUBMITTALS of material and equipment shall not relieve the Contractor from the responsibilities of furnishing same of proper dimension, size, quality, quantity, materials and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. Review shall not relieve the Contractor from responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents.

B. Review of shop drawings shall not be construed as releasing the Contractor from the responsibility of complying with the Specifications.

1.05 GENERAL REQUIREMENTS FOR SUBMITTALS

- A. Shop Drawings:
 - 1. Shop drawings shall be prepared by a qualified detailer. Details shall be identified by reference to sheet and detail numbers shown on Contract Drawings. Where applicable, show fabrication, layout, setting and erection details.
 - 2. Shop drawings are defined as original drawings prepared by the Contractor, subcontractors, suppliers, or distributors performing work under this Contract. Shop drawings illustrate some portion of the work and show fabrication, layout, setting or

erection details of equipment, materials and components. The Contractor shall, except as otherwise noted, have prepared the number of reviewed copies required for his distribution plus two (2) which will be retained by the Engineer. Shop drawings shall be folded to an approximate size of 8-1/2" x 11" and in such manner that the title block will be located in the lower righthand corner of the exposed surface.

B. Project data shall include manufacturer's standard schematic drawings modified to delete information which is not applicable to the Project, and shall be supplemented to provide additional information applicable to the Project. Each copy of descriptive literature shall be clearly marked to identify pertinent information as it applies to the Project.

C. Where samples are required, they shall be adequate to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged. Provide sufficient size and quantity to clearly illustrate functional characteristics of product and material, with integrally related parts and attachment devices, along with a full range of color samples.

D. All submittals shall be referenced to the applicable item, section and division of the Specifications, and to the applicable Drawing(s) or Drawing schedule(s).

E. The Contractor shall review and check SUBMITTALS, and shall indicate his review by initials and date.

F. If the submittals deviate from the Contract Drawings and/or Specifications, the Contractor shall advise the Engineer, in letter of transmittal of the deviation and the reasons therefor. All changes shall be clearly marked on the submittal with a bold red mark. Any additional costs for modifications shall be borne by the Contractor.

G. In the event the Engineer does not specifically reject the use of material or equipment at variance to that which is shown on the Drawings or specified, the Contractor shall, at no additional expense to the Owner, and using methods reviewed by the Engineer, make any changes to structures, piping, controls, electrical work, mechanical work, etc., that may be necessary to accommodate this equipment or material. Should equipment other than that on which design drawings are based be accepted by the Engineer, shop drawings shall be submitted detailing all modification work and equipment changes made necessary by the substituted item.

H. Additional information on particular items, such as special drawings, schedules, calculations, performance curves, and material details, shall be provided when specifically requested in the technical Specifications.

I. Submittals for all electrically operated items (including instrumentation and controls) shall include complete wiring diagrams showing leads, runs, number of wires, wire size, color coding, all terminations and connections, and coordination with related equipment.

J. Equipment shop drawings shall indicate all factory or shop paint coatings applied by suppliers, manufacturers and fabricators; the Contractor shall be responsible for insuring the compatibility of such coatings with the field-applied paint products and systems.

K. Fastener specifications of manufacturer shall be indicated on equipment shop drawings.

L. Where manufacturers' brand names are given in the Specifications for building and construction materials and products, such as grout, bonding compounds, curing compounds, masonry cleaners, waterproofing solutions and similar products, the Contractor shall submit names and descriptive literature of such materials and products he proposes to use in this Contract.

M. No material shall be fabricated or shipped unless the applicable drawings or submittals have been reviewed by the Engineer and returned to the Contractor.

N. All bulletins, brochures, instructions, parts lists, and warranties packaged with and accompanying materials and products delivered to and installed in the Project shall be saved and transmitted to the Owner through the Engineer.

1.06 CONTRACTOR RESPONSIBILITIES

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

- END OF SECTION -

SECTION 01380**VIDEO TAPE****PART 1 - GENERAL****1.01 WORK INCLUDED**

The Contractor shall be responsible for video taping the entire project site both prior to construction and immediately after completion and acceptance of all work. Video tapes shall be produced by a videographer acceptable to the Engineer and of a professional quality.

1.02 VIDEO TAPE

The video tape shall be of a high quality VHS or DVD format. Video tapes shall show the time, date, and project location on screen during playback.

1.03 SUBMITTALS

The Contractor shall provide two copies of the project video tape or DVD with jackets. Both the video tapes or DVD's and jackets shall be clearly labeled with project name start date and completion date as shown below.

Project Name and Contract No.
Owner Name
Start Date: _____
Completion Date: _____

-END OF SECTION-

SECTION 01450
QUALITY CONTROL

PART 1 - GENERAL

1.01 QUALITY CONTROL

A. Work of all crafts and trades shall be laid out to lines and elevations as established by the Contractor from the Drawings or from instructions by the Engineer.

B. Unless otherwise shown, all work shall be plumb and level, in straight lines and true planes, parallel or square to the established lines and levels. The Work shall be accurately measured and fitted to tolerance as established by the best practices of the crafts and trades involved, and shall be as required to fit all parts of the Work carefully and neatly together.

C. All equipment, materials and articles incorporated into the Work shall be new and of comparable quality as specified. All workmanship shall be first-class and shall be performed by mechanics skilled and regularly employed in their respective trades.

1.02 TESTS, INSPECTIONS, AND CERTIFICATIONS OF MATERIALS

A. Tests, inspections and certifications of materials, equipment, subcontractors or completed work, as required by the various sections of the Specifications shall be obtained by the Contractor and all costs shall be included in the Contract Price.

B. The Contractor shall submit to the Engineer the name of testing laboratory to be used.

C. Contractor shall deliver written notice to the Engineer at least 24 hours in advance of any inspections or tests to be made at the Project site. All inspections, tests, samples for water quality or other procedures requiring the Engineer to attest to be conducted in the field shall be done in the presence of the Engineer or his representative.

D. Certifications by independent testing laboratories may be by copy of the attestation(s) and shall give scientific procedures and results of tests. Certifications by persons having interest in the matter shall be by original attest properly sworn to and notarized.

- END OF SECTION -

SECTION 01500**TEMPORARY FACILITIES AND CONTROLS****PART 1 - GENERAL****1.01 DESCRIPTION**

A. The Contractor shall make his own provisions for temporary electricity and water and maintain strict supervision of use of temporary utility services as follows:

1. Enforce compliance with applicable standards.
2. Enforce safety practices
3. Prevent abuse of services.
4. Pay all utility charges required.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. The Contractor shall obtain and pay for all permits as required by governing authorities.
- B. Obtain and pay for temporary easements required across property other than that of Owner or that is shown on the Contract Drawings.
- C. The Contractor shall comply with applicable codes.

1.03 REMOVAL

- A. The Contractor shall completely remove temporary materials, equipment, and offices upon completion of construction.
- B. The Contractor shall repair damage caused by installation and restore to specified or original condition.

1.04 TEMPORARY LIGHTING

- A. The Contractor shall furnish and install temporary lighting required for:
1. Construction needs.
 2. Safe and adequate working conditions.
 3. Public Safety.
 4. Security lighting.
 5. Temporary office and storage area lighting.
- B. Service periods for safety lighting shall be as follows:
1. Within construction area: All times that authorized personnel are present.
 2. Public areas: At all times.

C. Costs of Installation and Preparation: Contractor shall pay all installation, maintenance and removal costs of temporary lighting.

D. Maintenance of temporary lighting service (replacement of bulbs, etc.) shall be the sole responsibility of the General Contractor.

1.05 TEMPORARY WATER

The Contractor shall provide the water necessary for testing and disinfection. Water purchased from the owner for flushing and testing shall be paid for at the whole sale price by the contractor. The Contractor shall supply his own hoses, chlorine for disinfection, etc.

1.06 SANITARY FACILITIES

Contractor shall provide sanitary facilities as set forth in General Provisions (GP-2.04.Sanitary Regulations).

1.07 FIELD OFFICE (Office Trailer not Required for this Contract)

The Contractor shall make his own provisions for providing the electricity, telephone, gas, water, sewer, and other utilities to his office trailer that are required or as necessary for completion of the work.

The Contractor shall be responsible for all utility charges.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 IMPLEMENTATION

- B. The Contractor shall provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to storm drains, adjacent areas and walkways prior to the start of any site work.
- C. Straw bale dikes, silt fencing and synthetic filter fabric shall be used as necessary to protect adjacent lands, surface waters, and vegetation to achieve environmental objectives.
- D. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Soil deposited on pavement by construction and other contractor vehicles shall be removed and the pavement swept as required.
- F. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- G. Minimize amount of bare soil exposed at one time.
- H. Provide temporary measures such as berms, dikes, drains, hay bales, gabions, etc., as directed by the Engineer so as to minimize siltation due to runoff.

- I. Construct fill and waste areas by selective placement to avoid erosive exposed surface of silts or clays.
- J. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

3.02 OPERATION AND MAINTENANCE

- A. The Contractor shall inspect, repair, and maintain erosion and sediment control measures until final stabilization has been established.

3.03 REMOVAL OF FACILITIES

- A. The Contractor shall remove the temporary facilities after final stabilization has been established. Used devices (including old straw bales) shall be disposed of as Construction & Demolition debris.

3.04 DUST CONTROL

- A. Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

- END OF SECTION -

SECTION 01530

BARRIERS

PART 1 - GENERAL

1.01 WORK INCLUDED

Temporary Railing: Temporary railing shall be provided around open pits and other locations where needed, to prevent accidents or injury to persons.

1.02 COST

The Contractor shall pay all costs for temporary railing.

- END OF SECTION -

SECTION 01530

BARRIERS

PART 1 - GENERAL

1.01 WORK INCLUDED

Temporary Railing: Temporary railing shall be provided around open pits and other locations where needed, to prevent accidents or injury to persons.

1.02 COST

The Contractor shall pay all costs for temporary railing.

- END OF SECTION -

SECTION 01540

SECURITY

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide barricades, lanterns and other such signs and signals as may be necessary to warn of the dangers in connection with open excavation and obstructions.

B. Provide an adequate and approved system to secure the Project area at all times, especially during non-construction periods; the Contractor shall be solely responsible for taking proper security measures.

1.02 COSTS

Contractor shall pay all costs for protection and security systems.

- END OF SECTION -

SECTION 01570
TRAFFIC REGULATION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Construction parking control.
- B. Flagmen.
- C. Flares and lights.
- D. Haul routes.
- E. Traffic signs and signals.
- F. Removal.

1.02 RELATED REQUIREMENTS

- A. Section 01530 - Barriers.
- B. Section 01580 - Project Identification and Signs.

PART 2 - PRODUCTS

2.01 SIGNS, SIGNALS AND DEVICES

- A. Post-mounted and wall-mounted traffic control and informational signs as specified and required by local jurisdictions.
- B. Automatic Traffic Control Signals: As approved by local jurisdictions.
- C. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.
- D. Flagman Equipment: As required by local jurisdictions.

PART 3 - EXECUTION

3.01 CONSTRUCTION PARKING CONTROL

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in nondesignated areas.

3.02 TRAFFIC CONTROL

A. Whenever and wherever, in the Engineer's opinion, traffic is sufficiently congested or public safety is endangered, Contractor shall furnish uniformed officers to direct traffic and to keep traffic off the highway area affected by construction operations.

B. Contractor shall abide by City regulations governing utility construction work.

C. Traffic control shall be provided according to the Kentucky Department of Highways Manual on Uniform Traffic Control Devices for Streets and Highways.

3.03 FLAGMEN

Provide trained and equipped flagmen to regulate traffic when construction operations or traffic encroach on public traffic lanes.

3.04 FLARES AND LIGHTS

Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.05 HAUL ROUTES

A. Consult with authorities, establish public thoroughfares to be used for haul routes and site access.

B. Confine construction traffic to designated haul routes.

C. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.

3.06 TRAFFIC SIGNS AND SIGNALS

A. At approaches to site and on site, install appropriate signs at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

B. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control, and areas affected by Contractor's operations.

C. Relocate as work progresses, to maintain effective traffic control.

3.07 REMOVAL

Remove equipment and devices when no longer required. Repair damage caused by installation. Remove post settings to a depth of 2 feet.

- END OF SECTION -

SECTION 01580**PROJECT IDENTIFICATION AND SIGNS****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. The Contractor shall provide all signs required by these specifications near the site of the work. The sign shall set forth the description of the work and the names of the Owner, Engineer and Contractor as shown on the Plans or in these Specifications.

B. The Contractor shall furnish and install Two (2) signs on the Project. Each sign shall conform to the specifications and painted as shown on Figure I and II on the following pages. The location of signs shall be determined by the Owner and/or Engineer at the pre-construction meeting.

PART 2 - PRODUCT**2.01 SIGN**

The sign shall be constructed of 3/4" thick APA A-B Exterior grade or marine plywood. Posts shall be 4" x 4" of fencing type material. Prime all wood with white primer. Sign shall be as shown in Figure I and II.

PART 3 - EXECUTION**3.01 MAINTENANCE**

The sign shall be maintained in good condition until completion of the Project.

3.02 LOCATION

The location of the project signs shall be determined at the pre-construction conference after the contract has been awarded.

TEMPORARY CONSTRUCTION SIGN FOR USDA RURAL DEVELOPMENT PROJECTS

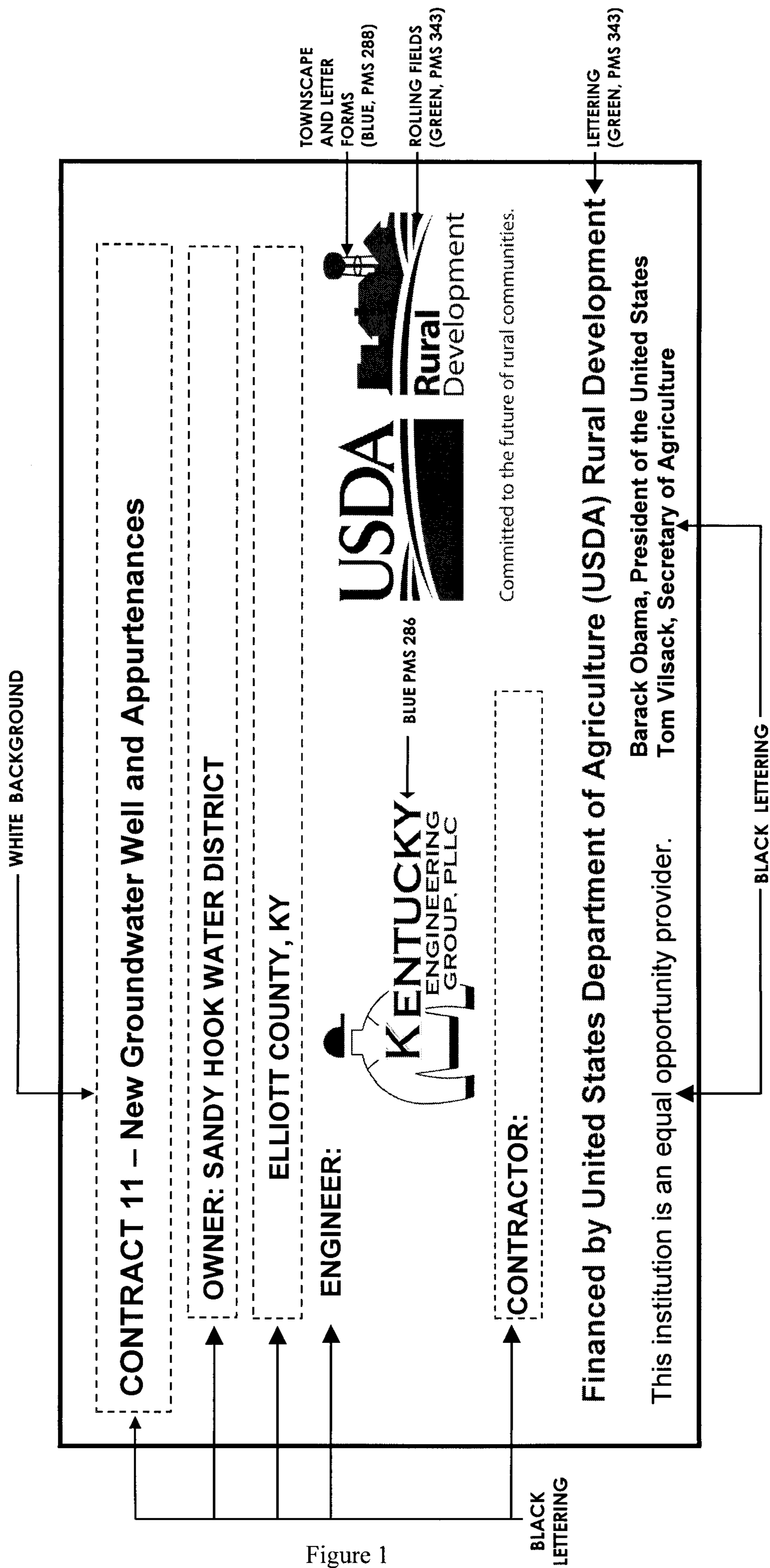


Figure 1
01580.2

SIGN DIMENSIONS: 1200 mm x 2400 mm x 19 mm (approx. 4' x 8' x 3/4")
PLYWOOD PANEL (APA RATED A-B GRADE--EXTERIOR)

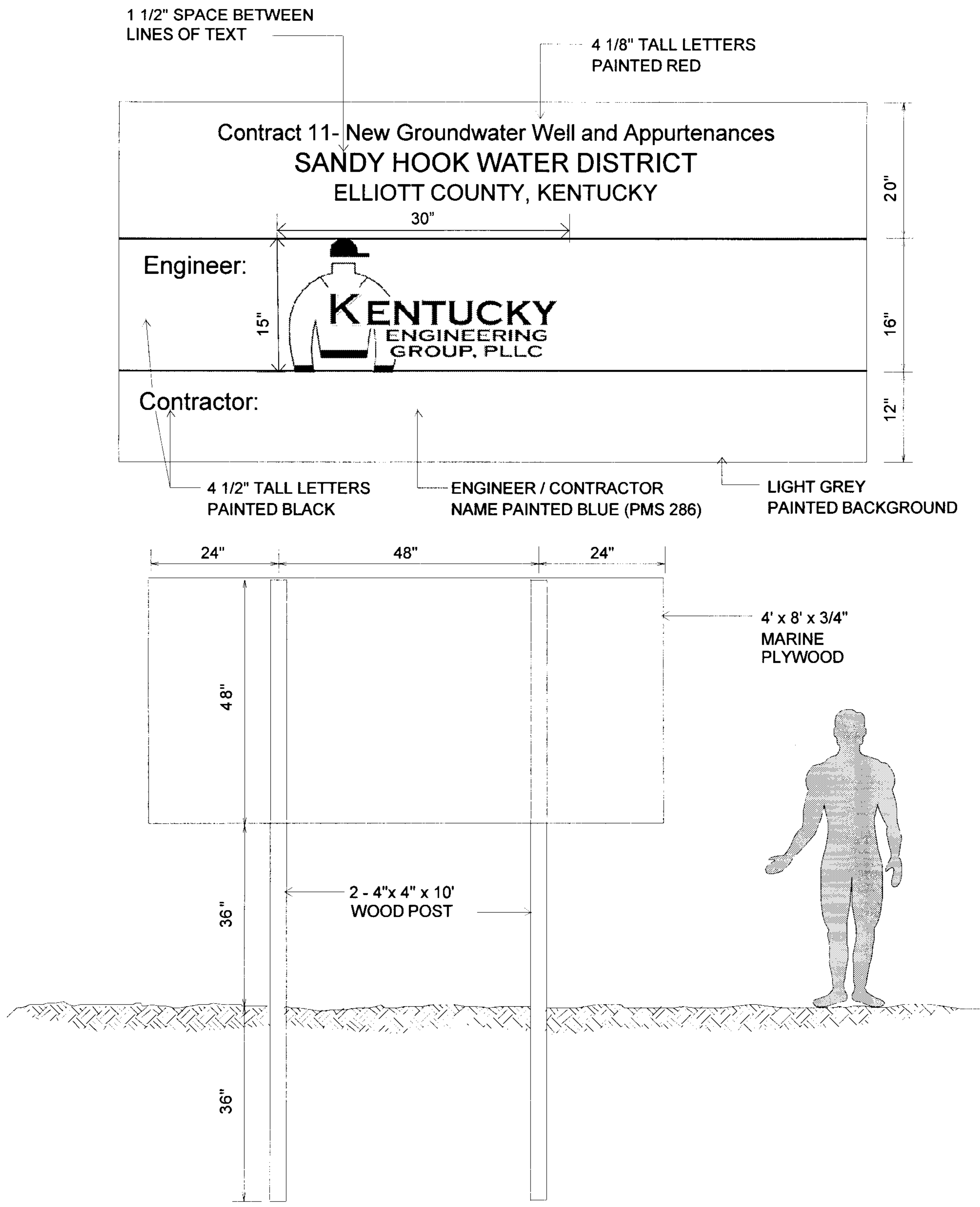


FIGURE 1
 01580-2

SECTION 01600**MATERIAL AND EQUIPMENT****PART 1 - GENERAL****1.01 COMPLIANCE WITH SAFETY REGULATIONS**

The equipment items furnished shall comply with all governing Federal and State laws regarding safety, including all requirements of the Occupational Safety and Health Act of 1970 (OSHA).

PART 2 - PRODUCTS**2.01 REFERENCES**

- A. General Provisions: Section 10 Correction and Guarantee of Work, Section 13 Materials and Equipment.
- B. Section 02600 - Pipe, Fittings, and Installation
- C. Section 02640 - Valves.
- D. All material shall meet applicable American Water Works Association (AWWA), American Standard Testing Methods (ASTM), Underwriters Laboratories (UL), Factory Mutual (FM), National Sanitation Foundation (NSF) standards.

SANDY HOOK WATER DISTRICT

The following is a list of manufacturers for the materials that may be provided on the project. All material shall meet applicable AWWA, ASTM, Underwriters Laboratories, and Factory Mutual standards. The Owner and Engineer shall approve actual materials during shop drawing review.

MATERIAL/ITEM	APPROVED MANUFACTURER
Air Release Valve (Water and Sewer)	Apco, ARI, Primer Corp or Approved Equal
All Brass Fittings (AWWA brass)	Ford, or Approved Equal
Aluminum Hatch	Bil-Co or Approved Equal
Blowoff Hydrant Assembly	Hydrants shall be post type Model No. A-411 as manufactured by Mueller Co. or Approved Equal.
Blowoff Assembly (Underground)	Hydrants shall be Model No. A-412 as manufactured by Mueller Co. or Approved Equal.
Bolted Cast Couplings	Dresser, Smith & Blair, Ford, Viking-Johnson, JCM, Powerseal or Approved Equal
Brass Nipples and Pipe	State Origin

MATERIAL/ITEM	APPROVED MANUFACTURER
Brass Service Saddles	Ford or Approved Equal
Butterfly Valves (Class 150)	Mueller Lineseal III or Approved Equal
Butterfly Valves (Class 250)	Mueller Lineseal XP or Approved Equal
Casing Spacers	State Origin
Check Valve	Valve shall be those manufactured by Muller, Kennedy, American Flow Control, or Approved Equal.
Control Valve	Valve shall be Model 710 as manufactured by Bermad or Approved Equal.
Copper Tracing Wire 14 AWG	State Origin
Customer Individual Pressure Reducing Valve	Watts N55BUM1 or Approved Equal
Customer Meter	Sensus Radio Read (Iperl)
Customer Meter Box Cover	Mid States Plastic box w/ Raised CI lid
Customer Meter Setter	Ford or approved equal
DI and Cast Iron Full Body Tapping Sleeves	Mueller, Clow, US Pipe, American Flow or Approved Equal or Approved Equal
DI Double Strap Service Saddles	Mueller, Ford, Smith & Blair, JCM or Approved Equal
DI Pipe Class 350	Griffin, Clow, US Pipe, American DI Pipe or Approved Equal
Dual Disc Check Valve	Valve shall be Series #8800 (class 125) as manufactured by Val-Matic® Valve & Mfg. Corporation, Elmhurst, IL. USA. or Approved Equal.
Fire Hydrant	Mueller® Super Centurion 250 ® Model A-423 or Approved Equal
Flushing Hydrant Assembly	Mueller® - Super Centurion 250, Model No. A-423 or Approved Equal
Full Circle Repair Clamps (all stainless steel)	Mueller, Smith & Blair, Ford, Powerseal, Cascade or Approved Equal
Galvanized Compression Couplings	Smith & Blair, Dresser, JCM, Powerseal or Approved Equal
Gate Valves	Mueller Resilient Seat or Approved Equal
Individual Pressure Reducing Valve	Watts Model No. N55BUM1 or Approved Equal
Mainline Pressure Reducing Valve	
Manhole Ring and Cover	J. R. Hoe & Sons or Approved Equal
MJ Fittings Compact/Full Body MJ Packs	McWayne (Tyler/Union, Clow), Griffin, US Pipe, American DI Pipe or Approved Equal
Precast Concrete Manholes	Cloud, Sherman-Dixie or Approved Equal
PVC Couplings	JM Manufacturing, Harrington, Multi-Fittings or Approved Equal
PVC Pipe Class 200 or C900	Diamond, JM Manufacturing, Napco, Freedom, ETI, National, Pioneer or Approved Equal

MATERIAL/ITEM	APPROVED MANUFACTURER
Restraint Joint Collar Fittings	Mueller, McWayne, Ford, EBBA or Approved Equal
Service Tubing - Polyethylene Tubing (CTS Service Tubing)	Domestic
Service Tubing - Type K Copper Soft	Domestic
Steel Tapping Valves and Sleeves (Check Working Pressure)	Mueller, Kennedy, Ford or Approved Equal
Underground Blowoff Hydrant Assembly	Mueller Model No. A-412 or Approved Equal
Underground Detectable Tape	Shall be Lineguard brand encased aluminum foil, Type III. The identification tape is manufactured by Lineguard, Inc., P. O. Box 426, Wheaton, IL 60187 or Approved Equal

-END OF SECTION-

SECTION 01610**TRANSPORTATION AND HANDLING****PART 1 - GENERAL****1.01 WORK INCLUDED****A. Handling and Distribution:**

1. The Contractor shall handle, haul, and distribute all materials and all surplus materials on the different portions of the work, as necessary or required; shall provide suitable and adequate storage room for materials and equipment during the progress of the work, and be responsible for the protection, loss of, or damage to materials and equipment furnished by him, until the final completion and acceptance of the work.
2. Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

B. Storage of Materials and Equipment: All excavated materials and equipment to be incorporated in the work shall be placed so as not to injure any part of the work or the existing facilities and so that free access can be had at all times to all parts of the work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

- END OF SECTION -

SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Liquidated Damages: General Provisions-11.20. CHARGES FOR DELAY CAUSED BY THE CONTRACTOR

B. Cleaning: Section 01710.

C. Project Record Documents: Section 01720.

1.02 SUBSTANTIAL COMPLETION

A. Contractor:

1. Submit written certification to Engineer that project is substantially complete.
2. Submit list of major items to be completed or corrected.

B. Engineer will make an inspection within seven days after receipt of certification, together with Owner's Representative.

C. Should Engineer consider that work is substantially complete:

1. Contractor shall prepare, and submit to Engineer, a list of items to be completed or corrected, as determined by the inspection.
2. Engineer will prepare and issue a Certificate of Substantial Completion, containing:
 - a. Date of Substantial Completion.
 - b. Contractor's list of items to be completed or corrected, verified and amended by Engineer.
 - c. The time within which Contractor shall complete or correct work of listed items.
 - d. Time and date Owner will assume possession of work or designated portion thereof.
 - e. Responsibilities of Owner and Contractor for:
 - (1) Insurance
 - (2) Utilities
 - (3) Operation of mechanical, electrical and other systems.
 - (4) Maintenance and cleaning.
 - (5) Security

f. Signatures of:

- (1) Engineer.
- (2) Contractor.
- (3) Owner.

3. Owner occupancy of Project or Designated Portion of Project:

a. Contractor shall:

- (1) Obtain certificate of occupancy.
- (2) Perform final cleaning in accordance with Section 01710.

b. Owner will occupy Project, under provisions stated in Certificate of Substantial Completion.

4. Contractor shall complete work listed for completion or correction, within designated time.

D. Should Engineer consider that work is not substantially complete.

- 1. He shall immediately notify Contractor, in writing, stating reasons.
- 2. Contractor shall complete work, and send second written notice to Engineer, certifying that Project, or designated portion of Project is substantially complete.
- 3. Engineer will reinspect work.

1.03 FINAL INSPECTION

A. Contractor shall submit written certification that:

- 1. Contract Documents have been reviewed.
- 2. Project has been inspected for compliance with Contract Documents.
- 3. Work has been completed in accordance with Contract Documents.
- 4. Equipment and systems have been tested in presence of Owner's Representative and are operational.
- 5. Project is completed and ready for final inspection.

B. Engineer will make final inspection within seven (7) days after receipt of certification.

C. Should Engineer consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Contractor to make Project Closeout submittals.

D. Should Engineer consider that work is not finally complete:

- 1. He shall notify Contractor, in writing, stating reasons.
- 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.

3. Engineer will reinspect work.

1.04 FINAL CLEAN UP

The Work will not be considered as completed and final payment made until all final clean up has been done by the Contractor in a manner satisfactory to the Engineer. See Section 01710 for detailed requirements.

1.05 CLOSEOUT SUBMITTALS

Project Record Documents: To requirements of Section 01720.

1.06 FINAL APPLICATION FOR PAYMENT

Contractor shall submit final applications in accordance with requirements of GENERAL PROVISIONS.

1.07 FINAL CERTIFICATE FOR PAYMENT

A. Engineer will issue final certificate in accordance with provisions of GENERAL PROVISIONS.

B. Should final completion be materially delayed through no fault of Contractor, Engineer may issue a Semi-Final Certificate for Payment.

- END OF SECTION -

SECTION 01710**CLEANING****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. During its progress the work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.

B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes, structures, by work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat condition.

C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organics in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

D. The Contractor shall thoroughly clean all materials and equipment installed by him and his subcontractors, and on completion of the work shall deliver it undamaged and in fresh and new appearing condition.

E. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition equal or better than that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

1.02 DESCRIPTION

A. Related Requirements Specified Elsewhere:

1. Project Closeout: Section 01700.
2. Cleaning for Specific Products or Work: Specification Section for that work.

B. On a continuous basis, maintain premises free from accumulations of waste, debris, and rubbish, caused by operations.

C. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave Project clean and ready for occupancy.

1.03 SAFETY REQUIREMENTS

- A. Hazards Control:
 - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
 - 2. Prevent accumulation of wastes, which create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- B. Conduct cleaning and disposal operations in compliance with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on Project site without written permission from the Owner.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil, or fuel in open drainage ditches or storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS**2.01 MATERIALS**

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION**3.01 DURING CONSTRUCTION**

- A. Execute cleaning to ensure that grounds and public properties are maintained free from accumulations of waste materials and rubbish.
- B. Wet down dry materials and rubbish to minimize blowing dust.
- C. At reasonable intervals during progress of Work, clean site and public properties, and dispose of waste materials, debris and rubbish.
- D. Provide on-site containers for collection of waste materials, debris and rubbish.
- E. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off construction site.
- F. The Contractor shall thoroughly clean all materials and equipment installed.

3.02 FINAL CLEANING

- A. Employ experienced workmen, or professional cleaners, for final cleaning.
- B. In preparation for substantial completion, conduct final inspection of project area(s).
- C. Broom clean paved surfaces; rake clean other surfaces of grounds.
- D. Maintain cleaning until Project, or portion thereof, is accepted by Owner.

- END OF SECTION -

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall obtain from the Engineer, one (1) set of prints of the Contract Drawings. These prints shall be kept and maintained in good condition at the project site and a qualified representative of the Contractor shall enter upon these prints, from day-to-day, the actual "as-built" record of the construction progress. Entries and notations shall be made in a neat and legible manner and these prints shall be delivered to the Engineer upon completion of the construction. APPROVAL FOR FINAL PAYMENT WILL BE CONTINGENT UPON COMPLIANCE WITH THIS PROVISION.

1.02 RELATED REQUIREMENTS SPECIFIED ELSEWHERE:

- A. Section 01300 - Submittals.
- B. General Provisions – Kentucky Engineering Group, PLLC

1.03 MAINTENANCE OF DOCUMENTS

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

1.04 MARKING DEVICES

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

1.05 RECORDING

- A. Label each document "PROJECT RECORD" in 2-inch high printed letters.

- B. Keep record documents current.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Contract Drawings: Legibly mark to record actual construction:
 - 1. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
 - 2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - 3. Field changes of dimension and detail.
 - 4. Changes made by Change Order or Field Order.
 - 5. Details not on original Contract Drawings.
- E. Specifications and Addenda: Legibly mark up each Section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - 2. Changes made by Change Order or Field Order.
 - 3. Other matters not originally specified.
- F. Shop Drawings: Maintain as record documents; legibly annotate Shop Drawings to record changes made after review.

1.06 SUBMITTAL

- A. At completion of project, deliver record documents to Engineer.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
 - 1. Date.
 - 2. Project Title and Number.
 - 3. Contractor's Name and Address.
 - 4. Title and Number of each Record Document.
 - 5. Certification that each Document as Submitted is Complete and Accurate.
 - 6. Signature of Contractor, or his authorized Representative.

- END OF SECTION -

SECTION 01740**WARRANTIES AND BONDS****PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. Compile specified warranties and bonds.
- B. Compile specified service and maintenance contracts.
- C. Co-execute submittals when so specified.
- D. Review submittals to verify compliance with Contract Documents.
- E. Related requirements specified elsewhere:
 - 1. Bid Bond: Instructions to Bidders.
 - 2. Performance and Payment Bonds: General Provisions.
 - 3. Guaranty: General Provisions.
 - 4. General Warranty of Construction: General Provisions.
 - 5. Project Closeout: Section 01700.
 - 6. Warranties and Bonds required for specific products: As listed herein.
 - 7. Provisions of Warranties and Bonds, Duration: Respective specification sections for particular products.
 - 8. Operating and Maintenance Data: Section 01730.

1.02 SUBMITTALS REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Furnish two (2) original signed copies.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product, equipment or work item.
 - 2. Firm name, address and telephone number.
 - 3. Scope

4. Date of beginning of warranty, bond or service and maintenance contract.
5. Duration of warranty, bond or service and maintenance contract.
6. Provide information for Owner's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.
7. Contractor name, address and telephone number.

1.03 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 1. Size 8-1/2 in. x 11 in., punch sheets for 3-ring binder: Fold larger sheets to fit into binders.
 2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
 - a. Title of Project.
 - b. Name of Contractor.
- C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.04 TIME OF SUBMITTALS

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

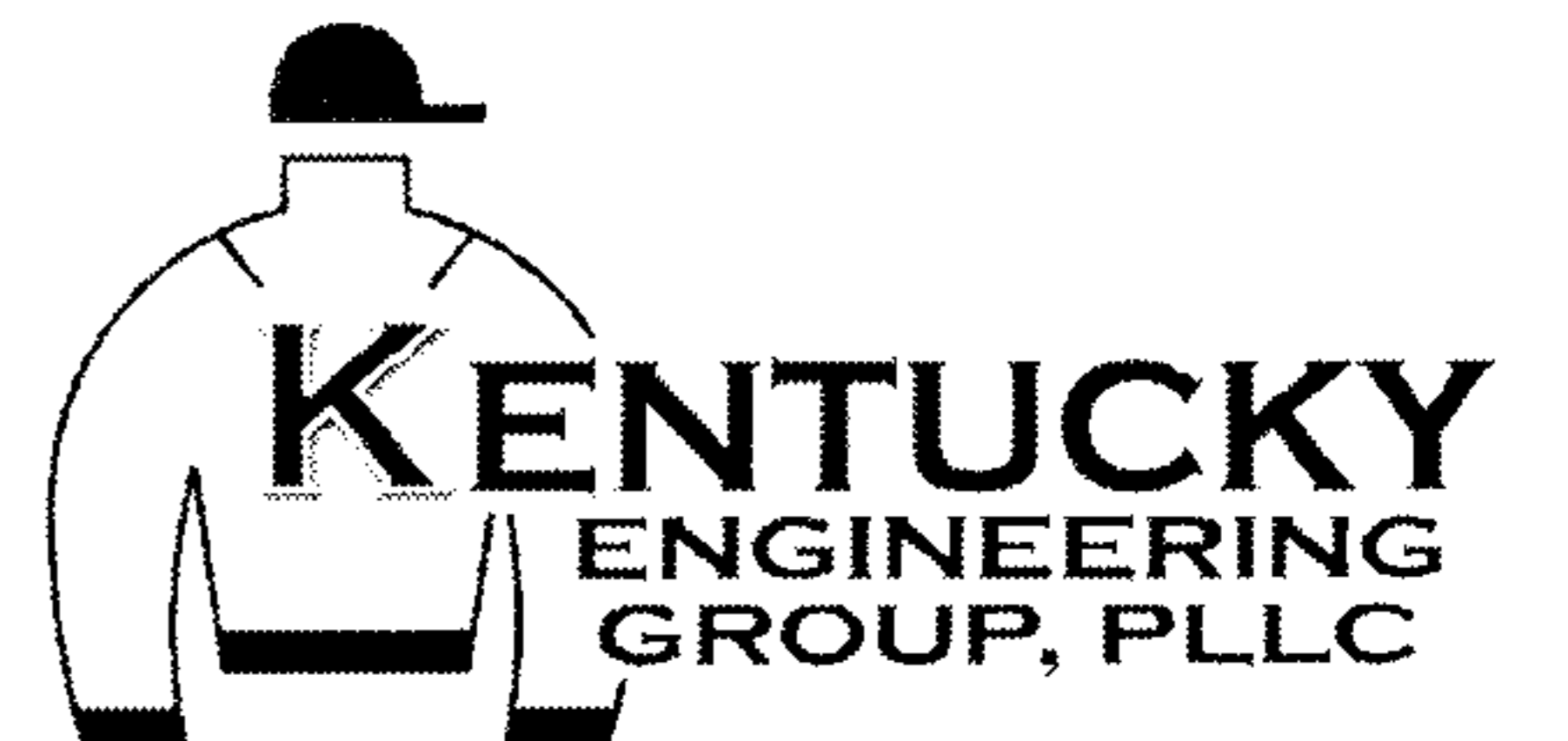
1.05 SUBMITTALS REQUIRED

Submit warranties, bonds, service and maintenance contracts as specified in the respective sections of the Specifications.

- END OF SECTION -

DIVISION 2

SITE WORK



SECTION 02110**SITE CLEARING****PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. Clear site within construction limits of plant life.
- B. Remove grass and topsoil in area of access road and foundation.
- C. Remove root system of trees and shrubs.
- D. Remove surface debris

1.02 RELATED WORK

- A. Section 02228 - Rock Removal.
- B. Section 02211 - Rough Grading.
- C. Section 02222 - Excavation.

1.03 REGULATORY REQUIREMENTS

Conform to applicable local codes and ordinances for disposal of debris.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION**3.01 CLEARING**

- A. Clear areas required for access to site and execution of work.
- B. Remove trees, shrubs, brush, and other vegetable matter such as snags, bark, and refuse.

3.02 PROTECTION

The Contractor shall not cut or injure any trees or other vegetation outside the easement lines and outside the areas to be cleared, as indicated on the Drawings, without written permission from the Engineer. The Contractor shall be responsible for all damage done outside these lines.

3.03 GRUBBING

From areas to be grubbed, the Contractor shall remove completely all stumps, remove to a depth of at least 24 inches below subgrade elevation all roots larger than 1 1/2 in. in diameter, and remove to a depth of 12 in. all roots larger than 1/2 in. in diameter. Such depths shall be measured from the existing ground surface, the proposed finished grade or subgrade, whichever is lower.

3.04 STRIPPING

All stumps, roots, foreign matter, topsoil, loam, and unsuitable earth shall be stripped from the ground surface. The topsoil and loam shall be utilized insofar as possible, for finished surfacing. Loam shall not be taken from the site.

3.05 DISPOSAL

A. All material resulting from clearing and grubbing and not scheduled for reuse or stockpiling shall become the property of the Contractor and shall be suitably disposed of off site, unless otherwise directed by the Engineer, in accordance with all applicable laws, ordinances, rules and regulations.

B. Such disposal shall be performed as promptly as possible after removal of the material and shall not be left until the final period of cleaning up.

3.06 FENCES

Wherever fences need to be removed to provide access to the work or are damaged during the progress of work, they shall be restored or repaired to as good a condition as existed prior to construction at the Contractor's expense.

- END OF SECTION -

SECTION 02220**EARTHWORK****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes excavation and backfilling including the loosening, removing, refilling, transporting, storage and disposal of all materials classified as "earth" necessary to be removed for the construction and completion of all work under the Contract, and as shown on the Contract Drawings, specified or directed.

1.02 REFERENCES

- A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards, and specifications, except where more stringent requirements have been specified herein:
1. American Society for Testing and Materials (ASTM)
 - a. A328 Specification for Steel Sheet Piling
 - b. D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³)
 - c. D1556 Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
 - d. D1760 Specification for Pressure Treatment of Timber Products
 - e. D2922 Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)

1.03 DEFINITIONS

- A. Excavation (or Trenching)
1. Grubbing, stripping, removing, storing and rehandling of all materials of every name and nature necessary to be removed for all purposes incidental to the construction and completion of all the work under construction.
 2. All sheeting, sheetpiling, bracing and shoring, and the placing, driving, cutting off and removing of the same.
 3. All diking, ditching, fluming, cofferdamming, pumping, bailing, draining, well pointing, or otherwise disposing of water.
 4. The removing and disposing of all surplus materials from the excavations in the manner specified.

5. The maintenance, accommodation and protection of travel and the temporary paving of highways, roads and driveways.
 6. The supporting and protecting of all tracks, rails, buildings, curbs, sidewalks, pavements, overhead wires, poles, trees, vines, shrubbery, pipes, sewers, conduits or other structures or property in the vicinity of the work, whether over- or underground or which appear within or adjacent to the excavations, and the restoration of the same in case of settlement or other injury.
 7. All temporary bridging and fencing and the removing of same.
- B. Earth
1. All materials such as sand, gravel, clay, loam, ashes, cinders, pavements, muck, roots or pieces of timber, soft or disintegrated rock, not requiring blasting, barring, or wedging from their original beds, and specifically excluding all ledge or bedrock and individual boulders or masonry larger than one-half cubic yard in volume.
- C. Backfill
1. The refilling of excavation and trenches to the line of filling indicated on the Contract Drawings or as directed using materials suitable for refilling of excavations and trenches; and the compacting of all materials used in filling or refilling by rolling, ramming, watering, puddling, etc., as may be required.
- D. Spoil
1. Surplus excavated materials not required or not suitable for backfills or embankments.
- E. Embankments
1. Fills constructed above the original surface of the ground or such other elevation as specified or directed.
- F. Limiting Subgrade
1. The underside of the pipe barrel for pipelines
 2. The underside of footing lines for structures
- G. Excavation Below Subgrade
1. Excavation below the limiting subgrades of structures or pipelines.
 2. Where materials encountered at the limiting subgrades are not suitable for proper support of structures or pipelines, the Contractor shall excavate to such new lines and grades as required.

PART 2 PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

- A. Wood Sheeting and Bracing

1. Shall be sound and straight; free from cracks, shakes and large or loose knots; and shall have dressed edges where directed.
 2. Shall conform to National Design Specifications for Stress Grade Lumber having a minimum fiber stress of 1200 pounds per square inch.
 3. Sheeting and bracing to be left-in-place shall be pressure treated in accordance with ASTM D1760 for the type of lumber used and with a preservative approved by the Engineer.
- B. Steel Sheeting and Bracing
1. Shall be sound
 2. Shall conform to ASTM A328 with a minimum thickness of 3/8 inch.

PART 3 EXECUTION

3.01 UNAUTHORIZED EXCAVATION

- A. Whenever excavations are carried beyond or below the lines and grades shown on the Contract Drawings, or as given or directed by the Engineer, all such excavated space shall be refilled with special granular materials, concrete or other materials as the Engineer may direct. All refilling of unauthorized excavations shall be at the Contractor's expense.
- B. All material which slides, falls or caves into the established limits of excavations due to any cause whatsoever, shall be removed and disposed of at the Contractor's expense and no extra compensation will be paid the Contractor for any materials ordered for refilling the void areas left by the slide, fall or cave-in.

3.02 REMOVAL OF WATER

- A. General
1. The Contractor shall at all times provide and maintain proper and satisfactory means and devices for the removal of all water entering the excavations, and shall remove all such water as fast as it may collect, in such manner as shall not interfere with the prosecution of the work or the proper placing of pipes, structures, or other work.
 2. Unless otherwise specified, all excavations which extend down to or below the static groundwater elevations shall be dewatered by lowering and maintaining the groundwater beneath such excavations at all times when work thereon is in progress, during subgrade preparation and the placing of the structure or pipe thereon.
 3. Water shall not be allowed to rise over or come in contact with any masonry, concrete or mortar, until at least 24 hours after placement, and no stream of water shall be allowed to flow over such work until such time as the Engineer may permit.
 4. Where the presence of fine grained subsurface materials and a high groundwater table may cause the upward flow of water into the excavation with a resulting quick or unstable condition, the Contractor shall install and

operate a well point system to prevent the upward flow of water during construction.

5. Water pumped or drained from excavations, or any sewers, drains or water courses encountered in the work, shall be disposed of in a suitable manner without injury to adjacent property, the work under construction, or to pavements, roads, drives, and water courses. No water shall be discharged to sanitary sewers. Sanitary sewage shall be pumped to sanitary sewers or shall be disposed of by an approved method.
6. Any damage caused by or resulting from dewatering operations shall be the sole responsibility of the Contractor.

B. Work Included

1. The construction and removal of cofferdams, sheeting and bracing, and the furnishing of materials and labor necessary therefor.
2. The excavation and maintenance of ditches and sluiceways.
3. The furnishing and operation of pumps, well points, and appliances needed to maintain thorough drainage of the work in a satisfactory manner.

C. Well Point Systems

1. Installation

- a. The well point system shall be designed and installed by or under the supervision of an organization whose principal business is well pointing and which has at least five consecutive years of similar experience and can furnish a representative list of satisfactory similar operations.
- b. Well point headers, points and other pertinent equipment shall not be placed within the limits of the excavation in such a manner or location as to interfere with the laying of pipe or trenching operations or with the excavation and construction of other structures.
- c. Detached observation wells of similar construction to the well points shall be installed at intervals of not less than 50 feet along the opposite side of the excavation from the header pipe and line of well points, to a depth of at least 5 feet below the proposed excavation. In addition, one well point in every 50 feet shall be fitted with a tee, plug and valve so that the well point can be converted for use as an observation well. Observation wells shall be not less than 1-½ inches in diameter.
- d. Standby gasoline or diesel powered equipment shall be provided so that in the event of failure of the operating equipment, the standby equipment can be readily connected to the system. The standby equipment shall be maintained in good order and actuated regularly not less than twice a week.

2. Operation

- a. Where well points are used, the groundwater shall be lowered and maintained continuously (day and night) at a level not less than 2 feet

below the bottom of the excavation. Excavation will not be permitted at a level lower than 2 feet above the water level as indicated by the observation wells.

- b. The effluent pumped from the well points shall be examined periodically by qualified personnel to determine if the system is operating satisfactorily without the removal of fines.
- c. The water level shall not be permitted to rise until construction in the immediate area is completed and the excavation backfilled.

3.03 STORAGE OF MATERIALS

A. Sod

- 1. Any sod cut during excavation shall be removed and stored during construction so as to preserve the grass growth. Sod damaged while in storage shall be replaced in like kind at the sole expense of the Contractor.

B. Topsoil

- 1. Topsoil suitable for final grading shall be removed and stored separately from other excavated material.

C. Excavated Materials

- 1. All excavated materials shall be stored in locations so as not to endanger the work, and so that easy access may be had at all times to all parts of the excavation. Stored materials shall be kept neatly piled and trimmed, so as to cause as little inconvenience as possible to public travel or to adjoining property holders.
- 2. Special precautions must be taken to permit access at all times to fire hydrants, fire alarm boxes, police and fire department driveways, and other points where access may involve the safety and welfare of the general public.
- 3.

3.04 DISPOSAL OF MATERIALS

A. Spoil Material

- 1. All spoil materials shall be disposed of as required by the local, state or federal regulations pertaining to the area or as described in the Special Provisions or on the Contract Drawings.
- 2. The surface of all spoil areas shall be graded and dressed and no unsightly mounds or heaps shall be left on completion of the work.

3.05 SHEETING AND BRACING

A. Installation

- 1. The Contractor shall furnish, place and maintain such sheeting, bracing and shoring as may be required to support the sides and ends of excavations in such manner as to prevent any movement which could, in any way, injure the pipe, structures, or other work; diminish the width necessary for construction;

otherwise damage or delay the work of the Contract; endanger existing structures, pipes or pavements; or cause the excavation limits to exceed the right-of-way limits.

2. In no case will bracing be permitted against pipes or structures in trenches or other excavations.
3. Sheet piling shall be driven as the excavation progresses, and in such manner as to maintain pressure against the original ground at all times. The sheet piling shall be driven vertically with the edges tight together, and all bracing shall be of such design and strength as to maintain the sheet piling in its proper position. Seepage which carries fines through the sheet piling shall be plugged to retain the fines.
4. Where breast boards are used between soldier pile, the boards shall be back packed with soil to maintain support.
5. The Contractor shall be solely responsible for the adequacy of all sheet piling and bracing.

B. Removal

1. In general, all sheet piling and bracing, whether of steel, wood or other material, used to support the sides of trenches or other open excavations, shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheet piling extending below the top of a pipe or structural foundation shall not be withdrawn, unless otherwise directed, before more than 6 inches of earth is placed above the top of the pipe or structural foundation and before any bracing is removed. The voids left by the sheet piling shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.
2. The Contractor shall not remove sheet piling and bracing until the work has attained the necessary strength to permit placing of backfill.

C. Left in Place

1. If, to serve any purpose of his own, the Contractor files a written request for permission to leave sheet piling or bracing in the trench or excavation, the Engineer may grant such permission, in writing, on condition that the cost of such sheet piling and bracing be assumed and paid by the Contractor.
2. The Contractor shall leave in place all sheet piling, shoring and bracing which are shown on the Contract Drawings or specified to be left in place or which the Engineer may order, in writing, to be left in place. All shoring, sheet piling and bracing shown or ordered to be left in place will be paid for under the appropriate item of the Contract. No payment allowance will be made for wasted ends or for portions above the proposed cutoff level which are driven down instead of cut-off.
3. In case sheet piling is left in place, it shall be cut off or driven down as directed so that no portion of the same shall remain within 12 inches of the street subgrade or finished ground surface.

3.06 BACKFILLING

A. General

1. All excavations shall be backfilled to the original surface of the ground or to such other grades as may be shown, specified or directed.
2. Backfilling shall be done with suitable excavated materials which can be satisfactorily compacted during refilling of the excavation. In the event the excavated materials are not suitable, Special Backfill as specified or ordered by the Engineer shall be used for backfilling.
4. Any settlement occurring in the backfilled excavations shall be refilled and compacted.

B. Unsuitable Materials

1. Stones, pieces of rock or pieces of pavement greater than 1 cubic foot in volume or greater than 1.5 feet in any single dimension shall not be used in any portion of the backfill.
2. All stones, pieces of rock or pavement shall be distributed through the backfill and alternated with earth backfill in such a manner that all interstices between them shall be filled with earth.
3. Frozen earth shall not be used for backfilling.

C. Compaction and Density Control

1. The compaction shall be as specified for the type of earthwork, i.e., structural, trenching or embankment.
 - a. The compaction specified shall be the percent of maximum dry density.
 - b. The compaction equipment shall be suitable for the material encountered.
2. Where required, to assure adequate compaction, in-place density test shall at the expense of the Contractor be made by an approved testing laboratory.
 - a. The moisture-density relationship of the backfill material shall be determined by ASTM D698, Method D.
 - 1) Compaction curves for the full range of materials used shall be developed.
 - b. In-place density shall be determined by the methods of ASTM D1556 or ASTM D2922 and shall be expressed as a percentage of maximum dry density.
3. Where required, to obtain the optimum moisture content, the Contractor shall add, at his expense, sufficient water during compaction to assure the specified maximum density of the backfill. If, due to rain or other causes, the material exceeds the optimum moisture content, it shall be allowed to dry, assisted if necessary, before resuming compaction or filling efforts.

4. The Contractor shall be responsible for all damage or injury done to pipes, structures, property or persons due to improper placing or compacting of backfill.

3.07 OTHER REQUIREMENTS

A. Drainage

1. All material deposited in roadway ditches or other water courses shall be removed immediately after backfilling is completed and the section, grades and contours of such ditches or water courses restored to their original condition, in order that surface drainage will be obstructed no longer than necessary.

B. Unfinished Work

1. When, for any reason, the work is to be left unfinished, all trenches and excavations shall be filled and all roadways, sidewalks and watercourses left unobstructed with their surfaces in a safe and satisfactory condition. The surface of all roadways and sidewalks shall have a temporary pavement.

C. Hauling Material on Streets

1. When it is necessary to haul material over the streets or pavements, the Contractor shall provide suitable tight vehicles so as to prevent deposits on the streets or pavements. In all cases where any materials are dropped from the vehicles, the Contractor shall clean up the same as often as required to keep the crosswalks, streets and pavements clean and free from dirt, mud, stone and other hauled material.

D. Dust Control

1. It shall be the sole responsibility of the Contractor to control the dust created by any and all of his operations to such a degree that it will not endanger the safety and welfare of the general public.
2. Calcium chloride and petroleum products shall not to be used for dust control.

E. Test Pits

1. For the purpose of obtaining detail locations of underground obstructions, the Contractor shall make excavations in advance of the work. Payment for the excavations ordered by the Engineer will be made under an appropriate item of the Contract and shall include sheeting, bracing, pumping, excavation and backfilling.

- END OF SECTION -

SECTION 02226**TRENCHING, BACKFILLING AND COMPACTING****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes excavation and backfill as required for pipe installation or other construction in the trench, and removal and disposal of water, in accordance with the applicable provisions of the Section entitled "Earthwork" unless modified herein.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION**3.01 EXCAVATION**

- A. The trench excavation shall be located as shown on the Contract Drawings or as specified. Under ordinary conditions, excavation shall be by open cut from the ground surface. Where the depth of trench and soil conditions permit, tunneling may be required beneath cross walks, curbs, gutters, pavements, trees, driveways, railroad tracks and other surface structures. No additional compensation will be allowed for such tunneling over the price bid for open cut excavation of equivalent depths below the ground surface unless such tunnel excavation is specifically provided for in the Contract Documents.
- B. Trenches shall be excavated to maintain the depths as shown on the Contract Drawings or as specified for the type of pipe to be installed.
- C. The alignment and depth shall be determined and maintained by the use of a string line installed on batter boards above the trench, a double string line installed along side of the trench or a laser beam system.
- D. The minimum width of trench excavation shall be 6-inches on each side of the pipe hub for 21-inch diameter pipe and smaller and 12-inches on each side of the pipe hub for 24-inch diameter pipe and larger.
- E. Trenches shall not be opened for more than 300 feet in advance of pipe installation nor left unfilled for more than 100 feet in the rear of the installed pipe when work is in progress without the consent of the Engineer. Open trenches shall be protected and barricaded as required.
- F. Bridging across open trenches shall be constructed and maintained where required.

3.02 SUBGRADE PREPARATION FOR PIPE

- A. Where pipe is to be laid on undisturbed bottom of excavated trench, mechanical excavation shall not extend lower than the finished subgrade elevation at any point.

- B. Where pipe is to be laid on special granular material the excavation below subgrade shall be to the depth specified or directed. The excavation below subgrade shall be refilled with special granular material as specified or directed, shall be deposited in layers not to exceed 6 inches and shall be thoroughly compacted prior to the preparation of pipe subgrade.
- C. The subgrade shall be prepared by shaping with hand tools to the contour of the pipe barrel to allow for uniform and continuous bearing and support on solid undisturbed ground or embedment for the entire length of the pipe.
- D. Pipe subgrade preparation shall be performed immediately prior to installing the pipe in the trench. Where bell holes are required they shall be made after the subgrade preparation is complete and shall be only of sufficient length to prevent any part of the bell from becoming in contact with the trench bottom and allowing space for joint assembly.

3.03 STORAGE OF MATERIALS

- A. Traffic shall be maintained at all times in accordance with the applicable Highway Permits. Where no Highway Permit is required at least one-half of the street must be kept open for traffic.
- B. Where conditions do not permit storage of materials adjacent to the trench, the material excavated from a length as may be required, shall be removed by the Contractor, at his cost and expense, as soon as excavated. The material subsequently excavated shall be used to refill the trench where the pipe had been built, provided it be of suitable character. The excess material shall be removed to locations selected and obtained by the Contractor.
 - 1. The Contractor shall, at his cost and expense, bring back adequate amounts of satisfactory excavated materials as may be required to properly refill the trenches.
- C. If directed by the Engineer, the Contractor shall refill trenches with select fill or other suitable materials and excess excavated materials shall be disposed of as spoil.

3.04 REMOVAL OF WATER AND DRAINAGE

- A. The Contractor shall at all times provide and maintain proper and satisfactory means and devices for the removal of all water entering the trench, and shall remove all such water as fast as it may collect, in such manner as shall not interfere with the prosecution of the work.
- B. The removal of water shall be in accordance with the Section entitled "Earthwork".

3.05 PIPE EMBEDMENT

- A. All pipe shall be protected from lateral displacement and possible damage resulting from superimposed backfill loads, impact or unbalanced loading during backfilling operations by being adequately embedded in suitable pipe embedment material. To ensure adequate lateral and vertical stability of the installed pipe during pipe jointing and embedment operations, a sufficient amount of the pipe embedment material to hold the pipe in rigid alignment shall be uniformly deposited and thoroughly compacted on each side, and back of the bell, of each pipe as laid.
- B. Concrete cradle and encasement of the class specified shall be installed where and as shown on the Contract Drawings or ordered by the Engineer. Before any concrete is placed, the pipe shall be securely blocked and braced to prevent movement or flotation. The concrete cradle or encasement shall extend the full width of the trench as excavated unless otherwise authorized by the Engineer. Where concrete is to be placed in a sheeted trench it shall be

poured directly against sheeting to be left in place or against a bond-breaker if the sheeting is to be removed.

- C. Embedment materials placed above the centerline of the pipe or above the concrete cradle to a depth of 12 inches above the top of the pipe barrel shall be deposited in such manner as to not damage the pipe. Compaction shall be as required for the type of embedment being installed.

3.06 BACKFILL ABOVE EMBEDMENT

- A. The remaining portion of the pipe trench above the embedment shall be refilled with suitable materials compacted as specified.
 - 1. Where trenches are within the ditch-to-ditch limits of any street or road or within a driveway or sidewalk, or shall be under a structure, the trench shall be refilled in horizontal layers not more than 8 inches in thickness, and compacted to obtain 95% maximum density, and determined as set forth in the Section entitled "Earthwork".
 - 2. Where trenches are in open fields or unimproved areas outside of the ditch limits of roads, the backfilling may be by placing the material in the trench and mounding the surface.
 - 3. Hand tamping shall be required around buried utility lines or other subsurface features that could be damaged by mechanical compaction equipment.
- B. Backfilling of trenches beneath, across or adjacent to drainage ditches and water courses shall be done in such a manner that water will not accumulate in unfilled or partially filled trenches and the backfill shall be protected from surface erosion by adequate means.
 - 1. Where trenches cross waterways, the backfill surface exposed on the bottom and slopes thereof shall be protected by means of stone or concrete rip-rap or pavement.
- C. All settlement of the backfill shall be refilled and compacted as it occurs.
- D. Temporary pavement shall be placed as specified in the Section entitled "Restoration of Surfaces".

-END OF SECTION-

SECTION 02228**ROCK REMOVAL****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes removal to the widths and depths shown on the Contract Drawings or as directed by the Engineer, including the loosening, removing, transporting, storing and disposal of all materials requiring blasting, barring, or wedging for removal from their original beds, and backfill of rock excavations with acceptable materials
- B. Use of explosives for rock removal shall be used only with prior permission from both the Engineer and Owner. **Blasting will NOT be permitted in this project.**
- C. Rock removal is part of and incidental to unclassified excavation. No separate payment shall be made for rock removal.

1.02 SUBMITTALS

- A. In addition to those submittals identified in the General Provisions, the following items shall be submitted:
 - 1. Before any blasting operations begin the Contractor shall obtain all permits and licenses required.

1.03 DEFINITIONS

- A. Rock
 - 1. All pieces of ledge or bedrock, boulders or masonry larger than one-half cubic yard in volume.
 - 2. Any material requiring blasting, barring, or wedging for removal from its original bed.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION**3.01 BLASTING (Use of explosives for rock removal shall be used only with prior permission from both the Engineer and Owner.)**

- A. General
 - 1. Handling of explosives and blasting shall be done only by experienced persons.

2. Handling and blasting shall be in accordance with all Federal, State and local laws, rules and regulations relating to the possession, handling, storage and transportation and use of explosives.
3. All blasts in open cut shall be properly covered and protected with approved blasting mats.
4. Charges shall be of such size that the excavation will not be unduly large and shall be so arranged and timed that adjacent rock, upon or against which pipelines or structures are to be built, will not be shattered.
5. Blasting will not be permitted within 25 feet of pipelines or structures.
6. All existing pipes or structures exposed during excavation shall be adequately protected from damage before proceeding with the blasting.
7. NFPA 495 - Code for Manufacture, Transportation, Storage and Use of Explosive Materials.
8. Commonwealth of Kentucky Department of Mines and Minerals, Laws and Regulations Governing Explosives and Blasting.

B. Repair of Damages Due to Blasting

1. Any injury or damage to the work or to existing pipes or structures shall be repaired or rebuilt by the Contractor at his expense.
2. Whenever blasting may damage adjacent rock, pipes or structures, blasting shall be discontinued and the rock removed by drilling, barring, wedging or other methods.

C. Explosives

1. At no time shall an excessive amount of explosives be kept at the site of the work. Such explosives shall be stored, handled and used in conformity with all applicable laws and regulations.
2. Accurate daily records shall be kept showing the amounts of explosives on hand, both at the site and at any storage magazine, the quantities received and issued, and the purpose for which issued.
3. The Contractor shall be responsible for any damage or injury to any persons, property or structures as a result of his handling, storage or use of explosives.

D. Rock Clearance in Trenches

1. Ledge rock, boulders and large stones shall be removed from the sides and bottom of the trench to provide clearance for the specified embedment of each pipe section, joint or appurtenance; but in no instance shall the clearance be less than 6 inches. Additional clearance at the pipe bell or joint shall be provided to allow for the proper make-up of the joint.
2. At the transition from an earth bottom to a rock bottom the minimum bottom clearance shall be 12 inches for a distance of not less than 5 feet.

E. Rock Clearance at Structures

1. Concrete for structures shall be placed directly on the rock and the excavation shall be only to the elevations and grades shown on the Contract Drawings.

3.02 EXCAVATION AND BACKFILL

- A. Rock removal and backfilling shall be performed in accordance with the applicable provisions of the Section entitled "Earthwork".
- B. The rock excavated which cannot be incorporated into the backfill material, as specified, shall be disposed of as spoil and shall be replaced with the quantity of acceptable material required for backfilling.

-END OF SECTION-

SECTION 02270**SLOPE PROTECTION AND EROSION CONTROL****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. The Contractor shall do all work and take all measures necessary to control soil erosion resulting from construction operations, shall prevent the flow of sediment from the construction site, and shall contain construction materials (including excavation and backfill) within his protected working area so as to prevent damage to adjacent property.

B. The Contractor shall not employ any construction method that violates a rule, regulation, guideline or procedure established by Federal, State or local agencies having jurisdiction over the environmental effects of construction. The Contractor shall be responsible for obtaining all associated permits.

C. Pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage and other harmful waste shall not be discharged into or alongside of any body of water or into natural or man-made channels leading thereto.

PART 2 - PRODUCTS**2.01 MATERIALS**

A. Temporary Slope Protection and Erosion Control:

Bales may be hay or straw, and shall be reasonably clean and free of noxious weeds and deleterious materials. Filter fabric for sediment traps shall be of suitable materials acceptable to the Engineer.

B. Permanent Slope Protection and Erosion Control:

On slopes 2H:1V and steeper, and where shown on the drawings place Type A Dumped Rock Fill with a 24-inch minimum thickness over non-woven geotextile filter fabric.

PART 3 - EXECUTION**3.01 METHODS OF CONSTRUCTION**

A. The Contractor shall use any of the acceptable methods necessary to control soil erosion and prevent the flow of sediment to the maximum extent possible. These methods shall include, but not be limited to, the use of water diversion structures, diversion ditches and settling basins.

B. Construction operations shall be restricted to the areas of work indicated on the Drawings and to the area which must be entered for the construction of temporary or permanent facilities. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of the wetlands and adjacent watercourses. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, and use of temporary mulches, mats, or other control devices or methods as necessary to control erosion.

C. Excavated soil material shall not be placed adjacent to the wetlands or watercourses in a manner that will cause it to be washed away by high water or runoff. Earth berms or diversions shall be constructed to

intercept and divert runoff water away from critical areas. Diversion outlets shall be stable or shall be stabilized by means acceptable to the Engineer. If for any reason construction materials are washed away during the course of construction, the Contractor shall remove those materials from the fouled areas as directed by the Engineer.

D. For work within easements, all materials used in construction such as excavation, backfill, roadway, and pipe bedding and equipment shall be kept within the limits of the easements.

E. The Contractor shall not pump silt-laden water from trenches or other excavations into the wetlands, or adjacent watercourses. Instead, silt-laden water from his excavations shall be discharged within areas surrounded by baled hay or into sediment traps to ensure that only sediment-free water is returned to the watercourses. Damage to vegetation by excessive watering or silt accumulation in the discharge area shall be avoided.

F. Prohibited construction procedures include, but are not limited to, the following:

1. Dumping of spoil material into any streams, wetlands, surface waters, or unspecified locations.
2. Indiscriminate, arbitrary, or capricious operation of equipment in wetlands or surface waters.
3. Pumping of silt-laden water from trenches or excavations into surface waters, or wetlands.
4. Damaging vegetation adjacent to or outside of the construction area limits.
5. Disposal of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, washwater from concrete trucks or hydroseeders, or any other pollutant in wetlands, surface waters, or unspecified locations.
6. Permanent or unauthorized alteration of the flow line of any stream.
7. Open burning of debris from the construction work.

G. Any temporary working roadways required shall be clean fill approved by the Engineer. In the event fill is used, the Contractor shall take every precaution to prevent the fill from mixing with native materials of the site. All such foreign fill materials shall be removed from the site following construction.

3.02 EROSION CHECKS

The Contractor shall furnish and install baled hay or straw erosion checks in all locations indicated on the Drawings, surrounding the base of all deposits of stored excavated material outside of the disturbed area, and where indicated by the Engineer. Checks, where indicated on the Drawings, shall be installed immediately after the site is cleared and before trench excavation is begun at the location indicated. Checks located surrounding stored material shall be located approximately 6 ft. from that material. Bales shall be held in place with two 2 in. by 2 in. by 3 ft. wooden stakes. Each bale shall be butted tightly against the adjoining bale to preclude short circuiting of the erosion check.

- END OF SECTION -

SECTION 02525
GROUNDWATER SUPPLY WELL

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The work included in the section shall consist of furnishing and delivering to the job site all material and equipment, and furnishing all labor necessary for the complete installation of one (1) groundwater supply well systems (well systems) each to include the following items:

1. Gravel packed screened well,
2. Vertical turbine well pump and motor,
3. Well vault and piping system,
4. Flow meter,
5. Pump check valve and piping,
6. In addition, other valves in vault.

All of these items shall be furnished and installed as a system by the Contractor.

The exact locations of the new well(s) are indicated on the site plan in the construction drawings.

B. The work to be done shall also include all necessary test drillings and tests on completed wells, which will verify to the Owner and the Engineer that the new well system will meet the minimum guaranteed capacity of no less than 250 gallons per minute.

C. All equipment and incidentals required shall be furnished as shown on the Drawings and as specified herein.

1.02 RELATED SECTIONS

A. The new well system shall meet all requirements as set forth in the following detailed specifications and all requirements in the applicable local and Kentucky codes including, but not limited to, KRS 223.400, 401 KAR 6:310, and 401 KAR 6:320.

B. Work sequence requirements are included in Division 1.

C. Painting requirements, including compatibility of shop paint and finish paint, are included in Division 9.

D. Applicable vertical turbine pump and motor requirements are included in Section 11310 and electrical requirements are included in Division 16.

E. AWWA, ASTM, ANSI, and API standards shall apply as referenced herein. Standards shall include, but are not restricted to the following:

1. AWWA Water Well Standards, A100-97 and A100-90.
2. ASTM Pipe Standards A53, D2241 and F480.
3. API Pipe Standards, 5L.
4. ASTM Portland Cement Standards, C 150-92.

F. The well shall be disinfected to remove bacteriological contamination in accordance with AWWA Water Well Standards A100-97 and ANSI/AWWA C654 as well as applicable Kentucky Division of Water Regulations.

1.03 SUBMITTALS

A. Submit to the Engineer for review, shop drawings, and technical literature covering details of all equipment and accessories being furnished under this section prior to fabrication, assembly, or shipment. See Division 1 for additional requirements. Information specifically required:

1. Completed data sheet.
2. Performance curve showing expected performance at points other than the design conditions. Curve shall show head capacity, efficiency, and horsepower based on bowl performance, and shall cover the complete operating range of the pump from zero capacity to the maximum capacity. Curve to state anticipated column friction and shaft HP at design point. Catalog sheets showing a family of curves will not be accepted.
3. Drawings of the proposed equipment giving general dimensions sufficient to determine how the equipment is to be supported and if it will fit within the space available.
4. Any additional information such as descriptive literature, manufacturer's specifications, and other data to demonstrate compliance with these specifications.
5. A list of manufacturer's recommended spare parts with the manufacturer's current price for each item.
6. Complete description of surface preparation and shop prime painting.

B. Submit operating and maintenance instructions in accordance with Division 1.

C. The Contractor shall keep a log of the geologic materials encountered in the drilling of the test boring and shall furnish typewritten copies of such log to the Engineer upon completion of each well. The Contractor shall also furnish copies of a drawing for the well showing the depth and exact construction of the well, and giving all dimensions regarding lengths and diameters of casing, and screen size of slot openings and other pertinent details and dimensions. The Contractor shall complete and submit to the Kentucky Division of Water (KDOW) a Kentucky Water Well Record (DEP-4045) within 30 days of well completion and provide a copy to the Owner.

D. **Materials and Shop Drawings:** Copies of all materials required to establish compliance with the specifications shall be submitted. Submittals shall at least include descriptive literature, bulletins, and/or catalogs providing description of all materials and mill certifications by material and specification (e.g., ANSI). These submittals shall include, but not be limited to the surface casing, well casing, and drilling fluid products.

1.04 QUALITY ASSURANCE

A. Test Boring

Prior to construction of the production well, a pilot hole shall be advanced to a depth of no more than 250 feet. Two sets of samples shall be taken at 5-foot intervals and at all changes in formation character. Samples shall be taken by means of mechanically driven split type core barrels. Sieve analysis shall be conducted on appropriate samples to determine gravel pack gradation and screen slot openings.

B. Vertical Alignment and Plumbness

The well(s) shall be constructed round, true to line, and shall not depart from the vertical more than four (4) inches per each 100 feet. If doubt exists as to the departure from the vertical, the Contractor may be required by the Engineer to furnish equipment to test the plumbness of the well at no extra cost. No well will be accepted if the straightness of vertical alignment is unsatisfactory to the extent that it interferes with the installation of the pump intended for the well.

C. Test Pump

1. A deep well turbine test pump capable of pumping at least 250 gpm shall be furnished by the Contractor and temporarily installed in the well to complete its development and to conduct a final pumping test of the well. The Contractor shall also furnish motive power such as a gasoline or diesel engine. If electric power is available at the site, the Contractor may use it at his option and expense. Any generator used for the test pumping shall have the necessary capacity to adequately power the selected test pump through the pumping period and discharge range. The engine shall be capable of operating at least 24 hours without shutdown. Additionally, the Contractor shall provide an opening or fitting such that depth to water level or potentiometric surface pressure may be measured using a pressure transducer during pumping.
2. Discharge pipe shall be of a diameter and length adequate to transmit water at the maximum discharge rate specified herein from the well site to a designated discharge point up to one thousand (1,000) feet down gradient from the well. Discharge pipe shall be in good condition, shall be free from leaks, and adequately restrained to withstand the maximum anticipated pressure without bursting of the pipe or separation of the joints. A hose bib suitable for collecting representative water samples shall be located on the discharge upstream from the flow meter. A ¼-inch diameter NPT threaded tap suitable for the installation of a sand tester shall be located on the horizontal centerline of the discharge pipe at a location approved by the Engineer.
3. A gate valve suitable for controlling flow through the discharge pipe shall be provided and shall be located at the wellhead, downstream of the calibrated flowmeter.
4. The Contractor shall provide a totalizing flow meter calibrated for the design flow and pipe size and capable of an accuracy of 95% or better. The meter shall have been calibrated within 90 days of the proposed use. The flow meter shall be installed as specified by the manufacturer for accurate operation. The meter shall be located a minimum of 10 pipe diameters upstream and 5 pipe diameters downstream from any flow obstructions.
5. The test pump shall be set a minimum of 200 feet below land surface. This requirement may be waived if pumping at a rate of 250 gpm in the test/production well results in pumping water level drawdowns, which are considerably less than 200 feet below land surface.
6. The Contractor shall provide data logger(s) and pressure transducers with appropriate pressure ranges for the measurement of water level changes or potentiometric pressure changes during the step-drawdown and constant rate discharge testing.

7. The data logger(s) shall be capable of recording measurements according to the schedule of variable time intervals as listed below:

<u>Interval</u>	<u>Number</u> of <u>Readings</u>	<u>Total Elapsed Time</u> <u>(min)</u>
1 sec	120	2
2 sec	120	6
5 sec	48	10
10 sec	60	20
30 sec	80	60
1 min	60	120
2 min	60	240
5 min	60	540
10 min	90-378	1440-4320

8. All test pumping equipment shall remain the property of the Contractor.

D. Pump Testing - Step Drawdown Testing

1. Within one week of the completion and development of a well, the well shall be tested to determine performance. The test will consist of a step-drawdown test in which the well will be pumped at four escalating rates.

- a) The discharge rates shall be as follows (or higher if the test pump will allow):

<u>Step</u>	<u>Pump Rate</u>
1	50 gpm
2	100 gpm
3	175 gpm
4	250 gpm

- b) The pump used in the step-drawdown test shall be capable of producing the discharge rates listed above.
- c) Water levels, discharge rates, and totalizer flow meter readings shall be manually measured and recorded every 10 minutes through each step by the Contractor
- d) Each pumping step shall last for 1 hour.
- e) The well will be allowed to recover a minimum of 1 hour or to within 0.05 feet of the original static water level at the end of the last step.
- f) Water quality samples will be collected at the end of the step drawdown test by the Engineer and sent to a State-certified lab for drinking water standards analysis. The Contractor shall be responsible for all cost for the analytical analysis.
2. Prior to the start of well testing, the Contractor shall install test data collection equipment. The pump and all measuring or testing equipment must be disinfected prior to being placed in the well.
- a) A gate valve shall be installed in the discharge pipe located at the wellhead. The valve shall be in good condition and shall be capable of controlling the discharge

rate of the well.

- b) A totalizing flow meter calibrated to read within 5% of actual discharge shall be installed in the discharge pipe to measure the discharge during testing.
 - c) The pressure transducer shall be setup in the pumping well and connected to the data logger. The data logger will be setup to record measurements every 5 seconds for the duration of the test and recovery period.
3. During testing of the well, the Contractor will record discharge rates and water levels in the well at predetermined times. For this purpose, the Contractor shall operate the pump without interruption, at no more than 2 percent fluctuation in the designated rates of discharge, during the full period of the step-drawdown test. If a test is started, but must be stopped due to equipment breakdown or inadequate supervision by the Contractor, no extra payment will be made for the time spent pumping before the test had to be stopped, or the time spent waiting for recovery before the test is restarted. If any part of the pumping equipment fails to operate properly or impairs the proper functioning of another element or instrument, involved in the test, the equipment shall be removed and repaired at the expense of the Contractor and no extra payment will be made for the delay.
 4. If, as a result of step-drawdown test analysis, the Engineer determines that the pumping well has not been fully developed, the Contractor shall continue well development using the test pump or other means. No additional payment will be due the Contractor for time in setting up and conducting the additional step-drawdown test, which will be required for well acceptance following this additional development.
 5. A copy of the test data collected by the data logger will be provided to the Engineer for reduction and analysis in its raw form on a CD-ROM in ASCII or Microsoft® Excel format. A copy of all other data, hand written or otherwise, collected for the test will also be provided to the Engineer for reduction and analysis.

E. Pump Testing - Constant Rate Discharge Testing

1. A constant rate discharge test (CRDT) will be conducted on test/production well. The test will consist of pumping the well at a constant rate for a specified period or until the water level, drawdown stabilizes in the test/production well. The discharge rate will be based on the results of the step drawdown testing. The duration of the CRDT will be 72 hours for the test/production well.
 - a) The Contractor shall wait a minimum of 24 hours following the completion of all step-drawdown testing before beginning the constant rate discharge test to allow the well to recover and the collection of background water levels by the Contractor.
 - b) Background and pump test water levels shall be obtained by the pressure transducers with data loggers from the test/production well, the exploratory test well and in up to three additional monitoring wells.
 - c) Daily rainfall data will be collected by the Contractor during the background water level measurement, the constant rate discharge test, and the test recovery period.
 - d) Discharge rates shall be measured and recorded periodically throughout the

test by the Contractor. The totalizing flow meter reading shall be recorded every half-hour for the duration of the test.

- e) Water levels in the test/production well shall be measured with pressure transducers with appropriate operating ranges and recorded by the data loggers. Water levels shall be collected manually by the Contractor at the test/production well every hour for the duration of the test.
 - f) Static water levels, drawdown, and recovery from the test shall be measured by the Contractor to the nearest 0.01-foot by pressure transducers in the observation wells. The measurement schedule will be followed during the constant rate discharge test and restarted for the recovery period.
 - g) Water levels shall be collected by the Contractor at the end of the discharge test until the pumping well recovers within 0.05 feet of the original static water level or a minimum of 24 hours.
 - h) A copy of the test data collected by the data logger will be provided to the Engineer for reduction and analysis in its raw form on a 3½" computer diskette in ASCII or Microsoft® Excel format. A copy of all other data, hand written or otherwise, collected for the test will also be provided to the Engineer for reduction and analysis.
2. Prior to the start of well testing, the Contractor shall install test data collection equipment. The pump and all measuring or testing equipment must be disinfected prior to being placed in the well.
- a) A 1¼-inch nominal diameter pipe, open only at the top and bottom and suitable for water-level measurement using a pressure transducer, shall be installed in the pumping test/production well. The top of the pipe shall be installed at or slightly above land surface and be accessible during the pumping test as directed by the Engineer. A fitting allowing for the watertight sealing of the access pipe around the transducer cable must be provided. The bottom of the pipe shall be 3 feet above the top of the pump bowl assembly. The inside of the pipe shall be smooth and unobstructed and the pipe shall be sufficiently plumb and straight so that there will be no interference with measurement.
 - b) A gate valve shall be installed in the discharge pipe located at the wellhead. The valve shall be in good condition and shall be capable of controlling the discharge rate of the well.
 - c) A totalizing flow meter calibrated to read within 5% of actual discharge shall be installed in the discharge pipe to measure the discharge during testing.
3. During testing of the well, the Contractor will record discharge rates and water levels in the well at predetermined times. For this purpose, the Contractor shall operate the pump without interruption, at no more than 2 percent fluctuation in the designated rate of discharge, during the full period of the test. If a test is started but must be stopped due to equipment breakdown or inadequate supervision by the Contractor, no extra payment will be made for the time spent pumping before the test had to be stopped, or the time spent waiting for recovery before the test is restarted. If any part of the pumping equipment fails to operate properly or impairs the proper functioning of another element or instrument, involved in the test, the equipment shall be removed and repaired at the expense of the Contractor and no extra payment will be made for the delay.

4. Pump rates for the CRDT shall be 250 gpm for the test/production well. This rate may be modified based on the results of the step drawdown tests.

F. Water Quality Analysis

Prior to the conclusion of pumping, water quality samples shall be taken and delivered to Owner's representative and/or representatives of the Kentucky Division of Water for analysis. Analysis shall include all required parameters by the Kentucky Division of Water for the construction of groundwater wells and comply with all other requirements of 401 KAR Chapter 6 and KRS Chapter 223. The actual list of parameters for the water quality analysis shall be obtained from the Kentucky Division of Water-Groundwater Branch, and at a minimum, but not limited to; the following parameters may also be included.

1. Hardness, Total
2. Hardness, Calcium
3. Hardness, Magnesium
4. Dissolved Iron
5. Dissolved Manganese
6. Total Silicon
7. Alkalinity, Total
8. Solids, Total Suspended
9. Sulfide
10. Carbon, Total Organic
11. Phosphorous, Total
12. Total Dissolved Solids
13. Nitrogen, Nitrate

1.05 WELL ACCEPTANCE CRITERIA

A. The sand content in the water pumped from the completed test/production well shall not, at anytime, exceed 1 mg/L while the well is being pumped at 250 gpm.

B. The turbidity of the water from the completed test/production well shall not exceed one NTU as measured on a calibrated turbidimeter when the well is being pumped at its design capacity of 250 gpm.

C. The Contractor must supply the equipment necessary to test, in the field, sand, and turbidity concentrations.

D. The well efficiency of the completed well shall not be less than seventy percent (70%) at the design pump rates (250 gpm) as calculated by the Hantush-Bierschenk's method.

E. The casing and borehole shall be constructed round, plumb and true to line; the well shall comply with AWWA A100-97 or latest revision. The well shall be tested for plumbness and alignment by the Contractor in accordance with Appendix D of the American Water Works Association (AWWA) Standard A100-97 or latest revision.

F. The Contractor shall demonstrate that the well is properly disinfected and bacteriologically

cleared by passing five consecutive microbiological samples as described elsewhere in this Section.

1.06 PROJECT RECORDS

A. Before installing the casing or materials in the well, a report listing the source and description of the materials to be used and the mill certificates shall be submitted to the Engineer.

B. During drilling of the well, the Contractor shall maintain at the well site a complete log setting forth the following:

1. The surveyed reference point for all depth measurements.
2. The depth at which changes of formation occur.
3. The depth and interval of each cavity encountered during drilling.
4. The identification of the material of which each stratum is composed.
5. The depth interval from which each formation sample is taken.
6. The depth interval from which each water sample is taken.
7. The depth at which hole diameters change.
8. Depth at which drilling method is changed.
9. Other pertinent data requested by the Engineer.

C. Lithologic samples and water quality samples shall be collected and preserved immediately upon retrieval. Lithologic samples shall be preserved in separate airtight jars or ziplock bags of at least 1.0 pound capacity for each interval specified by the Contractor. Lithologic samples shall be taken during drilling at 10-foot intervals and at lithologic changes. Once into the groundwater aquifer, water quality samples shall be collected. Samples shall be collected from each interval and each sample shall be clearly and legibly labeled with the following information:

1. Location of the well.
2. Name or number of the test/production well.
3. Depth interval represented by the sample.
4. Date taken.
5. Time taken.
6. Split number (1 of 2; or 2 of 2).

D. Upon completion of the well, the Contractor shall also submit to the Engineer a report and as-built drawings to include the following:

1. The total depth of the borehole and the length of casing installed in the well.
2. The nominal hole diameter.
3. The depth or location of any lost drilling fluid, drilling materials, or tools.
4. The type and amount of drilling fluid additives used.
5. The depth and diameter of any surface casing.
6. The amount of cement (cubic yards) used in grouting the well annulus and/or surface casing.
7. The complete description (including length, diameter, depth, and mill certificates) of the well casing.
8. Other pertinent data requested by the Engineer.
9. Any and all other pertinent information for a complete and accurate log (e.g., temperature, pH, and appearance (color) of any water samples taken).

E. Formation sample jars or bags shall be provided and properly labeled by the Contractor.

F. A daily detailed driller's report shall be maintained and delivered upon request to the Engineer or his representative at the well site. The report shall give a complete description of all lithologies encountered, number of feet drilled, number of hours on the job, shutdown time due to breakdown or other

cause, the fluid level in the hole measured daily before starting pumps, the properties of the drilling fluid, feet of casing set, and such other pertinent data as requested by the Engineer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. All water and monitoring well drillers submitting proposals for this work shall have a current Kentucky Water Well Driller's Certification as of the time of bid opening and certified to drill both water and monitoring wells in the State of Kentucky, and has successfully passed the examination, completed training, or complied with other requirements of 401 KAR 6:320 and KRS Chapter 223.

B. Offers, which are eligible to offer material and equipment for this work, provided any exceptions or deviations taken to the plan design and product specifications shall be approved by the Engineer prior to final acceptance and approval of the construction.

C. The Contractor for this work shall be one recognized and established in the design and construction of municipal production water wells and monitoring wells in the State of Kentucky and be a holder of a valid Kentucky Water Well Driller's Certification. The Contractor shall have successfully demonstrated experience and have constructed and/or installed a minimum of ten municipal water wells for production within the last ten years within the Commonwealth of Kentucky.

D. The Contractor shall provide a listing of the well drillers to perform the work and a copy of the current certification along with a list of a minimum of ten municipal water well installations within the last ten years in the Commonwealth of Kentucky.

E. Some standard equipment of these manufacturers may have to be modified to meet requirements of these specifications.

F. The cost of modifications to other equipment or facilities required to accommodate a manufacturer's equipment shall be included in the Contractor's bid.

G. Subject to compliance with the complete requirements of these specifications, manufacturers offering products, which may be incorporated into the work, shall be listed in the latest edition of the Well Drillers Certification Program for water well and monitoring well drillers in accordance with 401 KAR 6:320.

2.02 PUMP DESIGN

SEE SECTION 11210 - SUBMERSIBLE VERTICAL TURBINE PUMPS AND MOTORS

2.03 WELL DESIGN

A. Piping

Contractor shall furnish and install necessary pipe, valves, and fittings as required as indicated on attached Drawing. All valves and fittings to be rated with Class 150 ductile iron flanges except as noted otherwise. Piping also includes all drain back lines, surge relief lines, pressure gauges, hose bibs, and any associated electrical or mechanical fittings as indicated on the drawings.

The coupling between the pump and the valve vault and accessories on the platform shall be rated for a minimum working pressure of 250 psi.

B. Outer Casing Pipe

1. The outer casing pipe for the production well shall be black steel and shall have a minimum diameter of 18 inches and is to extend down to a depth of 20 feet below the ground surface. The casing shall be standard weight line pipe with a minimum wall thickness of 0.375 inch and shall conform to ASTM A53B or API 5L, Grade B, seamless or electric resistance welded, for black steel casing. A minimum annular space of six (6) inches between the formation and the casing will be maintained for the full length of the casing pipe. The space will be cemented throughout its entire depth with neat cement grout.
2. Casing lengths shall be joined watertight by a method appropriate to the material used, as selected by the Contractor, so that the resulting joints shall have the same structural integrity as the casing itself. If metallic casing is welded, the standards of the American Welding Society and AWWA C206 shall apply. Casing ends shall be coupled by field welding and shall be beveled. If threaded and coupled joints are used, couplings shall be API or equivalent, made up so that, when tight, all threads will be buried in the lip of the coupling. Should the joints fail or break, the Contractor shall be responsible for abandonment, repair, or replacement of the well.
3. The outer casing shall be as manufactured by U.S. Steel Corporation, or an approved equal. Copies of the mill certificates shall be submitted by the Contractor to the Owner/Engineer for approval prior to shipment of casing to the site.
4. If any surface casing is intended for construction purposes only, it shall be reasonably watertight, and of such weight and design as necessary to prevent entrance of sand and unconsolidated material, and to permit its installation without distortion or rupture to the specified depth and dimension.
5. No surface casing for the test/production well shall be ordered or delivered to the site until approval has been provided by the Engineer.

C. Inner Casing Pipe

1. The inner casing pipe shall extend up and into the outer casing pipe to the top of the ground. The inner casing shall have a minimum nominal diameter of 10 inches and shall be PVC SDR 17 OR DR 18 and new material or approved equal PVC having perfect roundness and uniform wall thickness. The PVC well casing shall conform to pipe standards ASTM F480 or D2241 for SDR 17 PVC and shall be approved by the National Sanitation Foundation (NSF) for use with potable water. The inner casing shall be supplied with guides of adequate spacing to properly center it in the outer casing pipe.
2. The well casing shall be as manufactured by the Certainteed Corporation or approved equal.
3. Casing lengths shall be joined watertight by a method appropriate to the material used, as selected by the Contractor, so that the resulting joints shall have the same structural integrity as the casing itself. Should the joints fail or break, the Contractor shall be responsible for abandonment, repair, or replacement of the well.
4. No well casing shall be ordered or delivered to the site until approval has been provided by the Engineer. This is required due to the potential for quantity and size changes.
5. The Contractor shall take necessary precautions while grouting around the inner casing pipe to prevent any damage of the PVC pipe. The Contractor shall be responsible for any damage to well casing resulting from cementing operations and for the cost required to correct such damages

D. Screen

Contractor shall install 25 feet of 10" diameter well screen of the continuous slot, stainless steel. It shall be directly connected to the inner casing. It shall be fabricated by circumferentially wrapping a triangular shaped wire profile around equally spaced internal rods circular in shape. To ensure maximum collapse strength and to provide a rugged one-piece unit, which will neither loosen nor unwrap, each juncture between horizontal and vertical wire profiles shall be made by rapid electrical resistance fusion welding under water. The entire unit shall be of all-welded construction including attachment of end fittings. The inlet slots shall have sharp outer edges, widening inwardly to resist clogging. The well screen shall be as manufactured by Houston, Universal Oil Products Company, or approved equal.

