

**CASE**

**NUMBER:**

99.239

INDEX FOR CASE: 99-239  
SOUTH ANDERSON WATER DISTRICT  
Construct, Financing

IN THE MATTER OF THE APPLICATION OF SOUTH ANDERSON WATER  
DISTRICT OF ANDERSON COUNTY, KENTUCKY, FOR A CERTIFICATE OF  
PUBLIC CONVENIENCE AND NECESSITY; AND APPROVAL OF PROPOSED  
PLAN OF FINANCING

| SEQ<br>NBR | ENTRY<br>DATE | REMARKS   |
|------------|---------------|---|
| 0001       | 06/14/99      | Application.  |
| 0002       | 06/16/99      | Acknowledgement letter.   |
| 0003       | 06/28/99      | Filing deficiencies letter; response due 7/13/99.                             |
| M0001      | 07/12/99      | SOUTH ANDERSON WD-RESPONSE TO FILING DEFCIENCIES                              |
| 0004       | 07/21/99      | Deficiencies cured letter   |
| 0005       | 08/12/99      | Final Order granting a Certificate to construct and approving financing plan. |



COMMONWEALTH OF KENTUCKY  
**PUBLIC SERVICE COMMISSION**

730 SCHENKEL LANE  
POST OFFICE BOX 615  
FRANKFORT, KY. 40602  
(502) 564-3940

CERTIFICATE OF SERVICE

RE: Case No. 99-239  
SOUTH ANDERSON WATER DISTRICT

I, Stephanie Bell, Secretary of the Public Service Commission, hereby certify that the enclosed attested copy of the Commission's Order in the above case was served upon the following by U.S. Mail on August 12, 1999.

Parties of Record:

Honorable Bob Kincer  
Chairman  
South Anderson Water District  
246 Court Street  
P. O. Box 16  
Lawrenceburg, KY. 40342

  
Secretary of the Commission

SB/hv  
Enclosure

COMMONWEALTH OF KENTUCKY  
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

THE APPLICATION OF SOUTH ANDERSON )  
WATER DISTRICT OF ANDERSON COUNTY, )  
KENTUCKY, FOR A CERTIFICATE OF PUBLIC ) CASE NO. 99-239  
CONVENIENCE AND NECESSITY; AND )  
APPROVAL OF PROPOSED PLAN OF FINANCING )

O R D E R

On July 20, 1998, South Anderson Water District ("South Anderson District") applied for a Certificate of Public Convenience and Necessity to construct a \$267,981 waterworks improvement project and for approval of its plan for financing the project. The proposed project involves the construction of 1,670 linear feet of 8-inch polyvinyl chloride ("PVC") water transmission main and appurtenances, a booster pump station and appurtenances, and a new 184,000 gallon standpipe. Project funding is a \$100,000 loan from the Lawrenceburg National Bank of Lawrenceburg, Kentucky at an interest rate of 5.5 percent for a period of 5 years and the remaining \$167,981 from internally generated funds.

The proposed project includes the construction of a booster pump station and a 184,000 gallon water storage standpipe to increase pressure in the high elevation areas along U.S. 62 and to provide more water storage for the south end of the county. Plans and specifications for the proposed improvements prepared by Kenvirons, Inc. of Frankfort, Kentucky, have been approved by the Division of Water of the Natural Resources and Environmental Protection Cabinet.

The Commission, having reviewed the evidence of record and being otherwise sufficiently advised, finds that:

1. Public convenience and necessity require that the construction proposed be performed and that a Certificate of Public Convenience and Necessity be granted.

2. The proposed construction consists of 1,670 linear feet of 8-inch ("PVC") water transmission main and appurtenances, a booster pump station and appurtenances, and a new 184,000 gallon standpipe.

3. South Anderson District should obtain approval from the Commission prior to performing any additional construction not expressly authorized by this Order.

4. Any deviation from the construction or financing plan approved should be undertaken only with the prior approval of the Commission.

5. South Anderson District should furnish documentation of the total costs of this project including the cost of construction and all other capitalized costs (engineering, legal, administrative, etc.) within 60 days of the date that construction is substantially completed. Construction costs should be classified into appropriate plant accounts in accordance with the Uniform System of Accounts for water utilities prescribed by the Commission.

6. South Anderson District should require construction to be inspected under the general supervision of a professional engineer with a Kentucky registration in civil or mechanical engineering.

7. The financing plan proposed by South Anderson District is for lawful objects within the corporate purpose of its utility operation, is necessary and appropriate for and

consistent with the proper performance of its service to the public, will not impair its ability to perform that purpose, should therefore be approved.

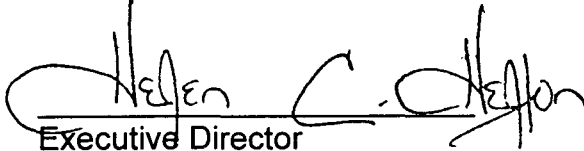
IT IS THEREFORE ORDERED that:

1. South Anderson District is granted a Certificate of Public Convenience and Necessity to proceed with the proposed construction project consisting of 1,670 linear feet of 8-inch ("PVC") water transmission main and appurtenances, a booster pump station and appurtenances, and a new 184,000 gallon standpipe.
2. South Anderson District shall comply with the requirements contained in Findings 3 through 6 as if the same were individually so ordered.
3. The financing plan proposed by South Anderson District is hereby approved.

Done at Frankfort, Kentucky, this 12th day of August, 1999.

By the Commission

ATTEST:

  
Executive Director



COMMONWEALTH OF KENTUCKY  
**PUBLIC SERVICE COMMISSION**

730 SCHENKEL LANE  
POST OFFICE BOX 615  
FRANKFORT, KY. 40602  
(502) 564-3940

July 21, 1999

Honorable Bob Kincer  
Chairman  
South Anderson Water District  
246 Court Street  
P. O. Box 16  
Lawrenceburg, KY. 40342

RE: Case No. 99-239  
SOUTH ANDERSON WATER DISTRICT

The Commission staff has reviewed your response of July 20, 1999 and has determined that your application in the above case now meets the minimum filing requirements set by our regulations. Enclosed please find a stamped filed copy of the first page of your filing. This case has been docketed and will be processed as expeditiously as possible.

If you need further information, please contact my staff at 502/564-3940.

Sincerely,

*Stephanie D. Bell*  
Stephanie Bell  
Secretary of the Commission

SB/hv  
Enclosure

COMMONWEALTH OF KENTUCKY  
BEFORE THE PUBLIC SERVICE COMMISSION

FILED

JUL 20 1999

PUBLIC SERVICE  
COMMISSION

PUBLIC SERVICE  
COMMISSION

JUN 14 1999

RECEIVED

In the Matter of:

THE APPLICATION OF SOUTH ANDERSON  
WATER DISTRICT OF ANDERSON COUNTY,  
KENTUCKY, FOR A CERTIFICATE OF PUBLIC  
CONVENIENCE AND NECESSITY; AND  
APPROVAL OF PROPOSED PLAN OF  
FINANCING )  
)  
)  
)  
)

Case No. 99-239

PETITION

This Petition of the South Anderson Water District, of Anderson County, Kentucky, respectfully states:

[1] That Petitioner is a Water District in Anderson County, Kentucky, created and existing as the result of an order of the Anderson County Court, dated May 5, 1967, signed by Judge Hollie Warford, Sr. A copy of said order is on file with the Public Service Commission. Said Water District does not include any incorporated cities.

[2] That the post office address of said District is "SOUTH ANDERSON WATER DISTRICT, P.O. Box 16, Lawrenceburg, Kentucky 40342.

[3] That, pursuant to KRS 278.020(1) and KRS 278.010(3)(d), the Petitioner seeks: (1) a "Certificate of Public Convenience and Necessity" permitting said District to construct a booster pump station, 1,670 linear feet of 8-inch PVC water transmission main and appurtenances, and a new 184,000 gallon standpipe in the vicinity of US 127/US 62; and (2) "approval of the proposed plan of financing" of said Project.

[4] That anticipated construction cost based on bids received on May 19, 1999 and total project cost is shown in Exhibit 1 of this application.

Petitioner proposes to finance the construction of this Project with a \$100,000 demand note at an estimated interest rate of 5.5% secured by existing investments. The additional funds will come from the District's existing reserve/depreciation accounts. No significant increase in operating expenses will be realized. The net revenues of the District will





COMMONWEALTH OF KENTUCKY  
**PUBLIC SERVICE COMMISSION**  
730 SCHENKEL LANE  
POST OFFICE BOX 615  
FRANKFORT, KENTUCKY 40602  
www.psc.state.ky.us  
(502) 564-3940  
Fax (502) 564-3460

**Ronald B. McCloud, Secretary**  
**Public Protection and**  
**Regulation Cabinet**

**Helen Helton**  
**Executive Director**  
**Public Service Commission**

**Paul E. Patton**  
**Governor**

June 28, 1999

Mr. Bob Kincer, Chairman  
South Anderson Water District  
246 Court Street  
P. O. Box 16  
Lawrenceburg, Kentucky 40342

Re: Case No. 99-239  
Filing Deficiencies

Dear Mr. Kincer:

The Commission staff has reviewed your application in the above case. This filing is rejected pursuant to 807 KAR 5:001, Section 2, for the reasons set forth below. These items are either required to be filed with the application or to be referenced in the application if they are already on file in another case or will be filed at a later date.

1. Filing deficiency pursuant to KRS 322.340:

At least one copy of preliminary and final engineering report must be signed, sealed, and dated by registered professional engineer.

2. Filing deficiencies pursuant to 807 KAR 5:001, Section 6:

(4) Mortgages: date of execution, name of mortgagor, name of mortgagee or trustee, amount of indebtedness secured, sinking fund provisions.

(5) Bonds: amount authorized, amount issued, name of utility who issued, description of each class issued, date of issue, date of maturity, how secured, interest paid in last fiscal year.

(6) Notes Outstanding: date of issue, amount, maturity date, rate of interest, in whose favor, interest paid in last fiscal year.



(7) Other Indebtedness: description of each class, how secured, description of any assumption of indebtedness by outside party (i.e., any transfer), interest paid in last fiscal year.

(9) Detailed income statement and balance sheet.

3. Filing deficiencies pursuant to 807 KAR 5:001, Section 9(2):

(b) Copies of franchises or permits, if any, from the proper public authority for the proposed new construction or extension, if not previously filed with the Commission.

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

(d) Three maps to suitable scale (preferably not more than two miles per inch) showing the location or route of the proposed new construction or extension, as well as the location to scale of any like facilities owned by others located anywhere within the map area with adequate identification as to the ownership of such other facilities.

(f) An estimated cost of operation after the proposed facilities are completed.

4. Filing deficiencies pursuant to 807 KAR 5:001, Section 11:

(1)(a) Description of applicant's property; statement of original cost of applicant's property and the cost to the applicant, if different.

(2)(b) Copies of all trust deeds or mortgages. If previously filed, state case number.

(2)(c) Maps and plans of property; detailed estimates by USOA account number.

The statutory time period in which the Commission must process this case will not commence until the above-mentioned information is filed with the Commission. You are requested to file six copies of this information (unless otherwise noted) within 15



Mr. Bob Kincer  
June 28, 1999  
Page 3

days of this letter. If you need further information, please contact James Rice or Scott Lawless of my staff at 502-564-3940, extension 411 or 239 respectively.

Sincerely,

*Stephanie Bell*

Stephanie Bell  
Secretary of the Commission

hv



AN EQUAL OPPORTUNITY EMPLOYER M/F/D



COMMONWEALTH OF KENTUCKY  
**PUBLIC SERVICE COMMISSION**

730 SCHENKEL LANE  
POST OFFICE BOX 615  
FRANKFORT, KY. 40602  
(502) 564-3940

June 16, 1999

Honorable Bob Kincer  
Chairman  
South Anderson Water District  
246 Court Street  
P. O. Box 16  
Lawrenceburg, KY. 40342

RE: Case No. 99-239  
SOUTH ANDERSON WATER DISTRICT  
(Construct, Financing)

This letter is to acknowledge receipt of initial application in the above case. The application was date-stamped received June 14, 1999 and has been assigned Case No. 99-239. In all future correspondence or filings in connection with this case, please reference the above case number.

If you need further assistance, please contact my staff at 502/564-3940.

Sincerely,

A handwritten signature in cursive script that reads "Stephanie Bell".

Stephanie Bell  
Secretary of the Commission

SB/jc

COMMONWEALTH OF KENTUCKY  
BEFORE THE PUBLIC SERVICE COMMISSION

FILED

JUL 20 1999

PUBLIC SERVICE  
COMMISSION

PUBLIC SERVICE  
COMMISSION

JUN 14 1999

RECEIVED

In the Matter of:

THE APPLICATION OF SOUTH ANDERSON  
WATER DISTRICT OF ANDERSON COUNTY,  
KENTUCKY, FOR A CERTIFICATE OF PUBLIC  
CONVENIENCE AND NECESSITY; AND  
APPROVAL OF PROPOSED PLAN OF  
FINANCING

Case No. 99-239

PETITION

This Petition of the South Anderson Water District, of Anderson County, Kentucky, respectfully states:

[1] That Petitioner is a Water District in Anderson County, Kentucky, created and existing as the result of an order of the Anderson County Court, dated May 5, 1967, signed by Judge Hollie Warford, Sr. A copy of said order is on file with the Public Service Commission. Said Water District does not include any incorporated cities.

[2] That the post office address of said District is "SOUTH ANDERSON WATER DISTRICT, P.O. Box 16, Lawrenceburg, Kentucky 40342.

[3] That, pursuant to KRS 278.020(1) and KRS 278.010(3)(d), the Petitioner seeks: (1) a "Certificate of Public Convenience and Necessity" permitting said District to construct a booster pump station, 1,670 linear feet of 8-inch PVC water transmission main and appurtenances, and a new 184,000 gallon standpipe in the vicinity of US 127/US 62; and (2) "approval of the proposed plan of financing" of said Project.

[4] That anticipated construction cost based on bids received on May 19, 1999 and total project cost is shown in Exhibit 1 of this application.

Petitioner proposes to finance the construction of this Project with a \$100,000 demand note at an estimated interest rate of 5.5% secured by existing investments. The additional funds will come from the District's existing reserve/depreciation accounts. No significant increase in operating expenses will be realized. The net revenues of the District will

support the demand note interest. An adjustment of rates is not requested at this time. A rate adjustment will be included in a pending Rural Development/CDBG funded extension project. A brief summary of the District's cash flow is given in Exhibit 2.

[5] That Petitioner has observed the appropriate legal procedure in employing Kenvirons, Inc., Consulting Engineers, 452 Versailles Road, Frankfort, Kentucky, 40601, to prepare the appropriate documents for the construction of the proposed Project, and in employing Local Counsel in connection with the proceedings required by the Public Service Commission.

[6] That low pressures are presently being experienced in the high elevation areas along US Highway 62 and additional water is needed in the south end of the county. The pending construction will increase the pressures at the higher elevations and allow additional water to be pumped into the south end of the county. Approval of the Public Service Commission is urgently needed in order to enable the District to begin construction. Further explanation of the need for the construction is given in Exhibit 3.

[7] That the District has been obtaining and will continue to obtain its water supply from the City of Lawrenceburg, in Anderson County, Kentucky, pursuant to the existing Water Purchase Contract.

[8] That the foregoing constitute the proceedings of the Petitioner plus other pertinent data with reference to the proposed Project. Prior to any hearing in this matter, the District will furnish to the Commission any further proceedings pertaining to said Project, to the extent that same are available.



**EXHIBIT 1**

**SOUTH ANDERSON WATER DISTRICT  
LAWRENCEBURG, ANDERSON COUNTY, KENTUCKY**

**PROJECT COST ESTIMATE**

**1. CONSTRUCTION**

|   |                  |
|---|------------------|
| A. Contract 5 - 184,000 Gallon Standpipe .....  | \$ 149,591.00    |
| B. Contract 6 - BPS and Transmission Line ..... | <u>68,390.00</u> |

|                       |               |
|-----------------------|---------------|
| <i>Subtotal</i> ..... | \$ 217,981.00 |
|-----------------------|---------------|

**2. ENGINEERING**

|                                  |                  |
|----------------------------------|------------------|
| A. Design.....                   | \$ 24,000.00     |
| B. Construction Observation..... | <u>16,000.00</u> |

|                       |              |
|-----------------------|--------------|
| <i>Subtotal</i> ..... | \$ 40,000.00 |
|-----------------------|--------------|

|                             |                     |
|-----------------------------|---------------------|
| <b>3. CONTINGENCY .....</b> | <b>\$ 10,000.00</b> |
|-----------------------------|---------------------|

|                    |                      |
|--------------------|----------------------|
| <b>TOTAL .....</b> | <b>\$ 267,981.00</b> |
|--------------------|----------------------|



**EXHIBIT I****SOUTH ANDERSON WATER DISTRICT  
LAWRENCEBURG, ANDERSON COUNTY, KENTUCKY****PROJECT COST ESTIMATE****1. CONSTRUCTION**

A. Contract 5 - 184,000 Gallon Standpipe..... \$ 149,591.00  
B. Contract 6 - BPS and Transmission Line ..... 68,390.00

*Subtotal* ..... \$ 217,981.00

**2. ENGINEERING**

B. Design ..... \$ 24,000.00  
C. Construction Observation..... 16,000.00

*Subtotal* ..... \$ 40,000.00

**3. CONTINGENCY**..... \$ 10,000.00

**TOTAL**..... \$ 267,981.00

**EXHIBIT 2****SOUTH ANDERSON WATER DISTRICT  
CONTRACTS 5 AND 6****CASH FLOW SUMMARY  
(PERIOD: JAN. - DEC., 1998)**

|   |                  |
|---|------------------|
| 1. Operating Income .....                   | \$ 469,427.00    |
| 2. Operating and Maintenance Expenses ..... | 372,969.00       |
| 3. Existing Long Term Debt Service .....    | 119,023.00       |
| 4. Proposed Loan Debt Service* .....        | <u>23,418.00</u> |

Amount Left for Depreciation and Coverage ..... \$ (45,983.00) \*\*

**CASH FLOW SUMMARY  
(PERIOD: JAN. - DEC., 1997)**

|   |                  |
|---|------------------|
| 1. Operating Income .....                   | \$ 459,746.00    |
| 2. Operating and Maintenance Expenses ..... | 310,081.00       |
| 3. Existing Long Term Debt Service .....    | 117,417.00       |
| 4. Proposed Loan Debt Service* .....        | <u>23,418.00</u> |

Amount Left for Depreciation and Coverage ..... \$ 8,830.00

\*5.5% with 5 year payback period.

\*\*The District's contractual services expenses were much higher than normal in 1998 due to a three (3) year legal battle on which the lead attorney did not invoice the District until the conclusion of the case.

**EXHIBIT 3****SOUTH ANDERSON WATER DISTRICT  
CONTRACTS 5 AND 6****PROJECT NARRATIVE**

The South Anderson Water District (SAWD) primarily serves water to the rural areas of Anderson County south and west of the City of Lawrenceburg. SAWD currently purchases all of the water it distributes from the City of Lawrenceburg, with most of the water being purchased through two master meters located near the intersection of the US 127 Bypass and US 62. The water is primarily fed to the master meters from the City's elevated storage tank located on the east side of the US 127 Bypass near the Anderson County High School. The master meter on US 62 feeds water west along US 62 to the bulk of the District's customers. SAWD's facilities in this area include two standpipes, a booster pump station and a solenoid valve which controls the flow of water from one standpipe to the other. As the customer base in this area has grown through extensions and development over the last few years pressure and volume problems have developed.

Last summer when the water usage jumped due to the hot, dry weather, the booster pump station was not able to maintain the required water levels in the tanks resulting in the temporary shutdown of a bulk loading station the District operates in the area. This summer the problem is expected to be at least as bad if not worse.

The problems are due to the outdated capacity of the existing booster pump station which cannot be corrected on its own because of the minimal pressure provided by the City's system. If the capacity of the booster pump station is increased significantly with no other improvements, unacceptably low pressures will develop at the higher elevations along the transmission main and spur distribution lines between the master meter and the booster pump station. Therefore, the pressure must be increased to the District's system.

The overflow elevation on the City of Lawrenceburg's tank is 922.5. The overflow elevation on the District's proposed standpipe is 995.0. This will potentially add 31 plus psi to the District's system. As the water level in the proposed standpipe will undoubtedly fluctuate more than that in the City's elevated tank the anticipated normal increase is more in the range of 24-25 psi. This increase on the suction side of the booster pump station will increase its capacity enough to serve the area without further modifications at this time.

The proposed standpipe will also allow the District to serve some areas within its boundary in the vicinity of the US 62/US 127 Bypass that are currently being prepared for development. Due to the elevations this area cannot be served off the City's existing tank as the peak ground elevations are less than 35 feet below the overflow elevation of the City's tank.

The proposed facilities consist of a 184,000 gallon standpipe, a 450 gpm nominal capacity booster pump station, and approximately 1,670 feet of 8" transmission line to connect the

standpipe to the District's existing system. The booster pump station will be located just downstream from the master meter on US 62.



# Lawrenceburg National Bank

Exhibit 4

CHARLES L. CAMMACK  
PRESIDENT & CEO

Main Office 128 S. Main Street (502) 839-2600  
Branch Office West Park Shopping Center (502) 839-2626  
Lawrenceburg, Kentucky 40342  
Fax No. (502) 839-2616

MEMBER  
FDIC

May 25, 1999

Mr. Alton Warford, Manager  
South Anderson Water District  
P.O. Box 16, 246 Court Street  
Lawrenceburg, KY 40342

Dear Mr. Warford:

This is to confirm a conversation that we had earlier concerning a loan up to \$100,000.00 for the purpose of constructing a new water tank for South Anderson Water District on the west side of Highway 127. We can approve this loan with a rate of 5.50% based on the fact that it will be a municipal loan to the bank. As we had talked earlier, there are certain authorizations and financial information that I will need for our files.

If you have any questions concerning this, please do not hesitate to contact me.

Yours very truly,

Charles L. Cammack  
CEO & President

CLC:srg

|                   |            |         |              |            |   |
|-------------------|------------|---------|--------------|------------|---|
| Post-It® Fax Note | 7871       | Date    | 5-26         | # of pages | 1 |
| To                | KEN TAYLOR | From    | ALTON        |            |   |
| Co./Dept.         | KENVIRONS  | Co.     | SAWD         |            |   |
| Phone #           |            | Phone # | 502 839 6919 |            |   |
| Fax #             |            | Fax #   | 89 0424      |            |   |

**SOUTH ANDERSON WATER DISTRICT  
P.O. Box 16  
LAWRENCEBURG, KENTUCKY 40342**

July 9, 1999

Ms. Stephanie Bell  
Secretary of the Commission  
Kentucky Public Service Commission  
P.O. Box 615  
Frankfort, Kentucky 40602

**RECEIVED**

JUL 12 1999

PUBLIC SERVICE  
COMMISSION

RE: Case No. 99-239

Dear Ms. Bell:

The following is offered in response to your June 28, 1999 list of deficiencies in our initial application in the above referenced case.

1. Filing deficiency pursuant to KRS 322.340:

As this project is to be funded by monies we have in-hand and a short-term loan from our local bank, we did not have the engineer prepare either a formal preliminary or final engineering report. Please accept the following three items as the preliminary and final engineering reports.

Attachment 1 – March 25, 1999 letter form Mr. Ken D. Taylor, P.E. stating the need for the tank and booster pump station.

Attachment 2 – Signed, sealed and dated copy of the project narrative (Exhibit 3) from the original submittal.

Attachment 3 – July 6, 1999 letter form Mr. Kenneth D. Taylor, P.E. recommending that the contracts be awarded to the respective low bidders if the anticipated funding is in place, which it is.

2. Filing deficiencies pursuant to 807 KAR 5:001, Section 6:

(4) Mortgages: None of the District's facilities are mortgaged.

(5) Bonds: See PSC Case 99-134 and the 1998 audit attached thereto and the District's Annual Reports for 1998 and 1997 which are on file with the

Commission. All of the pertinent information on the bonds is contained in these items. The Annual Reports are incorporated herein by reference.

(6) Notes outstanding: The District has no outstanding notes.

(7) Other indebtedness: The District has no other indebtedness.

(9) Detailed income statement and balance sheet: The 1998 audit report of the District referred to above and on file with the Commission in Case No. 99-134 is sufficient to partially satisfy the requirements of this section. The remaining financial schedules and other information necessary for the Financial Exhibit required by 807 DAR 5:001, Section 6 are contained in the 1998 Annual Report which is on file with the Commission and incorporated herein by reference. The District hereby requests and moves for a deviation, pursuant to 807 KAR 5:001, Section 14, from the requirements of 807 KAR 5:001, Section 6, which requires that the financial data filed with the Application be for a twelve (12) month period ending within ninety (90) days of the filing of the Application. The District states that the only changes material in nature to the financial condition or operation of the District since December 31, 1998 are the refunding of the 1988 Series A and B bonds through the issuance of Refunding Revenue Bonds, Series 199A (see Case 99-134) and the addition of approximately 35 new customers on our existing system. Both of these occurrences strengthen the financial condition of the District. The financial data referenced with this application is for the twelve (12) month period ending December 31, 1998. This is the most recent published financial data available. Because of the dire need for this tank and booster pump station at the earliest possible date, the District cannot delay the project while more current financial data is compiled.

3. Filing deficiencies pursuant to 807 KAR 5:001, Section 9(2):

(b) Copies of franchises or permits: The only franchise or permit (approval) required for the construction was received from the Kentucky Division of Water on April 16, 1999. A copy of the approval letter is attached as Attachment 4.

(c) Description: The proposed locations of the booster pump station and tank and the route of the transmission main between the two are fully given in the plans and specifications included herein as Attachments 5 and 6. The manner of construction is also fully described. The proposed construction is intended to only serve customers within the District's boundary and will not compete with any other public utilities, corporations or persons.

(d) Maps: A suitable map (3 copies) is included as Attachment 7.

(f) Estimated operation cost: The estimated additional cost of operation of the proposed facilities is approximately \$300.00 per month or \$3,600.00 per year.



4. Filing deficiencies pursuant to 807 KAR 5:001, Section 11:

(1)(a) Applicant's property: The District's property is fully described in the 1998 Annual Report previously incorporated by reference.

(2)(b) Trust Deeds or Mortgages: The District has no trust deeds or mortgages.

(2)(c) Maps and Plans of Property: The plans and specifications for the proposed project are included herein as Attachments 5 and 6. The project cost estimate is included as Attachment 8.

Should you have any questions, please contact either our Manager, Alton Warford, or our engineer, Ken Taylor, P.E. with Kenvirons, Inc. at (502) 695-4357.

Sincerely,



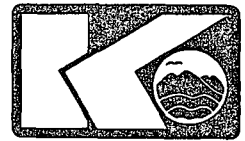
Bob Kincer  
Chairman

Attachments

Cc: Ray Edelman, Attorney-at-Law  
Kenneth D. Taylor, P.E., Associate, Kenvirons, Inc.

BK/jb

Attachment 1



KENVIRONS

Kenvirons, Inc.

452 Versailles Road • Frankfort, KY 40601 • Phone: (502) 695-4357 • Fax: (502) 695-4363

Civil & Environmental Engineering and Laboratory Services

March 25, 1999

Mr. Bob Kincer, Chairman  
South Anderson Water District  
P.O. Box 16  
Lawrenceburg, Kentucky 40342

RE: Witherspoon - Rouff Tank and Post Office  
Booster Pump Station Project

Dear Mr. Kincer:

Attached for your information is a current Revised Estimate of Probable Project Costs on the above referenced project excluding the cost of the property, legal fees and interest. This tank and associated booster pump station are necessary to maintain the service on the existing lines in the south end of the county as additional customers connect to them and if the District extends service along currently unserved roads in the area.

Last summer when water usage jumped due to the hot, dry weather, the existing US 62 booster pump station barely maintained the required water levels in the Goshen and US 62 tanks which it serves. By increasing the pressure on the suction side of the booster pump station it will pump a larger volume of water. This cannot be accomplished simply by putting in larger pumps. The increased flow through the mains will also result in a larger pressure loss due to friction in the lines. This would make the pressure concerns which currently exist in the higher portions of Bob-O-Link Estates and along US 62 even worse. The increased pressure resulting from the higher elevation of the water level in the proposed tank will eliminate these concerns.

The new tank will also make it possible to boost the pressures along Wildcat Road and allow service to the higher elevations in the area around the proposed tank site when it develops.

The cost of the property, and current legal fee should be available in the District's files if you need them. The amount of interest to be charged will depend on the type of loan secured.

March 25, 1999  
Page 2



If you have any questions or need additional information, please call.

Sincerely,

Ken D. Taylor, P.E.  
Associate

KDT/pw

Attachment

**ESTIMATED CONSTRUCTION COSTS  
SOUTH ANDERSON WATER DISTRICT  
POST OFFICE BOOSTER PUMP STATION  
AND  
TRANSMISSION LINE**

**CONTRACT 6**

|   | Quantity              | Unit | Unit price  | Price              |
|---|-----------------------|------|-------------|--------------------|
| 1. Booster Pump Station and Appurtenances | 1                     | L.S. | \$60,000.00 | \$60,000.00        |
| 2. 8" x 8" Wet Tap                        | 1                     | L.S. | \$1,400.00  | \$1,400.00         |
| 3. 8" SDR-21 PVC Water Line               | 1,670                 | L.F. | \$7.50      | \$12,525.00        |
| 4. ¾" PE Sensing Line                     | 2,000                 | L.F. | \$0.75      | \$1,500.00         |
| 5. Air Release Valve                      | 2                     | EA   | \$300.00    | \$600.00           |
| 6. 8" Gate Valve                          | 1                     | EA   | \$500.00    | \$500.00           |
| 7. 8" Blow-off Assembly                   | 1                     | EA   | \$700.00    | \$700.00           |
|   | <b>Total Estimate</b> |      |             | <b>\$77,225.00</b> |

**WITHERSPOON-ROUTT WATER STORAGE TANK**

**CONTRACT 7**

|   |                       |      |              |                     |
|---|-----------------------|------|--------------|---------------------|
| 1. 184,000 Gallon Standpipe and Appurtenances | 1                     | L.S. | \$150,000.00 | <u>\$150,000.00</u> |
|   | <b>Total Estimate</b> |      |              | <b>\$150,000.00</b> |

**REVISED ESTIMATE OF PROBABLE PROJECT COSTS**

**WITHERSPOON-ROUTT TANK  
AND  
POST OFFICE BOOSTER PUMP STATION**

|   |                     |
|---|---------------------|
| Contract 5 – Standpipe.....                   | \$150,000.00        |
| Contract 6 – Booster Pump Station & Line..... | 77,225.00           |
| Engineering.....                              | 24,880.00           |
| Construction Observation.....                 | 20,335.00           |
| Geotechnical Report, Surveying, etc.....      | 6,000.00            |
| Contingency.....                              | <u>\$21,560.00</u>  |
| <b>TOTAL ESTIMATE</b>                         | <b>\$300,000.00</b> |

Note: This estimate does not include the cost of the property, legal fees or interest.