The well screen and attached end fittings shall be completely fabricated of one corrosion-resistant metal, which shall be type 316 stainless steel. The end fittings shall be provided consistent with the well design and drilling methods used. The entire unit must be guaranteed by the well screen manufacturer to meet this specification. The diameter, length, and wire shape or shapes of the well screen shall be such that the desired yield of the well will be transmitted through the slot openings at a minimum calculated entrance velocity of 0.1 foot per second. No louvered or "shutter" type screen will be considered.

E. Gravel Filter

A gravel filter shall be installed around the screen and casing pipe for the entire length. The gravel shall be well rounded and graded to proper size so as to retain the formation sand. The gravel wall filter surrounding the screen shall have a minimum thickness of not less than nine (9) inches. The gravel shall be of the pure silica type only as supplied by Parry Company of Chillicothe, Ohio or Engineer approved equal.

F. Valves

Provide valves for the well system per specifications in Section 02640.

G. Pitless Unit System

1. This section includes specifications for a complete assembled Pitless Unit System including well cap, lift-out bail, hold down hooks, lift out pipe, discharge body with support ring, spool with check valves and pressure equalizing passages. The Pitless Unit shall be equal to Baker Manufacturing Company, Monitor Division, or Engineer approved equal. The unit should be factory assembled, before shipping to the site. The pitless unit must conform to the Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State Public Health & Environmental Managers, Health Education Services, Albany, NY., and/or Water Systems Council PAS-97 (04).
2. The watertight well cap shall be secured to the pitless casing with a compression gasket. The top of the cap can be removed without affecting the sealed conduit or wiring. The heavy duty watertight cap will have a separate protected downward facing stainless steel screened well vent with pipe nipple. Construction of the cap and well vent will be of heavy duty gray cast iron and painted with a green enamel finish.
3. The upper casing shall be factory assembled to the discharge body, and the lift out and hold down mechanism shall be factory assembled to the spool. Upper casing thickness must conform to the Recommended Standards for Water Works, and be coated with a rust protective coating. The upper casing must provide a watertight connection from the discharge body to the well cap. The discharge port center line to be three (3) feet below grade, and the pitless upper casing to extend two (2) feet above grade.

4. The spool shall include four (4) inch NPT per ANSI B 1.20.1 male drop pipe connection and shall be constructed of lead-free galvanized heavy duty gray cast iron, ductile iron, or steel with a lead-free galvanized plating on the wetted surface of over .010 inches thick. The spool shall have o-ring grooves machined into the spool retaining the o-rings when setting or pulling the system. The positive pressure o-ring seals shall be constructed of neoprene or equivalent. Spool shall be designed to accommodate probe tubes or water samplers and NPT ports for discharge pressure taps. O-ring protection should be provided to prevent the seals from dragging on the upper casing when the pump is installed or removed.
5. The discharge body shall be constructed of lead-free galvanized ductile iron or lead-free galvanized steel. O-ring seat to be designed to prevent crevice and galvanic corrosion, dissimilar metals should be avoided. Discharge body designed to be strong enough to prevent distortion due to vertical movement of discharge pipe thereby allowing spool to bind in the discharge body. Minimum I.D. of the discharge body to be equal to or greater than I.D. of the well casing for ease in well servicing.
6. The pitless unit spool should have a hold down mechanism, factory assembled to spool and capable of preventing rotation of the pitless spool relative to the discharge body, at full rated locked rotor torque of the submersible pump motor. The spool must also have a factory assembled lift out pipe and bail, or spider capable of 68,000 lbs. rated load, to allow lifting a water filled drop pipe and pump out of the well for service. Components to be constructed of ductile iron or steel with a corrosion resistant coating.
7. Check valves shall be provided in the removable spool of the pitless unit. These should be low pressure drop, self cleaning, swing type check valves, with elastomer seal at seat, and constructed of corrosion resistant materials.

2.04 SHOP DRAWINGS

- A. The Contractor shall submit the required materials and shop drawings and other submittals to the Engineer for approval as noted in Section 01300 and as specified elsewhere in this section.
- B. Each set of shop drawings shall include, but not be limited to, the following:
 1. Drawings showing dimensions of all steel units.
 2. Control details and electrical schematic diagrams.
 3. Performance data including, when applicable, pump curves, motor data, certified pump test curves, etc.
 4. All other information necessary to enable the Engineer to determine whether the proposed equipment meets the requirements.

2.05 SPARE PARTS

- A. Spare parts shall include those recommended by the manufacturer or those listed below, whichever is more comprehensive:
 1. Complete set of bearings,
 2. Complete set seals,
 3. Complete set of "O" rings, and
 4. One year supply of lubricants.

See Division 1 for additional requirements.

2.06 WARRANTY

A. The well contractor shall warrant the well system to be free from defects in workmanship for a period of one (1) year from the date of acceptance.

B. Warranties and guarantees by the suppliers of various components in lieu of a single source responsibility by the pump manufacturer shall not be accepted. The well contractor shall be solely responsible for the warranty. In the event a component fails to perform as specified or is proven defective in service during the warranty period, excluding items of supply normally extended during operation, the well contractor shall provide a replacement part without cost to the Owner.

2.07 INSTALLATION AND OPERATING INSTRUCTIONS

A. Five (5) copies of a manual containing installation instructions, operating and maintenance instructions, wiring diagrams, parts lists, and, where applicable, test data and curves shall be provided by the system supplier as outlined in Section 01300.

B. Installation of the pump and pump motor shall be done in accordance with the written instructions provided in the manual(s) as specified.

C. The well contractor shall provide the service of a factory-trained representative for a maximum period of one (1) day to start up the station and to instruct the Owner's operating personnel in the operation and maintenance of the equipment provided.

PART 3 - EXECUTION

3.01 WELL CONSTRUCTION

The well shall be constructed by the open hole process with freestanding walls, using only clean water for drilling and completion. No additives may be used unless previously approved by the Engineer.

3.02 DRILLING EQUIPMENT

The drilling equipment used for the work must be clean; free of excess oil, grease, and soil brought from other sites; and adequate in all respects to ensure expeditious completion of the work. If the drilling equipment, in the opinion of the Engineer, proves to be inadequate or not in proper repair for the execution of work, the Engineer may order that repairs to be made immediately or that more adequate equipment be furnished by the Contractor.

3.03 DEPTH OF WELL

The well will be a fully penetrating well drilled to the top of bedrock or a depth of approximately 250 feet below the existing grade.

3.04 MANUFACTURER'S SERVICE REPRESENTATIVE

The manufacturer's field engineer or service representative shall inspect and check the installation after erection and be on hand for initial start-up and testing of pump equipment. See Division 1 for additional requirements.

3.05 INSTALLATION

All equipment shall be installed in accordance with the manufacturer's instructions.

3.06 WELL DEVELOPMENT

A. The Contractor shall develop the well by means of straight mechanical surging, air surging, and overpumping.

B. Air surging and overpumping shall be performed prior to mechanically surging the well in order to remove fines from the well, gravel pack, and screen to minimize the potential of fines being forced back into the formation through mechanical surging. The mechanical surge blocks shall consist of double surge blocks that are spaced at least two to three feet apart and the surge block should fit freely in the well casing. Care should be taken to remove fines from the borehole as often as possible during the mechanical surging process.

D. A mixture of sodium tripolyphosphate and HTH shall be pumped into the well. This mixture shall consist of HTH sodium tripolyphosphate and shall be mixed in a drum or container of water on the surface in portions recommended by the manufacturers to disperse fines and clays and to disinfect the well, the gravel pack and the formation.

E. The solution shall then be pumped into the well and straight mechanically surged throughout the full length of the screen for four to five hours. The well shall then be air surged through out the full length of the screen for at least 8 hours.

F. A second charge of sodium tripolyphosphate and HTH, equal in weight to the first charge, shall then be added to the well in the same manner as the first charge. Following straight mechanical surging of the solution of the well, the well shall be air surged until the water being discharged is clear of any discoloration due to the silt, clay, and/or chemicals being pumped out of the well. This second period of air surging shall not exceed 8 hours unless authorized by the Engineer or his representative

G. Sand content shall be determined in the well using a Rossum sand tester or approved equivalent. The Contractor shall demonstrate that the well meets the acceptance criteria under this Section. It is the responsibility of the Contractor to secure prior written approval from the Engineer for any changes in the sand content testing method.

H. If a diesel engine is used to drive the test pumps, it shall be equipped with a clutch to allow instantaneous disengagement of the drive shaft and free spooling of the impellers. If an electric motor is used, it will not be equipped with an anti-reverse ratchet, therefore allowing the impellers to backspin when the motor is turned off.

I. Pumping for the turbidity test for well acceptance will begin after a rest period of at least 5 minutes.

J. Well development shall be deemed complete when sand content and turbidity are below the levels specified and well efficiency as calculated by the Hantush-Bierschenk's method is greater than the level specified at the design pump rate. Development shall be proved by step drawdown testing. It is the responsibility of the Contractor to attempt to meet the development criteria by the methods outlined.

K. If the development criteria are not met after a reasonable time for aggressive development using methods approved by the Engineer, the Engineer and Contractor shall meet to evaluate alternative development methods. It is not the intent of these criteria to place the entire burden on the Contractor for circumstances and events beyond his control. If, after due diligence by the Contractor and Engineer, the development criteria cannot be met, these criteria may be re-evaluated.

3.07 FIELD TESTING OF PUMP AND MOTOR PERFORMANCE

Each pump and motor shall be field tested for conformance with the approved pump characteristic

curves. Field tests shall confirm pump shut-off head and performance at the design point and at one other point in the head capacity curve. The tests shall be made by the Contractor and shall be witnessed by the Engineer. The Contractor shall furnish all test equipment including equipment to test the motor rpm. If the performance of the unit(s) proves to be lower than approved data shows, it will be cause for rejection of the unit, or at the Engineer's option, a deduction in the contract amount for the extra costs the Owner will bear in extra power and other costs.

3.08 MANUFACTURER'S TRAINING

A minimum of three (3) hours of operator training shall be furnished by a fully qualified field service engineer. The training shall address all aspects of well system operation, maintenance, and trouble shooting.

3.09 PROTECTION OF WELL

A. At all times during the progress of the Work the Contractor shall use all reasonable precautions to prevent tampering with the well or entrance of foreign material into it. The Contractor shall also maintain the site in a clean and orderly fashion at all times so that no adverse aesthetic impacts are created upon adjacent private properties or the adjacent public right-of-way. The Owner reserves the right to suspend work and have the site cleaned prior to proceeding, at no additional expense to Owner, if the site is not properly maintained.

B. Immediately upon disinfection of the well, the Contractor shall remove all of his equipment, materials, and supplies from the site of the Work, remove all surplus materials and debris, fill in all holes or excavations, and regrade the site to conform to the contours of the land, which existed before work started. The site shall be thoroughly cleaned and made ready for the Contractors on succeeding work. Not more than two weeks will be allowed for this site restoration, and the Contractor shall complete all site restoration work within that time.

3.10 DISINFECTION OF WELL

A. Preventative Actions

Clean conditions are necessary for effective well disinfection. During construction and maintenance operations, precautions shall be taken to minimize contamination. Surface runoff shall be diverted away from the well, drilling fluid pond, and other construction areas. Drilling equipment, gravel, pump column, and any other items and materials that will be inserted in the well shall be used and stored in a manner that minimizes contamination. Special care should be taken with grease and other lubricants to protect them from contamination. Some drilling fluid additives have been demonstrated to promote bacterial growth; additives of this type should be avoided.

B. Forms of Chlorine for Disinfection

The forms of chlorine that may be used in the disinfecting operations are liquid chlorine, sodium hypochlorite solution, and calcium hypochlorite granules or tablets.

1. Liquid Chlorine

Liquid chlorine conforming to ANSI/AWWA B301 contains 100 percent available chlorine and is packaged in steel containers, usually of 100-pound, 150-pound, or 1-ton net chlorine weight. Liquid chlorine shall be used only 1) in combination with appropriate gas-flow chlorinators and injectors to provide a controlled high-concentration solution feed to the water to be chlorinated; 2) under the direct supervision of a person who is familiar with the physiological, chemical, and physical properties of liquid chlorine, and who is trained and equipped to handle any emergency that may arise; and 3) when appropriate safety practices are

observed to protect working personnel and the public.

2. Sodium Hypochlorite

Sodium hypochlorite conforming to ANSI/ AWWA B300 is available in liquid form in glass, rubber-lined, or plastic containers, typically ranging in size from one (1) quart to five (5) gallons. Containers of 30 gallons or larger size may be available in some areas. Sodium hypochlorite contains approximately five (5) percent to 15 percent available chlorine, but care must be used in control of conditions and length of storage to minimize its deterioration.

3. Calcium Hypochlorite

Calcium hypochlorite conforming to ANSI/ AWWA B300 is available in granular form or in small tablets and contains approximately 65 percent available chlorine by weight. The material should be stored in a cool, dry, and dark environment to minimize its deterioration. The precautions listed on the container label should be carefully noted.

C. Gravel and Gravel-Pack Chlorination

1. Chlorination of Gravel Being Installed in New Wells

Gravel being installed in new wells shall be chlorinated by one of the following two procedures. In either case, prior to installing gravel, the drilling fluid shall be thinned as described in ANSI/AWWA A100 and shall extend to the top of the casing.

- a. Tablet Procedure in Gravel - Calcium hypochlorite tablets (approximately 5-g size) shall be uniformly mixed with the gravel at the rate of 1/4 pound to 1/2 pound of calcium hypochlorite per ton of gravel. The mixture shall then be fed into the gravel chute and shall completely fill the annular void outside the casing to the level desired.

WARNING: Gravel used in any water well should be free of organic material. Otherwise, there is potential for an explosion when gravel containing organic material is mixed with hypochlorite tablets.

- b. Chlorine Residual in Drilling Fluid - After the drilling fluid has been thinned, gravel can then be added to fill the annular void outside the well casing. After the drilling mud has been displaced, chlorinated water is then put into the well to produce a chlorine concentration of not less than 50 mg/L in the entire volume of fluid within the well. The chlorine residual shall be measured periodically during this operation and the chlorine feed adjusted if necessary.

2. Chlorination of Gravel Being Installed in Existing Wells

When gravel has settled in an existing well, any replacement gravel used to fill the void shall be soaked immediately prior to its use, for at least 30 minutes, in a chlorine solution maintained at a concentration of not less than 50 mg/L.

3. Chlorination of Existing Gravel Pack in Wells

When an existing gravel pack appears to be the source of contamination in a well, it shall be chlorinated by feeding water containing not less than 100 mg/L chlorine

residual down the gravel chute. The chlorinated water shall be fed down the gravel chute until the chute will no longer take water or until the volume down the chute is equal to at least twice the calculated volume of the annular space outside the well casing. The chlorinated water should be fed into the gravel chute through an air-gap system to avoid a pressure buildup that would lift the pump base. The maximum rate at which the gravel will accept water may vary greatly from one well to another, but rates of 20 gpm to 50 gpm (70 L/min to 190L/min) are not unusual.

D. Chlorination of Permanent Equipment and Material Used in Wells

All permanent equipment and material to be installed in the well shall be chlorinated just prior to installation. This shall be done by spraying such areas with a solution having a chlorine residual of not less than 200 mg/L.

E. Chlorination of Well after Permanent Equipment is Installed

After permanent equipment is installed, the well shall be chlorinated by 1) treating the water in the well casing to provide a chlorine residual of approximately 50 mg/L, 2) circulating the chlorinated water within the well casing and pump column, and 3) pumping the well to waste to remove chlorinated water.

1. Treating the Water in the Well Casing

The water in the casing shall be treated with chlorine so that an average chlorine dose of 50 mg/L has been added to the entire volume of water in the casing. This may be done by using calcium hypochlorite tablets or sodium hypochlorite solution in the amounts shown in Table A.1.

If calcium hypochlorite is used, tablets of approximately 5-g size shall be dribbled down the casing vent and at least 30 minutes shall pass to allow the tablets to fall through the water and dissolve.

If sodium hypochlorite is used, the solution must reach all parts of the well. To accomplish this, a tube shall be suspended through the well casing vent so that it reaches the bottom of the well. After it reaches the well bottom, it shall be withdrawn as the sodium hypochlorite solution is pumped through the tube.

After the chlorine has been applied, the well shall be surged at least three times to improve the mixing and induce contact of the chlorinated water with the adjacent aquifer. The chlorinated water shall be allowed to rest in the casing for at least 12 hours, but for no more than 24 hours.

2. Circulating the Chlorinated Water

Following completion of the procedure described in the preceding section, a pressure-tight connection shall be made at least two (2) inches in diameter (but not larger than the discharge piping) from the pump discharge piping to the casing vent. The pump shall be operated against a throttled discharge valve to return a flow of several hundred gallons per minute down the well casing while the rest of the pumped water is discharged to waste. In low-producing wells, the rate of return need not exceed one-half of the maximum rate of production of the well.

CAUTION: The discharge valve shall not be throttled to the extent that the pressure developed will damage equipment or pipe-restraining ties. This procedure will remove oil or other material that has accumulated on the water surface. Care must

be used to ensure that such material is harmlessly disposed of on site or is recovered for proper waste disposal.

The discharge water shall be tested periodically for chlorine residual. When zero chlorine residual is measured, the well shall continue to be pumped to waste for at least 15 minutes. The well shall then be sampled for bacteriological evaluation.

F. Disposal of Contaminants

Any oil or other significant contaminant pumped from the well must be collected for proper disposal. In addition, if the discharge of chlorinated water would be harmful to vegetation or wildlife, measures must be taken either to impound the highly chlorinated water or to neutralize the chlorine. Federal, state, or local environmental regulations may require special provisions or permits prior to disposal of highly chlorinated water. Chlorinated water from the well must be impounded or neutralized with sodium bisulfite or sulfur dioxide to reduce the residual to less than 0.02 mg/L prior to discharge to surface waters

G. Bacteriological Evaluation

After the well has been chlorinated and pumped to waste for minimum of 15 minutes with zero chlorine residual, at least duplicate samples shall be taken not less than 30 minutes apart, and the samples shall be tested for the presence of coliform in accordance with *Standard Methods for the Examination of Water and Wastewater*. Additional samples shall be collected until samples collected on five consecutive days do not show the presence of coliform bacteria. When no coliforms are present for five consecutive days, disinfection shall be considered complete.

If any of these samples show the presence of coliform, one of the following procedures shall be followed:

1. Pump the well to waste for a minimum of an additional 15 minutes, then take at least duplicate samples not less than 30 minutes apart and test for the presence of coliform in accordance with the latest edition of *Standard Methods for the Examination of Water and Wastewater*. If none of these samples show the presence of coliform, the well may be placed in domestic service. (If any of these samples show the presence of coliform, follow procedure 2 or 3 below.)
2. Chlorinate and test the well as described in Sections 3.09, E and 3.09, G.
3. Perform corrective action as determined by a qualified engineer experienced in water well disinfection.

H. Disinfection of Flow Wells

Flowing wells discharging at the surface generally do not require chlorination. Nevertheless, bacteriological sampling and evaluation for coliform shall be done as described in Section 3.09, G. If it is determined that coliforms are present, chlorine should be applied at or below the lowest aquifer producing the artesian condition in an amount that will produce a chlorine concentration of at least 25 mg/L in the flowing water. The chlorine may be introduced through a weighted tube discharging a solution with a high concentration of chlorine (such as 15,000 mg/L), or by means of calcium hypochlorite tablets confined in a perforated container. If bacteriological evaluation shows the presence of coliform after this disinfection, Procedure 3 of Section 3.09, E shall be followed.

I. Record of Compliance

The report of bacteriological test results certifying that the well is producing water free of contamination by coliform organisms shall be the record of compliance.

3.11 ABANDONMENT OF WELL

A. In the event that the Contractor shall fail to complete the well to the depth required, or should he abandon the well for any reason, he shall abandon the well per Kentucky Codes (KRS 223, 401 KAR 6:310, and all other applicable state and local regulations). If he salvages the casing or other materials before filling the well, such salvaged material shall remain his property. No payment will be made for any new well abandoned by the Contractor for any reason.

B. The Contractor shall abandon the existing 12-inch pumping well and monitoring wells as indicated on the drawings and in accordance with Kentucky Codes (KRS 223, 401 KAR 6:310, and all other applicable state and local regulations). The abandonment of the pumping well and monitoring wells shall not be conducted until completion of the construction and fully functioning new well and at the approval of the Owner/Engineer.

C. The well casing of any well to be abandoned may, at the Contractor's option, be salvaged and become the property of the Contractor. Such casing shall not be reused without approval by the Engineer.

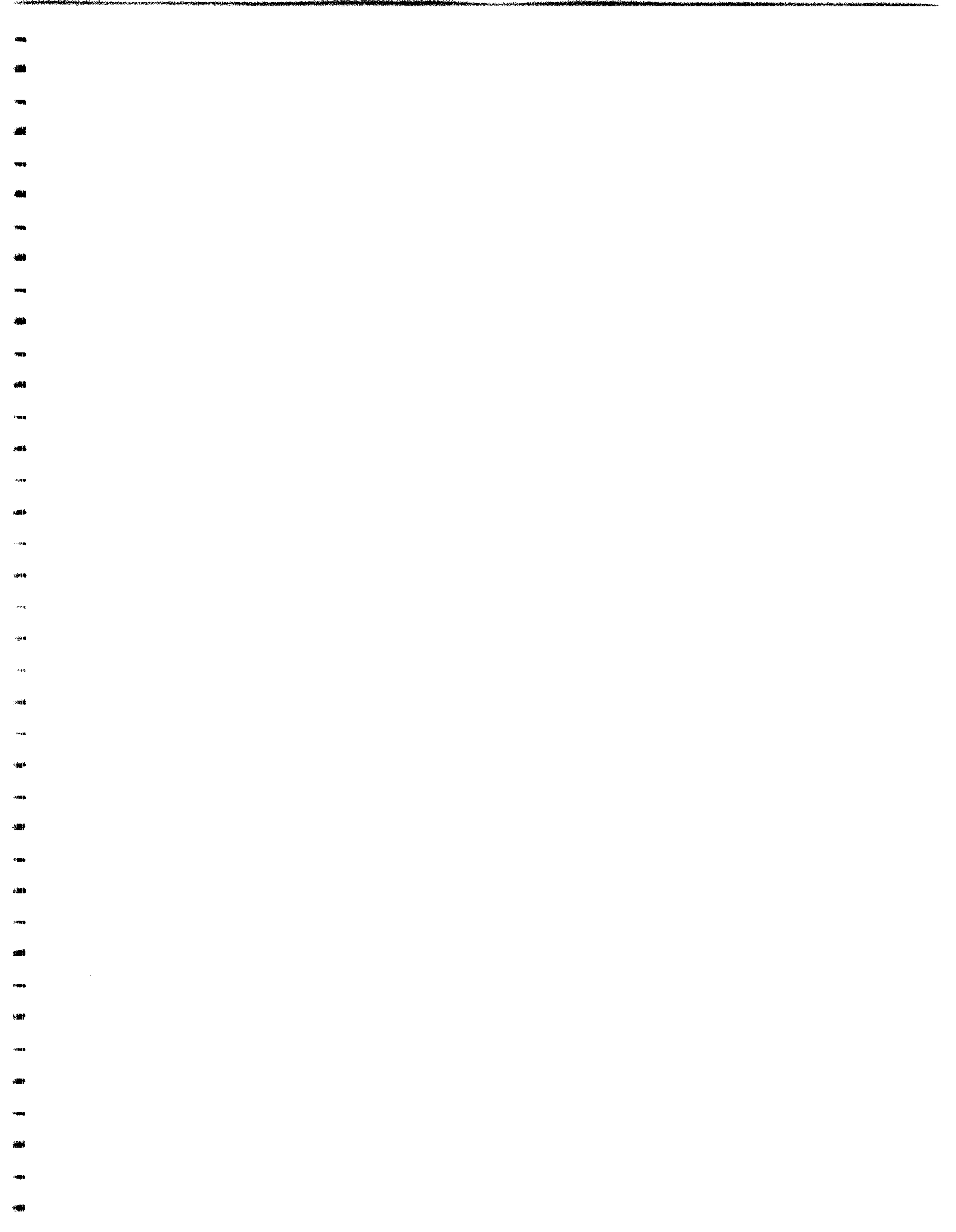
D. No payment will be made for pulling casing or reconditioning the open borehole unless the Engineer directs that the casing be pulled.

E. If the Contractor must abandon the well through fault of the Contractor or his employees or subcontractors, costs of drilling and abandonment will be borne by the Contractor.

3.12 CONTRACTOR'S RESPONSIBILITY

A. The Contractor shall be responsible for performing all of the work in strict accordance with these Specifications. If evidence indicates that the screen or casing in a well is broken, or that the well is not constructed in accordance with the Specifications to the satisfaction of the Engineer, the Engineer may order that proper changes be made by the Contractor or, in the event that proper changes cannot be made, the Engineer may order the Contractor to abandon the well, without additional cost, and to drill a new well.

- END OF SECTION -



SECTION 02600**PIPE, FITTINGS AND INSTALLATION****PART 1 - GENERAL****1.01 SCOPE**

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.

C. Wherever the word pipe or piping is used it shall mean pipe and fittings unless otherwise noted. All ductile iron pipe (D.I.P.), fittings, glands and accessories shall be of the same manufacturer unless approved otherwise.

PART 2 - PRODUCTS**2.01 DUCTILE IRON PIPE (D.I.P.) AND FITTINGS**

A. Ductile iron pipe (D.I.P.) shall conform to ANSI/AWWA C150/A21.50, ANSI/AWWA C151/A21.51 Standard. The pipe shall conform to thickness class 350 unless noted otherwise. All pipe, fittings and joints should be capable of accommodating pressure up to 350 psi. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

B. Ductile iron mechanical joint fittings shall have a body thickness and radii of curvature conforming to ANSI A21.10 and have joints in accordance with ANSI/AWWA C111.A21.11. Fittings and joints shall be supplied with all accessories.

C. All pipe and fittings shall be tar coated outside and shall receive a standard cement lining with bituminous seal coat on the inside in accordance with ASA Specification A21.40 (AWWA-C104).

D. Cement mortar lining and seal coating for pipe and fittings, where applicable, shall be in accordance with ANSI/AWWA C104/A21.4. Bituminous outside coating shall be in accordance with ANSI/AWWA C151/A21.51 for pipe and ANSI/AWWA C110/A21.10 for fittings.

E. All ductile fittings shall be rated at 350 psi water working pressure plus water hammer. Ductile iron fittings shall be ductile cast-iron grade 80-60-03 per ASTM Specification A339-55.

F. No separate pay item has been established for fittings and no determination of the number of fittings required on the job has been made. The Contractor, during the bidding phase, shall determine the number of fittings required on the job and include the cost of the fittings and installation in the unit price for pipe.

G. Push-on type joints shall be single rubber gasket, with cast gasket socket and recessed bell with a tapered annular opening and flared socket and shall conform to ANSI/AWWA C111/A21.11. Plain spigot ends shall be suitably beveled to permit easy entry into the bell, centering and compressing the gasket.

H. Ductile iron flanged joint pipe shall conform to ANSI/AWWA C115/A 21.15 Standard and have a Class of 350. The pipe shall have a rated working pressure of 350 psi with Class 125 flanges. Gaskets shall be ring gaskets with a thickness of 1/8-inch. Flange bolts shall conform to ANSI B16.1.

I. Flanged fittings shall meet all requirements of ANSI/AWWA C110/A21.10 and have Class 125 flanges. Fittings shall accommodate a working pressure up to 350 psi and be supplied with all accessories.

2.02 POLYVINYL CHLORIDE (PVC) PIPE (SDR 21 AND SDR 17)

A. Polyvinyl chloride (PVC) pipe for water mains shall be Class 200 (SDR 21) or Class 250 (SDR 17) PVC pressure rated pipe as shown on the Drawings or indicated in the proposal form with either twin gasket joints or integral bell joints with rubber O-ring seals.

B. All PVC pipe shall conform to the latest revisions of ASTM D-1784 (PVC Compounds), ASTM D-2241 (PVC Plastic Pipe, SDR) and ASTM D-2672 (Bell-End PVC Pipe). Rubber gasketed joints shall conform to ASTM D-3139. The gaskets for the PVC pipe joint shall conform to ASTM F-477 and D-1869.

C. Couplings shall be furnished by the pipe manufacturer and shall accommodate the pipe for which they are used. Rubber gasket joints shall provide adequate expansion to allow for a 50 degree change in temperature on one length of pipe. Lubrication for rubber connected couplings shall be water soluble, non-toxic, be non-objectionable in taste and odor and have no deteriorating affect on the PVC or rubber gaskets and shall be as supplied by the pipe manufacturer. Couplings shall conform to ASTM D-3139; SDR-21, 200 psi.

D. All pipe and couplings shall bear identification markings that will remain legible during normal handling, storage and installation, which have been applied in a manner that will not reduce the strength of the pipe or coupling or otherwise damage them. Pipe and coupling markings shall include the normal size and OD base, material code designation, dimension ratio number, ASTM Pressure Class, ASTM designation number for this standard, manufacturer's name or trademark, seal (mark) of the testing agency that verified the suitability of the pipe material for potable-water service. Each marking shall be applied at intervals of not more than 5 feet for the pipe and shall be marked on each coupling.

2.03 POLYVINYL CHLORINE (PVC) PIPE - C.I. PIPE SIZE DR14 AND DR 18

A. Pipe shall meet the requirements of AWWA C-900 Polyvinyl Chlorine (PVC) Pressure Pipe. All Class 200 pipe shall meet the requirements of DR 14 and all Class 150 pipe shall meet the requirements of DR 18. Joints shall be integral bell or twin gasket joints with rubber O-ring seals.

B. All pipe shall be suitable for use as a pressure conduit. Provisions must be made for expansion and contractions at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a solid cross-section elastomeric ring which meets the requirements of ASTM D-1869 and F-477. The bell section shall be designed to be at least as strong as the pipe wall. Sizes and dimensions shall be as shown in this specification.

C. Gaskets and lubricants intended for use with PVC pipe and couplings shall be made from materials that are compatible with the plastic material and with each other when used together, will not support the growth of bacteria, and will not adversely affect the potable qualities of the water that is to be transported. Gaskets and lubricants shall be supplied by the pipe manufacturer.

D. Physical Requirements:

1. Standard Laying Lengths - Standard laying lengths shall be 20 ft. (plus or minus 1") for all sizes. The total footage of pipe of any class and size shall be furnished in standard lengths. Each length of pipe shall be tested to four times the class pressure of the pipe for minimum of 5 second. The integral bell shall be tested with the pipe.
2. Pipe Stiffness - The pipe stiffness using F/y for PVC class water pipe shall be as follows:

<u>Class</u>	<u>DR</u>	<u>F/y</u>
200	14	815
150	18	364

3. Quick Burst Test - Randomly selected tested in accordance with ASTM D-1599 shall withstand without failure pressures listed below when applied in 60 - 70 seconds. Class 150 shall have a minimum burst pressure of 755 psi and Class 200 shall have a minimum burst pressure of 986 psi at 73 degrees F. for all sizes.
4. Drop Impact Test - Pipe shall withstand without failure at 73 degrees F. an impact of 120 ft/lbs created by a falling 12 lb missile with a 2" radius nose without visible evidence of shattering or splitting.

E. All pipe and couplings shall bear identification markings that will remain legible during normal handling, storage and installation, which have been applied in a manner that will not reduce the strength of the pipe or coupling or otherwise damage them. Pipe and coupling markings shall include the nominal size and OD base, material code designation, dimension ratio number, AWWA Pressure Class, AWWA designation number for this standard, manufacturer's name or trademark, seal (mark) of the testing agency that verified the suitability of the pipe material for potable-water service. Each marking shall be applied at intervals of not more than 5 feet for the pipe and shall be marked on each coupling.

2.04 DUCTILE IRON MECHANICAL JOINT FITTINGS FOR PVC PIPE

A. General: Cast-iron mechanical joints shall conform to the latest revision of ANSI A21.11 for centrifugally cast-iron water pipe.

1. 3" to 12". All Working Pressures: Fittings shall conform to ASA Specification A21.10 for 250 psi water working pressure plus water hammer.
2. Fittings 12" and Over, for 150 psi and Less WWP: Fittings for use on 150 psi WWP pipe shall be AWWA Class D Pattern.
3. Fittings 12" and Larger, for 200 psi and Above WWP: Fittings shall be ductile iron or gray iron rated at 250 psi water working pressure plus water hammer. Ductile iron fittings only will be used with ductile iron pipe.

B. All ductile iron fittings shall be rated at 250 psi water working pressure plus water hammer. Ductile iron fittings shall be ductile cast-iron grad 80-60-03 per ASTM Specification A33955. All fittings for connection to PVC pipe-all classes, shall be ductile iron.

C. No separate pay item has been established for fittings and no determination of the number of fittings required on the job has been made. The Contractor, during the bidding phase, shall determine the number of fittings required on the job and include the cost of the fittings and installation in the unit price for pipe.

D. Lining and Coating: All mechanical joint fittings shall be cement lined and bituminous seal coated per Federal Specification WW-P-421b and ASA Specification A421.40 (AWWA C104). Bituminous outside coating shall be in accordance with ANSI/AWWA C110/A21.10.

PART 3 - EXECUTION

3.01 LAYING DEPTHS FOR WATER MAINS

In general, water mains shall be laid with a minimum cover of 36" above the top of the main, unless otherwise noted on the Drawings , i.e. for minimum separation between water main and other utilities, connections to existing mains, valve locations, or when required by Kentucky Department of Highways, i.e. ditch lines and borings shall be 42" minimum cover.

3.02 PIPE BEDDING

A. The foundation for pipes laid in trenches shall be prepared so that the entire load of the backfill on top of the pipe will be carried uniformly on the barrel of the pipe. Pipe bells shall not carry any of the load of the backfill.

B. The Contractor shall use the "Undercutting Method" of pipe bedding.

C. When the "Undercutting Method" is used in rock bottom trenches, Class I granular bedding (No.9 crushed stone aggregate) or earth shall be of such depth that the bottom of the barrel of the pipe will be at least 6" above the bottom of the trench as excavated. Pipe bedding required in this paragraph is NOT considered a separate pay item.

D. In wet, yielding and mucky locations where pipe is in danger of sinking below grade or floating out of line or grade, the pipe must be weighted or secured permanently in place by such means as will prove effective. In areas where a high water table exists, the Contractor is cautioned to exercise extreme care in the placement of the backfill material to prevent flotation of the pipe at any time.

E. Where an unstable (i.e., water, mud, etc.) trench bottom is encountered, stabilization of the trench bottom is required. This is to be accomplished by undercutting the trench depth and replacing to grade with a foundation of crushed stone aggregate. The depth of the foundations dependent upon the severity of the trench bottom. The size of stone aggregate used in the foundation will be determined by the condition of the unstable material. Once the trench bottom has been stabilized, the required Class I bedding can be placed. The amount of crushed stone aggregate required to bring the top of the foundation to the trench bottom prior to the removal of the unstable material will be considered a separate pay item following negotiation between the Contractor and Owner and constitute a change order item. No compensation will be made if the instability of the trench bottom is caused by the Contractor's neglect.

F. The Contractor shall use compacted earth material or Class I granular bedding (No.9 crushed stone aggregate) when the pipe is to be placed in the rock bottom trenches or in trenches with excavated rock present. This type of bedding material shall be placed 12" above and 6" below the pipe as shown on the Contract Drawings as "Class C Bedding Detail".

G. It should be noted that no pipe shall be laid on solid or blasted rock. No rock shall be allowed to rest against the pipe once it is placed in the trench.

H. Pipe bedding as required in Paragraphs C and D of this Article is NOT considered a separate pay item.

3.03 PIPE LAYING

A. All pipe shall be laid with ends abutting and true to the lines and grades indicated on the Plans. Pipe shall be fitted and matched so that when laid in the work, it will provide a smooth and uniform invert. Supporting of pipe shall be as set out hereinbefore under "Pipe Bedding" and in no case shall the supporting of pipe on blocks be permitted.

B. Fittings and specials for the water main shall be provided and laid as and where directed by the Engineer or as shown on the Plans.

C. Before each piece of pipe is lowered into the trench, it shall be thoroughly swabbed out to insure its being clean. Any piece of pipe or fitting which is known to be defective shall not be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, it shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.

D. The interior of the pipe, as the work progresses, shall be cleaned of dirt, jointing materials, and superfluous materials of every description. When laying of pipe is topped for any reason, the exposed end of such pipe shall be closed with a plywood plug fitted into the pipe bell so as to exclude earth or other material and precautions shall be taken to prevent flotation of pipe by runoff into trench.

E. No backfilling (except for securing pipe in place) over pipe will be allowed until the Engineer has had an opportunity to make an inspection of the joints, alignment and grade in the section laid, but such inspection shall not relieve the Contractor of further liability in case of defective joints, misalignment caused by backfilling and other such deficiencies that are noted later.

F. Anchorage of Bends, Tees, Plugs and Valves:

1. At all tees, plugs, caps and bends of 11-1/4 degrees and over, and at reducers or in fittings where changes in pipe diameter occur, movement shall be prevented by using suitable harness, thrust blocks or ballast. Valves shall be provided with similar protection. Thrust blocks and supports shall be as shown in the typical details, with sufficient volumes of concrete being provided; however, care shall be taken to leave weep holes unobstructed and allow for future tightening of all nearby joints. Unless otherwise directed by the Engineer, thrust blocks shall be placed so that the pipe and fitting joints will be accessible for repair. Thrust blocks shall bear on undisturbed earth or rock.
2. Bridles, harness or pipe ballasting shall meet with the approval of the Engineer. Steel rods and clamps shall be galvanized.
3. No extra pay shall be allowed for work on proper anchorage of pipe, fittings or other appurtenances; such items shall be included in the unit price bid for the supported item.

3.04 WATER MAINS PUSHED UNDER DRIVEWAYS

The Contractor may be required to tunnel or bore under a bituminous or concrete surface driveway instead of open trenching as requested by the property owner. The opening under the driveway shall be of the smallest diameter possible to accommodate the water main to minimize settlement of the driveway. Should settlement occur, the Contractor shall repair the driveway at his own expense in a manner satisfactory to the Engineer and the property owner.

3.05 JOINTING

Jointing shall be accomplished in accordance with the manufacturer's recommendation.

3.06 TYPES OF CRUSHED STONE MATERIAL

Two classes of crushed stone material are mentioned in the Detailed Specifications. The Type of material used in each class is as follows:

Class I	No. 9 Aggregate
Class II	Dense Graded Aggregate

3.07 BACKFILLING

A. Initial Backfill:

1. This backfill is defined as that material which is placed over the water main from the spring line in an earth trench to a point 6" above the top of the pipe or from the trench bottom in a rock trench to a point 12" above the top of the pipe. The initial backfill for Case I situations shall be earth material free of rocks, acceptable to the Engineer or Class I material (No. 9 crushed stone aggregate). The initial backfill for Case II, Case III and Case IV situations shall be compacted earth material or be Class I material (No.9 crushed stone aggregate).
2. In areas where large quantities of rock are excavated, and the excavated earth is insufficient, then the Contractor must either haul in earth or order crushed stone aggregate for backfilling over the top of the pipe. Neither earth nor the crushed stone aggregate used to fulfill the backfill requirements is considered a pay item.

B. Final Backfill: There are four cases where the method final backfilling varies. The various cases and their trench situations are as follows:

1. Case I: Areas not subject to vehicular traffic.
2. Case II: Gravel areas subject to light vehicular traffic such as residential driveways; church and commercial parking lots and entrances; and farm drives.
3. Case III: City and County gravel roads; gravel and bituminous road shoulders; all bituminous surface areas such as City and County streets, residential driveways, church and commercial parking lots, and entrances; City and County road shoulders.
4. Case IV: State maintained streets and roads; road shoulders for State roads and streets.

C. In all cases, walking or working on the completed pipelines, except as may be necessary in backfilling, will not be permitted until the trench has been backfilled to a point twelve (12) inches above the top of the pipe. The method of final backfilling for each of the above cases is as follows:

1. Case I - The trench shall be backfilled from a point 6" (12" for a rock trench) above the top of the pipe to a point 8" below the surface of the ground with earth material free from large rock (over one-half cubic foot in volume), acceptable to the Engineer. The remainder of the trench to existing grade shall be backfilled with earth material reasonably free of any rocks.

Earth backfill used in this Case is not a separate pay item but will be paid under the pay item "Water Main".

2. Case II - The trench shall be backfilled from a point 6" (12" for a rock trench) above the top of the pipe to a point 12" below the surface of the ground with Class I (No. 9 crushed stone aggregate) material. The trench shall be tamped to assure maximum possible

compaction (approximately 80 to 85 percent of Standard Proctor density). Extreme care shall be exercised to prevent damage to the pipe during tamping operation. The remainder of the trench to existing grade shall be backfilled with Class II (dense graded aggregate) material with the material being mounded over the trench. The trench shall be tamped again to assure additional compaction. The trench may be left with a slight mound if permitted by the Engineer.

Class I material used and method of backfilling used in this case is not a separate pay item and is considered incidental to the work and will be paid for under the item "Water Main".

Class II material used in this method of backfill is not a separate pay item and will be included in the unit price per linear foot under the item "Water Main".

Sufficient stockpiles of Class II material shall be placed throughout the project area to insure immediate replacement by the Contractor of any settled areas. No extra payment will be made for the filling of settled areas by the Contractor.

3. Case III - The trench shall be backfilled from a point 6" (12" for a rock trench) above the top of pipe to the height indicated in the "City and County Maintained Streets, Roads and Driveway Pavement Replacement" detail with Class I (No. 9 crushed stone aggregate) material. Said material shall be tamped as described for Case II. A 12-inch layer of Class II (dense graded aggregate) material shall be placed over the compacted backfill before bituminous or concrete surface is placed as shown in the previously mentioned details. The 12-inch layer of Class II material is NOT a separate pay item but such expense will be borne by the Contractor and is considered incidental to the bid items "Bituminous Surface Replacement" and "Concrete Surface Replacement". Also considered incidental is all temporary stone required for a temporary surface between backfilling and pavement replacement.

Sufficient stockpiles of Class II material shall be placed throughout the project area to insure immediate replacement by the Contractor of any settled areas. No extra payment will be made for the filling in of settled areas by the Contractor. Class II material used in this method of backfill is paid for as a support item under item "Bituminous Surface Replacement" or "Concrete Surface Replacement" as its unit price per linear foot.

Class I material used for backfilling is not a separate pay item and is considered incidental to the bid item "Water Main".

4. Case IV - The trench shall be backfilled from the spring line to a point one 12-inches above the top of the pipe with earth material free from rock and acceptable to the Engineer, it shall be carefully and solidly tamped by approved mechanical methods. The remainder of the trench shall be backfilled to the height indicated in the "State Maintained Streets and Roads Pavement Replacement Detail" in the Contract Drawings, with material free from rock and acceptable to the Engineer; said material shall be mechanically tamped in approximately six-inch layers to obtain the maximum possible compaction. The backfilling method is NOT a separate pay item. A 12-inch layer of dense graded aggregate shall be placed over the compacted earth backfill when a bituminous or concrete surface street or road has been trenched. The 12-inch layer of stone is not a separate pay item but such expense will be borne by the Contractor.

D. Excavated materials from trenches and tunnels, in excess of quantity required for trench backfill, shall be disposed of by the Contractor. The Contractor may contact the Owner regarding the location of a suitable disposal site; however, if the Owner cannot recommend a site, it shall be the responsibility of the Contractor to obtain locations or permits for the disposal of the waste material. Unit prices for the various pipe sizes shall

include the cost of disposing of excess excavated materials, as set forth herein, no additional compensation being allowed for hauling or overhaul.

3.08 CRUSHED STONE BACKFILL

A. The Class I granular material used in Case II and Case III backfill situations shall be No. 9 Crushed Stone aggregate (No.9 Stone). Granular material will not be paid for as a separate bid item.

B. The twelve inches 12-inch of crushed stone backfill that is required in "City and County Maintained Streets, Roads and Driveway Pavement Replacement" or "State Maintained Streets and Roads Pavement Replacement" will not be paid for under the provisions of this article.

3.09 BITUMINOUS PAVEMENT REPLACEMENT

A. Sections of pavement shall be replaced as required to install the pipelines under the work of this Section. Disturbed pavement shall be reconstructed to original lines and grades with bituminous binder as detailed on the Drawings and in such manner as to leave all such surfaces in fully as good or better condition than that which existed prior to these operations.

B. Prior to trenching, the pavement shall be scored or cut to straight edges along each side of the proposed trench to avoid unnecessary damage to the remainder of the paving. Edges of the existing pavement shall be recut and trimmed as necessary to square, straight edges after the pipe has been installed and prior to placement of the binder course.

C. Backfilling of trenches shall be in accordance with the applicable portions of this section.

D. Bituminous concrete binder shall be one course construction in accordance with applicable provisions of the Kentucky Department of Highways Standard Specifications, Section 402. Placement and compaction of binder course shall be in accordance with Section 402 of the Kentucky Department of Highways Standard Specifications. Minimum thickness after compaction shall be as shown on the Drawings.

E. Bituminous pavement replacement will not be paid for as a separate bid item.

3.10 CRUSHED STONE SURFACE REPLACEMENT

The Class II granular material used in Case II backfill situations shall be dense graded aggregate (D.G.A.). Granular material will be included in the unit price per linear foot for "Water Mains".

3.11 CONCRETE SEPARATOR FOR UTILITY CROSSING OR CASING PIPE WATER/SAN. SEWER CROSSING

A. At locations shown on the Contract Drawings, or as required by the Specifications and Contract Drawings, concrete separator shall be used when the clearance between the proposed water main and any existing non-contaminating utility pipe is one (1) foot or less. Utility pipe includes underground gas, telephone and electrical conduit, storm sewers, or any other underground utility pipe.

B. There are two cases of non-contaminating utility crossing encasement. Case I is applicable when the proposed water main is below the existing utility line. Case II is applicable when the proposed water main is laid above the utility line. In either case, the concrete shall extend to at least the spring line of each pipe involved.

C. When a water main crosses an existing sanitary sewer line, either above or below and less than two feet vertical or ten feet horizontal separation, the water main shall be encased as shown on the Standard Details, or as required by the Specifications and Contract Documents.

D. Concrete shall be Class B (2500 psi) and shall be mixed sufficiently wet to permit it to flow between the pipes to form a continuous bridge. In tamping the concrete, care shall be taken not to disturb the grade of line of either pipe or damage the joints.

3.12 CONCRETE FOR CREEK CROSSING (Polyethelene and Type C Creek Crossing)

A. At locations shown on the Contract Drawings, or as required by the Specifications and Contract Drawings, concrete encasement shall be used when the water main crosses a stream or creek which is in rock or as directed by the Engineer.

B. All creek crossings (Polyethelene and Type C) shall be constructed as per the detail shown on the Contract Drawings.

C. Concrete shall be Class B (3000 psi) and shall be mixed sufficiently wet to permit flow around the pipe and to form a continuous bed. In tamping the concrete, care shall be taken not to disturb the grade or line of the pipe or injure the joints. Concrete shall be protected from excess water.

D. Concrete placed outside the specified limits or without authorization from the Engineer will not be subject to payment. Concrete will be paid under the pay items "Polyethelene and Creek Crossing Type C.

3.13 TESTING OF WATER MAINS

The completed work shall comply with the provisions listed below, or similar requirements which will insure equal or better results:

A. Before any allowable leakage calculation are preformed the pipeline being tested must pass the hydrostatically test.

B. The pipe shall be hydrostatically tested at 1.5 times the design pressure at the point of testing. The duration of the test(s) shall be at least 2 hours during which time the pressure shall not fall more than 5 psi. The pipe shall be tested for allowable leakage according to AWWA C-600 (latest revision) concurrently with the pressure test.

C. Where practicable, pipelines shall be tested between line valves or plugs in lengths of not more than 3000 feet. Testing shall proceed from the source of water toward the termination of the line. The line shall be tested upon the completion of the first 3000 feet. After the completion of two consecutive tests without failure, the Contractor, at his option and with the Engineer's approval, may discontinue testing until the system is complete.

D. Duration of test shall be not less than 2 hours.

E. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with.

F. All pipe, fittings and other materials found to be defective under test shall be removed and replaced at the Contractor's expense.

G. Test pressures shall not be less than 1.5 times the working pressure at the highest point along the test section, not exceed pipe or thrust restraint design pressure, not vary more than ± 5 psi and not exceed twice the rated pressure of the valves when the pressure boundary of the test sections include closed gate valves.

H. Before applying the specified test pressure, air shall be expelled completely from the pipes and valves. If permanent air vents are not located at high points within the test section, the Contractor shall install corporation cocks at such points so that the air can be expelled as the line is filled with water.

3.14 LEAKAGE TEST

A. The leakage shall be defined as the quantity of water that must be supplied to the tested section to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

B. The allowable leakage shall not be greater than that determined by the following formula:

$$L = \frac{SD(P)^{1/2}}{133,200}$$

Where L is the allowable leakage in gallons per hour; S is the length of the pipeline tested; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gage.

C. All visible leaks are to be repaired regardless of the amount of leakage.

3.15 DISINFECTION OF WATER LINES

A. New potable water lines shall not be placed into service, either temporarily or permanently, until they have been thoroughly disinfected in accordance with the following requirements and to the satisfaction of the OWNER.

B. After pressure testing, a solution of hypochlorite using HTH or equal shall be introduced into the section of the line being disinfected sufficient to insure a chlorine dosage of at least 50 parts per million (PPM) in the water main. While the solution is being applied, the water should be allowed to escape at the ends of the line until tests indicate that a chlorine concentration of at least 50 PPM has been obtained throughout the pipe. Open and close all valves and cocks while chlorinating agent is in the piping system. The chlorinated water shall remain in the pipe for 24 hours. Disinfection shall be repeated until a minimum chlorine residual of 25 PPM is measured after 24 hours. Once a chlorine residual of 25 PPM is obtained after 24 hours, the water main shall be thoroughly flushed until the residual chlorine content is not greater than 1.0 PPM.

C. Following disinfection of the line, bacteriological samples shall be collected and analyzed in accordance with the requirements of Kentucky Department of Natural Resources and Environmental Protection. When the samples have been tested and reported safe from contamination, the water line may be connected to the system. The Contractor shall provide to OWNER written documentation that the water sample passed the bacteriological test and is safe.

D. All sampling shall be taken in the presence of the Engineer or his representative.

E. The contractor shall compensate the owner for all water used in flushing, testing and sterilization.

3.16 PLACEMENT OF TRACING WIRE

Detectable underground copper tracing wire shall be installed with all utility lines. Insulated copper trace wire shall be attached to the top of the pipe with adhesive tape or other suitable devices. At each hydrant, valve, and end of new pipe installation, the trace wire shall be daylighted and the ends connected together with split bolt connectors covered with waterproof tape or wrap. For long runs of pipe, the maximum unbroken length of the trace wire shall be 2500 feet. Underground splicing shall be made using brass split bolt electrical connectors. The trace wire shall be #12 AWG THWN copper.

3.17 PLACEMENT OF IDENTIFICATION TAPE

A. The placement of detectable underground marking tape shall be installed over all utility lines. Care shall be taken to insure that the buried marking tape is not broken when installed. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

B. The identification tape shall bear the printed identification of the utility line below it, such as "CAUTION - BURIED WATER LINE BELOW". Tape shall be reverse printed, surface printing will not be acceptable. The tape shall be visible in all types and colors of soil and provide maximum color contrast to the soil. The tape shall meet the APWA color code, and shall be two (2) inches in width. Colors are: yellow - gas, green - sewer, red - electric, blue - water, orange - telephone, brown - force main.

C. The tape shall be the last equipment installed in the ditch so as to be first out. The tape shall be buried 4 - 6 inches below top of grade. After trench backfilling, the tape shall be placed in the backfill and allowed to settle into place with the backfill. The tape may be plowed in after final settlement, installed with a tool during the trench backfilling process, unrolled before final restoration or installed in any other way acceptable to the Owner or his agent or Engineer.

3.18 CLEAN-UP

Upon completion of the installation of the piping and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from the work. The Contractor shall grade the ground along each side of pipe trenches in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

3.19 CONNECTING TO THE WATER SYSTEM

Unless otherwise directed by the OWNER, the CONTRACTOR shall connect the new water main to the existing water system. The CONTRACTOR shall notify the OWNER when the connection is to be made so that representatives of the OWNER may operate existing valves and witness the connection. A minimum notice of at least 24 hours in advance of the connection shall be given to the UTILITY. The Contractor shall coordinate all connections and other work which require disruption of water service so as to minimize the amount of time the affected water lines are out of service.

- END OF SECTION -

SECTION 02640**VALVES****PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. The Contractor shall furnish and install valves and miscellaneous piping appurtenances, as indicated on the Drawings and as herein specified.
- B. The Drawings and Specifications direct attention to certain features of the equipment, but do not purport to cover all the details of their design. The equipment furnished shall be designed and constructed equal to the high quality equipment manufactured by such firms as are mentioned hereinafter, or as permitted by the Engineer. The Contractor shall furnish and install the equipment complete in all details and ready for operation.
- C. Electrical work and equipment specified herein shall conform to the requirements of the applicable electrical sections.
- D. Enclosures shall be of a suitable type for the atmospheres in which they are installed.
- E. Sizes and capacities not specified herein are indicated on the Drawings.
- F. Valves required within pre-engineered pump stations are not covered by this specification section.

PART 2 - PRODUCTS**2.01 BUTTERFLY VALVES (Not in Contract)**

- A. Butterfly valves and operators shall conform to the AWWA Standard Specifications for rubber seated butterfly valves, Designation C504, Class 150, except as hereinafter specified. Valves shall have a minimum 150 psi pressure rating.
- B. All butterfly valves shall be of cast iron body per ASTM A-126, Class B. Valve discs shall be of ductile iron per ASTM A-536 and provide uninterrupted 360 degree seating edge. Permanently self-lubricating body bushings shall be provided and shall be sized to withstand bearing loads. Valve shafts shall be Type 304 stainless steel with V-type packing. O-ring seals are not acceptable.
- C. Valve seats shall be full resilient seats of Buna - N or Hycar and retained in the body or on the disc edge. If the resilient seat is in the body, the disc shall conform to ASTM A-436 Type 1 (Ni-Resist) or gray/ductile iron with corrosion resistant seating surface. If the resilient seat is mounted on the disc edge, it shall be securely attached with Type 304 stainless steel retaining ring or pins. The disc seating edge shall be Type 316 stainless steel.
- D. Valve operators shall be electric actuators as specified elsewhere in the specifications. The valve shaft and actuators shall be designed for both torsional and shearing stresses when the valve is operated under its greatest torque.
- E. All valves shall conform with the latest revision of AWWA Standard for Butterfly Valves for Ordinary Water Service, AWWA C504. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.02 GATE VALVES AND BOXES

A. All gate valves shall be of the resilient seat wedge, iron body, non-rising stem, fully bronze mounted with O-ring seals. Valves shall be of standard manufacture and of the highest quality both as to materials and workmanship and shall conform to the latest revisions of AWWA Specification C-500. Valves shall have a rated working pressure of 250 psi.

B. Gate valves for buried service shall be furnished with mechanical joint end connections, unless otherwise shown on the plans or specified herein. The end connections shall be suitable to receive ductile iron or PVC pipe.

C. All gate valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working pressure cast on the body of the valve.

D. Buried service gate valves shall be provided with a 2" square operating nut and shall be opened by turning to the left (counterclockwise).

E. Buried service gate valves shall be installed in a vertical position with valve box as detailed on the plans. They shall be set vertically and properly adjusted so that the cover will be in the same plane as the finished surface of the ground or street.

F. Valve boxes shall be cast iron, two-piece, screw type (as shown on the drawings) with drop-cover marked "Water". They shall be set vertically and properly adjusted so that the cover will be in the same plane as the finished surface of the ground or street. A concrete pad shall be placed around the valve box cover as shown on the drawings.

G. The Contractor shall furnish two (2) T-operating wrenches in the lengths necessary to operate the buried gate valves for an operator of average height in a normal working position.

H. Gate valves for installation in building, drywells, pits or vaults shall be flanged ANSI B16.1, Class 125 with handwheel operator, non-rising stem or OS&Y as indicated on the drawings.

I. Gate valves installed with tapping sleeves shall have a mechanical joint outlet and a flanged joint connection to the sleeves.

J. All valves shall conform with the latest revision of AWWA Standard for Gate Valves for Ordinary Water Works Service, AWWA C500. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

K. All 24" or larger gate valves shall be supplied with spur gearing and grease case.

L. All gate valves shall receive at two part thermosetting epoxy protective coating both inside and outside of the valve and shall be listed for use as with potable water by the Federal EPA. The epoxy coating shall meet or exceed ANSI/AWWA C550 Standard and ASTM D1763 Standard.

2.03 CONTROL VALVE (Not in Contract)

A. The control valve is an automatic pilot controlled, hydraulically operated, diaphragm actuated globe valve in the oblique (Y) pattern design. A 3-way solenoid pilot valve either applies upstream pressure to the upper control chamber to close the main valve or vents the upper control chamber to atmosphere allowing the main valve to open. The solenoid and a limit switch assembly on the main valve are electrically synchronized with the telemetry controls to allow the valve to open or close to fill the tank.

B. In the event of a power failure the valve will open immediately, regardless of the operational mode of the valve at the time of the power failure.

C. The main valve shall be a center guided diaphragm actuated globe valve of oblique (Y) pattern design. The body and cover shall be cast iron, ASTM A 126 Class B, with bronze seat. The internal and external surfaces of the valve body shall be fusion bonded coated. End connections shall meet the ANSI, or other internationally recognized standard required. The body shall have a replaceable non-threaded seat ring that is held in place by set screws which tighten into a body groove. This seat should be accessible and serviceable without removing the valve from the pipeline. The seat area shall have a flow opening with no stem guides, bearings or supporting ribs.

D. The actuator assembly shall be a double chamber design with a separating partition between the lower surface of the diaphragm and the main valve. The entire actuator assembly consisting of the seal disk, valve shaft, bearing, diaphragm assembly, separating partition and top cover must be removable from the valve as a single unit. The control chamber between the diaphragm and the separating partition shall be capable of being open to or isolated from the valve internal body pressure. The stainless steel valve shaft shall be guided throughout its travel by a bearing in the separating partition. The replaceable resilient seal shall be rectangular in cross section and contained on three and one half sides. A lip shall be provided on the seal disk outside edge to lock the seal in place. The actuator assembly must be capable of accepting a V-port throttling plug by simply bolting the device to the seal disk.

E. The electric solenoid valve shall be a 3-way solenoid with a manual override system to allow the valve to be operated manually should electrical power be unavailable. The solenoid and limit switch shall be properly rated for the intended service. Liquid to the pilot must be filtered and a cock valve must be provided to isolate the control loop.

F. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE.

2.04 DUAL DISK VALVE (Not in Contract)

A. Dual Disc Check Valves shall be suitable for pressures up to 250 psig water service. The check valve shall be of the dual disc, wafer style with torsion spring induced closure. The valves shall be provided for installation between ANSI B16.1 Class 125 iron flanges.

B. The body shall be of one piece construction incorporating a vulcanized synthetic seal. Seal design must allow for positive seating at both high and low pressures. This shall be achieved by a minimal seal contact at low pressure with progressively increased contact at higher pressures. The disc shall fully overlap the synthetic seal, preventing pressure indentations. Opening and closing of the valve must utilize a lift and

pivot action to prevent seal wear and ensure long seal life. The stop and pivot pins shall be stabilized by the use of synthetic spheres to prevent wear due to vibration during operating conditions.

C. The valve body shall be constructed of ASTM A536 Grade 65-45-12 ductile iron. The disc shall be constructed of ASTM B584, Alloy C83600 (2"-12") cast bronze or ASTM B148, Alloy C95200 (14" and larger) cast aluminum bronze. The disc pins and stop pins shall be Type 316 stainless steel. The torsion spring shall be ASTM A313 Type 316 stainless steel up to 16 in. sizes and ASTM A313 Type 17-7 PH on 18 in. and larger sizes. The seal shall be Buna - N per ASTM D2000-BG or Viton per D2000-CA.

D. End connections shall be full diameter threaded flanges.

E. The valves shall be hydrostatically tested at 1.5 times their rated cold working pressure. A seat closure test at the valve rating shall be conducted to demonstrate zero leakage. The manufacturer shall provide test certificates, dimensional drawings, parts list drawings, and operation and maintenance manuals.

F. The exterior of the valve shall be coated with a universal alkyd primer.

- G. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

2.05 CHECK VALVES (Not in Contract)

A. The check valves shall be a swing check valve with flanged ends; lever and weight and function to prevent reverse flow. The valve shall be tight seating when closed and full ported when open. The hinged shaft shall be completely out of the water way employing a disc with a convex shape facing the normal flow. The valve shall be manufactured where the closing of the valve will not cause water hammer and minimize disc slam. The valve shall be capable of a tight seal at pressures above 5 psi.

B. The valve body shall be cast iron with a bronze seat ring. The valve disc shall be cast iron and suspended from a non-corrosive shaft. Valves shall be rated at a minimum working pressure of 175 psi.

- C. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

2.06 TAPPING VALVES AND SLEEVES

A. Tapping valves and sleeves shall be installed in the locations shown the Contract Drawings. The valves shall be a resilient seat wedge, iron body, non-rising stem, gate valve with a mechanical joint outlet and a flanged joint connection to the sleeves. They shall be provided with a valve box, counterclockwise opening and installed as described in detail on the plans.

B. Tapping Sleeves: Tapping sleeves of the sizes indicated for connection to existing main shall be the cast gray, ductile, or malleable-iron, split-sleeve type with flanged outlet, and with bolts, follower rings and gaskets on each end of the sleeve. Construction shall be suitable for a maximum working pressure of 200 psi. Bolts shall have hexagonal heads and nuts. Longitudinal gaskets and mechanical joints with gaskets shall be as recommended by the manufacturer of the sleeve. When using grooved mechanical tee, it shall consist of an upper housing with full locating collar for rigid positioning which engages a machine-cut hole in pipe, encasing an elastomeric gasket which conforms to the pipe outside diameter around the hole and a lower housing with positioning lugs, secured together during assembly by nuts and bolts as specified, pretorqued to 50 foot-pound.

- C. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

- D. Tapping valves shall be suitable for a maximum working pressure of 200 psi with 125 lb. flanges

2.07 CUSTOMER SERVICE PRESSURE REDUCING VALVE

A. The individual customer service pressure reducing valve shall be hydraulically operated, spring loaded, diaphragm type control regulator. The valve shall be held open by the force of the compression spring above the diaphragm and shall maintain a constant delivery pressure downstream without shock or water hammer. Adjustments shall be made by an adjusting screw on top of the valve. Setting shall be as shown on the plans. The valve shall have a cast brass or bronze body and cover per ASTM B-62, stainless steel seat (Stainless Steel 303) and adjustment ranges of 40 to 300 psi.

B. The individual pressure reducing valve shall be equipped with a built-in by-pass to prevent a closed system on the customer's side of the meter service.

C. All valves shall be preceded by a strainer provided by the valve manufacturer and have a maximum working pressure the same as the pressure reducing valve.

- D. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

2.08 MAIN LINE PRESSURE REDUCING VALVE

A. The pressure reducing valve shall maintain a constant downstream pressure regardless of varying inlet pressure. This valve shall be a hydraulically operated, diaphragm actuated, globe pattern valve. It shall contain a resilient, synthetic rubber disc, having a rectangular cross section, contained on three and one-half sides by a disc retainer and forming a tight seal against a single removable seat insert. The diaphragm assembly containing a valve stem shall be fully guided at both ends by a bearing in the valve cover and integral bearing in the valve seat. This diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. The diaphragm shall consist of nylon fabric bonded with synthetic rubber and shall not be used as a seating surface. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the valve or pilot controls. All necessary repairs shall be possible without removing valve from the line.

B. The main valve body and cover shall be Cast Iron per ASTM A48, and the main valve trim shall be 303 stainless steel. The valve shall come equipped with a valve position indicator. The valve shall be equipped with a flow clean strainer, closing speed control, opening speed control and flow stabilizer. The valve shall be equipped with a V-port diaphragm plug for low flow conditions or approved equal by the Engineer.

C. The pilot control shall be a direct acting, adjustable, spring loaded, normally open, diaphragm valve, designed to permit flow when controlled pressure is less than the spring setting. The control system shall include a fixed orifice. The pilot control valve trim shall be 303 stainless steel.

D. The valve shall have a maximum working pressure rating as stated on the Drawings.

E. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

F. The main line pressure reducing valve shall be installed in a 2" Ford 70 Series Coppersetter with an outlet valve and by pass feature. All transition fittings shall be brass and capable of handling inlet pressures of 300 psi. The pressure reducing valve and coppersetter shall be installed in a 30" x 30" ultra rib meter box with flat cast iron lid. A pressure gauge shall be installed on the outlet side of the line that can register between 0-200 psi. This gauge shall be installed within the meter box.

2.09 AIR RELEASE VALVE

A. The valve shall have a 1" screwed inlet diameter with a 1" corporation stop and a minimum of 3/32" size orifice. The body and cover shall be constructed of cast iron while the float shall be stainless steel. All internal parts, such as lever pins, retaining rings, screws, etc. shall be of stainless steel or bronze construction. Valves shall be suitable for use in lines with an operating pressure up to 175 psi. SEE SECTION 01600 MATERIAL AND EQUIPMENT for APPROVED MANUFACTURE

B. A service clamp shall be used to connect the air release valve to the water main. Service clamps and corporation stops shall be those as previously specified in Section 02650, except the corporation stops shall have a female IP thread outlet.

C. The air release valve box shall be a standard meter box with dimensions of 18" I.D. and a height of 36". The valve box cover shall be a standard water meter box cover.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Valves shall be installed as nearly as possible in the positions indicated on the Drawings consistent with conveniences of operating the handwheel or wrench. All valves shall be carefully erected and supported in their respective positions free from all distortion and strain on appurtenances during handling and installation.

B. All material shall be carefully inspected for defects in workmanship and material, all debris and foreign material cleaned out of valve openings and seats, all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness.

C. Valves and other equipment which do not operate easily or are otherwise defective shall be repaired or replaced at the Contractor's expense.

D. Valves shall be set plumb and supported adequately in conformance with the instructions of the manufacturer. Valves mounted on the face of concrete shall be shimmed vertically and grouted in place. Valves in the control piping shall be installed so as to be easily accessible.

3.02 INTERIOR PIPING INSTALLATION

A. It shall be the Contractor's responsibility to furnish a complete system of pipe supports, to provide expansion joints and to anchor all piping. The pipe support system shall be installed complete with all necessary inserts, bolts, nuts, rods, washers, miscellaneous steel, and other accessories.

B. In some instances, expansion joints have been shown on the drawings, but no attempt has been made to indicate every expansion joint for piping included under this portion of the specifications. Portions of the piping are shown on the detail drawings. Some of the piping, however, is shown only on the schematics.

C. Reaction Anchorage and Blocking: All piping exposed in interior locations and subject to internal pressure in which flexible connectors are used shall be blocked, anchored, or harnessed, as shown on the drawings, or as directed by the Engineer to preclude separation of joints.

3.03 PAINTING

Field painting is specified in elsewhere in these specifications.

- END OF SECTION -

SECTION 02700**SITE RESTORATION****PART 1 - GENERAL****1.01 CLEAN-UP**

Upon completion of the installation of the water main and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from his work. The Contractor shall grade the ground along each side of the pipe trench and/or structure in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

PART 2 - PRODUCTS**2.01 SEEDING**

A. All graded areas shall be seeded at the rate of six (6) pounds of seed per 1,000 square feet. The mixture shall consist of:

Kentucky 31 Fescue	60%
Creeping Red Fescue	20%
Annual Rye Grass	20%

B. After seed has been distributed, the Contractor shall cover areas with straw to a depth of 1-1/2". Any necessary re-seeding or repairing shall be accomplished by the Contractor before final acceptance. Seeding is not a pay item.

PART 3 - EXECUTION**3.01 SITE RESTORATION**

A. After installation of water lines, the construction site will be restored to its original condition or better. All paved streets, roads, sidewalks, curbs, etc. removed or disturbed during construction shall be replaced, and all materials and workmanship shall conform to standard practices and specifications of the Owner, and/or to the Kentucky Department of Highways requirements, and specifications, whichever applies. Gravel, cinder or dirt streets, drives and shoulders shall be replaced and sufficiently compacted to provide a surface suitable for carrying the type of traffic normally imposed at the location.

B. All seeded areas shall be watered daily during the germination period, unless rain supplies the required moisture. The Contractor shall replace, at his own expense, trees, shrubs, etc. disturbed during construction.

C. The Contractor shall remove from the site all equipment, unused materials and other items at his expense. The construction site shall be left in a neat, orderly condition, clear of all unsightly items, before the Work is finally accepted.

- END OF SECTION -

SECTION 02830**CHAIN LINK FENCES AND GATES****PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. The Contractor shall furnish and erect the chain link fence and gates as indicated on the drawings and as herein specified.
- B. The chain link fence shall have a top rail and bottom tension wire.
- C. The chain link fence materials and installation shall meet or exceed the standards of the Chain Link Fence Manufacturers Institute, New York, N.Y., except as otherwise specified in this section; also fence materials shall meet or exceed Fed. Spec. RR-F-191H/GEN for Fencing, Wire and Post Metal (and Gates, Chain Link Fence Fabric, and Accessories), and shall conform to the ASTM Standard Specifications hereinafter noted.
- D. Fence framework, fabric, and accessories.
- E. Excavation for post bases.
- F. Concrete anchorage for posts.
- G. Manual gates and related hardware.

1.02 RELATED WORK

Section 03310 - Structural Concrete.

1.03 REFERENCES

- A. ANSI/ASTM A123 - Zinc (Hot Galvanized) Coatings of Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strips.
- B. ANSI/ASTM F567 - Installation of Chain Link Fence.
- C. ASTM A120 - Pipe, Steel, Black and Hot-dipped Zinc-coated (Galvanized) Welded and Seamless, for Ordinary Uses.
- D. ASTM C94 - Ready-mixed Concrete.
- E. FS RR-F-191 - Fencing, Wire and Post, Metal, Type I or Type II.

1.04 QUALITY ASSURANCE

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

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Include plan layout, grid, spacing of components, accessories, fittings, hardware, anchorages, and schedule of components.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.
- D. Submit samples under provisions of Section 01300.
- E. Submit the following samples illustrating each fence material and fabric finish.
 - 1. A 2" length of each type of post.
 - 2. A 2" length of each type of brace and railing.
 - 3. A 2" length of framework for gates.
 - 4. A 2" length of diagonal truss brace.
 - 5. A 2" length of tension wire.
 - 6. Each type of fitting used at terminal posts.
 - 7. Fittings used at line posts.
 - 8. Fittings for the gate leaf frame.
 - 9. Gate hinge.
 - 10. Gate latch.
 - 11. Stretcher bar, 2" length.
 - 12. Bolt and nut fastener.
 - 13. Fence fabric, 2 weaves, 2 meshes long.
 - 14. Tie.
- F. Accompanying the samples, the Contractor shall submit two statements, one on his and one on his subcontractor's letterhead that the samples submitted comply with the requirements of these Contract Documents. Samples shall be submitted for review at least 30 days before fence erection.

PART 2 - PRODUCTS**2.01 MATERIALS**

Framework: ASTM A120; Schedule 40 steel pipe, standard weight, one piece without joints.

2.02 CONCRETE MIX

- A. Concrete: As specified in Section 03000.
- B. Concrete: ASTM C94; Portland Cement; 2500 min. psi at 38 days; 3" slump/1" maximum sized aggregate.

2.03 MATERIALS

- A. Type I metal fittings, posts, fence and gate framework, and all accessories shall be galvanized with a heavy coating of 1.8 oz. pure zinc spelter per sq. ft. of surface area to be coated using the hot-dip process. Type II shall be triple coated with 102 zinc, 15 MG of chromate and .3 mils cross link polyurethane.
- B. All fabrication and welding shall be done before hot-dip galvanizing. All welding shall conform to the American Welding Society standards.
- C. The chain link fence fabric shall be galvanized steel chain link fabric conforming to ASTM Standard Specification for Zinc-Coated Steel Chain Link Fence Fabric, Designation A392-74, with Class 2 zinc coating (2.0 oz. of zinc per sq. ft. of uncoated wire surface). The fabric shall be woven in 2" mesh from No. 9 gauge wire in a 6-foot width with barbed selvages top and bottom.
- D. The barbed wire shall be galvanized steel barbed wire consisting of two strands of twisted No. 12 1/2-gauge wires with 4-point barbs spaced 3" apart and conforming to ASTM Standard Specification of Zinc-Coated (Galvanized) Steel Barbed Wire, Designation A121-77, with Class 3 zinc coating (minimum of 0.80 oz. of zinc per sq. ft. of uncoated wire surface for No. 12 1/2-gauge wire).
- E. The tension wire shall be No. 7-gauge coil spring steel wire with galvanized finish having minimum of 0.80 oz. of zinc coating per sq. ft. of uncoated wire surface.
- F. Tie wires for fastening fence fabric to line posts and rails shall be not less than No. 6 gauge aluminum wire.
- G. Line posts shall be 2-3/8" (2.375") outside diameter steel pipe weighing not less than 3.65 lb. per ft. for Type I or 3.117 lb. per ft. for Type II, or 1-7/8" high carbon steel H-beams weighing not less than 2.70 lb. per ft.
- H. End, corner, and pull posts shall be 2-7/8" (2.875) outside diameter steel pipe weighing not less than 5.79 lb. per ft. for Type I or 4.64 lb. per ft. for Type II, or 2 1/2" square steel tube weighing not less than 5.14 lb. per ft., or 3 1/2" by 3 1/2" roll-formed, steel corner section weighing not less than 5.14 lb. per ft.
- I. Gate posts for gate leaves up to and including 6 ft., wide shall be 2-7/8" outside diameter steel pipe weighing not less than 5.79 lb. per ft., or 2 1/2" square steel tube weighing not less than 5.14 lb. per ft., or 3 1/2" by 3 1/2" roll-formed, steel corner section weighing not less than 5.14 lb. per ft.
- J. Gate posts for gate leaves over 6 ft. wide and up to an including 13 ft. wide shall be 4" outside diameter steel pipe weighing not less than 9.10 lb. per ft. for Type I or 3 1/2" Type II at 5.71 lb. per ft.
- K. Top railings and railings for top, middle and bottom braces between terminal posts and adjacent line posts shall be 1-5/8" outside diameter steel pipe weighing not less than 2.27 lb. per ft., or 1-5/8" by 1 1/4", 14-gauge roll-form section.
- L. Diagonal truss braces between terminal and adjacent line posts and for gate framework shall be 3/8" diameter steel rod.
- M. Barbed wire support arms shall project outward from the top of the posts at 45 degrees and shall be capable of withstanding a 200 lb. downward pull on the outermost end of the arm, without failure. The arms shall have provision for the attachment of three strands of evenly spaced barbed wire. Arms shall be integral with post top weather caps having holes for the passage of the top rail at intermediate posts.

- N. Fittings shall be heavy duty malleable iron or pressed steel of suitable size to produce strong construction.
- O. Stretcher bars for attaching fabric to terminal posts such as end, corner, pull, or gate posts and gate frames shall be flat bars with minimum cross-section dimensions of not less than 1/4" by 3/4". The stretcher bars shall be the full height of the fabric and shall be secured with bar bands of not less than 11-gauge sheet steel, spaced approximately 15" on centers and bolted with 3/8" diameter bolts.
- P. Gate leave framework shall be 1-7/8" outside diameter steel pipe weighing not less than 2.72 lb. per ft. for Type I or 2.28 lb. per ft. for Type II.
- Q. If bolted or riveted corner fittings are not used, the gate frame shall be hot-dip galvanized after welding.
- R. Gate hinges shall be of heavy pattern of adequate strength for the gate size, with large bearing surfaces for clamping or bolting in position.
- S. The gates shall be provided with a suitable latch accessible from both sides and with provision for padlocking.
- T. Double leaf swing gates shall have a center bolt, center stop, and automatic backstops to hold leaves in open position.
- U. Gate padlocks shall have solid brass cases, hardened steel shackles, removable core cylinders, and galvanized steel chains attached to the shackle by a clevis. Padlocks shall be manufactured by Eaton Corp. Lock & Hardware Div., of Emhart Corp., Berlin, Conn.; Best Universal Lock Co., Inc., Indianapolis, Ind.; or be an acceptable equivalent product. The padlocks shall be furnished with two keys each.

2.04 FINISHES

- A. Galvanized: ANSI/ASTM A120; 1.8 oz./sq. ft. coating.
- B. Accessories: Same finish as framing and fabric.

PART 3 - EXECUTION

3.01 INSTALLATION - ERECTION OF CHAIN LINK FENCE

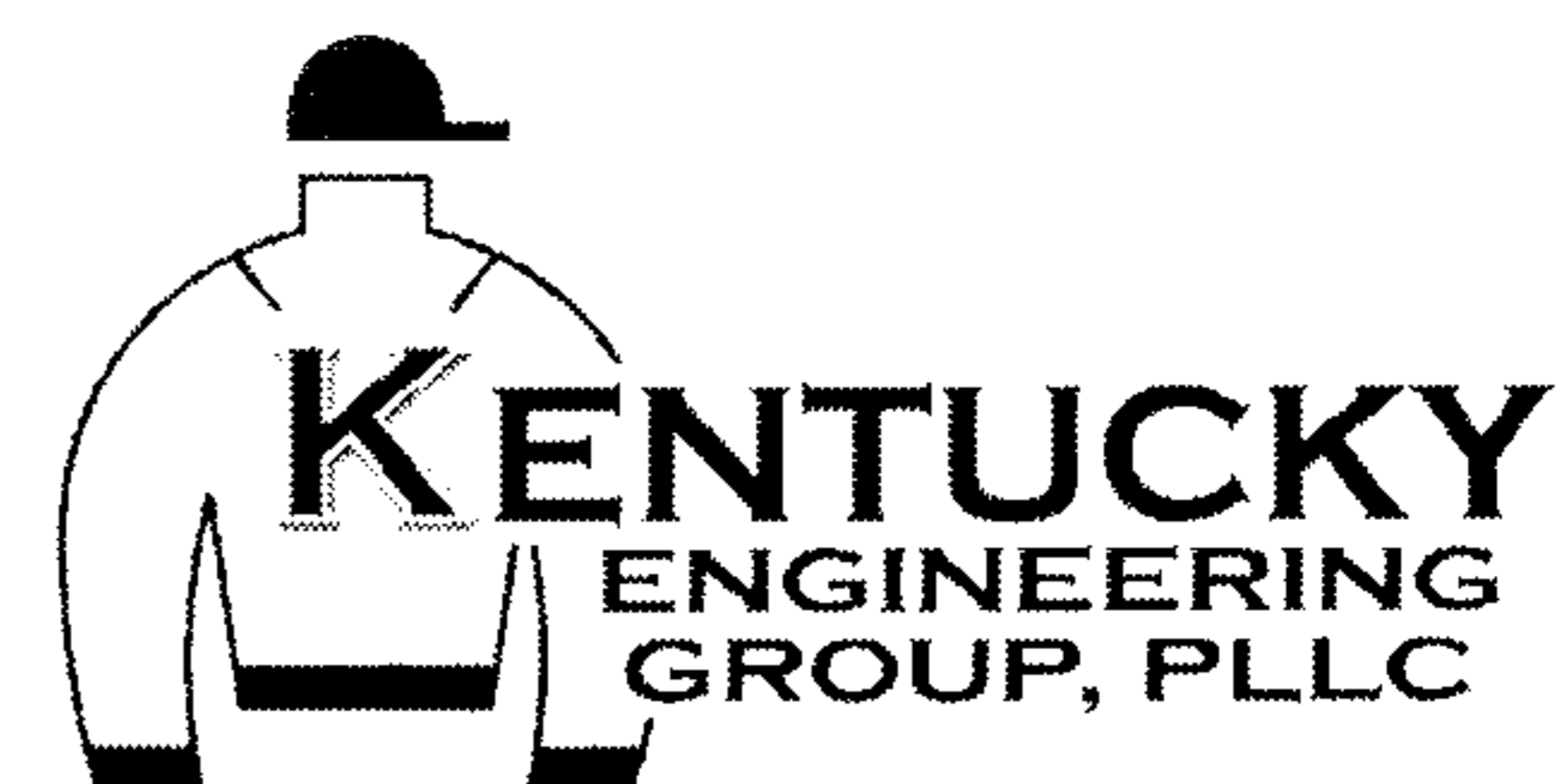
- A. The fence and gates shall be erected by skilled mechanics.
- B. Post spacing shall be uniform with maximum spacing of 10 ft. in fences erected along straight lines. All posts shall be placed plumb and centered in the concrete foundations.
- C. Post foundations in earth shall be concrete cylinders with a minimum diameter of 12", crowned at grade to shed water, and shall not be less than 36" deep in the ground. Posts shall be set in the full depth of the foundations except for 6" of concrete under the posts.
- D. If foundation holes are excavated in peat or other unstable soil, the Engineer shall be notified for determination of suitable construction precautions.
- E. If solid ledge is encountered without overburden of soil, posts shall be set into the rock a minimum depth of 12" for line posts and 18" for terminal posts. Post holes shall be at least 1" greater in diameter than the post and the grout shall be thoroughly worked into the hole so as not to leave voids, and shall be crowned at the top to shed water. Where solid rock is covered by an overburden, the total setting depths shall not exceed the depths required for setting in earth, and the posts shall be grouted into the rock as described.

- F. Any change in direction of the fence line of 30 degrees or more shall be considered corners. Pull posts shall be used at any abrupt change in grade.
- G. Maximum area of unbraced fence shall not exceed 1,500 square feet.
- H. Terminal posts shall be braced to adjacent posts with horizontal brace rails and diagonal truss rods brought to proper tension so that posts are plumb.
- I. There shall be no loose connections or sloppy fits in the fence framework. The fence framework shall withstand all wind and other forces due to the weather.
- J. Fabric shall be stretched taut and tied to posts, rails and tension wires with the bottom edge following the finished grade not more than 2" above the grade. The fabric shall be installed on the security side of the fence and shall be anchored to the framework so that the fabric remains in tension after pulling force is released. The fabric shall be attached to line posts with ties spaced at not more than 15" intervals and to rails and braces at not more than 24" intervals. The fabric shall be attached to the tension wire with hog ring ties on 24" centers.
- K. Three strands of barbed wire shall be installed on each extension arm of the line fence and at the top of each gate. The wires shall be pulled taut and fastened at each support.
- L. Gates shall be installed plumb, level, and secure for the full width of the opening and the hardware adjusted for smooth operation. Provide concrete center drop to foundation depth and drop rod retainers at center of double gate openings.

- END OF SECTION -

DIVISION 11

EQUIPMENT



SECTION 11210**SUBMERSIBLE VERTICAL TURBINE PUMPS AND MOTORS****PART 1 - GENERAL****1.01 WORK INCLUDED**

A. The Contractor shall furnish, install, and test all pumping units and their appurtenances as indicated on the Drawings and as herein specified. These specifications direct attention to certain features of the pumping units, but do not purport to cover all the details of their design. The equipment furnished shall be designed, constructed, and erected in conformity with accepted high quality standards.

B. All pumps as indicated in this section of the work herein specified include:

1. Pump and Motor. Also see Division 16 - Electrical
2. Installation.
3. Supports, Anchors and Seals.
4. Concrete, Grouting.
5. Instrumentation.
6. Controls.
7. Electrical.
8. Adjustment and Start-Up.

C. Pump Data:

1. Pump capacities and other operational data are indicated on the pump schedule included herein.
2. Insofar as possible, pumps of the same type shall be the product of one manufacturer.
3. Electrical controls and starting equipment not specified herein are specified under the appropriate electrical sections.
4. Pumping units shall be equipped with the necessary accessories, including lifting attachments, lubricators, and drainage connections.

D. All bidders must recognize that, if any alternate pumping system is used and does not meet or exceed the physical and dimensional standards nor perform as specified in the judgment of the project Engineer or Owner, the Contractor shall be required to modify or replace the alternate equipment with the original pumping equipment at no additional cost to the Owner or Engineer.

E. In order for alternate equipment to be considered an "approved equal," prospective suppliers must make a pre-bid submittal as detailed in the following paragraphs and make it available to the design engineer fourteen (14) calendar days prior to the time of bidding. All differences shall be clearly marked between the specifications and proposed substitute equipment.

F. The pre-bid submittals for qualification to bid must contain an installation list of ten (10) similar in size and capacity completed and in operation within the past five (5) years. The installation list will be complete with the date of installation, the name and telephone number of the equipment operator and the name and telephone number of the design engineer.

1.02 RELATED WORK

- A. Division 1 - General Requirements
- B. Division 2 - Site Work
- C. Division 15 - Mechanical
- D. Division 16 - Electrical

1.03 REFERENCES

The chemical and physical properties of all materials and the design, performance characteristics and methods of construction of all items of equipment shall be in accordance with the requirements of the latest issue of the various applicable Standard Specifications. These Standard Specifications have been prepared by authorities which are recognized by the Mechanical Trades. The names of these authorities are listed below together with the abbreviation of their names as they may appear in these Specifications:

- A. American National Standards Institute (ANSI). - ANSI B58.1-71 -Deep Well Vertical Turbine Pumps.
- B. American Water Works Association (AWWA).
- C. American Society for Testing and Materials (ASTM).
- D. National Fire Protection Association (NFPA).
- E. National Association of Fan Manufacturers (NAFM).
- F. American Society of Mechanical Engineers (ASME).
- G. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
- H. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

1.04 QUALITY ASSURANCE

- A. Standards, codes, rules and regulations as established and listed herein, as amended, latest edition, govern the work.
- B. Factory Pump Tests:
 - 1. The Contractor shall furnish sworn certificates to the effect that the pump casings have passed the hydrostatic pressure tests.
 - 2. Pump tests shall be conducted on all pumps included in this specification section. During each test, the pump shall be run at all specified head conditions for a sufficient time to permit accurate determination of discharge, head, and power input. Certified

copies of the test data shall be furnished to the Engineer for review. All tests shall be run in accordance with the Standards of the Hydraulic Institute.

C. **Motor Tests:** Each motor shall be given the standard commercial tests in the shop of the motor manufacturer, and certified copies of the tests results submitted to the Engineer for review prior to installation of the motors.

D. **Field Acceptance Tests:**

1. After installation of the pumping equipment, and after inspection, operation, testing and adjustment have been completed by the manufacturer's representative, each pump shall be given a running test in the presence of the Engineer during which it shall determine its ability to operate without vibration or overheating, and to deliver its rated capacity under the conditions. During the tests, observations shall be made of head, capacity, and motor input. All defects or defective equipment revealed by or noted during the tests shall be corrected or replaced promptly at the expense of the Contractor, and if necessary, the tests shall be repeated until results acceptable to the Engineer are obtained. The Contractor shall furnish all labor, piping, equipment, and materials necessary for conducting the tests.
2. All adjustments necessary to place the equipment in satisfactory working order shall be made at the time of the above tests.
3. If sufficient water is NOT available for the test, the Contractor shall provide water for testing.
4. In the event that the Contractor is unable to demonstrate to the satisfaction of the Engineer that the units will satisfactorily perform the service required and that they will operate free from vibration and heating, the pumping units may be rejected. The Contractor shall then remove and replace the equipment at his own expense.
5. The field verification and/or drawdown tests shall include measuring or determining the following items:
 - a. Flow rate.
 - b. Total head on the pump.
 - c. Power input.
 - d. Static head on the pump.
6. On those pumps or set of pumps that have a flowmeter in the discharge line, the flowmeter may be used to determine the pump flow rate once its accuracy has been verified in the field. The Contractor shall verify the accuracy of the raw water flowmeters. These flowmeters shall be calibrated as necessary for acceptable meter accuracy.
 - a. **Drawdown Test:**
 - (1) The drawdown/fill test involves measuring the flow rate in the field and comparing it to the meter measurement. The meter shall not be accepted until the results of the tests indicate the meter is measuring within its stated accuracy. The meter shall be tested over the expected range of flow in which it will operate during normal operation; however, the Engineer will select no more than five (5) flow rates at which the meter accuracy is to be tested. At each flow rate, the meter test shall be of a minimum ten (10) minute duration unless the

capacity of the basin being used in the testing will not allow that time period.

- (2) Prior to the test, the volume of the basin being used to determine the drawdown of fill shall be measured for liquid volume per unit of height.
- (3) In the event the meter does not perform within its stated accuracy, the Contractor shall either postpone the pump tests until an accurate meter is obtained or proceed with the tests using the drawdown/fill methodology for measuring flow rate.

b. Field Testing:

- (1) All field measurements for pump rate shall be made within ± 0.01 feet. Readings on all instruments shall be made at two (2) minute intervals for readings shall be averaged to calculate the power draw of the motor, the actual flow pumped, and the static and total dynamic head on the pumps.
- (2) The Contractor shall submit and receive approval on a pump and meter field test rate form from the Engineer prior to any field tests being conducted.