# Attachment 2

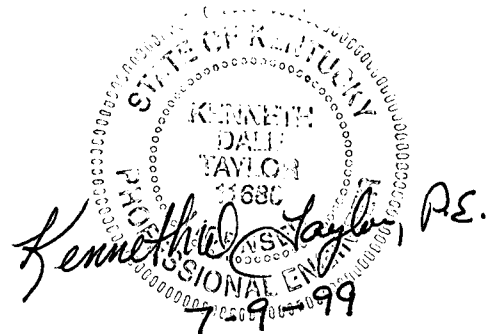
## EXHIBIT 3

### SOUTH ANDERSON WATER DISTRICT CONTRACTS 5 AND 6

#### PROJECT NARRATIVE

The South Anderson Water District (SAWD) primarily serves water to the rural areas of Anderson County south and west of the City of Lawrenceburg. SAWD currently purchases all of the water it distributes from the City of Lawrenceburg, with most of the water being purchased through two master meters located near the intersection of the US 127 Bypass and US 62. The water is primarily fed to the master meters from the City's elevated storage tank located on the east side of the US 127 Bypass near the Anderson County High School. The master meter on US 62 feeds water west along US 62 to the bulk of the District's customers. SAWD's facilities in this area include two standpipes, a booster pump station and a solenoid valve which controls the flow of water from one standpipe to the other. As the customer base in this area has grown through extensions and development over the last few years pressure and volume problems have developed.

Last summer when the water usage jumped due to the hot, dry weather, the booster pump station was not able to maintain the required water levels in the tanks resulting in the temporary shutdown of a bulk loading station the District operates in the area. This summer the problem is expected to be at least as bad if not worse.

  
Kenneth Dale Taylor, P.E.

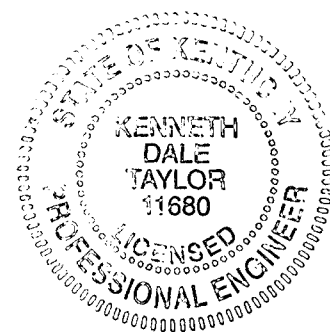
The problems are due to the outdated capacity of the existing booster pump station which cannot be corrected on its own because of the minimal pressure provided by the City's system. If the capacity of the booster pump station is increased significantly with no other improvements, unacceptably low pressures will develop at the higher elevations along the transmission main and spur distribution lines between the master meter and the booster pump station. Therefore, the pressure must be increased to the District's system.

The overflow elevation on the City of Lawrenceburg's tank is 922.5. The overflow elevation on the District's proposed standpipe is 995.0. This will potentially add 31 plus psi to the District's system. As the water level in the proposed standpipe will undoubtedly fluctuate more than that in the City's elevated tank the anticipated normal increase is more in the range of 24-25 psi. This increase on the suction side of the booster pump station will increase its capacity enough to serve the area without further modifications at this time.

The proposed standpipe will also allow the District to serve some areas within its boundary in the vicinity of the US 62/US 127 Bypass that are currently being prepared for development. Due to the elevations this area cannot be served off the City's existing tank as the peak ground elevations are less than 35 feet below the overflow elevation of the City's tank.

The proposed facilities consist of a 184,000 gallon standpipe, a 450 gpm nominal capacity booster pump station, and approximately 1,670 feet of 8" transmission line to connect the

standpipe to the District's existing system. The booster pump station will be located just downstream from the master meter on US 62.





Attachment 3



KENVIRONS

Kenvirons, Inc.

452 Versailles Road • Frankfort, KY 40601 • Phone: (502) 695-4357 • Fax: (502) 695-4363  
Civil & Environmental Engineering and Laboratory Services

July 6, 1999

Mr. Bob Kincer, Chairman  
South Anderson Water District  
P.O. Box 16  
Lawrenceburg, Kentucky 40342

RE: Contract 5: Witherspoon-Rouff Water Storage Tank  
Contract 6: Post Office Booster Pump Station and  
Transmission Line

Dear Mr. Kincer:

Kenvirons, Inc. has worked with each of the low bidders on the above referenced contracts and feel they are both capable of performing the required work. Both bids are within our estimate. Therefore, if the anticipated funding is available, we recommend that Contract 5 be awarded to Kentucky Glass Lined Tank Systems, Inc. for the amount of \$149,591.00 and Contract 6 be awarded to Clay Pipeline, Inc. for the amount of \$68,390.00.

Should you have any questions, please call.

Sincerely,

*Kenneth D. Taylor, P.E.*  
Kenneth D. Taylor, P.E.  
Associate

KDT/jb

Attachment 4

KENVIRONS, Inc.

JAMES E. BICKFORD  
SECRETARY



PAUL E. PATTON  
GOVERNOR

COMMONWEALTH OF KENTUCKY  
**NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET**  
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

FRANKFORT OFFICE PARK  
14 REILLY RD  
FRANKFORT KY 40601

April 16, 1999

RECEIVED

APR 22 1999

South Anderson Water District  
246 Court Street  
Lawrenceburg, Kentucky 40342

KENVIRONS, INC.

RE: DW #0030660-99-001  
Water System Improvements  
Contract 5 & 6  
Anderson County, Kentucky

Dear Sirs:

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. If PVC piping is used, it must be NSF approved and manufactured in accordance with ASTM standards.
2. Upon completion of construction, disinfection shall be strictly in accordance with the procedure designated in the State Regulations, which reads as follows:

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



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An Equal Opportunity Employer M/F/D

New or repaired water distribution lines shall not be placed into service until bacteriological samples taken at the points specified in 401 KAR 8:150 Section 4 (2) are examined and are shown to be negative following disinfection.

3. An alternate acceptable method for storage tank disinfection is as follows:

Fill tank with enough water (containing a free chlorine concentration of at least 250 mg/l) to spray all inside tank surfaces with the chlorinated water. Repeat the spraying again at no less than 1.0 hour from the end of the first spraying. Drain the tank at no less than 30 minutes from end of second spraying before filling for use.

4. The interior coating system for the proposed storage tank must be of a type approved by the Division of Water for use in contact with potable water.
5. A minimum pressure of 30 psi must be available on the discharge side of all meters.
6. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sewer. A sewer is defined as any conduit conveying fluids other than potable water. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot separation, this office may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. This deviation will not be allowed for force mains.

Contract 5 & 6  
April 16, 1999  
Page three

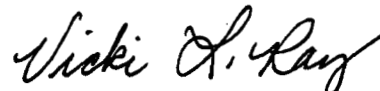
Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossings, one full length of the water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.

7. The proposed standpipe's inlet pipe elevation shall be placed at or near the "pump-on" set point selected for normal operating conditions.
8. When this project is completed, the owner shall submit a written certification to the Division of Water that the above referenced water supply facilities have been constructed and tested in accordance with the approved plans and specifications and the above stipulations. Such certification shall be signed by a registered professional engineer.

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 approvals, permits or licenses required by this Cabinet and other state, federal and local agencies.

Unless construction of this project is begun within one year from the date of approval, the approval shall expire. If you have any questions concerning this project, please contact Bob Arnett, PE at 502/564-2225, extension 578.

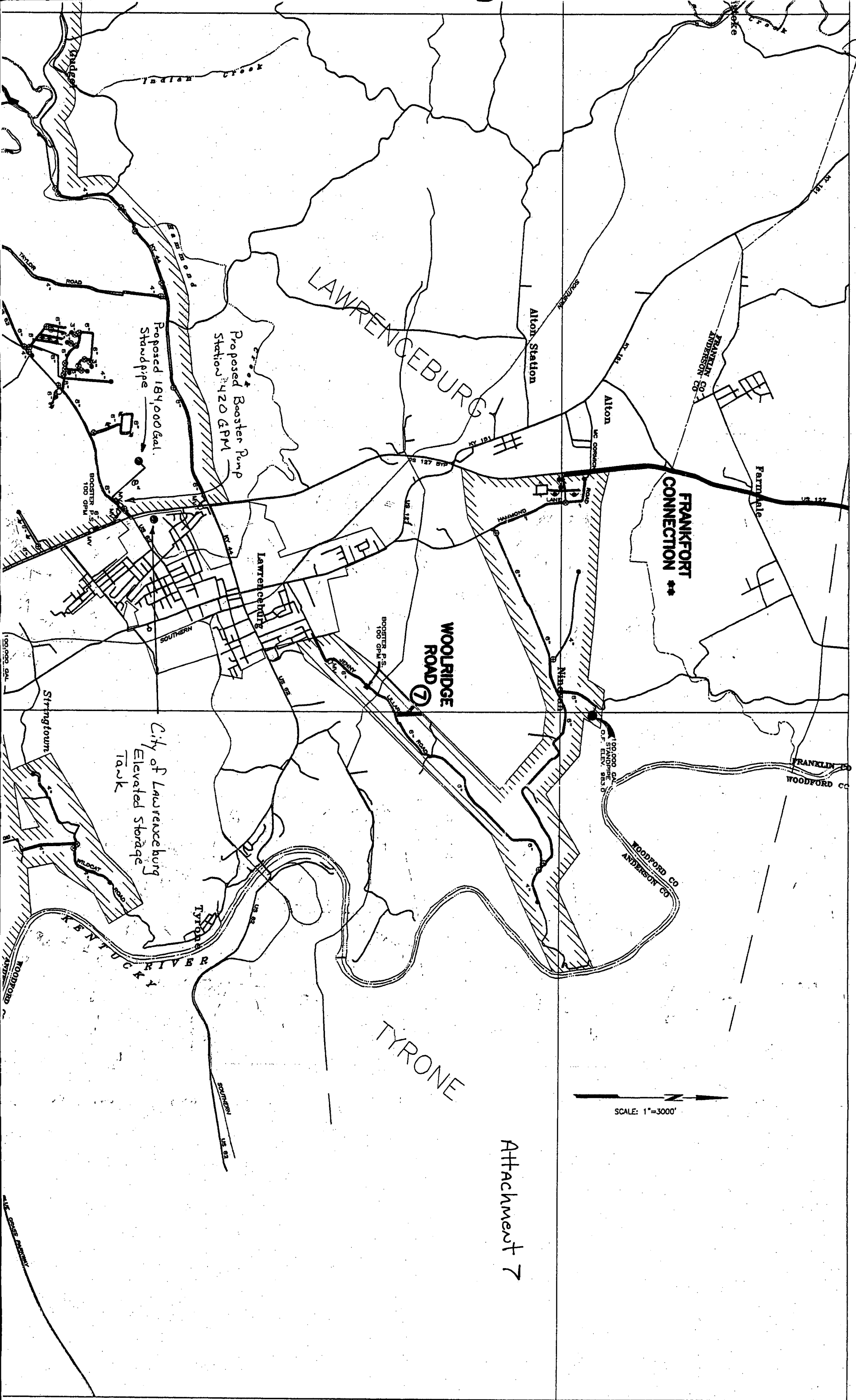
Sincerely,



Vicki L. Ray, Branch Manager  
Drinking Water Branch  
Division of Water

VLR:RNA:lm

Enclosures



SCALE: 1"=3000'

Attachment 7

ATTACHMENT 8

ESTIMATE OF PROBABLE PROJECT COSTS

SOUTH ANDERSON WATER DISTRICT

WITHERSPOON-ROUTT WATER STORAGE TANK  
AND  
POST OFFICE BOOSTER PUMP STATION PROJECT

| ACC'T | DESCRIPTION   | CONSTRUCTION/<br>PURCHASE | DESIGN/<br>INSPECTION | SURVEYING/<br>GEOTECH | LEGAL     | TOTAL                    |
|-------|---|---------------------------|-----------------------|-----------------------|-----------|--------------------------|
| 303   | LAND AND LAND RIGHTS                                  | \$ 27,500.                |                       |                       |           | \$ 27,500.               |
| 311   | PUMPING EQUIPMENT                                     | \$ 42,250.                | \$ 7,760.             |                       | \$ 500.   | \$ 50,510.               |
| 330   | DISTRIBUTION RESER/<br>AND STANDPIPES                 | \$ 149,591.               | \$ 27,440.            | \$ 6,000.             | \$ 2,000. | \$185,031.               |
| 331   | TRANSMISSION AND<br>DISTRIBUTION MAINS<br>CONTINGENCY | \$ 26,140.                | \$ 4,800.             |                       | \$ 500.   | \$ 31,440.<br>\$ 10,000. |
|       |   |                           |                       |                       | TOTAL     | \$ 304,481.              |

# Attachment 5

## TECHNICAL SPECIFICATIONS WATER DISTRIBUTION SYSTEM IMPROVEMENTS



KENVIRONS

*for*

**SOUTH ANDERSON WATER DISTRICT**

RECEIVED

JUL 17 1999

PUBLIC SERVICE  
COMMISSION

**CONTRACT 5: WITHERSPOON – ROUTT WATER STORAGE TANK  
184,000 GALLONS STANDPIPE**

*Prepared By:*

**KENVIRONS, INC.  
452 VERSAILLES ROAD  
FRANKFORT, KENTUCKY 40601**

**PROJECT NO. 97185**

**Kenvirons, Inc.**

**MARCH, 1999**

*Civil & Environmental Engineering and Laboratory Services*

**TECHNICAL SPECIFICATIONS  
WATER DISTRIBUTION SYSTEM IMPROVEMENTS**

*for*

**SOUTH ANDERSON WATER DISTRICT**

**RECEIVED**

**JUL 12 1999**

**PUBLIC SERVICE  
COMMISSION**

**CONTRACT 5: WITHERSPOON – ROUTT WATER STORAGE  
TANK 184,000 GALLONS STANDPIPE**

*Prepared By:*

**KENVIRONS, INC.  
452 VERSAILLES ROAD  
FRANKFORT, KENTUCKY 40601**

**PROJECT NO. 97185**

**MARCH, 1999**

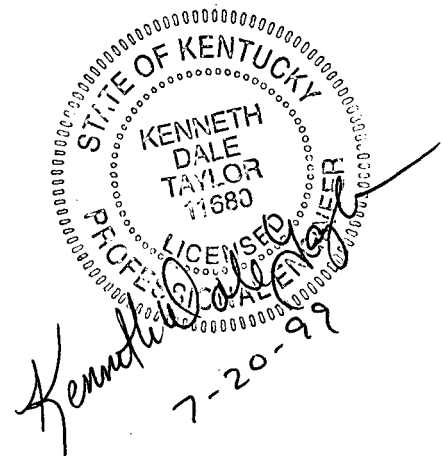




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**BID DOCUMENTS**

## ADVERTISEMENT FOR BIDS

Separate Sealed BIDS for the construction of **Contract 5: Witherspoon – Rount Water Storage Tank, 184,000 Gallons Standpipe** will be received by the Water District, at 246 Court Street, P.O. Box 16, Lawrenceburg, Kentucky 40342 until 2:00 p.m. local time on May 19, 1999, and then at said office publicly opened and read aloud. The project will consist of the construction of a glass lined steel standpipe with a nominal height of 112 feet and a nominal diameter of 17 feet.