E. There shall be no significant change in vibration and noise level per the Hydraulic Institute standards over the entire listed range of flow for the pumping system. The Contractor shall provide the services of a qualified third party vibration consultant to measure critical frequencies of the installed equipment and measure total vibration over the entire listed range of flow of all of the VFD pumping units. The results shall be furnished to the Engineer in accordance with shop drawing requirements.

1.05 PERMITS AND CODES

A. Contractor shall obtain and pay for all permits and inspections from legally authorized agencies governing such work.

B. Installation shall be in accordance with all applicable codes and regulations. A partial list includes:

- 1. City and/or County Building Inspector.
- 2. National Board of Fire Underwriters.
- 3. State Division of Water.
- 4. State Plumbing Code.
- 5. Standards and Safety.
- 6. State Department of Public Safety.

C. Check with the Engineer to be sure the installation work is being constructed in accordance with Plans and Specifications which have been approved in their entirety and/or which reflect any changes requested by the State Division of Water. Furnish three (3) copies of all inspection certificates obtained, including the State Department of Health certification, when work is completed.

1.06 TEMPORARY SERVICES

A. The equipment when installed may require the use of temporary heating and electrical services, subject to an agreement between the Owner and the Contractor, and with the consent of the Engineer. Should the

permanent systems be used for this purpose, the Contractor shall pay for all temporary connections required and all replacements, without cost to the Owner, leaving same in "as new" condition.

B. Permission to use the permanent equipment does not relieve the Contractor from the responsibility for damage to the building construction and/or equipment which might result because of its use.

1.07 SUBMITTALS

A. In addition to submittal requirements specified in Section 01300, the Contractor shall submit the following:

B. Detailed shop drawings for all equipment and where applicable color and finish of each.

C. Submission of certified shop and erection drawings and data regarding pump and motor characteristics and performance. The data shall include performance curves based on actual shop tests of pumping units, which show that the units meet the specified requirements for head, capacity, efficiency, and horsepower for the various capacities specified. At the time of submission, the Contractor shall, in writing, call the Engineer's attention to any deviations between Drawings, Specifications, and/or equipment to be provided. Curves shall be submitted on 8-1/2" by 11" sheets. Serial numbers for each unit shall be listed on the curve sheet. Shop drawings for accessory equipment shall also be submitted. Shop drawings for electrical equipment and systems furnished herein shall be provided as specified under Electrical Work.

1. Foundations, installation, and grouting.
2. Services of the manufacturer's representative.
3. Operating and maintenance instructions and parts lists.
4. Lubricants.
5. Special tools.
6. Bolts, anchor bolts and nuts.
7. Electric motors.
8. Voltage rating of motors.
9. Equipment drive guards.
10. Nameplates.
11. Capacitors for motors.

D. Submit two (2) copies of welding procedure specifications to the Engineer together with proof of qualification as outlined and required by most recent issue of Code having jurisdiction before any welding is performed. Also, submit two (2) copies of all operator's qualification record in conformance with provisions of Code having jurisdiction. Record shall show that operator was tested under proven procedure specifications submitted. One copy of the above shall be given to the resident project representative to be kept on file at the job site. Standard procedure specifications and welders qualified by National Certified Pipe Welding Bureau shall be considered as conforming to requirements.

E. Shop drawings, descriptive literature and schedules on:

1. Accessory Equipment.
2. General Specialties.
3. Water Supply Specialties.
4. Drainage Specialties.
5. Insulation.
6. Valves.
7. Controls.
8. Instrumentation.
9. Piping.
10. Electrical.

PART 2 - PRODUCTS

2.01 SUBMERSIBLE VERTICAL TURBINE PUMPS

A. General

1. The pump system shall include a product lubricated, deep well submersible vertical turbine pump and furnished with suitable driver and accessories as specified herein, for installation in a well casing to a depth of approximately 200 to 250 feet below ground surface for each well location. The wells shall be designed to optimize capacity and longevity with an initial capacity of 250 gpm and capable of upgrades to 300 gpm for future phases. The pumping unit shall be designed and furnished in accordance with the latest Hydraulic Institute and AWWA Standard for submersible turbine pumps.
2. Insofar as possible, all pumps of the same type shall be the product of one manufacturer. The submersible vertical turbine pumps shall be as manufactured by Goulds Pumps, Grundfos, Franklin Motor or Engineer approved equal.
3. The pump shall be designed and constructed to operate satisfactorily with a reasonable service life, when installed in a dependable and adequate water resource location. Other manufacturers will be considered providing the unit offered is an approved equal in all respects to the brand and model preferred by the Owner. Factory pump performance curves for alternate pumps shall be submitted with the bid.

B. Operating Conditions

Number of Pumps:	One Complete Pump and Motor Installed
Type:	Deep Well Submersible Vertical Turbine
Capacity:	Normal 250 gpm @ TDH 300 ft.
Minimum Shutoff Head:	465 Ft.
Motor Speed (max.) :	3600 rpm
Motor Hp:	30 maximum
Drive:	Constant Speed - RVSS
Number of Stages (max.) :	7
Pump Efficiency:	77% or greater
Discharge Size:	4-inch

The pump will be throttled at shutoff during each pump starting and stopping event. All elements of the pump shall be designed for the pressures involved.

C. Pump Construction

1. Bowl assembly: The bowls shall be flanged type constructed of 316SS conforming to ASTM A744, CF8M. They shall be free from sand holes, blowholes, or other faults and must be accurately machined and fitted to close tolerances. They shall be capable of withstanding a hydrostatic pressure equal to twice the pressure at rated flow or 1.5 times shut-off head, whichever is greater. All intermediate bowls shall be of identical design for interchangeability. All the bowls shall be fitted with thermoplastic sleeve type bearings. A discharge bowl shall be used to connect bowl assembly to the discharge pipe. The hub of the discharge bowl should be such that the bearing can be easily removed through the top of the hub. A polyethylene thrust ring shall be above the top impeller to prevent excessive vertical upthrust.

2. **Impellers:** The impellers shall be constructed from 316SS ASTM A744, CF8M and shall be the enclosed type. They shall be free from defects and must be accurately cast, machined, balanced, and filed for optimum performance and minimum vibration. Impellers shall be balanced to grade G6.3 of ISO 1940 as minimum. They shall be securely fastened to the bowl shaft with taper locks of 316SS.
3. **Motor Adapter:** The inlet motor adapter shall be of ASTM A744, CF8M and shall contain an extra long thermoplastic bearing. The inlet area shall have a net open area of at least four times the eye of the impeller and shall be protected with a 316 stainless steel screen. The openings on the screen shall not be more than 75% of the minimum opening of the water passage through the bowl or the impeller.
4. **Shaft:** The pump shaft shall be of ASTM A582 type 316 stainless steel. It shall be precision ground and polished with surface finish better than 40 RMS.
5. **Coupling:** The shaft coupling shall be of 316 stainless steel and be capable of transmitting the total torque and total thrust of the bowl assembly in either direction of rotation.

D. Submersible Electric Motor

1. **Motor Driver**
 - a. The motor shall be of the submersible type, capable of continuous operation at nameplate rating submerged under water at a maximum temperature of 77 degrees F and suitable for "across the line" starting.
 - b. The motor shall be rated at 30 HP (max), 3 phase, 60 Hz, 240 volt, 3600 RPM with a minimum Service Factor of 1.15. Minimum efficiency at full load shall be 90% inclusive of fully loaded thrust bearing. The maximum actual motor diameter shall not exceed 6" in diameter at the stator casing.
 - c. The motor shall be of the water filled "wet winding" type. It shall be filled with a 50/50 solution of water and propylene-glycol. The motor winding insulation shall consist of an epoxy enamel layer over the copper conductor, covered by a denatured polypropylene insulation layer with an external nylon sheath.
 - d. Motor material of construction shall be 316 stainless steel.
 - e. The motor is to be totally enclosed, utilizing an elastomer expansion diaphragm for the equalization of internal and external pressure.
 - f. The motor shall be equipped with a double rubber type shaft seal, to seal the motor at the point that the shaft extends through the casing
 - g. Replaceable carbon composite sleeve type radial bearings shall be provided at each end of the rotor
 - h. The motor shall be equipped with a pivotal shoe type thrust bearing, with a carbon composite pad, capable of carrying the weight of all rotating elements plus the hydraulic thrust of the pump at shutoff head
 - i. All wetted fasteners and washers shall be of 316 series stainless steel

- j. The motor shall be equipped with one (1) set of three separate, continuous leads. The leads are to be internally spliced directly to the stator winding. The motor leads shall have a minimum length of 15'.
 - k. Exposed fasteners, plugs, and shafting shall be 316 stainless steel. The motor exterior shall be 316 stainless steel for resistance to water and corrosion.
2. Power Cable.
- a. The downhole power cable shall be sized to conform to National Electrical Code for 125 percent of motor full load amps at a conductor temperature rating of 75 degrees C submerged, and a voltage drop at the motor not to exceed 5%.
 - b. The cable shall have three continuous conductors rated for 600V operations. The individual conductors shall be class "B" stranding or better, with a synthetic rubber or thermoplastic insulation. The three conductor cables shall be contained in a flat or round jacket composed of synthetic rubber or thermo plastic with non-hygroscopic fillers between the conductor cables. The cable shall conform to U.L. standard 44 or 83 for submersible cable.
 - c. The cable shall be of sufficient length to allow easy connection in terminal box at the well head
3. Power Cable Splice.
- a. The motor lead to power cable splice shall be a waterproof type splice, suitable for continuous submerged operation.
 - b. The spliced connection between the motor leads and the power cable shall be HI/POT tested while submerged at the factory prior to shipment.

E. Electrical

The Contractor shall furnish all electrical components as indicated on the Drawings and in Division 16.

PART 3 - EXECUTION

3.01 FACTORY PUMP TESTS

- A. The Contractor shall furnish sworn certificates to the effect that the pump casings have passed the hydrostatic pressure tests.
- B. Pump tests shall be conducted on all constant-speed pumps. During each test, the pump shall be run at all specified head conditions for a sufficient time to permit accurate determination of discharge, head, and power input.
- C. Certified copies of the test data shall be furnished to the Engineer for review. All tests shall be run in accordance with the Standards of the Hydraulic Institute.

3.02 MOTOR TESTS

Each motor shall be given the standard commercial tests in the shop of the motor manufacturer, and certified copies of the tests results submitted to the Engineer for review prior to installation of the motors.

3.03 FIELD ACCEPTANCE TESTS

A. After installation of the pumping equipment, and after inspection, operation, testing and adjustment have been completed by the manufacturer's representative, each pump shall be given a running test in the presence of the Engineer during which it shall determine its ability to operate without vibration or overheating, and to deliver its rated capacity under the specified conditions.

B. During the tests, observations shall be made of head, capacity, and motor input. All defects or defective equipment revealed by or noted during the tests shall be corrected or replaced promptly at the expense of the Manufacturer, and if necessary, the tests shall be repeated until results acceptable to the Engineer are obtained. The Contractor shall furnish all labor, piping, equipment, and materials necessary for conducting the tests.

C. All adjustments necessary to place the equipment in satisfactory working order shall be made at the time of the above tests.

D. If sufficient sewage or sludge is NOT available for the test, the Contractor shall provide water for testing, if so directed.

E. Water for testing shall be furnished by the Contractor.

F. In the event that the Contractor is unable to demonstrate to the satisfaction of the Engineer that the units will satisfactorily perform the service required and that they will operate free from vibration and heating, the pumping units will be rejected.

G. The field verification and/or drawdown tests shall include measuring or determining the following items:

1. Flow rate
2. Total head on the pump
3. Power input
4. Static head on the pump

3.04 SPARE PARTS

A. The following spare parts, all of which shall be identical and interchangeable with similar parts installed in the work, shall be provided for the submersible pumps and shall be as recommended by the manufacturer; however, at a minimum shall include the following for each pump. The spare parts shall include those recommended by the manufacturer or those listed below, whichever is more comprehensive:

1. Complete set of bearings,
2. Complete set seals,
3. Complete set of "O" rings, and
4. One year supply of lubricants.

See Division 1 for additional requirements.

B. Spare parts shall be packed in suitable boxes or containers bearing labels clearly designating the contents and the piece of equipment for which they are intended.

C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The parts shall be properly stored and safeguarded until completion of the work, at which time they shall be delivered to the Owner. See Section 01750 for further requirements.

3.07 OPERATION AND MAINTENANCE MANUALS

Manuals shall be provided.

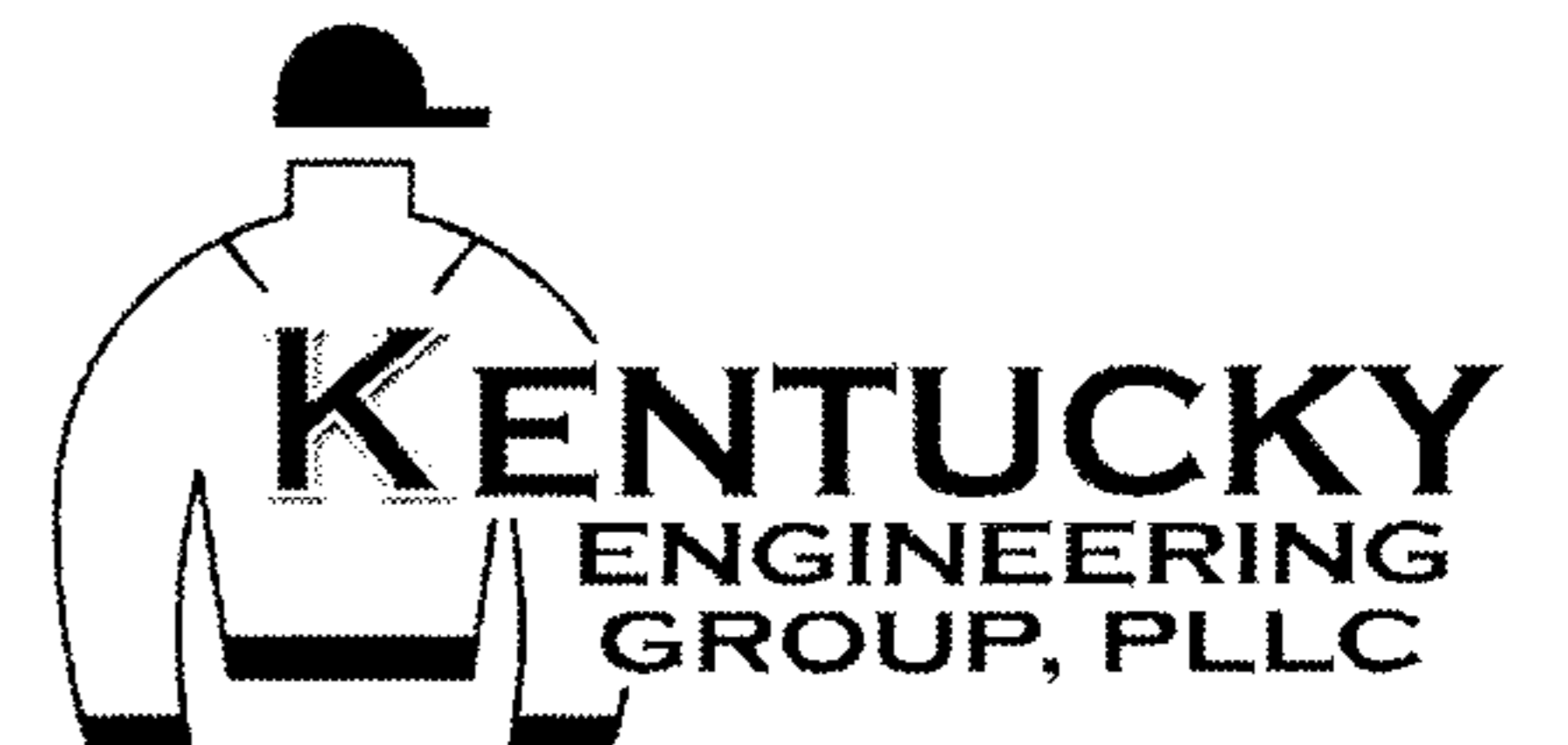
3.08 WARRANTY

Written warranty shall be provided.

- END OF SECTION -

DIVISION 17

TELEMETRY



SECTION 17000**INSTRUMENTATION AND CONTROL SYSTEM AND SUPERVISORY
CONTROL AND DATA ACQUISITION (SCADA) – TELEMETRY SYSTEM****1.0 PART 1 - PROJECT DESCRIPTION****1.01. Description****A) Description of Work**

The work to be accomplished under this section shall consist of furnishing the equipment necessary to upgrade the existing SCADA control system to function as specified herein and as shown on the drawings.

B) Scope of Work

The Contractor shall furnish and install all materials, labor, tools, equipment, supplies and services required to furnish and/or modify the existing system for a complete, stand alone INSTRUMENT & CONTROL/SUPERVISORY CONTROL AND DATA ACQUISITION (I&C/SCADA) system. This system includes transfer and re-installation of one Remote Terminal Unit (RTU) from existing well no. 7 to the new well site. This shall include the transfer and re-installation of the existing antenna from the old site to the new site. A new concrete pad and anchor will be required at the new site. The contractor is to insure that all information can be obtained from the RTU and transmitted to the MTU at the Sandy Hook Water District office.

C) Owner Shall Supply:

- 1) Access and easements as needed for all sites.

1.02. Quality Assurance**A) Manufacturer's Qualifications**

The system specified herein shall be the product of a manufacturer who can demonstrate at least ten (10) years of satisfactory experience in furnishing and installing comparable radio telemetry/control systems for water and wastewater installations.

The manufacturer of this system shall maintain a 24-hour available inventory of all replaceable modules to assure the Owner of prompt maintenance service and a single source of responsibility. The manufacturer shall certify this to the Engineer in writing at the time of bidder pre-qualification.

B) Prebid Approval

All "unapproved" manufactures are required to submit a prebid submittal (14) days prior to the bid date. Submissions that fail to include a complete submittal as detailed shall be deemed unresponsive. The Consulting Engineer and the Owner shall be the sole judge as to whether the alternate equipment is considered an approved equal. Approval of an alternate system by the Engineer will not relieve the alternate system of strict adherence to these specifications. The prebid submittal shall include the following:

- 1) Block diagrams for the various sites in the proposed system,
- 2) Sample electrical drawings for typical sites
- 3) A product performance data sheet shall be included for each proposed component in the system (i.e. antennas, radios, coaxial cables & arrestors, remote unit equipment, central terminal unit equipment, power supplies, time delays and relays, and the various sensors required).
- 4) Radio path study for each radio path in the system.
- 5) An installation list with the names and phone numbers of both the Owner and

- Consulting Engineer for at least ten projects of similar size and complexity.
- 6) A "statement of compliance" detailing paragraph by paragraph his compliance or exceptions to these specifications.

Bidders shall satisfy themselves that the necessary radio frequency can be obtained. The radio path study provided by each bidder shall utilize either:

- a) Computer generated techniques utilizing USGS terrain information to plot the path profiles for each radio path with elevation samples not more than 2000-foot increments.
- b) Actual field measurements to determine the necessary antenna heights, transmitter power, and antenna gains required to insure a 20db fade margin as detailed in Section 2.02 of these specifications.

The a physical path analysis shall be made using temporary equipment installations and an IFR 1000 or equal equipment to measure actual path margins. The bidder shall include in his bid, all the calculations used to extrapolate the measured data. The bidder is expected to obtain the necessary temporary FCC license for the study.

C) Codes & Standards

The control system and its components shall comply with all applicable requirements of the following:

- 1) Electrical Code Compliance (National & Local)
- 2) NEMA Compliance
- 3) IEEE Compliance
- 4) EIA Compliance
- 5) FCC Compliance

2.0 PART 4 - EXECUTION

2.01. System Start-up

The manufacturer shall supply "Factory" personnel for start-up service as needed to insure satisfactory operation. Subsequent trips to the job site to correct defects shall be made at no charge to the Owner during the warranty period.

2.02. Training

The system manufacturer shall supply "factory" personnel to conduct an on-site training session; a minimum of one day of training is required.

2.03. Substantial Completion

The Engineer will grant substantial completion only after completion of the start-up and initial training phase of the project. The Engineer shall make an inspection of the system to determine the status of completion. Substantial completion will be awarded only when the system is providing usable service to the Owner. If the system is commissioned in phases, the Contractor may request substantial completion for the completed phases.

END OF SECTION

Contract No. 11

SANDY HOOK WATER DISTRICT NEW GROUNDWATER WELL and APPURTENANCES

FOR THE
SANDY HOOK WATER DISTRICT
ELLIOTT COUNTY, KENTUCKY

BOARD MEMBERS

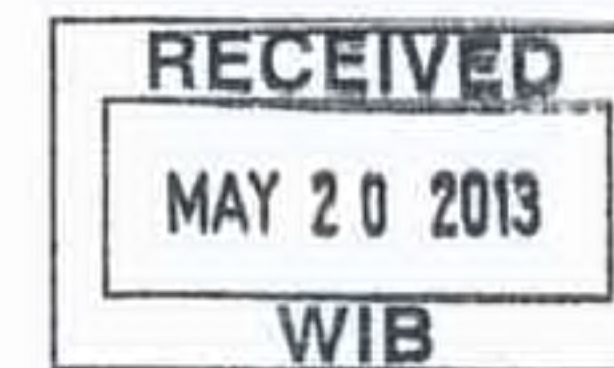
BERNAL ATKINS - CHAIRMAN
KIM CARROLL DALE HOWARD
REBECCA JOHNSTON IRA VEST

GENERAL MANAGER

TRINA SARTAIN

MAY 2013

0220383-13-001



996APE20130001



DOW SUBMITTAL

Not Approved for Construction

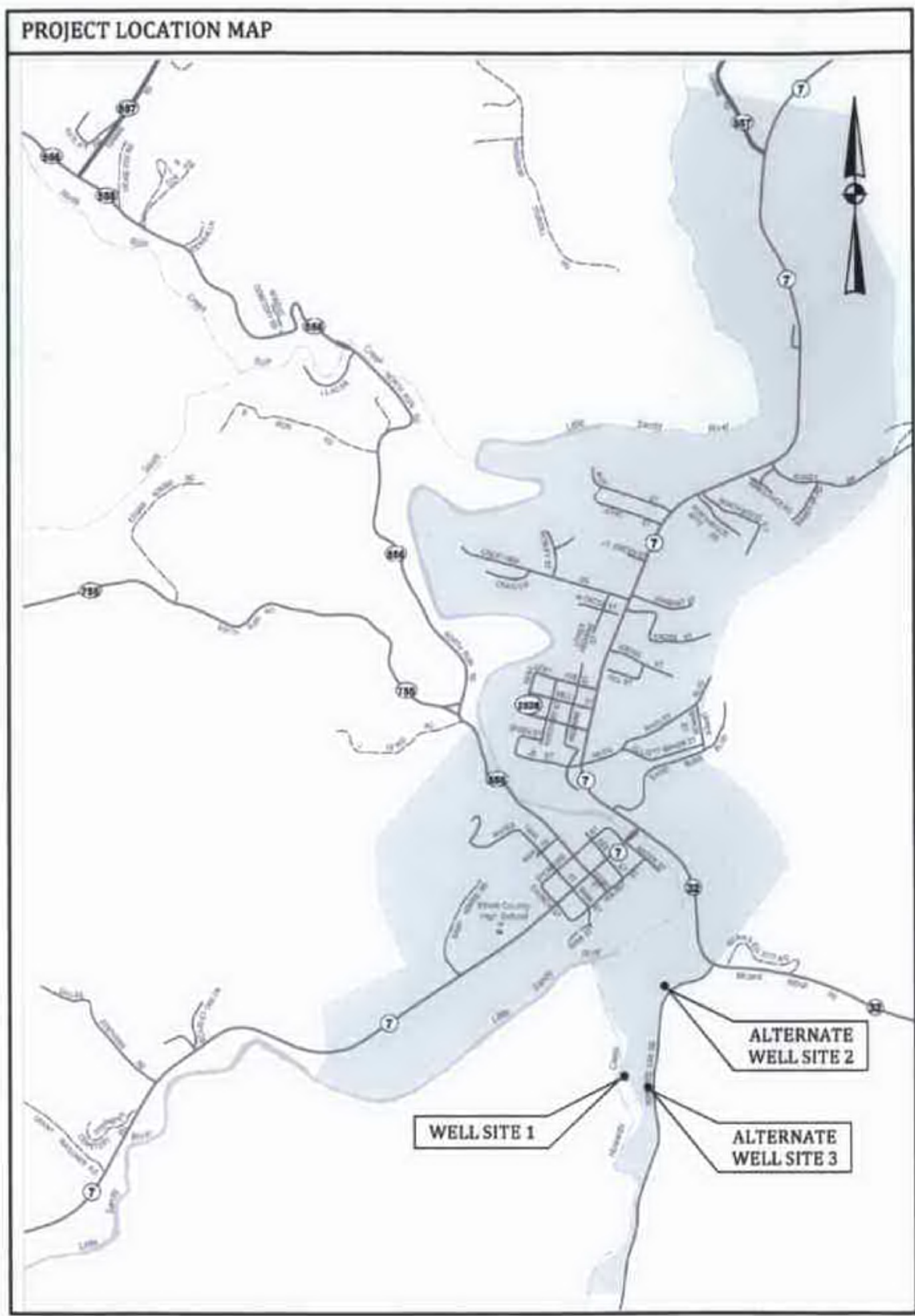


P.O. Box 1034
VERSAILLES, KENTUCKY 40383

PROJECT No. 11001

SET NO. _____

P:\PROJECTS\Sandy Hook\11001_Sandy Hook - Contract 10\Drawings\Contract 11\Drawings\11001-11-01.dwg RDS 5/16/13



INDEX OF DRAWINGS

SHT. NO.	DESCRIPTION
-	COVER
1	LOCATION MAP, LEGEND, UTILITY OWNERS and INDEX OF DRAWINGS
2	GENERAL NOTES
3	AERIAL - SITE PLAN
4	NEW WELL - PLAN, SECTION AND DETAILS
5	STANDARD DETAILS

LEGEND

EXISTING	PROPOSED	DESCRIPTION
PVC	PVC	POLYVINYL CHLORIDE
DIP	DIP	DUCTILE IRON PIPE
WM	WM	WATER MAIN
⊕	⊕	HYDRANT ASSEMBLY
⊕	⊕	FLUSHING/BLOWOFF ASSEMBLY
△	▲	AIR RELEASE VALVE (ARV)
⊗	⊗	GATE VALVE (GV)
⊗	⊗	RECONNECT EXISTING METER
---	---	WATER MAIN (WM)
---	---	SPECIAL CROSSING OR CASING PIPE
---	---	WATER MAIN TO BE ABANDONED
---	---	RIGHT-OF-WAY LINE
---	---	CENTERLINE
---	---	PROPERTY LINE
OWNER	OWNER	EASEMENT ACQUIRED

UTILITIES

BUD - Before You Dig
1-800-752-6007
or DIAL 811

NOTE:
IN ACCORDANCE WITH KENTUCKY STATE LAW, ANY ACTIVITY THAT RESULTS IN MOVEMENT, PLACEMENT, BORING, PROBING OR DIGGING IN OR ON THE GROUND SHALL CONTACT THE ONE CALL CENTER FOR UNDERGROUND UTILITY LOCATIONS.

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE: MAY 2013
PROJECT MGR: LRS
DRAWN BY: CDS
CHECKED BY: LRS
SCALE: AS NOTED
2013 © Kentucky Engineering Group, PLLC



Contract No. 11
SANDY HOOK WATER DISTRICT
NEW GROUNDWATER WELL and APPURTENANCES
ELLIOTT COUNTY, KENTUCKY

**PROJECT LOCATION MAP,
UTILITIES, LEGEND and
INDEX OF DRAWINGS**

PROJECT NO.
11001

SHEET NO.
1

OF 5

GENERAL NOTES

1. **GENERAL PROJECT REQUIREMENTS** - IN THE EVENT OF A CONFLICT BETWEEN ANY PORTION OF THE CONTRACT DOCUMENTS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.
2. **PROJECT COMMUNICATIONS / INSPECTION** - THE ENGINEER SHALL BE THE OWNER'S DESIGNATED SITE REPRESENTATIVE. ALL COMMUNICATION FROM THE CONTRACTOR AND TO THE CONTRACTOR, SHALL BE THROUGH THE ENGINEER.
3. **SAFETY** - THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR SHALL SELECT THE MEANS, METHODS, SEQUENCES, AND TECHNIQUES OF CONSTRUCTION HE DEEMS APPROPRIATE FOR ACCOMPLISHING THE WORK IN A SAFE MANNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE TO PERSONS AND PROPERTY RESULTING FROM HIS ACTIVITIES.
4. **EMERGENCY SHUTDOWN** - THE CONTRACTOR SHALL LOCATE EXISTING WATER AND GAS VALVES PRIOR TO STARTING WORK SO THAT IN THE EVENT OF AN EMERGENCY THE UTILITY SERVICE MAY BE QUICKLY SHUT OFF.
5. **EASEMENTS AND RIGHT-OF-WAY** - THE OWNER IS RESPONSIBLE FOR THE PROCUREMENT OF ALL PERMANENT EASEMENTS NECESSARY OR REQUIRED FOR THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR TEMPORARY EASEMENTS FOR HIS STAGING AREAS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBSERVE THE CONDITIONS OF THESE AGREEMENTS AND CONFINE HIS ACTIVITIES TO THE LIMITS OF THE EASEMENTS. CONTRACTOR TO OBTAIN COPIES OF EASEMENTS OBTAINED BY OWNER AND ABIDE BY THE CONDITIONS OF THESE EASEMENTS DURING CONSTRUCTION.
6. **EXCAVATION** - IT SHALL BE DISTINCTLY UNDERSTOOD THAT ANY REFERENCE TO ROCK, EARTH, OR ANY OTHER MATERIALS ON THE PLANS WHETHER IN NUMBERS, WORDS, LETTERS, OR LINES, IS SOLELY FOR THE OWNER'S INFORMATION AND SHALL NOT BE TAKEN AS AN INDICATION OF CLASSIFIED EXCAVATION OR THE QUANTITY OF EITHER ROCK, EARTH OR ANY OTHER MATERIAL INVOLVED. THE BIDDER MUST DRAW HIS OWN CONCLUSIONS AS TO THE CONDITIONS TO BE ENCOUNTERED. THE CONTRACTOR SHALL PERFORM ALL EXCAVATION NECESSARY OR REQUIRED FOR COMPLETION OF THE PROJECT. THIS WORK SHALL INCLUDE THE REMOVAL AND PROPER DISPOSAL OF ALL MATERIALS OF WHATEVER NATURE ENCOUNTERED. EXCAVATION FOR UTILITIES SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE WORK AND SHALL NOT BE MEASURED FOR PAYMENT.
7. **TOTAL SITE RESPONSIBILITY** - IN OCCUPYING THE SITE AND COMMENCING WORK IN ACCORDANCE WITH THE NOTICE TO PROCEED, THE CONTRACTOR ASSUMES TOTAL AND COMPLETE RESPONSIBILITY FOR THE WORK UNTIL FINAL PAYMENT AND RELEASE OF CLAIMS. ANY PORTION OF THE WORK DAMAGED IN THIS TIME PERIOD BY ACTS OF GOD, OR THE PUBLIC ENEMY, ACTS OF THE OWNER, ACTS OF OTHER CONTRACTORS, FIRES, FLOODS, EPIDEMICS, QUARANTINE, STRIKES, FREIGHT EMBARGOES, VANDALISM AND ABNORMAL WEATHER SHALL BE CORRECTED, REPAIRED, OR REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
8. **ACCESS TO WORK** - THE ENGINEER, HIS REPRESENTATIVES, AND REPRESENTATIVES OF THE OWNER SHALL HAVE FULL ACCESS TO THE WORK AT ALL TIMES.
9. **BLASTING** - NO BLASTING SHALL BE ALLOWED ON THIS PROJECT.
10. **BURNING** - BURNING SHALL CONFORM TO ALL APPLICABLE LOCAL, STATE, AND FEDERAL ORDINANCES.
11. **WASTE AREAS** - THE CONTRACTOR WILL NECESSARILY GENERATE WASTE MATERIALS IN THE FORM OF BRUSH CLIPPINGS, OVERSIZE BOULDERS, MUCK, ETC. THE CONTRACTOR SHALL SUBMIT A WRITTEN PLAN DETAILING THE MANNER IN WHICH WASTE MATERIALS WILL BE HANDLED. THE CONTRACTOR SHALL STRICTLY COMPLY WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS PERTAINING TO THE DISPOSITION OF CONSTRUCTION RELATED WASTE PRODUCTS. IN NO EVENT SHALL WASTE MATERIALS BE PLACED IN A REGULATORY FLOODWAY (OR FLOODPLAIN) WITHOUT A DOW PERMIT TO CONSTRUCT ALONG OR ACROSS A STREAM. OWNER WILL NOT ASSUME RESPONSIBILITY FOR WASTE AREAS.
12. **SILT CONTROL** - THE CONTRACTOR SHALL CONDUCT HIS WORK IN AN ENVIRONMENTALLY SOUND MANNER AND SHALL UTILIZE "BEST MANAGEMENT PRACTICES" TO MINIMIZE EROSION. THE CONTRACTOR SHALL HOLD HARMLESS THE OWNER FROM ANY VIOLATIONS ASSOCIATED WITH THE CLEAN WATER ACT.
13. **DRAINAGE** - CONTRACTOR SHALL MAINTAIN DRAINAGE WORK AREAS DURING ALL PHASES OF CONSTRUCTION. THE OWNER MAY DIRECT THE CONTRACTOR TO CONSTRUCT DITCHES OR BERMS TO ALLEVIATE SITE DRAINAGE PROBLEMS. CONSTRUCTION AND MAINTENANCE OF MINOR DRAINAGE WORKS SHALL BE CONSIDERED AN INTEGRAL PART OF THE OVERALL ACCOMPLISHMENTS OF THE PROJECT AND SHALL NOT BE MEASURED FOR SEPERATE PAYMENT.
14. **ADHERENCE TO PERMITS** - PERMITS REQUIRED BY THE OWNER ARE:
 - a. DIVISION OF WATER CONSTRUCTION PERMIT FOR WATER LINE EXTENSIONS.
 - b. DEPARTMENT OF HIGHWAYS ENCROACHMENT PERMIT.

THE CONTRACTOR SHALL CONDUCT HIS ACTIVITIES IN STRICT ACCORDANCE WITH THESE PERMITS AT ALL TIMES. IN PARTICULAR, THE CONTRACTOR SHALL STRICTLY OBSERVE THE 401 WATER QUALITIES CERTIFICATION KEY REQUIREMENTS OF THE 401 CERTIFICATION WHICH INCLUDE:

- a. RE-VEGETATION AND CLEANUP OF AREA ADJACENT TO STREAMS SHALL OCCUR CONCURRENTLY WITH THE PROGRESS OF THE WORK. CONCURRENTLY IS HEREIN DEFINED TO MEAN THAT RE-VEGETATION AND CLEANUP.
- b. BEST MANAGEMENT PRACTICES SHALL BE EMPLOYED. TO MINIMIZE SEDIMENT RUNOFF AND SOIL EROSION TO THE WATER COURSE.
- c. EXTREME CARE SHALL BE TAKEN TO PREVENT SPILLS OF FUELS AND LUBRICANT INTO WATERCOURSES. EQUIPMENT WORKS FROM THE STREAM BANK.

15. **EXISTING UTILITIES AND UNDERGROUND FACILITIES** - THE CONTRACTOR'S ATTENTION IS CALLED TO THE PRESENCE OF EXISTING UTILITIES IN CLOSE PROXIMITY TO THE PROJECT SITE. THE CONTRACTOR IS ADVISED TO CAREFULLY REVIEW THE PROJECT REQUIREMENTS REGARDING UTILITY RELOCATIONS. THE CONTRACTOR CAN CALL 1-800-752-6007 A MINIMUM OF TWO AND NO MORE THAN TEN BUSINESS DAYS PRIOR TO EXCAVATION FOR INFORMATION ON THE LOCATION OF EXISTING UNDERGROUND UTILITIES WHICH SUBSCRIBE TO THE BEFORE-U-DIG (BUD) SERVICE. ALL UTILITY REPAIR AND RELOCATION WORK SHALL BE INCIDENTAL TO OTHER ITEMS OF WORK. THE EXISTING CONTRACTOR MUST MAKE DILIGENT EFFORT TO MAINTAIN THE SERVICE OF EXISTING UTILITIES. THE CONTRACTOR SHALL PROVIDE BY-PASS PUMPING OF WASTEWATER TO THE NEAREST PUBLIC SANITARY SEWER WHENEVER HIS ACTIVITIES INTERRUPT THE FLOW OF AN EXISTING SANITARY WASTEWATER DISPOSAL FACILITY (SEWER, SEPTIC TANK, LEACH FIELD, ETC.) BY-PASS PUMPING SHALL BE CONSIDERED AN INCIDENTAL PART OF THE PIPE LAYING ACTIVITY AND SHALL NOT BE MEASURED FOR SEPERATE PAYMENT.

GENERAL NOTES (continued)

16. **TESTING** - THE WATER LINES SHALL BE TESTED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS IN THE PRESENCE OF THE ENGINEER AND THE OWNER.
17. **NOTICE** - THE CONTRACTOR SHALL NOT MOVE EQUIPMENT OR MATERIAL TO THE WORK SITE, NOR BEGIN ANY CONSTRUCTION PRIOR TO THE DATE SPECIFIED IN THE 'NOTICE TO PROCEED.' THE CONTRACTOR MUST NOTIFY THE OWNER AND ENGINEER PRIOR TO OCCUPYING THE SITE IN ACCORDANCE WITH THE REQUIREMENTS OF THE TECHNICAL SPECIFICATIONS.
18. **TRAFFIC CONTROL** - THE CONTRACTOR'S WORK WILL DISTURB NUMEROUS PRIVATE DRIVEWAYS AND SUBSTANTIAL PORTIONS OF PUBLIC THOROUGHFARES. THE TERRAIN DOES NOT LEND ITSELF TO DETOURS. CONSEQUENTLY, THE CONTRACTOR MUST OBSERVE THE FOLLOWING TRAFFIC PRINCIPLES:
 - a. ACCESS TO RESIDENCE DRIVE MAY NOT BE INTERRUPTED FOR MORE THAN THREE (3) HOURS AT ANY ONE TIME
 - b. ACCESS TO ALL DRIVEWAYS AND PUBLIC THOROUGHFARES MUST BE RESTORED AT THE END OF EACH WORKDAY.
 - c. WORK WITHIN THE LIMITS OF PUBLIC THROUGHFARE MAY ONLY BE CONDUCTED BETWEEN THE HOURS OF 8:30 A.M. AND 12:00 NOON, BETWEEN 12:30 P.M. AND 3:30 P.M., AND BETWEEN 6:00 P.M. AND 9:30 P.M. THE CONTRACTOR MUST POST SIGNS ADJACENT TO THE WORK STATING THE ROADWAY WILL BE CLOSED DURING THE POSTED HOURS AT LEAST ONE (1) DAY IN ADVANCE OF THE PROPOSED ROAD CLOSURE.
 - d. THE CONTRACTOR MUST MAKE SPECIAL PROVISIONS FOR ACCESS FOR EMERGENCY VEHICLES: POLICE, FIRE AND AMBULANCE.
 - e. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY SAFETY DEVICES IN THE FORM OF SIGNS, FLASHERS, BARRICADES, ETC. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CLAIMS ARISING FROM THE PUBLIC WITH RESPECT TO HIS TRAFFIC CONTROL ACTIVITIES.
26. **SEEDING** - ALL DISTURBED AREAS SHALL BE SEEDED IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
27. **PROTECTION OF TREES** - 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 THE BRANCHES SHALL BE TRIMMED OF THOSE BRANCHES TO IMPROVE THE APPEARANCE OF THE TREE. TREE TRUNKS RECEIVING DAMAGE FROM EQUIPMENT SHALL BE TREATED WITH A TREE DRESSING.
28. **TREE REMOVAL** IN PROJECT AREA IS RESTRICTED TO LESS THAN 4" IN DIAMETER UNLESS APPROVAL IS GRANTED BY U.S. FISH AND WILDLIFE.

WATER MAIN NOTES

1. CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES AND THE ENGINEER TWO WORKING DAYS (MINIMUM) BEFORE BEGINNING CONSTRUCTION.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF TRAFFIC IN ACCORDANCE WITH CITY, COUNTY AND STATE REQUIREMENTS.
3. THE CONTRACTOR SHALL MAINTAIN A CURRENT SET OF CONSTRUCTION PLANS ON THE JOB SITE DURING ALL PHASES OF CONSTRUCTION.
- 4.
5. ALL CONSTRUCTION AND INSTALLATION OF MATERIALS BEING USED SHALL BE IN CONFORMANCE WITH THE PLANS AND SPECIFICATIONS. SUBSTITUTIONS AND DEVIATION SHALL BE PERMITTED ONLY WHEN WRITTEN APPROVAL HAS BEEN ISSUED BY THE ENGINEER.
6. SHOP DRAWINGS OF ALL MATERIALS BEING USED SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.
7. **EXISTING UTILITIES HAVE NOT BEEN SHOWN**. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UTILITIES. THE CONTRACTOR SHALL COORDINATE WITH A REPRESENTATIVE WHEN WORKING NEAR EXISTING UTILITIES.
8. THE CONTRACTOR SHALL PROTECT ALL UTILITIES AND OTHER IMPROVEMENTS SHOWN ON THESE PLANS AND ALL OTHER UTILITIES AND OTHER IMPROVEMENTS NOT SHOWN. THE CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY FOR REPAIRS OF UTILITIES AND OTHER IMPROVEMENTS DAMAGED DURING CONSTRUCTION.
9. UNLESS OTHERWISE NOTED, A SEPARATE BID ITEM HAS NOT BEEN ESTABLISHED FOR FITTINGS. THE FITTINGS INCLUDED BUT NOT LIMITED TO ARE: TEES, BENDS, PLUGS, REDUCERS, CROSSES, COUPLINGS, ETC. CONTRACTORS SHALL INCLUDE THE COST OF THESE ITEMS IN THE BID PRICE FOR THE PIPE.
- 10.
11. CONTRACTOR IS TO COORDINATE WITH THE PROPERTY OWNERS AS TO WHETHER OR NOT TEMPORARY FENCING IS REQUIRED AND CONSTRUCT IF NECESSARY.
12. ALL PIPING SHALL HAVE 36" MINIMUM COVER.
- 13.
14. ALL EXCAVATION IS UNCLASSIFIED. COMPENSATION FOR ALL EXCAVATION SHALL BE INCLUDED IN LUMP SUM BID.
15. REGRADE OF SITE SHALL BE SUCH THAT DRAINAGE IS AWAY FROM ALL STRUCTURES.
16. BACKFILL AROUND ALL STRUCTURES SHALL BE SUFFICIENTLY COMPACTED TO PRECLUDE SETTLEMENT AND PONDING OF WATER AROUND STRUCTURES AND GRADED TO DIVERT RUNOFF AWAY FROM THE STRUCTURES.
17. DIMENSIONS, DETAILS AND REINFORCEMENT MAY VARY WITH MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR SHALL OBTAIN AND MAINTAIN ON SITE, APPROVED SHOP DRAWINGS PRIOR TO BEGINNING CONSTRUCTION.
18. NO PAY ITEM FOR EXTRA TRENCH DEPTH HAS BEEN SET UP. CONTRACTOR SHALL INCLUDE THE COST OF THE ADDITIONAL DEPTH IN HIS BID PRICE.
19. ROCK SOUNDINGS WERE NOT PERFORMED BY THE ENGINEER, THE CONTRACTOR SHALL TAKE APPROPRIATE ACTION TO DETERMINE SUBSURFACE CONDITIONS.

CONTAMINATION PREVENTION REQUIREMENTS

1. ALL PIPING, VALVES, FITTINGS, ETC. DELIVERED TO THE JOB SITE SHALL BE STORED ELEVATED ABOVE THE GROUND AND SHALL BE COVERED WITH PLASTIC, TARPES OR SIMILAR MEANS TO PROTECT FROM EXPOSURE TO DUST AND DEBRIS.
2. ALL PIPING, FITTINGS AND VALVES SHALL BE THOROUGHLY CLEANED OF DUST, DIRT AND DEPOSITS BY SWABBING OR OTHER MEANS ACCEPTABLE. EACH COMPONENT SHALL BE CLEANED ON THE SAME DAY IT IS TO BE INSTALLED.
3. ALL OPENINGS IN THE PIPELINE SHALL BE CLOSED WITH AN APPROVED WATERTIGHT PLUG AT THE END OF EACH DAY WHEN PIPE LAYING HAS STOPPED, OR FOR OTHER REASONS SUCH AS REST OR MEAL BREAKS.

FINAL CLEANUP AND RESTORATION

UNLESS SPECIFICALLY APPROVED BY THE OWNER AND ENGINEER, CLEANUP OF DISTURBED AREAS SHALL BE KEPT CURRENT WITH CONSTRUCTION AND RESTORATION EFFORTS BY THE CONTRACTOR INITIATED NO LONGER THAN SEVEN (7) DAYS AFTER THE TRENCH EXCAVATION WORK HAS STARTED. ALL EXCAVATED MATERIAL NOT REQUIRED FOR BACKFILLING OF THE TRENCH AND ANY LARGE ROCKS, STONES OR DEBRIS SHALL BE REMOVED FROM THE SITE, AND SHALL NOT BE A BURDEN TO THE PROPERTY OWNER(S) AND/OR ADJACENT PROPERTIES. THE CONTRACTOR MAY WINDROW OR TRACK-IN THE EXCAVATED MATERIAL OVER THE TRENCH PRIOR TO FINAL CLEANUP TO ALLOW FOR AND TO ASSIST IN THE INITIAL SETTLEMENT OF THE TRENCH. ALL DISTURBED AREAS MUST BE SEEDED AT LEAST WITH A TEMPORARY SEED MIX IF FOR SOME REASON THE AREA CANNOT BE PERMANENTLY SEEDED WITHIN TWO (2) WEEKS.

P:\PROJECTS\Sandy Hook\11001_Sandy Hook - Contract 10\Drawings\Contract 11\Drawings\11001-11-02.dwg 05/15/13

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE:	MAY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	



Contract No. 11
SANDY HOOK WATER DISTRICT
 NEW GROUNDWATER WELL and APPURTENANCES
 ELLIOTT COUNTY, KENTUCKY

GENERAL NOTES

PROJECT NO.
11001

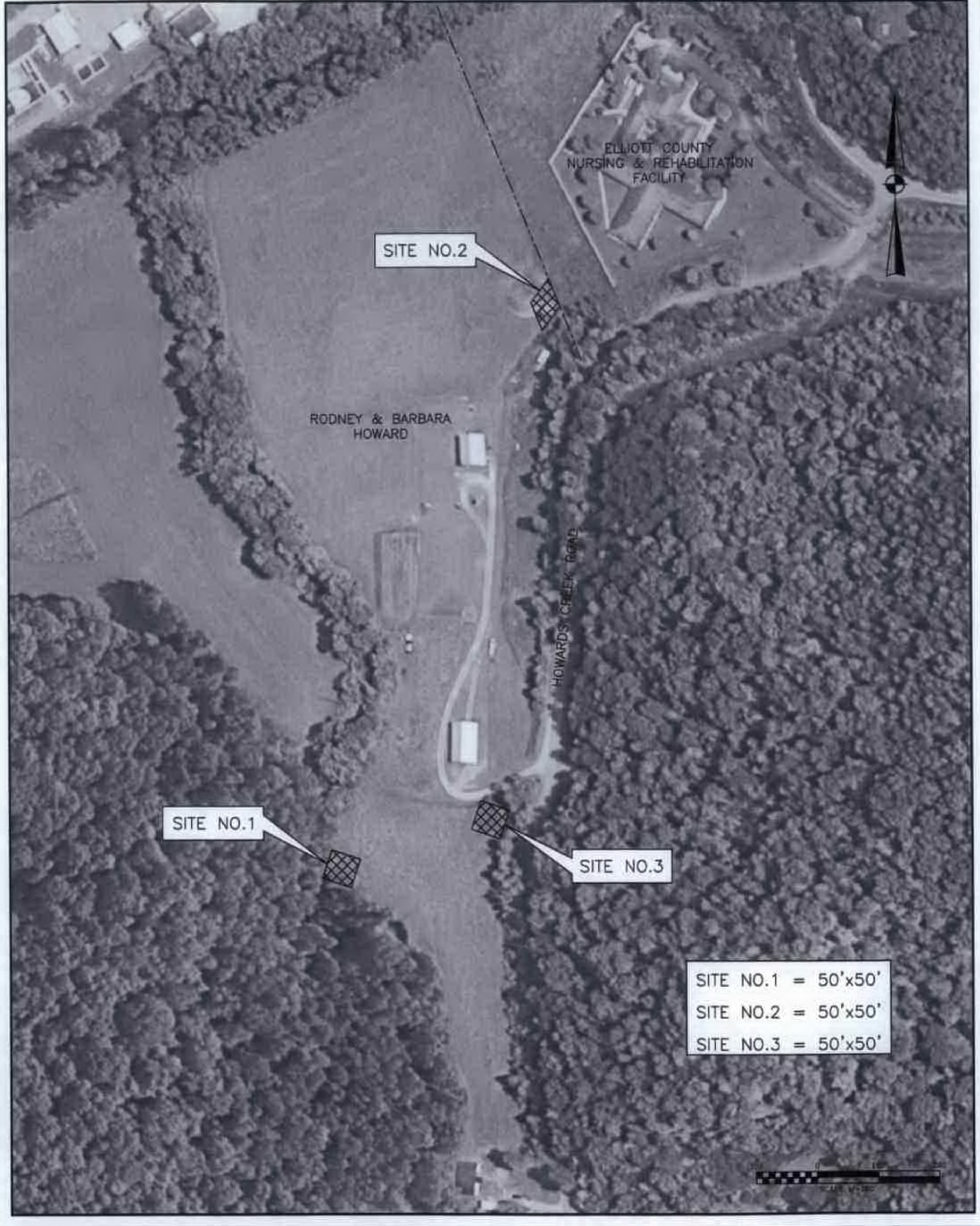
SHEET NO.
2

OF 5

P:\PROJECTS\Sandy Hook\11001 - Sandy Hook - Contract 11\Drawings\Contract 11\Drawings\111001-11-02.dwg RBE 5/16/13



- NOTES:**
1. CONTRACTOR SHALL PROVIDE MEANS TO DRILL AND PUMP TEST WELL AS ELECTRIC WILL BE UNAVAILABLE DURING PUMP TEST AT ANY SITE.
 2. CONTRACTOR SHALL PROVIDE CHAIN LINK FENCING AT THE CONCLUSION OF ALL CONSTRUCTION.
 3. CONTRACTOR SHALL PROVIDE FOR ACCESS ROAD TO SITE ONCE TEST WELL LOCATION HAS BEEN ACCEPTED AS SHOWN ON SITE PLAN.
 4. ALL ELECTRICAL COMPONENTS SHALL BE MOUNTED ABOVE THE 100 YEAR FLOOD PLAIN ELEV. 720
 5. IF SITE NO.1 DOES NOT PROVIDE THE MINIMUM FLOWS AND QUALITY, THE CONTRACTOR WILL BE INSTRUCTED TO MOVE TO SITE NO.2. IF SITE NO.2 DOES NOT PROVIDE THE MINIMUM FLOWS AND QUALITY, THE CONTRACTOR WILL BE INSTRUCTED TO MOVE TO SITE NO.3. CONTRACTOR MOVEMENT BETWEEN SITES CAN ONLY BE PRACTICED IF DIRECTED BY THE ENGINEER.



SITE NO.1 = 50'x50'
 SITE NO.2 = 50'x50'
 SITE NO.3 = 50'x50'

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE:	MAY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	



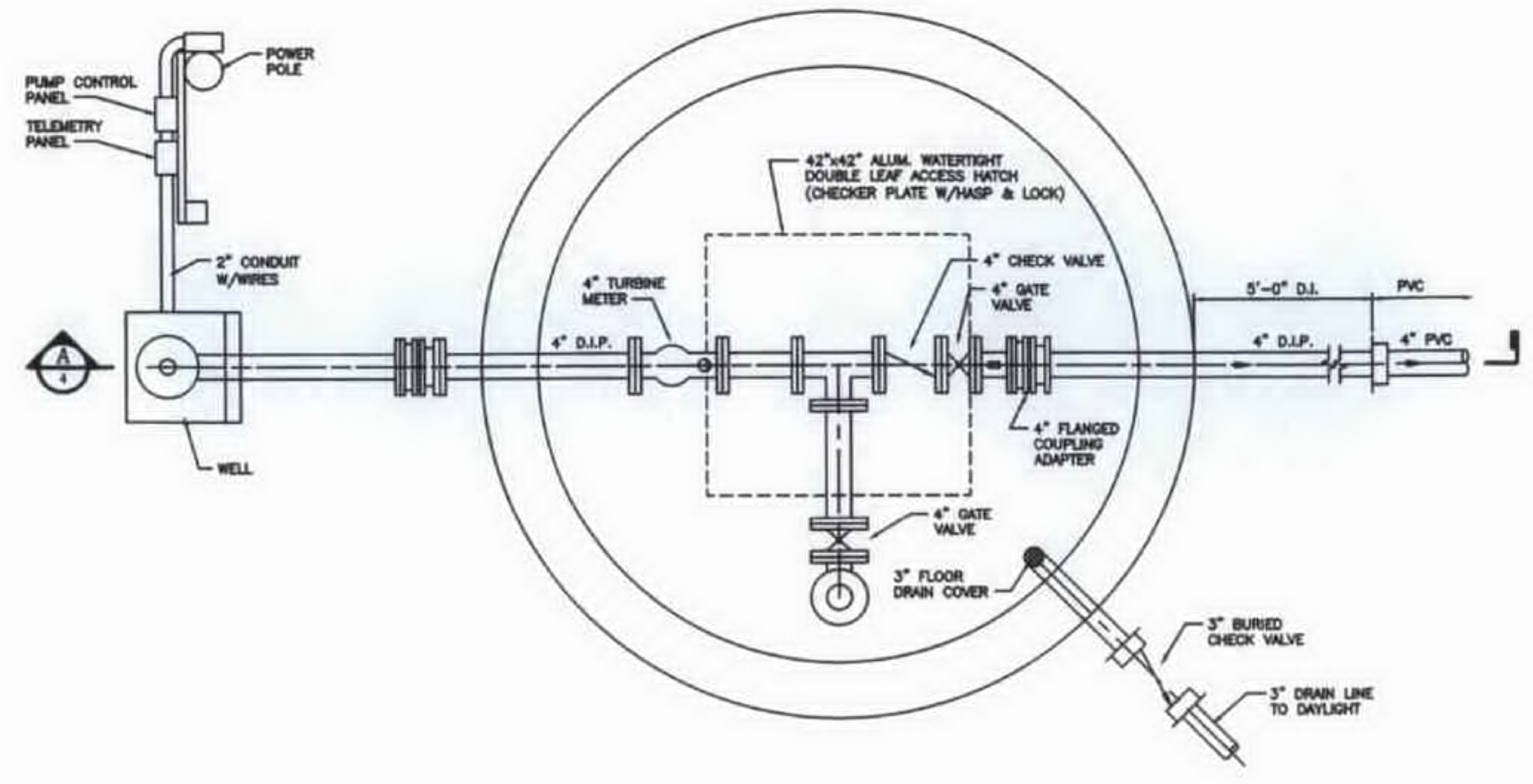
Contract No. 11
SANDY HOOK WATER DISTRICT
 NEW GROUNDWATER WELL and APPURTENANCES
 ELLIOTT COUNTY, KENTUCKY

SITE PLAN
WELL and VALVE VAULT

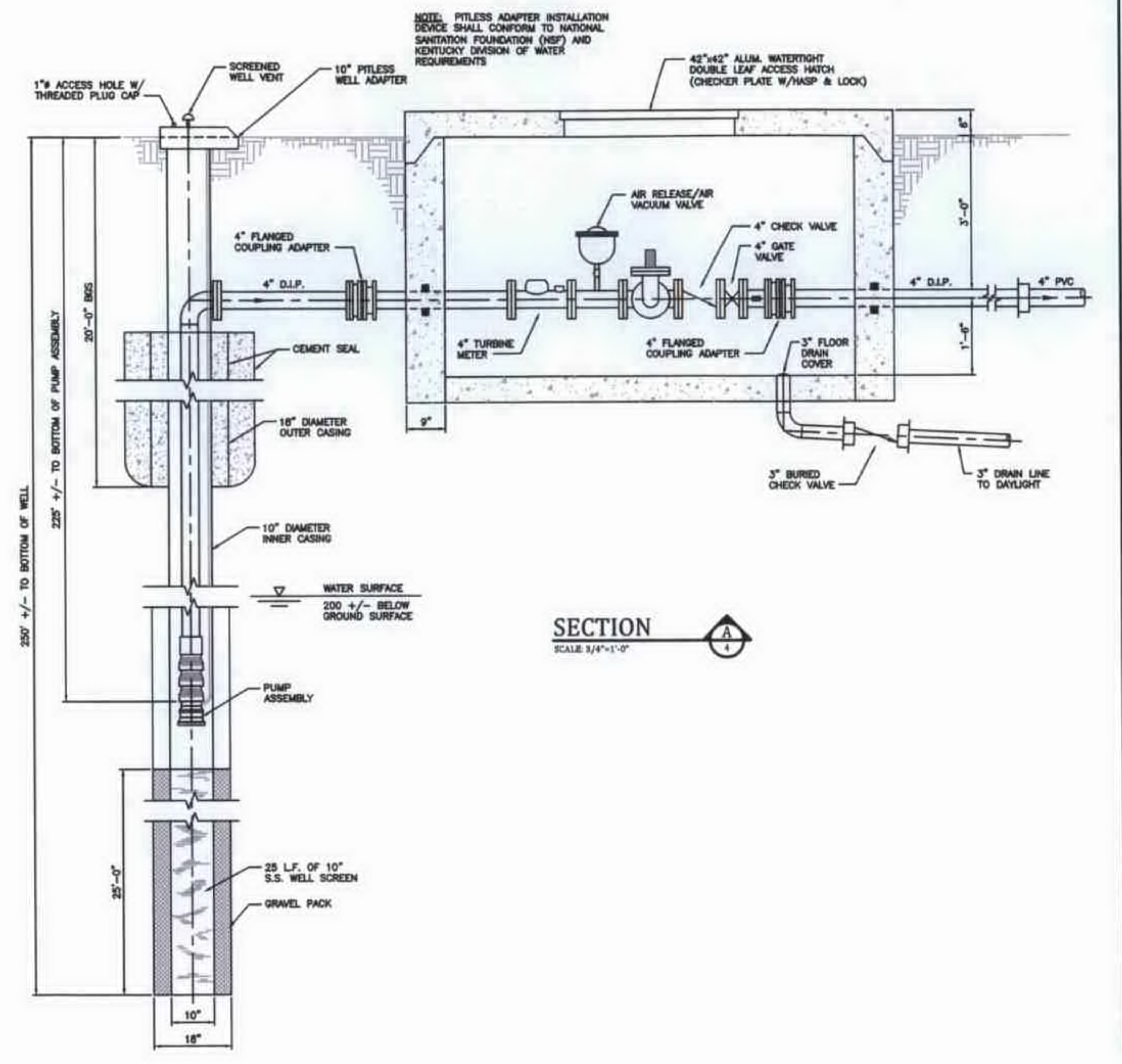
PROJECT NO.	11001
SHEET NO.	3

OF 5

P:\PROJECTS\Sandy Hook\11001_Sandy Hook - Contract 11\Drawings\Contract 11\11001-11-04.dwg REV: 5/14/13



PLAN - WELL and VALVE VAULT
SCALE 3/4" = 1'-0"



SECTION
SCALE 3/4" = 1'-0"

NOTE: PITLESS ADAPTER INSTALLATION DEVICE SHALL CONFORM TO NATIONAL SANITATION FOUNDATION (NSF) AND KENTUCKY DIVISION OF WATER REQUIREMENTS

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE:	MAY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	

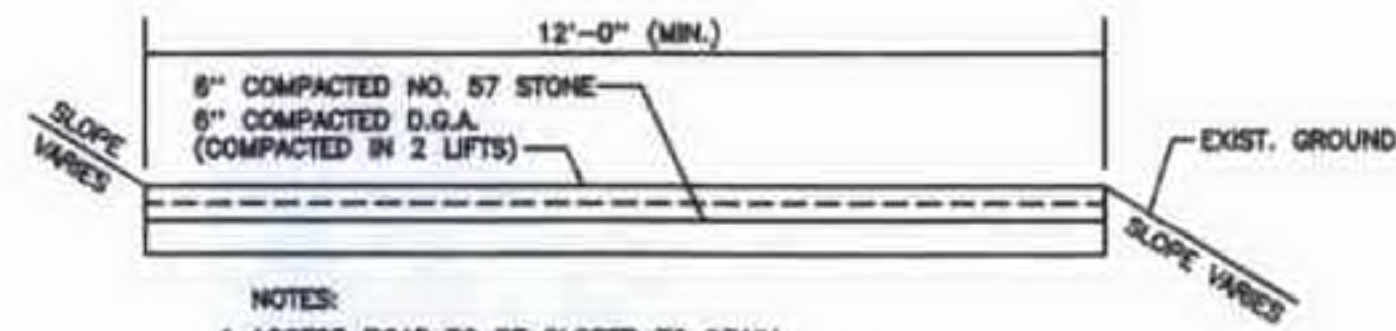


Contract No. 11
SANDY HOOK WATER DISTRICT
 NEW GROUNDWATER WELL and APPURTENANCES
 ELLIOTT COUNTY, KENTUCKY

WELL and VALVE VAULT
 PLAN, SECTION and DETAILS

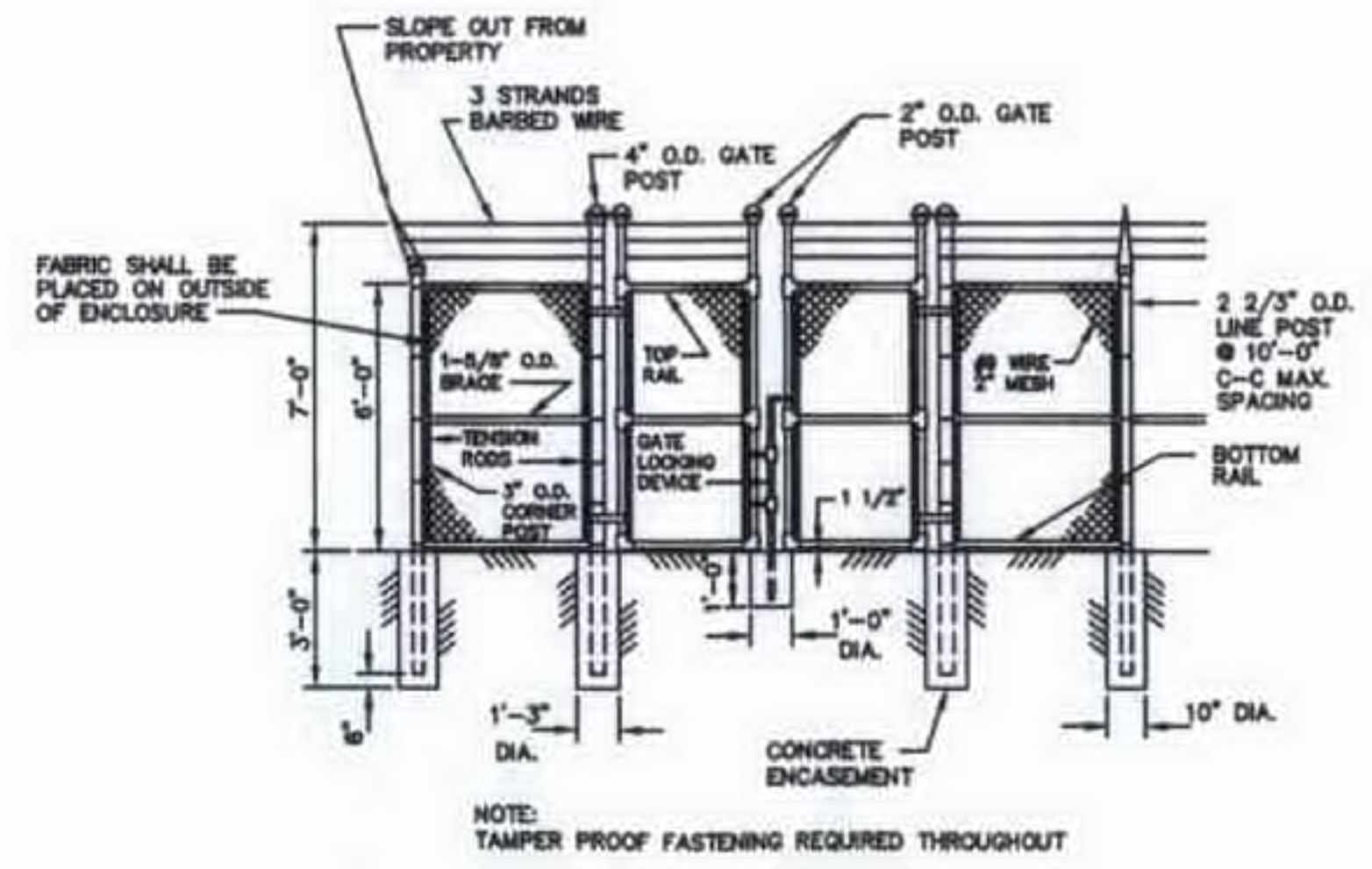
PROJECT NO.	11001
SHEET NO.	4

P:\PROJECTS\Sandy Hook\11001_Sandy Hook - Contract 11\Drawings\Contract 11\Drawings\11001-11-05.dwg BKG 5/15/13

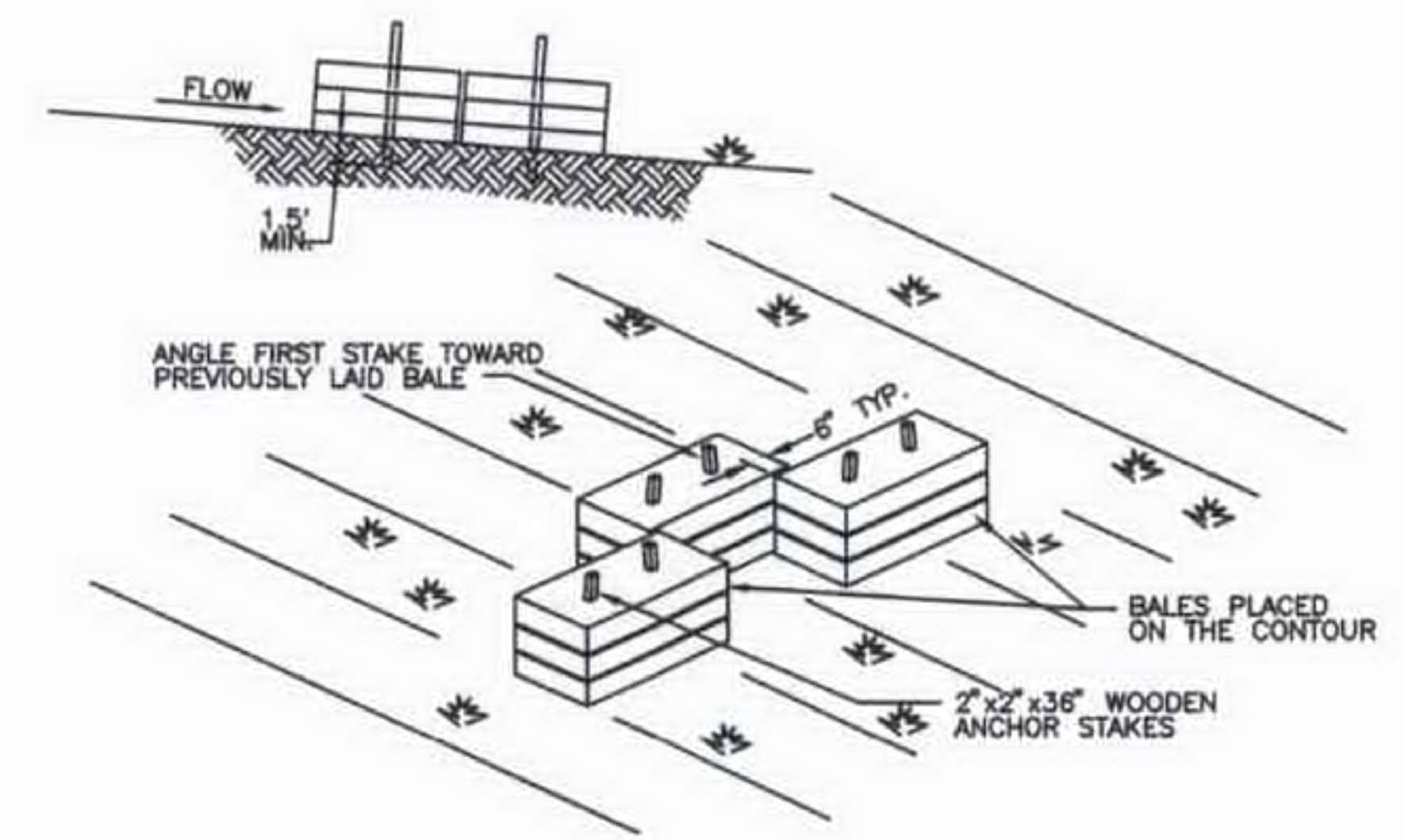


- NOTES:
1. ACCESS ROAD TO BE SLOPED TO DRAIN.
 2. REMOVE TOPSOIL TO A MINIMUM DEPTH OF 10".
 3. COMPACT EXISTING SUBGRADE TO 95% STD. PROCTOR.
 4. CROSS DRAINS SHALL BE INSTALLED AS REQUIRED.

TYPICAL ACCESS ROAD
NOT TO SCALE



CHAIN LINK FENCE W/SWINGING GATES
NOT TO SCALE



STRAW BALE SILT CHECK
NOT TO SCALE

IT IS A VIOLATION OF LAW FOR ANY PERSON TO ALTER THIS DRAWING WITHOUT WRITTEN PERMISSION FROM KENTUCKY ENGINEERING GROUP, PLLC AND ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE DRAWING OR TITLE BLOCK TO DETERMINE THE ACTUAL SCALE.

NO.	DATE	REVISIONS	BY

DATE:	MAY 2013
PROJECT MGR:	LRS
DRAWN BY:	CDS
CHECKED BY:	LRS
SCALE:	AS NOTED
2013 © Kentucky Engineering Group, PLLC	



Contract No. 11
SANDY HOOK WATER DISTRICT
 NEW GROUNDWATER WELL and APPURTENANCES
 ELLIOTT COUNTY, KENTUCKY

STANDARD DETAILS

PROJECT NO.
11001

SHEET NO.
5

OF 5

Sandy Hook Water District
Well #8 System Head Curve to WTP

Minor Losses in Piping

NOT USED LENGTH: 2350
6" Raw Water Line to WTP - SDR 21 LENGTH: 30
4" Field Piping and Valve Vault - SDR 21 LENGTH: 225
4" Pump and Well Drop Pipe - SCH 80 COEFFIC: 120

Well Site Ground Elev. = 710
WTP Hydraulic Grade Line plus Residual Pressure = 818.40
Pump EL. = 485.00
DRAWDOWN EL. = 510.00 "MINIMUM WELL LEVEL"

Well Depth @ 250 Feet with Pump Set @ 225.0 feet
Residual Pressure = 40 PSI
Design Flow = 250 GPM
Assume 200 Below Ground Surface (BGS)

FLOW MGD GPM	4" Pump and Well Drop Pipe - SCH 80						4" Field Piping and Valve Vault - SDR 21					
	ACTUAL DIA.	AREA	VELOCITY	LOSS PER 1000'	FRICTIOI IN FEET	MINOR LOSSES	ACTUAL DIA.	AREA	VELOCITY	FRICTIOI IN FEET	MINOR LOSSES	
-	3.826	0.080	0.00	0.00	0.00	0.00	4.072	0.090	0.00	0.00	0.00	
0.07	3.826	0.080	1.40	0.08	0.88	0.18	4.072	0.090	1.23	0.07	0.16	
0.14	3.826	0.080	2.79	0.29	2.47	0.73	4.072	0.090	2.47	0.24	0.65	
0.22	3.826	0.080	4.19	0.61	5.22	1.64	4.072	0.090	3.70	0.51	1.46	
0.29	3.826	0.080	5.59	1.05	8.90	2.91	4.072	0.090	4.93	0.88	2.59	
0.36	3.826	0.080	6.99	1.58	13.44	4.55	4.072	0.090	6.17	1.32	4.05	
0.43	3.826	0.080	8.38	2.22	18.84	6.55	4.072	0.090	7.40	1.85	5.83	
0.50	3.826	0.080	9.78	2.95	25.05	8.91	4.072	0.090	8.63	2.47	7.93	
0.58	3.826	0.080	11.18	3.77	32.07	11.64	4.072	0.090	9.87	3.16	10.36	
0.65	3.826	0.080	12.58	4.69	39.88	14.73	4.072	0.090	11.10	3.93	13.11	
0.72	3.826	0.080	13.97	5.70	48.46	18.19	4.072	0.090	12.34	4.77	16.18	

FLOW MGD GPM	NOT USED					6" Raw Water Line to WTP - SDR 21					STATIC HEAD	TDH (FEET)	(PSI)	FLOWRATE (GPM)
	ACTUAL DIA.	AREA	VELOCITY	FRICTIOI IN FEET	MINOR LOSSES	ACTUAL DIA.	AREA	VELOCITY	FRICTIOI IN FEET	MINOR LOSSES				
-	4.072	0.090	0.00	0.00	0.00	5.993	0.196	0.00	0.00	0.00	308.4	308.4	133.64	0.0
0.07	4.072	0.090	1.23	0.00	0.00	5.993	0.196	0.57	0.80	0.02	308.4	310.3	134.47	50.0
0.14	4.072	0.090	2.47	0.00	0.00	5.993	0.196	1.14	2.90	0.07	308.4	315.5	136.70	100.0
0.22	4.072	0.090	3.70	0.00	0.00	5.993	0.196	1.71	6.13	0.17	308.4	323.5	140.20	150.0
0.29	4.072	0.090	4.93	0.00	0.00	5.993	0.196	2.28	10.45	0.29	308.4	334.4	144.91	200.0
0.36	4.072	0.090	6.17	0.00	0.00	5.993	0.196	2.85	15.78	0.46	308.4	348.0	150.80	250.0
0.43	4.072	0.090	7.40	0.00	0.00	5.993	0.196	3.42	22.12	0.66	308.4	364.2	157.84	300.0
0.50	4.072	0.090	8.63	0.00	0.00	5.993	0.196	3.99	29.41	0.90	308.4	383.1	166.00	350.0
0.58	4.072	0.090	9.87	0.00	0.00	5.993	0.196	4.56	37.66	1.18	308.4	404.5	175.27	400.0
0.65	4.072	0.090	11.10	0.00	0.00	5.993	0.196	5.13	46.82	1.49	308.4	428.4	185.62	450.0
0.72	4.072	0.090	12.34	0.00	0.00	5.993	0.196	5.69	56.90	1.84	308.4	454.7	197.06	500.0

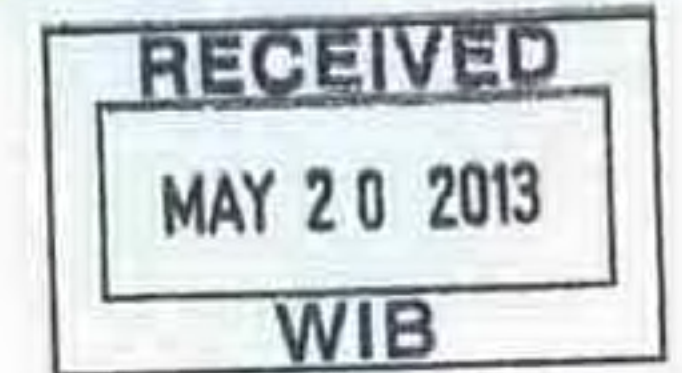
Well Site G 710
WTP Hydraulic Grade Line plus Residual Pressure = 818.40
Pump EL. = 485.00
DRAWDOWN EL. = 610.00 "MAXIMUM CLEARWELL LEVEL"

Design Flow = 250 GPM
Assume 100 Below Ground Surface (BGS)

FLOW MGD GPM	4" Pump and Well Drop Pipe - SCH 80						4" Field Piping and Valve Vault - SDR 21					
	ACTUAL DIA.	AREA	VELOCITY	LOSS PER 1000'	FRICTIOI IN FEET	MINOR LOSSES	ACTUAL DIA.	AREA	VELOCITY	FRICTIOI IN FEET	MINOR LOSSES	
-	3.826	0.080	0.00	0.00	0.00	0.00	4.072	0.090	0.00	0.00	0.00	
0.07	3.826	0.080	1.40	0.08	0.88	0.18	4.072	0.090	1.23	0.07	0.16	
0.14	3.826	0.080	2.79	0.29	2.47	0.73	4.072	0.090	2.47	0.24	0.65	
0.22	3.826	0.080	4.19	0.61	5.22	1.64	4.072	0.090	3.70	0.51	1.46	
0.29	3.826	0.080	5.59	1.05	8.90	2.91	4.072	0.090	4.93	0.88	2.59	
0.36	3.826	0.080	6.99	1.58	13.44	4.55	4.072	0.090	6.17	1.32	4.05	
0.43	3.826	0.080	8.38	2.22	18.84	6.55	4.072	0.090	7.40	1.85	5.83	
0.50	3.826	0.080	9.78	2.95	25.05	8.91	4.072	0.090	8.63	2.47	7.93	
0.58	3.826	0.080	11.18	3.77	32.07	11.64	4.072	0.090	9.87	3.16	10.36	
0.65	3.826	0.080	12.58	4.69	39.88	14.73	4.072	0.090	11.10	3.93	13.11	
0.72	3.826	0.080	13.97	5.70	48.46	18.19	4.072	0.090	12.34	4.77	16.18	

FLOW MGD GPM	NOT USED					6" Raw Water Line to WTP - SDR 21					STATIC HEAD	TDH (FEET)	(PSI)	FLOWRATE (GPM)
	ACTUAL DIA.	AREA	VELOCITY	FRICTIOI IN FEET	MINOR LOSSES	ACTUAL DIA.	AREA	VELOCITY	FRICTIOI IN FEET	MINOR LOSSES				
-	4.072	0.090	0.00	0.00	0.00	5.993	0.196	0.00	0.00	0.00	208.4	208.4	90.31	0.0
0.07	4.072	0.090	1.23	0.00	0.00	5.993	0.196	0.57	0.80	0.02	208.4	210.3	91.14	50.0
0.14	4.072	0.090	2.47	0.00	0.00	5.993	0.196	1.14	2.90	0.07	208.4	215.5	93.36	100.0
0.22	4.072	0.090	3.70	0.00	0.00	5.993	0.196	1.71	6.13	0.17	208.4	223.5	96.86	150.0
0.29	4.072	0.090	4.93	0.00	0.00	5.993	0.196	2.28	10.45	0.29	208.4	234.4	101.58	200.0
0.36	4.072	0.090	6.17	0.00	0.00	5.993	0.196	2.85	15.78	0.46	208.4	248.0	107.47	250.0
0.43	4.072	0.090	7.40	0.00	0.00	5.993	0.196	3.42	22.12	0.66	208.4	264.2	114.50	300.0
0.50	4.072	0.090	8.63	0.00	0.00	5.993	0.196	3.99	29.41	0.90	208.4	283.1	122.67	350.0
0.58	4.072	0.090	9.87	0.00	0.00	5.993	0.196	4.56	37.66	1.18	208.4	304.5	131.93	400.0
0.65	4.072	0.090	11.10	0.00	0.00	5.993	0.196	5.13	46.82	1.49	208.4	328.4	142.29	450.0
0.72	4.072	0.090	12.34	0.00	0.00	5.993	0.196	5.69	56.90	1.84	208.4	354.7	153.72	500.0

0320383-13-001



996ARE20130001

POWER COST PUMP EFF. = 0.75

gpm x TDH MOTOR EFF. = 0.9

Kw = $\frac{\text{gpm} \times \text{TDH}}{3960 \times \text{pump eff.} \times \text{motor eff.}}$ Kw COST = 0.06

	Pump Hp		HOURS OF OPERATION	DAYS OF OPERATION
	0	-	12	365
	50	5.80 \$	12	365
	100	11.80 \$	12	365
	150	18.16 \$	12	365
	200	25.02 \$	12	365
	250	32.55 \$	12	365
	450	72.11 \$	12	365
	500	85.06 \$	12	365

MINOR LOSS CALCULATION

FITTINGS	4"	4" "K" VALUE	6"
1 4" column pipe			
2 4" Pitless Adapter 90 elbow	2.50		
3 4" pump			
4 Entrance to Pump	1.00		
5 4" Foot Check Valve	2.50		
6 4" Coupling		0.20	
7 4" Turbine Meter		2.50	
8 4" Check Valve		2.50	
9 4" Tee		1.20	
10 4" Coupling		0.20	
11 4" Gate Valve		0.25	
12 4"x 6" reducer			1.50
13			
14			
15			
16			
17 6" 90 base elbow			0.90
18 4 - 6" 45 elbow			
19			
20 2 - 6" gate valves			0.25
21			
22 Exit			1.00
<hr/>			
TOTAL "K"	6.0	6.85	3.7

PUMP FLOWRATE - Grundfos Pumps

Grundfos Pump-15B73008 - 230S250-8

Flowrate	Head
25	504
91	469
141	432
192	387
236	337
280	271
312	209

Grundfos Pump-14B63007 - 300S250-7

Flowrate	Head
39	466
104	443
164	394
200	358
259	308
310	264
370	197

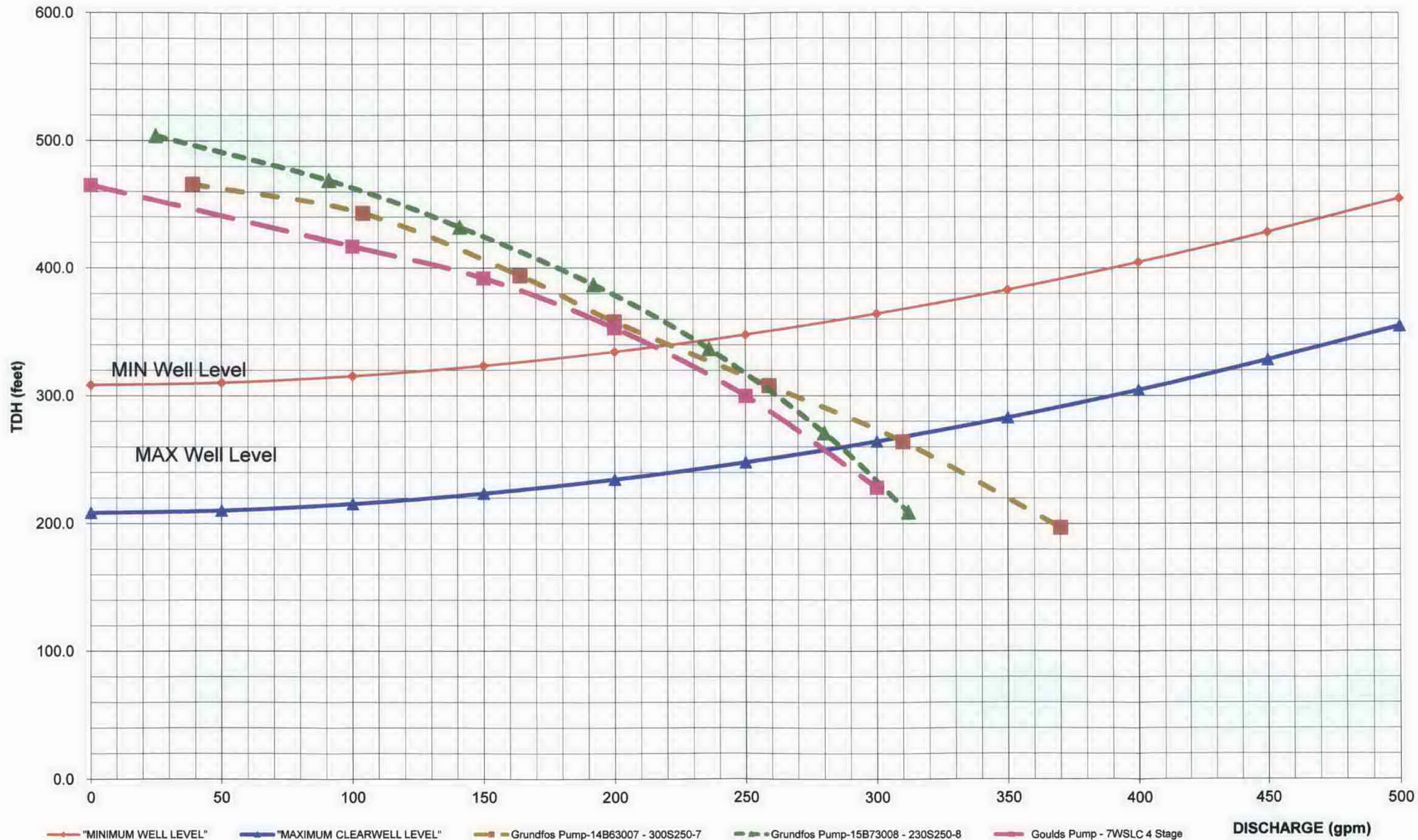
Goulds Pump - 7WSLC 4 Stage

0	465
100	417
150	392
200	353
250	300
300	228

Flows @ Reduced RPM with 12.25" Imp.

FLOW	3450 RPM		60 Hertz				
	100% Speed RATE	60 Hertz 3460 RPM	91% Speed RATE	55 Hertz 3140 RPM	84% Speed RATE	50 Hertz 2898 RPM	45 Hertz 2588 RPM
25	504.0	23	417.4	21	355.6	19	283.5
91	469.0	83	388.4	76	330.9	68	263.8
141	432.0	128	357.7	118	304.8	106	243.0
192	387.0	175	320.5	161	273.1	144	217.7
236	337.0	215	279.1	198	237.8	177	189.6
280	271.0	255	224.4	236	191.2	210	152.4
312	209.0	284	173.1	262	147.5	234	117.6

Sandy Hook Water District Well #8 to WTP Raw Water Line



Pump Option #3

Pump Data Sheet - Submersible Stainless Steel

Company: Kentucky Engineering Group
 Name: Bryan Lovan
 Date: 5/1/2013

Customer:
 Order No:



Pump:

Size: 7WSLC (4 stage)
 Type: Submersible SST
 Synch speed: 3600 rpm
 Curve:
 Specific Speeds:
 Dimensions:
 Vertical Turbine:
 Speed: 3450 rpm
 Dia: 5.125 in
 Impeller:
 Ns: 1655
 Nss: —
 Suction: —
 Discharge: —
 Bowl size: 7.13 in
 Max lateral: —
 Thrust K factor: 2.63 lb/ft

Search Criteria:

Flow: 250 US gpm
 Head: 300 ft
 Near miss: 5 % of Head

Fluid:

Water
 SG: 1
 Viscosity: 1.105 cP
 NPSHa: —
 Temperature: 60 °F
 Vapor pressure: 0.2553 psi a
 Atm pressure: 14.7 psi a

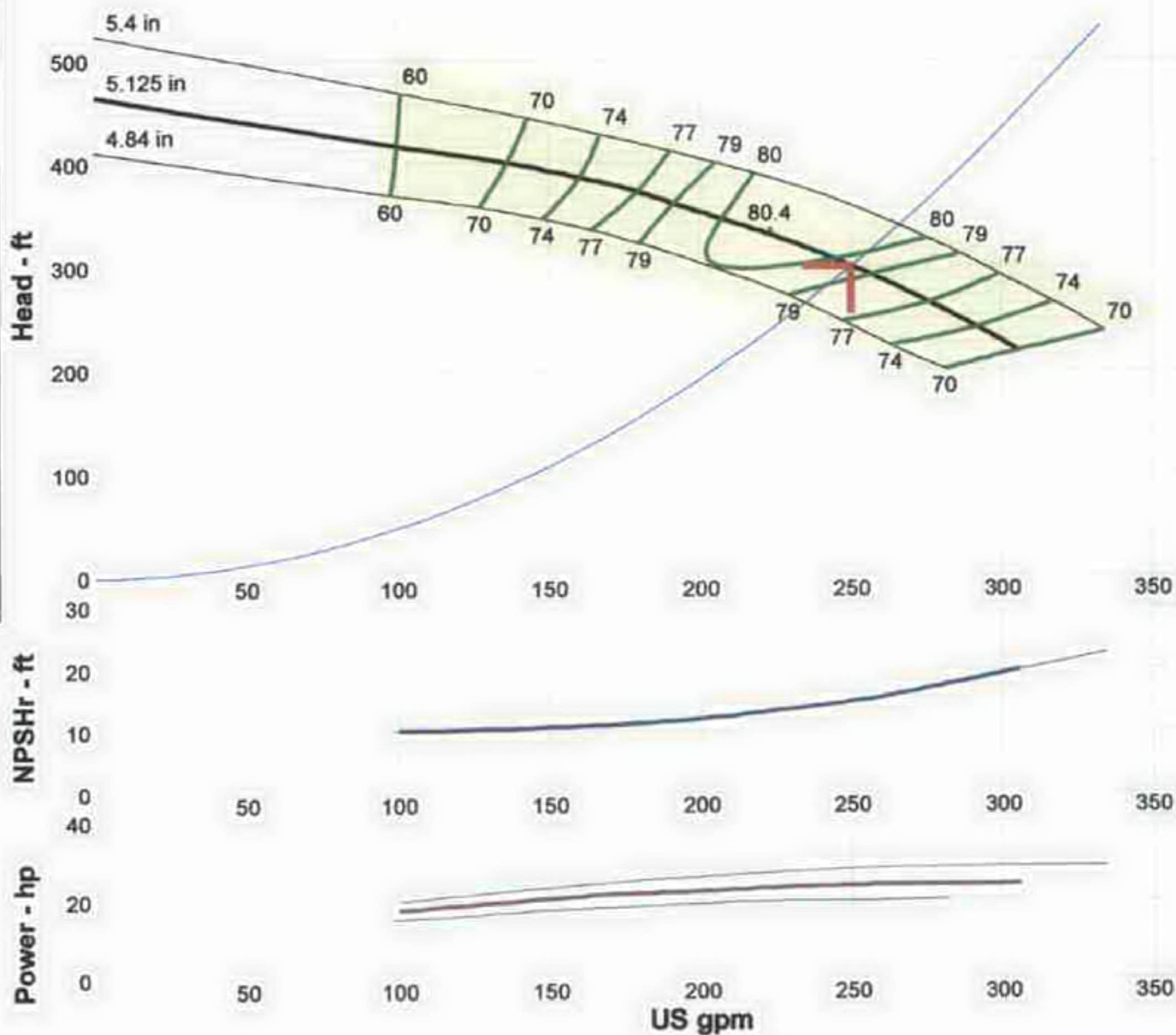
Motor:

Standard: NEMA
 Enclosure: SUB
 Sizing criteria: Max Power on Design Curve
 Size: 25 hp
 Speed: 3600
 Frame: 6 inch

Pump Limits:

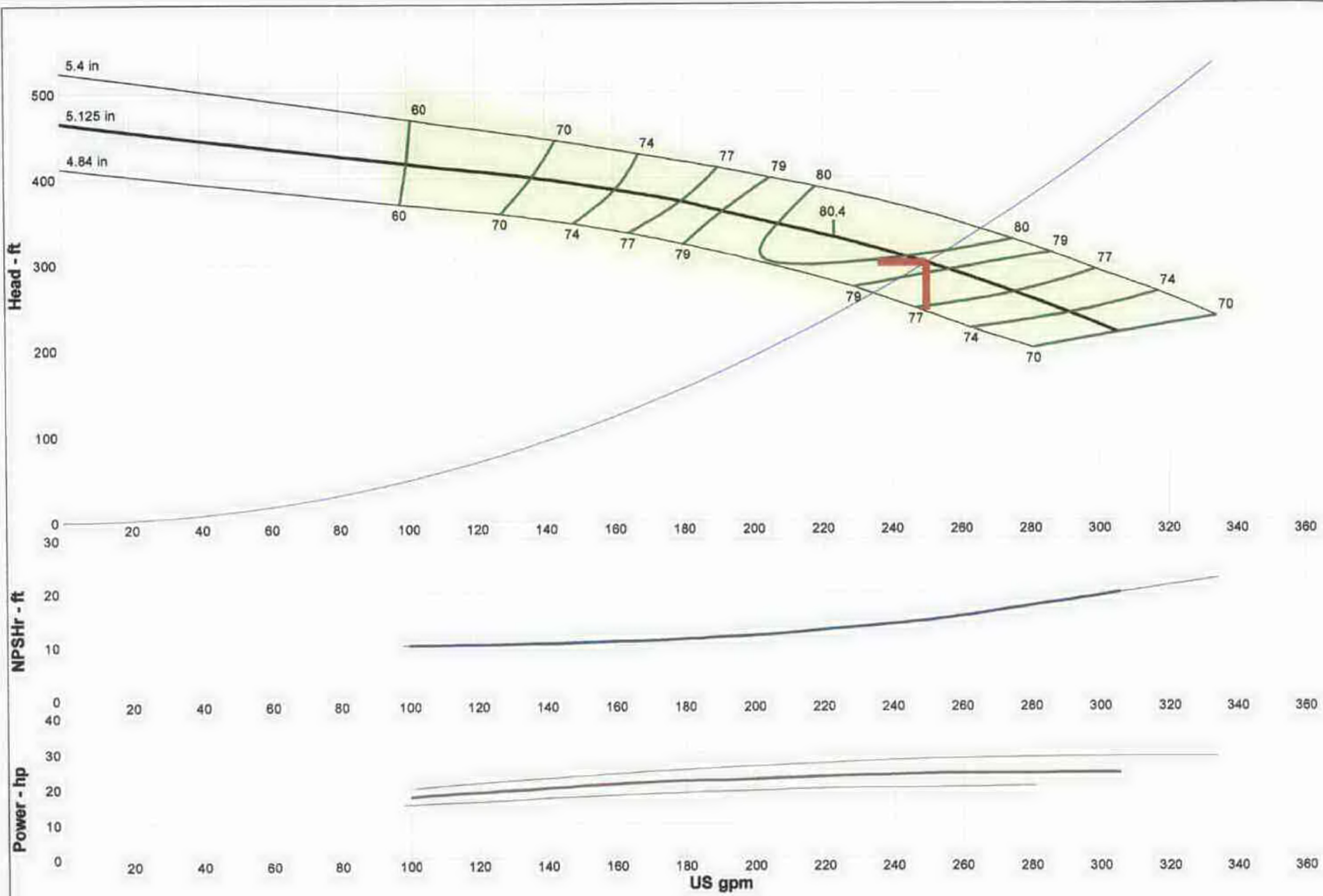
Temperature: —
 Pressure: 450 psi g
 Sphere size: —
 Power: —
 Eye area: —

— Data Point —	
Flow:	250 US gpm
Head:	300 ft
Eff:	79.5%
Power:	23.8 hp
NPSHr:	14.7 ft
— Design Curve —	
Shutoff head:	465 ft
Shutoff dP:	201 psi
Min flow:	—
BEP:	80.4% @ 223 US gpm
NOL power:	24.1 hp @ 306 US gpm
— Max Curve —	
Max power:	28.8 hp @ 317 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
300	3450	228	71.6	24.1	19.3
250	3450	300	79.5	23.8	14.7
200	3450	353	79.5	22.4	11.9
150	3450	392	72.3	20.5	10.6
100	3450	417	60.1	17.5	10.1



Company: Kentucky Engineering Group
 Name: Bryan Lovan
 5/1/2013

Submersible Stainless Steel
 Catalog: goulds sub sst.60, Vers 3.36
 Submersible SST - 3600
 Design Point: 250 US gpm, 300 ft

Size: 7WSLC 4 stage
 Speed: 3450 rpm
 Dia: 5.125 in
 Curve:



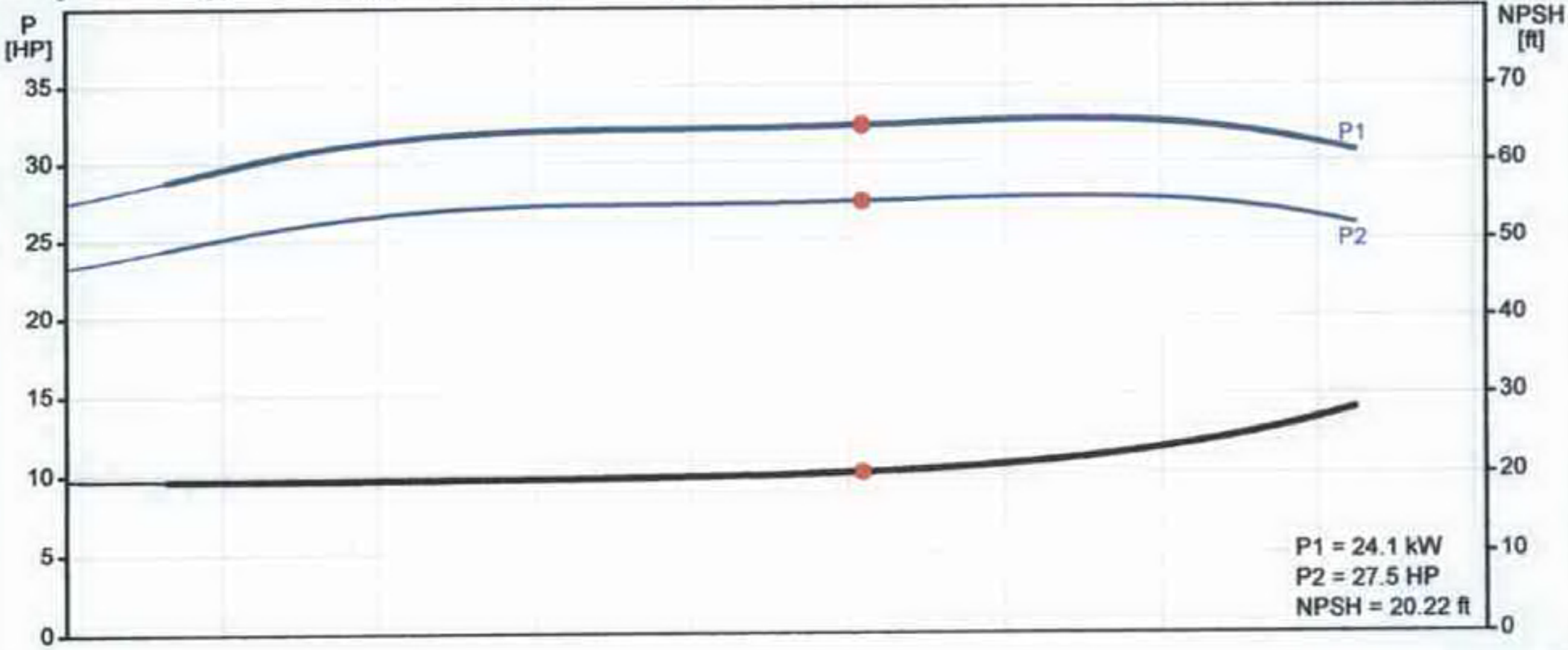
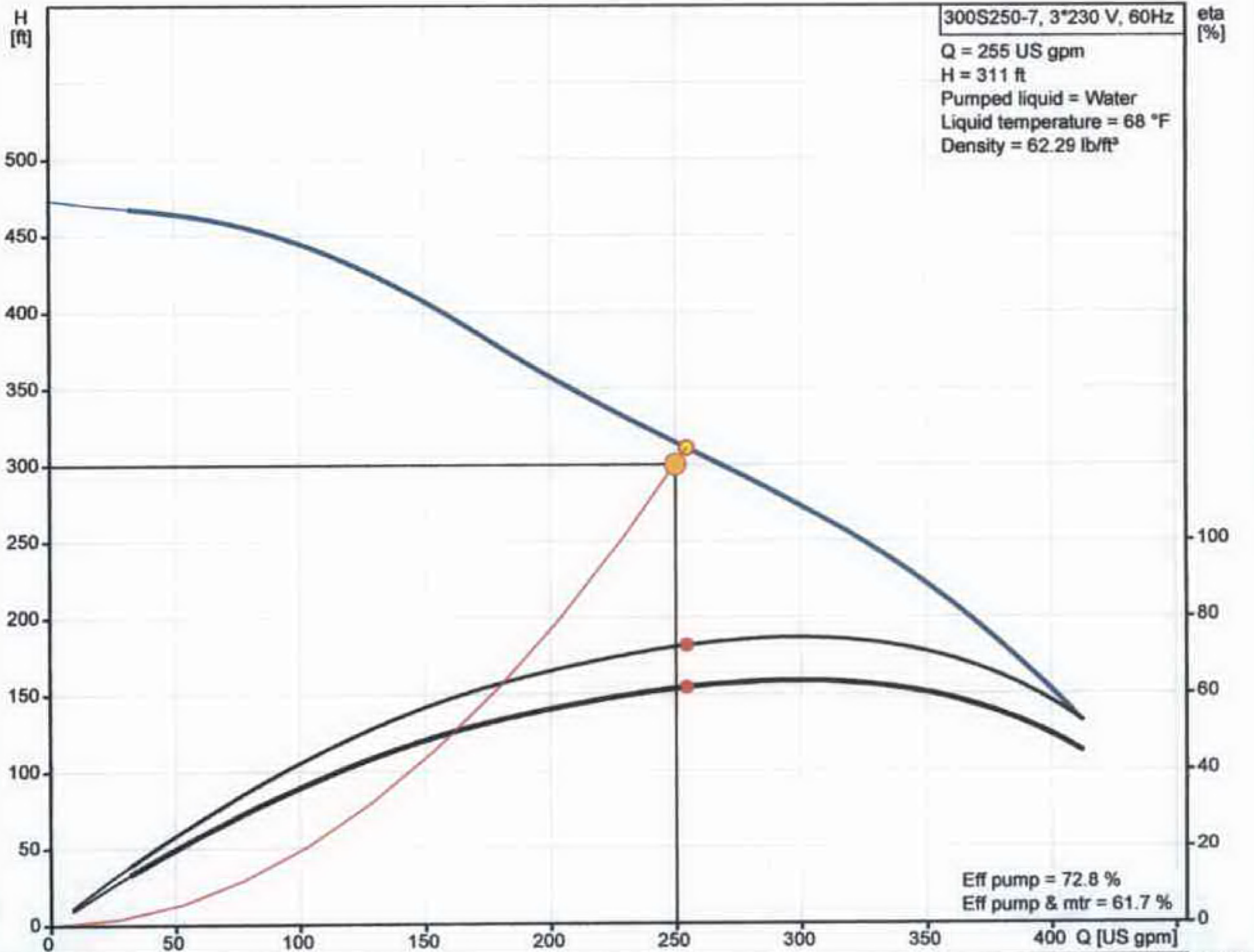
Pump Option #2

GRUNDFOS

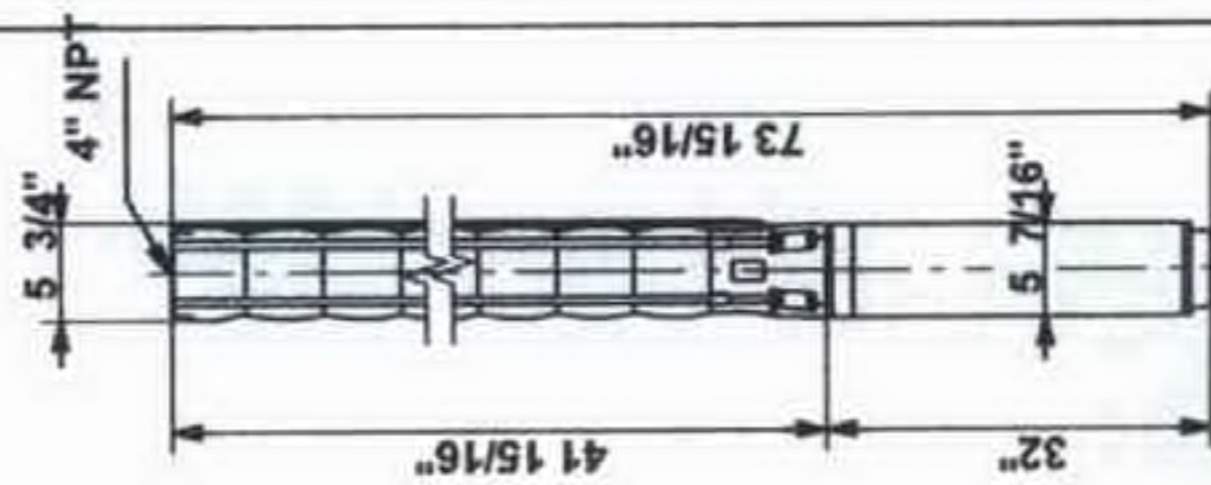
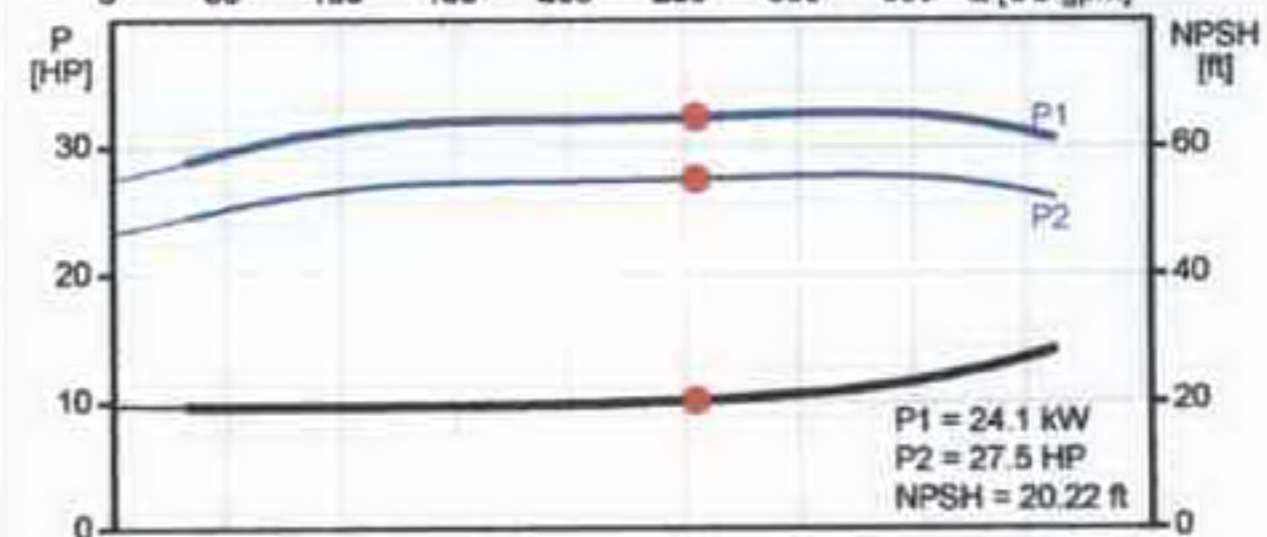
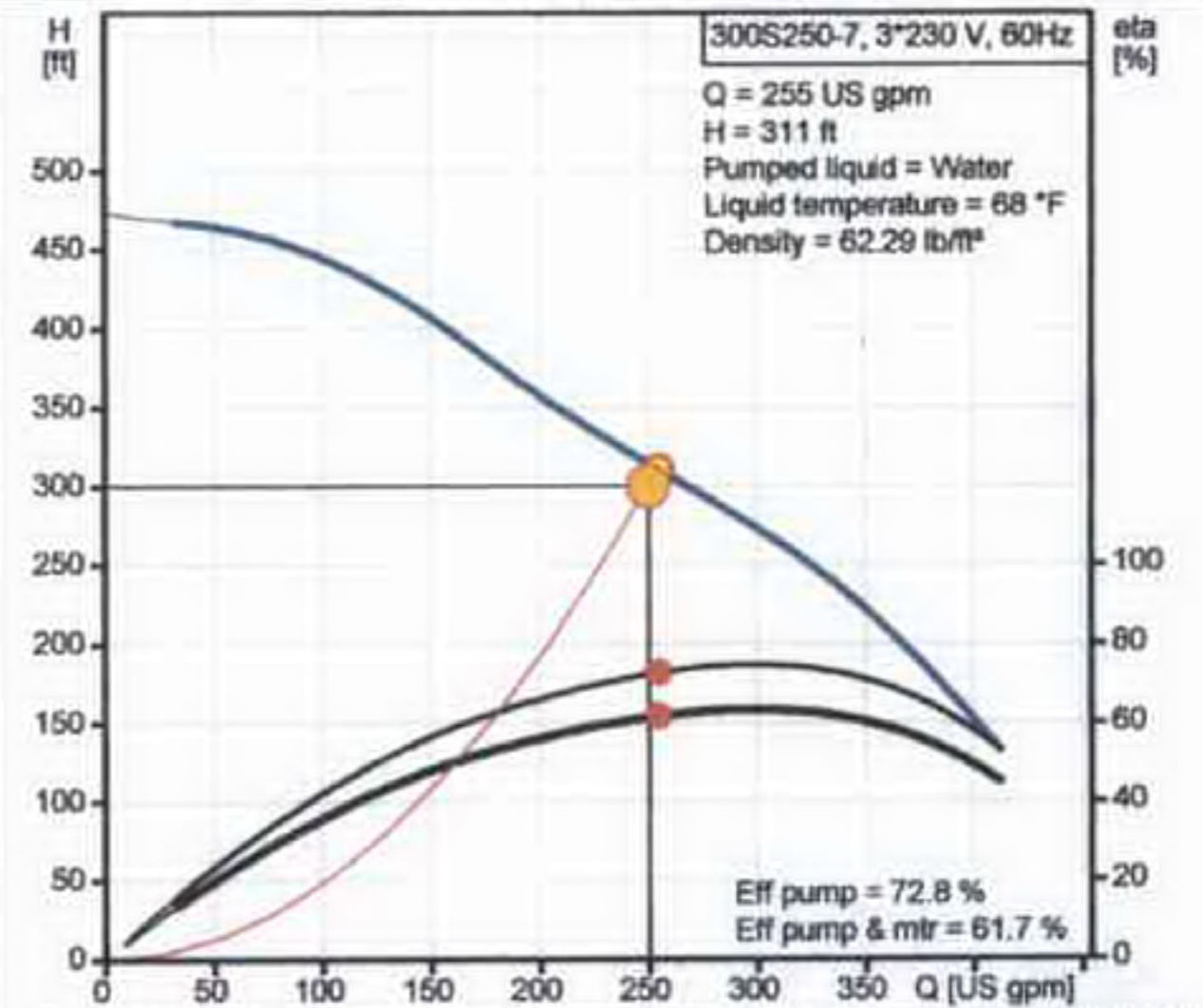


Company name: -
 Created by: -
 Phone: -
 Fax: -
 Date: -

14B63007 300S250-7 60 Hz



Description	Value
Product name:	300S250-7
Product Number:	14B63007
EAN number:	5700391742118
Technical:	
Speed for pump data:	3450 rpm
Actual calculated flow:	255 US gpm
Flow range:	41.2 .. 412 US gpm
Max flow:	412 US gpm
Resulting head of the pump:	311 ft
Shaft seal for motor:	CER/CARBON
Approvals on nameplate:	CE,CSACUS
Curve tolerance:	ISO 9906:2012 Grade 3B
Stages:	7
Model:	A
Valve:	pump with built-in non-return valve
Materials:	
Pump:	Stainless steel DIN W.-Nr. 1.4301 AISI 304
Impeller:	Stainless steel DIN W.-Nr. 1.4301 AISI 304
Motor:	Stainless steel DIN W.-Nr. 1.4301 AISI 304
Installation:	
Maximum ambient pressure:	870 psi
Pump outlet:	4" NPT
Motor diameter:	6 inch
Minimum borehole diameter:	6" mm
Liquid:	
Pumped liquid:	Water
Max liquid temperature at 0.15 m/sec:	86 °F
Liquid temp:	68 °F
Density:	62.29 lb/ft ³
Kinematic viscosity:	0.0388 ft ² /h
Electrical data:	
Motor type:	MS6
Maximum current consumption:	93 A
Rated power - P2:	25 HP
Main frequency:	60 Hz
Rated voltage:	3 x 208-230 V
Start. method:	direct-on-line
Starter:	4 1/2
Service factor:	1.15
Rated current:	86.0-78.0 A
Starting current:	474 A
Cos phi - power factor:	0.87-0.84
Rated speed:	3430-3470 rpm
Motor efficiency at full load:	85.0 %
Enclosure class (IEC 34-5):	IP68
Insulation class (IEC 85):	F



GRUNDFOS

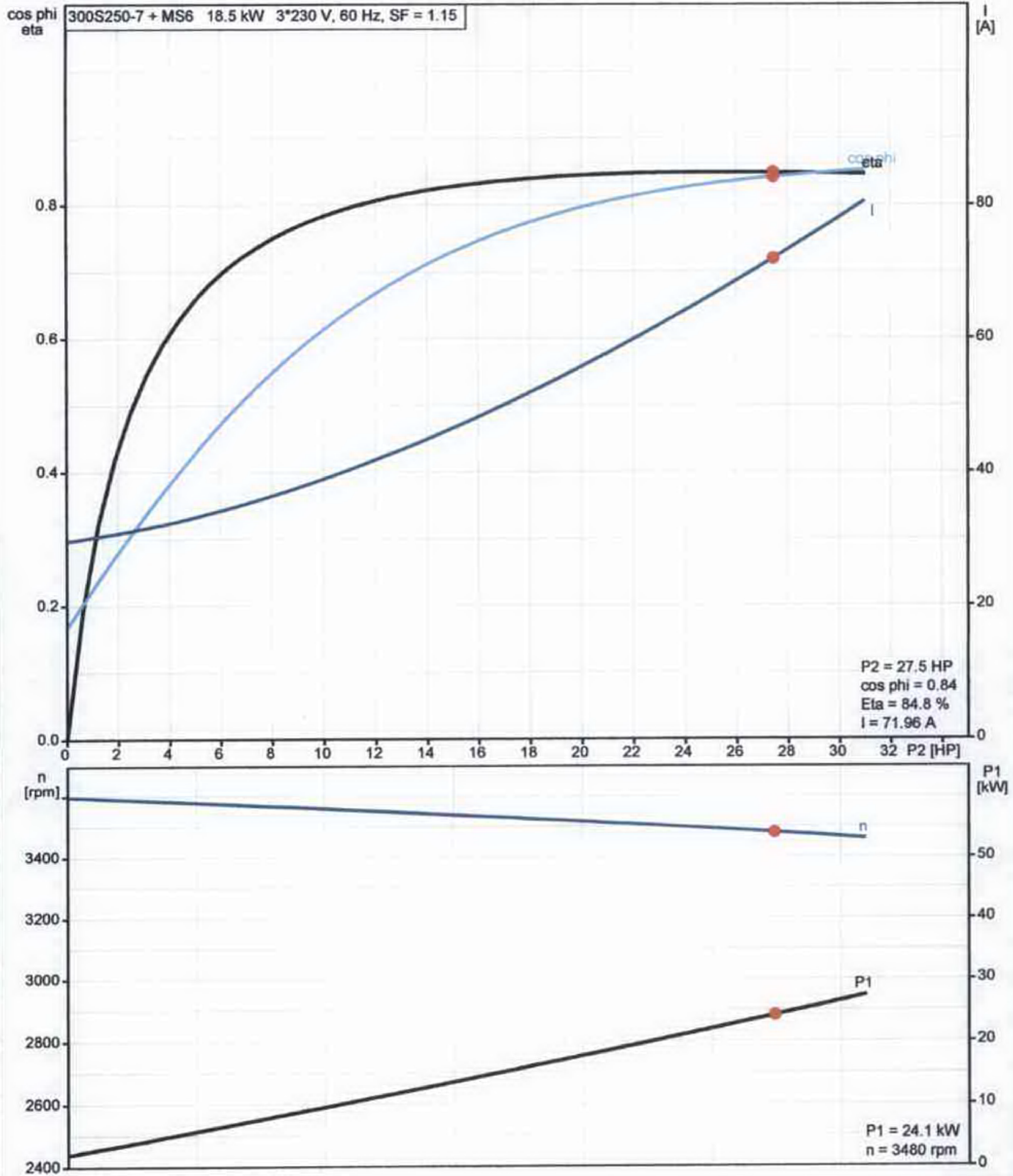


Company name: -
Created by: -
Phone: -
Fax: -
Date: -

Description	Value
Motor protection:	None
Thermal protec:	external
Built-in temperature transmitter:	yes
Motor Number:	78285547
Controls:	
Heather:	K87
Others:	
Net weight:	218 lb
Gross weight:	242 lb
Sales region:	Namreg

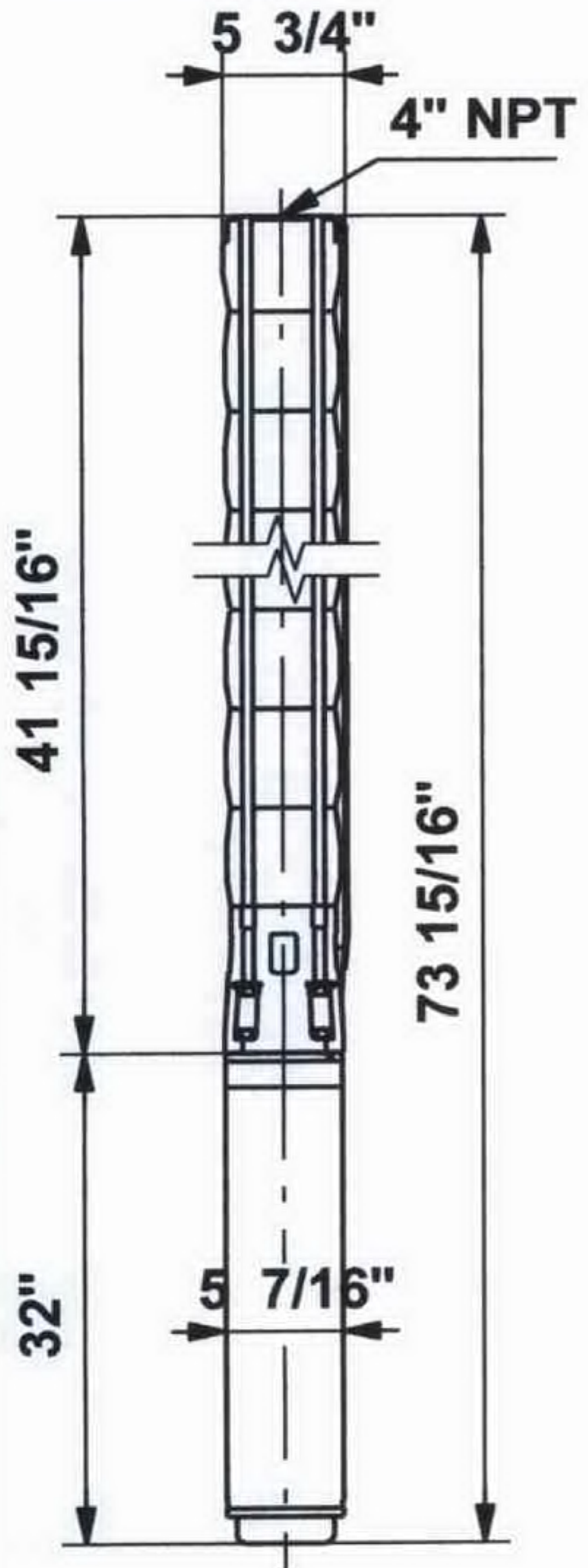


14B63007 300S250-7 60 Hz





14B63007 300S250-7 60 Hz



Note! All units are in [mm] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.

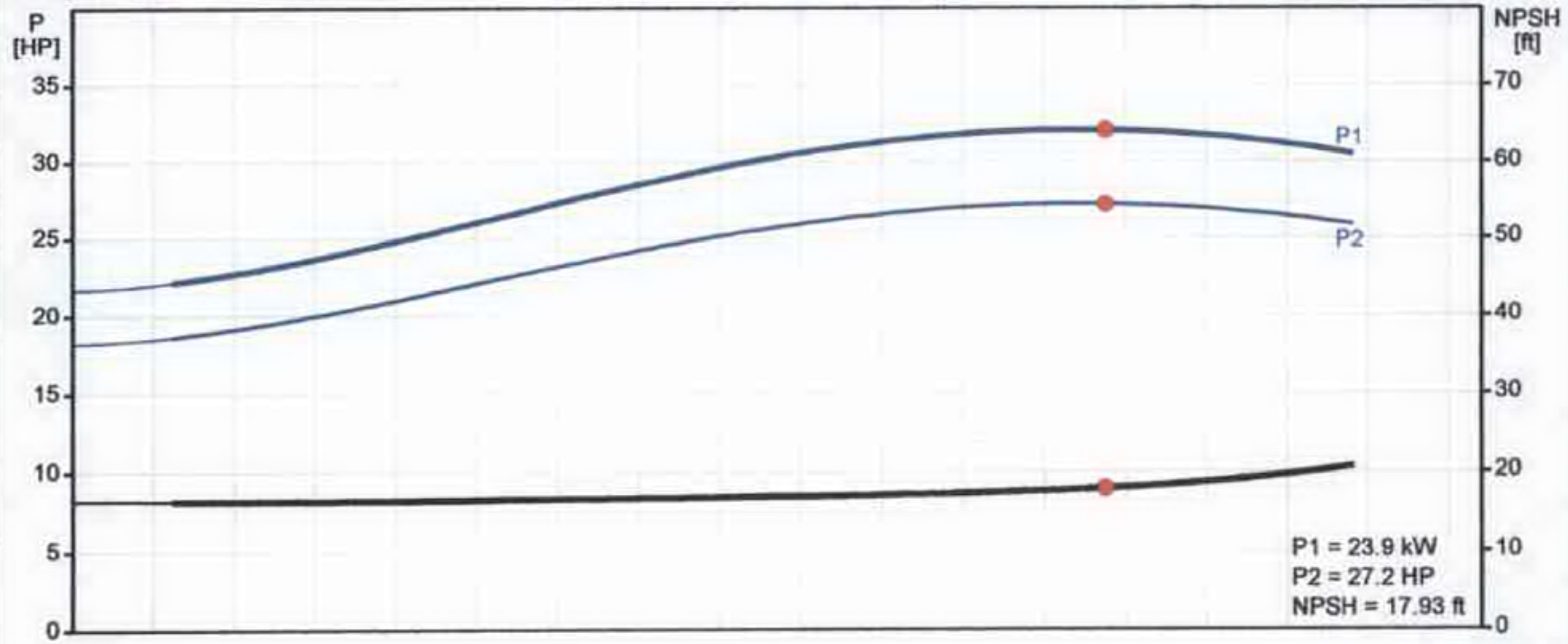
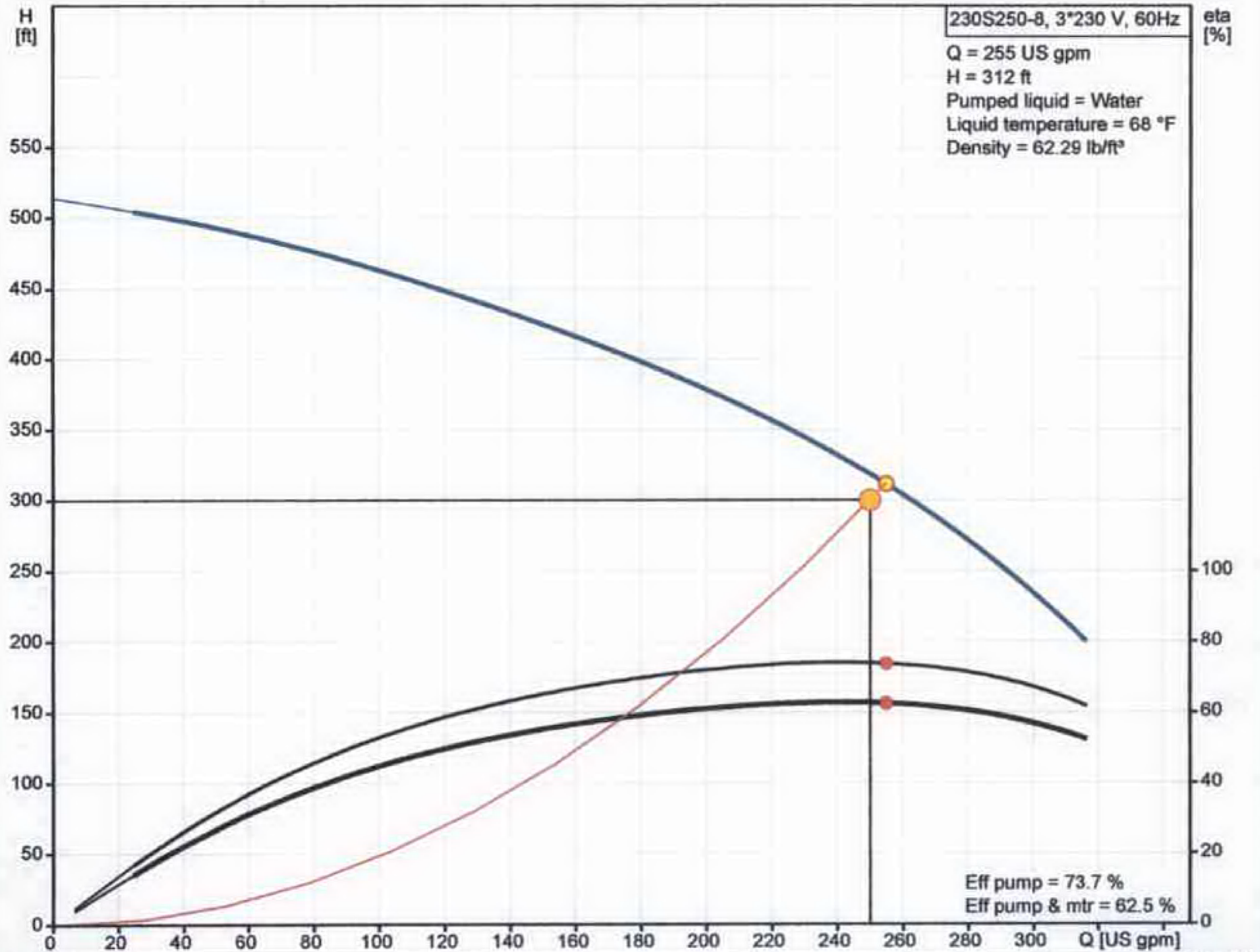
Pump Option # 1

GRUNDFOS

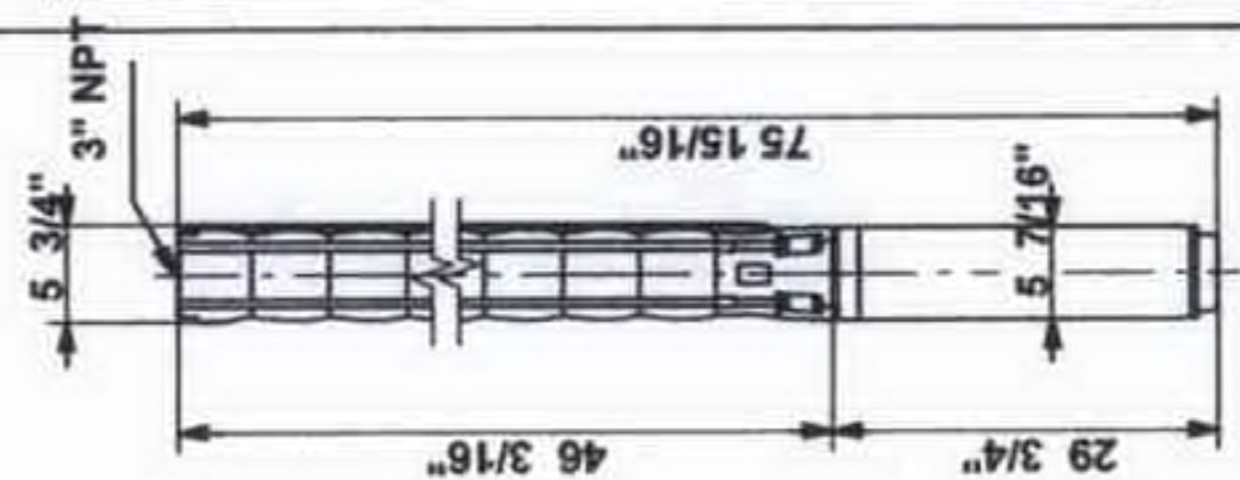
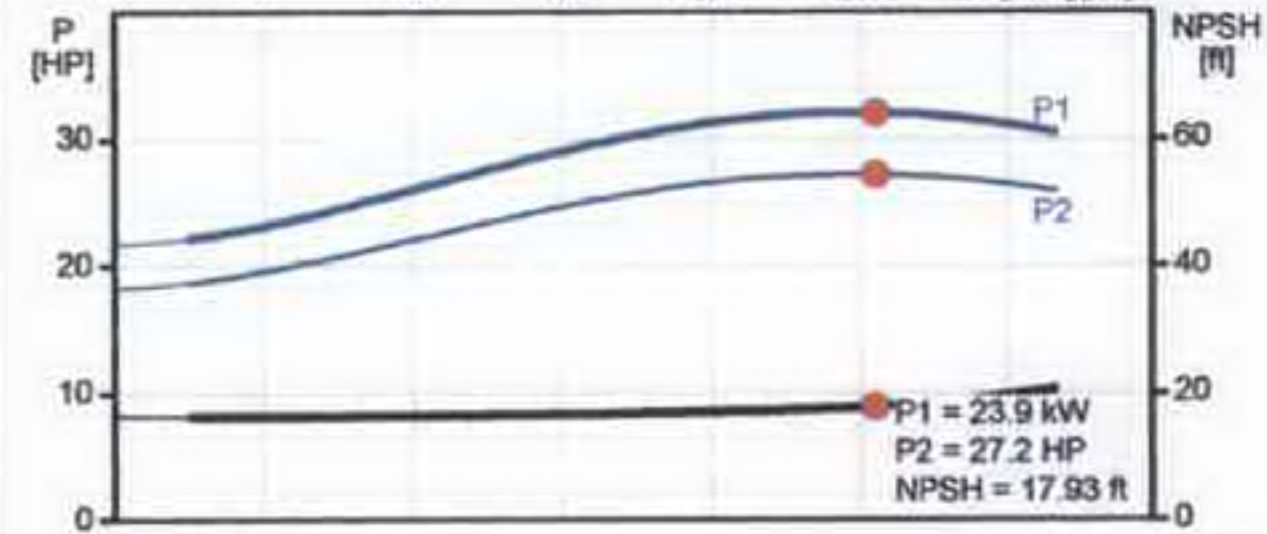
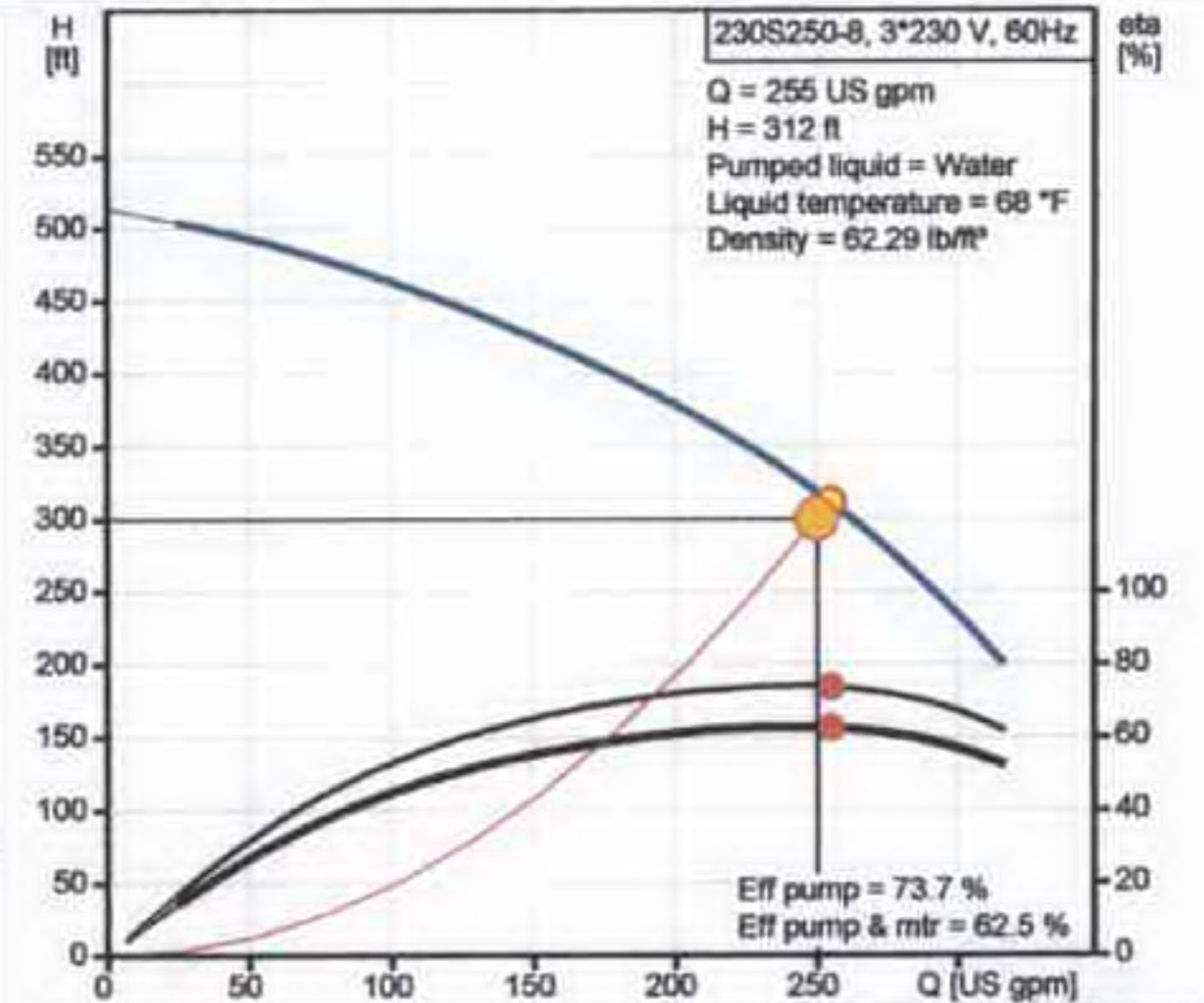


Company name: -
 Created by: -
 Phone: -
 Fax: -
 Date: -

15B73008 230S250-8 60 Hz



Description	Value
Product name:	230S250-8
Product Number:	15B73008
EAN number:	5700391830372
Technical:	
Speed for pump data:	3450 rpm
Actual calculated flow:	255 US gpm
Flow range:	31.7 .. 316 US gpm
Max flow:	316 US gpm
Resulting head of the pump:	312 ft
Shaft seal for motor:	CER/CARBON
Approvals on nameplate:	CE,CSACUS
Curve tolerance:	ISO 9906:2012 Grade 3B
Stages:	8
Model:	A
Valve:	pump with built-in non-return valve
Materials:	
Pump:	Stainless steel DIN W.-Nr. 1.4301 AISI 304
Impeller:	Stainless steel DIN W.-Nr. 1.4301 AISI 304
Motor:	Stainless steel DIN W.-Nr. 1.4301 AISI 304
Installation:	
Maximum ambient pressure:	870 psi
Pump outlet:	3" NPT
Motor diameter:	6 inch
Minimum borehole diameter:	6" mm
Liquid:	
Pumped liquid:	Water
Max liquid temperature at 0.15 m/sec:	86 °F
Liquid temp:	68 °F
Density:	62.29 lb/ft ³
Kinematic viscosity:	0.0388 ft ² /h
Electrical data:	
Motor type:	MS6
Maximum current consumption:	82 A
Rated power - P2:	25 HP
Main frequency:	60 Hz
Rated voltage:	3 x 208-230 V
Start. method:	direct-on-line
Starter:	3
Service factor:	1.15
Rated current:	86.0-78.0 A
Starting current:	435 A
Cos phi - power factor:	0.87-0.84
Rated speed:	3430-3470 rpm
Motor efficiency at full load:	84,5 %
Enclosure class (IEC 34-5):	IP68
Insulation class (IEC 85):	F





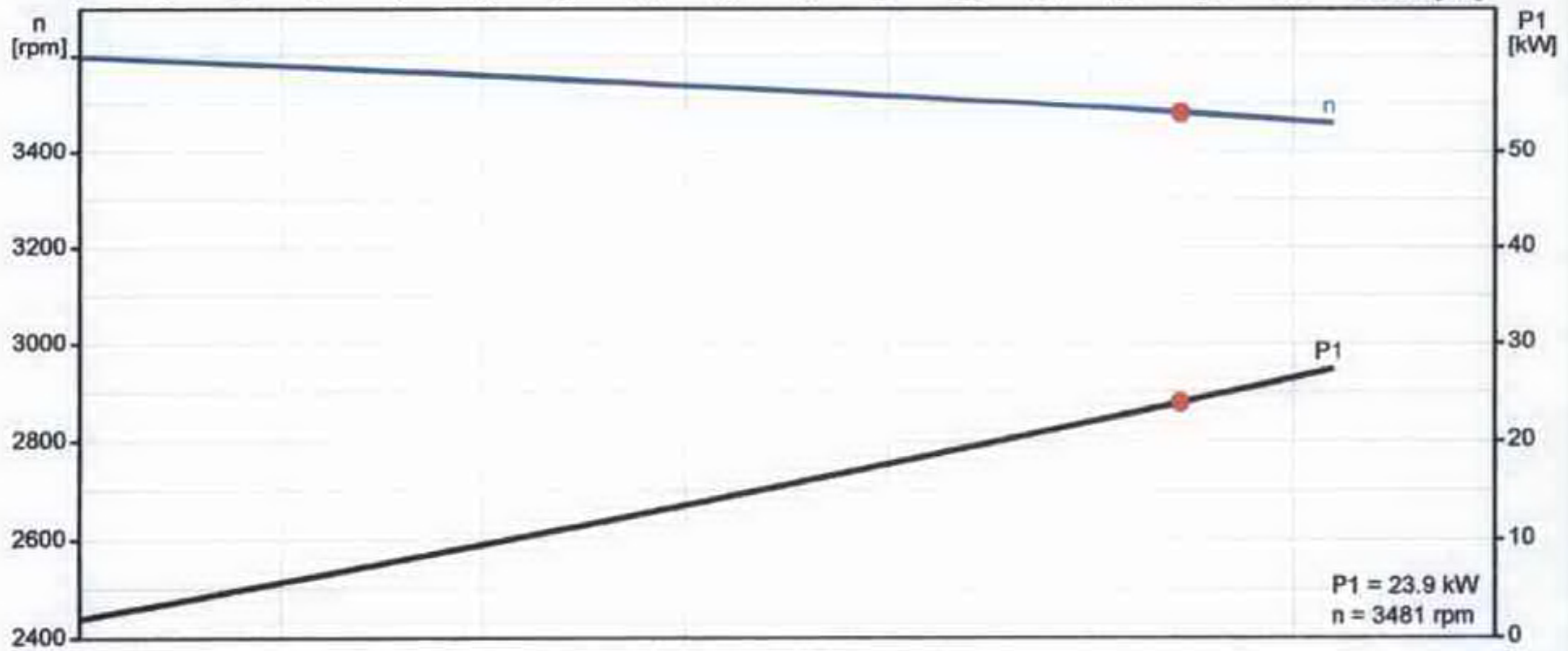
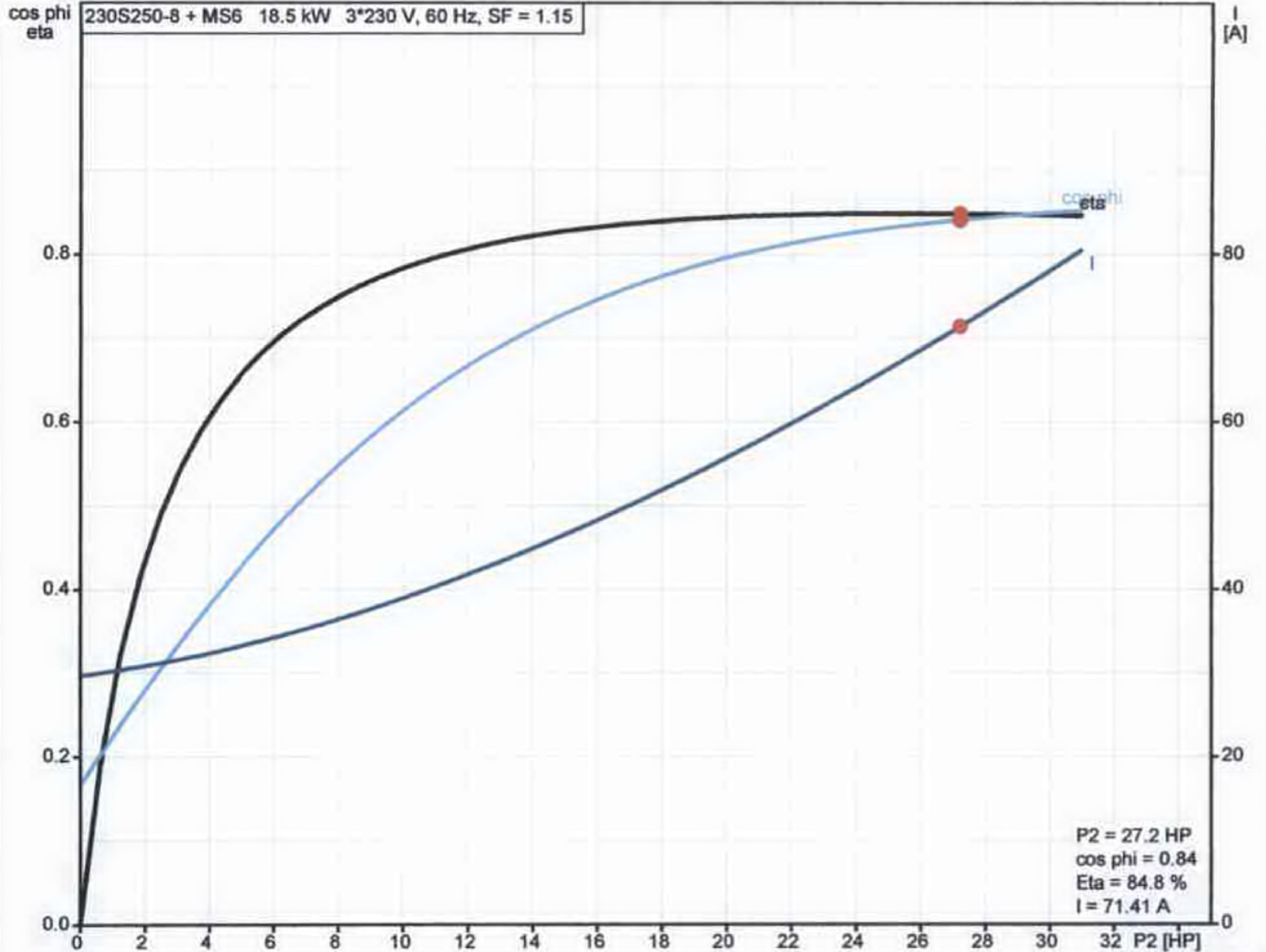
Company name: -
Created by: -
Phone: -
Fax: -
Date: -

Description	Value
Motor protection:	None
Thermal protec:	external
Built-in temperature transmitter:	yes
Motor Number:	78285547
Controls:	
Heather:	K86
Others:	
Net weight:	188 lb
Gross weight:	209 lb
Sales region:	Namreg



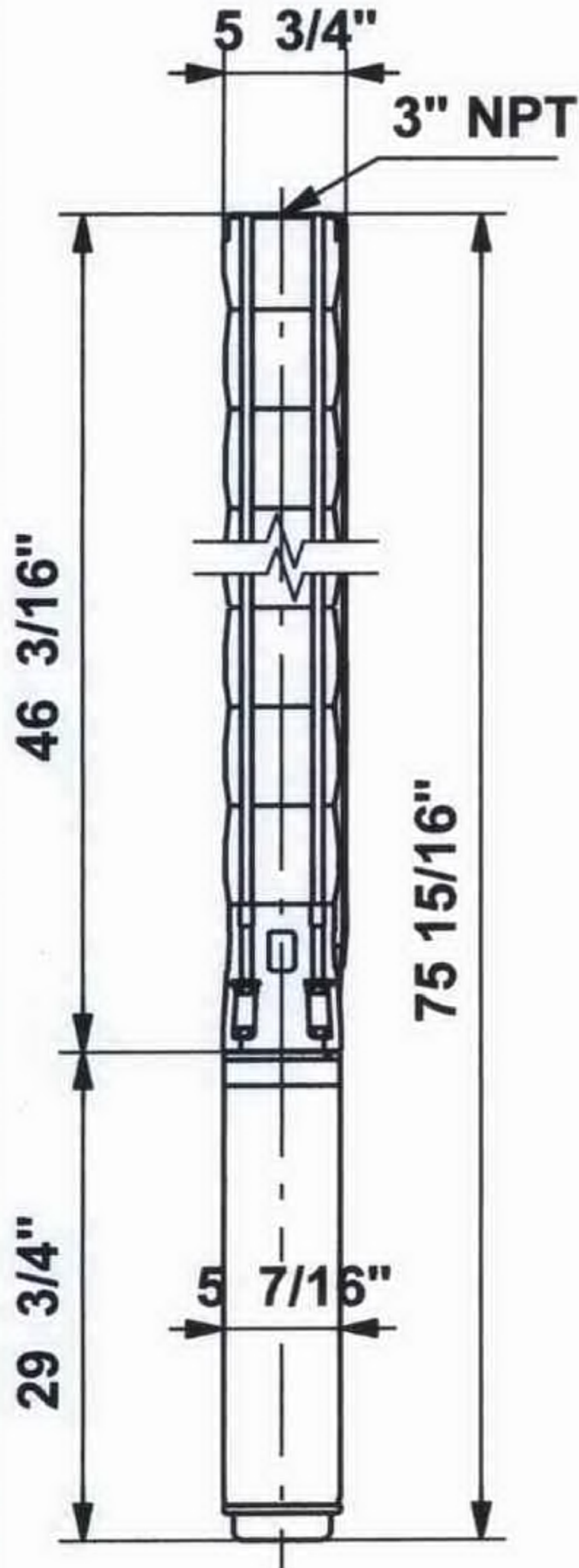
Company name: -
 Created by: -
 Phone: -
 Fax: -
 Date: -

15B73008 230S250-8 60 Hz





15B73008 230S250-8 60 Hz



Note! All units are in [mm] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.

**Sandy Hook Water District
Contract No. 10 – Water System Improvements**

Hydraulic Analysis Summary during flushing

Case #	Road Name	End Node	Pressure During Flushing (psi)	Velocity (fps)
1	Simmons Road	J-57	119	2.5
2	Crestview Street	J-253	24	2.5
3	Flat Rock Road	J-243	73	2.5
4	Pruett's Fork Road*	J-247	22	2.3
5	E. J. Adkins Road	J-249	68	2.5
6	Middle Fork Road	J-250	21	2.5

*Pruett's Fork Road was unable to obtain 2.5 fps flushing and maintain the 20 psi. As shown in the table above, the maximum flushing velocity is 2.3 fps. This area is fed by a small hydro-pneumatic pump station.

SANDY HOOK WATER DISTRICT SYSTEM MAP

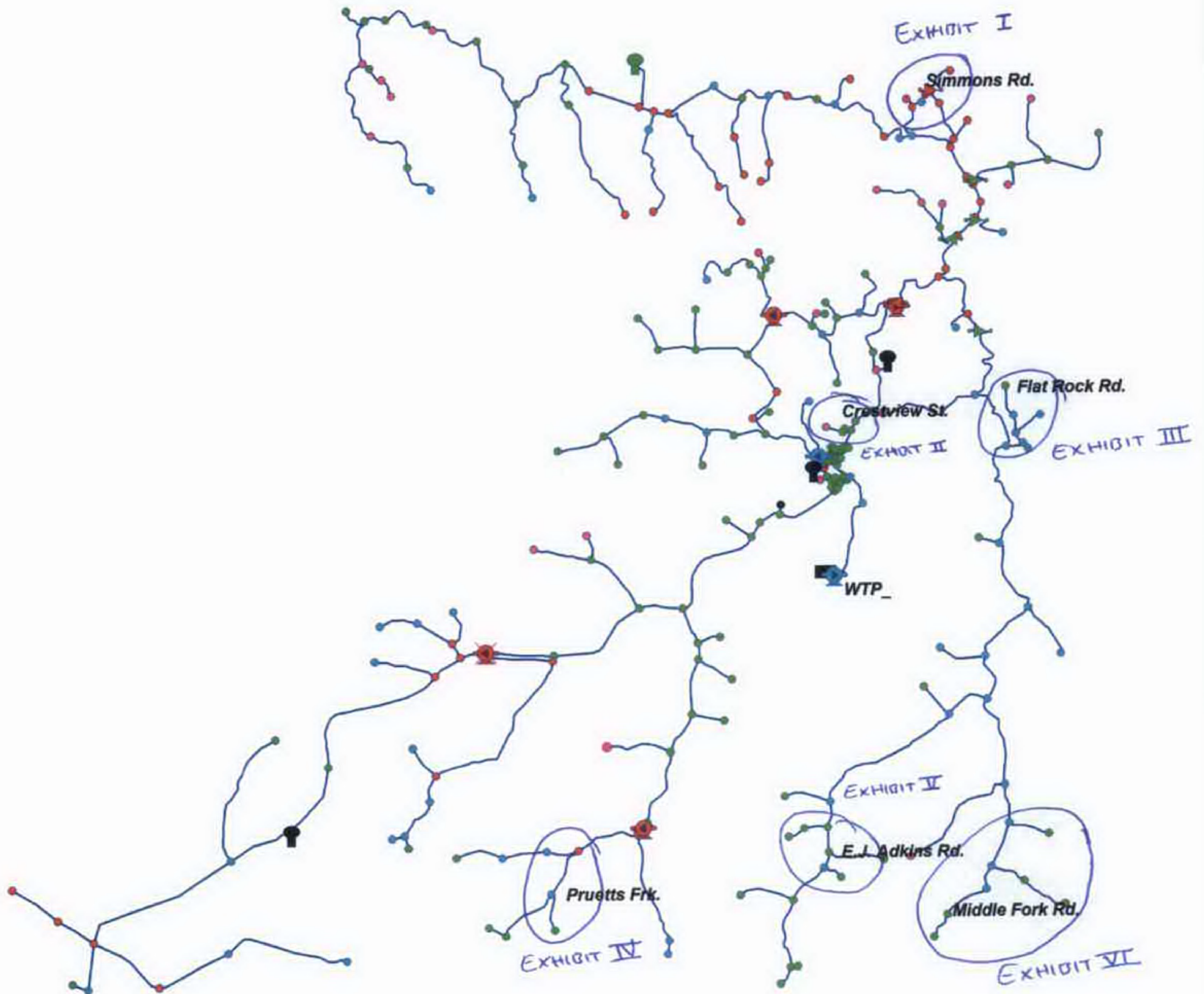


EXHIBIT I

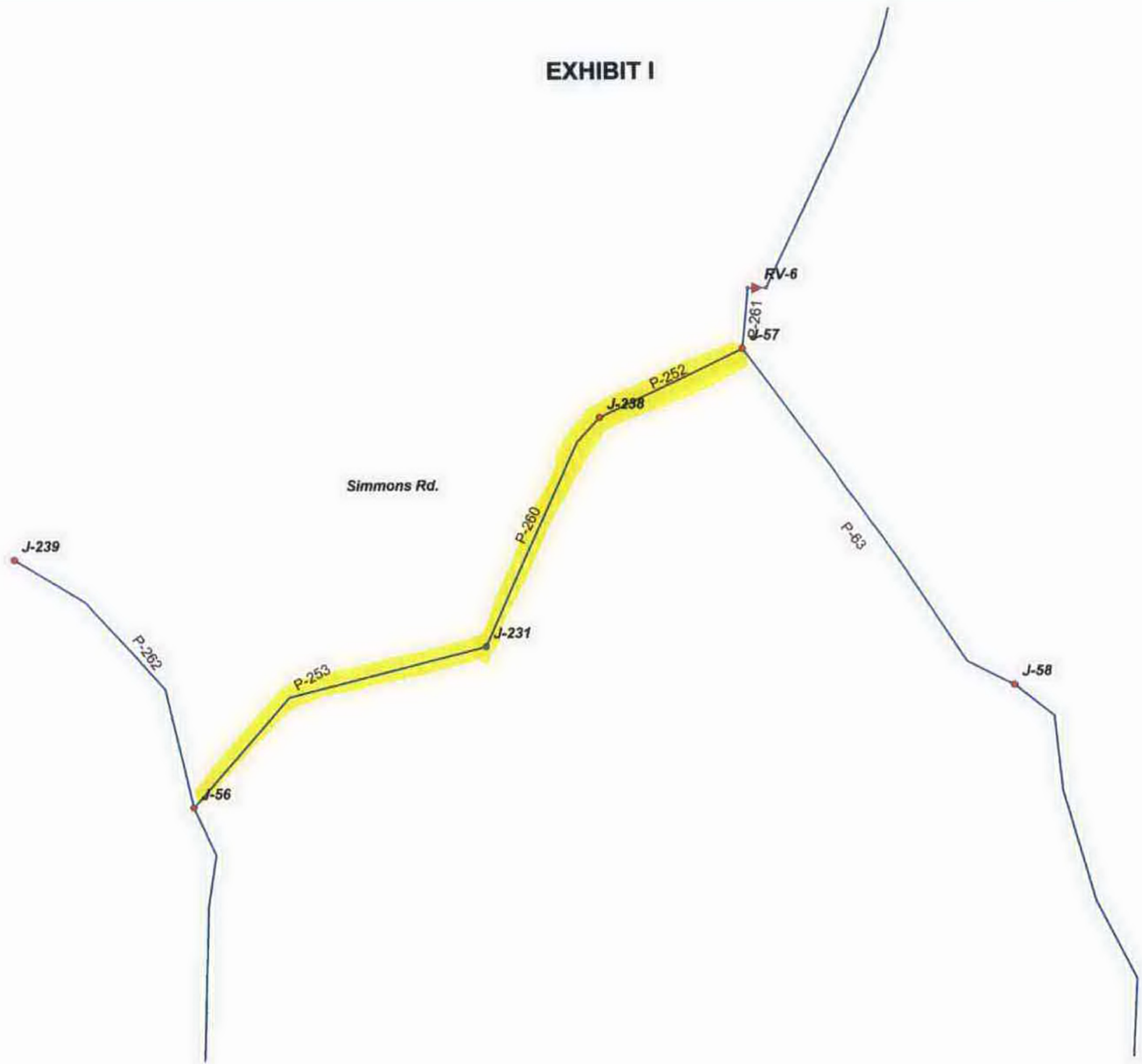


EXHIBIT II

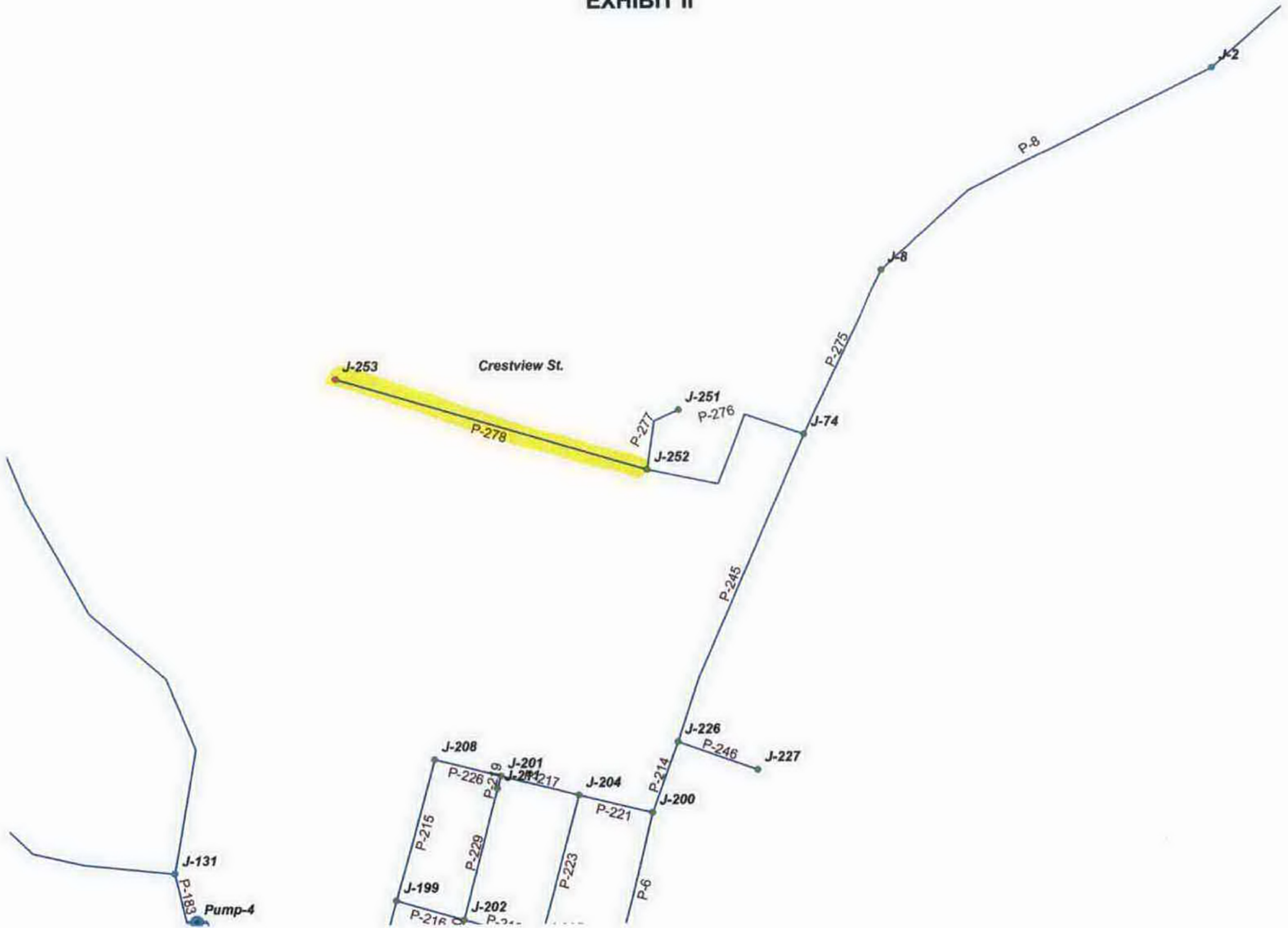


EXHIBIT III

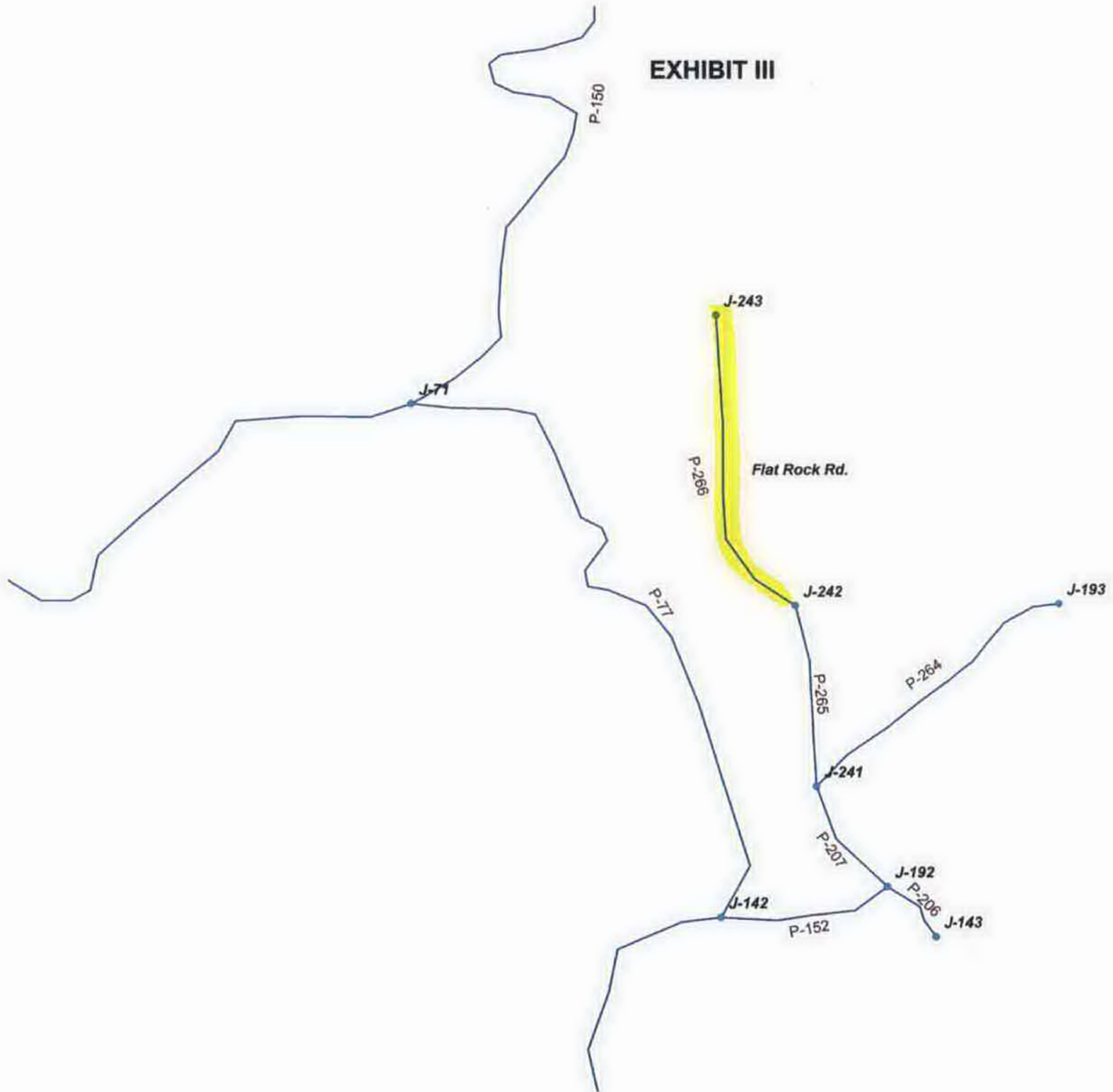


EXHIBIT IV

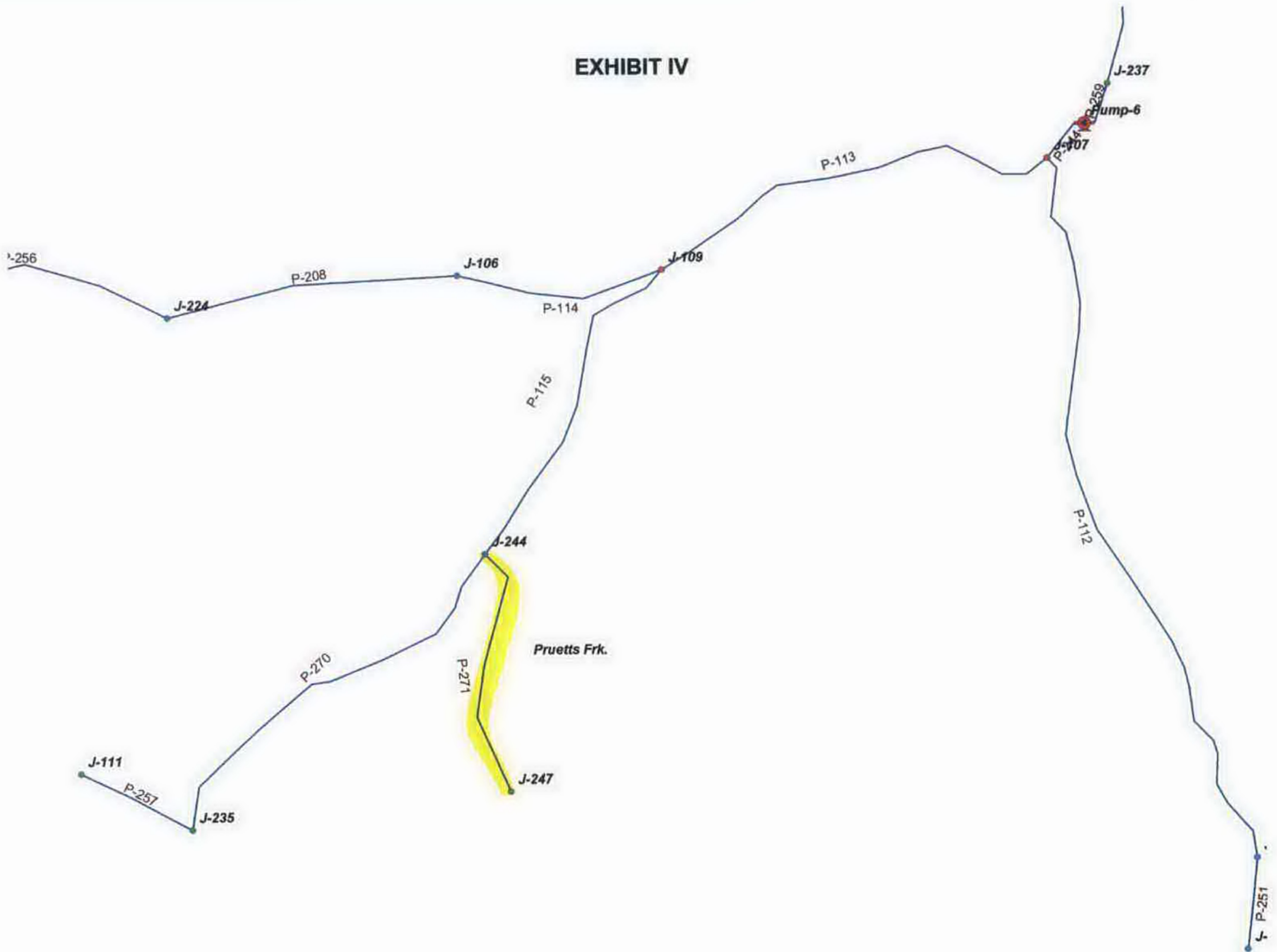


EXHIBIT V

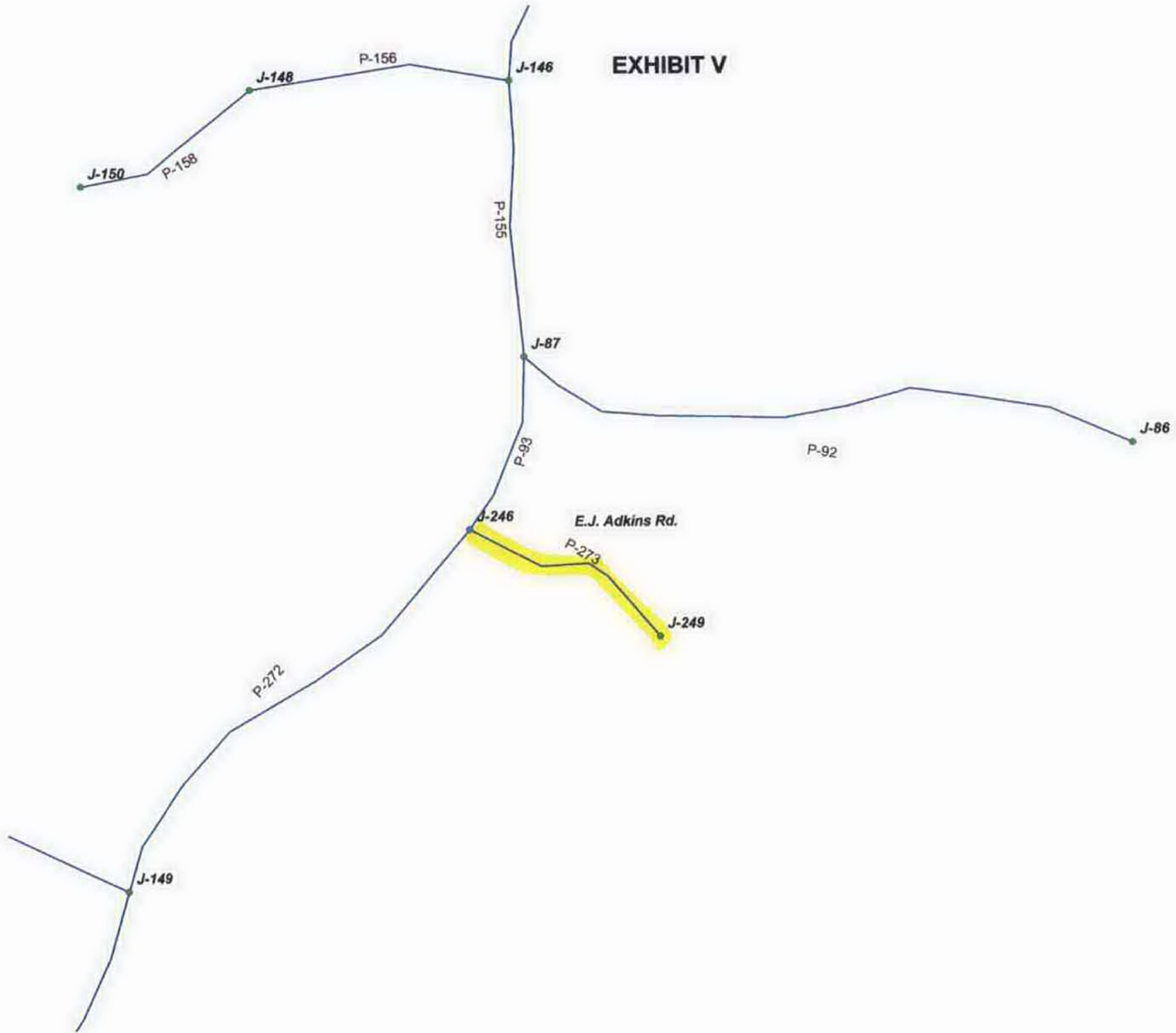
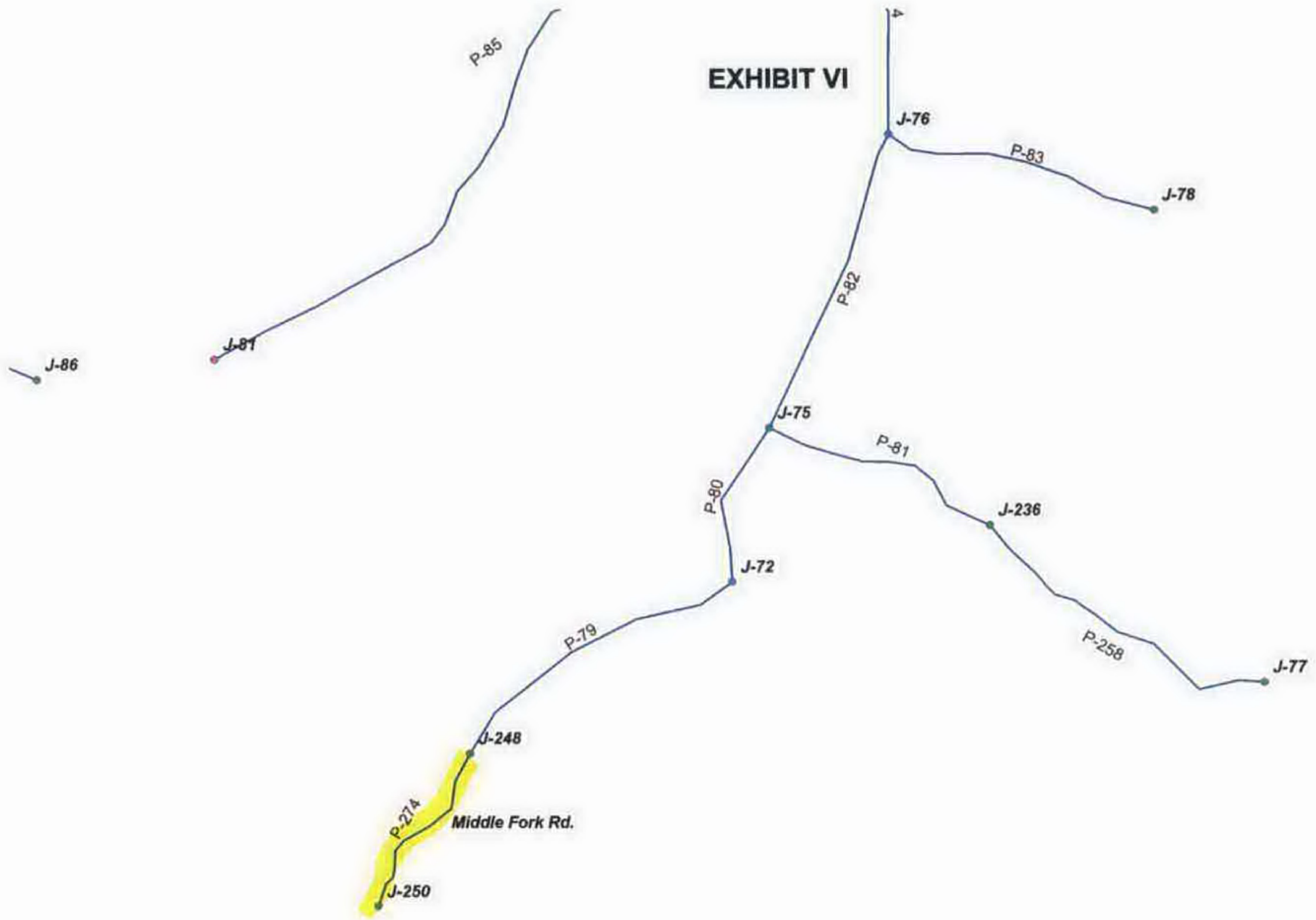


EXHIBIT VI



```

* * * * * K Y P I P E 5 * * * * *
*
*           Pipe Network Modeling Software
*
*           Copyrighted by KYPIPE LLC
*           Version 5 - February 2010
*
* * * * *

```

Date & Time: Mon May 06 16:02:24 2013

Master File : p:\projects\sandy hook\general\hydraulics\shwd-cont10.KYP\shwd-cont10.P2K

U N I T S S P E C I F I E D

FLOWRATE = gallons/minute
HEAD (HGL) = feet
PRESSURE = psig

*AVERAGE USAGE AND
FLUSHING VELOCITY
CALCULATIONS*

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT
MAXIMUM AND MINIMUM PRESSURES = 5
MAXIMUM AND MINIMUM VELOCITIES = 5
MAXIMUM AND MINIMUM HEAD LOSS/1000 = 5

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES(p) = 275
NUMBER OF END NODES(j) = 264
NUMBER OF PRIMARY LOOPS(l) = 7
NUMBER OF SUPPLY NODES(f) = 5
NUMBER OF SUPPLY ZONES(z) = 1

Case: 0

RESULTS OBTAINED AFTER 11 TRIALS: ACCURACY = 0.00000

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

Sandy Hook Water District

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE #1	NODE #2	FLOWRATE (gpm)	HEAD LOSS (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL+ML/1000 (ft/ft)	HL/1000 (ft/ft)
P-1	J-5	O-WTP	-206.73	21.99	0.00	2.35	4.64	4.64
P-10	J-2	J-9	71.09	0.39	0.00	0.45	0.16	0.16
P-100	J-94	J-95	0.00	0.00	0.00	0.00	0.00	0.00
P-101	J-96	J-94	56.70	0.39	0.00	0.64	0.42	0.42
P-102	J-97	J-96	56.85	0.55	0.00	0.65	0.42	0.42
P-103	J-97	J-98	0.00	0.00	0.00	0.00	0.00	0.00
P-104	J-93	J-110	6.30	0.02	0.00	0.07	0.01	0.01
P-105	J-93	J-101	47.40	0.64	0.00	0.54	0.30	0.30
P-106	J-101	J-100	0.22	0.00	0.00	0.00	0.00	0.00
P-107	J-101	J-139	46.95	0.28	0.00	0.53	0.30	0.30
P-108	J-102	J-104	0.15	0.00	0.00	0.01	0.00	0.00
P-109	J-102	J-103	45.38	0.68	0.00	0.51	0.28	0.28
P-11	J-9	T-2	-67.51	0.39	0.00	0.77	0.58	0.58
P-110	J-103	J-105	0.38	0.00	0.00	0.00	0.00	0.00
P-111	J-103	J-237	43.88	1.45	0.00	0.50	0.26	0.26
P-112	J-107	J-225	0.97	0.01	0.00	0.02	0.00	0.00
P-113	J-107	J-109	41.47	6.30	0.00	1.06	1.71	1.71
P-114	J-109	J-106	1.73	0.03	0.00	0.08	0.02	0.02
P-115	J-109	J-244	38.33	17.94	0.00	1.74	5.99	5.99
P-116	J-110	J-99	2.02	0.10	0.00	0.09	0.03	0.03
P-117	J-110	J-112	1.88	0.00	0.00	0.02	0.00	0.00
P-118	J-99	J-113	0.22	0.00	0.00	0.01	0.00	0.00
P-119	J-99	J-115	0.52	0.01	0.00	0.02	0.00	0.00
P-12	J-9	J-32	137.10	2.19	0.00	1.56	2.17	2.17
P-120	J-194	J-10	0.00	0.00	0.00	0.00	0.00	0.00
P-121	J-112	I-Pump-3	0.00	0.00	0.00	0.00	0.00	0.00