The CONTRACT DOCUMENTS may be examined at the following locations:

SOUTH ANDERSON WATER DISTRICT, 246 COURT STREET, LAWRENCEBURG, KY 40342  
KENVIRONS, INC., 452 VERSAILLES ROAD, FRANKFORT, KY 40602

Copies of the CONTRACT DOCUMENTS may be obtained at Kenvirons, Inc., 452 Versailles Road, Frankfort, Kentucky 40601, upon payment to Kenvirons, Inc. of \$25.00 for each non-refundable set.

The OWNER reserves the right to waive any informalities or to reject any and all bids. Any bid that is obviously unbalanced may be rejected.

All proposals shall be made on the forms furnished by the Engineer. Each BIDDER must deposit with his BID, security in the amount, form and subject to the conditions provided in the Information for Bidders. The BIDDER awarded the Contract shall execute a 100% Performance Bond and a 100% Payment Bond and shall furnish insurance as required by the General Conditions. CONTRACT shall be completed within 90 calendar days after authorization to start work. Liquidated damages will be \$300.00 per calendar day.

Federal law prohibits discrimination on the grounds of race, color, national origin, religion, age, handicap, and sex in this project. Minority contractors are encouraged to bid the project. Prime contractors are encouraged to use minority subcontractors.

No BIDDER may withdraw his bid within 90 days after the actual date of the opening thereof.

\_\_\_\_\_  
May 4, 1999

Date

\_\_\_\_\_  
Bob Kincer, Chairman  
South Anderson Water District

## INFORMATION FOR BIDDERS

BIDS will be received by the South Anderson Water District (herein called the "OWNER"), at 246 Court Street, P.O. Box 16, Lawrenceburg, Kentucky 40342, until 2:00 p.m. local time, May 19, 1999, and then at said building publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to the South Anderson Water District at P.O. Box 16, Lawrenceburg, Kentucky 40342. Each sealed envelope containing a BID must be plainly marked on the outside as BID for South Anderson Water District, Contract 5: Witherspoon – Routt Water Storage Tank and the envelope should bear on the outside the BIDDER'S name, address and license number if applicable, and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER, South Anderson Water District, P.O. Box 16, Lawrenceburg, Kentucky 40342.

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. Only one copy of the BID form is required.

The OWNER may waive any 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. No BIDDER may withdraw a BID within 90 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves on the accuracy of the estimated quantities in the BID schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve the CONTRACTOR from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a BID BOND payable to the OWNER for five percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed, the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the PAYMENT BOND and PERFORMANCE BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A PERFORMANCE BOND and a PAYMENT BOND each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

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.

The party 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 when the NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall 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.

The OWNER within ten (10) days of receipt of acceptable PERFORMANCE BOND, PAYMENT BOND and AGREEMENT signed by the party 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.

The NOTICE TO PROCEED shall be issued within ten (10) 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 ten (10) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the AGREEMENT without further liability on the part of either party.

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 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 contemplated herein.

A conditional or qualified BID will not be accepted.

Award will be made to the lowest responsible BIDDER.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to its BID.

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provisions of the equal opportunity clause set forth in the SUPPLEMENTAL GENERAL CONDITIONS.

The low BIDDER shall supply the names and addresses of the major material SUPPLIERS and SUBCONTRACTORS when required to do so by the OWNER.

A pre-bid inspection trip has not been scheduled for this contract.

The ENGINEER is Kenvirons, Inc. The ENGINEER'S address is 452 Versailles Road, Frankfort, Kentucky 40601.

**BID**

Proposal of \_\_\_\_\_ (hereinafter called "BIDDER"),  
organized and existing under the laws of the State of \_\_\_\_\_  
doing business as \_\_\_\_\_\*.

To the South Anderson Water District (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of CONTRACT 5: WITHERSPOON – ROUTT WATER STORAGE TANK in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

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

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within 90 consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of \$300.00 for each consecutive calendar day thereafter as provided in Section 15 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

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

\*Insert "a corporation", "a partnership", or "an individual" as applicable.





Respectfully submitted,

\_\_\_\_\_  
Signature Address

\_\_\_\_\_  
Title Phone

Employer Identification No. \_\_\_\_\_  
SEAL - (if BID is by a Corporation) Date

**BID BOND**

NOW, ALL MEN BY THESE PRESENTS, that we, the undersigned, \_\_\_\_\_ as Principal, and \_\_\_\_\_ as Surety, are hereby held and firmly bound unto South Anderson Water District 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 \_\_\_\_\_, 19\_\_\_\_\_. 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 the Construction of Contract 5: WITHERSPOON - ROUTT WATER STORAGE TANK, 184,000 GALLONS STANDPIPE.

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 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.

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.

**BID BOND**

NOW, ALL MEN BY THESE PRESENTS, that we, the undersigned, \_\_\_\_\_ as Principal, and \_\_\_\_\_ as Surety, are hereby held and firmly bound unto South Anderson Water District 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 \_\_\_\_\_, 19\_\_\_\_\_. 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 the Construction of Contract 5: WITHERSPOON - ROUTT WATER STORAGE TANK, 184,000 GALLONS STANDPIPE.

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- (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 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.

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.

\_\_\_\_\_(L.S.)  
Principal

\_\_\_\_\_  
Surety

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

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

**Notice of Award**

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PROJECT Description:** Contract 5; Witherspoon – Routt Water Storage Tank, 184,000 Gallons Standpipe.

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated May 4, 1999, and Information for Bidders.

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

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

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

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

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 1999.

Owner

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

**Acceptance Of Notice**

Receipt of the above NOTICE OF AWARD is hereby acknowledged by \_\_\_\_\_  
\_\_\_\_\_ this the \_\_\_\_\_ day of \_\_\_\_\_, 1999.

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

## AGREEMENT

THIS AGREEMENT, made this \_\_\_\_ day of \_\_\_\_\_, 1999, by and between South Anderson Water District, hereinafter called "OWNER" and \_\_\_\_\_ doing business as a \_\_\_\_\_ hereinafter called "CONTRACTOR". WITNESSETH: That for and in consideration of the payments and agreements herein after mentioned:

1. The CONTRACTOR will commence and complete the construction of Contract 5; WITHERSPOON - ROUTT WATER STORAGE TANK, 184,000 GALLONS STANDPIPE.

2. The CONTRACTOR will furnish all of the materials, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the PROJECT described herein.

3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS within 10 calendar days after the date of the NOTICE TO PROCEED and will complete the same within 90 calendar days unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.

4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of \$\_\_\_\_\_ based on bid contract quantities at the unit prices shown in the BID schedule.

5. The term "CONTRACT DOCUMENTS" means and includes the following:

- A) Advertisement for BIDS
- B) Information for BIDDERS
- C) BID
- D) BID BOND
- E) Agreement
- F) General Conditions

G) SUPPLEMENTAL GENERAL CONDITIONS

H) Payment BOND

I) Performance BOND

J) NOTICE OF AWARD

K) NOTICE TO PROCEED

L) CHANGE ORDER FORM

M) DRAWINGS prepared by Kenvirons, Inc. dated March, 1999

N) SPECIFICATIONS prepared or issued by Kenvirons, Inc., dated March, 1999.

O) ADDENDA:

No. \_\_\_\_\_, dated: \_\_\_\_\_

No. \_\_\_\_\_, dated: \_\_\_\_\_

6. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized official, this Agreement in 4 copies each of which shall be deemed an original on the date first above written.



OWNER:

SOUTH ANDERSON WATER DISTRICT

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

Employer Identification  
Number \_\_\_\_\_

(SEAL)

ATTEST:

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

Secretary

CONTRACTOR:

\_\_\_\_\_

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

Employer Identification  
Number \_\_\_\_\_

(SEAL)

ATTEST:

**PAYMENT BOND**

KNOW ALL PERSONS BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called  
(Corporation, Partnership or Individual)

Principal, and \_\_\_\_\_,  
(Name of Surety)

hereinafter called SURETY, are held and firmly bound unto the South Anderson Water District, hereinafter called OWNER, and unto all persons, firms, and corporations who or which may furnish labor or who furnish materials to perform as described under the contract and to their successors and assigns in the total aggregate penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the PRINCIPAL entered into a certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, a copy of which is hereto attached and made a part hereof for the construction of \_\_\_\_\_

NOW, THEREFORE, if the PRINCIPAL shall promptly make payment to all persons, firms, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extensions or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and for all labor cost incurred in such WORK including that by a SUBCONTRACTOR, and to any mechanic or materialman lienholder whether it acquires its lien by operation of State or Federal law; then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, that beneficiaries or claimants hereunder shall be limited to the SUBCONTRACTORS, and persons, firms, and corporations having a direct contract with the PRINCIPAL or its SUBCONTRACTORS.

PROVIDED, FURTHER, that the said SURETY for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of this contract or to the WORK or to the SPECIFICATIONS.

PROVIDE, FURTHER, that no suit or action shall be commenced hereunder by any claimant: (a) Unless claimant, other than one having a direct contract with the PRINCIPAL shall have given written notice to any two of the following: The PRINCIPAL, the OWNER, or the SURETY above named within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the PRINCIPAL, OWNER, or SURETY, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer. (b) After the expiration of one (1) year following the date of which PRINCIPAL ceased work on said CONTRACT, is being understood, however, that if any limitation embodied in the BOND is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by law.

PROVIDED, FURTHER, that it is expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND, the contract or the loan Documents shall include any alteration, addition, extension or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in 4 counterparts, each of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_\_.

ATTEST:

\_\_\_\_\_  
Principal

\_\_\_\_\_  
(Principal) Secretary

(SEAL)

By \_\_\_\_\_

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Surety

ATTEST:

\_\_\_\_\_  
Witness as to Surety

\_\_\_\_\_  
(Address)  
\_\_\_\_\_

By \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
(Address)  
\_\_\_\_\_

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners should execute BOND.

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

**PERFORMANCE BOND**

KNOW ALL PERSONS BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter  
(Corporation, Partnership, or Individual)

called Principal, and \_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_  
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto the South Anderson Water District, hereinafter called OWNER, in the total aggregate penal sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, a copy of which is hereto attached and made a part hereof for the construction of: \_\_\_\_\_

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the SURETY and during the one year guaranty period and if the PRINCIPAL shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said SURETY, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that it is expressly agreed that the BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the CONTRACT as so amended. The term "Amendment", wherever used in this BOND, and whether referring to this BOND, the Contract or the Loan Documents shall include any alteration, addition, extension, or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER and the PRINCIPAL shall abridge the right of the other beneficiary hereunder, whose claim may be unsatisfied. The OWNER is the only beneficiary hereunder.

IN WITNESS WHEREOF, this instrument is executed in 4 counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_\_.

ATTEST:

\_\_\_\_\_  
Principal

\_\_\_\_\_  
(Principal) Secretary

(SEAL)

By \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
(Witness as to Principal)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Surety

ATTEST:

\_\_\_\_\_  
Witness to Surety

By \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Address)

\_\_\_\_\_

\_\_\_\_\_

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners should execute BOND.

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

## NOTICE TO PROCEED

Date: \_\_\_\_\_

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

RE: Contract 5: Witherspoon – Routt Water Storage Tank, 184,000 Gallons Standpipe

You are hereby notified to commence WORK in accordance with the Agreement dated \_\_\_\_\_, 1999, on or before \_\_\_\_\_, and you are to complete the WORK within 90 consecutive calendar days thereafter. The date of completion of all WORK is therefore \_\_\_\_\_, 1999.

South Anderson Water District

\_\_\_\_\_  
Bob Kincer  
Chairman

### ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by \_\_\_\_\_ this the \_\_\_\_\_ day of \_\_\_\_\_, 1999.

Employer Identification  
Number \_\_\_\_\_



KENVIRONS, INC.  
FRANKFORT, KENTUCKY

Project No. \_\_\_\_\_

Change Order No. \_\_\_\_\_

**CONTRACT CHANGE ORDER**

Contract For \_\_\_\_\_

County \_\_\_\_\_

Owner \_\_\_\_\_

To \_\_\_\_\_

(Contractor)

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

| Description of Changes<br>(Supplemental Plans and Specifications Attached) | DECREASE<br>Contract Price | INCREASE<br>Contract Price |
|--|----------------------------|----------------------------|
|  |                            |                            |
|  |                            |                            |
|  |                            |                            |
|  |                            |                            |
|  |                            |                            |
|  |                            |                            |
|  |                            |                            |
|  |                            |                            |
| <b>TOTALS</b>  | \$ _____                   | \$ _____                   |
| <b>NET CHANGE IN CONTRACT PRICE</b>  | \$ _____                   | \$ _____                   |
|  |                            |                            |

**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): \_\_\_\_\_

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 \_\_\_\_\_ (Name and Title) \_\_\_\_\_ (Date)

# GENERAL CONDITIONS

GENERAL CONDITIONS

|     |   |     |  |
|-----|---|-----|--|
| 1.  | Definitions                                 | 17. | Subsurface Conditions                      |
| 2.  | Additional Instructions and Detail Drawings | 18. | Suspension of Work, Termination, and Delay |
| 3.  | Schedules, Reports, and Records             | 19. | Payments to Contractor                     |
| 4.  | Drawings and Specifications                 | 20. | Acceptance of Final Payment as Release     |
| 5.  | Shop Drawings                               | 21. | Insurance                                  |
| 6.  | Materials, Services, and Facilities         | 22. | Contract Security                          |
| 7.  | Inspection and Testing                      | 23. | Assignments                                |
| 8.  | Substitutions                               | 24. | Indemnification                            |
| 9.  | Patents                                     | 25. | Separate Contracts                         |
| 10. | Surveys, Permits, Regulations               | 26. | Subcontracting                             |
| 11. | Protection of Work, Property, Persons       | 27. | Engineer's Authority                       |
| 12. | Supervision by Contractor                   | 28. | Land and Rights-of-Way                     |
| 13. | Changes in the Work                         | 29. | Guaranty                                   |
| 14. | Changes in Contract Price                   | 30. | Arbitration                                |
| 15. | Time for Completion and Liquidated Damages  | 31. | Taxes                                      |
| 16. | Correction of Work                          | 32. | Environmental Requirements                 |

1. DEFINITIONS

1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated and shall be applicable to both the singular and plural thereof:

1.2 ADDENDA - 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.

1.3 BID - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER - Any person, firm, or corporation submitting a BID for the WORK.

1.5 BONDS - Bid, Performance, and Payment Bonds and other instruments of surety, furnished by the CONTRACTOR and the CONTRACTOR'S surety in accordance with the CONTRACT DOCUMENTS.

1.6 CHANGE ORDER - 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.

1.7 CONTRACT DOCUMENTS - The contract, including Advertisement For BIDS, Information For BIDDERS, BID, BID BOND, Agreement, Payment BOND, Performance BOND, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, and ADDENDA.

1.8 CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10 CONTRACTOR - The person, firm, or corporation with whom the OWNER has executed the Agreement.

1.11 DRAWINGS - The parts 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.

1.12 ENGINEER - The person, firm, or corporation named as such in the CONTRACT DOCUMENTS.

1.13 FIELD ORDER - A written order effecting a change in 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.

1.14 NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED - Written communication issued by the OWNER to the CONTRACTOR authorizing him/her to proceed with the WORK and establishing the date for commencement of the WORK.

1.16 OWNER - A public or quasi-public body or authority, corporation, association, partnership, or an individual for whom the WORK is to be performed.

1.17 PROJECT - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS - 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.

1.20 SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.21 SUBCONTRACTOR - An individual, firm, or corporation having a direct contract with CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.22 SUBSTANTIAL COMPLETION - That date 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.