P-122	J-116	J-114	0.00	0.00	0.00	0.00	0.00	0.00
P-123	J-118	J-117	0.22	0.00	0.00	0.01	0.00	0.00
P-124	J-118	J-120	0.22	0.00	0.00	0.01	0.00	0.00
P-125	J-116	J-119	-7.20	0.02	0.00	0.00	0.01	0.01
P-126	J-114	J-178	0.00	0.00	0.00	0.00	0.00	0.00
P-127	J-114	J-123	0.00	0.00	0.00	0.00	0.00	0.00
P-128	J-119	J-125	0.38	0.00	0.00	0.00	0.00	0.00
P-129	J-119	J-124	-7.95	0.10	0.00	0.00	0.01	0.01
P-13	J-1	J-17	9.98	0.05	0.00	0.11	0.02	0.02
P-130	J-132	I-RV-5	11.10	0.13	0.00	0.50	0.00	0.50
P-131	J-120	J-126	0.60	0.00	0.00	0.02	0.00	0.00
P-132	J-122	J-228	9.90	0.02	0.00	0.11	0.02	0.02
P-133	J-127	J-128	4.95	0.01	0.00	0.06	0.00	0.00
P-134	J-129	J-4	57.33	0.30	0.00	0.65	0.43	0.43
P-135	J-213	J-97	57.00	1.49	0.00	0.65	0.43	0.43
P-136	J-131	J-130	1.05	0.00	0.00	0.01	0.00	0.00
P-137	J-131	J-169	3.00	0.07	0.00	0.09	0.02	0.02
P-138	J-132	J-68	125.00	7.00	0.00	1.40	1.83	1.83
P-139	J-189	J-118	1.35	0.03	0.00	0.06	0.01	0.01
P-14	J-1	T-3	54.00	1.03	0.00	0.01	0.39	0.39
P-140	O-Pump-3	J-190	0.00	0.00	0.00	0.00	0.00	0.00
P-141	J-178	J-134	0.00	0.00	0.00	0.00	0.00	0.00
P-142	J-124	J-180	-7.95	0.05	0.00	0.09	0.01	0.01
P-143	J-135	J-188	1.35	0.01	0.00	0.03	0.00	0.00
P-144	J-135	J-187	6.07	0.22	0.00	0.16	0.05	0.05
P-145	J-135	J-138	0.75	0.00	0.00	0.02	0.00	0.00
P-146	J-138	J-137	0.30	0.00	0.00	0.01	0.00	0.00
P-147	J-139	J-102	46.28	0.91	0.00	0.53	0.29	0.29
P-148	J-139	J-141	0.22	0.00	0.00	0.00	0.00	0.00
P-149	J-75	J-140	0.38	0.00	0.00	0.02	0.00	0.00
P-15	J-11	J-10	2.93	0.00	0.00	0.03	0.00	0.00
P-150	O-RV-1	J-71	25.00	0.49	0.00	0.29	0.10	0.10
P-151	J-142	J-90	18.83	0.36	0.00	0.21	0.05	0.05
P-152	J-142	J-192	1.05	0.01	0.00	0.05	0.01	0.01
P-153	J-144	J-80	14.70	0.10	0.00	0.17	0.03	0.03
P-154	J-144	J-145	0.45	0.00	0.00	0.02	0.00	0.00
P-155	J-146	J-87	4.35	0.15	0.00	0.20	0.11	0.11
P-156	J-146	J-148	0.15	0.00	0.00	0.01	0.00	0.00
P-157	J-147	J-135	9.75	0.15	0.00	0.11	0.02	0.02
P-158	J-148	J-150	0.08	0.00	0.00	0.00	0.00	0.00
P-159	J-149	J-151	1.95	0.10	0.00	0.09	0.02	0.02
P-16	J-12	J-11	3.38	0.01	0.00	0.04	0.00	0.00
P-160	J-149	J-152	0.15	0.00	0.00	0.01	0.00	0.00
P-161	J-151	J-89	0.30	0.00	0.00	0.01	0.00	0.00
P-162	J-151	J-154	0.30	0.00	0.00	0.01	0.00	0.00
P-163	J-55	J-153	0.38	0.00	0.00	0.01	0.00	0.00
P-164	O-RV-2	J-62	3.15	0.00	0.00	0.04	0.00	0.00
P-165	O-RV-3	J-69	0.90	0.01	0.00	0.04	0.01	0.01
P-166	O-RV-4	J-232	5.10	0.04	0.00	0.13	0.04	0.04
P-167	J-128	J-156	1.12	0.01	0.00	0.03	0.00	0.00
P-168	J-156	J-155	0.08	0.00	0.00	0.00	0.00	0.00
P-169	J-128	J-159	2.47	0.11	0.00	0.11	0.04	0.04
P-17	J-13	J-12	3.60	0.00	0.00	0.04	0.00	0.00
P-170	J-157	J-158	0.30	0.00	0.00	0.01	0.00	0.00
P-171	J-159	J-157	0.90	0.01	0.00	0.04	0.01	0.01
P-172	J-159	J-160	0.45	0.00	0.00	0.02	0.00	0.00
P-173	O-Pump-5	J-161	2.40	0.08	0.00	0.11	0.04	0.04
P-174	J-127	I-Pump-5	2.40	0.00	0.00	0.03	0.00	0.00
P-175	J-161	J-162	0.68	0.00	0.00	0.01	0.00	0.00
P-176	J-162	J-163	0.15	0.00	0.00	0.01	0.00	0.00
P-177	J-162	J-165	0.15	0.00	0.00	0.01	0.00	0.00
P-178	J-161	J-183	0.97	0.01	0.00	0.04	0.01	0.01
P-179	J-164	J-127	7.35	0.02	0.00	0.08	0.01	0.01
P-18	J-14	J-13	3.90	0.01	0.00	0.04	0.00	0.00
P-180	J-164	J-185	0.83	0.00	0.00	0.04	0.00	0.00
P-181	J-168	J-164	8.55	0.01	0.00	0.10	0.01	0.01
P-182	J-168	J-170	0.45	0.00	0.00	0.01	0.00	0.00
P-183	O-Pump-4	J-131	6.15	0.00	0.00	0.07	0.01	0.01
P-184	J-169	J-133	2.78	0.02	0.00	0.07	0.01	0.01
P-185	J-169	J-172	0.15	0.00	0.00	0.01	0.00	0.00
P-186	J-133	J-171	2.55	0.02	0.00	0.07	0.01	0.01
P-187	J-171	J-175	1.73	0.01	0.00	0.04	0.00	0.00
P-188	J-171	J-174	0.22	0.01	0.00	0.02	0.00	0.00
P-189	J-175	J-173	1.35	0.00	0.00	0.03	0.00	0.00
P-19	J-15	J-14	4.65	0.02	0.00	0.05	0.00	0.00
P-190	J-173	J-176	1.12	0.01	0.00	0.03	0.00	0.00
P-191	J-176	J-177	0.38	0.00	0.00	0.02	0.00	0.00
P-192	J-176	J-179	0.08	0.00	0.00	0.00	0.00	0.00
P-193	J-180	J-147	10.65	0.07	0.00	0.12	0.02	0.02
P-194	J-180	T-4	-18.60	0.04	0.00	0.21	0.05	0.05
P-195	J-183	J-184	0.75	0.01	0.00	0.03	0.00	0.00
P-196	J-182	J-27	86.40	1.74	0.00	0.98	0.92	0.92
P-197	J-181	J-182	86.85	0.00	0.00	0.99	0.93	0.93
P-198	J-184	J-166	0.30	0.00	0.00	0.01	0.00	0.00
P-199	J-185	J-167	0.22	0.00	0.00	0.01	0.00	0.00
P-2	J-3	J-197	86.40	0.24	0.00	0.55	0.23	0.23
P-20	J-16	J-15	6.90	0.03	0.00	0.08	0.01	0.01
P-200	J-186	J-136	1.58	0.03	0.00	0.04	0.00	0.00
P-201	J-187	J-186	4.12	0.10	0.00	0.11	0.02	0.02
P-202	J-188	J-121	0.45	0.00	0.00	0.01	0.00	0.00

P-203	J-190	J-116	-6.90	0.01	0.00	0.09	0.02	0.01
P-204	J-190	J-191	6.45	0.23	0.00	0.16	0.05	0.05
P-205	J-191	J-196	4.73	1.24	0.00	0.21	0.12	0.12
P-206	J-192	J-143	0.08	0.00	0.00	0.00	0.00	0.00
P-207	J-192	J-241	0.68	0.00	0.00	0.03	0.00	0.00
P-208	J-106	J-224	0.63	0.01	0.00	0.04	0.00	0.00
P-209	J-147	J-195	0.45	0.01	0.00	0.02	0.00	0.00
P-21	J-17	J-16	9.45	0.03	0.00	0.11	0.02	0.02
P-210	J-196	J-159	2.10	0.04	0.00	0.10	0.03	0.03
P-211	J-196	J-198	0.30	0.00	0.00	0.01	0.00	0.00
P-212	J-197	J-6	76.74	0.06	0.00	0.49	0.18	0.18
P-213	J-197	J-207	8.46	0.05	0.00	0.22	0.09	0.09
P-214	J-200	J-226	80.39	0.04	0.00	0.51	0.20	0.20
P-215	J-199	J-208	5.61	0.02	0.00	0.11	0.04	0.04
P-216	J-199	J-202	1.80	0.00	0.00	0.05	0.01	0.01
P-217	J-201	J-204	8.08	0.02	0.00	0.21	0.08	0.08
P-218	J-202	J-205	-1.94	0.00	0.00	0.05	0.01	0.01
P-219	J-201	J-211	-2.84	0.00	0.00	0.13	0.05	0.05
P-22	J-18	J-44	67.50	0.48	0.00	0.77	0.58	0.58
P-220	J-202	J-203	0.15	0.00	0.00	0.01	0.00	0.00
P-221	J-204	J-200	9.02	0.02	0.00	0.23	0.10	0.10
P-222	J-205	J-209	-4.09	0.00	0.00	0.10	0.02	0.02
P-223	J-204	J-205	-1.47	0.05	0.00	0.15	0.10	0.10
P-224	J-205	J-206	0.15	0.00	0.00	0.02	0.00	0.00
P-225	J-207	J-199	7.86	0.03	0.00	0.20	0.08	0.08
P-226	J-208	J-201	5.46	0.01	0.00	0.14	0.04	0.04
P-227	J-209	J-6	-4.17	0.00	0.00	0.11	0.02	0.02
P-228	J-210	J-7	32.14	0.06	0.00	0.36	0.15	0.15
P-229	J-202	J-211	3.14	0.02	0.00	0.14	0.06	0.06
P-23	J-19	J-18	68.70	1.80	0.00	0.78	0.60	0.60
P-230	J-212	I-Pump-4	6.15	0.01	0.00	0.07	0.01	0.01
P-231	J-210	J-212	7.50	0.00	0.00	0.09	0.01	0.01
P-232	J-213	J-219	-5.59	0.02	0.00	0.25	0.17	0.17
P-233	J-215	J-217	45.56	0.08	0.00	0.52	0.28	0.28
P-234	J-215	J-214	-48.76	0.08	0.00	0.55	0.32	0.32
P-235	J-214	J-223	-48.76	0.14	0.00	0.55	0.32	0.32
P-236	J-214	J-216	0.00	0.00	0.00	0.00	0.00	0.00
P-237	J-217	J-210	42.86	0.08	0.00	0.49	0.25	0.25
P-238	J-217	J-218	0.00	0.00	0.00	0.00	0.00	0.00
P-239	J-219	J-221	-5.59	0.02	0.00	0.25	0.17	0.17
P-24	J-20	J-19	69.45	1.16	0.00	0.79	0.62	0.62
P-240	J-219	J-220	0.00	0.00	0.00	0.00	0.00	0.00
P-241	J-221	J-215	-5.59	0.04	0.00	0.25	0.17	0.17
P-242	J-222	J-129	-48.76	0.03	0.00	0.55	0.32	0.32
P-243	J-223	J-222	-48.76	0.06	0.00	0.55	0.32	0.32
P-244	O-Pump-6	J-107	43.50	0.09	0.00	1.11	1.86	1.86
P-245	J-226	J-74	78.29	0.19	0.00	0.50	0.19	0.19
P-246	J-226	J-227	0.15	0.00	0.00	0.02	0.00	0.00
P-247	J-228	J-168	9.45	0.02	0.00	0.11	0.02	0.02
P-248	J-228	J-230	0.22	0.00	0.00	0.01	0.00	0.00
P-249	J-229	J-122	11.10	0.05	0.00	0.13	0.02	0.02
P-25	J-21	J-20	72.15	1.22	0.00	0.82	0.66	0.66
P-250	O-RV-5	J-229	11.10	0.17	0.00	0.50	0.60	0.60
P-251	J-225	J-108	0.22	0.00	0.00	0.01	0.00	0.00
P-252	J-57	J-238	11.62	0.00	0.00	0.30	0.16	0.16
P-253	J-231	J-56	11.24	0.10	0.00	0.29	0.15	0.15
P-254	J-232	J-63	3.00	0.02	0.00	0.08	0.01	0.01
P-255	J-232	J-233	0.00	0.00	0.00	0.00	0.00	0.00
P-256	J-224	J-234	0.22	0.00	0.00	0.01	0.00	0.00
P-257	J-235	J-111	36.15	5.74	0.00	1.64	5.37	5.37
P-258	J-236	J-77	0.15	0.00	0.00	0.01	0.00	0.00
P-259	J-237	I-Pump-6	43.50	0.02	0.00	1.11	1.86	1.86
P-26	J-22	J-21	75.60	0.87	0.00	0.86	0.72	0.72
P-260	J-238	J-231	11.47	0.16	0.00	0.29	0.16	0.16
P-261	J-57	I-RV-6	0.00	0.00	0.00	0.00	0.00	0.00
P-262	J-56	J-239	0.00	0.00	0.00	0.00	0.00	0.00
P-263	O-RV-6	J-240	0.00	0.00	0.00	0.00	0.00	0.00
P-264	J-241	J-193	0.08	0.00	0.00	0.00	0.00	0.00
P-265	J-241	J-242	0.38	0.00	0.00	0.02	0.00	0.00
P-266	J-242	J-243	0.15	0.00	0.00	0.01	0.00	0.00
P-27	J-23	J-22	76.05	1.27	0.00	0.86	0.73	0.73
P-270	J-244	J-235	36.75	20.08	0.00	1.67	5.54	5.54
P-271	J-244	J-247	0.38	0.00	0.00	0.02	0.00	0.00
P-272	J-246	J-149	3.30	0.16	0.00	0.15	0.06	0.06
P-273	J-246	J-249	0.08	0.00	0.00	0.01	0.00	0.00
P-274	J-248	J-250	0.38	0.00	0.00	0.02	0.00	0.00
P-275	J-74	J-8	74.92	0.09	0.00	0.48	0.17	0.17
P-276	J-74	J-252	1.05	0.00	0.00	0.03	0.00	0.00
P-277	J-252	J-251	0.00	0.00	0.00	0.00	0.00	0.00
P-278	J-252	J-253	0.52	0.00	0.00	0.01	0.00	0.00
P-28	J-24	J-23	76.50	0.81	0.00	0.87	0.74	0.74
P-29	J-25	J-24	79.35	3.19	0.00	0.90	0.79	0.79
P-3	J-3	J-129	111.71	0.35	0.00	1.27	1.48	1.48
P-30	J-26	J-25	80.55	1.28	0.00	0.91	0.81	0.81
P-31	J-27	J-54	71.03	1.58	0.00	0.81	0.64	0.64
P-32	J-28	J-181	86.85	0.35	0.00	0.99	0.93	0.93
P-33	J-29	J-67	91.95	1.48	0.00	1.04	1.04	1.04
P-34	J-30	J-29	97.50	2.47	0.00	1.11	1.15	1.15
P-35	J-31	I-Pump-1	136.35	0.64	0.00	1.55	2.15	2.15
P-36	J-32	J-31	136.73	7.51	0.00	1.55	2.16	2.16

P-37	C-Pump-1	C-132	136.35	0.47	0.00	2.55	2.15	2.15			
P-38	J-10	J-34	2.40	0.02	0.00	0.06	0.01	0.01			
P-39	J-34	J-39	0.60	0.00	0.00	0.03	0.00	0.00			
P-4	J-4	J-215	4.80	0.00	0.00	0.05	0.00	0.00			
P-40	J-34	J-37	1.13	0.04	0.00	0.05	0.01	0.01			
P-41	J-33	J-35	0.15	0.00	0.00	0.01	0.00	0.00			
P-42	J-37	J-33	0.53	0.01	0.00	0.02	0.00	0.00			
P-43	J-38	J-36	0.15	0.00	0.00	0.01	0.00	0.00			
P-44	J-39	J-38	0.45	0.00	0.00	0.02	0.00	0.00			
P-45	J-15	J-41	0.90	0.02	0.00	0.04	0.01	0.01			
P-46	J-41	J-40	0.22	0.00	0.00	0.01	0.00	0.00			
P-47	J-16	J-43	1.80	0.06	0.00	0.08	0.02	0.02			
P-48	J-43	J-42	0.90	0.04	0.00	0.04	0.01	0.01			
P-49	J-44	J-1	65.18	0.48	0.00	0.74	0.55	0.55			
P-5	J-5	J-3	205.61	7.71	0.00	2.33	4.59	4.59			
P-50	J-44	J-46	2.10	0.03	0.00	0.10	0.03	0.03			
P-51	J-46	J-45	1.05	0.04	0.00	0.05	0.01	0.01			
P-52	J-18	J-49	0.45	0.00	0.00	0.01	0.00	0.00			
P-53	J-49	J-47	0.00	0.00	0.00	0.00	0.00	0.00			
P-54	J-20	J-48	1.20	0.01	0.00	0.03	0.00	0.00			
P-55	J-48	J-50	0.22	0.00	0.00	0.01	0.00	0.00			
P-56	J-21	J-51	1.68	0.02	0.00	0.05	0.01	0.01			
P-57	J-51	J-52	0.38	0.00	0.00	0.01	0.00	0.00			
P-58	J-24	J-53	0.75	0.01	0.00	0.03	0.00	0.00			
P-59	J-54	J-26	80.55	0.58	0.00	0.91	0.81	0.81			
P-6	J-6	J-200	72.05	0.07	0.00	0.46	0.16	0.16			
P-60	J-54	J-56	-10.49	0.26	0.00	0.27	0.13	0.13			
P-61	J-27	J-55	14.32	0.51	0.00	0.65	0.97	0.97			
P-62	J-55	J-58	12.52	0.41	0.00	0.32	0.19	0.19			
P-63	J-58	J-57	11.69	0.13	0.00	0.30	0.16	0.16			
P-64	J-28	I-RV-2	3.15	0.00	0.00	0.04	0.00	0.00			
P-65	J-59	J-60	0.38	0.00	0.00	0.00	0.00	0.00			
P-66	J-59	J-61	0.45	0.01	0.00	0.02	0.00	0.00			
P-67	J-62	J-59	2.03	0.00	0.00	0.02	0.00	0.00			
P-68	J-62	J-64	0.00	0.00	0.00	0.00	0.00	0.00			
P-69	J-29	I-RV-4	5.10	0.01	0.00	0.13	0.04	0.04			
P-7	J-7	T-1	30.34	0.05	0.00	0.34	0.13	0.13			
P-70	J-63	J-65	1.05	0.01	0.00	0.03	0.00	0.00			
P-71	J-66	J-28	90.30	1.08	0.00	1.02	1.00	1.00			
P-72	J-67	J-66	90.68	0.93	0.00	1.03	1.01	1.01			
P-73	J-67	I-RV-3	0.90	0.00	0.00	0.04	0.01	0.01			
P-74	J-68	J-30	97.80	0.80	0.00	1.11	1.16	1.16			
P-75	J-68	J-73	27.00	0.38	0.00	0.31	0.11	0.11			
P-76	J-71	J-70	1.50	0.09	0.00	0.07	0.01	0.01			
P-77	J-71	J-142	20.85	0.27	0.00	0.24	0.07	0.07			
P-78	J-73	I-RV-1	25.80	0.12	0.00	0.29	0.10	0.10			
P-79	J-72	J-248	1.05	0.02	0.00	0.05	0.01	0.01			
P-8	J-8	J-2	73.34	0.20	0.00	0.47	0.17	0.17			
P-80	J-75	J-72	1.35	0.02	0.00	0.06	0.01	0.01			
P-81	J-75	J-236	0.60	0.01	0.00	0.03	0.00	0.00			
P-82	J-76	J-75	2.55	0.10	0.00	0.12	0.04	0.04			
P-83	J-76	J-78	0.22	0.00	0.00	0.01	0.00	0.00			
P-84	J-79	J-76	3.30	0.03	0.00	0.08	0.02	0.02			
P-85	J-79	J-81	0.22	0.00	0.00	0.01	0.00	0.00			
P-86	J-80	J-79	4.50	0.15	0.00	0.11	0.03	0.03			
P-87	J-80	J-82	8.55	0.24	0.00	0.22	0.09	0.09			
P-88	J-82	J-83	5.92	0.41	0.00	0.15	0.05	0.05			
P-89	J-82	J-85	0.38	0.00	0.00	0.02	0.00	0.00			
P-9	I-WTP	R-1	-206.73	2.37	0.00	2.35	4.64	4.64			
P-90	J-83	J-84	0.15	0.00	0.00	0.01	0.00	0.00			
P-91	J-83	J-146	4.50	0.17	0.00	0.20	0.11	0.11			
P-92	J-87	J-86	0.22	0.00	0.00	0.01	0.00	0.00			
P-93	J-87	J-246	3.83	0.08	0.00	0.17	0.08	0.08			
P-94	J-88	J-144	15.90	0.15	0.00	0.18	0.04	0.04			
P-95	J-88	J-91	0.68	0.01	0.00	0.03	0.00	0.00			
P-96	J-90	J-88	17.70	0.21	0.00	0.20	0.05	0.05			
P-97	J-90	J-92	0.22	0.00	0.00	0.01	0.00	0.00			
P-98	J-4	J-213	51.41	0.08	0.00	0.58	0.35	0.35			
P-99	J-94	J-93	55.58	2.55	0.00	0.63	0.41	0.41			

PUMP/LOSS ELEMENT RESULTS

NAME	FLOWRATE (gpm)	INLET HEAD (ft)	OUTLET HEAD (ft)	PUMP HEAD (ft)	EFFIC- ENCY (%)	USEFUL POWER (Hp)	INCREMTL COST (\$)	TOTAL COST (\$)	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. (ft)
Pump-1	136.35	239.28	607.05	367.8	75.00	0.	0.0	0.0	**	**	272.4
Device "Pump-3" is closed											
Pump-3	0.00	145.19	344.78	0.0	75.00	0.	0.0	0.0	**	**	178.4
Pump-4	6.15	200.10	292.20	92.1	75.00	0.	0.0	0.0	**	**	233.3
Pump-5	2.40	124.33	318.11	193.8	75.00	0.	0.0	0.0	**	**	157.5
Pump-6	43.50	161.25	347.14	185.9	75.00	0.	0.0	0.0	**	**	194.4
WTP	206.73	2.63	245.63	243.0	75.00	0.	0.0	0.0	**	**	35.7

N C D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	NODE ELEVATION (ft)	PRESSURE HEAD (ft)	NODE PRESSURE (psi)
J-1		1.20	1276.03	885.00	391.03	169.45
J-10		0.52	1275.88	1080.00	195.88	84.88
J-100		0.22	944.57	770.00	174.57	75.65
J-101		0.22	944.57	750.00	194.57	84.32
J-102		0.75	943.39	750.00	193.39	83.80
J-103		1.12	942.71	760.00	182.71	79.18
J-104		0.15	943.39	780.00	163.39	70.80
J-105		0.38	942.71	860.00	82.71	35.84
J-106		0.90	1120.71	830.00	290.71	125.98
J-107		1.05	1127.04	780.00	347.04	150.39
J-108		0.22	1127.03	880.00	247.03	107.05
J-109		1.42	1120.75	800.00	320.75	138.99
J-11		0.45	1275.88	1130.00	145.88	63.22
J-110		2.40	945.20	750.00	195.20	84.59
J-111		36.15	1076.98	920.00	156.98	68.03
J-112		1.88	945.19	790.00	155.19	67.25
J-113		0.22	945.10	840.00	105.10	45.54
J-114		0.00	1144.79	810.00	334.79	145.08
J-115		0.52	945.09	840.00	105.09	45.54
J-116		0.30	1144.79	810.00	334.79	145.08
J-117		0.22	1143.24	900.00	243.24	105.41
J-118		0.90	1143.24	870.00	273.24	118.41
J-119		0.38	1144.81	820.00	324.81	140.75
J-12		0.22	1275.89	1100.00	175.89	76.22
J-120		0.22	1143.24	920.00	223.24	96.74
J-121		0.45	1144.73	820.00	324.73	140.72
J-122		0.60	1034.40	760.00	274.40	118.91
J-123		0.00	1144.79	880.00	264.79	114.74
J-124		0.00	1144.91	1000.00	144.91	62.80
J-125		0.38	1144.81	900.00	244.81	106.08
J-126		0.60	1034.40	860.00	174.40	75.57
J-127		0.00	1034.33	910.00	124.33	53.87
J-128		1.35	1034.31	820.00	214.31	92.87
J-129		5.62	950.58	740.00	210.58	91.25
J-13		0.30	1275.89	1180.00	95.89	41.55
J-130		1.05	1042.20	760.00	282.20	122.29
J-131		1.42	1042.20	770.00	272.20	117.95
J-132		0.22	1306.58	700.00	606.58	262.85
J-133		0.22	1042.11	840.00	202.11	87.58
J-134		0.00	1144.79	900.00	244.79	106.08
J-135		1.58	1144.74	815.00	329.74	142.89
J-136		1.58	1144.39	900.00	244.39	105.90
J-137		0.30	1144.74	960.00	184.74	80.05
J-138		0.45	1144.74	850.00	294.74	127.72
J-139		0.45	944.30	750.00	194.30	84.20
J-14		0.75	1275.90	1100.00	175.90	76.22
J-140		0.38	1299.20	1000.00	299.20	129.65
J-141		0.22	944.30	780.00	164.30	71.20
J-142		0.97	985.39	700.00	285.39	123.67
J-143		0.08	985.39	700.00	285.39	123.67
J-144		0.75	984.67	715.00	269.67	116.85
J-145		0.45	984.66	750.00	234.66	101.69
J-146		0.00	983.76	780.00	203.76	88.29
J-147		0.45	1144.89	860.00	284.89	123.45
J-148		0.08	983.76	800.00	183.76	79.63
J-149		1.20	983.37	780.00	203.37	88.13
J-15		1.35	1275.92	1100.00	175.92	76.23
J-150		0.08	983.76	820.00	163.76	70.96
J-151		1.35	983.27	840.00	143.27	62.08
J-152		0.15	983.37	840.00	143.37	62.13
J-153		0.38	1290.23	880.00	410.23	177.76
J-154		0.30	983.27	840.00	143.27	62.08
J-155		0.08	1034.31	700.00	334.31	144.87
J-156		1.05	1034.31	700.00	334.31	144.87
J-157		0.60	1034.19	820.00	214.19	92.82
J-158		0.30	1034.19	850.00	184.19	79.81
J-159		1.12	1034.20	810.00	224.20	97.15
J-16		0.75	1275.95	1110.00	165.95	71.91
J-160		0.45	1034.20	875.00	159.20	68.99
J-161		0.75	1228.03	1020.00	208.03	90.15
J-162		0.38	1228.03	1020.00	208.03	90.15
J-163		0.15	1228.03	1020.00	208.03	90.15
J-164		0.38	1034.35	840.00	194.35	84.22
J-165		0.15	1228.03	880.00	348.03	150.81
J-166		0.30	1228.01	980.00	248.01	107.47
J-167		0.22	1034.34	850.00	184.34	79.88
J-168		0.45	1034.36	800.00	234.36	101.56
J-169		0.75	1042.13	850.00	192.13	83.26
J-17		0.52	1275.98	960.00	315.98	136.93
J-170		0.45	1034.36	820.00	214.36	92.89
J-171		0.60	1042.10	800.00	242.10	104.91
J-172		0.15	1042.13	860.00	182.13	78.92
J-173		0.22	1042.08	860.00	182.08	78.90
J-174		0.22	1042.09	860.00	182.09	78.91

J-175	0.38	1042.08	795.00	247.08	107.97
J-176	0.68	1042.08	820.00	222.08	36.23
J-177	0.38	1042.07	880.00	162.07	70.23
J-178	0.00	1144.79	850.00	294.79	127.74
J-179	0.08	1042.08	855.00	207.08	59.73
J-18	0.75	1276.99	920.00	356.99	154.69
J-180	0.00	1144.96	900.00	244.96	106.15
J-181	0.00	1292.48			
J-182	0.45	1292.48			
J-183	0.22	1228.07	1040.00	188.02	81.48
J-184	0.45	1228.02	1040.00	188.02	81.47
J-185	0.60	1034.34	920.00	114.34	49.55
J-186	2.55	1144.42	850.00	294.42	127.58
J-187	1.95	1144.52	825.00	319.52	136.46
J-188	0.90	1144.73	800.00	344.73	149.38
J-189	0.75	1143.27	850.00	293.27	127.09
J-19	0.75	1278.78	1020.00	258.78	112.14
J-190	0.45	1144.78	800.00	344.78	149.41
J-191	1.73	1144.55	790.00	354.55	153.64
J-192	0.30	985.39	690.00	295.39	128.00
J-193	0.08	985.38	740.00	245.38	106.35
J-194	0.00	1275.88	1080.00	195.88	84.86
J-195	0.45	1144.88	1000.00	144.88	62.78
J-196	2.33	1143.32	830.00	313.32	135.77
J-197	1.20	950.69	760.00	190.69	82.63
J-198	0.30	1143.32	880.00	263.32	114.10
J-199	0.45	950.60	760.00	190.60	82.59
J-2	2.25	950.01	700.00	250.01	108.34
J-20	1.50	1279.94	1060.00	219.94	95.31
J-200	0.68	950.53	760.00	190.53	82.56
J-201	0.22	950.57	760.00	190.57	82.58
J-202	0.45	950.60	760.00	190.60	82.59
J-203	0.15	950.60	760.00	190.60	82.59
J-204	0.52	950.55	760.00	190.55	82.57
J-205	0.52	950.60	760.00	190.60	82.59
J-206	0.15	950.60	760.00	190.60	82.59
J-207	0.60	950.64	760.00	190.64	82.61
J-208	0.15	950.58	760.00	190.58	82.59
J-209	0.08	950.61	760.00	190.61	82.60
J-21	1.58	1281.16	1050.00	231.16	100.17
J-210	3.22	950.11	780.00	170.11	73.72
J-211	0.30	950.58	760.00	190.58	82.58
J-212	1.35	950.11			
J-213	0.00	950.19	780.00	170.19	73.75
J-214	0.00	950.35	760.00	190.35	82.49
J-215	2.40	950.27	780.00	170.27	73.79
J-216	0.00	950.35	760.00	190.35	82.49
J-217	2.70	950.20	780.00	170.20	73.75
J-218	0.00	950.20	760.00	190.20	82.42
J-219	0.00	950.22	780.00	170.22	73.76
J-22	0.45	1282.04	980.00	302.04	130.88
J-220	0.00	950.22	780.00	170.22	73.76
J-221	0.00	950.24	780.00	170.24	73.77
J-222	0.00	950.55	740.00	210.55	91.24
J-223	0.00	950.49	740.00	210.49	91.21
J-224	0.60	1120.70	850.00	270.70	117.30
J-225	0.75	1127.03	860.00	267.03	115.71
J-226	1.95	950.49	770.00	180.49	78.21
J-227	0.15	950.49	800.00	150.49	65.21
J-228	0.22	1034.38	820.00	214.38	92.90
J-229	0.00	1034.45	700.00	334.45	144.93
J-23	0.45	1283.31	1080.00	203.31	88.10
J-230	0.22	1034.38	860.00	174.38	75.56
J-231	0.22	1289.52	1025.00	264.52	114.63
J-232	2.10	980.72	800.00	180.72	78.31
J-233	0.00	980.72	860.00	120.72	52.31
J-234	0.22	1120.70	900.00	220.70	95.64
J-235	0.60	1082.72	870.00	212.72	92.18
J-236	0.45	984.28	775.00	209.28	90.69
J-237	0.38	941.27	780.00	161.27	69.88
J-238	0.15	1289.68	970.00	319.68	138.53
J-239	0.00	1289.42	960.00	329.42	142.75
J-24	2.10	1284.12	1020.00	264.12	114.45
J-240	0.00	1289.68	840.00	449.68	194.86
J-241	0.22	985.38	700.00	285.38	123.67
J-242	0.22	985.38	740.00	245.38	106.33
J-243	0.15	985.38	760.00	225.38	97.67
J-244	1.20	1102.81	850.00	252.81	109.55
J-246	0.45	983.53	740.00	243.53	105.53
J-247	0.38	1102.80	880.00	222.80	96.55
J-248	0.68	984.25	776.00	208.25	90.24
J-249	0.08	983.53	775.00	208.53	90.36
J-25	1.20	1287.30	880.00	407.30	176.50
J-250	0.38	984.24	800.00	184.24	79.84
J-251	0.00	950.30	800.00	150.30	65.13
J-252	0.52	950.30	780.00	170.30	73.80
J-253	0.52	950.30	880.00	70.30	30.46
J-26	0.00	1288.58	1020.00	268.58	116.39
J-27	1.05	1290.74	875.00	415.74	180.15
J-28	0.30	1292.83	800.00	492.83	213.56

Neal Howard'

J-29		0.45	1296.31	780.00	516.31	223.74
J-3		7.50	950.93	700.00	250.93	106.74
J-30		0.30	1298.78	680.00	618.78	268.14
J-31		0.38	939.91	700.00	239.91	101.96
J-32		0.38	947.42	800.00	147.42	63.88
J-33		0.38	1275.81	1085.00	190.81	82.68
J-34		0.68	1275.86	1150.00	125.86	54.54
J-35		0.15	1275.81	1040.00	235.81	102.18
J-36		0.15	1275.86	1140.00	135.86	58.87
J-37		0.60	1275.81	1170.00	105.81	45.85
J-38		0.30	1275.86	1170.00	105.86	45.87
J-39		0.15	1275.86	1110.00	165.86	71.87
J-4		1.12	950.28	780.00	170.28	73.79
J-40		0.22	1275.90	1020.00	255.90	110.89
J-41		0.68	1275.90	1090.00	185.90	80.56
J-42		0.90	1275.85	860.00	415.85	180.20
J-43		0.90	1275.89	1130.00	145.89	63.22
J-44		0.22	1276.51	885.00	391.51	169.66
J-45		1.05	1276.44	940.00	336.44	145.79
J-46		1.05	1276.48	1030.00	246.48	106.81
J-47		0.00	1276.99	900.00	376.99	163.36
J-48		0.97	1279.93	890.00	389.93	168.97
J-49		0.45	1276.99	680.00	596.99	258.69
J-5		1.12	958.64	680.00	278.64	120.74
J-50		0.22	1279.93	940.00	339.93	147.30
J-51		1.50	1281.14	890.00	391.14	169.50
J-52		0.38	1281.14	960.00	321.14	139.16
J-53		0.75	1284.11	870.00	414.11	179.45
J-54		0.97	1289.16	1000.00	289.16	125.30
J-55		1.42	1290.23	830.00	460.23	199.43
J-56		0.75	1289.42	980.00	309.42	134.08
J-57		0.08	1289.68	970.00	319.68	138.53
J-58		0.82	1289.81	980.00	309.81	134.25
J-59		1.20	961.53	750.00	211.53	91.66
J-6		0.52	950.61	760.00	190.61	82.60
J-60		0.38	961.53	800.00	161.53	70.00
J-61		0.45	961.53	860.00	81.53	35.33
J-62		1.12	961.53	790.00	171.53	74.33
J-63		1.95	980.70	850.00	130.70	56.64
J-64		0.00	961.53	840.00	121.53	52.66
J-65		1.05	980.70	880.00	100.70	43.64
J-66		0.38	1293.91	790.00	503.91	218.36
J-67		0.38	1294.84	800.00	494.84	214.43
J-68		0.22	1299.58	700.00	599.58	259.82
J-69		0.90	961.53	700.00	261.53	113.33
J-7		1.80	950.05	820.00	130.05	56.36
J-70		1.50	985.58	850.00	135.58	58.75
J-71		3.45	985.66	740.00	245.66	106.45
J-72		0.30	984.27	750.00	234.27	101.52
J-73		0.82	1299.20	930.00	369.20	159.99
J-74		2.33	950.30	760.00	190.30	82.46
J-75		0.60	984.28	750.00	234.28	101.52
J-76		0.52	984.39	740.00	244.39	105.90
J-77		0.15	984.28	825.00	159.28	69.02
J-78		0.22	984.39	800.00	184.39	79.90
J-79		0.97	984.42	720.00	264.42	114.58
J-8		1.58	950.20	800.00	150.20	65.09
J-80		1.65	984.57	710.00	274.57	118.98
J-81		0.22	984.42	880.00	104.42	45.25
J-82		2.25	984.33	720.00	264.33	114.54
J-83		1.27	983.93	720.00	263.93	114.37
J-84		0.15	983.92	800.00	183.92	79.70
J-85		0.38	984.33	800.00	184.33	79.88
J-86		0.22	983.61	840.00	143.61	62.23
J-87		0.30	983.61	760.00	223.61	96.90
J-88		1.12	984.82	700.00	284.82	123.42
J-89		0.30	983.27	840.00	143.27	62.08
J-9		1.50	949.61	850.00	99.61	43.17
J-90		0.90	985.03	690.00	295.03	127.85
J-91		0.68	984.81	720.00	264.81	114.75
J-92		0.22	985.03	800.00	185.03	80.18
J-93		1.88	945.22	750.00	195.22	84.59
J-94		1.12	947.77	760.00	187.77	81.37
J-95		0.00	947.77	800.00	147.77	64.03
J-96		0.15	948.16	760.00	188.16	81.54
J-97		0.15	948.71	760.00	188.71	81.77
J-98		0.00	948.71	900.00	48.71	21.11
J-99		1.27	945.10	780.00	165.10	71.54
O-Pump-1	Dehart PS	0.00	1307.05	700.00	607.05	263.06
I-Pump-3	Wrigley PS	0.00	945.19	800.00	145.19	62.92
I-Pump-4	S. Ruin PS	0.00	950.10	750.00	200.10	86.71
I-Pump-5		0.00	1034.33	910.00	124.33	53.87
I-Pump-6		0.00	941.25	780.00	161.25	69.87
R-1		----	740.00	735.00	5.00	2.17
O-RV-1		----	986.15	760.00	226.15	98.00
O-RV-2		----	961.54	800.00	161.54	70.00
O-RV-3		----	961.54	800.00	161.54	70.00
I-RV-4		0.00	1296.30	750.00	546.30	236.73
I-RV-5		0.00	1306.45	700.00	606.45	262.79
O-RV-6		----	1289.68	970.00	319.68	138.53

T-1		----	950.00	900.00	50.00	21.67
T-2	Cemetery Tan	----	950.00	900.00	50.00	21.67
T-3	Dehart Tank	----	1275.00	1122.50	152.50	66.08
T-4	Wrigley Tank	----	1145.00	1100.00	45.00	19.50
O-WTP		0.00	980.63	735.00	245.63	106.44
I-RV-1		0.00	1299.08	760.00	539.08	233.60
I-RV-2		0.00	1292.83	800.00	492.83	213.56
I-RV-3		0.00	1294.84	800.00	494.84	214.43
I-RV-6		0.00	1289.66	970.00	319.66	138.53
O-Pump-3	Wrigley PS	0.00	1144.78	800.00	344.78	149.41
O-RV-4		----	980.77	750.00	230.77	100.00
O-Pump-5		0.00	1228.11	910.00	318.11	137.85
O-Pump-4	S. Ruin PS	0.00	1042.20	750.00	292.20	126.62
O-Pump-6		0.00	1127.14	780.00	347.14	150.43
O-RV-5		----	1034.62	760.00	334.62	145.00
I-Pump-1	Dehart PS	0.00	939.28	700.00	239.28	103.69
I-WTP		0.00	737.63	735.00	2.63	1.14

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
J-30	268.14	I-WTP	1.14
O-Pump-1	263.06	R-1	2.17
J-132	262.85	T-4	19.50
I-RV-5	262.79	J-98	21.11
J-68	259.82	T-1	21.67

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-1	2.35	P-106	0.00
P-9	2.35	P-148	0.00
P-5	2.33	P-158	0.00
P-115	1.74	P-168	0.00
P-270	1.67	P-192	0.00

HL + ML / 1000

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-115	5.99	P-106	0.00
P-270	5.54	P-148	0.00
P-257	5.37	P-110	0.00
P-1	4.64	P-65	0.00
P-9	4.64	P-182	0.00

HL / 1000

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
P-115	5.99	P-106	0.00
P-270	5.54	P-148	0.00
P-257	5.37	P-110	0.00
P-1	4.64	P-65	0.00
P-9	4.64	P-182	0.00

REGULATING VALVE REPORT

VALVE LABEL	VALVE TYPE	VALVE SETTING (psi or gpm)	VALVE STATUS	UPSTREAM PRESSURE (psi)	DOWNSTREAM PRESSURE (psi)	THROUGH FLOW (gpm)
RV-1	PRV-1	98.00	ACTIVATED	233.60	98.00	25.80
RV-2	PRV-1	70.00	ACTIVATED	213.56	70.00	3.15
RV-3	PRV-1	70.00	ACTIVATED	214.43	70.00	0.90
RV-4	PRV-1	100.00	ACTIVATED	236.73	100.00	5.10
RV-5	PRV-1	145.00	ACTIVATED	262.79	145.00	11.10
RV-6	PRV-1	90.00	WIDE OPEN	138.53	138.53	0.00

SUMMARY OF INFLOWS AND OUTFLOWS

P-141	J-179	J-134	0.00	0.00	0.00	0.00	0.00	0.00
P-142	J-124	J-180	-7.95	0.05	0.00	0.09	0.01	0.01
P-143	J-135	J-188	1.55	0.01	0.00	0.03	0.00	0.00
P-144	J-135	J-187	6.07	0.22	0.00	0.16	0.05	0.05
P-145	J-135	J-138	0.75	0.00	0.00	0.02	0.00	0.00
P-146	J-138	J-137	0.30	0.00	0.00	0.01	0.00	0.00
P-147	J-139	J-182	46.28	0.91	0.00	0.53	0.29	0.29
P-148	J-139	J-141	0.22	0.00	0.00	0.00	0.00	0.00
P-149	J-73	J-140	0.38	0.00	0.00	0.02	0.00	0.00
P-15	J-11	J-10	2.93	0.00	0.00	0.03	0.00	0.00
P-150	O-RV-1	J-71	25.80	0.49	0.00	0.29	0.10	0.10
P-151	J-142	J-90	18.83	0.36	0.00	0.21	0.05	0.05
P-152	J-142	J-192	1.05	0.01	0.00	0.05	0.01	0.01
P-153	J-144	J-80	14.70	0.10	0.00	0.17	0.03	0.03
P-154	J-144	J-145	0.45	0.00	0.00	0.02	0.00	0.00
P-155	J-146	J-87	4.35	0.15	0.00	0.20	0.11	0.11
P-156	J-146	J-148	0.15	0.00	0.00	0.01	0.00	0.00
P-157	J-147	J-135	9.75	0.15	0.00	0.11	0.02	0.02
P-158	J-148	J-150	0.08	0.00	0.00	0.00	0.00	0.00
P-159	J-149	J-151	1.95	0.10	0.00	0.09	0.02	0.02
P-16	J-12	J-11	3.38	0.01	0.00	0.04	0.00	0.00
P-160	J-149	J-152	0.15	0.00	0.00	0.01	0.00	0.00
P-161	J-151	J-89	0.30	0.00	0.00	0.01	0.00	0.00
P-162	J-151	J-154	0.30	0.00	0.00	0.01	0.00	0.00
P-163	J-55	J-153	0.38	0.00	0.00	0.01	0.00	0.00
P-164	O-RV-2	J-62	3.15	0.00	0.00	0.04	0.00	0.00
P-165	O-RV-3	J-69	0.90	0.01	0.00	0.04	0.01	0.01
P-166	O-RV-4	J-232	5.10	0.04	0.00	0.13	0.04	0.04
P-167	J-128	J-156	1.12	0.01	0.00	0.03	0.00	0.00
P-168	J-156	J-155	0.08	0.00	0.00	0.00	0.00	0.00
P-169	J-128	J-159	2.47	0.11	0.00	0.11	0.04	0.04
P-17	J-13	J-12	3.60	0.00	0.00	0.04	0.00	0.00
P-170	J-157	J-158	0.30	0.00	0.00	0.01	0.00	0.00
P-171	J-159	J-157	0.90	0.01	0.00	0.04	0.01	0.01
P-172	J-159	J-160	0.45	0.00	0.00	0.02	0.00	0.00
P-173	O-Pump-5	J-161	2.40	0.08	0.00	0.11	0.04	0.04
P-174	J-127	I-Pump-5	2.40	0.00	0.00	0.03	0.00	0.00
P-175	J-161	J-162	0.68	0.00	0.00	0.01	0.00	0.00
P-176	J-162	J-163	0.15	0.00	0.00	0.01	0.00	0.00
P-177	J-162	J-165	0.15	0.00	0.00	0.01	0.00	0.00
P-178	J-161	J-183	0.97	0.01	0.00	0.04	0.01	0.01
P-179	J-164	J-127	7.35	0.02	0.00	0.08	0.01	0.01
P-18	J-14	J-13	3.90	0.01	0.00	0.04	0.00	0.00
P-180	J-164	J-185	0.83	0.00	0.00	0.04	0.00	0.00
P-181	J-168	J-164	8.55	0.01	0.00	0.10	0.01	0.01
P-182	J-168	J-170	0.45	0.00	0.00	0.01	0.00	0.00
P-183	O-Pump-4	J-131	6.15	0.00	0.00	0.07	0.01	0.01
P-184	J-169	J-133	2.78	0.02	0.00	0.07	0.01	0.01
P-185	J-169	J-172	0.15	0.00	0.00	0.01	0.00	0.00
P-186	J-133	J-171	2.55	0.02	0.00	0.07	0.01	0.01
P-187	J-171	J-175	1.73	0.01	0.00	0.04	0.00	0.00
P-188	J-171	J-174	0.22	0.01	0.00	0.02	0.00	0.00
P-189	J-175	J-173	1.35	0.00	0.00	0.03	0.00	0.00
P-19	J-15	J-14	4.65	0.02	0.00	0.05	0.00	0.00
P-190	J-173	J-176	1.12	0.01	0.00	0.03	0.00	0.00
P-191	J-176	J-177	0.38	0.00	0.00	0.02	0.00	0.00
P-192	J-176	J-179	0.08	0.00	0.00	0.00	0.00	0.00
P-193	J-180	J-147	10.65	0.07	0.00	0.12	0.02	0.02
P-194	J-180	T-4	-18.60	0.04	0.00	0.21	0.05	0.05
P-195	J-183	J-184	0.75	0.01	0.00	0.03	0.00	0.00
P-196	J-182	J-27	94.65	2.06	0.00	1.07	1.09	1.09
P-197	J-181	J-182	95.10	0.01	0.00	1.08	1.10	1.10
P-198	J-184	J-166	0.30	0.00	0.00	0.01	0.00	0.00
P-199	J-185	J-167	0.22	0.00	0.00	0.01	0.00	0.00
P-2	J-3	J-197	87.76	0.25	0.00	0.56	0.23	0.23
P-20	J-16	J-15	6.90	0.03	0.00	0.08	0.01	0.01
P-200	J-186	J-136	1.58	0.03	0.00	0.04	0.00	0.00
P-201	J-187	J-186	4.12	0.10	0.00	0.11	0.02	0.02
P-202	J-188	J-121	0.45	0.00	0.00	0.01	0.00	0.00
P-203	J-190	J-116	-6.90	0.01	0.00	0.08	0.01	0.01
P-204	J-190	J-191	6.45	0.23	0.00	0.16	0.05	0.05
P-205	J-191	J-196	4.73	1.24	0.00	0.21	0.12	0.12
P-206	J-192	J-143	0.08	0.00	0.00	0.00	0.00	0.00
P-207	J-192	J-241	0.68	0.00	0.00	0.03	0.00	0.00
P-208	J-106	J-224	0.83	0.01	0.00	0.04	0.00	0.00
P-209	J-147	J-195	0.45	0.01	0.00	0.02	0.00	0.00
P-21	J-17	J-16	9.45	0.03	0.00	0.11	0.02	0.02
P-210	J-196	J-189	2.10	0.04	0.00	0.10	0.03	0.03
P-211	J-196	J-198	0.30	0.00	0.00	0.01	0.00	0.00
P-212	J-197	J-6	77.97	0.08	0.00	0.50	0.19	0.19
P-213	J-197	J-207	8.59	0.05	0.00	0.22	0.09	0.09
P-214	J-200	J-226	81.76	0.05	0.00	0.52	0.21	0.21
P-215	J-199	J-208	5.70	0.02	0.00	0.15	0.04	0.04
P-216	J-199	J-202	1.83	0.00	0.00	0.05	0.01	0.01
P-217	J-201	J-204	8.22	0.02	0.00	0.21	0.09	0.09
P-218	J-202	J-205	-1.96	0.00	0.00	0.05	0.01	0.01
P-219	J-201	J-211	-2.89	0.00	0.00	0.13	0.05	0.05
P-22	J-18	J-44	-21.18	0.06	0.00	0.24	0.07	0.07
P-220	J-202	J-203	0.15	0.00	0.00	0.01	0.00	0.00
P-221	J-204	J-200	9.19	0.02	0.00	0.23	0.10	0.10

P-222	J-205	J-209	-4.13	0.00	0.00	0.11	0.02	0.02
P-223	J-204	J-205	-1.50	0.05	0.00	0.15	0.11	0.11
P-224	J-205	J-206	0.15	0.00	0.00	0.02	0.00	0.00
P-225	J-207	J-199	7.99	0.04	0.00	0.20	0.08	0.08
P-226	J-208	J-201	5.55	0.01	0.00	0.14	0.04	0.04
P-227	J-209	J-6	-4.21	0.00	0.00	0.11	0.02	0.02
P-228	J-210	J-7	30.81	0.06	0.00	0.35	0.14	0.14
P-229	J-202	J-211	3.19	0.02	0.00	0.14	0.06	0.06
P-23	J-19	J-18	-19.98	0.18	0.00	0.23	0.06	0.06
P-230	J-212	I-Pump-4	6.15	0.01	0.00	0.07	0.01	0.01
P-231	J-210	J-212	7.50	0.00	0.00	0.09	0.01	0.01
P-232	J-213	J-219	-5.60	0.02	0.00	0.25	0.17	0.17
P-233	J-215	J-217	44.24	0.07	0.00	0.50	0.27	0.27
P-234	J-215	J-214	-48.14	0.07	0.00	0.55	0.31	0.31
P-235	J-214	J-223	-48.14	0.14	0.00	0.55	0.31	0.31
P-236	J-214	J-216	0.00	0.00	0.00	0.00	0.00	0.00
P-237	J-217	J-210	41.54	0.08	0.00	0.47	0.24	0.24
P-238	J-217	J-218	0.00	0.00	0.00	0.00	0.00	0.00
P-239	J-219	J-221	-5.60	0.02	0.00	0.25	0.17	0.17
P-24	J-20	J-19	-19.23	0.11	0.00	0.22	0.06	0.06
P-240	J-219	J-220	0.00	0.00	0.00	0.00	0.00	0.00
P-241	J-221	J-215	-5.60	0.04	0.00	0.25	0.17	0.17
P-242	J-222	J-129	-48.14	0.03	0.00	0.55	0.31	0.31
P-243	J-223	J-222	-48.14	0.05	0.00	0.55	0.31	0.31
P-244	O-Pump-6	J-107	43.50	0.09	0.00	1.11	1.86	1.86
P-245	J-226	J-74	79.66	0.19	0.00	0.51	0.20	0.20
P-246	J-226	J-227	0.15	0.00	0.00	0.02	0.00	0.00
P-247	J-228	J-168	9.45	0.02	0.00	0.11	0.02	0.02
P-248	J-228	J-230	0.22	0.00	0.00	0.01	0.00	0.00
P-249	J-229	J-122	11.10	0.05	0.00	0.13	0.02	0.02
P-25	J-21	J-20	-16.53	0.08	0.00	0.19	0.04	0.04
P-250	O-RV-5	J-229	11.10	0.17	0.00	0.50	0.60	0.60
P-251	J-225	J-108	0.22	0.00	0.00	0.01	0.00	0.00
P-252	J-57	J-238	-97.00	0.16	0.00	2.48	8.23	8.23
P-253	J-231	J-56	-97.38	5.34	0.00	2.49	8.29	8.29
P-254	J-232	J-63	3.00	0.02	0.00	0.08	0.01	0.01
P-255	J-232	J-233	0.00	0.00	0.00	0.00	0.00	0.00
P-256	J-224	J-234	0.22	0.00	0.00	0.01	0.00	0.00
P-257	J-235	J-111	36.15	5.74	0.00	1.64	5.37	5.37
P-258	J-236	J-77	0.15	0.00	0.00	0.01	0.00	0.00
P-259	J-237	I-Pump-6	43.50	0.02	0.00	1.11	1.86	1.86
P-26	J-22	J-21	-13.08	0.03	0.00	0.15	0.03	0.03
P-260	J-238	J-231	-97.15	8.26	0.00	2.48	8.26	8.26
P-261	J-57	I-RV-6	0.00	0.00	0.00	0.00	0.00	0.00
P-262	J-56	J-239	0.00	0.00	0.00	0.00	0.00	0.00
P-263	O-RV-6	J-240	0.00	0.00	0.00	0.00	0.00	0.00
P-264	J-241	J-193	0.08	0.00	0.00	0.00	0.00	0.00
P-265	J-241	J-242	0.38	0.00	0.00	0.02	0.00	0.00
P-266	J-242	J-243	0.15	0.00	0.00	0.01	0.00	0.00
P-27	J-23	J-22	-12.63	0.05	0.00	0.14	0.03	0.03
P-270	J-244	J-235	36.75	20.08	0.00	1.67	5.54	5.54
P-271	J-244	J-247	0.38	0.00	0.00	0.02	0.00	0.00
P-272	J-246	J-149	3.30	0.16	0.00	0.15	0.06	0.06
P-273	J-246	J-249	0.08	0.00	0.00	0.01	0.00	0.00
P-274	J-248	J-250	0.38	0.00	0.00	0.02	0.00	0.00
P-275	J-74	J-8	76.29	0.10	0.00	0.49	0.18	0.18
P-276	J-74	J-252	1.05	0.00	0.00	0.03	0.00	0.00
P-277	J-252	J-251	0.00	0.00	0.00	0.00	0.00	0.00
P-278	J-252	J-253	0.52	0.00	0.00	0.01	0.00	0.00
P-28	J-24	J-23	-12.18	0.03	0.00	0.14	0.02	0.02
P-29	J-25	J-24	-9.33	0.06	0.00	0.11	0.01	0.01
P-3	J-3	J-129	110.39	0.35	0.00	1.25	1.45	1.45
P-30	J-26	J-25	-8.13	0.02	0.00	0.09	0.01	0.01
P-31	J-27	J-54	90.97	2.49	0.00	1.03	1.01	1.01
P-32	J-28	J-181	95.10	0.41	0.00	1.08	1.10	1.10
P-33	J-29	J-67	100.20	1.73	0.00	1.14	1.21	1.21
P-34	J-30	J-29	105.75	2.87	0.00	1.20	1.34	1.34
P-35	J-31	I-Pump-1	144.60	0.71	0.00	1.64	2.39	2.39
P-36	J-32	J-31	144.97	8.37	0.00	1.64	2.41	2.41
P-37	O-Pump-1	J-132	144.60	0.52	0.00	1.64	2.39	2.39
P-38	J-10	J-34	2.40	0.02	0.00	0.06	0.01	0.01
P-39	J-34	J-39	0.60	0.00	0.00	0.03	0.00	0.00
P-4	J-4	J-215	4.10	0.00	0.00	0.05	0.00	0.00
P-40	J-34	J-37	1.13	0.04	0.00	0.05	0.01	0.01
P-41	J-33	J-35	0.15	0.00	0.00	0.01	0.00	0.00
P-42	J-37	J-33	0.53	0.01	0.00	0.02	0.00	0.00
P-43	J-38	J-36	0.15	0.00	0.00	0.01	0.00	0.00
P-44	J-39	J-38	0.45	0.00	0.00	0.02	0.00	0.00
P-45	J-15	J-41	0.90	0.02	0.00	0.04	0.01	0.01
P-46	J-41	J-40	0.22	0.00	0.00	0.01	0.00	0.00
P-47	J-16	J-43	1.80	0.06	0.00	0.08	0.02	0.02
P-48	J-43	J-42	0.90	0.04	0.00	0.04	0.01	0.01
P-49	J-44	J-1	-23.50	0.07	0.00	0.27	0.08	0.08
P-5	J-5	J-3	205.65	7.71	0.00	2.33	4.60	4.60
P-50	J-44	J-46	2.10	0.03	0.00	0.10	0.03	0.03
P-51	J-46	J-45	1.05	0.04	0.00	0.05	0.01	0.01
P-52	J-18	J-49	0.45	0.00	0.00	0.01	0.00	0.00
P-53	J-49	J-47	0.00	0.00	0.00	0.00	0.00	0.00
P-54	J-20	J-48	1.20	0.01	0.00	0.03	0.00	0.00
P-55	J-48	J-50	0.22	0.00	0.00	0.01	0.00	0.00

P-56	J-21	J-51	1.88	0.02	0.00	3.05	0.01	0.01
P-57	J-51	J-52	0.38	0.00	0.00	0.01	0.00	0.00
P-58	J-24	J-53	0.75	0.01	0.00	0.03	0.00	0.00
P-59	J-54	J-26	-8.13	0.01	0.00	0.09	0.01	0.01
P-6	J-6	J-200	73.24	0.08	0.00	0.47	0.17	0.17
P-60	J-54	J-56	98.12	16.43	0.00	2.51	5.41	5.41
P-61	J-27	J-55	2.62	0.02	0.00	0.12	0.04	0.04
P-62	J-55	J-58	0.82	0.00	0.00	0.02	0.00	0.00
P-63-XX	J-58	J-57						
P-64	J-28	I-RV-2	3.15	0.00	0.00	0.04	0.00	0.00
P-65	J-59	J-60	0.35	0.00	0.00	0.00	0.00	0.00
P-66	J-59	J-61	0.45	0.01	0.00	0.02	0.00	0.00
P-67	J-62	J-59	2.03	0.00	0.00	0.02	0.00	0.00
P-68	J-62	J-64	0.00	0.00	0.00	0.00	0.00	0.00
P-69	J-29	I-RV-4	5.10	0.01	0.00	0.13	0.04	0.04
P-7	J-7	T-1	29.01	0.05	0.00	0.33	0.12	0.12
P-70	J-63	J-65	1.05	0.01	0.00	0.03	0.00	0.00
P-71	J-66	J-28	98.55	1.27	0.00	1.12	1.18	1.18
P-72	J-67	J-66	98.92	1.09	0.00	1.12	1.19	1.19
P-73	J-67	I-RV-3	0.90	0.00	0.00	0.04	0.01	0.01
P-74	J-68	J-30	106.05	0.93	0.00	1.20	1.35	1.35
P-75	J-68	J-73	27.00	0.38	0.00	0.31	0.11	0.11
P-76	J-71	J-70	1.50	0.09	0.00	0.07	0.01	0.01
P-77	J-71	J-142	20.85	0.27	0.00	0.24	0.07	0.07
P-78	J-73	I-RV-1	25.80	0.12	0.00	0.29	0.10	0.10
P-79	J-72	J-248	1.05	0.02	0.00	0.05	0.01	0.01
P-8	J-8	J-2	74.71	0.20	0.00	0.48	0.17	0.17
P-80	J-75	J-72	1.35	0.02	0.00	0.06	0.01	0.01
P-81	J-75	J-236	0.60	0.01	0.00	0.03	0.00	0.00
P-82	J-76	J-75	2.55	0.10	0.00	0.12	0.04	0.04
P-83	J-76	J-78	0.22	0.00	0.00	0.01	0.00	0.00
P-84	J-79	J-76	3.30	0.03	0.00	0.08	0.02	0.02
P-85	J-79	J-81	0.22	0.00	0.00	0.01	0.00	0.00
P-86	J-80	J-79	4.50	0.15	0.00	0.11	0.03	0.03
P-87	J-80	J-82	8.55	0.24	0.00	0.22	0.09	0.09
P-88	J-82	J-83	5.92	0.41	0.00	0.15	0.05	0.05
P-89	J-82	J-85	0.38	0.00	0.00	0.02	0.00	0.00
P-9	I-WTP	R-1	-206.77	2.37	0.00	2.35	4.64	4.64
P-90	J-83	J-84	0.15	0.00	0.00	0.01	0.00	0.00
P-91	J-83	J-146	4.50	0.17	0.00	0.20	0.11	0.11
P-92	J-87	J-86	0.22	0.00	0.00	0.01	0.00	0.00
P-93	J-87	J-246	3.83	0.08	0.00	0.17	0.08	0.08
P-94	J-88	J-144	15.90	0.15	0.00	0.18	0.04	0.04
P-95	J-88	J-91	0.68	0.01	0.00	0.03	0.00	0.00
P-96	J-90	J-88	17.70	0.21	0.00	0.20	0.05	0.05
P-97	J-90	J-92	0.22	0.00	0.00	0.01	0.00	0.00
P-98	J-4	J-213	51.40	0.08	0.00	0.58	0.35	0.35
P-99	J-94	J-93	55.58	2.55	0.00	0.63	0.41	0.41

P U M P / L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE (gpm)	INLET HEAD (ft)	OUTLET HEAD (ft)	PUMP HEAD (ft)	EFFIC- ENCY (%)	USEFUL POWER (Hp)	INCREMTL COST (\$)	TOTAL COST (\$)	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. (ft)
Pump-1	144.60	238.02	595.12	357.1	75.00	0.	0.0	0.0	**	**	271.2
Device "Pump-3" is closed											
Pump-3	0.00	145.18	344.78	0.0	75.00	0.	0.0	0.0	**	**	178.4
Pump-4	6.15	200.09	292.19	92.1	75.00	0.	0.0	0.0	**	**	233.3
Pump-5	2.40	124.33	318.11	193.8	75.00	0.	0.0	0.0	**	**	157.5
Pump-6	43.50	161.23	347.12	185.9	75.00	0.	0.0	0.0	**	**	194.4
WTP	206.77	2.63	245.61	243.0	75.00	0.	0.0	0.0	**	**	35.7

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	NODE ELEVATION (ft)	PRESSURE HEAD (ft)	NODE PRESSURE (psi)
J-1		1.20	1274.55	885.00	389.55	168.80
J-10		0.52	1274.40	1080.00	194.40	84.24
J-100		0.22	944.56	770.00	174.56	75.64
J-101		0.22	944.56	750.00	194.56	84.31
J-102		0.75	943.37	750.00	193.37	83.79
J-103		1.12	942.70	760.00	182.70	79.17
J-104		0.15	943.37	780.00	163.37	70.79
J-105		0.38	942.70	860.00	82.70	35.83
J-106		0.90	1120.69	830.00	290.69	125.97
J-107		1.05	1127.03	780.00	347.03	150.38
J-108		0.22	1127.01	880.00	247.01	107.04
J-109		1.42	1120.73	800.00	320.73	138.98
J-11		0.45	1274.40	1130.00	144.40	62.57
J-110		2.40	945.18	750.00	195.18	84.58
J-111		36.15	1076.96	920.00	156.96	68.02

J-112	1.88	945.18	790.00	155.18	67.24	
J-113	0.22	945.09	840.00	105.09	45.53	
J-114	0.00	1144.79	810.00	334.79	145.08	
J-115	0.32	945.07	840.00	105.07	45.53	
J-116	0.30	1144.79	810.00	334.79	145.08	
J-117	0.22	1143.24	900.00	243.24	105.41	
J-118	0.90	1143.24	870.00	273.24	118.41	
J-119	0.38	1144.81	820.00	324.81	140.75	
J-12	0.22	1274.40	1100.00	174.40	75.58	
J-120	0.22	1143.24	920.00	223.24	96.74	
J-121	0.45	1144.73	820.00	324.73	140.72	
J-122	0.60	1034.40	760.00	274.40	118.91	
J-123	0.00	1144.79	880.00	264.79	114.74	
J-124	0.00	1144.91	1000.00	144.91	62.80	
J-125	0.38	1144.81	900.00	244.81	106.08	
J-126	0.60	1034.40	860.00	174.40	75.57	
J-127	0.00	1034.53	910.00	124.53	53.87	
J-128	1.35	1034.51	820.00	214.51	92.87	
J-129	5.62	980.55	740.00	240.55	91.24	
J-13	0.30	1274.41	1180.00	94.41	40.91	
J-130	1.05	1042.19	760.00	282.19	122.28	
J-131	1.42	1042.19	770.00	272.19	117.95	
J-132	0.22	1294.60	700.00	594.60	257.66	
J-133	0.22	1042.10	840.00	202.10	87.58	
J-134	0.00	1144.79	900.00	244.79	106.08	
J-135	1.58	1144.74	815.00	329.74	142.89	
J-136	1.58	1144.39	900.00	244.39	105.90	
J-137	0.30	1144.74	960.00	184.74	80.05	
J-138	0.45	1144.74	850.00	294.74	127.72	
J-139	0.45	944.28	750.00	194.28	84.19	
J-14	0.75	1274.41	1100.00	174.41	75.58	
J-140	0.38	1286.33	1000.00	286.33	124.08	
J-141	0.22	944.28	780.00	164.28	71.19	
J-142	0.97	985.39	700.00	285.39	123.67	
J-143	0.08	985.39	700.00	285.39	123.67	
J-144	0.75	984.67	715.00	269.67	116.85	
J-145	0.45	984.66	750.00	234.66	101.69	
J-146	0.00	983.76	780.00	203.76	88.29	
J-147	0.45	1144.89	860.00	284.89	123.45	
J-148	0.08	983.76	800.00	183.76	79.63	
J-149	1.20	983.37	780.00	203.37	88.13	
J-15	1.35	1274.43	1100.00	174.43	75.59	
J-150	0.08	983.76	820.00	163.76	70.96	
J-151	1.35	983.27	840.00	143.27	62.08	
J-152	0.15	983.37	840.00	143.37	62.13	
J-153	0.38	1276.33	880.00	396.33	171.74	
J-154	0.30	983.27	840.00	143.27	62.08	
J-155	0.08	1034.31	700.00	334.31	144.87	
J-156	1.05	1034.31	700.00	334.31	144.87	
J-157	0.60	1034.19	820.00	214.19	92.82	
J-158	0.30	1034.19	850.00	184.19	79.81	
J-159	1.12	1034.20	810.00	224.20	97.15	
J-16	0.75	1274.46	1110.00	164.46	71.27	
J-160	0.45	1034.20	875.00	159.20	68.99	
J-161	0.75	1228.03	1020.00	208.03	90.15	
J-162	0.38	1228.03	1020.00	208.03	90.15	
J-163	0.15	1228.03	1020.00	208.03	90.15	
J-164	0.38	1034.35	840.00	194.35	84.22	
J-165	0.15	1228.03	880.00	348.03	150.81	
J-166	0.30	1228.01	980.00	248.01	107.47	
J-167	0.22	1034.34	850.00	184.34	79.88	
J-168	0.45	1034.36	800.00	234.36	101.56	
J-169	0.75	1042.12	850.00	192.12	83.25	
J-17	0.52	1274.50	960.00	314.50	136.28	
J-170	0.45	1034.36	820.00	214.36	92.89	
J-171	0.60	1042.09	800.00	242.09	104.90	
J-172	0.15	1042.12	860.00	182.12	78.92	
J-173	0.22	1042.07	860.00	182.07	78.90	
J-174	0.22	1042.08	860.00	182.08	78.90	
J-175	0.38	1042.08	795.00	247.08	107.07	
J-176	0.68	1042.07	820.00	222.07	96.23	
J-177	0.38	1042.06	880.00	162.06	70.23	
J-178	0.00	1144.79	850.00	294.79	127.74	
J-179	0.08	1042.07	835.00	207.07	89.73	
J-18	0.75	1274.42	920.00	354.42	153.58	
J-180	0.00	1144.96	900.00	244.96	106.15	
J-181	0.00	1278.41				
J-182	0.45	1278.41				
J-183	0.22	1228.02	1040.00	188.02	81.48	
J-184	0.45	1228.02	1040.00	188.02	81.47	
J-185	0.60	1034.34	920.00	114.34	49.55	
J-186	2.55	1144.42	850.00	294.42	127.58	
J-187	1.95	1144.52	825.00	319.52	138.46	
J-188	0.90	1144.73	800.00	344.73	149.38	
J-189	Neal Howard'	0.75	1143.27	850.00	293.27	127.09
J-19		0.75	1274.24	1020.00	254.24	110.17
J-190		0.45	1144.78	800.00	344.78	149.41
J-191		1.73	1144.55	790.00	354.55	153.64
J-192		0.30	985.39	690.00	295.39	128.00
J-193		0.08	985.38	740.00	245.38	106.33

J-194	0.00	1274.40	1080.00	194.40	84.24
J-195	0.45	1144.88	1000.00	144.88	60.78
J-196	2.33	1143.32	830.00	313.32	135.77
J-197	1.20	950.65	760.00	190.65	82.61
J-198	0.30	1143.32	850.00	263.32	114.10
J-199	0.45	950.56	760.00	190.56	82.58
J-2	2.25	949.95	700.00	249.95	108.31
J-20	1.50	1274.13	1060.00	214.13	92.79
J-200	0.68	950.43	760.00	190.43	82.54
J-201	0.22	950.53	760.00	190.53	82.56
J-202	0.45	950.56	760.00	190.56	82.58
J-203	0.15	950.56	760.00	190.56	82.58
J-204	0.52	950.51	760.00	190.51	82.55
J-205	0.52	950.56	760.00	190.56	82.58
J-206	0.15	950.56	760.00	190.56	82.58
J-207	0.60	950.59	760.00	190.59	82.59
J-208	0.15	950.54	760.00	190.54	82.57
J-209	0.08	950.56	760.00	190.56	82.58
J-21	1.58	1274.05	1050.00	224.05	97.09
J-210	3.22	950.10	780.00	170.10	73.71
J-211	0.30	950.53	760.00	190.53	82.56
J-212	1.35	950.10			
J-213	0.00	950.18	780.00	170.18	73.74
J-214	0.00	950.33	760.00	190.33	82.48
J-215	2.40	950.26	780.00	170.26	73.78
J-216	0.00	950.33	760.00	190.33	82.48
J-217	2.70	950.18	780.00	170.18	73.75
J-218	0.00	950.18	760.00	190.18	82.41
J-219	0.00	950.20	760.00	170.20	73.75
J-22	0.45	1274.01	960.00	294.01	127.41
J-220	0.00	950.20	780.00	170.20	73.75
J-221	0.00	950.22	780.00	170.22	73.76
J-222	0.00	950.53	740.00	210.53	91.25
J-223	0.00	950.47	740.00	210.47	91.20
J-224	0.60	1120.68	850.00	270.68	117.30
J-225	0.75	1127.01	860.00	267.01	115.71
J-226	1.95	950.44	770.00	180.44	78.19
J-227	0.15	950.44	800.00	150.44	65.19
J-228	0.22	1034.38	820.00	214.38	92.90
J-229	0.00	1034.45	700.00	334.45	144.93
J-23	0.45	1273.97	1080.00	193.97	84.05
J-230	0.22	1034.38	860.00	174.38	75.56
J-231	0.22	1252.08	1025.00	227.08	98.40
J-232	2.10	980.72	800.00	180.72	78.31
J-233	0.00	980.72	860.00	120.72	52.31
J-234	0.22	1120.68	900.00	220.68	95.63
J-235	0.60	1082.70	870.00	212.70	92.17
J-236	0.45	984.28	775.00	209.28	90.69
J-237	0.38	941.25	780.00	161.25	69.87
J-238	0.15	1243.82	970.00	273.82	118.66
J-239	0.00	1257.42	960.00	297.42	128.88
J-24	2.10	1273.94	1020.00	253.94	110.04
J-240	0.00	1243.66	840.00	403.66	174.92
J-241	0.22	985.38	700.00	285.38	123.67
J-242	0.22	985.38	740.00	245.38	106.33
J-243	0.15	985.38	760.00	225.38	97.67
J-244	1.20	1102.79	850.00	252.79	109.54
J-246	0.45	983.53	740.00	243.53	105.53
J-247	0.38	1102.78	880.00	222.78	96.54
J-248	0.68	984.25	776.00	208.25	90.24
J-249	0.08	983.53	775.00	208.53	90.36
J-25	1.20	1273.88	880.00	393.88	170.68
J-250	0.38	984.24	800.00	184.24	79.84
J-251	0.00	950.25	800.00	150.25	65.11
J-252	0.52	950.25	780.00	170.25	73.77
J-253	0.52	950.25	880.00	70.25	30.44
J-26	0.00	1273.86	1020.00	253.86	110.01
J-27	1.05	1276.35	875.00	401.35	173.92
J-28	0.30	1278.83	800.00	478.83	207.49
J-29	0.45	1282.92	780.00	502.92	217.93
J-3	7.50	950.90	700.00	250.90	108.72
J-30	0.30	1285.78	680.00	605.78	262.51
J-31	0.38	938.73	700.00	238.73	103.45
J-32	0.38	947.09	800.00	147.09	63.74
J-33	0.38	1274.32	1085.00	189.32	82.04
J-34	0.68	1274.37	1150.00	124.37	53.89
J-35	0.15	1274.32	1040.00	234.32	101.54
J-36	0.15	1274.37	1140.00	134.37	58.23
J-37	0.60	1274.33	1170.00	104.33	45.21
J-38	0.30	1274.37	1170.00	104.37	45.23
J-39	0.15	1274.37	1110.00	164.37	71.23
J-4	1.12	950.26	780.00	170.26	73.78
J-40	0.22	1274.41	1020.00	254.41	110.24
J-41	0.68	1274.41	1090.00	184.41	79.91
J-42	0.90	1274.36	860.00	414.36	179.56
J-43	0.90	1274.41	1130.00	144.41	62.58
J-44	0.22	1274.47	885.00	389.47	168.77
J-45	1.05	1274.40	940.00	334.40	144.91
J-46	1.05	1274.44	1030.00	244.44	105.93
J-47	0.00	1274.42	900.00	374.42	162.25

J-48		0.97	1274.12	890.00	384.12	166.45
J-49		0.45	1274.42	880.00	594.42	257.56
J-5		1.12	958.61	880.00	278.61	120.73
J-50		0.22	1274.12	940.00	334.12	144.79
J-51		1.50	1274.03	890.00	384.03	166.41
J-52		0.38	1274.03	980.00	314.03	136.08
J-53		0.75	1273.93	870.00	403.93	175.04
J-54		0.97	1273.85	1000.00	273.85	118.67
J-55		1.42	1276.33	830.00	446.33	193.41
J-56		0.75	1257.42	980.00	277.42	120.22
J-57		97.00 (**)	1243.66	970.00	273.66	118.59
J-58		0.82	1276.32	980.00	290.32	128.41
J-59		1.20	961.53	750.00	211.53	91.66
J-6		0.52	950.56	760.00	190.56	82.58
J-60		0.38	961.53	800.00	161.53	70.00
J-61		0.45	961.53	880.00	81.53	35.33
J-62		1.12	961.53	790.00	171.53	74.33
J-63		1.95	980.70	850.00	130.70	56.64
J-64		0.00	961.53	840.00	121.53	52.66
J-65		1.05	980.70	880.00	100.70	43.64
J-66		0.38	1280.09	790.00	490.09	212.37
J-67		0.38	1281.19	800.00	481.19	208.51
J-68		0.22	1286.71	700.00	586.71	254.24
J-69		0.90	961.53	700.00	261.53	113.33
J-7		1.80	950.05	820.00	130.05	56.35
J-70		1.50	985.58	850.00	135.58	58.75
J-71		3.45	985.66	740.00	245.66	106.45
J-72		0.30	984.27	750.00	234.27	101.52
J-73		0.82	1286.33	930.00	356.33	154.41
J-74		2.33	950.25	760.00	190.25	82.44
J-75		0.60	984.28	750.00	234.28	101.52
J-76		0.52	984.39	740.00	244.39	105.90
J-77		0.15	984.28	825.00	159.28	69.02
J-78		0.22	984.39	800.00	184.39	79.90
J-79		0.97	984.42	720.00	264.42	114.58
J-8		1.58	950.15	800.00	150.15	65.06
J-80		1.65	984.57	710.00	274.57	118.98
J-81		0.22	984.42	880.00	104.42	45.25
J-82		2.25	984.33	720.00	264.33	114.54
J-83		1.27	983.93	720.00	263.93	114.37
J-84		0.15	983.92	800.00	183.92	79.70
J-85		0.38	984.33	800.00	184.33	79.88
J-86		0.22	983.61	840.00	143.61	62.23
J-87		0.30	983.61	760.00	223.61	96.90
J-88		1.12	984.82	700.00	284.82	123.42
J-89		0.30	983.27	840.00	143.27	62.08
J-9		1.50	949.54	850.00	99.54	43.13
J-90		0.90	985.03	690.00	295.03	127.85
J-91		0.68	984.81	720.00	264.81	114.75
J-92		0.22	985.03	800.00	185.03	80.18
J-93		1.88	945.20	750.00	195.20	84.59
J-94		1.12	947.75	760.00	187.75	81.36
J-95		0.00	947.75	800.00	147.75	64.02
J-96		0.15	948.14	760.00	188.14	81.53
J-97		0.15	948.69	760.00	188.69	81.77
J-98		0.00	948.69	900.00	48.69	21.10
J-99		1.27	945.08	780.00	165.08	71.53
O-Pump-1	Dehart PS	0.00	1295.12	700.00	595.12	257.88
I-Pump-3	Wrigley PS	0.00	945.18	800.00	145.18	62.91
I-Pump-4	S. Ruin PS	0.00	950.09	750.00	200.09	86.71
I-Pump-5		0.00	1034.33	910.00	124.33	53.87
I-Pump-6		0.00	941.23	780.00	161.23	69.87
R-1		----	740.00	735.00	5.00	2.17
O-RV-1		----	986.15	760.00	226.15	98.00
O-RV-2		----	961.54	800.00	161.54	70.00
O-RV-3		----	961.54	800.00	161.54	70.00
I-RV-4		0.00	1282.90	750.00	532.90	230.92
I-RV-5		0.00	1294.46	700.00	594.46	257.60
O-RV-6		----	1243.66	970.00	273.66	118.59
T-1		----	950.00	900.00	50.00	21.67
T-2	Cemetery Tan	----	950.00	900.00	50.00	21.67
T-3	Dehart Tank	----	1275.00	1122.50	152.50	66.08
T-4	Wrigley Tank	----	1145.00	1100.00	45.00	19.50
O-WTP		0.00	980.61	735.00	245.61	106.43
I-RV-1		0.00	1286.22	760.00	526.22	228.03
I-RV-2		0.00	1278.83	800.00	478.83	207.49
I-RV-3		0.00	1281.19	800.00	481.19	208.51
I-RV-6		0.00	1243.66	970.00	273.66	118.59
O-Pump-3	Wrigley PS	0.00	1144.78	800.00	344.78	149.41
O-RV-4		----	980.77	750.00	230.77	100.00
O-Pump-5		0.00	1228.11	910.00	318.11	137.85
O-Pump-4	S. Ruin PS	0.00	1042.19	750.00	292.19	126.62
O-Pump-6		0.00	1127.12	780.00	347.12	150.42
O-RV-5		----	1034.62	700.00	334.62	145.00
I-Pump-1	Dehart PS	0.00	938.02	700.00	238.02	103.14
I-WTP		0.00	737.63	735.00	2.63	1.14

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
J-30	262.51	I-WTP	1.14
O-Pump-1	257.88	R-1	2.17
J-132	257.66	T-4	19.50
I-RV-5	257.60	J-98	21.10
J-49	257.58	T-1	21.67

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-60	2.51	P-106	0.00
P-253	2.49	P-148	0.00
P-260	2.48	P-158	0.00
P-252	2.48	P-168	0.00
P-1	2.35	P-192	0.00

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-60	8.41	P-106	0.00
P-253	8.29	P-148	0.00
P-260	8.26	P-110	0.00
P-252	8.23	P-65	0.00
P-115	5.99	P-182	0.00

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
P-60	8.41	P-106	0.00
P-253	8.29	P-148	0.00
P-260	8.26	P-110	0.00
P-252	8.23	P-65	0.00
P-115	5.99	P-182	0.00

R E G U L A T I N G V A L V E R E P O R T

VALVE LABEL	VALVE TYPE	VALVE SETTING (psi or gpm)	VALVE STATUS	UPSTREAM PRESSURE (psi)	DOWNSTREAM PRESSURE (psi)	THROUGH FLOW (gpm)
RV-1	PRV-1	98.00	ACTIVATED	228.03	98.00	25.80
RV-2	PRV-1	70.00	ACTIVATED	207.49	70.00	3.15
RV-3	PRV-1	70.00	ACTIVATED	208.51	70.00	0.90
RV-4	PRV-1	100.00	ACTIVATED	230.92	100.00	5.10
RV-5	PRV-1	145.00	ACTIVATED	257.60	145.00	11.10
RV-6	PRV-1	90.00	WIDE OPEN	118.59	118.59	0.00

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE (gpm)	NODE TITLE
R-1	206.77	
T-1	-29.01	
T-2	74.39	Cemetery Tan
T-3	34.68	Dehart Tank
T-4	18.60	Wrigley Tank

NET SYSTEM INFLOW = 334.43
 NET SYSTEM OUTFLOW = -29.01
 NET SYSTEM DEMAND = 305.42

CHANGES FOR NEXT SIMULATION (Change Number = 2)

Demand added to end of Crestview St. J-253
to show flushing velocity of 2.5 fps

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 6 TRIALS: ACCURACY = 0.00000

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	NODE NUMBERS #2	FLOWRATE (gpm)	HEAD LOSS (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL+ML/ 1000 (ft/ft)	HL/ 1000 (ft/ft)
P-1	J-5	O-WTP	-207.52	22.15	0.00	2.35	4.67	4.67
P-10	J-2	J-9	16.56	0.03	0.00	0.11	0.01	0.01
P-100	J-94	J-95	0.00	0.00	0.00	0.00	0.00	0.00
P-101	J-96	J-94	56.70	0.39	0.00	0.64	0.42	0.42
P-102	J-97	J-96	56.85	0.55	0.00	0.65	0.42	0.42
P-103	J-97	J-98	0.00	0.00	0.00	0.00	0.00	0.00
P-104	J-93	J-110	6.30	0.02	0.00	0.07	0.01	0.01
P-105	J-93	J-101	47.40	0.64	0.00	0.54	0.30	0.30
P-106	J-101	J-100	0.22	0.00	0.00	0.00	0.00	0.00
P-107	J-101	J-139	46.95	0.28	0.00	0.53	0.30	0.30
P-108	J-102	J-104	0.15	0.00	0.00	0.01	0.00	0.00
P-109	J-102	J-103	45.38	0.68	0.00	0.51	0.28	0.28
P-11	J-9	T-2	-121.42	1.14	0.00	1.38	1.73	1.73
P-110	J-103	J-105	0.38	0.00	0.00	0.00	0.00	0.00
P-111	J-103	J-237	43.88	1.45	0.00	0.50	0.26	0.26
P-112	J-107	J-225	0.97	0.01	0.00	0.02	0.00	0.00
P-113	J-107	J-109	41.47	6.30	0.00	1.06	1.71	1.71
P-114	J-109	J-106	1.73	0.03	0.00	0.08	0.02	0.02
P-115	J-109	J-244	38.33	17.94	0.00	1.74	5.99	5.99
P-116	J-110	J-99	2.02	0.10	0.00	0.09	0.03	0.03
P-117	J-110	J-112	1.88	0.00	0.00	0.02	0.00	0.00
P-118	J-99	J-113	0.22	0.00	0.00	0.01	0.00	0.00
P-119	J-99	J-115	0.52	0.01	0.00	0.02	0.00	0.00
P-12	J-9	J-32	136.47	2.17	0.00	1.55	2.15	2.15
P-120	J-194	J-10	0.00	0.00	0.00	0.00	0.00	0.00
P-121	J-112	I-Pump-3	0.00	0.00	0.00	0.00	0.00	0.00
P-122	J-116	J-114	0.00	0.00	0.00	0.00	0.00	0.00
P-123	J-118	J-117	0.22	0.00	0.00	0.01	0.00	0.00
P-124	J-118	J-120	0.22	0.00	0.00	0.01	0.00	0.00
P-125	J-116	J-119	-7.20	0.02	0.00	0.08	0.01	0.01
P-126	J-114	J-178	0.00	0.00	0.00	0.00	0.00	0.00
P-127	J-114	J-123	0.00	0.00	0.00	0.00	0.00	0.00
P-128	J-119	J-125	0.38	0.00	0.00	0.02	0.00	0.00
P-129	J-119	J-124	-7.95	0.10	0.00	0.09	0.01	0.01
P-13	J-1	J-17	9.98	0.05	0.00	0.11	0.02	0.02
P-130	J-132	I-RV-5	11.10	0.13	0.00	0.50	0.60	0.60
P-131	J-122	J-126	0.60	0.00	0.00	0.02	0.00	0.00
P-132	J-122	J-228	9.90	0.02	0.00	0.11	0.02	0.02
P-133	J-127	J-128	4.95	0.01	0.00	0.06	0.00	0.00
P-134	J-129	J-4	35.90	0.13	0.00	0.41	0.18	0.18
P-135	J-213	J-97	57.00	1.49	0.00	0.65	0.43	0.43
P-136	J-131	J-130	1.05	0.00	0.00	0.01	0.00	0.00
P-137	J-131	J-169	3.68	0.07	0.00	0.09	0.02	0.02
P-138	J-132	J-68	124.40	6.94	0.00	1.41	1.81	1.81
P-139	J-189	J-118	1.35	0.03	0.00	0.06	0.01	0.01
P-14	J-1	T-3	53.52	1.02	0.00	0.61	0.38	0.38
P-140	O-Pump-3	J-190	0.00	0.00	0.00	0.00	0.00	0.00
P-141	J-178	J-134	0.00	0.00	0.00	0.00	0.00	0.00
P-142	J-124	J-180	-7.95	0.05	0.00	0.09	0.01	0.01
P-143	J-135	J-188	1.35	0.01	0.00	0.03	0.00	0.00
P-144	J-135	J-187	6.07	0.22	0.00	0.16	0.05	0.05
P-145	J-135	J-138	0.75	0.00	0.00	0.02	0.00	0.00
P-146	J-138	J-137	0.30	0.00	0.00	0.01	0.00	0.00
P-147	J-139	J-102	46.28	0.91	0.00	0.53	0.29	0.29
P-148	J-139	J-141	0.22	0.00	0.00	0.00	0.00	0.00
P-149	J-73	J-140	0.38	0.00	0.00	0.02	0.00	0.00
P-15	J-11	J-10	2.93	0.00	0.00	0.03	0.00	0.00
P-150	O-RV-1	J-71	25.80	0.49	0.00	0.29	0.10	0.10
P-151	J-142	J-90	18.83	0.36	0.00	0.21	0.05	0.05
P-152	J-142	J-192	1.05	0.01	0.00	0.05	0.01	0.01
P-153	J-144	J-80	14.70	0.10	0.00	0.17	0.03	0.03
P-154	J-144	J-145	0.45	0.00	0.00	0.02	0.00	0.00
P-155	J-146	J-87	4.35	0.15	0.00	0.20	0.11	0.11
P-156	J-146	J-148	0.15	0.00	0.00	0.01	0.00	0.00
P-157	J-147	J-135	9.75	0.15	0.00	0.11	0.02	0.02
P-158	J-148	J-150	0.08	0.00	0.00	0.00	0.00	0.00
P-159	J-149	J-151	1.95	0.10	0.00	0.09	0.02	0.02
P-16	J-12	J-11	3.38	0.01	0.00	0.04	0.00	0.00
P-160	J-149	J-152	0.15	0.00	0.00	0.01	0.00	0.00

P-161	J-151	J-89	0.30	0.00	0.00	0.01	0.00	0.00
P-162	J-151	J-154	0.30	0.00	0.00	0.01	0.00	0.00
P-163	J-55	J-153	0.38	0.00	0.00	0.01	0.00	0.00
P-164	O-RV-2	J-62	3.15	0.00	0.00	0.04	0.00	0.00
P-165	O-RV-3	J-69	0.90	0.01	0.00	0.04	0.01	0.01
P-166	O-RV-4	J-232	5.10	0.04	0.00	0.13	0.04	0.04
P-167	J-128	J-156	1.12	0.01	0.00	0.03	0.00	0.00
P-168	J-156	J-155	0.08	0.00	0.00	0.00	0.00	0.00
P-169	J-128	J-159	2.47	0.11	0.00	0.11	0.04	0.04
P-17	J-13	J-12	3.60	0.00	0.00	0.04	0.00	0.00
P-170	J-157	J-158	0.30	0.00	0.00	0.01	0.00	0.00
P-171	J-159	J-157	0.90	0.01	0.00	0.04	0.01	0.01
P-172	J-159	J-160	0.45	0.00	0.00	0.02	0.00	0.00
P-173	O-Pump-5	J-161	2.40	0.08	0.00	0.11	0.04	0.04
P-174	J-127	I-Pump-5	2.40	0.00	0.00	0.03	0.00	0.00
P-175	J-161	J-162	0.68	0.00	0.00	0.01	0.00	0.00
P-176	J-162	J-163	0.15	0.00	0.00	0.01	0.00	0.00
P-177	J-162	J-165	0.15	0.00	0.00	0.01	0.00	0.00
P-178	J-161	J-183	0.97	0.01	0.00	0.04	0.01	0.01
P-179	J-164	J-127	7.35	0.02	0.00	0.08	0.01	0.01
P-18	J-14	J-13	3.90	0.01	0.00	0.04	0.00	0.00
P-180	J-164	J-185	0.83	0.00	0.00	0.04	0.00	0.00
P-181	J-168	J-164	8.55	0.01	0.00	0.10	0.01	0.01
P-182	J-168	J-170	0.45	0.00	0.00	0.01	0.00	0.00
P-183	O-Pump-4	J-131	6.15	0.00	0.00	0.07	0.01	0.01
P-184	J-169	J-133	2.78	0.02	0.00	0.07	0.01	0.01
P-185	J-169	J-172	0.15	0.00	0.00	0.01	0.00	0.00
P-186	J-133	J-171	2.55	0.02	0.00	0.07	0.01	0.01
P-187	J-171	J-175	1.73	0.01	0.00	0.04	0.00	0.00
P-188	J-171	J-174	0.22	0.01	0.00	0.02	0.00	0.00
P-189	J-175	J-173	1.35	0.00	0.00	0.03	0.00	0.00
P-19	J-15	J-14	4.65	0.02	0.00	0.05	0.00	0.00
P-190	J-173	J-176	1.12	0.01	0.00	0.03	0.00	0.00
P-191	J-176	J-177	0.38	0.00	0.00	0.02	0.00	0.00
P-192	J-176	J-179	0.08	0.00	0.00	0.00	0.00	0.00
P-193	J-180	J-147	10.65	0.07	0.00	0.12	0.02	0.02
P-194	J-180	T-4	-18.60	0.04	0.00	0.21	0.05	0.05
P-195	J-183	J-184	0.75	0.01	0.00	0.03	0.00	0.00
P-196	J-182	J-27	85.77	1.72	0.00	0.97	0.91	0.91
P-197	J-181	J-182	86.22	0.00	0.00	0.98	0.92	0.92
P-198	J-184	J-166	0.30	0.00	0.00	0.01	0.00	0.00
P-199	J-185	J-167	0.22	0.00	0.00	0.01	0.00	0.00
P-2	J-3	J-197	128.33	0.51	0.00	0.82	0.47	0.47
P-20	J-16	J-15	6.90	0.03	0.00	0.08	0.01	0.01
P-200	J-186	J-136	1.58	0.03	0.00	0.04	0.00	0.00
P-201	J-187	J-186	4.12	0.10	0.00	0.11	0.02	0.02
P-202	J-188	J-121	0.45	0.00	0.00	0.01	0.00	0.00
P-203	J-190	J-116	-6.90	0.01	0.00	0.08	0.01	0.01
P-204	J-190	J-191	6.45	0.23	0.00	0.16	0.05	0.05
P-205	J-191	J-196	4.73	1.24	0.00	0.21	0.12	0.12
P-206	J-192	J-143	0.06	0.00	0.00	0.00	0.00	0.00
P-207	J-192	J-241	0.68	0.00	0.00	0.03	0.00	0.00
P-208	J-106	J-224	0.83	0.01	0.00	0.04	0.00	0.00
P-209	J-147	J-195	0.45	0.01	0.00	0.02	0.00	0.00
P-21	J-17	J-16	9.45	0.03	0.00	0.11	0.02	0.02
P-210	J-196	J-189	2.10	0.04	0.00	0.10	0.03	0.03
P-211	J-196	J-198	0.30	0.00	0.00	0.01	0.00	0.00
P-212	J-197	J-6	114.76	0.17	0.00	0.73	0.38	0.38
P-213	J-197	J-207	12.37	0.10	0.00	0.32	0.18	0.18
P-214	J-200	J-226	122.33	0.10	0.00	0.78	0.43	0.43
P-215	J-199	J-208	8.42	0.04	0.00	0.21	0.09	0.09
P-216	J-199	J-202	2.91	0.00	0.00	0.07	0.01	0.01
P-217	J-201	J-204	12.43	0.04	0.00	0.32	0.18	0.18
P-218	J-202	J-205	-2.38	0.00	0.00	0.06	0.01	0.01
P-219	J-201	J-211	-4.39	0.00	0.00	0.20	0.11	0.11
P-22	J-18	J-44	67.02	0.47	0.00	0.76	0.58	0.58
P-220	J-202	J-203	0.15	0.00	0.00	0.01	0.00	0.00
P-221	J-204	J-200	14.13	0.05	0.00	0.36	0.23	0.23
P-222	J-205	J-209	-5.28	0.01	0.00	0.13	0.04	0.04
P-223	J-204	J-205	-2.22	0.10	0.00	0.23	0.22	0.22
P-224	J-205	J-206	0.15	0.00	0.00	0.02	0.00	0.00
P-225	J-207	J-199	11.77	0.07	0.00	0.30	0.17	0.17
P-226	J-208	J-201	8.27	0.02	0.00	0.21	0.09	0.09
P-227	J-209	J-6	-5.36	0.00	0.00	0.14	0.04	0.04
P-228	J-210	J-7	-9.01	0.01	0.00	0.10	0.01	0.01
P-229	J-202	J-211	4.69	0.05	0.00	0.21	0.12	0.12
P-23	J-19	J-18	68.22	1.77	0.00	0.77	0.60	0.60
P-230	J-212	I-Pump-4	6.15	0.01	0.00	0.07	0.01	0.01
P-231	J-210	J-212	7.50	0.00	0.00	0.09	0.01	0.01
P-232	J-213	J-219	-5.99	0.03	0.00	0.27	0.19	0.19
P-233	J-215	J-217	4.41	0.00	0.00	0.05	0.00	0.00
P-234	J-215	J-214	-29.03	0.03	0.00	0.33	0.12	0.12
P-235	J-214	J-223	-29.03	0.05	0.00	0.33	0.12	0.12
P-236	J-214	J-216	0.00	0.00	0.00	0.00	0.00	0.00
P-237	J-217	J-210	1.71	0.00	0.00	0.02	0.00	0.00
P-238	J-217	J-218	0.00	0.00	0.00	0.00	0.00	0.00
P-239	J-219	J-221	-5.99	0.02	0.00	0.27	0.19	0.19
P-24	J-20	J-19	68.97	1.14	0.00	0.78	0.61	0.61
P-240	J-219	J-220	0.00	0.00	0.00	0.00	0.00	0.00
P-241	J-221	J-215	-5.99	0.04	0.00	0.27	0.19	0.19

P-242	J-222	J-129	-29.03	0.01	0.00	0.33	0.12	0.12
P-243	J-223	J-222	-29.03	0.02	0.00	0.33	0.12	0.12
P-244	O-Pump-6	J-107	43.50	0.09	0.00	1.11	1.86	1.86
P-245	J-226	J-74	120.73	0.42	0.00	0.77	0.47	0.47
P-246	J-226	J-227	0.15	0.30	0.00	0.02	0.00	0.00
P-247	J-228	J-168	9.45	0.32	0.00	0.11	0.07	0.07
P-248	J-228	J-230	0.22	0.30	0.00	0.01	0.00	0.00
P-249	J-229	J-122	11.10	0.05	0.00	0.13	0.02	0.02
P-25	J-21	J-20	71.67	1.21	0.00	0.81	0.65	0.65
P-250	O-RV-5	J-229	11.10	0.17	0.00	0.50	0.60	0.60
P-251	J-225	J-108	0.22	0.00	0.00	0.01	0.00	0.00
P-252	J-57	J-238	0.00	0.00	0.00	0.00	0.00	0.00
P-253	J-231	J-56	-0.38	0.00	0.00	0.01	0.00	0.00
P-254	J-232	J-63	3.00	0.02	0.30	0.08	0.01	0.01
P-255	J-232	J-233	0.00	0.00	0.00	0.00	0.00	0.00
P-256	J-224	J-234	0.22	0.00	0.00	0.01	0.00	0.00
P-257	J-235	J-111	36.15	5.74	0.00	1.64	5.37	5.37
P-258	J-236	J-77	0.15	0.00	0.00	0.01	0.00	0.00
P-259	J-237	I-Pump-6	43.50	0.02	0.00	1.11	1.86	1.86
P-26	J-22	J-21	75.12	0.86	0.00	0.85	0.71	0.71
P-260	J-238	J-231	-0.15	0.00	0.00	0.00	0.00	0.00
P-261	J-57	I-RV-6	0.00	0.00	0.00	0.00	0.00	0.00
P-262	J-56	J-239	0.00	0.00	0.00	0.00	0.00	0.00
P-263	O-RV-6	J-240	0.00	0.00	0.00	0.00	0.00	0.00
P-264	J-241	J-193	0.08	0.00	0.00	0.00	0.00	0.00
P-265	J-241	J-242	0.38	0.00	0.00	0.02	0.00	0.00
P-266	J-242	J-243	0.15	0.00	0.00	0.01	0.00	0.00
P-27	J-23	J-22	75.57	1.25	0.00	0.86	0.72	0.72
P-270	J-244	J-235	36.75	20.08	0.00	1.67	5.54	5.54
P-271	J-244	J-247	0.38	0.00	0.00	0.02	0.00	0.00
P-272	J-246	J-149	3.30	0.16	0.00	0.15	0.06	0.06
P-273	J-246	J-249	0.08	0.00	0.00	0.01	0.00	0.00
P-274	J-248	J-250	0.38	0.00	0.00	0.02	0.00	0.00
P-275	J-74	J-8	20.38	0.01	0.00	0.13	0.02	0.02
P-276	J-74	J-252	97.53	5.19	0.00	2.49	8.32	8.32
P-277	J-252	J-251	0.00	0.00	0.00	0.00	0.00	0.00
P-278	J-252	J-253	97.00	7.96	0.00	2.48	8.23	8.23
P-28	J-24	J-23	76.02	0.80	0.00	0.86	0.73	0.73
P-29	J-25	J-24	78.87	3.15	0.00	0.89	0.78	0.78
P-3	J-3	J-129	70.56	0.15	0.00	0.80	0.63	0.63
P-30	J-26	J-25	80.07	1.26	0.00	0.91	0.80	0.80
P-31	J-27	J-54	82.17	2.07	0.00	0.93	0.84	0.84
P-32	J-28	J-181	86.22	0.34	0.00	0.98	0.92	0.92
P-33	J-29	J-67	91.32	1.46	0.00	1.04	1.02	1.02
P-34	J-30	J-29	96.87	2.44	0.00	1.10	1.14	1.14
P-35	J-31	I-Pump-1	135.72	0.63	0.00	1.54	2.13	2.13
P-36	J-32	J-31	136.10	7.44	0.00	1.54	2.14	2.14
P-37	O-Pump-1	J-132	135.72	0.47	0.00	1.54	2.13	2.13
P-38	J-10	J-34	2.40	0.02	0.00	0.06	0.01	0.01
P-39	J-34	J-39	0.60	0.00	0.00	0.03	0.00	0.00
P-4	J-4	J-215	-16.24	0.01	0.00	0.18	0.04	0.04
P-40	J-34	J-37	1.13	0.04	0.00	0.05	0.01	0.01
P-41	J-33	J-35	0.15	0.00	0.00	0.01	0.00	0.00
P-42	J-37	J-33	0.53	0.01	0.00	0.02	0.00	0.00
P-43	J-38	J-36	0.15	0.00	0.00	0.01	0.00	0.00
P-44	J-39	J-38	0.45	0.00	0.00	0.02	0.00	0.00
P-45	J-15	J-41	0.90	0.02	0.00	0.04	0.01	0.01
P-46	J-41	J-40	0.22	0.00	0.00	0.01	0.00	0.00
P-47	J-16	J-43	1.80	0.06	0.00	0.08	0.02	0.02
P-48	J-43	J-42	0.90	0.04	0.00	0.04	0.01	0.01
P-49	J-44	J-1	64.70	0.47	0.00	0.73	0.54	0.54
P-5	J-5	J-3	206.39	7.76	0.00	2.34	4.63	4.63
P-50	J-44	J-46	2.10	0.03	0.00	0.10	0.03	0.03
P-51	J-46	J-45	1.05	0.04	0.00	0.05	0.01	0.01
P-52	J-18	J-49	0.45	0.00	0.00	0.01	0.00	0.00
P-53	J-49	J-47	0.00	0.00	0.00	0.00	0.00	0.00
P-54	J-20	J-48	1.20	0.01	0.00	0.03	0.00	0.00
P-55	J-48	J-50	0.22	0.00	0.00	0.01	0.00	0.00
P-56	J-21	J-51	1.88	0.02	0.00	0.05	0.01	0.01
P-57	J-51	J-52	0.38	0.00	0.00	0.01	0.00	0.00
P-58	J-24	J-53	0.75	0.01	0.00	0.03	0.00	0.00
P-59	J-54	J-26	80.07	0.57	0.00	0.91	0.80	0.80
P-6	J-6	J-200	108.88	0.16	0.00	0.69	0.35	0.35
P-60	J-54	J-56	1.12	0.00	0.00	0.03	0.00	0.00
P-61	J-27	J-55	2.55	0.02	0.00	0.12	0.04	0.04
P-62	J-55	J-58	0.75	0.00	0.00	0.02	0.00	0.00
P-63-XX	J-58	J-57						
P-64	J-28	I-RV-2	3.15	0.00	0.00	0.04	0.00	0.00
P-65	J-59	J-60	0.38	0.00	0.00	0.00	0.00	0.00
P-66	J-59	J-61	0.45	0.01	0.00	0.02	0.00	0.00
P-67	J-62	J-59	2.03	0.00	0.00	0.02	0.00	0.00
P-68	J-62	J-64	0.00	0.00	0.00	0.00	0.00	0.00
P-69	J-29	I-RV-4	5.10	0.01	0.00	0.13	0.04	0.04
P-7	J-7	T-1	-10.81	0.01	0.00	0.12	0.02	0.02
P-70	J-63	J-65	1.05	0.01	0.00	0.03	0.00	0.00
P-71	J-66	J-28	89.67	1.06	0.00	1.02	0.99	0.99
P-72	J-67	J-66	90.05	0.92	0.00	1.02	1.00	1.00
P-73	J-67	I-RV-3	0.90	0.00	0.00	0.04	0.01	0.01
P-74	J-68	J-30	97.17	0.79	0.00	1.10	1.15	1.15
P-75	J-68	J-73	27.00	0.38	0.00	0.31	0.11	0.11

P-76	J-71	J-70	1.50	0.09	0.00	0.07	0.02	0.01
P-77	J-71	J-142	20.85	0.27	0.00	0.24	0.07	0.07
P-78	J-73	I-RV-1	25.80	0.12	0.00	0.29	0.10	0.10
P-79	J-72	J-248	1.05	0.02	0.00	0.05	0.01	0.01
P-8	J-8	J-2	18.81	0.02	0.00	0.12	0.01	0.01
P-80	J-75	J-72	1.35	0.02	0.00	0.06	0.01	0.01
P-81	J-75	J-236	0.60	0.01	0.00	0.03	0.00	0.00
P-82	J-76	J-75	2.55	0.10	0.00	0.12	0.04	0.04
P-83	J-76	J-78	0.22	0.00	0.00	0.01	0.00	0.00
P-84	J-79	J-76	3.30	0.03	0.00	0.08	0.02	0.02
P-85	J-79	J-81	0.22	0.00	0.00	0.01	0.00	0.00
P-86	J-80	J-79	4.50	0.15	0.00	0.11	0.03	0.03
P-87	J-80	J-82	8.55	0.24	0.00	0.22	0.09	0.09
P-88	J-82	J-83	5.92	0.41	0.00	0.15	0.05	0.05
P-89	J-82	J-85	0.38	0.00	0.00	0.02	0.00	0.00
P-9	I-WTP	R-1	-207.52	2.38	0.00	2.35	4.67	4.67
P-90	J-83	J-84	0.15	0.00	0.00	0.01	0.00	0.00
P-91	J-83	J-146	4.50	0.17	0.00	0.20	0.11	0.11
P-92	J-87	J-86	0.22	0.00	0.00	0.01	0.00	0.00
P-93	J-87	J-246	3.83	0.08	0.00	0.17	0.08	0.08
P-94	J-88	J-144	15.90	0.15	0.00	0.18	0.04	0.04
P-95	J-88	J-91	0.68	0.01	0.00	0.03	0.00	0.00
P-96	J-90	J-88	17.70	0.21	0.00	0.20	0.05	0.05
P-97	J-90	J-92	0.22	0.00	0.00	0.01	0.00	0.00
P-98	J-4	J-213	51.01	0.08	0.00	0.58	0.35	0.35
P-99	J-94	J-93	55.58	2.55	0.00	0.63	0.41	0.41

PUMP/LOSS ELEMENT RESULTS

NAME	FLOWRATE (gpm)	INLET HEAD (ft)	OUTLET HEAD (ft)	PUMP HEAD (ft)	EFFIC- ENCY (%)	USEFUL POWER (Hp)	INCREM TL COST (\$)	TOTAL COST (\$)	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. (ft)
Pump-1	135.72	238.61	607.19	368.6	75.00	0.	0.0	0.0	**	**	271.8
Device "Pump-3" is closed											
Pump-3	0.00	144.90	344.78	0.0	75.00	0.	0.0	0.0	**	**	178.1
Pump-4	6.15	199.98	292.08	92.1	75.00	0.	0.0	0.0	**	**	233.2
Pump-5	2.40	124.33	318.11	193.8	75.00	0.	0.0	0.0	**	**	157.5
Pump-6	43.50	160.95	346.84	185.9	75.00	0.	0.0	0.0	**	**	194.1
WTP	207.52	2.62	245.17	242.5	75.00	0.	0.0	0.0	**	**	35.7

NODE RESULTS

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	NODE ELEVATION (ft)	PRESSURE HEAD (ft)	NODE PRESSURE (psi)
J-1		1.20	1276.02	885.00	391.02	169.44
J-10		0.52	1275.86	1080.00	195.86	84.87
J-100		0.22	944.28	770.00	174.28	75.52
J-101		0.22	944.28	750.00	194.28	84.19
J-102		0.75	943.09	750.00	193.09	83.67
J-103		1.12	942.42	760.00	182.42	79.05
J-104		0.15	943.09	780.00	163.09	70.67
J-105		0.38	942.42	860.00	82.42	35.71
J-106		0.90	1120.41	830.00	290.41	125.85
J-107		1.05	1126.75	780.00	346.75	150.26
J-108		0.22	1126.73	880.00	246.73	106.92
J-109		1.42	1120.45	800.00	320.45	138.86
J-11		0.45	1275.87	1130.00	145.87	63.21
J-110		2.40	944.90	750.00	194.90	84.46
J-111		36.15	1076.69	920.00	156.69	67.90
J-112		1.88	944.90	790.00	154.90	67.12
J-113		0.22	944.80	840.00	104.80	45.41
J-114		0.00	1144.79	810.00	334.79	145.08
J-115		0.52	944.79	840.00	104.79	45.41
J-116		0.30	1144.79	810.00	334.79	145.08
J-117		0.22	1143.24	900.00	243.24	105.41
J-118		0.90	1143.24	870.00	273.24	118.41
J-119		0.38	1144.81	820.00	324.81	140.75
J-12		0.22	1275.87	1100.00	175.87	76.21
J-120		0.22	1143.24	920.00	223.24	96.74
J-121		0.45	1144.73	820.00	324.73	140.72
J-122		0.60	1034.40	760.00	274.40	118.91
J-123		0.00	1144.79	880.00	264.79	114.74
J-124		0.00	1144.91	1000.00	144.91	62.80
J-125		0.38	1144.81	900.00	244.81	106.08
J-126		0.60	1034.40	860.00	174.40	75.57
J-127		0.00	1034.33	910.00	124.33	53.87
J-128		1.35	1034.31	820.00	214.31	92.87
J-129		5.62	950.10	740.00	210.10	91.04
J-13		0.30	1275.87	1180.00	95.87	41.55
J-130		1.05	1042.07	760.00	282.07	122.23
J-131		1.42	1042.07	770.00	272.07	117.90

J-132	0.22	1306.72	700.00	606.72	262.91
J-133	0.22	1041.99	840.00	201.99	87.53
J-134	0.00	1144.79	900.00	244.79	106.08
J-135	1.58	1144.74	815.00	329.74	142.69
J-136	1.58	1144.39	900.00	244.39	105.90
J-137	0.30	1144.74	960.00	184.74	80.05
J-138	0.45	1144.74	850.00	294.74	127.72
J-139	0.45	944.00	750.00	194.00	84.07
J-14	0.75	1275.88	1100.00	175.88	76.22
J-140	0.38	1299.40	1000.00	299.40	129.74
J-141	0.22	944.00	780.00	164.00	71.07
J-142	0.97	985.39	700.00	285.39	123.67
J-143	0.08	985.39	700.00	285.39	123.67
J-144	0.75	984.67	715.00	269.67	116.85
J-145	0.45	984.66	750.00	234.66	101.69
J-146	0.00	983.76	780.00	203.76	88.29
J-147	0.45	1144.89	860.00	284.89	123.45
J-148	0.08	983.76	800.00	183.76	79.63
J-149	1.20	983.37	780.00	203.37	88.13
J-15	1.35	1275.90	1100.00	175.90	76.22
J-150	0.08	983.76	820.00	163.76	70.96
J-151	1.35	983.27	840.00	143.27	62.08
J-152	0.15	983.37	840.00	143.37	62.13
J-153	0.38	1291.03	880.00	411.03	178.11
J-154	0.30	983.27	840.00	143.27	62.08
J-155	0.08	1034.31	700.00	334.31	144.87
J-156	1.05	1034.31	700.00	334.31	144.87
J-157	0.60	1034.19	820.00	214.19	92.82
J-158	0.30	1034.19	850.00	184.19	79.81
J-159	1.12	1034.20	810.00	224.20	97.15
J-16	0.75	1275.93	1110.00	165.93	71.90
J-160	0.45	1034.20	875.00	159.20	68.99
J-161	0.75	1228.03	1020.00	208.03	90.15
J-162	0.38	1228.03	1020.00	208.03	90.15
J-163	0.15	1228.03	1020.00	208.03	90.15
J-164	0.38	1034.35	840.00	194.35	84.22
J-165	0.15	1228.03	880.00	348.03	150.81
J-166	0.30	1228.01	980.00	248.01	107.47
J-167	0.22	1034.34	850.00	184.34	79.88
J-168	0.45	1034.36	800.00	234.36	101.56
J-169	0.75	1042.01	850.00	192.01	83.20
J-17	0.52	1275.97	960.00	315.97	136.92
J-170	0.45	1034.36	820.00	214.36	92.89
J-171	0.60	1041.97	800.00	241.97	104.85
J-172	0.15	1042.01	860.00	182.01	78.87
J-173	0.22	1041.96	860.00	181.96	78.85
J-174	0.22	1041.96	860.00	181.96	78.85
J-175	0.38	1041.96	795.00	246.96	107.02
J-176	0.68	1041.95	820.00	221.95	96.18
J-177	0.38	1041.95	880.00	161.95	70.18
J-178	0.00	1144.79	850.00	294.79	127.74
J-179	0.08	1041.95	835.00	206.95	89.68
J-18	0.75	1276.96	920.00	356.96	154.68
J-180	0.00	1144.96	900.00	244.96	106.15
J-181	0.00	1292.77			
J-182	0.45	1292.77			
J-183	0.22	1228.02	1040.00	188.02	81.48
J-184	0.45	1228.02	1040.00	188.02	81.47
J-185	0.60	1034.34	920.00	114.34	49.55
J-186	2.55	1144.42	850.00	294.42	127.58
J-187	1.95	1144.52	825.00	319.52	138.46
J-188	0.90	1144.73	800.00	344.73	149.38
J-189	Neal Howard'	1143.27	850.00	293.27	127.09
J-19	0.75	1278.73	1020.00	258.73	112.12
J-190	0.45	1144.78	800.00	344.78	149.41
J-191	1.73	1144.55	790.00	354.55	153.64
J-192	0.30	985.39	690.00	295.39	128.00
J-193	0.08	985.38	740.00	245.38	106.33
J-194	0.00	1275.86	1080.00	195.86	84.87
J-195	0.45	1144.88	1000.00	144.88	62.78
J-196	2.33	1143.32	830.00	313.32	135.77
J-197	1.20	949.75	760.00	189.75	82.22
J-198	0.30	1143.32	880.00	263.32	114.10
J-199	0.45	949.57	760.00	189.57	82.15
J-2	2.25	948.88	700.00	248.88	107.85
J-20	1.50	1279.87	1060.00	219.87	95.28
J-200	0.68	949.42	760.00	189.42	82.08
J-201	0.22	949.52	760.00	189.52	82.12
J-202	0.45	949.57	760.00	189.57	82.15
J-203	0.15	949.57	760.00	189.57	82.15
J-204	0.52	949.47	760.00	189.47	82.10
J-205	0.52	949.57	760.00	189.57	82.15
J-206	0.15	949.57	760.00	189.57	82.15
J-207	0.60	949.65	760.00	189.65	82.18
J-208	0.15	949.53	760.00	189.53	82.13
J-209	0.08	949.58	760.00	189.58	82.15
J-21	1.58	1281.08	1050.00	231.08	100.14
J-210	3.22	949.99	780.00	169.99	73.66
J-211	0.30	949.52	760.00	189.52	82.13
J-212	1.35	949.98			

J-213	0.00	949.90	780.00	169.90	73.62
J-214	0.00	950.02	760.00	190.02	82.34
J-215	2.40	949.99	750.00	169.99	73.66
J-216	0.00	950.02	760.00	190.02	82.34
J-217	2.70	949.99	780.00	169.99	73.66
J-218	0.00	949.99	760.00	189.99	82.33
J-219	0.00	949.92	780.00	169.92	73.63
J-22	0.45	1281.95	980.00	301.95	130.84
J-220	0.00	949.92	780.00	169.92	73.63
J-221	0.00	949.95	780.00	169.95	73.64
J-222	0.00	950.09	740.00	210.09	91.04
J-223	0.00	950.07	740.00	210.07	91.03
J-224	0.60	1120.40	850.00	270.40	117.17
J-225	0.75	1126.74	860.00	266.74	115.59
J-226	1.95	949.32	770.00	179.32	77.71
J-227	0.15	949.32	800.00	149.32	64.71
J-228	0.22	1034.38	820.00	214.38	92.90
J-229	0.00	1034.45	700.00	334.45	144.93
J-23	0.45	1283.20	1080.00	203.20	88.05
J-230	0.22	1034.38	860.00	174.38	75.56
J-231	0.22	1288.98	1025.00	263.98	114.39
J-232	2.10	980.72	800.00	180.72	78.31
J-233	0.00	980.72	860.00	120.72	52.31
J-234	0.22	1120.40	900.00	220.40	95.51
J-235	0.60	1082.42	870.00	212.42	92.05
J-236	0.45	984.28	775.00	209.28	90.69
J-237	0.38	940.97	780.00	160.97	69.75
J-238	0.15	1288.98	970.00	318.98	138.23
J-239	0.00	1288.98	960.00	328.98	142.56
J-24	2.10	1284.00	1020.00	264.00	114.40
J-240	0.00	1288.98	840.00	448.98	194.56
J-241	0.22	985.38	700.00	285.38	123.67
J-242	0.22	985.38	740.00	245.38	106.33
J-243	0.15	985.38	760.00	225.38	97.67
J-244	1.20	1102.51	850.00	252.51	109.42
J-246	0.45	983.53	740.00	243.53	105.53
J-247	0.38	1102.51	880.00	222.51	96.42
J-248	0.68	984.25	776.00	208.25	90.24
J-249	0.08	983.53	775.00	208.53	90.36
J-25	1.20	1287.15	880.00	407.15	176.43
J-250	0.38	984.24	800.00	184.24	79.84
J-251	0.00	943.71	800.00	143.71	62.28
J-252	0.52	943.71	780.00	163.71	70.94
J-253	97.00 (**)	935.75	880.00	55.75	24.16
J-26	0.00	1288.42	1020.00	268.42	116.31
J-27	1.05	1291.05	875.00	416.05	180.29
J-28	0.30	1293.12	800.00	493.12	213.68
J-29	0.45	1296.56	780.00	516.56	223.84
J-3	7.50	950.25	700.00	250.25	108.44
J-30	0.30	1298.99	680.00	618.99	268.23
J-31	0.38	939.24	700.00	239.24	103.67
J-32	0.38	946.68	800.00	146.68	63.56
J-33	0.38	1275.79	1085.00	190.79	82.68
J-34	0.68	1275.84	1150.00	125.84	54.53
J-35	0.15	1275.79	1040.00	235.79	102.18
J-36	0.15	1275.84	1140.00	135.84	58.86
J-37	0.60	1275.80	1170.00	105.80	45.85
J-38	0.30	1275.84	1170.00	105.84	45.86
J-39	0.15	1275.84	1110.00	165.84	71.86
J-4	1.12	949.98	780.00	169.98	73.66
J-40	0.22	1275.88	1020.00	255.88	110.88
J-41	0.68	1275.88	1090.00	185.88	80.55
J-42	0.90	1275.83	860.00	415.83	180.19
J-43	0.90	1275.88	1130.00	145.88	63.21
J-44	0.22	1276.49	885.00	391.49	169.65
J-45	1.05	1276.42	940.00	336.42	145.78
J-46	1.05	1276.46	1030.00	246.46	106.80
J-47	0.00	1276.96	900.00	376.96	163.35
J-48	0.97	1279.87	890.00	389.87	168.94
J-49	0.45	1276.96	680.00	596.96	258.68
J-5	1.12	958.02	680.00	278.02	120.47
J-50	0.22	1279.87	940.00	339.87	147.28
J-51	1.50	1281.06	890.00	391.06	169.46
J-52	0.38	1281.06	960.00	321.06	139.13
J-53	0.75	1283.99	870.00	413.99	179.40
J-54	0.97	1288.99	1000.00	288.99	125.23
J-55	1.42	1291.03	830.00	461.03	199.78
J-56	0.75	1288.98	980.00	308.98	133.89
J-57	0.00 (0.00)	1288.98	970.00	318.98	138.23
J-58	0.75 (0.91)	1291.03	980.00	311.03	134.78
J-59	1.20	961.53	750.00	211.53	91.66
J-6	0.52	949.58	760.00	189.58	82.15
J-60	0.38	961.53	800.00	161.53	70.00
J-61	0.45	961.53	880.00	81.53	35.33
J-62	1.12	961.53	790.00	171.53	74.33
J-63	1.95	980.70	850.00	130.70	56.64
J-64	0.00	961.53	840.00	121.53	52.66
J-65	1.05	980.70	880.00	100.70	43.64
J-66	0.38	1294.18	790.00	504.18	218.48
J-67	0.38	1295.10	800.00	495.10	214.54

J-68		0.22	1299.79	700.00	599.79	259.91
J-69		0.90	961.53	700.00	261.53	113.33
J-7		1.80	949.99	820.00	129.99	56.33
J-70		1.50	985.58	850.00	135.58	58.75
J-71		3.45	985.66	740.00	245.66	106.45
J-72		0.30	984.27	750.00	234.27	101.52
J-73		0.82	1299.40	930.00	369.40	160.08
J-74		2.33	948.91	760.00	188.91	81.86
J-75		0.60	984.28	750.00	234.28	101.52
J-76		0.52	984.39	740.00	244.39	105.90
J-77		0.15	984.28	825.00	159.28	69.02
J-78		0.22	984.39	800.00	184.39	79.90
J-79		0.97	984.42	720.00	264.42	114.58
J-8		1.58	948.98	800.00	148.98	64.52
J-80		1.65	984.57	710.00	274.57	118.98
J-81		0.22	984.42	880.00	104.42	45.25
J-82		2.25	984.33	720.00	264.33	114.54
J-83		1.27	983.93	720.00	263.93	114.37
J-84		0.15	983.92	800.00	183.92	79.70
J-85		0.38	984.33	800.00	184.33	79.88
J-86		0.22	983.61	840.00	143.61	62.23
J-87		0.30	983.61	760.00	223.61	96.90
J-88		1.12	984.82	700.00	284.82	123.42
J-89		0.30	983.27	840.00	143.27	62.08
J-9		1.50	948.86	850.00	98.86	42.84
J-90		0.90	985.03	690.00	295.03	127.85
J-91		0.68	984.81	720.00	264.81	114.75
J-92		0.22	985.03	800.00	185.03	80.18
J-93		1.88	944.92	750.00	194.92	84.46
J-94		1.12	947.47	760.00	187.47	81.24
J-95		0.00	947.47	800.00	147.47	63.90
J-96		0.15	947.86	760.00	187.86	81.41
J-97		0.15	948.41	760.00	188.41	81.64
J-98		0.00	948.41	900.00	48.41	20.98
J-99		1.27	944.80	780.00	164.80	71.41
O-Pump-1	Dehart PS	0.00	1307.19	700.00	607.19	263.11
I-Pump-3	Wrigley PS	0.00	944.90	800.00	144.90	62.79
I-Pump-4	S. Ruin PS	0.00	949.98	750.00	199.98	86.66
I-Pump-5		0.00	1034.33	910.00	124.33	53.87
I-Pump-6		0.00	940.95	780.00	160.95	69.75
R-1		----	740.00	735.00	5.00	2.17
O-RV-1		----	986.15	760.00	226.15	98.00
O-RV-2		----	961.54	800.00	161.54	70.00
O-RV-3		----	961.54	800.00	161.54	70.00
I-RV-4		0.00	1296.54	750.00	546.54	236.84
I-RV-5		0.00	1306.59	700.00	606.59	262.85
O-RV-6		----	1288.98	970.00	318.98	138.23
T-1		----	950.00	900.00	50.00	21.67
T-2	Cemetery Tan	----	950.00	900.00	50.00	21.67
T-3	Dehart Tank	----	1275.00	1122.50	152.50	66.08
T-4	Wrigley Tank	----	1145.00	1100.00	45.00	19.50
O-WTP		0.00	980.17	735.00	245.17	106.24
I-RV-1		0.00	1299.29	760.00	539.29	233.69
I-RV-2		0.00	1293.12	800.00	493.12	213.68
I-RV-3		0.00	1295.10	800.00	495.10	214.54
I-RV-6		0.00	1288.98	970.00	318.98	138.23
O-Pump-3	Wrigley PS	0.00	1144.78	800.00	344.78	149.41
O-RV-4		----	980.77	750.00	230.77	100.00
O-Pump-5		0.00	1228.11	910.00	318.11	137.85
O-Pump-4	S. Ruin PS	0.00	1042.08	750.00	292.08	126.57
O-Pump-6		0.00	1126.84	780.00	346.84	150.30
O-RV-5		----	1034.62	700.00	334.62	145.00
I-Pump-1	Dehart PS	0.00	938.61	700.00	238.61	103.40
I-WTP		0.00	737.62	735.00	2.62	1.13

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
J-30	268.23	I-WTP	1.13
O-Pump-1	263.11	R-1	2.17
J-132	262.91	T-4	19.50
I-RV-5	262.85	J-98	20.98
J-68	259.91	T-1	21.67

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-276	2.49	P-106	0.00
P-278	2.48	P-148	0.00

P-1	2.35	P-158	0.00
P-9	2.35	P-168	0.00
P-5	2.34	P-192	0.00

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-276	8.32	P-106	0.00
P-278	8.23	P-148	0.00
P-115	5.99	P-110	0.00
P-270	5.54	P-65	0.00
P-257	5.37	P-260	0.00

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
P-276	8.32	P-106	0.00
P-278	8.23	P-148	0.00
P-115	5.99	P-110	0.00
P-270	5.54	P-65	0.00
P-257	5.37	P-260	0.00

REGULATING VALVE REPORT

VALVE LABEL	VALVE TYPE	VALVE SETTING (psi or gpm)	VALVE STATUS	UPSTREAM PRESSURE (psi)	DOWNSTREAM PRESSURE (psi)	THROUGH FLOW (gpm)
RV-1	PRV-1	98.00	ACTIVATED	233.69	98.00	25.80
RV-2	PRV-1	70.00	ACTIVATED	213.68	70.00	3.15
RV-3	PRV-1	70.00	ACTIVATED	214.54	70.00	0.90
RV-4	PRV-1	100.00	ACTIVATED	236.84	100.00	5.10
RV-5	PRV-1	145.00	ACTIVATED	262.85	145.00	11.10
RV-6	PRV-1	90.00	WIDE OPEN	138.23	138.23	0.00

SUMMARY OF INFLOWS AND OUTFLOWS

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE (gpm)	NODE TITLE
R-1	207.52	
T-1	10.81	
T-2	121.42	Cemetery Tan
T-3	-53.52	Dehart Tank
T-4	18.60	Wrigley Tank

NET SYSTEM INFLOW = 358.35
 NET SYSTEM OUTFLOW = -53.52
 NET SYSTEM DEMAND = 304.82

=====
 Case: 3

CHANGES FOR NEXT SIMULATION (Change Number = 3)

Demand added to end of Flat Rock Rd. J-243
 to show flushing velocity of 2.5 fps

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 6 TRIALS: ACCURACY = 0.00001

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE #1	NODE #2	FLOWRATE (gpm)	HEAD LOSS (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL+ML/1000 (ft/ft)	HL/1000 (ft/ft)
P-1	J-5	O-WTP	-206.79	22.00	0.00	2.35	4.64	4.64

P-10	J-2	J-9	73.05	0.42	0.00	0.47	0.17	0.17
P-100	J-94	J-95	0.00	0.00	0.00	0.00	0.00	0.00
P-101	J-96	J-94	56.73	0.39	0.00	0.64	0.42	0.42
P-102	J-97	J-96	56.85	0.55	0.00	0.65	0.42	0.42
P-103	J-97	J-98	0.00	0.00	0.00	0.00	0.00	0.00
P-104	J-93	J-110	6.30	0.02	0.00	0.07	0.01	0.01
P-105	J-93	J-101	47.40	0.64	0.00	0.54	0.30	0.30
P-106	J-101	J-100	0.22	0.00	0.00	0.00	0.00	0.00
P-107	J-101	J-139	46.95	0.28	0.00	0.53	0.30	0.30
P-108	J-102	J-104	0.15	0.00	0.00	0.01	0.00	0.00
P-109	J-102	J-103	45.39	0.68	0.00	0.51	0.28	0.28
P-11	J-9	T-2	-77.20	0.49	0.00	0.88	0.75	0.75
P-110	J-103	J-105	0.38	0.00	0.00	0.00	0.00	0.00
P-111	J-103	J-237	43.88	1.45	0.00	0.50	0.26	0.26
P-112	J-107	J-225	0.97	0.01	0.00	0.02	0.00	0.00
P-113	J-107	J-109	41.47	6.30	0.00	1.06	1.71	1.71
P-114	J-109	J-106	1.73	0.03	0.00	0.08	0.02	0.02
P-115	J-109	J-244	38.33	17.94	0.00	1.74	5.99	5.99
P-116	J-110	J-99	2.02	0.10	0.00	0.09	0.03	0.03
P-117	J-110	J-112	1.88	0.00	0.00	0.02	0.00	0.00
P-118	J-99	J-113	0.22	0.00	0.00	0.01	0.00	0.00
P-119	J-99	J-115	0.52	0.01	0.00	0.02	0.00	0.00
P-12	J-9	J-32	148.75	2.55	0.00	1.69	2.52	2.52
P-120	J-194	J-10	0.00	0.00	0.00	0.00	0.00	0.00
P-121	J-112	I-Pump-3	0.00	0.00	0.00	0.00	0.00	0.00
P-122	J-116	J-114	0.00	0.00	0.00	0.00	0.00	0.00
P-123	J-118	J-117	0.22	0.00	0.00	0.01	0.00	0.00
P-124	J-118	J-120	0.22	0.00	0.00	0.01	0.00	0.00
P-125	J-116	J-119	-7.20	0.02	0.00	0.08	0.01	0.01
P-126	J-114	J-178	0.00	0.00	0.00	0.00	0.00	0.00
P-127	J-114	J-123	0.00	0.00	0.00	0.00	0.00	0.00
P-128	J-119	J-125	0.38	0.00	0.00	0.02	0.00	0.00
P-129	J-119	J-124	-7.95	0.10	0.00	0.09	0.01	0.01
P-13	J-1	J-17	9.98	0.05	0.00	0.11	0.02	0.02
P-130	J-132	I-RV-5	11.10	0.13	0.00	0.50	0.60	0.60
P-131	J-122	J-126	0.60	0.00	0.00	0.02	0.00	0.00
P-132	J-122	J-228	9.90	0.02	0.00	0.11	0.02	0.02
P-133	J-127	J-128	4.95	0.01	0.00	0.06	0.00	0.00
P-134	J-129	J-4	56.32	0.29	0.00	0.64	0.42	0.42
P-135	J-213	J-97	57.00	1.49	0.00	0.65	0.43	0.43
P-136	J-131	J-130	1.05	0.00	0.00	0.01	0.00	0.00
P-137	J-131	J-169	3.68	0.07	0.00	0.09	0.02	0.02
P-138	J-132	J-68	136.68	8.26	0.00	1.55	2.16	2.16
P-139	J-189	J-118	1.35	0.03	0.00	0.06	0.01	0.01
P-14	J-1	T-3	11.96	0.06	0.00	0.14	0.02	0.02
P-140	O-Pump-3	J-190	0.00	0.00	0.00	0.00	0.00	0.00
P-141	J-178	J-134	0.00	0.00	0.00	0.00	0.00	0.00
P-142	J-124	J-180	-7.95	0.05	0.00	0.09	0.01	0.01
P-143	J-135	J-188	1.35	0.01	0.00	0.03	0.00	0.00
P-144	J-135	J-187	6.07	0.22	0.00	0.16	0.05	0.05
P-145	J-135	J-138	0.75	0.00	0.00	0.02	0.00	0.00
P-146	J-138	J-137	0.30	0.00	0.00	0.01	0.00	0.00
P-147	J-139	J-102	46.28	0.91	0.00	0.53	0.29	0.29
P-148	J-139	J-141	0.22	0.00	0.00	0.00	0.00	0.00
P-149	J-73	J-140	0.38	0.00	0.00	0.02	0.00	0.00
P-15	J-11	J-10	2.93	0.00	0.00	0.03	0.00	0.00
P-150	O-RV-1	J-71	79.65	3.95	0.00	0.90	0.79	0.79
P-151	J-142	J-90	18.83	0.36	0.00	0.21	0.05	0.05
P-152	J-142	J-192	54.90	11.31	0.00	2.49	11.65	11.65
P-153	J-144	J-80	14.70	0.10	0.00	0.17	0.03	0.03
P-154	J-144	J-145	0.45	0.00	0.00	0.02	0.00	0.00
P-155	J-146	J-87	4.35	0.15	0.00	0.20	0.11	0.11
P-156	J-146	J-148	0.15	0.00	0.00	0.01	0.00	0.00
P-157	J-147	J-135	9.75	0.15	0.00	0.11	0.02	0.02
P-158	J-148	J-150	0.08	0.00	0.00	0.00	0.00	0.00
P-159	J-149	J-151	1.95	0.10	0.00	0.09	0.02	0.02
P-16	J-12	J-11	3.38	0.01	0.00	0.04	0.00	0.00
P-160	J-149	J-152	0.15	0.00	0.00	0.01	0.00	0.00
P-161	J-151	J-89	0.30	0.00	0.00	0.01	0.00	0.00
P-162	J-151	J-154	0.30	0.00	0.00	0.01	0.00	0.00
P-163	J-55	J-153	0.38	0.00	0.00	0.01	0.00	0.00
P-164	O-RV-2	J-62	3.15	0.00	0.00	0.04	0.00	0.00
P-165	O-RV-3	J-69	0.90	0.01	0.00	0.04	0.01	0.01
P-166	O-RV-4	J-232	5.10	0.04	0.00	0.13	0.04	0.04
P-167	J-128	J-156	1.12	0.01	0.00	0.03	0.00	0.00
P-168	J-156	J-155	0.08	0.00	0.00	0.00	0.00	0.00
P-169	J-128	J-159	2.47	0.11	0.00	0.11	0.04	0.04
P-17	J-13	J-12	3.60	0.00	0.00	0.04	0.00	0.00
P-170	J-157	J-158	0.30	0.00	0.00	0.01	0.00	0.00
P-171	J-159	J-157	0.90	0.01	0.00	0.04	0.01	0.01
P-172	J-159	J-160	0.45	0.00	0.00	0.02	0.00	0.00
P-173	O-Pump-5	J-161	2.40	0.08	0.00	0.11	0.04	0.04
P-174	J-127	I-Pump-5	2.40	0.00	0.00	0.03	0.00	0.00
P-175	J-161	J-162	0.68	0.00	0.00	0.01	0.00	0.00
P-176	J-162	J-163	0.15	0.00	0.00	0.01	0.00	0.00
P-177	J-162	J-165	0.15	0.00	0.00	0.01	0.00	0.00
P-178	J-161	J-183	0.97	0.01	0.00	0.04	0.01	0.01
P-179	J-164	J-127	7.35	0.02	0.00	0.08	0.01	0.01
P-18	J-14	J-13	3.90	0.01	0.00	0.04	0.00	0.00
P-180	J-164	J-185	0.83	0.00	0.00	0.04	0.00	0.00

P-181	J-168	J-164	8.55	0.01	0.00	0.10	0.01	0.01
P-182	J-168	J-170	0.45	0.00	0.00	0.01	0.00	0.00
P-183	O-Pump-4	J-131	6.15	0.00	0.00	0.07	0.01	0.01
P-184	J-169	J-133	2.78	0.02	0.00	0.07	0.01	0.01
P-185	J-169	J-172	0.15	0.00	0.00	0.01	0.00	0.00
P-186	J-133	J-171	2.55	0.02	0.00	0.07	0.01	0.01
P-187	J-171	J-175	1.73	0.01	0.00	0.04	0.00	0.00
P-188	J-171	J-174	0.22	0.01	0.00	0.02	0.00	0.00
P-189	J-175	J-173	1.35	0.00	0.00	0.03	0.00	0.00
P-19	J-15	J-14	4.65	0.02	0.00	0.05	0.00	0.00
P-190	J-173	J-176	1.12	0.01	0.00	0.03	0.00	0.00
P-191	J-176	J-177	0.38	0.00	0.00	0.02	0.00	0.00
P-192	J-176	J-179	0.08	0.00	0.00	0.00	0.00	0.00
P-193	J-180	J-147	10.65	0.07	0.00	0.12	0.02	0.02
P-194	J-180	T-4	-18.60	0.04	0.00	0.21	0.05	0.05
P-195	J-183	J-184	0.75	0.01	0.00	0.03	0.00	0.00
P-196	J-182	J-27	44.20	0.50	0.00	0.50	0.27	0.27
P-197	J-181	J-182	44.65	0.00	0.00	0.51	0.27	0.27
P-198	J-184	J-166	0.30	0.00	0.00	0.01	0.00	0.00
P-199	J-185	J-167	0.22	0.00	0.00	0.01	0.00	0.00
P-2	J-3	J-197	88.35	0.25	0.00	0.56	0.24	0.24
P-20	J-16	J-15	6.90	0.03	0.00	0.08	0.01	0.01
P-200	J-186	J-136	1.58	0.03	0.00	0.04	0.00	0.00
P-201	J-187	J-186	4.12	0.10	0.00	0.11	0.02	0.02
P-202	J-188	J-121	0.45	0.00	0.00	0.01	0.00	0.00
P-203	J-190	J-116	-6.90	0.01	0.00	0.08	0.01	0.01
P-204	J-190	J-191	6.45	0.23	0.00	0.16	0.05	0.05
P-205	J-191	J-196	4.73	1.24	0.00	0.21	0.12	0.12
P-206	J-192	J-143	0.08	0.00	0.00	0.00	0.00	0.00
P-207	J-192	J-241	54.53	8.08	0.00	2.47	11.50	11.50
P-208	J-106	J-224	0.83	0.01	0.00	0.04	0.00	0.00
P-209	J-147	J-195	0.45	0.01	0.00	0.02	0.00	0.00
P-21	J-17	J-16	9.45	0.03	0.00	0.11	0.02	0.02
P-210	J-196	J-189	2.10	0.04	0.00	0.10	0.03	0.03
P-211	J-196	J-198	0.30	0.00	0.00	0.01	0.00	0.00
P-212	J-197	J-6	79.51	0.08	0.00	0.50	0.19	0.19
P-213	J-197	J-207	8.64	0.05	0.00	0.22	0.09	0.09
P-214	J-200	J-226	82.35	0.05	0.00	0.53	0.21	0.21
P-215	J-199	J-208	5.74	0.02	0.00	0.15	0.04	0.04
P-216	J-199	J-202	1.85	0.00	0.00	0.05	0.01	0.01
P-217	J-201	J-204	8.28	0.02	0.00	0.21	0.09	0.09
P-218	J-202	J-205	-1.96	0.00	0.00	0.05	0.01	0.01
P-219	J-201	J-211	-2.91	0.00	0.00	0.13	0.05	0.05
P-22	J-18	J-44	25.45	0.08	0.00	0.29	0.10	0.10
P-220	J-202	J-203	0.15	0.00	0.00	0.01	0.00	0.00
P-221	J-204	J-200	9.26	0.02	0.00	0.24	0.11	0.11
P-222	J-205	J-209	-4.15	0.00	0.00	0.11	0.02	0.02
P-223	J-204	J-205	-1.51	0.05	0.00	0.15	0.11	0.11
P-224	J-205	J-206	0.15	0.00	0.00	0.02	0.00	0.00
P-225	J-207	J-199	8.04	0.04	0.00	0.21	0.08	0.08
P-226	J-208	J-201	5.59	0.01	0.00	0.14	0.04	0.04
P-227	J-209	J-6	-4.22	0.00	0.00	0.11	0.02	0.02
P-228	J-210	J-7	30.23	0.05	0.00	0.34	0.13	0.13
P-229	J-202	J-211	3.21	0.02	0.00	0.15	0.06	0.06
P-23	J-19	J-18	26.65	0.31	0.00	0.30	0.10	0.10
P-230	J-212	I-Pump-4	6.15	0.01	0.00	0.07	0.01	0.01
P-231	J-210	J-212	7.50	0.00	0.00	0.09	0.01	0.01
P-232	J-213	J-219	-5.60	0.02	0.00	0.25	0.17	0.17
P-233	J-215	J-217	43.66	0.07	0.00	0.50	0.26	0.26
P-234	J-215	J-214	-47.87	0.07	0.00	0.54	0.31	0.31
P-235	J-214	J-223	-47.87	0.14	0.00	0.54	0.31	0.31
P-236	J-214	J-216	0.00	0.00	0.00	0.00	0.00	0.00
P-237	J-217	J-210	40.96	0.08	0.00	0.46	0.23	0.23
P-238	J-217	J-218	0.00	0.00	0.00	0.00	0.00	0.00
P-239	J-219	J-221	-5.60	0.02	0.00	0.25	0.17	0.17
P-24	J-20	J-19	27.40	0.21	0.00	0.31	0.11	0.11
P-240	J-219	J-220	0.00	0.00	0.00	0.00	0.00	0.00
P-241	J-221	J-215	-5.60	0.04	0.00	0.25	0.17	0.17
P-242	J-222	J-129	-47.87	0.03	0.00	0.54	0.31	0.31
P-243	J-223	J-222	-47.87	0.05	0.00	0.54	0.31	0.31
P-244	O-Pump-6	J-107	43.50	0.09	0.00	1.11	1.86	1.86
P-245	J-226	J-74	80.25	0.20	0.00	0.51	0.20	0.20
P-246	J-226	J-227	0.15	0.00	0.00	0.02	0.00	0.00
P-247	J-228	J-168	9.45	0.02	0.00	0.11	0.02	0.02
P-248	J-228	J-230	0.22	0.00	0.00	0.01	0.00	0.00
P-249	J-229	J-122	11.10	0.05	0.00	0.13	0.02	0.02
P-25	J-21	J-20	30.10	0.24	0.00	0.34	0.13	0.13
P-250	O-RV-5	J-229	11.10	0.17	0.00	0.50	0.60	0.60
P-251	J-225	J-108	0.22	0.00	0.00	0.01	0.00	0.00
P-252	J-57	J-238	0.00	0.00	0.00	0.00	0.00	0.00
P-253	J-231	J-56	-0.38	0.00	0.00	0.01	0.00	0.00
P-254	J-232	J-63	3.00	0.02	0.00	0.08	0.01	0.01
P-255	J-232	J-233	0.00	0.00	0.00	0.00	0.00	0.00
P-256	J-224	J-234	0.22	0.00	0.00	0.01	0.00	0.00
P-257	J-235	J-111	36.15	5.74	0.00	1.64	5.37	5.37
P-258	J-236	J-77	0.15	0.00	0.00	0.01	0.00	0.00
P-259	J-237	I-Pump-6	43.50	0.02	0.00	1.11	1.86	1.86
P-26	J-22	J-21	33.55	0.19	0.00	0.38	0.16	0.16
P-260	J-238	J-231	-0.15	0.00	0.00	0.00	0.00	0.00
P-261	J-57	I-RV-6	0.00	0.00	0.00	0.00	0.00	0.00

P-262	J-56	J-239	0.00	0.00	0.00	0.00	0.00	0.00
P-263	O-RV-6	J-240	0.00	0.00	0.00	0.32	0.00	0.00
P-264	J-241	J-193	0.00	0.00	0.00	0.35	0.00	0.00
P-265	J-241	J-242	54.22	11.57	0.00	2.46	11.38	11.38
P-266	J-242	J-243	54.00	20.31	0.00	2.45	11.30	11.30
P-27	J-23	J-22	34.00	0.29	0.00	0.39	0.16	0.16
P-270	J-244	J-235	36.75	20.08	0.00	1.67	5.54	5.54
P-271	J-244	J-247	0.33	0.00	0.00	0.32	0.00	0.00
P-272	J-246	J-149	0.30	0.16	0.00	0.15	0.06	0.06
P-273	J-246	J-249	0.00	0.00	0.00	0.01	0.00	0.00
P-274	J-248	J-250	0.38	0.00	0.00	0.07	0.00	0.00
P-275	J-74	J-8	76.89	0.10	0.00	0.49	0.18	0.18
P-276	J-74	J-252	1.05	0.00	0.00	0.03	0.00	0.00
P-277	J-252	J-251	0.00	0.00	0.00	0.00	0.00	0.00
P-278	J-252	J-253	0.52	0.00	0.00	0.01	0.00	0.00
P-28	J-24	J-23	34.45	0.19	0.00	0.39	0.17	0.17
P-29	J-25	J-24	37.30	0.79	0.00	0.42	0.19	0.19
P-3	J-3	J-129	109.81	0.34	0.00	1.25	1.44	1.44
P-30	J-26	J-25	38.50	0.33	0.00	0.44	0.21	0.21
P-31	J-27	J-54	40.60	0.56	0.00	0.46	0.23	0.23
P-32	J-28	J-181	44.65	0.10	0.00	0.31	0.27	0.27
P-33	J-29	J-67	49.75	0.47	0.00	0.36	0.33	0.33
P-34	J-30	J-29	55.30	0.66	0.00	0.63	0.40	0.40
P-35	J-31	I-Pump-1	148.00	0.74	0.00	1.68	2.50	2.50
P-36	J-32	J-31	148.38	8.74	0.00	1.68	2.51	2.51
P-37	O-Pump-1	J-132	148.00	0.55	0.00	1.68	2.50	2.50
P-38	J-10	J-34	2.40	0.02	0.00	0.06	0.01	0.01
P-39	J-34	J-39	0.60	0.00	0.00	0.03	0.00	0.00
P-4	J-4	J-215	3.80	0.00	0.00	0.04	0.00	0.00
P-40	J-34	J-37	1.13	0.04	0.00	0.05	0.01	0.01
P-41	J-33	J-35	0.15	0.00	0.00	0.01	0.00	0.00
P-42	J-37	J-33	0.53	0.01	0.00	0.02	0.00	0.00
P-43	J-38	J-36	0.15	0.00	0.00	0.01	0.00	0.00
P-44	J-39	J-38	0.45	0.00	0.00	0.02	0.00	0.00
P-45	J-15	J-41	0.90	0.02	0.00	0.04	0.01	0.01
P-46	J-41	J-40	0.22	0.00	0.00	0.01	0.00	0.00
P-47	J-16	J-43	1.80	0.06	0.00	0.08	0.02	0.02
P-48	J-43	J-42	0.90	0.04	0.00	0.04	0.01	0.01
P-49	J-44	J-1	23.13	0.07	0.00	0.26	0.08	0.08
P-5	J-5	J-3	205.66	7.71	0.00	2.33	4.60	4.60
P-50	J-44	J-46	2.10	0.03	0.00	0.10	0.03	0.03
P-51	J-46	J-45	1.05	0.04	0.00	0.05	0.01	0.01
P-52	J-18	J-49	0.45	0.00	0.00	0.01	0.00	0.00
P-53	J-49	J-47	0.00	0.00	0.00	0.00	0.00	0.00
P-54	J-20	J-48	1.20	0.01	0.00	0.03	0.00	0.00
P-55	J-48	J-50	0.22	0.00	0.00	0.01	0.00	0.00
P-56	J-21	J-51	1.88	0.02	0.00	0.05	0.01	0.01
P-57	J-51	J-52	0.38	0.00	0.00	0.01	0.00	0.00
P-58	J-24	J-53	0.75	0.01	0.00	0.03	0.00	0.00
P-59	J-54	J-26	38.50	0.15	0.00	0.44	0.21	0.21
P-6	J-6	J-200	73.76	0.08	0.00	0.47	0.17	0.17
P-60	J-54	J-56	1.12	0.00	0.00	0.03	0.00	0.00
P-61	J-27	J-55	2.55	0.02	0.00	0.12	0.04	0.04
P-62	J-55	J-58	0.75	0.00	0.00	0.02	0.00	0.00
P-63-XX	J-58	J-57						
P-64	J-28	I-RV-2	3.15	0.00	0.00	0.04	0.00	0.00
P-65	J-59	J-60	0.38	0.00	0.00	0.00	0.00	0.00
P-66	J-59	J-61	0.45	0.01	0.00	0.02	0.00	0.00
P-67	J-62	J-59	2.03	0.00	0.00	0.02	0.00	0.00
P-68	J-62	J-64	0.00	0.00	0.00	0.00	0.00	0.00
P-69	J-29	I-RV-4	5.10	0.01	0.00	0.13	0.04	0.04
P-7	J-7	T-1	28.43	0.05	0.00	0.32	0.12	0.12
P-70	J-63	J-65	1.05	0.01	0.00	0.03	0.00	0.00
P-71	J-66	J-28	48.10	0.34	0.00	0.55	0.31	0.31
P-72	J-67	J-66	48.48	0.29	0.00	0.55	0.32	0.32
P-73	J-67	I-RV-3	0.90	0.00	0.00	0.04	0.01	0.01
P-74	J-68	J-30	55.60	0.28	0.00	0.63	0.41	0.41
P-75	J-68	J-73	80.85	2.90	0.00	0.92	0.82	0.82
P-76	J-71	J-70	1.50	0.09	0.00	0.07	0.01	0.01
P-77	J-71	J-142	74.70	2.87	0.00	0.85	0.70	0.70
P-78	J-73	I-RV-1	79.65	0.93	0.00	0.90	0.79	0.79
P-79	J-72	J-248	1.05	0.02	0.00	0.05	0.01	0.01
P-8	J-8	J-2	75.30	0.21	0.00	0.48	0.18	0.18
P-80	J-75	J-72	1.35	0.02	0.00	0.06	0.01	0.01
P-81	J-75	J-236	0.60	0.01	0.00	0.03	0.00	0.00
P-82	J-76	J-75	2.55	0.10	0.00	0.12	0.04	0.04
P-83	J-76	J-78	0.22	0.00	0.00	0.01	0.00	0.00
P-84	J-79	J-76	3.30	0.03	0.00	0.08	0.02	0.02
P-85	J-79	J-81	0.22	0.00	0.00	0.01	0.00	0.00
P-86	J-80	J-79	4.50	0.15	0.00	0.11	0.03	0.03
P-87	J-80	J-82	8.55	0.24	0.00	0.22	0.09	0.09
P-88	J-82	J-83	5.92	0.41	0.00	0.15	0.05	0.05
P-89	J-82	J-85	0.38	0.00	0.00	0.02	0.00	0.00
P-9	I-WTP	R-1	-206.79	2.37	0.00	2.35	4.64	4.64
P-90	J-83	J-84	0.15	0.00	0.00	0.01	0.00	0.00
P-91	J-83	J-146	4.50	0.17	0.00	0.20	0.11	0.11
P-92	J-87	J-86	0.22	0.00	0.00	0.01	0.00	0.00
P-93	J-87	J-246	3.83	0.08	0.00	0.17	0.08	0.08
P-94	J-88	J-144	15.90	0.15	0.00	0.18	0.04	0.04
P-95	J-88	J-91	0.68	0.01	0.00	0.03	0.00	0.00

P-96	J-90	J-98	17.70	0.21	0.00	0.22	0.05	0.05
P-97	J-90	J-91	0.22	0.99	0.00	0.01	0.00	0.00
P-98	J-4	J-213	51.40	0.08	0.00	0.58	0.35	0.35
P-99	J-94	J-93	55.58	2.55	0.00	0.63	0.41	0.41

P U M P / L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE (gpm)	INLET HEAD (ft)	OUTLET HEAD (ft)	PUMP HEAD (ft)	EFFIC- ENCY (%)	USEFUL POWER (Hp)	INCREMTL COST (\$)	TOTAL COST (\$)	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. (ft)
Pump-1	148.00	237.48	590.11	352.6	75.00	0.	0.0	0.0	**	**	270.6
Device "Pump-3" is closed											
Pump-3	0.00	145.17	344.78	0.0	75.00	0.	0.0	0.0	**	**	178.4
Pump-4	6.15	200.09	292.19	92.1	75.00	0.	0.0	0.0	**	**	233.3
Pump-5	2.40	124.33	318.11	193.8	75.00	0.	0.0	0.0	**	**	157.5
Pump-6	43.50	161.22	347.11	185.9	75.00	0.	0.0	0.0	**	**	194.4
WTP	206.79	2.63	245.60	243.0	75.00	0.	0.0	0.0	**	**	35.7

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	NODE ELEVATION (ft)	PRESSURE HEAD (ft)	NODE PRESSURE (psi)
J-1		1.20	1275.06	885.00	390.06	169.03
J-10		0.52	1274.91	1080.00	194.91	84.46
J-100		0.22	944.55	770.00	174.55	75.64
J-101		0.22	944.55	750.00	194.55	84.30
J-102		0.75	943.36	750.00	193.36	83.79
J-103		1.12	942.69	760.00	182.69	79.16
J-104		0.15	943.36	780.00	163.36	70.79
J-105		0.38	942.69	860.00	82.69	35.83
J-106		0.90	1120.69	830.00	290.69	125.96
J-107		1.05	1127.02	780.00	347.02	150.37
J-108		0.22	1127.01	880.00	247.01	107.04
J-109		1.42	1120.72	800.00	320.72	138.98
J-11		0.45	1274.92	1130.00	144.92	62.80
J-110		2.40	945.17	750.00	195.17	84.57
J-111		36.15	1076.96	920.00	156.96	68.01
J-112		1.88	945.17	790.00	155.17	67.24
J-113		0.22	945.07	840.00	105.07	45.53
J-114		0.00	1144.79	810.00	334.79	145.08
J-115		0.52	945.06	840.00	105.06	45.53
J-116		0.30	1144.79	810.00	334.79	145.08
J-117		0.22	1143.24	900.00	243.24	105.41
J-118		0.90	1143.24	870.00	273.24	118.41
J-119		0.38	1144.81	820.00	324.81	140.75
J-12		0.22	1274.92	1100.00	174.92	75.80
J-120		0.22	1143.24	920.00	223.24	96.74
J-121		0.45	1144.73	820.00	324.73	140.72
J-122		0.60	1034.40	760.00	274.40	118.91
J-123		0.00	1144.79	880.00	264.79	114.74
J-124		0.00	1144.91	1000.00	144.91	62.80
J-125		0.38	1144.81	900.00	244.81	106.08
J-126		0.60	1034.40	860.00	174.40	75.57
J-127		0.00	1034.33	910.00	124.33	53.87
J-128		1.35	1034.31	820.00	214.31	92.87
J-129		5.62	950.54	740.00	210.54	91.23
J-13		0.30	1274.92	1180.00	94.92	41.13
J-130		1.05	1042.19	760.00	282.19	122.28
J-131		1.42	1042.19	770.00	272.19	117.95
J-132		0.22	1289.57	700.00	589.57	255.48
J-133		0.22	1042.10	840.00	202.10	87.58
J-134		0.00	1144.79	900.00	244.79	106.08
J-135		1.58	1144.74	815.00	329.74	142.89
J-136		1.58	1144.39	900.00	244.39	105.90
J-137		0.30	1144.74	960.00	184.74	80.05
J-138		0.45	1144.74	850.00	294.74	127.72
J-139		0.45	944.27	750.00	194.27	84.18
J-14		0.75	1274.93	1100.00	174.93	75.80
J-140		0.38	1278.40	1000.00	278.40	120.64
J-141		0.22	944.27	780.00	164.27	71.18
J-142		0.97	979.33	700.00	279.33	121.04
J-143		0.08	968.02	700.00	268.02	116.14
J-144		0.75	978.60	715.00	263.60	114.23
J-145		0.45	978.60	750.00	228.60	99.06
J-146		0.00	977.70	780.00	197.70	85.67
J-147		0.45	1144.89	860.00	284.89	123.45
J-148		0.08	977.70	800.00	177.70	77.00
J-149		1.20	977.31	780.00	197.31	85.50
J-15		1.35	1274.95	1100.00	174.95	75.81
J-150		0.08	977.70	820.00	157.70	68.33
J-151		1.35	977.21	840.00	137.21	59.46

J-152	0.15	977.31	840.00	137.31	59.50	
J-153	0.38	1278.44	880.00	398.44	172.66	
J-154	0.30	977.21	840.00	137.21	59.46	
J-155	0.08	1034.31	700.00	334.31	144.87	
J-156	1.05	1034.31	700.00	334.31	144.87	
J-157	0.60	1034.19	820.00	214.19	92.82	
J-158	0.30	1034.19	850.00	184.19	79.81	
J-159	1.12	1034.20	810.00	224.20	97.15	
J-16	0.75	1274.98	1110.00	164.98	71.49	
J-160	0.45	1034.20	875.00	159.20	68.99	
J-161	0.75	1228.03	1020.00	208.03	90.15	
J-162	0.38	1228.03	1020.00	208.03	90.15	
J-163	0.15	1228.03	1020.00	208.03	90.15	
J-164	0.38	1034.35	840.00	194.35	84.22	
J-165	0.15	1228.03	880.00	348.03	150.81	
J-166	0.30	1228.01	980.00	248.01	107.47	
J-167	0.22	1034.34	850.00	184.34	79.88	
J-168	0.45	1034.36	800.00	234.36	101.56	
J-169	0.75	1042.12	850.00	192.12	83.25	
J-17	0.52	1275.01	960.00	315.01	136.51	
J-170	0.45	1034.36	820.00	214.36	92.89	
J-171	0.60	1042.08	800.00	242.08	104.90	
J-172	0.15	1042.12	860.00	182.12	78.92	
J-173	0.22	1042.07	860.00	182.07	78.90	
J-174	0.22	1042.08	860.00	182.08	78.90	
J-175	0.38	1042.07	795.00	247.07	107.06	
J-176	0.68	1042.06	820.00	222.06	96.23	
J-177	0.38	1042.06	880.00	162.06	70.23	
J-178	0.00	1144.79	850.00	294.79	127.74	
J-179	0.08	1042.06	835.00	207.06	89.73	
J-18	0.75	1275.21	920.00	355.21	153.93	
J-180	0.00	1144.96	900.00	244.96	106.15	
J-181	0.00	1278.96				
J-182	0.45	1278.96				
J-183	0.22	1228.02	1040.00	188.02	81.48	
J-184	0.45	1228.02	1040.00	188.02	81.47	
J-185	0.60	1034.34	920.00	114.34	49.55	
J-186	2.55	1144.42	850.00	294.42	127.58	
J-187	1.95	1144.52	825.00	319.52	138.46	
J-188	0.90	1144.73	800.00	344.73	149.38	
J-189	Neal Howard'	0.75	1143.27	850.00	293.27	127.09
J-19	0.75	1275.52	1020.00	255.52	110.73	
J-190	0.45	1144.78	800.00	344.78	149.41	
J-191	1.73	1144.55	790.00	354.55	153.64	
J-192	0.30	968.02	690.00	278.02	120.48	
J-193	0.08	959.95	740.00	219.95	95.31	
J-194	0.00	1274.91	1080.00	194.91	84.46	
J-195	0.45	1144.88	1000.00	144.88	62.78	
J-196	2.33	1143.32	830.00	313.32	135.77	
J-197	1.20	950.63	760.00	190.63	82.61	
J-198	0.30	1143.32	880.00	263.32	114.10	
J-199	0.45	950.54	760.00	190.54	82.57	
J-2	2.25	949.92	700.00	249.92	108.30	
J-20	1.50	1275.73	1060.00	215.73	93.48	
J-200	0.68	950.47	760.00	190.47	82.54	
J-201	0.22	950.51	760.00	190.51	82.56	
J-202	0.45	950.54	760.00	190.54	82.57	
J-203	0.15	950.54	760.00	190.54	82.57	
J-204	0.52	950.49	760.00	190.49	82.55	
J-205	0.52	950.54	760.00	190.54	82.57	
J-206	0.15	950.54	760.00	190.54	82.57	
J-207	0.60	950.58	760.00	190.58	82.58	
J-208	0.15	950.52	760.00	190.52	82.56	
J-209	0.08	950.55	760.00	190.55	82.57	
J-21	1.58	1275.97	1050.00	225.97	97.92	
J-210	3.22	950.10	780.00	170.10	73.71	
J-211	0.30	950.52	760.00	190.52	82.56	
J-212	1.35	950.10				
J-213	0.00	950.17	780.00	170.17	73.74	
J-214	0.00	950.32	760.00	190.32	82.47	
J-215	2.40	950.25	780.00	170.25	73.77	
J-216	0.00	950.32	760.00	190.32	82.47	
J-217	2.70	950.18	780.00	170.18	73.74	
J-218	0.00	950.18	760.00	190.18	82.41	
J-219	0.00	950.19	780.00	170.19	73.75	
J-22	0.45	1276.17	980.00	296.17	128.34	
J-220	0.00	950.19	780.00	170.19	73.75	
J-221	0.00	950.21	780.00	170.21	73.76	
J-222	0.00	950.52	740.00	210.52	91.22	
J-223	0.00	950.46	740.00	210.46	91.20	
J-224	0.60	1120.67	850.00	270.67	117.29	
J-225	0.75	1127.01	860.00	267.01	115.70	
J-226	1.95	950.42	770.00	180.42	78.18	
J-227	0.15	950.42	800.00	150.42	65.18	
J-228	0.22	1034.38	820.00	214.38	92.90	
J-229	0.00	1034.45	700.00	334.45	144.93	
J-23	0.45	1276.45	1080.00	196.45	85.13	
J-230	0.22	1034.38	860.00	174.38	75.56	
J-231	0.22	1277.89	1025.00	252.89	109.59	
J-232	2.10	980.72	800.00	180.72	78.31	

C-233	0.00	990.72	860.00	120.72	52.31
C-234	0.22	1120.67	900.00	220.67	95.62
C-235	0.60	1082.70	870.00	212.70	92.17
C-236	0.45	978.22	775.00	203.22	88.06
C-237	0.38	941.24	780.00	161.24	69.87
C-238	0.15	1277.89	970.00	307.89	133.42
C-239	0.00	1277.89	960.00	317.89	137.75
J-24	2.10	1276.64	1020.00	256.64	111.21
C-240	0.00	1277.89	840.00	437.89	189.75
C-241	0.22	959.95	700.00	259.95	112.64
C-242	0.22	948.38	740.00	208.38	90.30
C-243	54.00 (**)	928.07	760.00	168.07	72.83
C-244	1.20	1102.78	850.00	252.78	109.54
C-246	0.45	977.47	740.00	237.47	102.90
C-247	0.38	1102.78	880.00	222.78	96.54
C-248	0.68	978.18	776.00	202.18	87.61
C-249	0.08	977.47	775.00	202.47	87.74
J-25	1.20	1277.42	980.00	397.42	172.22
C-250	0.38	978.18	800.00	178.18	77.21
C-251	0.00	950.22	800.00	150.22	65.10
C-252	0.52	950.22	780.00	170.22	73.76
C-253	0.52	950.22	880.00	70.22	30.43
J-26	0.00	1277.75	1020.00	257.75	111.69
J-27	1.05	1278.46	875.00	403.46	174.83
J-28	0.30	1279.06	900.00	479.06	207.59
J-29	0.45	1280.16	780.00	500.16	216.74
J-3	7.50	950.88	700.00	250.88	108.72
J-30	0.30	1281.03	680.00	601.03	260.44
J-31	0.38	938.22	700.00	238.22	103.23
J-32	0.38	946.95	800.00	146.95	63.68
J-33	0.38	1274.84	1085.00	189.84	82.26
J-34	0.68	1274.89	1150.00	124.89	54.12
J-35	0.15	1274.84	1040.00	234.84	101.76
J-36	0.15	1274.89	1140.00	134.89	58.45
J-37	0.60	1274.85	1170.00	104.85	45.43
J-38	0.30	1274.89	1170.00	104.89	45.45
J-39	0.15	1274.89	1110.00	164.89	71.45
J-4	1.12	950.25	780.00	170.25	73.77
J-40	0.22	1274.93	1020.00	254.93	110.47
J-41	0.68	1274.93	1090.00	184.93	80.14
J-42	0.90	1274.88	860.00	414.88	179.78
J-43	0.90	1274.92	1130.00	144.92	62.80
J-44	0.22	1275.13	885.00	390.13	169.06
J-45	1.05	1275.06	940.00	335.06	145.19
J-46	1.05	1275.11	1030.00	245.11	106.21
J-47	0.00	1275.21	900.00	375.21	162.59
J-48	0.97	1275.72	890.00	385.72	167.15
J-49	0.45	1275.21	680.00	595.21	257.92
J-5	1.12	958.60	680.00	278.60	120.73
J-50	0.22	1275.72	940.00	335.72	145.48
J-51	1.50	1275.95	890.00	385.95	167.25
J-52	0.38	1275.95	960.00	315.95	136.91
J-53	0.75	1276.63	870.00	406.63	176.21
J-54	0.97	1277.90	1000.00	277.90	120.42
J-55	1.42	1278.44	830.00	448.44	194.32
J-56	0.75	1277.89	980.00	297.89	129.09
J-57	0.00 (0.00)	1277.89	970.00	307.89	133.42
J-58	0.75 (0.91)	1278.43	980.00	298.43	129.32
J-59	1.20	961.53	750.00	211.53	91.66
J-6	0.52	950.55	760.00	190.55	82.57
J-60	0.38	961.53	800.00	161.53	70.00
J-61	0.45	961.53	880.00	81.53	35.33
J-62	1.12	961.53	790.00	171.53	74.33
J-63	1.95	980.70	850.00	130.70	56.64
J-64	0.00	961.53	840.00	121.53	52.66
J-65	1.05	980.70	880.00	100.70	43.64
J-66	0.38	1279.40	790.00	489.40	212.07
J-67	0.38	1279.69	800.00	479.69	207.87
J-68	0.22	1281.31	700.00	581.31	251.90
J-69	0.90	961.53	700.00	261.53	113.33
J-7	1.80	950.05	820.00	130.05	56.35
J-70	1.50	982.12	850.00	132.12	57.25
J-71	3.45	982.21	740.00	242.21	104.96
J-72	0.30	978.21	750.00	228.21	98.89
J-73	0.82	1278.41	930.00	348.41	150.98
J-74	2.33	950.23	760.00	190.23	82.43
J-75	0.60	978.22	750.00	228.22	98.90
J-76	0.52	978.33	740.00	238.33	103.27
J-77	0.15	978.22	825.00	153.22	66.39
J-78	0.22	978.33	800.00	178.33	77.27
J-79	0.97	978.36	720.00	258.36	111.96
J-8	1.58	950.13	800.00	150.13	65.05
J-80	1.65	978.51	710.00	268.51	116.35
J-81	0.22	978.36	880.00	98.36	42.62
J-82	2.25	978.27	720.00	258.27	111.92
J-83	1.27	977.86	720.00	257.86	111.74
J-84	0.15	977.86	800.00	177.86	77.07
J-85	0.38	978.27	800.00	178.27	77.25
J-86	0.22	977.55	840.00	137.55	59.60
J-87	0.30	977.55	760.00	217.55	94.27

J-88		1.12	978.76	700.00	279.76	129.79
J-89		0.30	977.21	840.00	137.21	59.46
J-9		1.50	949.51	850.00	99.51	43.12
J-90		0.90	978.97	690.00	288.97	125.22
J-91		0.68	978.75	720.00	258.75	112.12
J-92		0.22	978.97	800.00	178.97	77.55
J-93		1.88	945.19	750.00	195.19	84.58
J-94		1.12	947.74	760.00	187.74	81.35
J-95		0.00	947.74	800.00	147.74	64.02
J-96		0.15	948.13	760.00	188.13	81.52
J-97		0.15	948.68	760.00	188.68	81.76
J-98		0.00	948.68	900.00	48.68	21.10
J-99		1.27	945.07	780.00	165.07	71.53
O-Pump-1	Dehart PS	0.00	1290.11	700.00	590.11	255.72
I-Pump-3	Wrigley PS	0.00	945.17	800.00	145.17	62.91
I-Pump-4	S. Ruin PS	0.00	950.09	750.00	200.09	86.71
I-Pump-5		0.00	1034.33	910.00	124.33	53.87
I-Pump-6		0.00	941.22	780.00	161.22	69.86
R-1		----	740.00	735.00	5.00	2.17
O-RV-1		----	986.15	760.00	226.15	98.00
O-RV-2		----	961.54	800.00	161.54	70.00
O-RV-3		----	961.54	800.00	161.54	70.00
I-RV-4		0.00	1280.15	750.00	530.15	229.73
I-RV-5		0.00	1289.43	700.00	589.43	255.42
O-RV-6		----	1277.89	970.00	307.89	133.42
T-1		----	950.00	900.00	50.00	21.67
T-2	Cemetery Tan	----	950.00	900.00	50.00	21.67
T-3	Dehart Tank	----	1275.00	1122.50	152.50	66.08
T-4	Wrigley Tank	----	1145.00	1100.00	45.00	19.50
O-WTP		0.00	980.60	735.00	245.60	106.43
I-RV-1		0.00	1277.47	760.00	517.47	224.24
I-RV-2		0.00	1279.06	800.00	479.06	207.59
I-RV-3		0.00	1279.69	800.00	479.69	207.87
I-RV-6		0.00	1277.89	970.00	307.89	133.42
O-Pump-3	Wrigley PS	0.00	1144.78	800.00	344.78	149.41
O-RV-4		----	980.77	750.00	230.77	100.00
O-Pump-5		0.00	1228.11	910.00	318.11	137.85
O-Pump-4	S. Ruin PS	0.00	1042.19	750.00	292.19	126.62
O-Pump-6		0.00	1127.11	780.00	347.11	150.41
O-RV-5		----	1034.62	700.00	334.62	145.00
I-Pump-1	Dehart PS	0.00	937.48	700.00	237.48	102.91
I-WTP		0.00	737.63	735.00	2.63	1.14

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
J-30	260.44	I-WTP	1.14
J-49	257.92	R-1	2.17
O-Pump-1	255.72	T-4	19.50
J-132	255.48	J-98	21.10
I-RV-5	255.42	T-1	21.67

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-152	2.49	P-106	0.00
P-207	2.47	P-148	0.00
P-265	2.46	P-158	0.00
P-266	2.45	P-168	0.00
P-1	2.35	P-192	0.00

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-152	11.65	P-106	0.00
P-207	11.50	P-148	0.00
P-265	11.38	P-110	0.00
P-266	11.30	P-65	0.00
P-115	5.99	P-260	0.00

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
-------------	-------------------------	-------------	-------------------------

P-152	11.65	P-106	0.00
P-207	11.50	P-148	0.00
P-265	11.38	P-119	0.00
P-266	11.30	P-65	0.00
P-115	5.99	P-263	0.00

REGULATING VALVE REPORT

VALVE LABEL	VALVE TYPE	VALVE SETTING (psi or gpm)	VALVE STATUS	UPSTREAM PRESSURE (psi)	DOWNSTREAM PRESSURE (psi)	THROUGH FLOW (gpm)
RV-1	PRV-1	98.00	ACTIVATED	224.24	98.00	79.65
RV-2	PRV-1	70.00	ACTIVATED	207.59	70.00	3.15
RV-3	PRV-1	70.00	ACTIVATED	207.87	70.00	0.90
RV-4	PRV-1	100.00	ACTIVATED	229.73	100.00	5.10
RV-5	PRV-1	145.00	ACTIVATED	255.42	145.00	11.10
RV-6	PRV-1	90.00	WIDE OPEN	133.42	133.42	0.00

SUMMARY OF INFLOWS AND OUTFLOWS

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE (gpm)	NODE TITLE
R-1	206.79	
T-1	-28.43	
T-2	77.20	Cemetery Tan
T-3	-11.96	Dehart Tank
T-4	18.60	Wrigley Tank

NET SYSTEM INFLOW = 302.59
 NET SYSTEM OUTFLOW = -40.40
 NET SYSTEM DEMAND = 262.20

Case: 4

CHANGES FOR NEXT SIMULATION (Change Number = 4)

Demand added to end of Pruett's Fork Rd. J-247
 to show flushing velocity of 2.5 fps

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 6 TRIALS: ACCURACY = 0.00000

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE #1	NODE #2	FLOWRATE (gpm)	HEAD LOSS (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL+ML/1000 (ft/ft)	HL/1000 (ft/ft)
P-1	J-5	O-WTP	-207.02	22.05	0.00	2.35	4.65	4.65
P-10	J-2	J-9	65.12	0.34	0.00	0.42	0.13	0.13
P-100	J-94	J-95	0.00	0.00	0.00	0.00	0.00	0.00
P-101	J-96	J-94	106.32	1.26	0.00	1.21	1.35	1.35
P-102	J-97	J-96	106.47	1.75	0.00	1.21	1.36	1.36
P-103	J-97	J-98	0.00	0.00	0.00	0.00	0.00	0.00
P-104	J-93	J-110	6.30	0.02	0.00	0.07	0.01	0.01
P-105	J-93	J-101	97.03	2.42	0.00	1.10	1.14	1.14
P-106	J-101	J-100	0.22	0.00	0.00	0.00	0.00	0.00
P-107	J-101	J-139	96.58	1.05	0.00	1.10	1.13	1.13
P-108	J-102	J-104	0.15	0.00	0.00	0.01	0.00	0.00
P-109	J-102	J-103	95.00	2.66	0.00	1.08	1.10	1.10
P-11	J-9	T-2	-73.18	0.45	0.00	0.83	0.68	0.68
P-110	J-103	J-105	0.38	0.00	0.00	0.00	0.00	0.00
P-111	J-103	J-237	93.50	5.87	0.00	1.06	1.07	1.07
P-112	J-107	J-225	0.97	0.01	0.00	0.02	0.00	0.00
P-113	J-107	J-109	91.10	27.04	0.00	2.33	7.33	7.33
P-114	J-109	J-106	1.73	0.03	0.00	0.08	0.02	0.02
P-115	J-109	J-244	87.95	83.55	0.00	3.99	27.88	27.88
P-116	J-110	J-99	2.02	0.10	0.00	0.09	0.03	0.03
P-117	J-110	J-112	1.88	0.00	0.00	0.02	0.00	0.00
P-118	J-99	J-113	0.22	0.00	0.00	0.01	0.00	0.00
P-119	J-99	J-115	0.52	0.01	0.00	0.02	0.00	0.00

P-12	J-9	J-32	136.80	2.19	0.00	1.55	2.16	2.16
P-120	J-194	J-10	0.00	0.00	0.00	0.00	0.00	0.00
P-121	J-112	I-Pump-3	0.00	0.00	0.00	0.00	0.00	0.00
P-122	J-116	J-114	0.00	0.00	0.00	0.00	0.00	0.00
P-123	J-118	J-117	0.22	0.00	0.00	0.01	0.00	0.00
P-124	J-118	J-120	0.22	0.00	0.00	0.01	0.00	0.00
P-125	J-116	J-119	-7.20	0.00	0.00	0.00	0.01	0.01
P-126	J-114	J-178	0.00	0.00	0.00	0.00	0.00	0.00
P-127	J-114	J-123	0.00	0.00	0.00	0.00	0.00	0.00
P-128	J-119	J-125	0.30	0.00	0.00	0.00	0.00	0.00
P-129	J-119	J-124	-7.95	0.10	0.00	0.00	0.01	0.01
P-13	J-1	J-17	0.98	0.05	0.00	0.11	0.02	0.02
P-130	J-130	I-RV-5	11.10	0.13	0.00	0.50	0.60	0.60
P-131	J-120	J-126	0.00	0.00	0.00	0.02	0.00	0.00
P-132	J-120	J-228	0.90	0.02	0.00	0.11	0.02	0.02
P-133	J-127	J-128	4.95	0.01	0.00	0.06	0.00	0.00
P-134	J-129	J-4	62.67	0.36	0.00	0.71	0.51	0.51
P-135	J-213	J-97	106.62	4.74	0.00	1.21	1.36	1.36
P-136	J-131	J-130	1.05	0.00	0.00	0.01	0.00	0.00
P-137	J-131	J-169	3.68	0.07	0.00	0.09	0.02	0.02
P-138	J-132	J-68	124.73	6.97	0.00	1.42	1.82	1.82
P-139	J-189	J-118	1.35	0.03	0.00	0.06	0.01	0.01
P-14	J-1	T-3	53.85	1.03	0.00	0.61	0.38	0.38
P-140	O-Pump-3	J-190	0.00	0.00	0.00	0.00	0.00	0.00
P-141	J-178	J-134	0.00	0.00	0.00	0.00	0.00	0.00
P-142	J-124	J-180	-7.95	0.05	0.00	0.00	0.01	0.01
P-143	J-135	J-188	1.35	0.01	0.00	0.00	0.00	0.00
P-144	J-135	J-187	6.07	0.22	0.00	0.16	0.05	0.05
P-145	J-135	J-138	0.75	0.00	0.00	0.02	0.00	0.00
P-146	J-138	J-137	0.30	0.00	0.00	0.01	0.00	0.00
P-147	J-139	J-102	95.90	3.50	0.00	1.09	1.12	1.12
P-148	J-139	J-141	0.22	0.00	0.00	0.00	0.00	0.00
P-149	J-73	J-140	0.38	0.00	0.00	0.02	0.00	0.00
P-15	J-11	J-10	2.93	0.00	0.00	0.03	0.00	0.00
P-150	O-RV-1	J-71	25.80	0.49	0.00	0.29	0.10	0.10
P-151	J-142	J-90	18.83	0.36	0.00	0.21	0.05	0.05
P-152	J-142	J-192	1.05	0.01	0.00	0.05	0.01	0.01
P-153	J-144	J-80	14.70	0.10	0.00	0.17	0.03	0.03
P-154	J-144	J-145	0.45	0.00	0.00	0.02	0.00	0.00
P-155	J-146	J-87	4.35	0.15	0.00	0.20	0.11	0.11
P-156	J-146	J-148	0.15	0.00	0.00	0.01	0.00	0.00
P-157	J-147	J-135	9.75	0.15	0.00	0.11	0.02	0.02
P-158	J-148	J-150	0.08	0.00	0.00	0.00	0.00	0.00
P-159	J-149	J-151	1.95	0.10	0.00	0.09	0.02	0.02
P-16	J-12	J-11	3.38	0.01	0.00	0.04	0.00	0.00
P-160	J-149	J-152	0.15	0.00	0.00	0.01	0.00	0.00
P-161	J-151	J-89	0.30	0.00	0.00	0.01	0.00	0.00
P-162	J-151	J-154	0.30	0.00	0.00	0.01	0.00	0.00
P-163	J-55	J-153	0.38	0.00	0.00	0.01	0.00	0.00
P-164	O-RV-2	J-62	3.15	0.00	0.00	0.04	0.00	0.00
P-165	O-RV-3	J-69	0.90	0.01	0.00	0.04	0.01	0.01
P-166	O-RV-4	J-232	5.10	0.04	0.00	0.13	0.04	0.04
P-167	J-128	J-156	1.12	0.01	0.00	0.03	0.00	0.00
P-168	J-156	J-155	0.08	0.00	0.00	0.00	0.00	0.00
P-169	J-128	J-159	2.47	0.11	0.00	0.11	0.04	0.04
P-17	J-13	J-12	3.60	0.00	0.00	0.04	0.00	0.00
P-170	J-157	J-158	0.30	0.00	0.00	0.01	0.00	0.00
P-171	J-159	J-157	0.90	0.01	0.00	0.04	0.01	0.01
P-172	J-159	J-160	0.45	0.00	0.00	0.02	0.00	0.00
P-173	O-Pump-5	J-161	2.40	0.08	0.00	0.11	0.04	0.04
P-174	J-127	I-Pump-5	2.40	0.00	0.00	0.03	0.00	0.00
P-175	J-161	J-162	0.68	0.00	0.00	0.01	0.00	0.00
P-176	J-162	J-163	0.15	0.00	0.00	0.01	0.00	0.00
P-177	J-162	J-165	0.15	0.00	0.00	0.01	0.00	0.00
P-178	J-161	J-183	0.97	0.01	0.00	0.04	0.01	0.01
P-179	J-164	J-127	7.35	0.02	0.00	0.08	0.01	0.01
P-18	J-14	J-13	3.90	0.01	0.00	0.04	0.00	0.00
P-180	J-164	J-185	0.83	0.00	0.00	0.04	0.00	0.00
P-181	J-168	J-164	8.55	0.01	0.00	0.10	0.01	0.01
P-182	J-168	J-170	0.45	0.00	0.00	0.01	0.00	0.00
P-183	O-Pump-4	J-131	6.15	0.00	0.00	0.07	0.01	0.01
P-184	J-169	J-133	2.78	0.02	0.00	0.07	0.01	0.01
P-185	J-169	J-172	0.15	0.00	0.00	0.01	0.00	0.00
P-186	J-133	J-171	2.55	0.02	0.00	0.07	0.01	0.01
P-187	J-171	J-175	1.73	0.01	0.00	0.04	0.00	0.00
P-188	J-171	J-174	0.22	0.01	0.00	0.02	0.00	0.00
P-189	J-175	J-173	1.35	0.00	0.00	0.03	0.00	0.00
P-19	J-15	J-14	4.65	0.02	0.00	0.05	0.00	0.00
P-190	J-173	J-176	1.12	0.01	0.00	0.03	0.00	0.00
P-191	J-176	J-177	0.38	0.00	0.00	0.02	0.00	0.00
P-192	J-176	J-179	0.08	0.00	0.00	0.00	0.00	0.00
P-193	J-180	J-147	10.65	0.07	0.00	0.12	0.02	0.02
P-194	J-180	T-4	-18.60	0.04	0.00	0.21	0.05	0.05
P-195	J-183	J-184	0.75	0.01	0.00	0.03	0.00	0.00
P-196	J-182	J-27	86.10	1.73	0.00	0.98	0.92	0.92
P-197	J-181	J-182	86.55	0.00	0.00	0.98	0.93	0.93
P-198	J-184	J-166	0.30	0.00	0.00	0.01	0.00	0.00
P-199	J-185	J-167	0.22	0.00	0.00	0.01	0.00	0.00
P-2	J-3	J-197	80.42	0.21	0.00	0.51	0.20	0.20
P-20	J-16	J-15	6.90	0.03	0.00	0.08	0.01	0.01