1.23 SUPPLEMENTAL GENERAL CONDITIONS - Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by applicable state laws.

1.24 SUPPLIER - Any person 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.

1.25 WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.26 WRITTEN NOTICE - 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 their last given address, or delivered in person to said party or their authorized representative on the WORK.

## 2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

2.1 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.

2.2 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.

3. SCHEDULES, REPORTS AND RECORDS

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

3.2 Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which the CONTRACTOR proposes to carry on the WORK, including dates at which the various parts of the WORK will be started, estimated date of completion of each part and, as applicable:

3.2.1 The dates at which special detail drawings will be required; and

3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

3.3 The CONTRACTOR shall also submit a schedule of payments that the CONTRACTOR anticipates will be earned during the course of the WORK.

4. DRAWINGS AND SPECIFICATIONS

4.1 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.

4.2 In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over general DRAWINGS.

4.3 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 discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR'S risk.

5. SHOP DRAWINGS

5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING which substantially deviates from the requirement of the CONTRACT DOCUMENTS shall be evidenced by a CHANGE ORDER.

5.2 When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

#### 6. MATERIALS, SERVICES AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2 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.

6.3 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

6.4 Materials, supplies, and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.

6.5 Materials, supplies, or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.

7.3 The CONTRACTOR shall provide at the CONTRACTOR'S expense the testing and inspection services required by the CONTRACT DOCUMENTS.

7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.

7.5 Inspections, tests, or approvals by the engineer or others shall not relieve the CONTRACTOR from the obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

7.6 The ENGINEER and the ENGINEER'S representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records or personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection or testing thereof.

7.7 If any WORK is covered contrary to the written instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for the ENGINEER'S observation and replaced at the CONTRACTOR'S expense.



7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, if, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate CHANGE ORDER shall be issued.

### 8. SUBSTITUTIONS

8.1 Whenever a material, article, or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalogue numbers, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. 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 CONTRACT DOCUMENTS 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 approve its substitution and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, 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 will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

### 9. PATENTS

9.1 The CONTRACTOR shall pay all applicable royalties and license fees, and shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or product of a particular manufacturer or manufacturers is specified, however, if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent, the CONTRACTOR shall be responsible for such loss unless the CONTRACTOR promptly gives such information to the ENGINEER.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. The CONTRACTOR will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. The CONTRACTOR will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone directly or indirectly employed by any of them or anyone of 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, of the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instructions or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. The CONTRACTOR will 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.

## 12. SUPERVISION BY CONTRACTOR

12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the WORK.

## 13. CHANGES IN THE WORK

13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

13.2 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 the CONTRACTOR to a change in CONTRACT PRICE or TIME, or both, in which event the CONTRACTOR shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

#### 14. CHANGES IN CONTRACT PRICE

14.1 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

- a. Unit prices previously approved.
- b. An agreed lump sum.

#### 15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

15.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.

15.4.1 To any preference, priority or allocation order duly issued by the OWNER.

15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1 and 15.4.2 of this article.

#### 16. CORRECTION OF WORK

16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and reexecute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

16.2 All removal and replacement WORK shall be done at the CONTRACTOR'S expense. If the CONTRACTOR does not take action to remove such rejected WORK within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

#### 17. SUBSURFACE CONDITIONS

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.2 Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.

17.2 The OWNER shall promptly investigate the conditions, and if it is found that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless the required WRITTEN NOTICE has been given; provided that the OWNER may, if the OWNER determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

18. SUSPENSION OF WORK, TERMINATION, AND DELAY

18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume that WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 If the CONTRACTOR is adjudged a bankrupt or insolvent, or makes a general assignment for the benefit of its creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of its property, or if CONTRACTOR files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or disregards the authority of the ENGINEER, or otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and its surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method the OWNER may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

18.3 Where the CONTRACTOR'S services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

18.4 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.

18.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within thirty (30) days of its approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days written notice to the OWNER and the ENGINEER stop the WORK until 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.

18.6 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

19. PAYMENT TO CONTRACTOR

19.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. 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 the OWNER'S interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing approval of payment, and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing the 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 of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate less the retainage. The retainage shall be an amount equal to 5% of said estimate. If at any time thereafter when the progress of the WORK is not satisfactory, additional amounts may be retained. Upon substantial completion of the work, any amount retained may be paid to the CONTRACTOR. When the WORK has been substantially completed except for WORK which cannot be completed because of weather conditions, lack of materials or other reasons which in the judgment of the OWNER are valid reasons for noncompletion, the OWNER may make additional payments, retaining at all times an amount sufficient to cover the estimated cost of the WORK still to be completed.

19.2 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.

19.3 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.

19.4 The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

19.5 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 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.

19.6 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demand 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, the CONTRACTOR'S 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.

19.7 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 the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

## 20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

20.1 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and others relating to or arising out of this WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or its sureties from any obligations under the CONTRACT DOCUMENTS or the Performance and Payment BONDS.



21. INSURANCE

21.1 The CONTRACTOR shall purchase and maintain such insurance as will protect it from claims set forth below which may arise out of, or result from, the CONTRACTOR'S execution of the WORK, whether such execution be by the CONTRACTOR, any SUBCONTRACTOR, or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

21.1.1 Claims under workmen's compensation, disability benefit and other similar employee benefit acts;

21.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of employees;

21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than employees;

21.1.4 Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person; and

21.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

21.2 Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

21.3 The CONTRACTOR shall procure and maintain, at the CONTRACTOR'S own expense, during the CONTRACT TIME, Liability insurance as hereinafter specified:

21.3.1 CONTRACTOR'S General Public Liability and Property Damage Insurance including vehicle coverage issued to the CONTRACTOR and protecting the CONTRACTOR from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by the CONTRACTOR or by any SUBCONTRACTOR employed by the CONTRACTOR or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR employed by the CONTRACTOR. Insurance shall be written with a limit of liability of not less than \$500,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; and a limit of liability of not less than \$500,000 aggregate for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than \$200,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than \$200,000 aggregate for any such damage sustained by two or more persons in any one accident.

21.3.2 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

21.4 The CONTRACTOR shall procure and maintain, at the CONTRACTOR'S own expense, during the CONTRACT TIME, in accordance with the provisions of the laws of the state in which the WORK is performed, Workmen's Compensation Insurance, including occupational disease provisions, for all of the CONTRACTOR'S employees at the site of the PROJECT and in case any WORK is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, and shall cause each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of its employees not otherwise protected.

21.5 The CONTRACTOR shall secure, if applicable, "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, and the OWNER.

## 22. CONTRACT SECURITY

22.1 The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance BOND and a Payment BOND in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such 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 Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared a 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 accepted on Federal Bonds, CONTRACTOR shall within ten (10) 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 payment shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

## 23. ASSIGNMENTS

23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign, or otherwise dispose of the Contract or any portion thereof, or of any right, title or interest therein, or any obligations thereunder, without written consent of the other party.

## 24. INDEMNIFICATION

24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission 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.

24.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any 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 benefits acts.

24.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, its agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs or SPECIFICATIONS.

## 25. SEPARATE CONTRACTS

25.1 The OWNER reserves the right to let other contracts in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate the WORK with theirs. 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.

25.2 The OWNER may perform additional WORK related to the PROJECT or the OWNER may let other contracts containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS who are parties to such Contracts (or the OWNER, if the OWNER is performing the additional WORK) reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate the WORK with theirs.

25.3 If the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, written notice thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves it in additional expense or entitles it to an extension of the CONTRACT TIME, the CONTRACTOR may make a claim thereof as provided in Sections 14 and 15.

## 26. SUBCONTRACTING

26.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTS on those parts of the WORK which, under normal contracting practices, are performed by specialty SUBCONTRACTORS.

26.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(s), in excess of fifty (50%) percent of the CONTRACT PRICE, without prior written approval of the OWNER.

26.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of its SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as the CONTRACTOR is for the acts and omissions of persons directly employed by the CONTRACTOR.

26.4 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 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 provision of the CONTRACT DOCUMENTS.

26.5 Nothing contained in this CONTRACT shall create any contractual relationship between any SUBCONTRACTOR and the OWNER.

#### 27. ENGINEER'S AUTHORITY

27.1 The ENGINEER shall act as the OWNER'S representative during the construction period, shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed, and shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship, and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

#### 28. LAND AND RIGHTS-OF-WAY

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at its own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

29. GUARANTEE

29.1 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. 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.

30. ARBITRATION BY MUTUAL AGREEMENT

30.1 All claims, disputes, and other matters in question arising out of, or relating to, the CONTRACT DOCUMENTS or the breach thereof, except for claims which have been waived by making an acceptance of final payment as provided by Section 20, may be decided by arbitration if the parties mutually agree. Any agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

30.2 Notice of the request for arbitration shall be filed in writing with the other party to the CONTRACT DOCUMENTS and a copy shall be filed with the ENGINEER. Request for arbitration shall in no event be made on any claim, dispute, or other matter in question which would be barred by the applicable statute of limitations.

30.3 The CONTRACTOR will carry on the WORK and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

31. TAXES

31.1 The CONTRACTOR will pay all sales, consumer, use, and other similar taxes required by the laws of the place where the WORK is performed.

32. ENVIRONMENTAL REQUIREMENTS

The CONTRACTOR, when constructing a project involving trenching and/or other related earth excavation, shall comply with the following environmental constraints.

32.1 WETLANDS - The CONTRACTOR, when disposing of excess, spoil, or other construction materials on public or private property, WILL NOT FILL IN or otherwise CONVERT WETLANDS.

32.2 FLOODPLAINS - The CONTRACTOR, when disposing of excess, spoil, or other construction materials on public or private property, WILL NOT FILL IN or otherwise CONVERT 100 YEAR FLOODPLAIN areas delineated on the latest FEMA Floodplain Maps.

32.3 HISTORIC PRESERVATION - Any excavation by the Contractor that uncovers an historical or archaeological artifact shall be immediately reported to the PROJECT ENGINEER and a representative of RUS. Construction shall be temporarily halted pending the notification process and further directions issued by RUS after consultation with the State Historic Preservation Officer (SHPO).

32.4 ENDANGERED SPECIES - The 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 the CONTRACTOR, the CONTRACTOR will immediately report this evidence to the PROJECT ENGINEER and a representative of RUS. Construction shall be temporarily halted pending the notification process and further directions issued by RUS after consultation with the U.S. Fish and Wildlife Service.

**SUPPLEMENTAL GENERAL CONDITIONS**



## RUS Supplemental General Conditions

The provisions of the Rural Utilities Service (RUS) Supplemental General Conditions as described herein change, amend, or supplement the General Conditions and shall supersede any conflicting provisions of this CONTRACT. All provisions of the General Conditions which are not changed, amended, or supplemented, remain in full force.

- |                                     |                          |
|-------------------------------------|--------------------------|
| 1. CONTRACT APPROVAL                | 9. SMALL, MINORITY AND   |
| 2. CONTRACT CHANGE ORDERS           | WOMEN'S BUSINESSES       |
| 3. PARTIAL PAYMENT ESTIMATES        | 10. ANTI-KICKBACK        |
| 4. CONFLICT OF INTEREST             | 11. VIOLATING FACILITIES |
| 5. PROTECTION OF LIVES AND PROPERTY | 12. STATE ENERGY POLICY  |
| 6. REMEDIES                         | 13. EQUAL OPPORTUNITY    |
| 7. GRATUITIES                       | REQUIREMENTS             |
| 8. AUDIT AND ACCESS TO RECORDS      | 14. CERTIFICATE OF       |
|                                     | OWNER'S ATTORNEY         |
|                                     | 15. RUS CONCURRENCE      |

1. Contract Approval.

1.1 The OWNER and the CONTRACTOR will furnish the OWNER'S Attorney such evidence as required so that the OWNER'S Attorney can complete and execute "Certificate of Owner's Attorney" (Section 14) before the OWNER submits the executed Contract Documents to RUS for approval.

1.2 Concurrence by the State Program Official or designee in the award of the CONTRACT is required before it is effective and the "RUS Concurrence" (Section 15), shall be attached and made a part of the Agreement.

1.3 Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located. [Revision 1, 07/11/1997]

1.4 This CONTRACT is expected to be funded in part with funds from the RUS. Neither the United States nor any of its departments, agencies, or employees is or will be a party to this CONTRACT or any SUBCONTRACT.

2. Contract Change Orders.

2.1 All changes affecting the project's construction cost or modifications of the terms or conditions of the contract must be authorized by means of a written contract change order which is mutually agreed to by the OWNER and CONTRACTOR and is approved by RUS. The contract change order will include extra work, work for which quantities have been altered from those shown in the bidding schedule, as well as decreases or increases in the quantities of installed units which are different than those shown in the bidding schedule because of final measurements. All changes must be recorded on a contract change order before they can be included in a partial payment estimate.

2.2 FORM RD 1924-7, "Contract Change Order" or similar form approved by RUS shall be used to record CONTRACT changes.

2.3 When the CONTRACT sum is, in whole or in part, based on unit prices, the OWNER reserves the right to increase or decrease a unit price quantity as may be deemed reasonable or necessary in order to complete the work contemplated by this CONTRACT.

3. Partial Payment Estimates.

3.1 FORM RD 1924-18, "Partial Payment Estimate," or similar form approved by RUS shall be used when estimating periodic payments due the CONTRACTOR.

3.2 The OWNER may after consultation with the ARCHITECT/ENGINEER withhold or, on account of subsequently discovered evidence, nullify the whole or part of any approved partial payment estimate to such extent as may be necessary to protect the OWNER from loss on account of:

3.2.1 Defective work not remedied.

3.2.2 Claims filed.

3.2.3 Failure of CONTRACTOR to make payments properly to subcontractors or suppliers.

3.2.4 A reasonable doubt that the WORK can be completed for the balance then unpaid.

3.2.5 Damage to another CONTRACTOR.

3.2.6 Performance of WORK in violation of the terms of the CONTRACT DOCUMENTS.

3.3 Where WORK on unit price items is substantially complete but lacks testing, clean-up and/or corrections, amounts shall be deducted from unit prices in partial payment estimates to amply cover such testing, clean-up and/or corrections.

3.4 When the items in 3.2 and 3.3 are cured, payment shall be made for amounts withheld because of them.

3.5 Payments will not be made that would deplete the retainage nor place in escrow any funds that are required for retainage nor invest the retainage for the benefit of the CONTRACTOR.

4. Conflict of Interest.

4.1. Unacceptable bidders. An ENGINEER (individual or firm including persons they employ) who has prepared plans and specifications will not be considered an acceptable bidder. Any firm or corporation in which such ENGINEER (including persons they employ) is an officer, employee, or holds or controls a substantial interest will not be considered an acceptable bidder. Contracts or purchases by the CONTRACTOR shall not be awarded or made to a supplier or manufacturer if the ENGINEER (firm or individual) who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer. Bids will not be awarded to firms or corporations which are owned or controlled wholly or in part by a member of the governing body of the OWNER or to an individual who is such a member.

4.2. The 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: (a) the employee, officer or agent; (b) any member of their immediate family; (c) their partner or (d) an organization which employs, or is about to employ, any of the above has financial or other interest in the CONTRACTOR. The OWNER'S officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from the CONTRACTOR or subcontractor.

5. Protection of Lives and Property

5.1 In order to protect the lives and health of its employees under the CONTRACT, the CONTRACTOR shall comply with all pertinent provisions of the Occupational Safety and Health Administration (OSHA) and any State Safety and Health agency requirements.