P-200	J-186	J-136	1.58	0.03	0.00	0.04	0.00	0.00
P-201	J-187	J-186	4.12	0.10	0.00	0.11	0.02	0.02
P-202	J-188	J-181	0.45	0.00	0.00	0.01	0.00	0.00
P-203	J-190	J-116	-6.90	0.01	0.00	0.08	0.01	0.01
P-204	J-190	J-191	6.45	0.23	0.00	0.16	0.05	0.05
P-205	J-191	J-196	4.73	1.24	0.00	0.21	0.12	0.12
P-206	J-192	J-143	0.05	0.00	0.00	0.00	0.00	0.00
P-207	J-192	J-241	0.69	0.00	0.00	0.03	0.00	0.00
P-208	J-206	J-224	0.83	0.01	0.00	0.04	0.00	0.00
P-209	J-147	J-195	0.45	0.01	0.00	0.02	0.00	0.00
P-21	J-17	J-16	9.45	0.03	0.00	0.11	0.02	0.02
P-210	J-196	J-189	2.10	0.04	0.00	0.10	0.03	0.03
P-211	J-196	J-198	0.30	0.00	0.00	0.01	0.00	0.00
P-212	J-197	J-6	71.32	0.07	0.00	0.46	0.16	0.16
P-213	J-197	J-207	7.90	0.04	0.00	0.20	0.03	0.03
P-214	J-200	J-226	74.42	0.04	0.00	0.47	0.17	0.17
P-215	J-199	J-209	5.21	0.02	0.00	0.13	0.04	0.04
P-216	J-199	J-202	1.64	0.00	0.00	0.04	0.00	0.00
P-217	J-201	J-204	7.45	0.02	0.00	0.19	0.07	0.07
P-218	J-202	J-205	-1.88	0.00	0.00	0.05	0.01	0.01
P-219	J-201	J-211	-2.62	0.00	0.00	0.12	0.04	0.04
P-22	J-18	J-44	67.35	0.47	0.00	0.76	0.58	0.58
P-220	J-202	J-203	0.15	0.00	0.00	0.01	0.00	0.00
P-221	J-204	J-200	8.30	0.02	0.00	0.21	0.09	0.09
P-222	J-205	J-209	-3.92	0.00	0.00	0.10	0.02	0.02
P-223	J-204	J-205	-1.37	0.04	0.00	0.14	0.09	0.09
P-224	J-205	J-206	0.15	0.00	0.00	0.02	0.00	0.00
P-225	J-207	J-199	7.30	0.03	0.00	0.19	0.07	0.07
P-226	J-208	J-201	5.06	0.01	0.00	0.13	0.03	0.03
P-227	J-209	J-6	-3.99	0.00	0.00	0.10	0.02	0.02
P-228	J-210	J-7	-11.22	0.01	0.00	0.13	0.02	0.02
P-229	J-202	J-211	2.92	0.02	0.00	0.13	0.05	0.05
P-23	J-19	J-18	68.55	1.79	0.00	0.78	0.60	0.60
P-230	J-212	I-Pump-4	6.15	0.01	0.00	0.07	0.01	0.01
P-231	J-210	J-212	7.50	0.00	0.00	0.09	0.01	0.01
P-232	J-213	J-219	-11.34	0.09	0.00	0.51	0.63	0.63
P-233	J-215	J-217	2.20	0.00	0.00	0.02	0.00	0.00
P-234	J-215	J-214	-49.68	0.08	0.00	0.56	0.33	0.33
P-235	J-214	J-223	-49.68	0.15	0.00	0.56	0.33	0.33
P-236	J-214	J-216	0.00	0.00	0.00	0.00	0.00	0.00
P-237	J-217	J-210	-0.50	0.00	0.00	0.01	0.00	0.00
P-238	J-217	J-218	0.00	0.00	0.00	0.00	0.00	0.00
P-239	J-219	J-221	-11.34	0.07	0.00	0.51	0.63	0.63
P-24	J-20	J-19	69.30	1.15	0.00	0.79	0.61	0.61
P-240	J-219	J-220	0.00	0.00	0.00	0.00	0.00	0.00
P-241	J-221	J-215	-11.34	0.14	0.00	0.51	0.63	0.63
P-242	J-222	J-129	-49.68	0.03	0.00	0.56	0.33	0.33
P-243	J-223	J-222	-49.68	0.06	0.00	0.56	0.33	0.33
P-244	O-Pump-6	J-107	93.12	0.38	0.00	2.38	7.63	7.63
P-245	J-226	J-74	72.32	0.16	0.00	0.46	0.16	0.16
P-246	J-226	J-227	0.15	0.00	0.00	0.02	0.00	0.00
P-247	J-228	J-168	9.45	0.02	0.00	0.11	0.02	0.02
P-248	J-228	J-230	0.22	0.00	0.00	0.01	0.00	0.00
P-249	J-229	J-122	11.10	0.05	0.00	0.13	0.02	0.02
P-25	J-21	J-20	72.00	1.22	0.00	0.82	0.66	0.66
P-250	O-RV-5	J-229	11.10	0.17	0.00	0.50	0.60	0.60
P-251	J-225	J-108	0.22	0.00	0.00	0.01	0.00	0.00
P-252	J-57	J-238	0.00	0.00	0.00	0.00	0.00	0.00
P-253	J-231	J-56	-0.38	0.00	0.00	0.01	0.00	0.00
P-254	J-232	J-63	3.00	0.02	0.00	0.08	0.01	0.01
P-255	J-232	J-233	0.00	0.00	0.00	0.00	0.00	0.00
P-256	J-224	J-234	0.22	0.00	0.00	0.01	0.00	0.00
P-257	J-235	J-111	36.15	5.74	0.00	1.64	5.37	5.37
P-258	J-236	J-77	0.15	0.00	0.00	0.01	0.00	0.00
P-259	J-237	I-Pump-6	93.12	0.08	0.00	2.38	7.63	7.63
P-26	J-22	J-21	75.45	0.87	0.00	0.86	0.72	0.72
P-260	J-238	J-231	-0.15	0.00	0.00	0.00	0.00	0.00
P-261	J-57	I-RV-6	0.00	0.00	0.00	0.00	0.00	0.00
P-262	J-56	J-239	0.00	0.00	0.00	0.00	0.00	0.00
P-263	O-RV-6	J-240	0.00	0.00	0.00	0.00	0.00	0.00
P-264	J-241	J-193	0.08	0.00	0.00	0.00	0.00	0.00
P-265	J-241	J-242	0.38	0.00	0.00	0.02	0.00	0.00
P-266	J-242	J-243	0.15	0.00	0.00	0.01	0.00	0.00
P-27	J-23	J-22	75.90	1.26	0.00	0.86	0.73	0.73
P-270	J-244	J-235	36.75	20.08	0.00	1.67	5.54	5.54
P-271	J-244	J-247	50.00	21.57	0.00	2.27	9.80	9.80
P-272	J-246	J-149	3.30	0.16	0.00	0.15	0.06	0.06
P-273	J-246	J-249	0.08	0.00	0.00	0.01	0.00	0.00
P-274	J-248	J-250	0.38	0.00	0.00	0.02	0.00	0.00
P-275	J-74	J-8	68.94	0.08	0.00	0.44	0.15	0.15
P-276	J-74	J-252	1.05	0.00	0.00	0.03	0.00	0.00
P-277	J-252	J-251	0.00	0.00	0.00	0.00	0.00	0.00
P-278	J-252	J-253	0.52	0.00	0.00	0.01	0.00	0.00
P-28	J-24	J-23	76.35	0.81	0.00	0.87	0.73	0.73
P-29	J-25	J-24	79.20	3.18	0.00	0.90	0.79	0.79
P-3	J-3	J-129	117.97	0.39	0.00	1.34	1.64	1.64
P-30	J-26	J-25	80.40	1.27	0.00	0.91	0.81	0.81
P-31	J-27	J-54	82.50	2.08	0.00	0.94	0.85	0.85
P-32	J-28	J-181	86.55	0.35	0.00	0.98	0.93	0.93
P-33	J-29	J-67	91.65	1.47	0.00	1.04	1.03	1.03

P-34	J-30	J-29	97.20	2.45	0.00	1.10	1.15	1.15
P-35	J-31	I-Pump-1	136.05	0.63	0.00	1.54	2.14	2.14
P-36	J-32	J-31	136.43	7.48	0.00	1.55	2.15	2.15
P-37	O-Pump-1	J-132	136.05	0.47	0.00	1.54	2.14	2.14
P-38	J-10	J-34	2.40	0.02	0.00	0.06	0.01	0.01
P-39	J-34	J-39	0.60	0.00	0.00	0.03	0.00	0.00
P-4	J-4	J-215	-33.75	0.04	0.00	0.38	0.16	0.16
P-40	J-34	J-37	1.13	0.04	0.00	0.05	0.01	0.01
P-41	J-33	J-35	0.15	0.00	0.00	0.01	0.00	0.00
P-42	J-37	J-33	0.53	0.01	0.00	0.02	0.00	0.00
P-43	J-38	J-36	0.15	0.00	0.00	0.01	0.00	0.00
P-44	J-39	J-38	0.45	0.00	0.00	0.02	0.00	0.00
P-45	J-15	J-41	0.90	0.02	0.00	0.04	0.01	0.01
P-46	J-41	J-40	0.22	0.00	0.00	0.01	0.00	0.00
P-47	J-16	J-43	1.80	0.06	0.00	0.08	0.02	0.02
P-48	J-43	J-42	0.90	0.04	0.00	0.04	0.01	0.01
P-49	J-44	J-1	65.03	0.48	0.00	0.74	0.54	0.54
P-5	J-5	J-3	205.89	7.73	0.00	2.34	4.61	4.61
P-50	J-44	J-46	2.10	0.03	0.00	0.10	0.03	0.03
P-51	J-46	J-45	1.05	0.04	0.00	0.05	0.01	0.01
P-52	J-18	J-49	0.45	0.00	0.00	0.01	0.00	0.00
P-53	J-49	J-47	0.00	0.00	0.00	0.00	0.00	0.00
P-54	J-20	J-48	1.20	0.01	0.00	0.03	0.00	0.00
P-55	J-48	J-50	0.22	0.00	0.00	0.01	0.00	0.00
P-56	J-21	J-51	1.88	0.02	0.00	0.05	0.01	0.01
P-57	J-51	J-52	0.38	0.00	0.00	0.01	0.00	0.00
P-58	J-24	J-53	0.75	0.01	0.00	0.03	0.00	0.00
P-59	J-54	J-26	80.40	0.58	0.00	0.91	0.81	0.81
P-6	J-6	J-200	66.80	0.07	0.00	0.43	0.14	0.14
P-60	J-54	J-56	1.12	0.00	0.00	0.03	0.00	0.00
P-61	J-27	J-55	2.55	0.02	0.00	0.12	0.04	0.04
P-62	J-55	J-58	0.75	0.00	0.00	0.02	0.00	0.00
P-63-XX	J-58	J-57						
P-64	J-28	I-RV-2	3.15	0.00	0.00	0.04	0.00	0.00
P-65	J-59	J-60	0.38	0.00	0.00	0.00	0.00	0.00
P-66	J-59	J-61	0.45	0.01	0.00	0.02	0.00	0.00
P-67	J-62	J-59	2.03	0.00	0.00	0.02	0.00	0.00
P-68	J-62	J-64	0.00	0.00	0.00	0.00	0.00	0.00
P-69	J-29	I-RV-4	5.10	0.01	0.00	0.13	0.04	0.04
P-7	J-7	T-1	-13.02	0.01	0.00	0.15	0.03	0.03
P-70	J-63	J-65	1.05	0.01	0.00	0.03	0.00	0.00
P-71	J-66	J-28	90.00	1.07	0.00	1.02	0.99	0.99
P-72	J-67	J-66	90.38	0.93	0.00	1.03	1.00	1.00
P-73	J-67	I-RV-3	0.90	0.00	0.00	0.04	0.01	0.01
P-74	J-68	J-30	97.50	0.80	0.00	1.11	1.15	1.15
P-75	J-68	J-73	27.00	0.38	0.00	0.31	0.11	0.11
P-76	J-71	J-70	1.50	0.09	0.00	0.07	0.01	0.01
P-77	J-71	J-142	20.85	0.27	0.00	0.24	0.07	0.07
P-78	J-73	I-RV-1	25.80	0.12	0.00	0.29	0.10	0.10
P-79	J-72	J-248	1.05	0.02	0.00	0.05	0.01	0.01
P-8	J-8	J-2	67.37	0.17	0.00	0.43	0.14	0.14
P-80	J-75	J-72	1.35	0.02	0.00	0.06	0.01	0.01
P-81	J-75	J-236	0.60	0.01	0.00	0.03	0.00	0.00
P-82	J-76	J-75	2.55	0.10	0.00	0.12	0.04	0.04
P-83	J-76	J-78	0.22	0.00	0.00	0.01	0.00	0.00
P-84	J-79	J-76	3.30	0.03	0.00	0.08	0.02	0.02
P-85	J-79	J-81	0.22	0.00	0.00	0.01	0.00	0.00
P-86	J-80	J-79	4.50	0.15	0.00	0.11	0.03	0.03
P-87	J-80	J-82	8.55	0.24	0.00	0.22	0.09	0.09
P-88	J-82	J-83	5.92	0.41	0.00	0.15	0.05	0.05
P-89	J-82	J-85	0.38	0.00	0.00	0.02	0.00	0.00
P-9	I-WTP	R-1	-207.02	2.37	0.00	2.35	4.65	4.65
P-90	J-83	J-84	0.15	0.00	0.00	0.01	0.00	0.00
P-91	J-83	J-146	4.50	0.17	0.00	0.20	0.11	0.11
P-92	J-87	J-86	0.22	0.00	0.00	0.01	0.00	0.00
P-93	J-87	J-246	3.83	0.08	0.00	0.17	0.08	0.08
P-94	J-88	J-144	15.90	0.15	0.00	0.18	0.04	0.04
P-95	J-88	J-91	0.68	0.01	0.00	0.03	0.00	0.00
P-96	J-90	J-88	17.70	0.21	0.00	0.20	0.05	0.05
P-97	J-90	J-92	0.22	0.00	0.00	0.01	0.00	0.00
P-98	J-4	J-213	95.29	0.26	0.00	1.08	1.11	1.11
P-99	J-94	J-93	105.20	8.32	0.00	1.19	1.33	1.33

PUMP/LOSS ELEMENT RESULTS

NAME	FLOWRATE (gpm)	INLET HEAD (ft)	OUTLET HEAD (ft)	PUMP HEAD (ft)	EFFIC- ENCY (%)	USEFUL POWER (Hp)	INCREMTL COST (\$)	TOTAL COST (\$)	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. (ft)
Pump-1	136.05	239.26	607.42	368.2	75.00	0.	0.0	0.0	**	**	272.4
Device "Pump-3" is closed											
Pump-3	0.00	133.59	344.78	0.0	75.00	0.	0.0	0.0	**	**	166.8
Pump-4	6.15	199.97	292.07	92.1	75.00	0.	0.0	0.0	**	**	233.2
Pump-5	2.40	124.33	318.11	193.8	75.00	0.	0.0	0.0	**	**	157.5
Pump-6	93.12	138.04	282.47	144.4	75.00	0.	0.0	0.0	**	**	171.2
WTP	207.02	2.63	245.46	242.8	75.00	0.	0.0	0.0	**	**	35.7

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	NODE ELEVATION (ft)	PRESSURE HEAD (ft)	NODE PRESSURE (psi)
J-1		1.20	1276.03	885.00	391.03	169.44
J-10		0.52	1275.88	1080.00	195.88	84.88
J-100		0.22	931.19	770.00	161.19	69.85
J-101		0.22	931.19	750.00	181.19	78.52
J-102		0.75	926.65	750.00	176.65	76.55
J-103		1.12	923.99	760.00	163.99	71.06
J-104		0.15	926.65	780.00	146.65	63.55
J-105		0.38	923.99	860.00	63.99	27.73
J-106		0.90	1035.01	830.00	205.01	88.84
J-107		1.05	1062.09	780.00	282.09	122.24
J-108		0.22	1062.08	880.00	182.08	78.90
J-109		1.42	1035.05	800.00	235.05	101.85
J-11		0.45	1275.88	1130.00	145.88	63.21
J-110		2.40	933.60	750.00	183.60	79.56
J-111		36.15	925.67	920.00	5.67	2.46
J-112		1.88	933.59	790.00	143.59	62.22
J-113		0.22	933.49	840.00	93.49	40.51
J-114		0.00	1144.79	810.00	334.79	145.08
J-115		0.52	933.49	840.00	93.49	40.51
J-116		0.30	1144.79	810.00	334.79	145.08
J-117		0.22	1143.24	900.00	243.24	105.41
J-118		0.90	1143.24	870.00	273.24	118.41
J-119		0.38	1144.81	820.00	324.81	140.75
J-12		0.22	1275.89	1100.00	175.89	76.22
J-120		0.22	1143.24	920.00	223.24	96.74
J-121		0.45	1144.73	820.00	324.73	140.72
J-122		0.60	1034.40	760.00	274.40	118.91
J-123		0.00	1144.79	880.00	264.79	114.74
J-124		0.00	1144.91	1000.00	144.91	62.80
J-125		0.38	1144.81	900.00	244.81	106.08
J-126		0.60	1034.40	860.00	174.40	75.57
J-127		0.00	1034.33	910.00	124.33	53.87
J-128		1.35	1034.31	820.00	214.31	92.87
J-129		5.62	950.29	740.00	210.29	91.13
J-13		0.30	1275.89	1180.00	95.89	41.55
J-130		1.05	1042.07	760.00	282.07	122.23
J-131		1.42	1042.07	770.00	272.07	117.90
J-132		0.22	1306.95	700.00	606.95	263.01
J-133		0.22	1041.98	840.00	201.98	87.52
J-134		0.00	1144.79	900.00	244.79	106.08
J-135		1.58	1144.74	815.00	329.74	142.89
J-136		1.58	1144.39	900.00	244.39	105.90
J-137		0.30	1144.74	960.00	184.74	80.05
J-138		0.45	1144.74	850.00	294.74	127.72
J-139		0.45	930.15	750.00	180.15	78.06
J-14		0.75	1275.90	1100.00	175.90	76.22
J-140		0.38	1299.60	1000.00	299.60	129.82
J-141		0.22	930.15	780.00	150.15	65.06
J-142		0.97	985.39	700.00	285.39	123.67
J-143		0.08	985.39	700.00	285.39	123.67
J-144		0.75	984.67	715.00	269.67	116.85
J-145		0.45	984.66	750.00	234.66	101.69
J-146		0.00	983.76	780.00	203.76	88.29
J-147		0.45	1144.89	860.00	284.89	123.45
J-148		0.08	983.76	800.00	183.76	79.63
J-149		1.20	983.37	780.00	203.37	88.13
J-15		1.35	1275.91	1100.00	175.91	76.23
J-150		0.08	983.76	820.00	163.76	70.96
J-151		1.35	983.27	840.00	143.27	62.08
J-152		0.15	983.37	840.00	143.37	62.13
J-153		0.38	1291.17	880.00	411.17	178.17
J-154		0.30	983.27	840.00	143.27	62.08
J-155		0.08	1034.31	700.00	334.31	144.87
J-156		1.05	1034.31	700.00	334.31	144.87
J-157		0.60	1034.19	820.00	214.19	92.82
J-158		0.30	1034.19	850.00	184.19	79.81
J-159		1.12	1034.20	810.00	224.20	97.15
J-16		0.75	1275.95	1110.00	165.95	71.91
J-160		0.45	1034.20	875.00	159.20	68.99
J-161		0.75	1228.03	1020.00	208.03	90.15
J-162		0.38	1228.03	1020.00	208.03	90.15
J-163		0.15	1228.03	1020.00	208.03	90.15
J-164		0.38	1034.35	840.00	194.35	84.22
J-165		0.15	1228.03	880.00	348.03	150.81
J-166		0.30	1228.01	980.00	248.01	107.47
J-167		0.22	1034.34	850.00	184.34	79.88
J-168		0.45	1034.36	800.00	234.36	101.56
J-169		0.75	1042.00	850.00	192.00	83.20
J-17		0.52	1275.98	960.00	315.98	136.92
J-170		0.45	1034.36	820.00	214.36	92.89
J-171		0.60	1041.96	800.00	241.96	104.85

J-172	0.15	1042.00	860.00	182.00	79.87
J-173	0.22	1041.95	860.00	181.95	79.84
J-174	0.22	1041.96	860.00	181.96	79.85
J-175	0.38	1041.95	795.00	246.95	107.01
J-176	0.68	1041.94	820.00	221.94	96.18
J-177	0.38	1041.94	880.00	161.94	70.17
J-178	0.00	1144.79	850.00	294.79	127.74
J-179	0.08	1041.94	835.00	206.94	89.68
J-18	0.75	1276.95	920.00	356.95	154.69
J-180	0.00	1144.96	900.00	244.96	106.15
J-181	0.00	1292.92			
J-182	0.45	1292.92			
J-183	0.22	1228.02	1040.00	188.02	81.48
J-184	0.45	1228.02	1040.00	188.02	81.47
J-185	0.60	1034.34	920.00	114.34	49.55
J-186	2.55	1144.42	850.00	294.42	127.58
J-187	1.95	1144.52	825.00	319.52	138.46
J-188	0.90	1144.73	800.00	344.73	149.38
J-189	0.75	1143.27	950.00	293.27	127.09
J-19	0.75	1278.77	1020.00	258.77	112.13
J-190	0.45	1144.78	900.00	344.78	149.41
J-191	1.73	1144.55	790.00	354.55	153.64
J-192	0.30	985.39	690.00	295.39	128.00
J-193	0.08	985.38	740.00	245.38	106.33
J-194	0.00	1275.88	1080.00	195.88	84.88
J-195	0.45	1144.88	1000.00	144.88	62.78
J-196	2.33	1143.32	830.00	313.32	135.77
J-197	1.20	950.47	760.00	190.47	82.54
J-198	0.30	1143.32	880.00	263.32	114.10
J-199	0.45	950.40	760.00	190.40	82.51
J-2	2.25	949.89	700.00	249.89	108.28
J-20	1.50	1279.92	1060.00	219.92	95.30
J-200	0.68	950.34	760.00	190.34	82.48
J-201	0.22	950.37	760.00	190.37	82.50
J-202	0.45	950.40	760.00	190.40	82.50
J-203	0.15	950.40	760.00	190.40	82.50
J-204	0.52	950.36	760.00	190.36	82.49
J-205	0.52	950.40	760.00	190.40	82.51
J-206	0.15	950.40	760.00	190.40	82.51
J-207	0.60	950.43	760.00	190.43	82.52
J-208	0.15	950.38	760.00	190.38	82.50
J-209	0.08	950.40	760.00	190.40	82.51
J-21	1.58	1281.14	1050.00	231.14	100.16
J-210	3.22	949.98	780.00	169.98	73.66
J-211	0.30	950.38	760.00	190.38	82.50
J-212	1.35	949.98			
J-213	0.00	949.68	780.00	169.68	73.53
J-214	0.00	950.06	760.00	190.06	82.36
J-215	2.40	949.98	780.00	169.98	73.66
J-216	0.00	950.06	760.00	190.06	82.36
J-217	2.70	949.98	780.00	169.98	73.66
J-218	0.00	949.98	760.00	189.98	82.32
J-219	0.00	949.77	780.00	169.77	73.57
J-22	0.45	1282.01	980.00	302.01	130.87
J-220	0.00	949.77	780.00	169.77	73.57
J-221	0.00	949.84	780.00	169.84	73.60
J-222	0.00	950.27	740.00	210.27	91.12
J-223	0.00	950.21	740.00	210.21	91.09
J-224	0.60	1035.00	850.00	185.00	80.17
J-225	0.75	1062.08	860.00	202.08	87.57
J-226	1.95	950.30	770.00	180.30	78.13
J-227	0.15	950.30	800.00	150.30	65.13
J-228	0.22	1034.38	820.00	214.38	92.90
J-229	0.00	1034.45	700.00	334.45	144.93
J-23	0.45	1283.27	1080.00	203.27	88.08
J-230	0.22	1034.38	860.00	174.38	75.56
J-231	0.22	1289.10	1025.00	264.10	114.44
J-232	2.10	980.72	800.00	180.72	78.31
J-233	0.00	980.72	860.00	120.72	52.31
J-234	0.22	1035.00	900.00	135.00	58.50
J-235	0.60	931.41	870.00	61.41	26.61
J-236	0.45	984.28	775.00	209.28	90.69
J-237	0.38	918.11	780.00	138.11	59.85
J-238	0.15	1289.10	970.00	319.10	138.28
J-239	0.00	1289.10	960.00	329.10	142.61
J-24	2.10	1284.08	1020.00	264.08	114.43
J-240	0.00	1289.10	840.00	449.10	194.61
J-241	0.22	985.38	700.00	285.38	123.67
J-242	0.22	985.38	740.00	245.38	106.33
J-243	0.15	985.38	760.00	225.38	97.67
J-244	1.20	951.49	850.00	101.49	43.98
J-246	0.45	983.53	740.00	243.53	105.53
J-247	50.00 (**)	929.92	880.00	49.92	21.63
J-248	0.68	984.25	776.00	208.25	90.24
J-249	0.08	983.53	775.00	208.53	90.36
J-25	1.20	1287.26	880.00	407.26	176.48
J-250	0.38	984.24	800.00	184.24	79.84
J-251	0.00	950.13	800.00	150.13	65.06
J-252	0.52	950.13	780.00	170.13	73.72
J-253	0.52	950.13	880.00	70.13	30.39

Neal Howard'

J-26	0.00	1288.53	1020.00	268.53	116.36	
J-27	1.05	1291.19	875.00	416.19	180.35	
J-28	0.30	1293.27	800.00	493.27	213.75	
J-29	0.45	1296.73	780.00	516.73	223.92	
J-3	7.50	950.68	700.00	250.68	108.63	
J-30	0.30	1299.18	680.00	619.18	268.31	
J-31	0.38	939.89	700.00	239.89	103.95	
J-32	0.38	947.37	800.00	147.37	63.86	
J-33	0.38	1275.80	1085.00	190.80	82.68	
J-34	0.68	1275.85	1150.00	125.85	54.54	
J-35	0.15	1275.80	1040.00	235.80	102.18	
J-36	0.15	1275.85	1140.00	135.85	56.87	
J-37	0.60	1275.81	1170.00	105.81	45.85	
J-38	0.30	1275.85	1170.00	105.85	45.87	
J-39	0.15	1275.85	1110.00	165.85	71.87	
J-4	1.12	949.94	780.00	169.94	73.64	
J-40	0.22	1275.89	1020.00	255.89	110.89	
J-41	0.68	1275.89	1090.00	185.89	80.55	
J-42	0.90	1275.85	860.00	415.85	180.20	
J-43	0.90	1275.89	1130.00	145.89	63.22	
J-44	0.22	1276.51	885.00	391.51	169.65	
J-45	1.05	1276.44	940.00	336.44	145.79	
J-46	1.05	1276.48	1030.00	246.48	106.81	
J-47	0.00	1276.98	900.00	376.98	163.36	
J-48	0.97	1279.91	890.00	389.91	168.96	
J-49	0.45	1276.98	680.00	596.98	258.69	
J-5	1.12	958.41	680.00	278.41	120.65	
J-50	0.22	1279.91	940.00	339.91	147.30	
J-51	1.50	1281.12	890.00	391.12	169.48	
J-52	0.38	1281.12	960.00	321.12	139.15	
J-53	0.75	1284.07	870.00	414.07	179.43	
J-54	0.97	1289.11	1000.00	289.11	125.28	
J-55	1.42	1291.17	830.00	461.17	199.84	
J-56	0.75	1289.10	980.00	309.10	133.94	
J-57	0.00 (0.00)	1289.10	970.00	319.10	138.28	
J-58	0.75 (0.91)	1291.16	980.00	311.16	134.84	
J-59	1.20	961.53	750.00	211.53	91.66	
J-6	0.52	950.40	760.00	190.40	82.51	
J-60	0.38	961.53	800.00	161.53	70.00	
J-61	0.45	961.53	880.00	81.53	35.33	
J-62	1.12	961.53	790.00	171.53	74.33	
J-63	1.95	980.70	850.00	130.70	56.64	
J-64	0.00	961.53	840.00	121.53	52.66	
J-65	1.05	980.70	880.00	100.70	43.64	
J-66	0.38	1294.34	790.00	504.34	218.55	
J-67	0.38	1295.26	800.00	495.26	214.61	
J-68	0.22	1299.98	700.00	599.98	259.99	
J-69	0.90	961.53	700.00	261.53	113.33	
J-7	1.80	949.99	820.00	129.99	56.33	
J-70	1.50	985.58	850.00	135.58	58.75	
J-71	3.45	985.66	740.00	245.66	106.45	
J-72	0.30	984.27	750.00	234.27	101.52	
J-73	0.82	1299.60	930.00	369.60	160.16	
J-74	2.33	950.14	760.00	190.14	82.39	
J-75	0.60	984.28	750.00	234.28	101.52	
J-76	0.52	984.39	740.00	244.39	105.90	
J-77	0.15	984.28	825.00	159.28	69.02	
J-78	0.22	984.39	800.00	184.39	79.90	
J-79	0.97	984.42	720.00	264.42	114.58	
J-8	1.58	950.05	800.00	150.05	65.02	
J-80	1.65	984.57	710.00	274.57	118.98	
J-81	0.22	984.42	880.00	104.42	45.25	
J-82	2.25	984.33	720.00	264.33	114.54	
J-83	1.27	983.93	720.00	263.93	114.37	
J-84	0.15	983.92	800.00	183.92	79.70	
J-85	0.38	984.33	800.00	184.33	79.88	
J-86	0.22	983.61	840.00	143.61	62.23	
J-87	0.30	983.61	760.00	223.61	96.90	
J-88	1.12	984.82	700.00	284.82	123.42	
J-89	0.30	983.27	840.00	143.27	62.08	
J-9	1.50	949.55	850.00	99.55	43.14	
J-90	0.90	985.03	690.00	295.03	127.85	
J-91	0.68	984.81	720.00	264.81	114.75	
J-92	0.22	985.03	800.00	185.03	80.18	
J-93	1.88	933.61	750.00	183.61	79.57	
J-94	1.12	941.93	760.00	181.93	78.84	
J-95	0.00	941.93	800.00	141.93	61.50	
J-96	0.15	943.19	760.00	183.19	79.38	
J-97	0.15	944.94	760.00	184.94	80.14	
J-98	0.00	944.94	900.00	44.94	19.47	
J-99	1.27	933.49	780.00	153.49	66.51	
O-Pump-1	Dehart PS	0.00	1307.42	700.00	607.42	263.21
I-Pump-3	Wrigley PS	0.00	933.59	800.00	133.59	57.89
I-Pump-4	S. Ruin PS	0.00	949.97	750.00	199.97	86.65
I-Pump-5		0.00	1034.33	910.00	124.33	53.87
I-Pump-6		0.00	918.04	780.00	138.04	59.82
R-1		----	740.00	735.00	5.00	2.17
O-RV-1		----	986.15	760.00	226.15	98.00
O-RV-2		----	961.54	800.00	161.54	70.00
O-RV-3		----	961.54	800.00	161.54	70.00

I-RV-4		0.00	1296.72	750.00	546.72	236.91
I-RV-5		0.00	1306.81	700.00	606.81	262.95
O-RV-6		----	1289.10	970.00	319.10	158.28
T-1		----	950.00	900.00	50.00	21.67
T-2	Cemetery Tan	----	950.00	900.00	50.00	21.67
T-3	Dehart Tank	----	1275.00	1122.50	152.50	66.08
T-4	Wrigley Tank	----	1145.00	1100.00	45.00	19.50
O-WTP		0.00	980.46	735.00	245.46	106.37
I-RV-1		0.00	1099.48	760.00	539.48	233.78
I-RV-2		0.00	1293.27	800.00	493.27	213.75
I-RV-3		0.00	1295.26	800.00	495.26	214.61
I-RV-6		0.00	1289.10	970.00	319.10	158.28
O-Pump-3	Wrigley PS	0.00	1144.78	800.00	344.78	149.41
O-RV-4		----	980.77	750.00	230.77	100.00
O-Pump-5		0.00	1228.11	910.00	318.11	137.85
O-Pump-4	S. Ruin PS	0.00	1042.07	750.00	292.07	126.56
O-Pump-6		0.00	1062.47	780.00	282.47	122.40
O-RV-5		----	1034.62	700.00	334.62	145.00
I-Pump-1	Dehart PS	0.00	939.26	700.00	239.26	103.68
I-WTP		0.00	737.63	735.00	2.63	1.14

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
J-30	268.31	I-WTP	1.14
O-Pump-1	263.21	R-1	2.17
J-132	263.01	J-111	2.46
I-RV-5	262.95	J-98	19.47
J-68	259.99	T-4	19.50

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-115	3.99	P-106	0.00
P-244	2.38	P-148	0.00
P-259	2.38	P-158	0.00
P-1	2.35	P-168	0.00
P-9	2.35	P-192	0.00

HL + ML / 1000

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-115	27.88	P-106	0.00
P-271	9.80	P-148	0.00
P-244	7.63	P-110	0.00
P-259	7.63	P-65	0.00
P-113	7.33	P-260	0.00

HL / 1000

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
P-115	27.88	P-106	0.00
P-271	9.80	P-148	0.00
P-244	7.63	P-110	0.00
P-259	7.63	P-65	0.00
P-113	7.33	P-260	0.00

REGULATING VALVE REPORT

VALVE LABEL	VALVE TYPE	VALVE SETTING (psi or gpm)	VALVE STATUS	UPSTREAM PRESSURE (psi)	DOWNSTREAM PRESSURE (psi)	THROUGH FLOW (gpm)
RV-1	PRV-1	98.00	ACTIVATED	233.78	98.00	25.80
RV-2	PRV-1	70.00	ACTIVATED	213.75	70.00	3.15
RV-3	PRV-1	70.00	ACTIVATED	214.61	70.00	0.90
RV-4	PRV-1	100.00	ACTIVATED	236.91	100.00	5.10
RV-5	PRV-1	145.00	ACTIVATED	262.95	145.00	11.10
RV-6	PRV-1	90.00	WIDE OPEN	138.28	138.28	0.00

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE (gpm)	NODE TITLE
R-1	207.02	
T-1	13.02	
T-2	73.18	Cemetery Tan
T-3	-53.85	Dehart Tank
T-4	18.60	Wrigley Tank
NET SYSTEM INFLOW = 311.83		
NET SYSTEM OUTFLOW = -53.85		
NET SYSTEM DEMAND = 257.97		

Case: 5

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 5)

Demand added to end of E.J. Adkins Rd. J-249
 to show flushing velocity of 2.3 fps

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 6 TRIALS: ACCURACY = 0.00001

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE #1	NODE #2	FLOWRATE (gpm)	HEAD LOSS (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL+ML/1000 (ft/ft)	HL/1000 (ft/ft)
P-1	J-5	O-WTP	-206.76	22.00	0.00	2.35	4.64	4.64
P-10	J-2	J-9	72.08	0.40	0.00	0.46	0.16	0.16
P-100	J-94	J-95	0.00	0.00	0.00	0.00	0.00	0.00
P-101	J-96	J-94	56.70	0.39	0.00	0.64	0.42	0.42
P-102	J-97	J-96	56.85	0.55	0.00	0.65	0.42	0.42
P-103	J-97	J-98	0.00	0.00	0.00	0.00	0.00	0.00
P-104	J-93	J-110	6.30	0.02	0.00	0.07	0.01	0.01
P-105	J-93	J-101	47.40	0.64	0.00	0.54	0.30	0.30
P-106	J-101	J-100	0.22	0.00	0.00	0.00	0.00	0.00
P-107	J-101	J-139	46.95	0.28	0.00	0.53	0.30	0.30
P-108	J-102	J-104	0.15	0.00	0.00	0.01	0.00	0.00
P-109	J-102	J-103	45.38	0.68	0.00	0.51	0.28	0.28
P-11	J-9	T-2	-72.53	0.44	0.00	0.82	0.67	0.67
P-110	J-103	J-105	0.38	0.00	0.00	0.00	0.00	0.00
P-111	J-103	J-237	43.88	1.45	0.00	0.50	0.26	0.26
P-112	J-107	J-225	0.97	0.01	0.00	0.02	0.00	0.00
P-113	J-107	J-109	41.47	6.30	0.00	1.06	1.71	1.71
P-114	J-109	J-106	1.73	0.03	0.00	0.08	0.02	0.02
P-115	J-109	J-244	38.33	17.94	0.00	1.74	5.99	5.99
P-116	J-110	J-99	2.02	0.10	0.00	0.09	0.03	0.03
P-117	J-110	J-112	1.88	0.00	0.00	0.02	0.00	0.00
P-118	J-99	J-113	0.22	0.00	0.00	0.01	0.00	0.00
P-119	J-99	J-115	0.52	0.01	0.00	0.02	0.00	0.00
P-12	J-9	J-32	143.12	2.37	0.00	1.62	2.35	2.35
P-120	J-194	J-10	0.00	0.00	0.00	0.00	0.00	0.00
P-121	J-112	I-Pump-3	0.00	0.00	0.00	0.00	0.00	0.00
P-122	J-116	J-114	0.00	0.00	0.00	0.00	0.00	0.00
P-123	J-118	J-117	0.22	0.00	0.00	0.01	0.00	0.00
P-124	J-118	J-120	0.22	0.00	0.00	0.01	0.00	0.00
P-125	J-116	J-119	-7.20	0.02	0.00	0.08	0.01	0.01
P-126	J-114	J-178	0.00	0.00	0.00	0.00	0.00	0.00
P-127	J-114	J-123	0.00	0.00	0.00	0.00	0.00	0.00
P-128	J-119	J-125	0.38	0.00	0.00	0.02	0.00	0.00
P-129	J-119	J-124	-7.95	0.10	0.00	0.09	0.01	0.01
P-13	J-1	J-17	9.98	0.05	0.00	0.11	0.02	0.02
P-130	J-132	I-RV-5	11.10	0.13	0.00	0.50	0.60	0.60
P-131	J-122	J-126	0.60	0.00	0.00	0.02	0.00	0.00
P-132	J-122	J-228	9.90	0.02	0.00	0.11	0.02	0.02
P-133	J-127	J-128	4.95	0.01	0.00	0.06	0.00	0.00
P-134	J-129	J-4	56.82	0.30	0.00	0.64	0.42	0.42
P-135	J-213	J-97	57.00	1.49	0.00	0.65	0.43	0.43
P-136	J-131	J-130	1.05	0.00	0.00	0.01	0.00	0.00
P-137	J-131	J-169	3.68	0.07	0.00	0.09	0.02	0.02
P-138	J-132	J-68	131.04	7.64	0.00	1.49	2.00	2.00
P-139	J-189	J-118	1.35	0.03	0.00	0.06	0.01	0.01

P-14	J-1	T-3	35.24	0.47	0.00	0.40	0.18	0.18
P-140	O-Pump-3	J-190	0.00	0.00	0.00	0.00	0.00	0.00
P-141	J-178	J-134	0.00	0.00	0.00	0.00	0.00	0.00
P-142	J-124	J-180	-7.95	0.05	0.00	0.09	0.01	0.01
P-143	J-135	J-188	1.35	0.01	0.00	0.03	0.00	0.00
P-144	J-135	J-187	6.07	0.22	0.00	0.16	0.05	0.05
P-145	J-135	J-138	0.75	0.00	0.00	0.02	0.00	0.00
P-146	J-138	J-137	0.30	0.00	0.00	0.01	0.00	0.00
P-147	J-139	J-102	46.28	0.91	0.00	0.53	0.29	0.29
P-148	J-139	J-141	0.22	0.00	0.00	0.00	0.00	0.00
P-149	J-73	J-140	0.38	0.00	0.00	0.02	0.00	0.00
P-15	J-11	J-10	2.93	0.00	0.00	0.03	0.00	0.00
P-150	O-RV-1	J-71	50.72	1.71	0.00	0.58	0.34	0.34
P-151	J-142	J-90	43.75	1.74	0.00	0.50	0.26	0.26
P-152	J-142	J-192	1.05	0.01	0.00	0.05	0.01	0.01
P-153	J-144	J-80	39.62	0.60	0.00	0.45	0.22	0.22
P-154	J-144	J-145	0.45	0.00	0.00	0.02	0.00	0.00
P-155	J-146	J-87	29.27	5.06	0.00	1.33	3.63	3.63
P-156	J-146	J-148	0.15	0.00	0.00	0.01	0.00	0.00
P-157	J-147	J-135	9.75	0.15	0.00	0.11	0.02	0.02
P-158	J-148	J-150	0.08	0.00	0.00	0.00	0.00	0.00
P-159	J-149	J-151	1.95	0.10	0.00	0.09	0.02	0.02
P-16	J-12	J-11	3.38	0.01	0.00	0.04	0.00	0.00
P-160	J-149	J-152	0.15	0.00	0.00	0.01	0.00	0.00
P-161	J-151	J-89	0.30	0.00	0.00	0.01	0.00	0.00
P-162	J-151	J-154	0.30	0.00	0.00	0.01	0.00	0.00
P-163	J-55	J-153	0.38	0.00	0.00	0.01	0.00	0.00
P-164	O-RV-2	J-62	3.15	0.00	0.00	0.04	0.00	0.00
P-165	O-RV-3	J-69	0.90	0.01	0.00	0.04	0.01	0.01
P-166	O-RV-4	J-232	5.10	0.04	0.00	0.13	0.04	0.04
P-167	J-128	J-156	1.12	0.01	0.00	0.03	0.00	0.00
P-168	J-156	J-155	0.08	0.00	0.00	0.00	0.00	0.00
P-169	J-128	J-159	2.47	0.11	0.00	0.11	0.04	0.04
P-17	J-13	J-12	3.60	0.00	0.00	0.04	0.00	0.00
P-170	J-157	J-158	0.30	0.00	0.00	0.01	0.00	0.00
P-171	J-159	J-157	0.90	0.01	0.00	0.04	0.01	0.01
P-172	J-159	J-160	0.45	0.00	0.00	0.02	0.00	0.00
P-173	O-Pump-5	J-161	2.40	0.08	0.00	0.11	0.04	0.04
P-174	J-127	I-Pump-5	2.40	0.00	0.00	0.03	0.00	0.00
P-175	J-161	J-162	0.68	0.00	0.00	0.01	0.00	0.00
P-176	J-162	J-163	0.15	0.00	0.00	0.01	0.00	0.00
P-177	J-162	J-165	0.15	0.00	0.00	0.01	0.00	0.00
P-178	J-161	J-183	0.97	0.01	0.00	0.04	0.01	0.01
P-179	J-164	J-127	7.35	0.02	0.00	0.08	0.01	0.01
P-18	J-14	J-13	3.90	0.01	0.00	0.04	0.00	0.00
P-180	J-164	J-185	0.83	0.00	0.00	0.04	0.00	0.00
P-181	J-168	J-164	8.55	0.01	0.00	0.10	0.01	0.01
P-182	J-168	J-170	0.45	0.00	0.00	0.01	0.00	0.00
P-183	O-Pump-4	J-131	6.15	0.00	0.00	0.07	0.01	0.01
P-184	J-169	J-133	2.78	0.02	0.00	0.07	0.01	0.01
P-185	J-169	J-172	0.15	0.00	0.00	0.01	0.00	0.00
P-186	J-133	J-171	2.55	0.02	0.00	0.07	0.01	0.01
P-187	J-171	J-175	1.73	0.01	0.00	0.04	0.00	0.00
P-188	J-171	J-174	0.22	0.01	0.00	0.02	0.00	0.00
P-189	J-175	J-173	1.35	0.00	0.00	0.03	0.00	0.00
P-19	J-15	J-14	4.65	0.02	0.00	0.05	0.00	0.00
P-190	J-173	J-176	1.12	0.01	0.00	0.03	0.00	0.00
P-191	J-176	J-177	0.38	0.00	0.00	0.02	0.00	0.00
P-192	J-176	J-179	0.08	0.00	0.00	0.00	0.00	0.00
P-193	J-180	J-147	10.65	0.07	0.00	0.12	0.02	0.02
P-194	J-180	T-4	-18.60	0.04	0.00	0.21	0.05	0.05
P-195	J-183	J-184	0.75	0.01	0.00	0.03	0.00	0.00
P-196	J-182	J-27	67.49	1.10	0.00	0.77	0.58	0.58
P-197	J-181	J-182	67.94	0.00	0.00	0.77	0.59	0.59
P-198	J-184	J-166	0.30	0.00	0.00	0.01	0.00	0.00
P-199	J-185	J-167	0.22	0.00	0.00	0.01	0.00	0.00
P-2	J-3	J-197	87.38	0.25	0.00	0.56	0.23	0.23
P-20	J-16	J-15	6.90	0.03	0.00	0.08	0.01	0.01
P-200	J-186	J-136	1.58	0.03	0.00	0.04	0.00	0.00
P-201	J-187	J-186	4.12	0.10	0.00	0.11	0.02	0.02
P-202	J-188	J-121	0.45	0.00	0.00	0.01	0.00	0.00
P-203	J-190	J-116	-6.90	0.01	0.00	0.08	0.01	0.01
P-204	J-190	J-191	6.45	0.23	0.00	0.16	0.05	0.05
P-205	J-191	J-196	4.73	1.24	0.00	0.21	0.12	0.12
P-206	J-192	J-143	0.08	0.00	0.00	0.00	0.00	0.00
P-207	J-192	J-241	0.68	0.00	0.00	0.03	0.00	0.00
P-208	J-106	J-224	0.83	0.01	0.00	0.04	0.00	0.00
P-209	J-147	J-195	0.45	0.01	0.00	0.02	0.00	0.00
P-21	J-17	J-16	9.45	0.03	0.00	0.11	0.02	0.02
P-210	J-196	J-189	2.10	0.04	0.00	0.10	0.03	0.03
P-211	J-196	J-198	0.30	0.00	0.00	0.01	0.00	0.00
P-212	J-197	J-6	77.63	0.08	0.00	0.50	0.19	0.19
P-213	J-197	J-207	8.55	0.05	0.00	0.22	0.09	0.09
P-214	J-200	J-226	81.38	0.05	0.00	0.52	0.20	0.20
P-215	J-199	J-208	5.68	0.02	0.00	0.14	0.04	0.04
P-216	J-199	J-202	1.82	0.00	0.00	0.05	0.01	0.01
P-217	J-201	J-204	8.18	0.02	0.00	0.21	0.08	0.08
P-218	J-202	J-205	-1.95	0.00	0.00	0.05	0.01	0.01
P-219	J-201	J-211	-2.88	0.00	0.00	0.13	0.05	0.05
P-22	J-18	J-44	48.74	0.26	0.00	0.55	0.32	0.32

P-220	J-202	J-203	0.15	0.00	0.00	0.01	0.00	0.00
P-221	J-204	J-200	9.14	0.02	0.00	0.23	0.10	0.10
P-222	J-205	J-209	-4.12	0.00	0.00	0.11	0.02	0.02
P-223	J-204	J-205	-1.49	0.05	0.00	0.15	0.11	0.11
P-224	J-205	J-206	0.15	0.00	0.00	0.02	0.00	0.00
P-225	J-207	J-199	7.95	0.04	0.00	0.20	0.08	0.08
P-226	J-208	J-201	5.53	0.01	0.00	0.14	0.04	0.04
P-227	J-209	J-6	-4.19	0.00	0.00	0.11	0.02	0.02
P-228	J-210	J-7	31.18	0.06	0.00	0.35	0.14	0.14
P-229	J-202	J-211	3.18	0.02	0.00	0.14	0.06	0.06
P-23	J-19	J-18	49.94	0.99	0.00	0.57	0.33	0.33
P-230	J-212	I-Pump-4	6.15	0.01	0.00	0.07	0.01	0.01
P-231	J-210	J-212	7.50	0.00	0.00	0.09	0.01	0.01
P-232	J-213	J-219	-5.60	0.02	0.00	0.25	0.17	0.17
P-233	J-215	J-217	44.60	0.08	0.00	0.51	0.27	0.27
P-234	J-215	J-214	-48.31	0.08	0.00	0.55	0.31	0.31
P-235	J-214	J-223	-48.31	0.14	0.00	0.55	0.31	0.31
P-236	J-214	J-216	0.00	0.00	0.00	0.00	0.00	0.00
P-237	J-217	J-210	41.90	0.08	0.00	0.48	0.24	0.24
P-238	J-217	J-218	0.00	0.00	0.00	0.00	0.00	0.00
P-239	J-219	J-221	-5.60	0.02	0.00	0.25	0.17	0.17
P-24	J-20	J-19	50.69	0.65	0.00	0.58	0.34	0.34
P-240	J-219	J-220	0.00	0.00	0.00	0.00	0.00	0.00
P-241	J-221	J-215	-5.60	0.04	0.00	0.25	0.17	0.17
P-242	J-222	J-129	-48.31	0.03	0.00	0.55	0.31	0.31
P-243	J-223	J-222	-48.31	0.05	0.00	0.55	0.31	0.31
P-244	O-Pump-6	J-107	43.50	0.09	0.00	1.11	1.86	1.86
P-245	J-226	J-74	79.28	0.19	0.00	0.51	0.19	0.19
P-246	J-226	J-227	0.15	0.00	0.00	0.02	0.00	0.00
P-247	J-228	J-168	9.45	0.02	0.00	0.11	0.02	0.02
P-248	J-228	J-230	0.22	0.00	0.00	0.01	0.00	0.00
P-249	J-229	J-122	11.10	0.05	0.00	0.13	0.02	0.02
P-25	J-21	J-20	53.39	0.70	0.00	0.61	0.38	0.38
P-250	O-RV-5	J-229	11.10	0.17	0.00	0.50	0.60	0.60
P-251	J-225	J-108	0.22	0.00	0.00	0.01	0.00	0.00
P-252	J-57	J-238	0.00	0.00	0.00	0.00	0.00	0.00
P-253	J-231	J-56	-0.38	0.00	0.00	0.01	0.00	0.00
P-254	J-232	J-63	3.00	0.02	0.00	0.08	0.01	0.01
P-255	J-232	J-233	0.00	0.00	0.00	0.00	0.00	0.00
P-256	J-224	J-234	0.22	0.00	0.00	0.01	0.00	0.00
P-257	J-235	J-111	36.15	5.74	0.00	1.64	5.37	5.37
P-258	J-236	J-77	0.15	0.00	0.00	0.01	0.00	0.00
P-259	J-237	I-Pump-6	43.50	0.02	0.00	1.11	1.86	1.86
P-26	J-22	J-21	56.84	0.52	0.00	0.64	0.42	0.42
P-260	J-238	J-231	-0.15	0.00	0.00	0.00	0.00	0.00
P-261	J-57	I-RV-6	0.00	0.00	0.00	0.00	0.00	0.00
P-262	J-56	J-239	0.00	0.00	0.00	0.00	0.00	0.00
P-263	O-RV-6	J-240	0.00	0.00	0.00	0.00	0.00	0.00
P-264	J-241	J-193	0.08	0.00	0.00	0.00	0.00	0.00
P-265	J-241	J-242	0.38	0.00	0.00	0.02	0.00	0.00
P-266	J-242	J-243	0.15	0.00	0.00	0.01	0.00	0.00
P-27	J-23	J-22	57.29	0.75	0.00	0.65	0.43	0.43
P-270	J-244	J-235	36.75	20.08	0.00	1.67	5.54	5.54
P-271	J-244	J-247	0.38	0.00	0.00	0.02	0.00	0.00
P-272	J-246	J-149	3.30	0.16	0.00	0.15	0.06	0.06
P-273	J-246	J-249	25.00	22.48	0.00	2.55	19.55	19.55
P-274	J-248	J-250	0.38	0.00	0.00	0.02	0.00	0.00
P-275	J-74	J-8	75.91	0.10	0.00	0.48	0.18	0.18
P-276	J-74	J-252	1.05	0.00	0.00	0.03	0.00	0.00
P-277	J-252	J-251	0.00	0.00	0.00	0.00	0.00	0.00
P-278	J-252	J-253	0.52	0.00	0.00	0.01	0.00	0.00
P-28	J-24	J-23	57.74	0.48	0.00	0.66	0.44	0.44
P-29	J-25	J-24	60.59	1.93	0.00	0.69	0.48	0.48
P-3	J-3	J-129	110.75	0.35	0.00	1.26	1.46	1.46
P-30	J-26	J-25	61.79	0.78	0.00	0.70	0.50	0.50
P-31	J-27	J-54	63.89	1.30	0.00	0.72	0.53	0.53
P-32	J-28	J-181	67.94	0.22	0.00	0.77	0.59	0.59
P-33	J-29	J-67	73.04	0.96	0.00	0.83	0.68	0.68
P-34	J-30	J-29	78.59	1.65	0.00	0.89	0.77	0.77
P-35	J-31	I-Pump-1	142.37	0.69	0.00	1.62	2.33	2.33
P-36	J-32	J-31	142.74	8.13	0.00	1.62	2.34	2.34
P-37	O-Pump-1	J-132	142.37	0.51	0.00	1.62	2.33	2.33
P-38	J-10	J-34	2.40	0.02	0.00	0.06	0.01	0.01
P-39	J-34	J-39	0.60	0.00	0.00	0.03	0.00	0.00
P-4	J-4	J-215	4.29	0.00	0.00	0.05	0.00	0.00
P-40	J-34	J-37	1.13	0.04	0.00	0.05	0.01	0.01
P-41	J-33	J-35	0.15	0.00	0.00	0.01	0.00	0.00
P-42	J-37	J-33	0.53	0.01	0.00	0.02	0.00	0.00
P-43	J-38	J-36	0.15	0.00	0.00	0.01	0.00	0.00
P-44	J-39	J-38	0.45	0.00	0.00	0.02	0.00	0.00
P-45	J-15	J-41	0.90	0.02	0.00	0.04	0.01	0.01
P-46	J-41	J-40	0.22	0.00	0.00	0.01	0.00	0.00
P-47	J-16	J-43	1.80	0.06	0.00	0.08	0.02	0.02
P-48	J-43	J-42	0.90	0.04	0.00	0.04	0.01	0.01
P-49	J-44	J-1	46.42	0.26	0.00	0.53	0.29	0.29
P-5	J-5	J-3	205.64	7.71	0.00	2.33	4.60	4.60
P-50	J-44	J-46	2.10	0.03	0.00	0.10	0.03	0.03
P-51	J-46	J-45	1.05	0.04	0.00	0.05	0.01	0.01
P-52	J-18	J-49	0.45	0.00	0.00	0.01	0.00	0.00
P-53	J-49	J-47	0.00	0.00	0.00	0.00	0.00	0.00

P-54	J-20	J-48	1.20	0.01	0.00	3.03	0.00	0.00
P-55	J-48	J-50	0.22	0.00	0.00	0.01	0.00	0.00
P-56	J-21	J-51	1.68	0.02	0.00	0.05	0.01	0.01
P-57	J-51	J-52	0.38	0.00	0.00	0.01	0.00	0.00
P-58	J-24	J-53	0.75	0.01	0.00	0.03	0.00	0.00
P-59	J-54	J-26	61.79	0.35	0.00	0.70	0.50	0.50
P-6	J-6	J-200	72.91	0.08	0.00	0.47	0.17	0.17
P-60	J-54	J-56	1.12	0.00	0.00	0.03	0.00	0.00
P-61	J-27	J-55	2.55	0.02	0.00	0.10	0.04	0.04
P-62	J-55	J-58	0.75	0.00	0.00	0.02	0.00	0.00
P-63-XX	J-58	J-57						
P-64	J-28	I-RV-2	3.15	0.00	0.00	0.04	0.00	0.00
P-65	J-59	J-60	0.38	0.00	0.00	0.00	0.00	0.00
P-66	J-59	J-61	0.45	0.01	0.00	0.02	0.00	0.00
P-67	J-62	J-59	2.03	0.00	0.00	0.02	0.00	0.00
P-68	J-62	J-64	0.00	0.00	0.00	0.00	0.00	0.00
P-69	J-29	I-RV-4	5.10	0.01	0.00	0.13	0.04	0.04
P-7	J-7	T-1	29.33	0.05	0.00	0.33	0.13	0.13
P-70	J-63	J-65	1.05	0.01	0.00	0.03	0.00	0.00
P-71	J-66	J-28	71.39	0.70	0.00	0.81	0.65	0.65
P-72	J-67	J-66	71.77	0.60	0.00	0.81	0.65	0.65
P-73	J-67	I-RV-3	0.90	0.00	0.00	0.04	0.01	0.01
P-74	J-68	J-30	78.89	0.54	0.00	0.90	0.78	0.78
P-75	J-68	J-73	51.92	1.28	0.00	0.59	0.36	0.36
P-76	J-71	J-70	1.50	0.09	0.00	0.07	0.01	0.01
P-77	J-71	J-142	45.77	1.16	0.00	0.52	0.28	0.28
P-78	J-73	I-RV-1	50.72	0.40	0.00	0.58	0.34	0.34
P-79	J-72	J-248	1.05	0.02	0.00	0.05	0.01	0.01
P-8	J-8	J-2	74.33	0.20	0.00	0.47	0.17	0.17
P-80	J-75	J-72	1.35	0.02	0.00	0.06	0.01	0.01
P-81	J-75	J-236	0.60	0.01	0.00	0.03	0.00	0.00
P-82	J-76	J-75	2.55	0.10	0.00	0.12	0.04	0.04
P-83	J-76	J-78	0.22	0.00	0.00	0.01	0.00	0.00
P-84	J-79	J-76	3.30	0.03	0.00	0.08	0.02	0.02
P-85	J-79	J-81	0.22	0.00	0.00	0.01	0.00	0.00
P-86	J-80	J-79	4.50	0.15	0.00	0.11	0.03	0.03
P-87	J-80	J-82	33.47	2.97	0.00	0.85	1.15	1.15
P-88	J-82	J-83	30.85	8.64	0.00	0.79	0.99	0.99
P-89	J-82	J-85	0.38	0.00	0.00	0.02	0.00	0.00
P-9	I-WTP	R-1	-206.76	2.37	0.00	2.35	4.64	4.64
P-90	J-83	J-84	0.15	0.00	0.00	0.01	0.00	0.00
P-91	J-83	J-146	29.42	5.48	0.00	1.34	3.67	3.67
P-92	J-87	J-86	0.22	0.00	0.00	0.01	0.00	0.00
P-93	J-87	J-246	28.75	3.27	0.00	1.30	3.52	3.52
P-94	J-88	J-144	40.82	0.87	0.00	0.46	0.23	0.23
P-95	J-88	J-91	0.68	0.01	0.00	0.03	0.00	0.00
P-96	J-90	J-98	42.62	1.08	0.00	0.48	0.25	0.25
P-97	J-90	J-92	0.22	0.00	0.00	0.01	0.00	0.00
P-98	J-4	J-213	51.40	0.08	0.00	0.58	0.35	0.35
P-99	J-94	J-93	55.58	2.55	0.00	0.63	0.41	0.41

PUMP/LOSS ELEMENT RESULTS

NAME	FLOWRATE (gpm)	INLET HEAD (ft)	OUTLET HEAD (ft)	PUMP HEAD (ft)	EFFIC- ENCY (%)	USEFUL POWER (Hp)	INCREMENTL COST (\$)	TOTAL COST (\$)	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. (ft)
Pump-1	142.37	238.37	598.37	360.0	75.00	0.	0.0	0.0	**	**	271.5
Device "Pump-3" is closed											
Pump-3	0.00	145.18	344.78	0.0	75.00	0.	0.0	0.0	**	**	178.4
Pump-4	6.15	200.10	292.20	92.1	75.00	0.	0.0	0.0	**	**	233.3
Pump-5	2.40	124.33	318.11	193.8	75.00	0.	0.0	0.0	**	**	157.5
Pump-6	43.50	161.24	347.12	185.9	75.00	0.	0.0	0.0	**	**	194.4
WTP	206.76	2.63	245.61	243.0	75.00	0.	0.0	0.0	**	**	35.7

NODE RESULTS

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	NODE ELEVATION (ft)	PRESSURE HEAD (ft)	NODE PRESSURE (psi)
J-1		1.20	1275.47	885.00	390.47	169.20
J-10		0.52	1275.32	1080.00	195.32	84.64
J-100		0.22	944.56	770.00	174.56	75.64
J-101		0.22	944.56	750.00	194.56	84.31
J-102		0.75	943.38	750.00	193.38	83.80
J-103		1.12	942.70	760.00	182.70	79.17
J-104		0.15	943.38	780.00	163.38	70.80
J-105		0.38	942.70	860.00	82.70	35.84
J-106		0.90	1120.70	830.00	290.70	125.97
J-107		1.05	1127.03	780.00	347.03	150.38
J-108		0.22	1127.02	880.00	247.02	107.04
J-109		1.42	1120.73	800.00	320.73	138.98
J-11		0.45	1275.32	1130.00	145.32	62.97

J-110	2.40	945.18	750.00	195.18	84.58
J-111	36.15	1076.97	920.00	156.97	68.02
J-112	1.88	945.18	790.00	155.18	67.24
J-113	0.22	945.08	840.00	105.08	45.54
J-114	0.00	1144.79	810.00	334.79	145.08
J-115	0.52	945.08	840.00	105.08	45.53
J-116	0.30	1144.79	810.00	334.79	145.08
J-117	0.22	1143.24	900.00	243.24	105.41
J-118	0.90	1143.24	870.00	273.24	118.41
J-119	0.38	1144.81	820.00	324.81	140.75
J-120	0.22	1275.33	1100.00	175.33	75.97
J-121	0.22	1143.24	920.00	223.24	96.74
J-122	0.45	1144.73	820.00	324.73	140.72
J-123	0.60	1034.40	760.00	274.40	118.91
J-124	0.00	1144.79	880.00	264.79	114.74
J-125	0.00	1144.91	1000.00	144.91	62.80
J-126	0.38	1144.81	900.00	244.81	106.08
J-127	0.60	1034.40	860.00	174.40	75.57
J-128	0.00	1034.33	910.00	124.33	53.87
J-129	1.35	1034.31	820.00	214.31	92.87
J-130	5.62	950.56	740.00	210.56	91.24
J-131	0.30	1275.33	1180.00	95.33	41.31
J-132	1.05	1042.19	760.00	282.19	122.28
J-133	1.42	1042.19	770.00	272.19	117.95
J-134	0.22	1297.86	700.00	597.86	259.07
J-135	0.22	1042.11	840.00	202.11	87.58
J-136	0.00	1144.79	900.00	244.79	106.08
J-137	1.58	1144.74	815.00	329.74	142.89
J-138	1.58	1144.39	900.00	244.39	105.90
J-139	0.30	1144.74	960.00	184.74	80.05
J-140	0.45	1144.74	850.00	294.74	127.72
J-141	0.45	944.29	750.00	194.29	84.19
J-142	0.75	1275.34	1100.00	175.34	75.98
J-143	0.38	1288.94	1000.00	288.94	125.21
J-144	0.22	944.28	780.00	164.28	71.19
J-145	0.97	983.28	700.00	283.28	122.76
J-146	0.08	983.28	700.00	283.28	122.75
J-147	0.75	979.59	715.00	264.59	114.66
J-148	0.45	979.59	750.00	229.59	99.49
J-149	0.00	961.90	780.00	181.90	78.82
J-150	0.45	1144.89	860.00	284.89	123.45
J-151	0.08	961.90	800.00	161.90	70.16
J-152	1.20	953.41	780.00	173.41	75.15
J-153	1.35	1275.36	1100.00	175.36	75.99
J-154	0.08	961.90	820.00	141.90	61.49
J-155	1.35	953.31	840.00	113.31	49.10
J-156	0.15	953.41	840.00	113.41	49.15
J-157	0.38	1284.42	880.00	404.42	175.25
J-158	0.30	953.31	840.00	113.31	49.10
J-159	0.08	1034.31	700.00	334.31	144.87
J-160	1.05	1034.31	700.00	334.31	144.87
J-161	0.60	1034.19	820.00	214.19	92.82
J-162	0.30	1034.19	850.00	184.19	79.81
J-163	1.12	1034.20	810.00	224.20	97.15
J-164	0.75	1275.39	1110.00	165.39	71.67
J-165	0.45	1034.20	875.00	159.20	68.99
J-166	0.75	1228.03	1020.00	208.03	90.15
J-167	0.38	1228.03	1020.00	208.03	90.15
J-168	0.15	1228.03	1020.00	208.03	90.15
J-169	0.38	1034.35	840.00	194.35	84.22
J-170	0.15	1228.03	880.00	348.03	150.81
J-171	0.30	1228.01	980.00	248.01	107.47
J-172	0.22	1034.34	850.00	184.34	79.88
J-173	0.45	1034.36	800.00	234.36	101.56
J-174	0.75	1042.13	850.00	192.13	83.26
J-175	0.52	1275.42	960.00	315.42	136.68
J-176	0.45	1034.36	820.00	214.36	92.89
J-177	0.60	1042.09	800.00	242.09	104.91
J-178	0.15	1042.13	860.00	182.13	78.92
J-179	0.22	1042.07	860.00	182.07	78.90
J-180	0.22	1042.08	860.00	182.08	78.90
J-181	0.38	1042.08	795.00	247.08	107.07
J-182	0.68	1042.07	820.00	222.07	96.23
J-183	0.38	1042.07	880.00	162.07	70.23
J-184	0.00	1144.79	850.00	294.79	127.74
J-185	0.08	1042.07	835.00	207.07	89.73
J-186	0.75	1275.98	920.00	355.98	154.26
J-187	0.00	1144.96	900.00	244.96	106.15
J-188	0.00	1285.54			
J-189	0.45	1285.54			
J-190	0.22	1228.02	1040.00	188.02	81.48
J-191	0.45	1228.02	1040.00	188.02	81.47
J-192	0.60	1034.34	920.00	114.34	49.55
J-193	2.55	1144.42	850.00	294.42	127.58
J-194	1.95	1144.52	825.00	319.52	138.46
J-195	0.90	1144.73	800.00	344.73	149.38
J-196	0.75	1143.27	850.00	293.27	127.09
J-197	0.75	1276.98	1020.00	256.98	111.36
J-198	0.45	1144.78	800.00	344.78	149.41
J-199	1.73	1144.55	790.00	354.55	153.64

Neal Howard'

J-192	0.30	983.28	690.00	293.28	127.09
J-193	0.08	983.27	740.00	243.27	105.42
J-194	0.00	1275.32	1060.00	195.32	84.64
J-195	0.45	1144.88	1000.00	144.88	62.78
J-196	2.33	1143.32	830.00	313.32	135.77
J-197	1.20	950.66	760.00	190.66	82.62
J-198	0.30	1143.32	880.00	263.32	114.10
J-199	0.45	950.57	760.00	190.57	82.58
J-2	2.25	949.96	700.00	249.96	108.32
J-20	1.50	1277.63	1060.00	217.63	94.30
J-200	0.68	950.50	760.00	190.50	82.55
J-201	0.22	950.54	760.00	190.54	82.57
J-202	0.45	950.57	760.00	190.57	82.58
J-203	0.15	950.57	760.00	190.57	82.58
J-204	0.52	950.52	760.00	190.52	82.56
J-205	0.52	950.57	760.00	190.57	82.58
J-206	0.15	950.57	760.00	190.57	82.58
J-207	0.60	950.61	760.00	190.61	82.60
J-208	0.15	950.55	760.00	190.55	82.57
J-209	0.08	950.58	760.00	190.58	82.58
J-21	1.58	1278.33	1050.00	228.33	98.94
J-210	3.22	950.11	780.00	170.11	73.71
J-211	0.30	950.55	760.00	190.55	82.57
J-212	1.35	950.10			
J-213	0.00	950.18	780.00	170.18	73.75
J-214	0.00	950.34	760.00	190.34	82.48
J-215	2.40	950.26	780.00	170.26	73.78
J-216	0.00	950.34	760.00	190.34	82.48
J-217	2.70	950.19	780.00	170.19	73.75
J-218	0.00	950.19	760.00	190.19	82.41
J-219	0.00	950.20	780.00	170.20	73.76
J-22	0.45	1278.84	980.00	298.84	129.50
J-220	0.00	950.20	780.00	170.20	73.76
J-221	0.00	950.22	780.00	170.22	73.76
J-222	0.00	950.53	740.00	210.53	91.23
J-223	0.00	950.48	740.00	210.48	91.21
J-224	0.60	1120.69	850.00	270.69	117.30
J-225	0.75	1127.02	860.00	267.02	115.71
J-226	1.95	950.45	770.00	180.45	78.20
J-227	0.15	950.45	800.00	150.45	65.20
J-228	0.22	1034.38	820.00	214.38	92.90
J-229	0.00	1034.45	700.00	334.45	144.93
J-23	0.45	1279.59	1080.00	199.59	86.49
J-230	0.22	1034.38	860.00	174.38	75.56
J-231	0.22	1283.14	1025.00	258.14	111.86
J-232	2.10	980.72	800.00	180.72	78.31
J-233	0.00	980.72	860.00	120.72	52.31
J-234	0.22	1120.69	900.00	220.69	95.63
J-235	0.60	1082.71	870.00	212.71	92.17
J-236	0.45	978.70	775.00	203.70	88.27
J-237	0.38	941.25	780.00	161.25	69.88
J-238	0.15	1283.14	970.00	313.14	135.69
J-239	0.00	1283.14	960.00	323.14	140.03
J-24	2.10	1280.07	1020.00	260.07	112.70
J-240	0.00	1283.14	840.00	443.14	192.03
J-241	0.22	983.27	700.00	283.27	122.75
J-242	0.22	983.27	740.00	243.27	105.42
J-243	0.15	983.27	760.00	223.27	96.75
J-244	1.20	1102.79	850.00	252.79	109.54
J-246	0.45	953.58	740.00	213.58	92.55
J-247	0.38	1102.79	880.00	222.79	96.54
J-248	0.68	978.67	776.00	202.67	87.82
J-249	25.00 (**)	931.09	775.00	156.09	67.64
J-25	1.20	1282.01	880.00	402.01	174.20
J-250	0.38	978.66	800.00	178.66	77.42
J-251	0.00	950.26	800.00	150.26	65.11
J-252	0.52	950.26	780.00	170.26	73.78
J-253	0.52	950.26	880.00	70.26	30.45
J-26	0.00	1282.79	1020.00	262.79	113.88
J-27	1.05	1284.44	875.00	409.44	177.42
J-28	0.30	1285.77	800.00	485.77	210.50
J-29	0.45	1288.03	780.00	508.03	220.15
J-3	7.50	950.91	700.00	250.91	108.73
J-30	0.30	1289.68	680.00	609.68	264.20
J-31	0.38	939.05	700.00	239.05	103.59
J-32	0.38	947.18	800.00	147.18	63.78
J-33	0.38	1275.24	1085.00	190.24	82.44
J-34	0.68	1275.30	1150.00	125.30	54.29
J-35	0.15	1275.24	1040.00	235.24	101.94
J-36	0.15	1275.29	1140.00	135.29	58.63
J-37	0.60	1275.25	1170.00	105.25	45.61
J-38	0.30	1275.29	1170.00	105.29	45.63
J-39	0.15	1275.29	1110.00	165.29	71.63
J-4	1.12	950.26	780.00	170.26	73.78
J-40	0.22	1275.33	1020.00	255.33	110.64
J-41	0.68	1275.33	1090.00	185.33	80.31
J-42	0.90	1275.29	860.00	415.29	179.96
J-43	0.90	1275.33	1130.00	145.33	62.98
J-44	0.22	1275.72	885.00	390.72	169.31
J-45	1.05	1275.65	940.00	335.65	145.45

J-46		1.05	1275.70	1030.00	245.70	106.47
J-47		0.00	1275.98	900.00	375.98	162.93
J-48		0.97	1277.62	890.00	387.62	167.97
J-49		0.45	1275.98	680.00	595.98	258.26
J-5		1.12	958.62	680.00	278.62	120.73
J-50		0.22	1277.62	940.00	337.62	146.30
J-51		1.50	1278.31	890.00	388.31	168.07
J-52		0.38	1278.31	960.00	318.31	137.93
J-53		0.75	1280.07	870.00	410.07	177.70
J-54		0.97	1283.14	1000.00	283.14	122.70
J-55		1.42	1284.42	830.00	454.42	196.92
J-56		0.75	1283.14	980.00	303.14	131.36
J-57		0.00 (0.00)	1283.14	970.00	313.14	135.69
J-58		0.75 (0.91)	1284.42	980.00	304.42	131.91
J-59		1.20	961.53	750.00	211.53	91.66
J-6		0.52	950.58	760.00	190.58	82.58
J-60		0.38	961.53	800.00	161.53	70.00
J-61		0.45	961.53	880.00	81.53	35.33
J-62		1.12	961.53	790.00	171.53	74.33
J-63		1.95	980.70	850.00	130.70	56.64
J-64		0.00	961.53	840.00	121.53	52.66
J-65		1.05	980.70	880.00	100.70	43.64
J-66		0.38	1286.46	790.00	496.46	215.13
J-67		0.38	1287.07	800.00	487.07	211.06
J-68		0.22	1290.22	700.00	590.22	255.76
J-69		0.90	961.53	700.00	261.53	113.33
J-7		1.80	950.05	820.00	130.05	56.35
J-70		1.50	984.35	850.00	134.35	58.22
J-71		3.45	984.44	740.00	244.44	105.92
J-72		0.30	978.69	750.00	228.69	99.10
J-73		0.82	1288.94	930.00	358.94	155.54
J-74		2.33	950.26	760.00	190.26	82.45
J-75		0.60	978.70	750.00	228.70	99.10
J-76		0.52	978.81	740.00	238.81	103.48
J-77		0.15	978.70	825.00	153.70	66.60
J-78		0.22	978.81	800.00	178.81	77.48
J-79		0.97	978.84	720.00	258.84	112.16
J-8		1.58	950.16	800.00	150.16	65.07
J-80		1.65	978.99	710.00	268.99	116.56
J-81		0.22	978.84	880.00	98.84	42.83
J-82		2.25	976.02	720.00	256.02	110.94
J-83		1.27	967.38	720.00	247.38	107.20
J-84		0.15	967.37	800.00	167.37	72.53
J-85		0.38	976.02	800.00	176.02	76.27
J-86		0.22	956.84	840.00	116.84	50.63
J-87		0.30	956.84	760.00	196.84	85.30
J-88		1.12	980.46	700.00	280.46	121.53
J-89		0.30	953.31	840.00	113.31	49.10
J-9		1.50	949.56	850.00	99.56	43.14
J-90		0.90	981.55	690.00	291.55	126.34
J-91		0.68	980.45	720.00	260.45	112.86
J-92		0.22	981.55	800.00	181.55	78.67
J-93		1.88	945.20	750.00	195.20	84.59
J-94		1.12	947.75	760.00	187.75	81.36
J-95		0.00	947.75	800.00	147.75	64.03
J-96		0.15	948.15	760.00	188.15	81.53
J-97		0.15	948.69	760.00	188.69	81.77
J-98		0.00	948.69	900.00	48.69	21.10
J-99		1.27	945.08	780.00	165.08	71.54
O-Pump-1	Dehart PS	0.00	1298.37	700.00	598.37	259.29
I-Pump-3	Wrigley PS	0.00	945.18	800.00	145.18	62.91
I-Pump-4	S. Ruin PS	0.00	950.10	750.00	200.10	86.71
I-Pump-5		0.00	1034.33	910.00	124.33	53.87
I-Pump-6		0.00	941.24	780.00	161.24	69.87
R-1		----	740.00	735.00	5.00	2.17
O-RV-1		----	986.15	760.00	226.15	98.00
O-RV-2		----	961.54	800.00	161.54	70.00
O-RV-3		----	961.54	800.00	161.54	70.00
I-RV-4		0.00	1288.02	750.00	538.02	233.14
I-RV-5		0.00	1297.73	700.00	597.73	259.01
O-RV-6		----	1283.14	970.00	313.14	135.69
T-1		----	950.00	900.00	50.00	21.67
T-2	Cemetery Tank	----	950.00	900.00	50.00	21.67
T-3	Dehart Tank	----	1275.00	1122.50	152.50	66.08
T-4	Wrigley Tank	----	1145.00	1100.00	45.00	19.50
O-WTP		0.00	980.61	735.00	245.61	106.43
I-RV-1		0.00	1288.54	760.00	528.54	229.03
I-RV-2		0.00	1285.77	800.00	485.77	210.50
I-RV-3		0.00	1287.07	800.00	487.07	211.06
I-RV-6		0.00	1283.14	970.00	313.14	135.69
O-Pump-3	Wrigley PS	0.00	1144.78	800.00	344.78	149.41
O-RV-4		----	980.77	750.00	230.77	100.00
O-Pump-5		0.00	1228.11	910.00	318.11	137.85
O-Pump-4	S. Ruin PS	0.00	1042.20	750.00	292.20	126.62
O-Pump-6		0.00	1127.12	780.00	347.12	150.42
O-RV-5		----	1034.62	700.00	334.62	145.00
I-Pump-1	Dehart PS	0.00	938.37	700.00	238.37	103.29
I-WTP		0.00	737.63	735.00	2.63	1.14

MAXIMUM AND MINIMUM VALUES

PRESURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
J-30	264.20	I-WTP	1.14
O-Pump-1	259.29	R-1	2.17
J-132	259.07	T-4	19.50
I-RV-5	259.01	J-98	21.10
J-49	258.26	T-1	21.67

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-273	2.55	P-106	0.00
P-1	2.35	P-148	0.00
P-9	2.35	P-158	0.00
P-5	2.33	P-168	0.00
P-115	1.74	P-192	0.00

HL + ML / 1000

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-273	19.55	P-106	0.00
P-115	5.99	P-148	0.00
P-270	5.54	P-110	0.00
P-257	5.37	P-65	0.00
P-1	4.64	P-260	0.00

HL / 1000

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
P-273	19.55	P-106	0.00
P-115	5.99	P-148	0.00
P-270	5.54	P-110	0.00
P-257	5.37	P-65	0.00
P-1	4.64	P-260	0.00

REGULATING VALVE REPORT

VALVE LABEL	VALVE TYPE	VALVE SETTING (psi or gpm)	VALVE STATUS	UPSTREAM PRESSURE (psi)	DOWNSTREAM PRESSURE (psi)	THROUGH FLOW (gpm)
RV-1	PRV-1	98.00	ACTIVATED	229.03	98.00	50.72
RV-2	PRV-1	70.00	ACTIVATED	210.50	70.00	3.15
RV-3	PRV-1	70.00	ACTIVATED	211.06	70.00	0.90
RV-4	PRV-1	100.00	ACTIVATED	233.14	100.00	5.10
RV-5	PRV-1	145.00	ACTIVATED	259.01	145.00	11.10
RV-6	PRV-1	90.00	WIDE OPEN	135.69	135.69	0.00

SUMMARY OF INFLOWS AND OUTFLOWS

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE (gpm)	NODE TITLE
R-1	206.76	
T-1	-29.38	
T-2	72.53	Cemetery Tan
T-3	-35.24	Dehart Tank
T-4	18.60	Wrigley Tank

NET SYSTEM INFLOW = 297.89
 NET SYSTEM OUTFLOW = -64.62
 NET SYSTEM DEMAND = 233.27

Demand added to end of Middle Fork Rd. J-250
to show flushing velocity of 2.5 fps

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 6 TRIALS: ACCURACY = 0.00001

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE #1	NODE #2	FLOWRATE (gpm)	HEAD LOSS (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL+ML/1000 (ft/ft)	HL/1000 (ft/ft)
P-1	J-5	O-WTP	-206.79	22.00	0.00	2.35	4.64	4.64
P-10	J-2	J-9	73.04	0.41	0.00	0.47	0.17	0.17
P-100	J-94	J-95	0.00	0.00	0.00	0.00	0.00	0.00
P-101	J-96	J-94	56.70	0.39	0.00	0.64	0.42	0.42
P-102	J-97	J-96	56.85	0.55	0.00	0.65	0.42	0.42
P-103	J-97	J-98	0.00	0.00	0.00	0.00	0.00	0.00
P-104	J-93	J-110	6.30	0.02	0.00	0.07	0.01	0.01
P-105	J-93	J-101	47.40	0.64	0.00	0.54	0.30	0.30
P-106	J-101	J-100	0.22	0.00	0.00	0.00	0.00	0.00
P-107	J-101	J-139	46.95	0.28	0.00	0.53	0.30	0.30
P-108	J-102	J-104	0.15	0.00	0.00	0.01	0.00	0.00
P-109	J-102	J-103	45.38	0.68	0.00	0.51	0.28	0.28
P-11	J-9	T-2	-77.17	0.49	0.00	0.88	0.75	0.75
P-110	J-103	J-105	0.38	0.00	0.00	0.00	0.00	0.00
P-111	J-103	J-237	43.88	1.45	0.00	0.50	0.26	0.26
P-112	J-107	J-225	0.97	0.01	0.00	0.02	0.00	0.00
P-113	J-107	J-109	41.47	6.30	0.00	1.06	1.71	1.71
P-114	J-109	J-106	1.73	0.03	0.00	0.08	0.02	0.02
P-115	J-109	J-244	38.33	17.94	0.00	1.74	5.99	5.99
P-116	J-110	J-99	2.02	0.10	0.00	0.09	0.03	0.03
P-117	J-110	J-112	1.88	0.00	0.00	0.02	0.00	0.00
P-118	J-99	J-113	0.22	0.00	0.00	0.01	0.00	0.00
P-119	J-99	J-115	0.52	0.01	0.00	0.02	0.00	0.00
P-12	J-9	J-32	148.72	2.55	0.00	1.69	2.52	2.52
P-120	J-194	J-10	0.00	0.00	0.00	0.00	0.00	0.00
P-121	J-112	I-Pump-3	0.00	0.00	0.00	0.00	0.00	0.00
P-122	J-116	J-114	0.00	0.00	0.00	0.00	0.00	0.00
P-123	J-118	J-117	0.22	0.00	0.00	0.01	0.00	0.00
P-124	J-118	J-120	0.22	0.00	0.00	0.01	0.00	0.00
P-125	J-116	J-119	-7.20	0.02	0.00	0.08	0.01	0.01
P-126	J-114	J-178	0.00	0.00	0.00	0.00	0.00	0.00
P-127	J-114	J-123	0.00	0.00	0.00	0.00	0.00	0.00
P-128	J-119	J-125	0.38	0.00	0.00	0.02	0.00	0.00
P-129	J-119	J-124	-7.95	0.10	0.00	0.09	0.01	0.01
P-13	J-1	J-17	9.98	0.05	0.00	0.11	0.02	0.02
P-130	J-132	I-RV-5	11.10	0.13	0.00	0.50	0.60	0.60
P-131	J-122	J-126	0.60	0.00	0.00	0.02	0.00	0.00
P-132	J-122	J-228	9.90	0.02	0.00	0.11	0.02	0.02
P-133	J-127	J-128	4.95	0.01	0.00	0.06	0.00	0.00
P-134	J-129	J-4	56.32	0.29	0.00	0.64	0.42	0.42
P-135	J-213	J-97	57.00	1.49	0.00	0.65	0.43	0.43
P-136	J-131	J-130	1.05	0.00	0.00	0.01	0.00	0.00
P-137	J-131	J-169	3.68	0.07	0.00	0.09	0.02	0.02
P-138	J-132	J-68	136.64	8.25	0.00	1.55	2.16	2.16
P-139	J-189	J-118	1.35	0.03	0.00	0.06	0.01	0.01
P-14	J-1	T-3	12.14	0.07	0.00	0.14	0.02	0.02
P-140	O-Pump-3	J-190	0.00	0.00	0.00	0.00	0.00	0.00
P-141	J-178	J-134	0.00	0.00	0.00	0.00	0.00	0.00
P-142	J-124	J-180	-7.95	0.05	0.00	0.09	0.01	0.01
P-143	J-135	J-188	1.35	0.01	0.00	0.03	0.00	0.00
P-144	J-135	J-187	6.07	0.22	0.00	0.16	0.05	0.05
P-145	J-135	J-138	0.75	0.00	0.00	0.02	0.00	0.00
P-146	J-138	J-137	0.30	0.00	0.00	0.01	0.00	0.00
P-147	J-139	J-102	46.28	0.91	0.00	0.53	0.29	0.29
P-148	J-139	J-141	0.22	0.00	0.00	0.00	0.00	0.00
P-149	J-73	J-140	0.38	0.00	0.00	0.02	0.00	0.00
P-15	J-11	J-10	2.93	0.00	0.00	0.03	0.00	0.00
P-150	O-RV-1	J-71	79.42	3.93	0.00	0.90	0.79	0.79
P-151	J-142	J-90	72.45	4.42	0.00	0.82	0.67	0.67
P-152	J-142	J-192	1.05	0.01	0.00	0.05	0.01	0.01
P-153	J-144	J-80	68.32	1.65	0.00	0.78	0.60	0.60
P-154	J-144	J-145	0.45	0.00	0.00	0.02	0.00	0.00
P-155	J-146	J-87	4.35	0.15	0.00	0.20	0.11	0.11
P-156	J-146	J-148	0.15	0.00	0.00	0.01	0.00	0.00
P-157	J-147	J-135	9.75	0.15	0.00	0.11	0.02	0.02
P-158	J-148	J-150	0.08	0.00	0.00	0.00	0.00	0.00
P-159	J-149	J-151	1.95	0.10	0.00	0.09	0.02	0.02