5.2 The CONTRACTOR alone shall be responsible for the safety, efficiency, and adequacy of its plant, appliances, and methods, and for any damage which may result from their failure or their improper construction, maintenance or operation.

6. Remedies. Unless otherwise provided in this CONTRACT, all claims, counterclaims, disputes, and other matters in question between the OWNER and the CONTRACTOR arising out of or relating to this CONTRACT or the breach thereof will be decided by arbitration if the parties mutually agree, or in a court of competent jurisdiction within the State in which the OWNER is located.

6.1 The arbitration provisions of this section may be initiated by either party to this CONTRACT by filing with the other party and the ENGINEER a WRITTEN REQUEST for arbitration.

6.2 Each party to this CONTRACT will appoint one arbitrator; the two arbitrators will select a third arbitrator.

6.3 The arbitrators will select a hearing location as close to the OWNER'S locale as possible.

6.4 The procedure for conducting the hearings will follow the Construction Industry Arbitration Rules of the American Arbitration Association.

7. Gratuities.

7.1 If the OWNER finds after a notice and hearing that the CONTRACTOR, or any of the CONTRACTOR'S agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of the OWNER, the State, or RUS officials in an attempt to secure this CONTRACT or favorable treatment in awarding, amending, or making any determinations related to the performance of this CONTRACT, the OWNER may, by written notice to the CONTRACTOR, terminate this CONTRACT. The OWNER may also pursue other rights and remedies that the law or this CONTRACT provides. However, the existence of the facts on which the OWNER bases such findings shall be an issue and may be reviewed in proceedings under the Remedies clause of this CONTRACT.

7.2 In the event this CONTRACT is terminated as provided in paragraph 7.1 the OWNER may pursue the same remedies against the CONTRACTOR as it could pursue in the event of a breach of the CONTRACT by the CONTRACTOR. As a penalty, in addition to any other damages to which it may be entitled by law, the OWNER may pursue exemplary damages in an amount (as determined by the OWNER) which shall be not less than three nor more than ten times the costs the CONTRACTOR incurs in providing any such gratuities to any such officer or employee.

8. Audit and Access to Records. For all negotiated contracts (except those of \$10,000 or less), the RUS, the Comptroller General, the OWNER 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. The CONTRACTOR shall maintain all required records for three years after final payment is made and all other pending matters are closed.

9. Small, Minority and Women's Businesses. If the CONTRACTOR intends to let any subcontracts for a portion of the work, the 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.

10. Anti-Kickback. The CONTRACTOR shall comply with the Copeland Anti-Kickback Act (18 USC 874) as supplemented in Department of Labor regulations (29 CFR, Part 3). This act provides that each CONTRACTOR 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. The OWNER shall report all suspected or reported violations to RUS.

11. Violating Facilities. Where 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 U.S.C. 1857(h)), section 508 of the Clean Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency regulations 40 CFR Part 15 which prohibit the awarding of non-exempt federal contracts, grants, or loans to facilities included on EPA's list of violating facilities. The CONTRACTOR will report violations to the EPA.

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

13. Equal Opportunity Requirements. For all contracts in excess of \$10,000, the CONTRACTOR shall comply with Executive Order 11246, entitled "Equal Employment Opportunity," as amended by Executive Order 11375, and as supplemented in Department of Labor regulations (41 CFR Part 60).

13.1 If the CONTRACT exceeds \$10,000, the CONTRACTOR will execute Form RD 400-6, "Compliance Statement."

13.2 The CONTRACTOR'S compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action 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 the CONTRACTOR shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project for the sole purpose of meeting the CONTRACTOR'S goals shall be a violation of the CONTRACT, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

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

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GEOTECHNICAL REPORT

Kenneth H. Ralston  
3-22-99

## SECTION 0100

### SUMMARY OF WORK

1. SCOPE OF WORK PERFORMED UNDER THIS CONTRACT

The South Anderson Water District distributes potable water in the outlying areas of the county. This contract provides for the construction of a 184, 000 gallon nominal capacity water storage standpipe; reinforced concrete foundation; silt control; piping and associated appurtenances.



## **SECTION 0101**

### **SPECIAL CONDITIONS**

#### **1.0 DESCRIPTION OF THE WORK AND DESIGNATION OF OWNER**

These Specifications and accompanying Drawings describe the work to be done and the materials to be furnished for the construction of the project entitled "South Anderson Water District, Contract 5: Witherspoon-Routt Water Storage Tank, 184,000 Gallons Standpipe".

All references to the Owner in these Specifications, Contract Documents and plans shall mean the South Anderson Water District.

#### **2.0 AVAILABLE FUNDS**

This project is funded by the Owner.

#### **3.0 TIME OF COMPLETION**

The time allowed for completion of this contract is 90 calendar days.

The time allowed for completion shall begin at midnight, Eastern Standard Time, on the date which the Owner, or his authorized representative, the Engineer, shall instruct the Contractor in writing to start work, but no later than 10 days after Notice to Proceed.

Additional time will be allowed the Contractor to cover approved over-runs or additions to the contract in the same proportion that the said over-run or addition in net monetary value bears to the original amount; the total of said additional time to be computed to the nearest whole calendar day.

#### **4.0 LIQUIDATED DAMAGES**

It is understood that time is the essence of this contract and that the Owner will sustain damages, monetary and otherwise, in the event of delay in completion of the work hereby contracted.

Therefore, if the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part of the consideration for the awarding of these contracts, to pay to the Owner the amount specified in the contract, not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every

calendar day that the Contractor shall be in default after the time stipulated in the Contract for completing the work.

The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be retained from time to time by the Owner from current periodical estimates.

Liquidated damages are fixed at \$300 per calendar day of over-run beyond the date set for completion or authorized extension thereof.

## 5.0 INSURANCE

Insurance is to be furnished by the Contractor for the benefit of the Owner, Contractor, and Subcontractors as their interests may appear. The minimum amounts of insurance coverage to be furnished under these contracts, in accordance with the applicable provisions of the General Conditions, are:

- a) Workman's Compensation - - - - - \$1,000,000.00
- b) Comprehensive General Liability including coverage for the explosion, collapse, and underground hazards where applicable; also including contractual liability, and also products and/or completed operations liability coverage (no deductible clauses are acceptable for these coverages):
  - Bodily Injury Liability - \$1,000,000 each person  
\$1,000,000 each occurrence
  - Property Damage Liability - \$500,000 each person  
\$500,000 each occurrence
- c) Comprehensive Automobile Liability including hired car and employer's non-ownership liability coverage:
  - Bodily Injury Liability - \$1,000,000 each person  
\$1,000,000 each occurrence
  - Property Damage Liability - \$500,000 each occurrence
- d) Builder's Risk (Building Construction) including coverage for fire, extended coverages, vandalism, and malicious mischief - - - - 100% of insurable values.
- e) Installation Floater (Non-building Construction such as water and sewer pipe lines - - - - 100% of insurable values.

All policies written for and applicable to the contract of which this Specification is a part shall provide for a minimum of fifteen (15) days written cancellation notice with notice to be given both to the Owner and the Engineer. The Owner and Engineer shall be included as additional insured parties.

#### **6.0 PERFORMANCE AND PAYMENT BOND**

The Contractor shall furnish separate performance and payment bonds issued by an approved bonding company in an amount at least equal to one hundred (100%) per cent of the contract price, as security for the faithful performance of this contract and for the payment of persons performing labor and furnishing materials in connection with this contract. These bonds shall be executed by a company authorized to do business in the State of Kentucky and shall be signed or countersigned by a Kentucky resident agent. Bonds shall remain in effect for one year after date of final acceptance of the work.

#### **7.0 SITE DIMENSIONS**

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

#### **8.0 DAMAGE TO EQUIPMENT STORED AND/OR IN PLACE PRIOR TO INITIAL OPERATION**

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

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

#### **9.0 SALVAGED MATERIALS AND EQUIPMENT**

All materials and/or equipment to be removed from existing structures and not specifically specified to be re-used shall remain the property of the Owner. Such materials and/or equipment shall be stored on sites by the Contractor as directed by the Owner.

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

#### 10.0 TEMPORARY FACILITIES

- a) Build and maintain temporary offices and storage sheds as necessary for the work. Location of temporary buildings shall be subject to the approval of the Engineer.
- b) Provide temporary heat, light and power required by the work. Temporary telephone service shall be provided in the job office paid for by the General Contractor, except that the party placing a long distance call shall pay the toll charge.
- c) Each Contractor shall construct and maintain, in a sanitary condition, sanitary facilities for his employees and also employees of his subcontractors. At completion of the contract work these sanitary facilities shall be properly disposed of as directed by the Engineer.
- d) Temporary construction for safety measures, hoists and scaffolds shall be erected in accordance with the General Conditions.
- e) Construction yard shall be located on job site. Provide security and safety protection.
- f) The obtaining of all utilities for construction, including power and water, shall be the responsibility of the Contractor, and he shall bear the cost of all utilities used for construction. Cost of all connections and facilities for use of utilities shall be borne by the Contractor.

#### 11.0 PROPERTY PROTECTION

Care is to be exercised by the Contractor in all phases of construction to prevent damage and injury to the Owner's or other property.

In connection with work performed on "private property" (property other than that belonging to the Owner), the Contractor shall confine his equipment, the storage of materials, and the operation of his workmen to the limits indicated on the plans, or to lands and right-of-way provided for the project by the Owner, and shall take every precaution to avoid damage to the private property Owner's buildings, grounds and facilities.

Fences, hedges, shrubs, etc. within the construction limits shall be carefully removed, preserved, and replaced when the construction is completed. 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. Grassed areas,

other than lawns, shall be graded, fertilized and seeded when construction is completed. When construction is completed the private property Owner's facilities and grounds shall be restored to as good or better condition than found as quickly as possible at the Contractor's expense.

## **12.0 CONFLICT WITH OR DAMAGE TO EXISTING UTILITIES AND FACILITIES**

Insofar as location data is available to the Engineers, existing underground utilities (such as waterlines, sewer lines, gas lines, telephone conduits, etc.) are accurately located on the drawings. Due, however, to the approximate nature of much of this data, the location of any particular facility cannot be certified to be correct. In general, locations and elevations shown are approximate only.

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 is to verify the location of, and possible interference with, the existing utilities that are shown on the Plans, arrange for necessary suspension of service, and make arrangements to locate and avoid interference with all utilities that are not shown on the Plans.

## **13.0 CONTROL OF EROSION**

The Contractor shall be responsible for control of siltation and erosion from the project work. Control shall include all necessary ditching, check dams, mulching, etc. to prevent deposition of materials in roadside ditches. The Owner shall incur no extra costs from such work.

## **14.0 MEASUREMENT AND PAYMENT**

14.1. Measurement of Quantities. All Work completed under the Agreement will be measured by the ENGINEER according to United States standard measure.

14.1.1. Unless otherwise specified, measurement of concrete quantities will include only that volume within the neat lines as shown on the Plans or as altered by the ENGINEER to fit field conditions. The prismatic formula will be used in computing the volumes of structures, or portions of structures, having end sections of unequal areas.

14.1.2. All items which are measured by the linear foot, such as pipe, will be measured along the centerline distance of the installed item with no allowance for connections, fittings or laps at connections.

14.1.3. In computing volumes of excavation, borrow and embankments, the average end-area method will be used. For the purpose of ascertaining quantities, it is agreed that the planimeter shall be considered an instrument of precision adapted to the measurement of areas.

14.2 Lump Sum. When a complete structure or structural unit (in effect, "lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

14.3 Plan Quantities. When the plan quantities for a specific portion of the Work are designated as the pay quantities in the Contract Documents, they shall be the final quantities for which payment for such specific portion of the Work will be made, unless the dimensions of said portions of the Work shown on the plans are revised by the ENGINEER. When revised dimensions result in an increase or decrease in the quantities of such Work, the final quantities for payment will be revised in the amount represented by the authorized changes in dimensions.

14.4 Actual Quantities. When actual quantities for a specific portion of the Work are designated as the pay quantities in the Contract Documents, they shall be the final quantities for which payment for such specific portion of the Work will be made. The actual quantities will be determined by the difference in field measurements and cross sections before and after construction.

14.5 Scope of Payment. The contract unit prices whether based on lump sum, plan quantities or actual quantities for the various bid items of the Contract Documents shall be considered full compensation for all labor, materials, supplies, equipment, tools, and all things of whatever nature required for the complete incorporation of the item into the Work the same as though the items were to read "in Plan" unless the Contract Documents provide otherwise.

14.6 Payments. Estimates for payment, partial payments and final payments shall be in accordance with and follow procedures set forth in the General Conditions and Supplementary Conditions.

## 15.0 ACCESS ROADS

15.1 The CONTRACTOR, CONTRACTOR'S employees and all trucks delivering equipment, supplies or materials to the project shall use the access roads shown in the Plans for entering and leaving the project sites.

## 16.0 TESTING LABORATORY SERVICES

### 16.1 GENERAL

16.1.1 Work Included. From time to time during progress of the Work, the OWNER may require that testing be performed to determine that materials provided for the Work meet the specified requirements; such testing includes, but is not necessarily limited to:

- 1) Material Compaction
- 2) Cast-In-Place Concrete

16.1.2 Related Work Described Elsewhere. Requirements for testing may be described in various Sections of these Specifications; where no testing requirements are described, but the OWNER decides that testing is required, the OWNER may require testing to be performed under current pertinent standards for testing.

16.1.3 Selection of Testing Laboratory. The OWNER will select a testing laboratory.

16.1.4 Codes and Standards. Testing, when required, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

16.1.5 Product Handling. The CONTRACTOR shall promptly process and distribute all required copies of test reports for which he is responsible and related instructions to ensure all necessary retesting and/or replacement of materials with the least possible delay in progress of the Work.

## 16.2 Payment for Testing Services.

16.2.1 Initial Services. The OWNER will pay for all initial testing services required by the OWNER unless specified differently in the specifications related to that item.

16.2.2 Retesting. When initial tests indicate non-compliance with the Contract Documents, all subsequent retesting made necessary by the non-compliance shall be performed by a testing laboratory selected by the CONTRACTOR and approved by the ENGINEER and the costs thereof will be paid directly by the CONTRACTOR.

16.2.3 CONTRACTOR'S Convenience Testing. Inspection or testing performed exclusively for the CONTRACTOR'S convenience shall be the sole responsibility of the CONTRACTOR.

## 16.3 EXECUTION.

16.3.1 Cooperation with Testing Laboratory. Representatives of the testing laboratory shall have access to the Work at all times. The CONTRACTOR shall provide facilities for such access in order that the laboratory may properly perform its functions.

### 16.3.2 Schedules for Testing.

16.3.2.1 Establishing Schedule. By advance discussion with the testing laboratory selected by the OWNER, the CONTRACTOR shall allow for the time required for the laboratory to perform its tests and to issue each of its findings. The CONTRACTOR shall allow for this time within the construction schedule.

16.3.2.2 Revising Schedule. When changes of construction schedule are necessary during construction, the CONTRACTOR shall coordinate all such changes of schedule with the testing laboratory as required.

16.3.2.3 Adherence to Schedule. When the testing laboratory is ready to test according to the determined schedule but is prevented from testing or taking specimens due to incompleteness of the Work, all extra costs for testing attributed to the delay may be back-charged to the CONTRACTOR and shall not be borne by the OWNER.

16.3.3 Taking Specimens. All specimens and samples for testing, unless otherwise provided in these Contract Documents, will be taken by the testing laboratory; all sampling equipment and personnel will be provided by the testing laboratory; and all deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

## 17.0 SUBMITTALS AND SUBSTITUTIONS

### 17.1 GENERAL.

17.1.1 Work Included. Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards. To insure that the specified products are furnished and installed in accordance with design intent, procedures have been established for advance submittal of design data and for its review and approval or rejection by the ENGINEER.

### 17.1.2 Related Work Described Elsewhere.

17.1.2.1 Contractual requirements for submittals are described in the General Conditions and Supplementary Conditions.

17.1.2.2 Individual submittals required are described in the pertinent sections of these Specifications.

### 17.2 SUBSTITUTIONS.

17.2.1 ENGINEER'S Approval Required. The Agreement is based on the materials, equipment, and methods described in the Contract Documents. The ENGINEER will



consider proposals for substitution of materials, equipment, and methods only when such proposals are accompanied by full and complete technical data and all other information required by the ENGINEER to evaluate the proposed substitution. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this Work by the ENGINEER.

17.2.2 "Or Equal". Where the phrase "or equal" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the ENGINEER unless the item has been specifically approved for this Work. The decision of the ENGINEER shall be final.

17.2.3 Availability of Specified Items. The CONTRACTOR shall verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the Work. In the event the specified item or items will not be so available, the CONTRACTOR shall notify the ENGINEER prior to receipt of Bids.

17.3 Identification of Submittals. The CONTRACTOR shall completely identify each submittal and resubmittal by showing at least the following information:

- 1) Name and address of submitter, plus name and telephone number of the individual who may be contacted for further information.
- 2) Name of project as it appears in these Specifications.
- 3) Drawing number and Specifications Section number to which the submittal applies.
- 4) Whether this is an original submittal or resubmittal.

#### 17.4 COORDINATION OF SUBMITTALS.

17.4.1 General. Prior to submittal for ENGINEER'S review, the CONTRACTOR shall use all means necessary to fully coordinate all material, including the following procedures:

- 1) Determine and verify all field dimensions and conditions, materials, catalog numbers, and similar data.
- 2) Coordinate as required with all trades and with all public agencies involved.

- 3) Secure all necessary approvals from public agencies and others and signify by stamp, or other means, that they have been secured.
- 4) Clearly indicate all deviations from the Contract Documents.

17.4.2 Grouping of Submittals. Unless otherwise specifically permitted by the ENGINEER, the CONTRACTOR shall make all submittals in groups containing all associated items; the ENGINEER may reject partial submittals as not complying with the provisions of the Contract Documents.

17.5 Timing of Submittals. The CONTRACTOR shall make all submittals far enough in advance of schedule dates of installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery. In scheduling, allow at least five full working days for the ENGINEER'S review following his receipt of the submittal.

## 18.0 INSTALLATION REQUIREMENTS

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

## 19.0 PROOF OF COMPLIANCE

Whenever the Contract Documents require that a product be in accordance with Federal specification, ASTM designation, ANSI specification, or other association standard, the CONTRACTOR shall present an affidavit from the manufacturer certifying that the product complies therewith. Where requested or specified, the CONTRACTOR shall submit supporting test data to substantiate compliance.

## 20.0 PROJECT RECORD DOCUMENTS

20.1 As the Work progress, the CONTRACTOR shall keep a complete and accurate record of changes or deviations from the Contract Documents and the Shop Drawings, indicating the Work as actually installed. Changes shall be neatly and correctly shown on the respective portion of the affected document, using blackline prints of the Drawings affected, or the Specifications, with appropriate supplementary notes. This record set of Drawings, Shop Drawings, and Specifications shall be kept at the job site for inspection by the ENGINEER.

20.2 The records above shall be arranged in order, in accordance with the various sections of the Specifications, and properly indexed. Prior to application for final payment, and as a condition to its approval by the ENGINEER, deliver the record

Drawings and Specifications, arranged in proper order, indexed, and endorsed as hereinbefore specified.

20.3 No review or receipt of such records by the ENGINEER or OWNER shall be a waiver of any deviation from the Contract Documents or the Shop Drawings or in any way relieve the CONTRACTOR from his responsibility to perform the Work in accordance with the Contract Documents and the Shop Drawings to the extent they are in accordance with the Contract Documents.

#### **21.0 PROJECT MEETINGS**

The CONTRACTOR'S Superintendent for the Work shall attend project meetings as required by either the OWNER or ENGINEER.

## SECTION 02001

### EARTHWORK

#### 1.0 SCOPE

This section covers the required topsoil removal, excavation, the removal and proper utilization or disposal of all excavated materials, necessary borrow, fill requirements, and the shaping and finishing of all excavation work to the required lines and grades.

#### 2.0 TOPSOIL REMOVAL

All topsoil on areas to receive fill shall be stripped and stockpiled at an approved location.

#### 3.0 CLEARING AND GRUBBING

Work shall consist of cutting and removing designated trees, stumps, brush, logs, removal of fences, or other loose and projecting material. Unless otherwise specified, it shall also include the grubbing of stumps, roots and other natural obstructions which, in the opinion of the Engineer, must be removed to prosecute properly the construction work and operate properly the facility upon the completion of construction.

No cleared or grubbed materials shall be used in backfills or embankment fills.

All stumps, roots and other objectionable material shall be grubbed up so that no roots larger than 3 inches in diameter remain less than 18 inches below the ground surface.

All holes and depressions left by grubbing operations shall be filled with suitable material and compacted to grade.

Disposal shall be by burning or other methods satisfactory to the Engineer; however, burning will be permitted only when the Contractor has obtained written permission from the local regulatory agency.

The Contractor shall also remove from the site and satisfactorily dispose of all miscellaneous rubbish including, but not limited to, masonry, scrap metal, rock, pavement, etc., that is under the fill or to be removed as shown on the Drawings, specified herein, or directed by the Engineer.

Existing improvements, adjacent property, utility and other facilities, and trees, plants and brush that are not to be removed shall be protected from injury or damage resulting from the Contractor's operations.

Trees and shrubs, designated to remain or that are beyond the clearing and grubbing limits, which are injured or damaged during construction operations shall be treated at the Contractor's expense by experienced tree surgery personnel.

### 3.1 EROSION CONTROL

Temporary measures shall be applied throughout the construction permit to control and to minimize siltation to adjacent properties and waterways. Such measures shall include, but not be limited to, the use of berms, baled straw silt barriers, gravel or crushed stone, mulch, slope drains and other methods. These temporary measures shall be applied to erodible material exposed by any activity associated with the construction of this project.

## 4.0 STRUCTURAL EXCAVATION

Structural excavation shall consist of and include the removal of all materials encountered or involved in the excavation and subgrade preparation for the placing of structures. The final depths and extent of structural excavation will be determined by the nature of the material encountered; however, after excavation to the limits as shown on the drawings, the ENGINEER shall inspect the work and determine if additional excavation is required.

## 5.0 EXCAVATION CONSTRUCTION METHODS

### 5.1 OPEN-CUT EXCAVATION - GENERAL

All open cut excavation shall be performed in accordance with this section to the lines, grades, and dimensions shown on the drawings or established by the ENGINEER.

All necessary precautions shall be taken to preserve the material below and beyond the lines of all excavation in the soundest possible condition. Any damage to the work due to the CONTRACTOR'S operations, including shattering of the material beyond the required excavation lines, shall be repaired at the expense of and by the CONTRACTOR. Any and all excess excavation for the convenience of the CONTRACTOR for any purpose or reason, except as may be ordered in writing by the ENGINEER and whether or not due to the fault of the CONTRACTOR, shall be at the expense of the CONTRACTOR. Where required to complete the work, all such excess excavation and overexcavation shall be refilled with materials furnished and placed at the expense of and by the CONTRACTOR. Slopes shattered or loosened by blasting shall be taken down at the expense of and by the CONTRACTOR.

All excavation for embankment and structure foundations shall be performed in the dry. No excavation shall be made in frozen materials without written approval.

The bottom and side slope of rock or shale upon or against which concrete or pervious blanket material is to be placed shall be excavated to the required dimensions as shown on the drawings or established by the ENGINEER. No material will be permitted to extend within the neat lines of the structure. If, at any point in rock or shale upon written orders from the ENGINEER, material is excavated beyond the limits required to receive the structure, the additional excavation shall be filled solidly with concrete. If material is excavated beyond the limits required to receive the structure without written orders from the ENGINEER, the additional excavation shall be brought back to grade with "Class A" concrete at the CONTRACTOR'S expense.

## 5.2 UTILIZATION OF EXCAVATED MATERIAL

All suitable material removed from the excavations shall be used insofar as practicable, in constructing the permanent works and at such other places as directed. The CONTRACTOR shall not waste materials removed from excavations and suitable for use in the construction of the permanent works, without a written application to do so and a written approval from the ENGINEER.

## 5.3 DISPOSAL OF SURPLUS AND/OR WASTE MATERIAL

All surplus excavated material and/or all waste materials shall be disposed of outside of the floodplain in an area provided by the CONTRACTOR and approved by the ENGINEER.

The surfaces thereof shall be left in a neat and sightly condition and sloped to provide positive drainage. Compaction of the waste materials shall be required.

## 5.4 BLASTING FOR EXCAVATION

### A. General

Blasting may be done only to the depth, amount, and extent, and in such locations approved by the ENGINEER. Approval of the methods of blasting by the ENGINEER will not relieve the CONTRACTOR of his responsibility in blasting operation, and no payment will be made for any necessary extra excavation below or outside of the limit lines indicated on the drawings, or modifications thereof, due solely to injury caused by over-shooting, improper blasting, or carelessness on the part of the CONTRACTOR. All material thus removed shall be replaced by concrete when a concrete structure is to be placed upon or against such surface, or by compacted fill material when fill is to be placed thereon, at the expense of the CONTRACTOR and in a manner satisfactory to the ENGINEER. Extra fill is to be of the same type as that to be placed directly above it.

## B. Blasting Trench and/or Structure Excavation

The use of explosives or blasting material of any kind in trench excavation and/or the structure excavation shall be carried out by using not over one-half (1/2) pound of explosives (equivalent in strength to 40 percent dynamite) per cubic yard of material to be blasted and by shooting only a few holes simultaneously.

## C. Use of Explosives

The transportation, handling, storage, and use of dynamite and other explosives shall be directed and supervised by a person of proven experience and ability in blasting operation. All blasting operations shall be in accordance with applicable local, state, and federal laws. Before any explosives are brought on the job, permission to do so shall be obtained from the ENGINEER. All blasts shall be fired electrically with an electric blasting machine. Where detonating cord is used as a detonating agent, the detonation cord shall be fired with an electric blasting cap. Delay electric detonators shall be used for all delayed blasts. Blasting machines used for firing shall be known to be in good condition and of sufficient capacity to fire all charges. Rubber-covered or other adequately insulated copper wires in good condition shall be used for firing lines and shall have solid cores of appropriate gage. Sufficient firing lines shall be provided to permit the blaster to be located at a safe distance from the blast. Single conductor lead lines shall be used. All operations involving the handling or use of explosives shall be discontinued during approach of a thunderstorm or while it is in progress. Blasting operations in the proximity of overhead power lines, communication lines, or other structures shall not be carried on until the operator and/or OWNER of such lines has been notified and precautionary measures deemed necessary have been taken. All holes loaded on a shift shall be fired on the same shift. The use of black powder is prohibited. Before any drilling operations in preparation for blasting are started, the CONTRACTOR shall furnish the ENGINEER a detailed plan of operations showing the method proposed for the prevention of damage. In order to assure adequate protection, such plan may be modified to meet the conditions that may develop.

## 5.5 SHEETING AND BRACING

Sheeting and bracing as may be required to safely support the sides of excavations while maintaining the required side slopes shall comply with the safety precautions as outlined in current and accepted safety manuals, such as "Associated General Contractors Manual of Accident Prevention in Construction". Where sheeting and bracing are necessary to prevent caving of the walls of excavations and to safeguard the workmen, the excavations shall be dug to such widths that proper allowance is made for the space occupied by the sheeting and bracing. The CONTRACTOR shall perform the additional excavation required and furnish and put in place the necessary sheeting and bracing and shall remove the same as the excavation is filled, at his own expense.

## 5.6 REMOVAL OF WATER

The CONTRACTOR shall construct and maintain all necessary channels, flumes, and/or other temporary diversion and protective works; shall furnish all materials required therefore; and shall furnish, install, maintain and operate all well points, casings, pumps and other equipment for dewatering the various parts of the work and for maintaining the foundations, trenches and other parts of the work free from water as required for constructing each part of the work. After having served their purpose, all temporary protective works shall be removed, or leveled, to give a slightly appearance and so as not to interfere in any way with the operation, usefulness or stability of the permanent structures.

## 5.7 PROTECTION OF FINISHED STRUCTURE EXCAVATIONS

It shall be the CONTRACTOR'S responsibility to maintain finished excavated foundation surfaces for the works in good condition until such time as the structures are placed on or against the surfaces.

## 5.8 BORROW

Borrow excavation shall consist of and include the required excavation and proper utilization of approved materials obtained from designated areas when sufficient quantities of suitable materials are not available from other required excavation.

The control of excavation in any borrow area and the selection of materials therefrom shall at all times be as directed by the ENGINEER. On completion of excavation, all borrow pits shall be left in a neat and slightly condition. Unless otherwise approved by the ENGINEER, all borrow pits shall be so graded and dressed that water will readily drain therefrom, and away from all embankments, berms and structures. When shown on the drawings, terraces, or diversions shall be constructed to protect the slopes of the borrow areas from erosion and shall be considered a subsidiary of this specification.

## 6.0 STRUCTURE FOUNDATION FILL

After clearing and stripping operations have been completed, all structure locations shall be proofrolled with a loaded pan or heavy pneumatic tired vehicle to densify upper soils and to locate possible areas which will require undercutting, removal and/or recompaction. This operation shall be conducted under the surveillance of the ENGINEER.

### 6.1 FILL MATERIAL APPROVAL

Before initiating filling operations, the CONTRACTOR shall receive approval of fill material by the ENGINEER. Several laboratory Proctor density tests shall be run on representative samples obtained from the proposed borrow material.



## 6.2 PLACEMENT OF FILLS

Where structures or other appurtenances are constructed on fill, the fill shall be placed in layers not over six (6") inches deep, as measured before compaction and be thoroughly compacted.

## 6.3 COMPACTION

Compaction may be obtained by use of a sheeps foot roller or pneumatic-tired roller. Water shall be applied as directed to obtain close adhesion between layers and all parts of the material. Fill shall be compacted to a minimum of 95% of the Standard Proctor maximum dry density (ASTM Specifications D- 698). A minimum of two (2) compaction tests per each two (2') feet of fill on a structure location shall be run by an experienced soils engineering technician.

In order to prevent damage to existing structures, heavy construction equipment shall not be allowed to operate within approximately 8 feet horizontally of the existing structure exterior wall.

## 7.0 BACKFILLING AROUND STRUCTURES

Only suitable material approved by the ENGINEER shall be used for backfilling around structures.

Backfilling around structures shall have material placed in layers of six (6") inch depth and compacted by pneumatic tools or other small equipment operated by hand. In no case shall the backfilling be allowed to obtain an elevation of one (1') foot above any other area. It shall be uniformly compacted throughout the structure depth. Any deviation shall be cause for the ENGINEER to require the material deposited to be removed and recompacted at the CONTRACTOR'S expense.

All backfilling shall be done in such a manner that the pipe or structure over or against which it is being placed will not be disturbed or injured. Any pipe or structure injured, damaged or moved from its proper line or grade during backfilling operations shall be removed or repaired to the satisfaction of the ENGINEER and then re-backfilled.