P-16	J-12	J-11	3.38	0.01	0.00	0.04	0.00	0.00
P-160	J-149	J-152	0.15	0.00	0.00	0.01	0.00	0.00
P-161	J-151	J-89	0.30	0.00	0.00	0.01	0.00	0.00
P-162	J-151	J-154	0.30	0.00	0.00	0.01	0.00	0.00
P-163	J-55	J-153	0.38	0.00	0.00	0.01	0.00	0.00
P-164	O-RV-2	J-62	3.15	0.00	0.00	0.04	0.00	0.00
P-165	O-RV-3	J-69	0.90	0.01	0.00	0.04	0.01	0.01
P-166	O-RV-4	J-232	5.10	0.04	0.00	0.13	0.04	0.04
P-167	J-128	J-156	1.12	0.01	0.00	0.03	0.00	0.00
P-168	J-156	J-155	0.08	0.00	0.00	0.00	0.00	0.00
P-169	J-128	J-159	2.47	0.11	0.00	0.11	0.04	0.04
P-17	J-13	J-12	3.60	0.00	0.00	0.04	0.00	0.00
P-170	J-157	J-158	0.30	0.00	0.00	0.01	0.00	0.00
P-171	J-159	J-157	0.90	0.01	0.00	0.04	0.01	0.01
P-172	J-159	J-160	0.45	0.00	0.00	0.02	0.00	0.00
P-173	O-Pump-5	J-161	2.40	0.08	0.00	0.11	0.04	0.04
P-174	J-127	I-Pump-5	2.40	0.00	0.00	0.03	0.00	0.00
P-175	J-161	J-162	0.68	0.00	0.00	0.01	0.00	0.00
P-176	J-162	J-163	0.15	0.00	0.00	0.01	0.00	0.00
P-177	J-162	J-165	0.15	0.00	0.00	0.01	0.00	0.00
P-178	J-161	J-183	0.97	0.01	0.00	0.04	0.01	0.01
P-179	J-164	J-127	7.35	0.02	0.00	0.08	0.01	0.01
P-18	J-14	J-13	3.90	0.01	0.00	0.04	0.00	0.00
P-180	J-164	J-185	0.83	0.00	0.00	0.04	0.00	0.00
P-181	J-168	J-164	8.55	0.01	0.00	0.10	0.01	0.01
P-182	J-168	J-170	0.45	0.00	0.00	0.01	0.00	0.00
P-183	O-Pump-4	J-131	6.15	0.00	0.00	0.07	0.01	0.01
P-184	J-169	J-133	2.78	0.02	0.00	0.07	0.01	0.01
P-185	J-169	J-172	0.15	0.00	0.00	0.01	0.00	0.00
P-186	J-133	J-171	2.55	0.02	0.00	0.07	0.01	0.01
P-187	J-171	J-175	1.73	0.01	0.00	0.04	0.00	0.00
P-188	J-171	J-174	0.22	0.01	0.00	0.02	0.00	0.00
P-189	J-175	J-173	1.35	0.00	0.00	0.03	0.00	0.00
P-19	J-15	J-14	4.65	0.02	0.00	0.05	0.00	0.00
P-190	J-173	J-176	1.12	0.01	0.00	0.03	0.00	0.00
P-191	J-176	J-177	0.38	0.00	0.00	0.02	0.00	0.00
P-192	J-176	J-179	0.08	0.00	0.00	0.00	0.00	0.00
P-193	J-180	J-147	10.65	0.07	0.00	0.12	0.02	0.02
P-194	J-180	T-4	-18.60	0.04	0.00	0.21	0.05	0.05
P-195	J-183	J-184	0.75	0.01	0.00	0.03	0.00	0.00
P-196	J-182	J-27	44.39	0.51	0.00	0.50	0.27	0.27
P-197	J-181	J-182	44.84	0.00	0.00	0.51	0.27	0.27
P-198	J-184	J-166	0.30	0.00	0.00	0.01	0.00	0.00
P-199	J-185	J-167	0.22	0.00	0.00	0.01	0.00	0.00
P-2	J-3	J-197	88.34	0.25	0.00	0.56	0.24	0.24
P-20	J-16	J-15	6.90	0.03	0.00	0.08	0.01	0.01
P-200	J-186	J-136	1.58	0.03	0.00	0.04	0.00	0.00
P-201	J-187	J-186	4.12	0.10	0.00	0.11	0.02	0.02
P-202	J-188	J-121	0.45	0.00	0.00	0.01	0.00	0.00
P-203	J-190	J-116	-6.90	0.01	0.00	0.08	0.01	0.01
P-204	J-190	J-191	6.45	0.23	0.00	0.16	0.05	0.05
P-205	J-191	J-196	4.73	1.24	0.00	0.21	0.12	0.12
P-206	J-192	J-143	0.08	0.00	0.00	0.00	0.00	0.00
P-207	J-192	J-241	0.68	0.00	0.00	0.03	0.00	0.00
P-208	J-106	J-224	0.83	0.01	0.00	0.04	0.00	0.00
P-209	J-147	J-195	0.45	0.01	0.00	0.02	0.00	0.00
P-21	J-17	J-16	9.45	0.03	0.00	0.11	0.02	0.02
P-210	J-196	J-189	2.10	0.04	0.00	0.10	0.03	0.03
P-211	J-196	J-198	0.30	0.00	0.00	0.01	0.00	0.00
P-212	J-197	J-6	78.50	0.08	0.00	0.50	0.19	0.19
P-213	J-197	J-207	8.64	0.05	0.00	0.22	0.09	0.09
P-214	J-200	J-226	82.34	0.05	0.00	0.53	0.21	0.21
P-215	J-199	J-208	5.74	0.02	0.00	0.15	0.04	0.04
P-216	J-199	J-202	1.85	0.00	0.00	0.05	0.01	0.01
P-217	J-201	J-204	8.28	0.02	0.00	0.21	0.09	0.09
P-218	J-202	J-205	-1.96	0.00	0.00	0.05	0.01	0.01
P-219	J-201	J-211	-2.91	0.00	0.00	0.13	0.05	0.05
P-22	J-18	J-44	25.64	0.08	0.00	0.29	0.10	0.10
P-220	J-202	J-203	0.15	0.00	0.00	0.01	0.00	0.00
P-221	J-204	J-200	9.26	0.02	0.00	0.24	0.11	0.11
P-222	J-205	J-209	-4.15	0.00	0.00	0.11	0.02	0.02
P-223	J-204	J-205	-1.51	0.05	0.00	0.15	0.11	0.11
P-224	J-205	J-206	0.15	0.00	0.00	0.02	0.00	0.00
P-225	J-207	J-199	8.04	0.04	0.00	0.21	0.08	0.08
P-226	J-208	J-201	5.59	0.01	0.00	0.14	0.04	0.04
P-227	J-209	J-6	-4.22	0.00	0.00	0.11	0.02	0.02
P-228	J-210	J-7	30.24	0.05	0.00	0.34	0.13	0.13
P-229	J-202	J-211	3.21	0.02	0.00	0.15	0.06	0.06
P-23	J-19	J-18	26.84	0.32	0.00	0.30	0.11	0.11
P-230	J-212	I-Pump-4	6.15	0.01	0.00	0.07	0.01	0.01
P-231	J-210	J-212	7.50	0.00	0.00	0.09	0.01	0.01
P-232	J-213	J-219	-5.60	0.02	0.00	0.25	0.17	0.17
P-233	J-215	J-217	43.67	0.07	0.00	0.50	0.26	0.26
P-234	J-215	J-214	-47.87	0.07	0.00	0.54	0.31	0.31
P-235	J-214	J-223	-47.87	0.14	0.00	0.54	0.31	0.31
P-236	J-214	J-216	0.00	0.00	0.00	0.00	0.00	0.00
P-237	J-217	J-210	40.97	0.08	0.00	0.46	0.23	0.23
P-238	J-217	J-218	0.00	0.00	0.00	0.00	0.00	0.00
P-239	J-219	J-221	-5.60	0.02	0.00	0.25	0.17	0.17
P-24	J-20	J-19	27.59	0.21	0.00	0.31	0.11	0.11

P-240	J-219	J-220	3.00	0.00	0.00	0.00	0.00	0.00
P-241	J-221	J-215	-5.60	0.04	0.00	0.25	0.17	0.17
P-242	J-222	J-129	-47.87	0.03	0.00	0.54	0.31	0.31
P-243	J-223	J-222	-47.87	0.05	0.00	0.54	0.31	0.31
P-244	O-Pump-6	J-107	43.50	0.09	0.00	1.11	1.86	1.86
P-245	J-226	J-74	80.24	0.20	0.00	0.51	0.20	0.20
P-246	J-226	J-227	0.13	0.00	0.00	0.02	0.00	0.00
P-247	J-228	J-168	9.45	0.02	0.00	0.11	0.02	0.02
P-248	J-228	J-230	0.32	0.00	0.00	0.01	0.00	0.00
P-249	J-229	J-122	11.10	0.05	0.00	0.13	0.02	0.02
P-25	J-21	J-20	30.29	0.25	0.00	0.34	0.13	0.13
P-250	O-RV-5	J-229	11.10	0.17	0.00	0.30	0.60	0.60
P-251	J-225	J-108	0.22	0.00	0.00	0.01	0.00	0.00
P-252	J-57	J-238	0.00	0.00	0.00	0.00	0.00	0.00
P-253	J-231	J-56	-0.33	0.00	0.00	0.01	0.00	0.00
P-254	J-232	J-63	3.00	0.02	0.00	0.08	0.01	0.01
P-255	J-232	J-233	0.00	0.00	0.00	0.00	0.00	0.00
P-256	J-224	J-234	0.22	0.00	0.00	0.01	0.00	0.00
P-257	J-235	J-111	36.15	5.74	0.00	1.64	5.37	5.37
P-258	J-236	J-77	0.15	0.00	0.00	0.01	0.00	0.00
P-259	J-237	I-Pump-6	43.50	0.02	0.00	1.11	1.86	1.86
P-26	J-22	J-21	33.74	0.20	0.00	0.38	0.16	0.16
P-260	J-238	J-231	-0.15	0.00	0.00	0.00	0.00	0.00
P-261	J-57	I-RV-6	0.00	0.00	0.00	0.00	0.00	0.00
P-262	J-56	J-239	0.00	0.00	0.00	0.00	0.00	0.00
P-263	O-RV-6	J-240	0.00	0.00	0.00	0.00	0.00	0.00
P-264	J-241	J-193	0.08	0.00	0.00	0.00	0.00	0.00
P-265	J-241	J-242	0.38	0.00	0.00	0.02	0.00	0.00
P-266	J-242	J-243	0.15	0.00	0.00	0.01	0.00	0.00
P-27	J-23	J-22	34.19	0.29	0.00	0.39	0.17	0.17
P-270	J-244	J-235	36.75	20.08	0.00	1.67	5.54	5.54
P-271	J-244	J-247	0.38	0.00	0.00	0.02	0.00	0.00
P-272	J-246	J-149	3.30	0.16	0.00	0.15	0.06	0.06
P-273	J-246	J-249	0.08	0.00	0.00	0.01	0.00	0.00
P-274	J-248	J-250	54.00	17.58	0.00	2.45	11.30	11.30
P-275	J-74	J-8	76.87	0.10	0.00	0.49	0.18	0.18
P-276	J-74	J-252	1.05	0.00	0.00	0.03	0.00	0.00
P-277	J-252	J-251	0.00	0.00	0.00	0.00	0.00	0.00
P-278	J-252	J-253	0.52	0.00	0.00	0.01	0.00	0.00
P-28	J-24	J-23	34.64	0.19	0.00	0.39	0.17	0.17
P-29	J-25	J-24	37.49	0.80	0.00	0.43	0.20	0.20
P-3	J-3	J-129	109.82	0.34	0.00	1.25	1.44	1.44
P-30	J-26	J-25	38.69	0.33	0.00	0.44	0.21	0.21
P-31	J-27	J-54	40.79	0.56	0.00	0.46	0.23	0.23
P-32	J-28	J-181	44.84	0.10	0.00	0.51	0.27	0.27
P-33	J-29	J-67	49.94	0.48	0.00	0.57	0.33	0.33
P-34	J-30	J-29	55.49	0.87	0.00	0.63	0.41	0.41
P-35	J-31	I-Pump-1	147.97	0.74	0.00	1.68	2.50	2.50
P-36	J-32	J-31	148.34	8.73	0.00	1.68	2.51	2.51
P-37	O-Pump-1	J-132	147.97	0.55	0.00	1.68	2.50	2.50
P-38	J-10	J-34	2.40	0.02	0.00	0.06	0.01	0.01
P-39	J-34	J-39	0.60	0.00	0.00	0.03	0.00	0.00
P-4	J-4	J-215	3.80	0.00	0.00	0.04	0.00	0.00
P-40	J-34	J-37	1.13	0.04	0.00	0.05	0.01	0.01
P-41	J-33	J-35	0.15	0.00	0.00	0.01	0.00	0.00
P-42	J-37	J-33	0.53	0.01	0.00	0.02	0.00	0.00
P-43	J-38	J-36	0.15	0.00	0.00	0.01	0.00	0.00
P-44	J-39	J-38	0.45	0.00	0.00	0.02	0.00	0.00
P-45	J-15	J-41	0.90	0.02	0.00	0.04	0.01	0.01
P-46	J-41	J-40	0.22	0.00	0.00	0.01	0.00	0.00
P-47	J-16	J-43	1.80	0.06	0.00	0.08	0.02	0.02
P-48	J-43	J-42	0.90	0.04	0.00	0.04	0.01	0.01
P-49	J-44	J-1	23.31	0.07	0.00	0.26	0.08	0.08
P-5	J-5	J-3	205.66	7.71	0.00	2.33	4.60	4.60
P-50	J-44	J-46	2.10	0.03	0.00	0.10	0.03	0.03
P-51	J-46	J-45	1.05	0.04	0.00	0.05	0.01	0.01
P-52	J-18	J-49	0.45	0.00	0.00	0.01	0.00	0.00
P-53	J-49	J-47	0.00	0.00	0.00	0.00	0.00	0.00
P-54	J-20	J-48	1.20	0.01	0.00	0.03	0.00	0.00
P-55	J-48	J-50	0.22	0.00	0.00	0.01	0.00	0.00
P-56	J-21	J-51	1.88	0.02	0.00	0.05	0.01	0.01
P-57	J-51	J-52	0.38	0.00	0.00	0.01	0.00	0.00
P-58	J-24	J-53	0.75	0.01	0.00	0.03	0.00	0.00
P-59	J-54	J-26	38.69	0.15	0.00	0.44	0.21	0.21
P-6	J-6	J-200	73.76	0.08	0.00	0.47	0.17	0.17
P-60	J-54	J-56	1.12	0.00	0.00	0.03	0.00	0.00
P-61	J-27	J-55	2.55	0.02	0.00	0.12	0.04	0.04
P-62	J-55	J-58	0.75	0.00	0.00	0.02	0.00	0.00
P-63-XX	J-58	J-57						
P-64	J-28	I-RV-2	3.15	0.00	0.00	0.04	0.00	0.00
P-65	J-59	J-60	0.38	0.00	0.00	0.00	0.00	0.00
P-66	J-59	J-61	0.45	0.01	0.00	0.02	0.00	0.00
P-67	J-62	J-59	2.03	0.00	0.00	0.02	0.00	0.00
P-68	J-62	J-64	0.00	0.00	0.00	0.00	0.00	0.00
P-69	J-29	I-RV-4	5.10	0.01	0.00	0.13	0.04	0.04
P-7	J-7	T-1	28.44	0.05	0.00	0.32	0.12	0.12
P-70	J-63	J-65	1.05	0.01	0.00	0.03	0.00	0.00
P-71	J-66	J-28	48.29	0.34	0.00	0.55	0.31	0.31
P-72	J-67	J-66	48.67	0.29	0.00	0.55	0.32	0.32
P-73	J-67	I-RV-3	0.90	0.00	0.00	0.04	0.01	0.01

P-74	J-68	J-30	55.79	0.28	0.00	0.63	0.41	0.41
P-75	J-68	J-73	80.62	2.89	0.00	0.91	0.81	0.81
P-76	J-71	J-70	1.50	0.09	0.00	0.07	0.01	0.01
P-77	J-71	J-142	74.47	2.86	0.00	0.65	0.70	0.70
P-78	J-75	1-RV-1	79.40	0.93	0.00	0.90	0.79	0.79
P-79	J-70	J-248	54.68	30.66	0.00	2.48	11.56	11.56
P-8	J-8	J-1	75.29	0.21	0.00	0.48	0.18	0.18
P-80	J-75	J-72	54.98	16.31	0.00	2.50	11.68	11.68
P-81	J-75	J-236	0.60	0.01	0.00	0.03	0.00	0.00
P-82	J-76	J-75	56.17	31.89	0.00	2.55	12.15	12.15
P-83	J-76	J-78	0.22	0.00	0.00	0.01	0.00	0.00
P-84	J-79	J-76	56.92	6.78	0.00	1.45	3.07	3.07
P-85	J-79	J-81	0.22	0.00	0.00	0.01	0.00	0.00
P-86	J-80	J-79	58.12	16.93	0.00	1.48	3.19	3.19
P-87	J-80	J-82	8.55	0.24	0.00	0.22	0.09	0.09
P-88	J-82	J-83	5.92	0.41	0.00	0.15	0.05	0.05
P-89	J-82	J-85	0.38	0.00	0.00	0.02	0.00	0.00
P-9	I-WTP	R-1	-206.79	2.37	0.00	2.35	4.64	4.64
P-90	J-83	J-84	0.15	0.00	0.00	0.01	0.00	0.00
P-91	J-83	J-146	4.50	0.17	0.00	0.20	0.11	0.11
P-92	J-87	J-86	0.22	0.00	0.00	0.01	0.00	0.00
P-93	J-87	J-246	3.83	0.08	0.00	0.17	0.08	0.08
P-94	J-88	J-144	69.52	2.34	0.00	0.79	0.62	0.62
P-95	J-88	J-91	0.68	0.01	0.00	0.03	0.00	0.00
P-96	J-90	J-88	71.32	2.81	0.00	0.81	0.65	0.65
P-97	J-90	J-92	0.22	0.00	0.00	0.01	0.00	0.00
P-98	J-4	J-213	51.40	0.08	0.00	0.58	0.35	0.35
P-99	J-94	J-93	55.58	2.55	0.00	0.63	0.41	0.41

P U M P / L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE (gpm)	INLET HEAD (ft)	OUTLET HEAD (ft)	PUMP HEAD (ft)	EFFIC- ENCY (%)	USEFUL POWER (Hp)	INCREMTL COST (\$)	TOTAL COST (\$)	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. (ft)
Pump-1	147.97	237.49	590.17	352.7	75.00	0.	0.0	0.0	**	**	270.6
Device "Pump-3" is closed											
Pump-3	0.00	145.17	344.78	0.0	75.00	0.	0.0	0.0	**	**	178.4
Pump-4	6.15	200.09	292.19	92.1	75.00	0.	0.0	0.0	**	**	233.3
Pump-5	2.40	124.33	318.11	193.8	75.00	0.	0.0	0.0	**	**	157.5
Pump-6	43.50	161.22	347.11	185.9	75.00	0.	0.0	0.0	**	**	194.4
WTP	206.79	2.63	245.60	243.0	75.00	0.	0.0	0.0	**	**	35.7

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	NODE ELEVATION (ft)	PRESSURE HEAD (ft)	NODE PRESSURE (psi)
J-1		1.20	1275.07	885.00	390.07	169.03
J-10		0.52	1274.91	1080.00	194.91	84.46
J-100		0.22	944.55	770.00	174.55	75.64
J-101		0.22	944.55	750.00	194.55	84.30
J-102		0.75	943.36	750.00	193.36	83.79
J-103		1.12	942.69	760.00	182.69	79.16
J-104		0.15	943.36	780.00	163.36	70.79
J-105		0.38	942.69	860.00	82.69	35.83
J-106		0.90	1120.69	830.00	290.69	125.96
J-107		1.05	1127.02	780.00	347.02	150.37
J-108		0.22	1127.01	880.00	247.01	107.04
J-109		1.42	1120.72	800.00	320.72	138.98
J-11		0.45	1274.92	1130.00	144.92	62.80
J-110		2.40	945.17	750.00	195.17	84.57
J-111		36.15	1076.96	920.00	156.96	68.01
J-112		1.88	945.17	790.00	155.17	67.24
J-113		0.22	945.07	840.00	105.07	45.53
J-114		0.00	1144.79	810.00	334.79	145.08
J-115		0.52	945.06	840.00	105.06	45.53
J-116		0.30	1144.79	810.00	334.79	145.08
J-117		0.22	1143.24	900.00	243.24	105.41
J-118		0.90	1143.24	870.00	273.24	118.41
J-119		0.38	1144.81	820.00	324.81	140.75
J-12		0.22	1274.92	1100.00	174.92	75.80
J-120		0.22	1143.24	920.00	223.24	96.74
J-121		0.45	1144.73	820.00	324.73	140.72
J-122		0.60	1034.40	760.00	274.40	118.91
J-123		0.00	1144.79	880.00	264.79	114.74
J-124		0.00	1144.91	1000.00	144.91	62.80
J-125		0.38	1144.81	900.00	244.81	106.08
J-126		0.60	1034.40	860.00	174.40	75.57
J-127		0.00	1034.33	910.00	124.33	53.87
J-128		1.35	1034.31	820.00	214.31	92.87
J-129		5.62	950.54	740.00	210.54	91.23
J-13		0.30	1274.92	1180.00	94.92	41.13

J-130	1.05	1042.19	760.00	282.19	122.28
J-131	1.42	1042.19	770.00	272.19	117.95
J-132	0.22	1289.62	700.00	589.62	255.50
J-133	0.22	1042.10	840.00	202.10	87.58
J-134	0.00	1144.79	900.00	244.79	106.08
J-135	1.58	1144.74	815.00	329.74	142.89
J-136	1.58	1144.39	900.00	244.39	105.90
J-137	0.30	1144.74	960.00	184.74	80.05
J-138	0.45	1144.74	850.00	294.74	127.72
J-139	0.45	944.27	750.00	194.27	84.18
J-14	0.75	1274.93	1100.00	174.93	75.80
J-140	0.38	1278.48	1000.00	278.48	120.67
J-141	0.22	944.27	780.00	164.27	71.18
J-142	0.97	979.37	700.00	279.37	121.06
J-143	0.08	979.36	700.00	279.36	121.06
J-144	0.75	969.80	715.00	254.80	110.41
J-145	0.45	969.80	750.00	219.80	95.25
J-146	0.00	967.34	780.00	187.34	81.18
J-147	0.45	1144.89	860.00	284.89	123.45
J-148	0.08	967.34	800.00	167.34	72.52
J-149	1.20	966.95	780.00	186.95	81.01
J-15	1.35	1274.95	1100.00	174.95	75.81
J-150	0.08	967.34	820.00	147.34	63.85
J-151	1.35	966.86	840.00	126.86	54.97
J-152	0.15	966.95	840.00	126.95	55.01
J-153	0.38	1278.47	880.00	398.47	172.67
J-154	0.30	966.86	840.00	126.86	54.97
J-155	0.08	1034.31	700.00	334.31	144.87
J-156	1.05	1034.31	700.00	334.31	144.87
J-157	0.60	1034.19	820.00	214.19	92.82
J-158	0.30	1034.19	850.00	184.19	79.81
J-159	1.12	1034.20	810.00	224.20	97.15
J-16	0.75	1274.98	1110.00	164.98	71.49
J-160	0.45	1034.20	875.00	159.20	68.99
J-161	0.75	1228.03	1020.00	208.03	90.15
J-162	0.38	1228.03	1020.00	208.03	90.15
J-163	0.15	1228.03	1020.00	208.03	90.15
J-164	0.38	1034.35	840.00	194.35	84.22
J-165	0.15	1228.03	880.00	348.03	150.81
J-166	0.30	1228.01	980.00	248.01	107.47
J-167	0.22	1034.34	850.00	184.34	79.88
J-168	0.45	1034.36	800.00	234.36	101.56
J-169	0.75	1042.12	850.00	192.12	83.25
J-17	0.52	1275.02	960.00	315.02	136.51
J-170	0.45	1034.36	820.00	214.36	92.89
J-171	0.60	1042.08	800.00	242.08	104.90
J-172	0.15	1042.12	860.00	182.12	78.92
J-173	0.22	1042.07	860.00	182.07	78.90
J-174	0.22	1042.08	860.00	182.08	78.90
J-175	0.38	1042.07	795.00	247.07	107.06
J-176	0.68	1042.06	820.00	222.06	96.23
J-177	0.38	1042.06	880.00	162.06	70.23
J-178	0.00	1144.79	850.00	294.79	127.74
J-179	0.08	1042.06	835.00	207.06	89.73
J-18	0.75	1275.22	920.00	355.22	153.93
J-180	0.00	1144.96	900.00	244.96	106.15
J-181	0.00	1279.00			
J-182	0.45	1279.00			
J-183	0.22	1228.02	1040.00	188.02	81.48
J-184	0.45	1228.02	1040.00	188.02	81.47
J-185	0.60	1034.34	920.00	114.34	49.55
J-186	2.55	1144.42	850.00	294.42	127.58
J-187	1.95	1144.52	825.00	319.52	138.46
J-188	0.90	1144.73	800.00	344.73	149.38
J-189	0.75	1143.27	850.00	293.27	127.09
J-19	0.75	1275.53	1020.00	255.53	110.73
J-190	0.45	1144.78	800.00	344.78	149.41
J-191	1.73	1144.55	790.00	354.55	153.64
J-192	0.30	979.36	690.00	289.36	125.39
J-193	0.08	979.36	740.00	239.36	103.72
J-194	0.00	1274.91	1080.00	194.91	84.46
J-195	0.45	1144.88	1000.00	144.88	62.78
J-196	2.33	1143.32	830.00	313.32	135.77
J-197	1.20	950.63	760.00	190.63	82.61
J-198	0.30	1143.32	880.00	263.32	114.10
J-199	0.45	950.54	760.00	190.54	82.57
J-2	2.25	949.92	700.00	249.92	108.30
J-20	1.50	1275.74	1060.00	215.74	93.49
J-200	0.68	950.47	760.00	190.47	82.54
J-201	0.22	950.51	760.00	190.51	82.56
J-202	0.45	950.54	760.00	190.54	82.57
J-203	0.15	950.54	760.00	190.54	82.57
J-204	0.52	950.49	760.00	190.49	82.55
J-205	0.52	950.54	760.00	190.54	82.57
J-206	0.15	950.54	760.00	190.54	82.57
J-207	0.60	950.58	760.00	190.58	82.58
J-208	0.15	950.52	760.00	190.52	82.56
J-209	0.08	950.55	760.00	190.55	82.57
J-21	1.58	1275.99	1050.00	225.99	97.93
J-210	3.22	950.10	780.00	170.10	73.71

Neal Howard'

J-211	0.30	950.52	760.00	190.52	82.56
J-212	1.35	950.10			
J-213	0.00	950.17	780.00	170.17	73.74
J-214	0.00	950.32	760.00	190.32	82.47
J-215	2.40	950.25	780.00	170.25	73.77
J-216	0.00	950.32	760.00	190.32	82.47
J-217	0.70	950.18	780.00	170.18	73.74
J-218	0.00	950.18	760.00	190.18	82.41
J-219	0.00	950.19	780.00	170.19	73.75
J-22	0.45	1276.18	980.00	296.18	128.35
J-220	0.00	950.19	780.00	170.19	73.75
J-221	0.00	950.21	780.00	170.21	73.76
J-222	0.00	950.52	740.00	210.52	91.22
J-223	0.00	950.46	740.00	210.46	91.20
J-224	0.60	1120.67	850.00	270.67	117.29
J-225	0.75	1127.01	860.00	267.01	115.70
J-226	1.95	950.42	770.00	180.42	78.18
J-227	0.15	950.42	800.00	150.42	65.18
J-228	0.22	1034.38	820.00	214.38	92.90
J-229	0.00	1034.45	700.00	334.45	144.93
J-23	0.45	1276.47	1080.00	196.47	85.14
J-230	0.22	1034.38	860.00	174.38	75.56
J-231	0.22	1277.93	1025.00	252.93	109.60
J-232	2.10	980.72	800.00	180.72	78.31
J-233	0.00	980.72	860.00	120.72	52.31
J-234	0.22	1120.67	900.00	220.67	95.63
J-235	0.60	1082.70	870.00	212.70	92.17
J-236	0.45	912.56	775.00	137.56	59.61
J-237	0.38	941.24	780.00	161.24	69.87
J-238	0.15	1277.93	970.00	307.93	133.43
J-239	0.00	1277.93	960.00	317.93	137.77
J-24	2.10	1276.66	1020.00	256.66	111.22
J-240	0.00	1277.93	840.00	437.93	189.77
J-241	0.22	979.36	700.00	279.36	121.06
J-242	0.22	979.36	740.00	239.36	103.72
J-243	0.15	979.36	760.00	219.36	95.06
J-244	1.20	1102.78	850.00	252.78	109.54
J-246	0.45	967.12	740.00	227.12	98.42
J-247	0.38	1102.78	880.00	222.78	96.54
J-248	0.68	865.59	776.00	89.59	38.82
J-249	0.08	967.12	775.00	192.12	83.25
J-25	1.20	1277.45	880.00	397.45	172.23
J-250	54.00 (**)	848.01	800.00	48.01	20.80
J-251	0.00	950.22	800.00	150.22	65.10
J-252	0.52	950.22	780.00	170.22	73.76
J-253	0.52	950.22	880.00	70.22	30.43
J-26	0.00	1277.78	1020.00	257.78	111.71
J-27	1.05	1278.49	875.00	403.49	174.85
J-28	0.30	1279.11	800.00	479.11	207.61
J-29	0.45	1280.21	780.00	500.21	216.76
J-3	7.50	950.88	700.00	250.88	108.72
J-30	0.30	1281.08	680.00	601.08	260.47
J-31	0.38	938.22	700.00	238.22	103.23
J-32	0.38	946.96	800.00	146.96	63.68
J-33	0.38	1274.84	1085.00	189.84	82.26
J-34	0.68	1274.89	1150.00	124.89	54.12
J-35	0.15	1274.84	1040.00	234.84	101.76
J-36	0.15	1274.89	1140.00	134.89	58.45
J-37	0.60	1274.85	1170.00	104.85	45.43
J-38	0.30	1274.89	1170.00	104.89	45.45
J-39	0.15	1274.89	1110.00	164.89	71.45
J-4	1.12	950.25	780.00	170.25	73.78
J-40	0.22	1274.93	1020.00	254.93	110.47
J-41	0.68	1274.93	1090.00	184.93	80.14
J-42	0.90	1274.88	860.00	414.88	179.78
J-43	0.90	1274.93	1130.00	144.93	62.80
J-44	0.22	1275.14	885.00	390.14	169.06
J-45	1.05	1275.07	940.00	335.07	145.20
J-46	1.05	1275.11	1030.00	245.11	106.21
J-47	0.00	1275.21	900.00	375.21	162.59
J-48	0.97	1275.73	890.00	385.73	167.15
J-49	0.45	1275.21	680.00	595.21	257.93
J-5	1.12	958.60	680.00	278.60	120.73
J-50	0.22	1275.73	940.00	335.73	145.48
J-51	1.50	1275.96	890.00	385.96	167.25
J-52	0.38	1275.96	960.00	315.96	136.92
J-53	0.75	1276.65	870.00	406.65	176.21
J-54	0.97	1277.93	1000.00	277.93	120.44
J-55	1.42	1278.47	830.00	448.47	194.34
J-56	0.75	1277.93	980.00	297.93	129.10
J-57	0.00 (0.00)	1277.93	970.00	307.93	133.43
J-58	0.75 (0.91)	1278.47	980.00	298.47	129.34
J-59	1.20	961.53	750.00	211.53	91.66
J-6	0.52	950.55	760.00	190.55	82.57
J-60	0.38	961.53	800.00	161.53	70.00
J-61	0.45	961.53	880.00	81.53	35.33
J-62	1.12	961.53	790.00	171.53	74.33
J-63	1.95	980.70	850.00	130.70	56.64
J-64	0.00	961.53	840.00	121.53	52.66
J-65	1.05	980.70	880.00	100.70	43.64

J-66		0.38	1279.44	790.00	489.44	213.09
J-67		0.38	1279.74	800.00	479.74	207.89
J-68		0.22	1281.37	700.00	581.37	251.92
J-69		0.90	961.53	700.00	261.53	113.33
J-7		1.80	950.05	820.00	130.05	56.35
J-70		1.50	982.14	850.00	132.14	57.26
J-71		3.45	982.23	740.00	242.23	104.96
J-72		0.30	896.25	750.00	146.25	63.38
J-73		0.82	1278.48	930.00	348.48	151.01
J-74		2.33	950.23	760.00	190.23	82.43
J-75		0.60	912.56	750.00	162.56	70.44
J-76		0.52	944.45	740.00	204.45	88.59
J-77		0.15	912.56	825.00	87.56	37.94
J-78		0.22	944.45	800.00	144.45	62.59
J-79		0.97	951.23	720.00	231.23	100.20
J-8		1.58	950.13	800.00	150.13	65.05
J-80		1.65	968.16	710.00	258.16	111.87
J-81		0.22	951.23	880.00	71.23	30.86
J-82		2.25	967.92	720.00	247.92	107.43
J-83		1.27	967.51	720.00	247.51	107.26
J-84		0.15	967.51	800.00	167.51	72.59
J-85		0.38	967.92	800.00	167.92	72.76
J-86		0.22	967.19	840.00	127.19	55.12
J-87		0.30	967.19	760.00	207.19	89.78
J-88		1.12	972.14	700.00	272.14	117.93
J-89		0.30	966.85	840.00	126.85	54.97
J-9		1.50	949.51	850.00	99.51	43.12
J-90		0.90	974.95	690.00	284.95	123.48
J-91		0.68	972.13	720.00	252.13	109.26
J-92		0.22	974.95	800.00	174.95	75.81
J-93		1.88	945.19	750.00	195.19	84.58
J-94		1.12	947.74	760.00	187.74	81.35
J-95		0.00	947.74	800.00	147.74	64.02
J-96		0.15	948.13	760.00	188.13	81.52
J-97		0.15	948.68	760.00	188.68	81.76
J-98		0.00	948.68	900.00	48.68	21.10
J-99		1.27	945.07	780.00	165.07	71.53
O-Pump-1	Dehart PS	0.00	1290.17	700.00	590.17	255.74
I-Pump-3	Wrigley PS	0.00	945.17	800.00	145.17	62.91
I-Pump-4	S. Ruin PS	0.00	950.09	750.00	200.09	86.71
I-Pump-5		0.00	1034.33	910.00	124.33	53.87
I-Pump-6		0.00	941.22	780.00	161.22	69.86
R-1		----	740.00	735.00	5.00	2.17
O-RV-1		----	986.15	760.00	226.15	98.00
O-RV-2		----	961.54	800.00	161.54	70.00
O-RV-3		----	961.54	800.00	161.54	70.00
I-RV-4		0.00	1280.20	750.00	530.20	229.75
I-RV-5		0.00	1289.48	700.00	589.48	255.44
O-RV-6		----	1277.93	970.00	307.93	133.43
T-1		----	950.00	900.00	50.00	21.67
T-2	Cemetery Tan	----	950.00	900.00	50.00	21.67
T-3	Dehart Tank	----	1275.00	1122.50	152.50	66.08
T-4	Wrigley Tank	----	1145.00	1100.00	45.00	19.50
O-WTP		0.00	980.60	735.00	245.60	106.43
I-RV-1		0.00	1277.55	760.00	517.55	224.27
I-RV-2		0.00	1279.10	800.00	479.10	207.61
I-RV-3		0.00	1279.74	800.00	479.74	207.89
I-RV-6		0.00	1277.93	970.00	307.93	133.43
O-Pump-3	Wrigley PS	0.00	1144.78	800.00	344.78	149.41
O-RV-4		----	980.77	750.00	230.77	100.00
O-Pump-5		0.00	1228.11	910.00	318.11	137.85
O-Pump-4	S. Ruin PS	0.00	1042.19	750.00	292.19	126.62
O-Pump-6		0.00	1127.11	780.00	347.11	150.41
O-RV-5		----	1034.62	700.00	334.62	145.00
I-Pump-1	Dehart PS	0.00	937.49	700.00	237.49	102.91
I-WTP		0.00	737.63	735.00	2.63	1.14

MAXIMUM AND MINIMUM VALUES

PRESURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
J-30	260.47	I-WTP	1.14
J-49	257.93	R-1	2.17
O-Pump-1	255.74	T-4	19.50
J-132	255.50	J-250	20.80
I-RV-5	255.44	J-98	21.10

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
-------------	-------------------------	-------------	-------------------------

P-82	2.55	P-106	0.00
P-80	2.50	P-148	0.00
P-79	2.48	P-158	0.00
P-274	2.45	P-168	0.00
P-1	2.35	P-192	0.00

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-82	12.15	P-106	0.00
P-80	11.68	P-148	0.00
P-79	11.56	P-110	0.00
P-274	11.30	P-65	0.00
P-115	5.99	P-260	0.00

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
P-82	12.15	P-106	0.00
P-80	11.68	P-148	0.00
P-79	11.56	P-110	0.00
P-274	11.30	P-65	0.00
P-115	5.99	P-260	0.00

REGULATING VALVE REPORT

VALVE LABEL	VALVE TYPE	VALVE SETTING (psi or gpm)	VALVE STATUS	UPSTREAM PRESSURE (psi)	DOWNSTREAM PRESSURE (psi)	THROUGH FLOW (gpm)
RV-1	PRV-1	98.00	ACTIVATED	224.27	98.00	79.42
RV-2	PRV-1	70.00	ACTIVATED	207.61	70.00	3.15
RV-3	PRV-1	70.00	ACTIVATED	207.89	70.00	0.90
RV-4	PRV-1	100.00	ACTIVATED	229.75	100.00	5.10
RV-5	PRV-1	145.00	ACTIVATED	255.44	145.00	11.10
RV-6	PRV-1	90.00	WIDE OPEN	133.43	133.43	0.00

SUMMARY OF INFLOWS AND OUTFLOWS

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE (gpm)	NODE TITLE
R-1	206.79	
T-1	-28.44	
T-2	77.17	Cemetery Tan
T-3	-12.14	Dehart Tank
T-4	18.60	Wrigley Tank

NET SYSTEM INFLOW = 302.56
 NET SYSTEM OUTFLOW = -40.58
 NET SYSTEM DEMAND = 261.97

***** HYDRAULIC ANALYSIS COMPLETED *****

* * * * * K Y P I P E S * * * * *
 *
 * Pipe Network Modeling Software *
 *
 * Copyrighted by KYPIPE LLC *
 * Version 5 - February 2010 *
 * * * * *

Date & Time: Mon May 06 16:22:46 2013

Master File : p:\projects\sandy hook\general\hydraulics\shwd-contl0-peak.KYP\shwd-contl0-peak.P2K

U N I T S S P E C I F I E D

FLOWRATE = gallons/minute
 HEAD (HGL) = feet
 PRESSURE = psig

*PEAK DEMAND
CALCULATIONS*

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT
 MAXIMUM AND MINIMUM PRESSURES = 5
 MAXIMUM AND MINIMUM VELOCITIES = 5
 MAXIMUM AND MINIMUM HEAD LOSS/1000 = 5

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES(p) = 275
 NUMBER OF END NODES(j) = 264
 NUMBER OF PRIMARY LOOPS(l) = 7
 NUMBER OF SUPPLY NODES(f) = 5
 NUMBER OF SUPPLY ZONES(z) = 1

Case: 0

RESULTS OBTAINED AFTER 11 TRIALS: ACCURACY = 0.00000

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

Sandy Hook Water District
 Average Usage (0.15) x Peaking Factor (3.6) = 0.54

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE #1	NODE #2	FLOWRATE (gpm)	HEAD LOSS (ft)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL+ML/1000 (ft/ft)	HL/1000 (ft/ft)
P-1	J-5	O-WTP	-209.08	22.46	0.00	2.37	4.74	4.74
P-10	J-2	J-9	28.74	0.07	0.00	0.18	0.03	0.03
P-100	J-94	J-95	0.00	0.00	0.00	0.00	0.00	0.00
P-101	J-96	J-94	110.52	1.35	0.00	1.25	1.46	1.46
P-102	J-97	J-96	111.06	1.90	0.00	1.26	1.47	1.47
P-103	J-97	J-98	0.00	0.00	0.00	0.00	0.00	0.00
P-104	J-93	J-110	22.68	0.19	0.00	0.26	0.08	0.08
P-105	J-93	J-101	77.04	1.58	0.00	0.87	0.75	0.75
P-106	J-101	J-100	0.81	0.00	0.00	0.01	0.00	0.00
P-107	J-101	J-139	75.42	0.66	0.00	0.86	0.72	0.72
P-108	J-102	J-104	0.54	0.00	0.00	0.02	0.00	0.00
P-109	J-102	J-103	69.75	1.50	0.00	0.79	0.62	0.62
P-11	J-9	T-2	-142.04	1.53	0.00	1.61	2.32	2.32
P-110	J-103	J-105	1.35	0.00	0.00	0.02	0.00	0.00
P-111	J-103	J-237	64.35	2.94	0.00	0.73	0.53	0.53
P-112	J-107	J-225	3.51	0.11	0.00	0.09	0.02	0.02
P-113	J-107	J-109	55.71	10.88	0.00	1.42	2.95	2.95
P-114	J-109	J-106	6.21	0.37	0.00	0.28	0.21	0.21
P-115	J-109	J-244	44.37	23.53	0.00	2.01	7.85	7.85
P-116	J-110	J-99	7.29	1.08	0.00	0.33	0.28	0.28
P-117	J-110	J-112	6.75	0.05	0.00	0.08	0.01	0.01
P-118	J-99	J-113	0.81	0.01	0.00	0.04	0.00	0.00
P-119	J-99	J-115	1.89	0.07	0.00	0.09	0.02	0.02
P-12	J-9	J-32	165.38	3.10	0.00	1.88	3.07	3.07
P-120	J-194	J-10	0.00	0.00	0.00	0.00	0.00	0.00

P-121	J-112	I-Pump-3	0.00	0.00	0.00	0.00	0.00	0.00
P-122	J-116	J-114	0.00	0.00	0.00	0.00	0.00	0.00
P-123	J-118	J-117	0.81	0.00	0.00	0.04	0.00	0.00
P-124	J-118	J-120	0.81	0.00	0.00	0.04	0.00	0.00
P-125	J-116	J-119	-25.92	0.18	0.00	0.29	0.10	0.10
P-126	J-114	J-118	0.00	0.00	0.00	0.00	0.00	0.00
P-127	J-114	J-123	0.00	0.00	0.00	0.00	0.00	0.00
P-128	J-119	J-125	1.55	0.04	0.00	0.06	0.01	0.01
P-129	J-119	J-124	-28.62	1.09	0.00	0.32	0.12	0.12
P-13	J-1	J-17	35.91	0.53	0.00	0.41	0.18	0.18
P-130	J-132	I-RV-5	39.96	1.44	0.00	1.81	6.47	6.47
P-131	J-122	J-126	2.16	0.02	0.00	0.06	0.01	0.01
P-132	J-122	J-228	35.64	0.23	0.00	0.40	0.18	0.18
P-133	J-127	J-128	17.82	0.13	0.00	0.20	0.05	0.05
P-134	J-129	J-4	46.95	0.21	0.00	0.53	0.30	0.30
P-135	J-213	J-97	111.60	5.16	0.00	1.27	1.48	1.48
P-136	J-131	J-130	3.78	0.01	0.00	0.04	0.00	0.00
P-137	J-131	J-169	13.23	0.72	0.00	0.54	0.21	0.21
P-138	J-132	J-68	121.91	6.68	0.00	1.38	1.75	1.75
P-139	J-189	J-118	4.86	0.33	0.00	0.22	0.13	0.13
P-14	J-1	T-3	-133.78	5.54	0.00	1.52	2.07	2.07
P-140	O-Pump-3	J-190	0.00	0.00	0.00	0.00	0.00	0.00
P-141	J-178	J-134	0.00	0.00	0.00	0.00	0.00	0.00
P-142	J-124	J-180	-28.62	0.52	0.00	0.32	0.12	0.12
P-143	J-135	J-188	4.86	0.08	0.00	0.12	0.03	0.03
P-144	J-135	J-187	21.87	2.34	0.00	0.56	0.52	0.52
P-145	J-135	J-138	2.70	0.03	0.00	0.07	0.01	0.01
P-146	J-138	J-137	1.08	0.01	0.00	0.05	0.01	0.01
P-147	J-139	J-102	72.99	2.11	0.00	0.83	0.67	0.67
P-148	J-139	J-141	0.81	0.00	0.00	0.01	0.00	0.00
P-149	J-73	J-140	1.35	0.02	0.00	0.06	0.01	0.01
P-15	J-11	J-10	10.53	0.02	0.00	0.12	0.02	0.02
P-150	O-RV-1	J-71	92.88	5.25	0.00	1.05	1.05	1.05
P-151	J-142	J-90	67.77	3.91	0.00	0.77	0.59	0.59
P-152	J-142	J-192	3.78	0.08	0.00	0.17	0.08	0.08
P-153	J-144	J-80	52.92	1.03	0.00	0.60	0.37	0.37
P-154	J-144	J-145	1.62	0.05	0.00	0.07	0.02	0.02
P-155	J-146	J-87	15.66	1.59	0.00	0.71	1.14	1.14
P-156	J-146	J-148	0.54	0.00	0.00	0.02	0.00	0.00
P-157	J-147	J-135	35.10	1.61	0.00	0.40	0.17	0.17
P-158	J-148	J-150	0.27	0.00	0.00	0.01	0.00	0.00
P-159	J-149	J-151	7.02	1.06	0.00	0.32	0.26	0.26
P-16	J-12	J-11	12.15	0.07	0.00	0.14	0.02	0.02
P-160	J-149	J-152	0.54	0.01	0.00	0.02	0.00	0.00
P-161	J-151	J-89	1.08	0.01	0.00	0.05	0.01	0.01
P-162	J-151	J-154	1.08	0.00	0.00	0.05	0.01	0.01
P-163	J-55	J-153	1.35	0.00	0.00	0.03	0.00	0.00
P-164	O-RV-2	J-62	11.34	0.05	0.00	0.13	0.02	0.02
P-165	O-RV-3	J-69	3.24	0.11	0.00	0.15	0.06	0.06
P-166	O-RV-4	J-232	18.36	0.48	0.00	0.47	0.38	0.38
P-167	J-128	J-156	4.05	0.06	0.00	0.10	0.02	0.02
P-168	J-156	J-155	0.27	0.00	0.00	0.01	0.00	0.00
P-169	J-128	J-159	8.91	1.20	0.00	0.40	0.40	0.40
P-17	J-13	J-12	12.96	0.01	0.00	0.15	0.03	0.03
P-170	J-157	J-158	1.08	0.02	0.00	0.05	0.01	0.01
P-171	J-159	J-157	3.24	0.13	0.00	0.15	0.06	0.06
P-172	J-159	J-160	1.62	0.04	0.00	0.07	0.02	0.02
P-173	O-Pump-5	J-161	8.64	0.89	0.00	0.39	0.38	0.38
P-174	J-127	I-Pump-5	8.64	0.00	0.00	0.10	0.01	0.01
P-175	J-161	J-162	2.43	0.00	0.00	0.03	0.00	0.00
P-176	J-162	J-163	0.54	0.00	0.00	0.02	0.00	0.00
P-177	J-162	J-165	0.54	0.00	0.00	0.02	0.00	0.00
P-178	J-161	J-183	3.51	0.07	0.00	0.16	0.07	0.07
P-179	J-164	J-127	26.46	0.25	0.00	0.30	0.10	0.10
P-18	J-14	J-13	14.04	0.09	0.00	0.16	0.03	0.03
P-180	J-164	J-185	2.97	0.04	0.00	0.13	0.05	0.05
P-181	J-168	J-164	30.78	0.10	0.00	0.35	0.14	0.14
P-182	J-168	J-170	1.62	0.00	0.00	0.02	0.00	0.00
P-183	O-Pump-4	J-131	22.14	0.01	0.00	0.25	0.07	0.07
P-184	J-169	J-133	9.99	0.22	0.00	0.26	0.12	0.12
P-185	J-169	J-172	0.54	0.00	0.00	0.02	0.00	0.00
P-186	J-133	J-171	9.18	0.17	0.00	0.23	0.10	0.10
P-187	J-171	J-175	6.21	0.13	0.00	0.16	0.05	0.05
P-188	J-171	J-174	0.81	0.07	0.00	0.08	0.03	0.03
P-189	J-175	J-173	4.86	0.04	0.00	0.12	0.03	0.03
P-19	J-15	J-14	16.74	0.20	0.00	0.19	0.04	0.04
P-190	J-173	J-176	4.05	0.06	0.00	0.10	0.02	0.02
P-191	J-176	J-177	1.35	0.02	0.00	0.06	0.01	0.01
P-192	J-176	J-179	0.27	0.00	0.00	0.01	0.00	0.00
P-193	J-180	J-147	38.34	0.76	0.00	0.44	0.20	0.20
P-194	J-180	T-4	-66.96	0.42	0.00	0.76	0.58	0.58
P-195	J-183	J-184	2.70	0.07	0.00	0.12	0.04	0.04
P-196	J-182	J-27	-17.14	0.09	0.00	0.19	0.05	0.05
P-197	J-181	J-182	-15.52	0.00	0.00	0.18	0.04	0.04
P-198	J-184	J-166	1.08	0.02	0.00	0.05	0.01	0.01
P-199	J-185	J-167	0.81	0.00	0.00	0.04	0.00	0.00
P-2	J-3	J-197	83.82	0.23	0.00	0.53	0.21	0.21
P-20	J-16	J-15	24.84	0.35	0.00	0.28	0.09	0.09
P-200	J-186	J-136	5.67	0.31	0.00	0.14	0.04	0.04
P-201	J-187	J-186	14.85	1.08	0.00	0.38	0.25	0.25

P-202	J-188	J-121	1.62	0.01	0.00	0.04	0.00	0.00
P-203	J-190	J-116	-24.84	0.10	0.00	0.28	0.09	0.09
P-204	J-190	J-191	23.22	2.47	0.00	0.59	0.58	0.58
P-205	J-191	J-196	17.01	13.25	0.00	0.77	1.33	1.33
P-206	J-192	J-143	0.27	0.00	0.00	0.01	0.00	0.00
P-207	J-192	J-241	2.43	0.03	0.00	0.11	0.04	0.04
P-208	J-106	J-224	2.97	0.13	0.00	0.10	0.05	0.05
P-209	J-147	J-195	1.62	0.14	0.00	0.07	0.02	0.02
P-21	J-17	J-16	34.02	0.34	0.00	0.39	0.16	0.16
P-210	J-196	J-189	7.56	0.46	0.00	0.34	0.30	0.30
P-211	J-196	J-198	1.08	0.02	0.00	0.05	0.01	0.01
P-212	J-197	J-6	70.18	0.07	0.00	0.45	0.15	0.15
P-213	J-197	J-207	9.32	0.06	0.00	0.24	0.11	0.11
P-214	J-200	J-226	62.22	0.03	0.00	0.40	0.12	0.12
P-215	J-199	J-208	4.71	0.01	0.00	0.12	0.03	0.03
P-216	J-199	J-202	0.83	0.00	0.00	0.02	0.00	0.00
P-217	J-201	J-204	4.93	0.01	0.00	0.13	0.03	0.03
P-218	J-202	J-205	-3.98	0.01	0.00	0.10	0.02	0.02
P-219	J-201	J-211	-1.58	0.00	0.00	0.07	0.02	0.02
P-22	J-18	J-44	-85.18	0.73	0.00	0.97	0.90	0.90
P-220	J-202	J-203	0.54	0.00	0.00	0.02	0.00	0.00
P-221	J-204	J-200	4.23	0.01	0.00	0.11	0.02	0.02
P-222	J-205	J-209	-7.60	0.01	0.00	0.19	0.07	0.07
P-223	J-204	J-205	-1.18	0.03	0.00	0.12	0.07	0.07
P-224	J-205	J-206	0.54	0.00	0.00	0.06	0.02	0.02
P-225	J-207	J-199	7.16	0.03	0.00	0.18	0.07	0.07
P-226	J-208	J-201	4.17	0.00	0.00	0.11	0.02	0.02
P-227	J-209	J-6	-7.87	0.00	0.00	0.20	0.08	0.08
P-228	J-210	J-7	-98.66	0.48	0.00	1.12	1.18	1.18
P-229	J-202	J-211	2.66	0.02	0.00	0.12	0.04	0.04
P-23	J-19	J-18	-80.86	2.43	0.00	0.92	0.82	0.82
P-230	J-212	I-Pump-4	22.14	0.06	0.00	0.25	0.07	0.07
P-231	J-210	J-212	27.00	0.05	0.00	0.31	0.11	0.11
P-232	J-213	J-219	-12.92	0.11	0.00	0.59	0.80	0.80
P-233	J-215	J-217	-50.33	0.09	0.00	0.57	0.34	0.34
P-234	J-215	J-214	-27.01	0.03	0.00	0.31	0.11	0.11
P-235	J-214	J-223	-27.01	0.05	0.00	0.31	0.11	0.11
P-236	J-214	J-216	0.00	0.00	0.00	0.00	0.00	0.00
P-237	J-217	J-210	-60.05	0.15	0.00	0.68	0.47	0.47
P-238	J-217	J-218	0.00	0.00	0.00	0.00	0.00	0.00
P-239	J-219	J-221	-12.92	0.09	0.00	0.59	0.80	0.80
P-24	J-20	J-19	-78.16	1.44	0.00	0.89	0.77	0.77
P-240	J-219	J-220	0.00	0.00	0.00	0.00	0.00	0.00
P-241	J-221	J-215	-12.92	0.18	0.00	0.59	0.80	0.80
P-242	J-222	J-129	-27.01	0.01	0.00	0.31	0.11	0.11
P-243	J-223	J-222	-27.01	0.02	0.00	0.31	0.11	0.11
P-244	O-Pump-6	J-107	63.00	0.19	0.00	1.61	3.70	3.70
P-245	J-226	J-74	54.66	0.10	0.00	0.35	0.10	0.10
P-246	J-226	J-227	0.54	0.00	0.00	0.06	0.02	0.02
P-247	J-228	J-168	34.02	0.25	0.00	0.39	0.16	0.16
P-248	J-228	J-230	0.82	0.01	0.00	0.04	0.00	0.00
P-249	J-229	J-122	39.96	0.48	0.00	0.45	0.22	0.22
P-25	J-21	J-20	-68.44	1.11	0.00	0.78	0.60	0.60
P-250	O-RV-5	J-229	39.96	1.80	0.00	1.81	6.47	6.47
P-251	J-225	J-108	0.81	0.00	0.00	0.04	0.00	0.00
P-252	J-57	J-238	-4.95	0.00	0.00	0.13	0.03	0.03
P-253	J-231	J-56	-6.30	0.03	0.00	0.16	0.05	0.05
P-254	J-232	J-63	10.80	0.24	0.00	0.28	0.14	0.14
P-255	J-232	J-233	0.00	0.00	0.00	0.00	0.00	0.00
P-256	J-224	J-234	0.81	0.01	0.00	0.04	0.00	0.00
P-257	J-235	J-111	36.54	5.85	0.00	1.66	5.48	5.48
P-258	J-236	J-77	0.54	0.01	0.00	0.02	0.00	0.00
P-259	J-237	I-Pump-6	63.00	0.04	0.00	1.61	3.70	3.70
P-26	J-22	J-21	-56.02	0.50	0.00	0.64	0.41	0.41
P-260	J-238	J-231	-5.49	0.04	0.00	0.14	0.04	0.04
P-261	J-57	I-RV-6	0.00	0.00	0.00	0.00	0.00	0.00
P-262	J-56	J-239	0.00	0.00	0.00	0.00	0.00	0.00
P-263	O-RV-6	J-240	0.00	0.00	0.00	0.00	0.00	0.00
P-264	J-241	J-193	0.27	0.00	0.00	0.01	0.00	0.00
P-265	J-241	J-242	1.35	0.01	0.00	0.06	0.01	0.01
P-266	J-242	J-243	0.54	0.00	0.00	0.02	0.00	0.00
P-27	J-23	J-22	-54.40	0.68	0.00	0.62	0.39	0.39
P-270	J-244	J-235	38.70	22.10	0.00	1.76	6.10	6.10
P-271	J-244	J-247	1.35	0.03	0.00	0.06	0.01	0.01
P-272	J-246	J-149	11.88	1.74	0.00	0.54	0.68	0.68
P-273	J-246	J-249	0.27	0.01	0.00	0.03	0.00	0.00
P-274	J-248	J-250	1.35	0.02	0.00	0.06	0.01	0.01
P-275	J-74	J-8	42.51	0.03	0.00	0.27	0.06	0.06
P-276	J-74	J-252	3.78	0.01	0.00	0.10	0.02	0.02
P-277	J-252	J-251	0.00	0.00	0.00	0.00	0.00	0.00
P-278	J-252	J-253	1.89	0.01	0.00	0.05	0.01	0.01
P-28	J-24	J-23	-52.78	0.41	0.00	0.60	0.37	0.37
P-29	J-25	J-24	-42.52	1.00	0.00	0.48	0.25	0.25
P-3	J-3	J-129	94.21	0.26	0.00	1.07	1.08	1.08
P-30	J-26	J-25	-38.20	0.32	0.00	0.43	0.20	0.20
P-31	J-27	J-54	-25.68	0.24	0.00	0.29	0.10	0.10
P-32	J-28	J-181	-15.52	0.01	0.00	0.18	0.04	0.04
P-33	J-29	J-67	2.84	0.00	0.00	0.03	0.00	0.00
P-34	J-30	J-29	22.82	0.17	0.00	0.26	0.08	0.08
P-35	J-31	I-Pump-1	162.68	0.88	0.00	1.85	2.98	2.98

P-36	J-32	J-31	164.03	10.52	0.00	1.86	3.02	3.02
P-37	O-Pump-1	J-132	162.68	0.65	0.00	1.85	2.98	2.98
P-38	J-10	J-34	8.64	0.24	0.00	0.22	0.09	0.09
P-39	J-34	J-39	2.16	0.01	0.00	0.10	0.03	0.03
P-4	J-4	J-215	-55.77	0.11	0.00	0.63	0.41	0.41
P-40	J-34	J-37	4.05	0.48	0.00	0.18	0.09	0.09
P-41	J-33	J-35	0.54	0.00	0.00	0.02	0.00	0.00
P-42	J-37	J-33	1.89	0.07	0.00	0.09	0.02	0.02
P-43	J-38	J-36	0.54	0.00	0.00	0.02	0.00	0.00
P-44	J-39	J-38	1.62	0.02	0.00	0.07	0.02	0.02
P-45	J-15	J-41	3.24	0.24	0.00	0.15	0.06	0.06
P-46	J-41	J-40	0.81	0.01	0.00	0.04	0.00	0.00
P-47	J-16	J-43	6.48	0.62	0.00	0.29	0.22	0.22
P-48	J-43	J-42	3.24	0.45	0.00	0.15	0.06	0.06
P-49	J-44	J-1	-93.55	0.94	0.00	1.06	1.07	1.07
P-5	J-5	J-3	205.03	7.67	0.00	2.33	4.57	4.57
P-50	J-44	J-46	7.56	0.30	0.00	0.34	0.30	0.30
P-51	J-46	J-45	3.78	0.45	0.00	0.17	0.08	0.08
P-52	J-18	J-49	1.62	0.02	0.00	0.04	0.00	0.00
P-53	J-49	J-47	0.00	0.00	0.00	0.00	0.00	0.00
P-54	J-20	J-48	4.32	0.06	0.00	0.11	0.03	0.03
P-55	J-48	J-50	0.81	0.00	0.00	0.02	0.00	0.00
P-56	J-21	J-51	6.75	0.23	0.00	0.17	0.06	0.06
P-57	J-51	J-52	1.35	0.00	0.00	0.03	0.00	0.00
P-58	J-24	J-53	2.70	0.08	0.00	0.12	0.04	0.04
P-59	J-54	J-26	-38.20	0.15	0.00	0.43	0.20	0.20
P-6	J-6	J-200	60.42	0.05	0.00	0.39	0.12	0.12
P-60	J-54	J-56	9.00	0.20	0.00	0.23	0.10	0.10
P-61	J-27	J-55	4.77	0.07	0.00	0.22	0.13	0.13
P-62	J-55	J-58	-1.71	0.01	0.00	0.04	0.00	0.00
P-63	J-58	J-57	-4.68	0.02	0.00	0.12	0.03	0.03
P-64	J-28	I-RV-2	11.34	0.01	0.00	0.13	0.02	0.02
P-65	J-59	J-60	1.35	0.00	0.00	0.02	0.00	0.00
P-66	J-59	J-61	1.62	0.07	0.00	0.07	0.02	0.02
P-67	J-62	J-59	7.29	0.02	0.00	0.08	0.01	0.01
P-68	J-62	J-64	0.00	0.00	0.00	0.00	0.00	0.00
P-69	J-29	I-RV-4	18.36	0.15	0.00	0.47	0.38	0.38
P-7	J-7	T-1	-105.14	0.52	0.00	1.19	1.33	1.33
P-70	J-63	J-65	3.78	0.06	0.00	0.10	0.02	0.02
P-71	J-66	J-28	-3.10	0.00	0.00	0.04	0.00	0.00
P-72	J-67	J-66	-1.75	0.00	0.00	0.02	0.00	0.00
P-73	J-67	I-RV-3	3.24	0.01	0.00	0.15	0.06	0.06
P-74	J-68	J-30	23.90	0.06	0.00	0.27	0.09	0.09
P-75	J-68	J-73	97.20	4.08	0.00	1.10	1.15	1.15
P-76	J-71	J-70	5.40	0.94	0.00	0.25	0.16	0.16
P-77	J-71	J-142	75.06	2.90	0.00	0.85	0.71	0.71
P-78	J-73	I-RV-1	92.88	1.24	0.00	1.05	1.05	1.05
P-79	J-72	J-248	3.78	0.22	0.00	0.17	0.08	0.08
P-8	J-8	J-2	36.84	0.05	0.00	0.24	0.05	0.05
P-80	J-75	J-72	4.86	0.18	0.00	0.22	0.13	0.13
P-81	J-75	J-236	2.16	0.06	0.00	0.10	0.03	0.03
P-82	J-76	J-75	9.18	1.11	0.00	0.42	0.42	0.42
P-83	J-76	J-78	0.81	0.01	0.00	0.04	0.00	0.00
P-84	J-79	J-76	11.88	0.37	0.00	0.30	0.17	0.17
P-85	J-79	J-81	0.81	0.03	0.00	0.04	0.00	0.00
P-86	J-80	J-79	16.20	1.59	0.00	0.41	0.30	0.30
P-87	J-80	J-82	30.78	2.54	0.00	0.79	0.98	0.98
P-88	J-82	J-83	21.33	4.36	0.00	0.54	0.50	0.50
P-89	J-82	J-85	1.35	0.03	0.00	0.06	0.01	0.01
P-9	I-WTP	R-1	-209.08	2.41	0.00	2.37	4.74	4.74
P-90	J-83	J-84	0.54	0.01	0.00	0.02	0.00	0.00
P-91	J-83	J-146	16.20	1.81	0.00	0.74	1.21	1.21
P-92	J-87	J-86	0.81	0.02	0.00	0.04	0.00	0.00
P-93	J-87	J-246	13.77	0.84	0.00	0.62	0.90	0.90
P-94	J-88	J-144	57.24	1.63	0.00	0.65	0.43	0.43
P-95	J-88	J-91	2.43	0.12	0.00	0.11	0.04	0.04
P-96	J-90	J-88	63.72	2.28	0.00	0.72	0.52	0.52
P-97	J-90	J-92	0.81	0.00	0.00	0.02	0.00	0.00
P-98	J-4	J-213	98.68	0.27	0.00	1.12	1.18	1.18
P-99	J-94	J-93	106.47	8.50	0.00	1.21	1.36	1.36

P U M P / L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE (gpm)	INLET HEAD (ft)	OUTLET HEAD (ft)	PUMP HEAD (ft)	EFFIC- ENCY (%)	USEFUL POWER (Hp)	INCREMTL COST (\$)	TOTAL COST (\$)	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. (ft)
Pump-1	162.68	233.97	566.97	333.0	75.00	0.	0.0	0.0	**	**	267.1
Device "Pump-3" is closed											
Pump-3	0.00	131.22	342.68	0.0	75.00	0.	0.0	0.0	**	**	164.4
Pump-4	22.14	198.89	270.27	71.4	75.00	0.	0.0	0.0	**	**	232.1
Pump-5	8.64	121.51	307.26	185.8	75.00	0.	0.0	0.0	**	**	154.7
Pump-6	63.00	142.63	315.14	172.5	75.00	0.	0.0	0.0	**	**	175.8
WTP	209.08	2.59	244.23	241.6	75.00	0.	0.0	0.0	**	**	35.7

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	NODE ELEVATION (ft)	PRESSURE HEAD (ft)	NODE PRESSURE (psi)
J-1		4.32	1269.46	885.00	384.46	166.60
J-10		1.89	1267.65	1080.00	187.85	81.40
J-100		0.81	929.88	770.00	159.88	69.28
J-101		0.81	929.88	750.00	179.88	77.95
J-102		2.70	927.11	750.00	177.11	76.75
J-103		4.05	925.61	760.00	165.61	71.76
J-104		0.54	927.10	780.00	147.10	63.74
J-105		1.35	925.60	860.00	65.60	28.43
J-106		3.24	1083.70	830.00	253.70	109.94
J-107		3.78	1094.95	780.00	314.95	136.48
J-108		0.81	1094.83	880.00	214.83	93.09
J-109		5.13	1084.08	800.00	284.08	123.10
J-11		1.62	1267.87	1130.00	137.87	59.74
J-110		8.64	931.27	750.00	181.27	78.55
J-111		36.54	1032.59	920.00	112.59	48.79
J-112		6.75	931.22	790.00	141.22	61.20
J-113		0.81	930.18	840.00	90.18	39.08
J-114		0.00	1142.79	810.00	332.79	144.21
J-115		1.89	930.11	840.00	90.11	39.05
J-116		1.08	1142.79	810.00	332.79	144.21
J-117		0.81	1126.17	900.00	226.17	98.01
J-118		3.24	1126.17	870.00	256.17	111.01
J-119		1.35	1142.96	820.00	322.96	139.95
J-12		0.81	1267.94	1100.00	167.94	72.78
J-120		0.81	1126.17	920.00	206.17	89.34
J-121		1.62	1142.11	820.00	322.11	139.58
J-122		2.16	1032.33	760.00	272.33	118.01
J-123		0.00	1142.79	880.00	262.79	113.87
J-124		0.00	1144.06	1000.00	144.06	62.43
J-125		1.35	1142.92	900.00	242.92	105.27
J-126		2.16	1032.31	860.00	172.31	74.67
J-127		0.00	1031.51	910.00	121.51	52.65
J-128		4.86	1031.38	820.00	211.38	91.60
J-129		20.25	948.85	740.00	208.85	90.50
J-13		1.08	1267.96	1180.00	87.96	38.11
J-130		3.78	1020.25	760.00	260.25	112.77
J-131		5.13	1020.25	770.00	250.25	108.44
J-132		0.81	1266.32	700.00	566.32	245.41
J-133		0.81	1019.31	840.00	179.31	77.70
J-134		0.00	1142.79	900.00	242.79	105.21
J-135		5.67	1142.20	815.00	327.20	141.79
J-136		5.67	1138.47	900.00	238.47	103.34
J-137		1.08	1142.17	960.00	182.17	78.94
J-138		1.62	1142.17	850.00	292.17	126.61
J-139		1.62	929.22	750.00	179.22	77.66
J-14		2.70	1268.05	1100.00	168.05	72.82
J-140		1.35	1255.54	1000.00	255.54	110.73
J-141		0.81	929.22	780.00	149.22	64.66
J-142		3.51	978.01	700.00	278.01	120.47
J-143		0.27	977.93	700.00	277.93	120.44
J-144		2.70	970.19	715.00	255.19	110.58
J-145		1.62	970.15	750.00	220.15	95.40
J-146		0.00	960.44	780.00	180.44	78.19
J-147		1.62	1143.82	860.00	283.82	122.99
J-148		0.27	960.44	800.00	160.44	69.52
J-149		4.32	956.28	780.00	176.28	76.39
J-15		4.86	1268.25	1100.00	168.25	72.91
J-150		0.27	960.44	820.00	140.44	60.86
J-151		4.86	955.22	840.00	115.22	49.93
J-152		0.54	956.27	840.00	116.27	50.39
J-153		1.35	1259.44	880.00	379.44	164.43
J-154		1.08	955.22	840.00	115.22	49.93
J-155		0.27	1031.32	700.00	331.32	143.57
J-156		3.78	1031.32	700.00	331.32	143.57
J-157		2.16	1030.05	820.00	210.05	91.02
J-158		1.08	1030.03	850.00	180.03	78.01
J-159		4.05	1030.18	810.00	220.18	95.41
J-16		2.70	1268.59	1110.00	158.59	68.72
J-160		1.62	1030.14	875.00	155.14	67.23
J-161		2.70	1216.36	1020.00	196.36	85.09
J-162		1.35	1216.36	1020.00	196.36	85.09
J-163		0.54	1216.36	1020.00	196.36	85.09
J-164		1.35	1031.76	840.00	191.76	83.09
J-165		0.54	1216.36	880.00	336.36	145.76
J-166		1.08	1216.20	980.00	236.20	102.35
J-167		0.81	1031.71	850.00	181.71	78.74
J-168		1.62	1031.86	800.00	231.86	100.47
J-169		2.70	1019.53	850.00	169.53	73.46
J-17		1.89	1268.93	960.00	308.93	133.87
J-170		1.62	1031.85	820.00	211.85	91.80
J-171		2.16	1019.13	800.00	219.13	94.96
J-172		0.54	1019.53	860.00	159.53	69.13
J-173		0.81	1018.97	860.00	158.97	68.89

J-174	0.81	1019.07	860.00	159.07	68.93
J-175	1.35	1019.01	795.00	224.01	97.07
J-176	2.43	1018.91	820.00	198.91	86.19
J-177	1.35	1018.89	880.00	138.89	60.18
J-178	0.00	1142.79	850.00	292.79	136.67
J-179	0.27	1018.91	835.00	183.91	79.69
J-18	2.70	1267.79	920.00	347.79	150.71
J-180	0.00	1144.58	900.00	244.58	105.98
J-181	0.00	1259.43			
J-182	1.62	1259.43			
J-183	0.81	1216.30	1040.00	176.30	76.40
J-184	1.62	1216.22	1040.00	176.22	76.36
J-185	2.16	1031.72	920.00	111.72	48.41
J-186	9.18	1138.78	850.00	288.78	125.14
J-187	7.02	1139.86	825.00	314.86	136.44
J-188	3.24	1142.13	800.00	342.13	148.25
J-189	2.70	1126.50	850.00	276.50	119.82
J-19	2.70	1265.36	1020.00	245.36	106.32
J-190	1.62	1142.68	800.00	342.68	148.50
J-191	6.21	1140.21	790.00	350.21	151.76
J-192	1.08	977.93	690.00	287.93	124.77
J-193	0.27	977.90	740.00	237.90	103.09
J-194	0.00	1267.85	1080.00	187.85	81.40
J-195	1.62	1143.68	1000.00	143.68	62.26
J-196	8.37	1126.96	830.00	296.96	128.68
J-197	4.32	948.88	760.00	188.88	81.85
J-198	1.38	1126.94	880.00	246.94	107.01
J-199	1.62	948.79	760.00	188.79	81.81
J-2	8.10	948.54	700.00	248.54	107.70
J-20	5.40	1263.93	1060.00	203.93	88.37
J-200	2.43	948.76	760.00	188.76	81.79
J-201	0.81	948.77	760.00	188.77	81.80
J-202	1.62	948.79	760.00	188.79	81.81
J-203	0.54	948.79	760.00	188.79	81.81
J-204	1.89	948.76	760.00	188.76	81.80
J-205	1.89	948.79	760.00	188.79	81.81
J-206	0.54	948.79	760.00	188.79	81.81
J-207	2.16	948.82	760.00	188.82	81.82
J-208	0.54	948.77	760.00	188.77	81.80
J-209	0.27	948.81	760.00	188.81	81.82
J-21	5.67	1262.81	1050.00	212.81	92.22
J-210	11.61	949.00	780.00	169.00	73.23
J-211	1.08	948.77	760.00	188.77	81.80
J-212	4.86	948.94			
J-213	0.00	948.37	780.00	168.37	72.96
J-214	0.00	948.77	760.00	188.77	81.80
J-215	8.64	948.75	780.00	168.75	73.12
J-216	0.00	948.77	760.00	188.77	81.80
J-217	9.72	948.84	780.00	168.84	73.17
J-218	0.00	948.84	760.00	188.84	81.83
J-219	0.00	948.48	780.00	168.48	73.01
J-22	1.62	1262.31	980.00	282.31	122.34
J-220	0.00	948.48	780.00	168.48	73.01
J-221	0.00	948.57	780.00	168.57	73.05
J-222	0.00	948.84	740.00	208.84	90.50
J-223	0.00	948.82	740.00	208.82	90.49
J-224	2.16	1083.57	850.00	233.57	101.22
J-225	2.70	1094.84	860.00	234.84	101.76
J-226	7.02	948.73	770.00	178.73	77.45
J-227	0.54	948.72	800.00	148.72	64.45
J-228	0.81	1032.10	820.00	212.10	91.91
J-229	0.00	1032.81	700.00	332.81	144.22
J-23	1.62	1261.63	1080.00	181.63	78.71
J-230	0.81	1032.10	860.00	172.10	74.58
J-231	0.81	1259.52	1025.00	234.52	101.63
J-232	7.56	980.29	800.00	180.29	78.13
J-233	0.00	980.29	860.00	120.29	52.13
J-234	0.81	1083.56	900.00	183.56	79.54
J-235	2.16	1038.44	870.00	168.44	72.99
J-236	1.62	966.03	775.00	191.03	82.78
J-237	1.35	922.67	780.00	142.67	61.82
J-238	0.54	1259.48	970.00	289.48	125.44
J-239	0.00	1259.56	960.00	299.56	129.81
J-24	7.56	1261.22	1020.00	241.22	104.53
J-240	0.00	1259.48	840.00	419.48	181.78
J-241	0.81	977.90	700.00	277.90	120.42
J-242	0.81	977.89	740.00	237.89	103.09
J-243	0.54	977.89	760.00	217.89	94.42
J-244	4.32	1060.54	850.00	210.54	91.24
J-246	1.62	958.02	740.00	218.02	94.48
J-247	1.35	1060.52	880.00	180.52	78.22
J-248	2.43	965.69	776.00	189.69	82.20
J-249	0.27	958.02	775.00	183.02	79.31
J-25	4.32	1260.22	880.00	380.22	164.76
J-250	1.35	965.67	800.00	165.67	71.79
J-251	0.00	948.62	800.00	148.62	64.40
J-252	1.89	948.62	780.00	168.62	73.07
J-253	1.89	948.61	880.00	68.61	29.73
J-26	0.00	1259.90	1020.00	239.90	103.96
J-27	3.78	1259.52	875.00	384.52	166.62

Neal Howard'

J-28		1.08	1259.41	800.00	459.41	199.08
J-29		1.62	1259.41	780.00	479.41	207.75
J-3		27.00	949.11	700.00	249.11	107.95
J-30		1.08	1259.58	680.00	579.58	251.15
J-31		1.35	934.85	700.00	234.85	101.77
J-32		1.35	945.37	800.00	145.37	62.99
J-33		1.35	1267.05	1085.00	182.05	78.89
J-34		2.43	1267.61	1150.00	117.61	50.96
J-35		0.54	1267.04	1040.00	227.04	98.39
J-36		0.54	1267.57	1140.00	127.57	55.28
J-37		2.16	1267.12	1170.00	97.12	42.09
J-38		1.08	1267.57	1170.00	97.57	42.28
J-39		0.54	1267.59	1110.00	157.59	68.29
J-4		4.05	948.64	780.00	168.64	73.08
J-40		0.81	1268.00	1020.00	248.00	107.47
J-41		2.43	1268.01	1090.00	178.01	77.14
J-42		3.24	1267.52	860.00	407.52	176.59
J-43		3.24	1267.97	1130.00	137.97	59.79
J-44		0.81	1268.52	885.00	383.52	166.19
J-45		3.78	1267.77	940.00	327.77	142.03
J-46		3.78	1268.22	1030.00	238.22	103.23
J-47		0.00	1267.77	900.00	367.77	159.37
J-48		3.51	1263.86	890.00	373.86	162.01
J-49		1.62	1267.77	680.00	587.77	254.70
J-5		4.05	956.78	680.00	276.78	119.94
J-50		0.81	1263.86	940.00	323.86	140.34
J-51		5.40	1262.59	890.00	372.59	161.46
J-52		1.35	1262.58	960.00	302.58	131.12
J-53		2.70	1261.14	870.00	391.14	169.50
J-54		3.51	1259.75	1000.00	259.75	112.56
J-55		5.13	1259.45	830.00	429.45	186.09
J-56		2.70	1259.56	980.00	279.56	121.14
J-57		0.27	1259.48	970.00	289.48	125.44
J-58		2.97	1259.46	980.00	279.46	121.10
J-59		4.32	961.47	750.00	211.47	91.64
J-6		1.89	948.81	760.00	188.81	81.82
J-60		1.35	961.47	800.00	161.47	69.97
J-61		1.62	961.40	880.00	81.40	35.27
J-62		4.05	961.49	790.00	171.49	74.31
J-63		7.02	980.05	850.00	130.05	56.35
J-64		0.00	961.49	840.00	121.49	52.65
J-65		3.78	979.99	880.00	99.99	43.33
J-66		1.35	1259.41	790.00	469.41	203.41
J-67		1.35	1259.41	800.00	459.41	199.08
J-68		0.81	1259.64	700.00	559.64	242.51
J-69		3.24	961.43	700.00	261.43	113.29
J-7		6.48	949.48	820.00	129.48	56.11
J-70		5.40	979.96	850.00	129.96	56.32
J-71		12.42	980.91	740.00	240.91	104.39
J-72		1.08	965.91	750.00	215.91	93.56
J-73		2.97	1255.56	930.00	325.56	141.07
J-74		8.37	948.63	760.00	188.63	81.74
J-75		2.16	966.09	750.00	216.09	93.64
J-76		1.89	967.20	740.00	227.20	98.46
J-77		0.54	966.02	825.00	141.02	61.11
J-78		0.81	967.19	800.00	167.19	72.45
J-79		3.51	967.58	720.00	247.58	107.28
J-8		5.67	948.60	800.00	148.60	64.39
J-80		5.94	969.17	710.00	259.17	112.30
J-81		0.81	967.54	880.00	87.54	37.94
J-82		8.10	966.62	720.00	246.62	106.87
J-83		4.59	962.26	720.00	242.26	104.98
J-84		0.54	962.25	800.00	162.25	70.31
J-85		1.35	966.60	800.00	166.60	72.19
J-86		0.81	958.84	840.00	118.84	51.50
J-87		1.08	958.86	760.00	198.86	86.17
J-88		4.05	971.82	700.00	271.82	117.79
J-89		1.08	955.21	840.00	115.21	49.93
J-9		5.40	948.47	850.00	98.47	42.67
J-90		3.24	974.10	690.00	284.10	123.11
J-91		2.43	971.70	720.00	251.70	109.07
J-92		0.81	974.10	800.00	174.10	75.44
J-93		6.75	931.46	750.00	181.46	78.63
J-94		4.05	939.96	760.00	179.96	77.98
J-95		0.00	939.96	800.00	139.96	60.65
J-96		0.54	941.31	760.00	181.31	78.57
J-97		0.54	943.21	760.00	183.21	79.39
J-98		0.00	943.21	900.00	43.21	18.72
J-99		4.59	930.19	780.00	150.19	65.08
O-Pump-1	Dehart PS	0.00	1266.97	700.00	566.97	245.69
I-Pump-3	Wrigley PS	0.00	931.22	800.00	131.22	56.86
I-Pump-4	S. Ruin PS	0.00	948.89	750.00	198.89	86.19
I-Pump-5		0.00	1031.51	910.00	121.51	52.65
I-Pump-6		0.00	922.63	780.00	142.63	61.81
R-1		----	740.00	735.00	5.00	2.17
O-RV-1		----	986.15	760.00	226.15	98.00
O-RV-2		----	961.54	800.00	161.54	70.00
O-RV-3		----	961.54	800.00	161.54	70.00
I-RV-4		0.00	1259.26	750.00	509.26	220.68
I-RV-5		0.00	1264.88	700.00	564.88	244.78

O-RV-6		----	1259.48	970.00	289.48	125.44
T-1		----	950.00	900.00	50.00	21.67
T-2	Cemetery Tan	----	950.00	900.00	50.00	21.67
T-3	Dehart Tank	----	1275.00	1122.50	152.50	66.08
T-4	Wrigley Tank	----	1145.00	1100.00	45.00	19.50
O-WTP		0.00	979.23	735.00	244.23	105.83
I-RV-1		0.00	1254.30	760.00	494.30	214.20
I-RV-2		0.00	1259.41	800.00	459.41	199.08
I-RV-3		0.00	1259.40	800.00	459.40	199.07
I-RV-6		0.00	1259.48	970.00	289.48	125.44
O-Pump-3	Wrigley PS	0.00	1142.68	800.00	342.68	148.50
O-RV-4		----	980.77	750.00	230.77	100.00
O-Pump-5		0.00	1217.26	910.00	307.26	133.14
O-Pump-4	S. Ruin PS	0.00	1020.27	750.00	270.27	117.12
O-Pump-6		0.00	1095.14	780.00	315.14	136.56
O-RV-5		----	1034.62	700.00	334.62	145.00
I-Pump-1	Dehart PS	0.00	933.97	700.00	233.97	101.39
I-WTP		0.00	737.59	735.00	2.59	1.12

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
J-49	254.70	I-WTP	1.12
J-30	251.15	R-1	2.17
O-Pump-1	245.69	J-98	18.72
J-132	245.41	T-4	19.50
I-RV-5	244.78	T-1	21.67

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-1	2.37	P-106	0.01
P-9	2.37	P-148	0.01
P-5	2.33	P-158	0.01
P-115	2.01	P-168	0.01
P-12	1.88	P-192	0.01

HL + ML / 1000

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-115	7.85	P-148	0.00
P-130	6.47	P-106	0.00
P-250	6.47	P-65	0.00
P-270	6.10	P-110	0.00
P-257	5.48	P-182	0.00

HL / 1000

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
P-115	7.85	P-148	0.00
P-130	6.47	P-106	0.00
P-250	6.47	P-65	0.00
P-270	6.10	P-110	0.00
P-257	5.48	P-182	0.00

REGULATING VALVE REPORT

VALVE LABEL	VALVE TYPE	VALVE SETTING (psi or gpm)	VALVE STATUS	UPSTREAM PRESSURE (psi)	DOWNSTREAM PRESSURE (psi)	THROUGH FLOW (gpm)
RV-1	PRV-1	98.00	ACTIVATED	214.20	98.00	92.88
RV-2	PRV-1	70.00	ACTIVATED	199.08	70.00	11.34
RV-3	PRV-1	70.00	ACTIVATED	199.07	70.00	3.24
RV-4	PRV-1	100.00	ACTIVATED	220.68	100.00	18.36
RV-5	PRV-1	145.00	ACTIVATED	244.78	145.00	39.96
RV-6	PRV-1	90.00	WIDE OPEN	125.44	125.44	0.00

SUMMARY OF INFLOWS AND OUTFLOWS

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE (gpm)	NODE TITLE
R-1	209.08	
T-1	105.14	
T-2	142.04	Cemetery Tan
T-3	133.78	Dehart Tank
T-4	66.96	Wrigley Tank

NET SYSTEM INFLOW = 657.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 657.00

***** HYDRAULIC ANALYSIS COMPLETED *****



County Elliott
Type WLE
Project Contract No. 10-Water System Improvements and Contract 11-New Ground water

System Sandy Hook WD
 1000 Howards Creek Rd.
 Sandy Hook, KY 41171

Engineer Jim Thompson-10 & Bryan Lovan-11
Eng Phone 859-251-4127
Fax
e-mail

Reviewed by MT

Project No 0320383-13-001
 Agency Interest ID 996APE20130001
 Fee Amt _____ Code 1-H
 Submission Date 5/20/2013
 Admin NOD Is'ued NA Rec'vd NA
 Tech NOD Issued NA Rec'vd NA

Response Code
A-approved,B-accepted A
as-built,D-denied,N-no action
W-withdrawn,X-dead
DATE ON DESK: 5/28/2013

 Response Date 6/10/2013
 Approval _____
 EPA info. _____
 Attention to: _____

	8000 LF of 3-inch PVC, 1100 LF of 2-inch PVC, 2500 LF of 4-inch PVC, 4500 LF of 6-inch PVC and Construct a New Ground water Well and Appurtenances	_____
Miles or Ft of Line		_____
Projected Cost (\$)	\$950,000	_____

Date mailed:
 (C-facilities, M-mailed, P-Plumbing, F-filed)
 Source:
 Letter Code TEMPO
 Certification:
 Remarks
Proposed Customers: 12

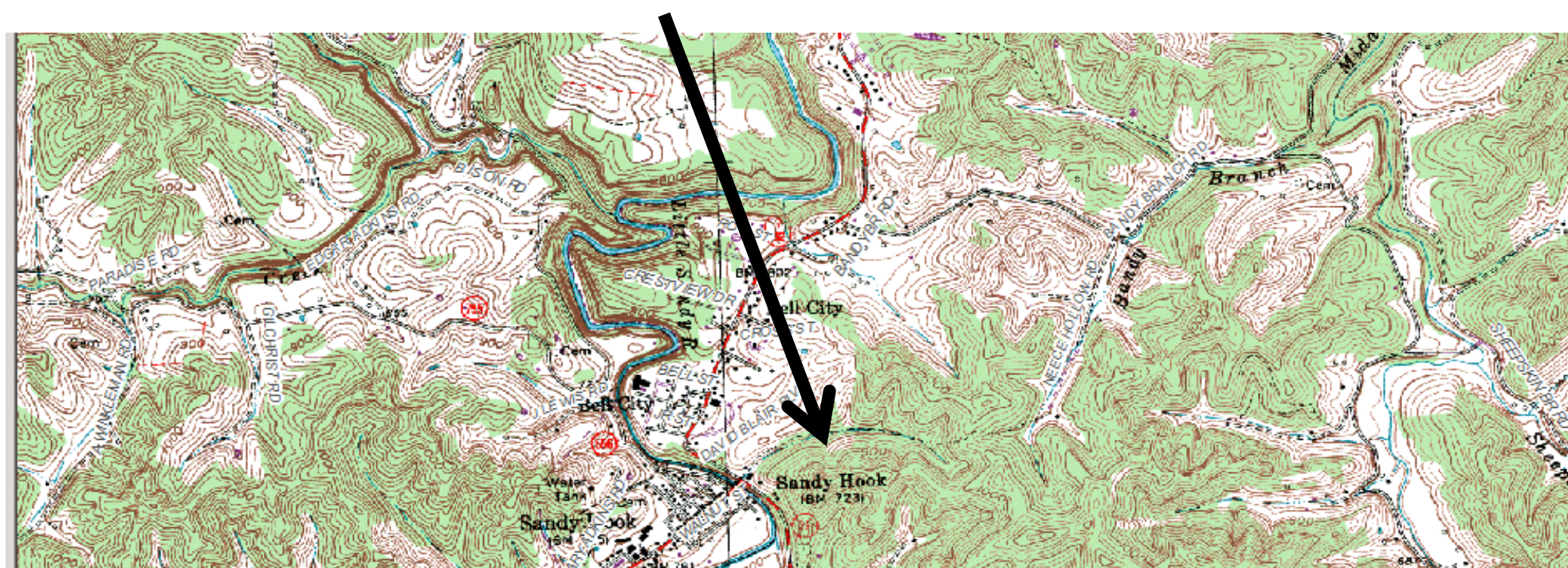
Population=12= CONNECTION
 Lat/N/Y= 38 5 1" N
 HUC11= 05090104010
 Lon/W/X= -83°7 24" W

Connection between new line and existent line:

Construction Site

Hydraulic Analysis:
Peak demand 34.64 GPM
minimum pressure 70 PSI

Flushing Test
flushing velocity 2.5 F/S
Min Pressure 20 PSI





STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
200 FAIR OAKS LANE, 4TH FLOOR
FRANKFORT, KENTUCKY 40601
www.kentucky.gov

June 18, 2013

Bernal P Atkins
Sandy Hook Water District
1000 Howards Creek Rd
Sandy Hook, KY 41171

RE: Sandy Hook Water District
AI#: 996, APE20130001
PWSID # 0320383-13-001
Contract No. 10-Water System Improvements and
Contract 11-New Ground water well and
Appurtenances Permit
Elliot County, KY

Dear Bernal P Atkins:

We have received the Plans and Specifications for the above referenced project. The project consists of installation of approximately 4500 LF of 6-inch PVC, 2500 LF of 4-inch PVC, 8000 LF of 3-inch PVC, 1100 LF of 2-inch PVC, and a new ground water well and appurtenances. This is to advise that plans and specifications covering the above referenced subject are APPROVED with respect to sanitary features of design as of this date with the following stipulations:

1. The well must not be located within 50 feet of septic tanks and 70 feet of drain fields, or near any other known source of contamination.
2. No sewer pipes are to be installed within 20 feet of the well.
3. The well must comply with the current regulations of the Ground Water Branch of the Division Water (401 KAR 6:310). Included are requirements for the well casing to extend at least 4-inch above grade and for a water-tight well cap to be installed on the casing top.
4. The water line leaving the well shall be equipped with a bypass valve to allow for flashing of water from the well.
5. A sample tap shall be placed on the drinking water line (prior to any treatment) for collection of raw water samples.
6. Within 30 days of well construction, the driller shall submit a report of construction to the Cabinet on the form entitled Kentucky Water Well Record (DEP-4045);
7. Residence in the vicinity of the proposed well shall be connected to city water

Sandy Hook Water District

AI#: 996, APE20130001

PWSID # 0320383-13-001

Contract No. 10-Water System Improvements and Contract 11-New Ground water well and Appurtenances Permit

Elliot County, KY

June 18, 2013

Page 2 of 2

For the purpose of review, DOW normally will not approve lines less than 3-inches in diameter for distribution. When 2-inch lines are proposed for distribution, they are approved on a case-by-case basis with the stipulation that such lines cannot be extended. In areas where lines may be extended in the future, DOW reserves the right to require waterline to have a minimum 3-inch diameter.

This approval has been issued under the provisions of KRS Chapter 224 and regulations promulgated pursuant thereto. Issuance of this approval does not relieve the applicant from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal and local agencies.

Unless construction on this project commences within two years from the date of this approval letter, Sandy Hook Water District shall re-submit the original plans and specifications for a new comprehensive review.

If you have any questions concerning this project, please contact Mr. Mortaza Tabayeh at 502-564-8158 extension 4826.

Sincerely,



Mark Rasche, P.E.
Supervisor, Engineering Section
Water Infrastructure Branch
Division of Water

MR: MT

Enclosures

C: Kentucky Engineering Group
Elliott County Health Department
Public Service Commission
Division of Plumbing