## 8.0 DAM EMBANKMENT *(Not Applicable to this Project)*

One foot of material shall be stripped from the top of the existing embankment. This material shall be stockpiled for use as final cover. The surface of the embankment shall then be moistened and/or worked with a harrow, scarifier, or other suitable equipment to

provide a satisfactory bonding surface for the additional fill. The surface condition must be approved by the ENGINEER prior to any fill being placed.

No fill material used in raising the embankment shall be dumped in place, but shall be distributed by blading or dozing in a manner that will insure placement so that voids, pockets, and bridging are held to a minimum. The hauling and placement equipment shall be routed over the area such that all areas receive approximately the same compactive effort. The fill shall be compacted such that in-place density checks indicate a soil dry density of at least 90 percent of the maximum value as determined by the standard Proctor density test. The embankment shall be raised in approximately horizontal lifts extending the entire length and width of the embankment. The thickness of the lifts before compaction shall not be more than eight (8) inches.

The stockpiled topsoil shall be uniformly spread over the raised embankment to insure that the final surface is capable of being vegetated.

It is anticipated that sufficient material to reach the designated elevations and grades will be generated from the excavation necessary to construct the principal spillway and the cleaning of the emergency spillway. Should an insufficient supply of material be available from these two sources, the needed additional material will be obtained from the borrow area below the toe of the embankment designated on the Drawings. Borrow operations shall be conducted in accordance with 4.08 BORROW.

## **9.0 PRELOADING OF STRUCTURES**

All tanks shall be preloaded with water prior to making final pipe connections. Elevations of structures shall be monitored until settlement has virtually ceased.

## **10.0 BACKFILLING TRENCHES**

The backfill shall be in accordance with other applicable sections of these specifications.

## **11.0 FINISH GRADING**

Finish grading shall be to the finished elevations and grades shown, and shall be made to blend into conformation with remaining natural ground surfaces. All finish graded surfaces shall be left smooth and free to drain. Areas to be sown in grasses shall be prepared according to Section 02003. Excess materials shall be spread and compacted as directed. Grading within the construction area and around the outside of building and structure lines shall be performed in a manner which will prevent accumulation of water within the area. Where necessary, or where shown, finish grading shall be extended to

insure that water will be directed to drainage ditches, and the site area left smooth and free from depressions holding water.

## 12.0 MAINTENANCE

All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels shall be maintained by the CONTRACTOR in good condition at all times until final acceptance by the OWNER. The CONTRACTOR shall maintain trench backfill at the original ground surface by periodically adding specified backfill material as necessary or when directed by the ENGINEER. Such maintenance shall be continued until final acceptance of the project.

## 13.0 PAYMENT

Payment for all excavation and fill work shown on the Drawings and herein specified, that is required to complete the clearing, grubbing, site grading, roads, structural excavation, trench excavation, borrow excavation, backfill, sheeting, shoring, topsoil, crushed stone or gravel, drainage, pumping, embankment fills and any other excavation and fills required to complete the work as shown on the Drawings shall be included in the work to which it is subsidiary in the Bid Schedule and no measurement of the quantities will be made. The contours and elevations of the present ground are believed to be reasonably correct but are not guaranteed. The CONTRACTOR shall satisfy himself by actual examination of the site of work as to the existing elevations and contours and the amount of work required under this Section.

The cost of all initial soils inspections and testing shall be paid by the OWNER. If compaction tests do not meet required values, the cost of additional testing as required by the ENGINEER shall be paid by the CONTRACTOR.

## SECTION 02003

### SEEDING, MULCHING AND CLEANING UP

#### 1.0 GENERAL

The Work covered by this Specification consists of furnishing all materials, equipment, and labor for preparing the seedbed, fertilizing, seeding and mulching the disturbed areas as directed by the ENGINEER. This Specification also covers cleaning up and repairing damage.

The ENGINEER shall direct all areas to receive seeding and mulching. All areas receiving seeding and mulching shall have lime and fertilizer applied.

#### 2.0 MATERIALS

##### 2.1 LIME

Two tons of agricultural limestone per acre shall be required.

##### 2.2 FERTILIZER

A. Amounts. The following amounts of fertilizer are required per acre:

- |                        |          |
|------------------------|----------|
| (1) Nitrogen (N)       | 60 lbs.  |
| (2) Phosphorous (P205) | 120 lbs. |
| (3) Potash             | 120 lbs. |

B. Analysis. This requirement can be met by applying fertilizer having an analysis of 10-20-20 at the rate of 600 pounds per acre.

##### 2.3 SEED

The following amounts of pure live seed are required per acre:

###### Permanent Mix

- |                        |         |
|------------------------|---------|
| (1) KY-31 Fescue       | 60 lbs. |
| (2) Perennial Ryegrass | 25 lbs. |
| (3) Red Clover         | 10 lbs. |

## Temporary Mix

- |                     |                        |
|---------------------|------------------------|
| (1) Annual Ryegrass | 40 lbs. (2/15 – 7/15)  |
| or Rye (Grain)      | 80 lbx. (7/15 – 11/15) |
| (2) KY 31 Fescue    | 40 lbs.                |

### 2.4 MULCH

Mulch shall consist of wood fiber applied at a rate of 1600 pounds per acre, bituminous treated straw applied at a rate of 2000 pounds per acre or other mulch subject to the advance approval of the ENGINEER.

## 3.0 EXECUTION

### 3.1 TIME

The seeding shall be completed within two weeks after completion of the work or as soon thereafter as conditions are favorable.

### 3.2 PREPARATION OF SEEDBED

- A. Application of Lime and Fertilizer. Immediately prior to seedbed preparation, the CONTRACTOR shall apply the agricultural lime and fertilizer uniformly over the area to be seeded.
- B. Mechanical Tillage. The seedbed shall be prepared by pulverizing and breaking up the soil to a minimum depth of two inches with a disk harrow, drag harrow, spike tooth harrow or similar tool. All rocks, clods, and undesirable material that would interfere with seeding operations shall be removed.

### 3.3 SEEDING

- A. Time. The seeding operations shall be performed immediately after, or as soon as practicable, after the seedbed has been prepared.
- B. Equipment. The seed shall be drilled or broadcast uniformly over the seedbed with regular approved type of equipment or method acceptable to the ENGINEER.
- C. Tillage. The seeded area shall be passed over with a harrow or cultipacker to help cover more seed and improve seedling establishment. Excessive tillage shall be avoided.

### 3.4 MULCHING

The approved mulch shall be applied uniformly over the seeded area at the rate required.

### 4.0 CLEANING UP

4.1 After all construction work is complete, prior to final payment, all exposed areas shall be cleaned and left in a sightly manner.

4.2 All unused material shall be removed from the site. No burning will be allowed on the site.

### 5.0 HYDROSEEDING AND HYDROMULCHING

The CONTRACTOR may hydroseed and hydromulch if the following requirements are met.

1. The individual seed quantities shall be increased by 20%.
2. The mulch shall be a processed hay or straw applied at a rate of 3/4 ton per acre with 80 lbs. per acre of an organic tackifier.
3. The hydroseeder slurry shall not be allowed to drop below a pH of 5.0.

### 6.0 MAINTENANCE AND WARRANTIES

#### 6.1 MAINTENANCE

The CONTRACTOR shall be responsible for the maintenance of all work under this Section until final acceptance. Adequate protection of exposed slopes shall be provided at all times to prevent excessive erosion. No work will be accepted unless there is evidence of healthy growth and sufficient cover to prevent erosion.

#### 6.2 WARRANTIES

Work executed under this Section shall be guaranteed for one year with the guarantee beginning on the date of final acceptance of all work under this Contract. Any seeded areas of the site which are found to not have an adequate growth of cover during the guarantee period, shall be re-seeded as soon as weather conditions permit, at no cost to the OWNER.

7.0 PAYMENT

Payment for all revegetation work and cleanup shall be included in the work to which it is subsidiary in the Bid Schedule and no measurement of the quantities will be made.

# SECTION 03001

## CONCRETE

### 1.0 CAST-IN PLACE CONCRETE

#### 1.1 SCOPE

This specification covers the furnishing of all materials, except as may be otherwise provided in the contract, equipment, labor and plant, and performing all operations specified herein, including the manufacturing, transporting, placing, finishing and curing of the concrete. The furnishing and placing of reinforcing steel when specified is covered in a separate technical specification.

#### 1.2 COMPOSITION

Concrete shall be composed of Portland cement, water, fine aggregate, coarse aggregate, and when specified or approved in writing by the Engineer, admixtures for entraining air or retarding agents. The design of the concrete mixture will be based on the water-cement ratio necessary to secure (a) a plastic workable mixture suitable for the specific conditions of placement, and (b) when properly cured, a product having durability, impermeability and strength, in accordance with all the requirements of the structures covered by these specifications. The concrete mixture shall be designed so that the concrete placed according to plans shall produce a minimum laboratory cylinder compressive strength equal to the strength designated in paragraph 3 for the class of concrete specified.

#### 1.3 CLASSIFICATION

Concrete shall be classified as Class A. The basis of classification of concrete shall be the minimum compressive strength at twenty-eight (28) days as listed below. Other minimum design requirements are also shown.

| Minimum Strength |         |          | Cement Factor |                 |
|------------------|---------|----------|---------------|-----------------|
| Class            | (7-day) | (28-day) | (Bags/C.Y.)   | Air Entrainment |
| A                | 2850    | 4000 psi | 6.0           | 4-½ ± 1-½ %     |



1.4 CEMENT

1.4.1 Portland Cement. Portland cement shall meet the requirements of ASTM Designation: C-150 for the type of cement specified.

1.4.2 Air-Entraining Portland Cement. Air entraining Portland cement shall meet the requirements of ASTM Designation: C-175 for the type of cement specified.

1.4.3 Storage of Cement on the Site. Cement shall be properly stored and protected from weather, dampness or other destructive agents and any cement which is damaged will be rejected and not permitted to be used in the work.

1.4.4 Sampling and Testing. Portland cement shall be subject to sampling and testing in accordance with ASTM Designation: C-150.

Air-entraining Portland cement shall be subject to sampling and testing in accordance with ASTM Designation: C-175.

1.5 AGGREGATES

1.5.1 Fine and Coarse Aggregates. Shall conform to the provisions of ASTM Designation: C-136 and ASTM Designation: C-33. Sand shall consist of clean, well graded particles of hard, durable stone and shall contain limited amount of deleterious substances. It shall be equivalent to washed Ohio, Scioto, or Cumberland River sand.

Coarse aggregate shall be washed river gravel or crushed limestone of hard durable particles and shall contain limited amounts of deleterious substances. The maximum size of coarse aggregate will be limited to one and one-half (1 1/2) inches.

1.5.2 Handling and Measurement of Materials. Aggregates shall be stored or stockpiled in such a manner that separation of coarse and fine particles of each size will be avoided and that various sizes will not become intermixed before proportioning. Methods of handling and transporting aggregates shall be such as to avoid contamination, excessive breakage, segregation or degradation, or intermingling or various sizes.

Scales for weighing aggregates and cement shall be beam type or springless dial type. They shall be accurate within 1 percent under operating conditions. All exposed fulcrums, clevises and similar working parts of scales shall be kept clean.

The quantities of cement and aggregates in each batch of concrete as indicated by the scales, shall be within the following percentages of the required batch weights:

Cement - plus or minus 1.0 percent  
Aggregates - plus or minus 2.0 percent

Measuring tanks for mixing water shall be of adequate capacity to furnish the maximum amount of mixing water required per batch and shall be equipped with outside taps and valves to provide for checking their calibration unless other means are provided for readily and accurately determining the amount of water in the tank.

Cement shall be measured by weight or in bags of 94 lbs. each. When cement is measured by weight, it shall be weighted on scale separate from that used for other materials, and in a hopper entirely free and independent of the hopper used for weighing the aggregates. When cement is measured in bags, no fraction of a bag shall be used unless weighed.

Aggregates shall be measured by weight. Mix proportions shall be based on saturated, surface-dry weights. The batch weight of each aggregate shall be the required saturated, surface-dry weight plus the weight of surface moisture it contains.

Mixing water shall consist of water added to the batch, ice added to the batch, water occurring as surface moisture on the aggregates and water introduced in the form of admixtures. The added water shall be measured by weight or volume to an accuracy of 1 percent of the required total mixing water. Added ice shall be measured by weight. Wash water shall not be used as a portion of the mixing water for succeeding batches.

Dry admixtures shall be measured by weight, and paste or liquid admixtures by weight or volume, within a limit of accuracy of 3 percent.

1.5.3 Sampling and Testing. When testing is required, the sampling shall be done in accordance with, and the testing results shall conform to, the ASTM Standards referenced herein. The source from which the aggregates are to be obtained shall be selected well in advance of the time when the material will be required in the work. Samples of the aggregates, when requested, shall be furnished at least fifteen (15) days in advance of the time when the placing of concrete is expected to begin.

Usually 150 pounds of sand for initial tests and 150 pounds for periodic tests will be sufficient. Usually 200 pounds of coarse aggregate for initial tests and 200 pounds for periodic tests will be sufficient.

Unless otherwise specified, all test samples shall be taken under the supervision of the Engineer and delivered to the designated point by the Contractor at his expense. Routine control tests and analysis of the aggregates at various stages in the processing operations will be made by the Engineer. The Contractor shall provide such facilities as the Engineer may consider necessary for the ready procurement of representative test samples.

It shall be the responsibility of the Owner to pay for the necessary tests. Once a material has been tested and approved for use, it shall be the Contractor's responsibility to use material throughout the job which is equal in all respects and from the same source as that approved material he delivered to the testing laboratory.

The Engineer shall order additional material tests, if in his opinion the material stored or being used is not equal to the approved tested material. The Contractor shall pay for additional tests if the material is not suitable in accordance with these specifications or if the characteristics of the material are such that a redesign of concrete mix is necessary.

If the Contractor desires to change supplier and/or source of materials after materials have been tested and approved, the Engineer may order additional material tests, the cost of which shall be charged to the Contractor.

In rare instances, a material may meet the requirements of these specifications, but have unusual characteristics which render it unsuitable for the use intended. Therefore, the Owner reserves the right to reject materials if adequate reason is furnished. The Owner also reserves the right to reject material suppliers and sources if quality, uniformity, and other important considerations are not and/or cannot be acceptably maintained. If suppliers or sources of material are rejected after work begins, it may be necessary to test materials from different suppliers and/or sources. If the Engineer deems that tests are necessary, the Contractor shall pay the cost of the necessary tests and all concreting shall be stopped until material is approved for use by the Engineer.

Each material must come from a single source, unless otherwise approved in writing by the Engineer.

All materials must be tested in accordance with these specifications and approved by the Engineer in writing before used in the work, unless the Engineer establishes that some or all of the tests will not be required because of the size of the project or for other reasons. Reports of test results shall be submitted to the Engineer in four (4) copies. It is the intent that the Owner shall pay for material tests necessary to insure suitability for the work, but the Owner shall not pay for material tests caused by negligence, indecision, or carelessness on the part of the Contractor, his subcontractors, or his suppliers.

In the case of ready-mixed concrete the requirements for design mix and testing shall be the same unless waived by the Engineer.

After award of the contract, the Contractor shall submit in writing to the Engineer the name, address and qualifications of the ready mix supplier who will furnish concrete for the project. The Contractor shall also submit the supplier and source of the sand, coarse aggregate, cement and admixture. The Engineer shall then select a testing laboratory and request proposed mixes from the Contractor or ready-mix plant. The Engineer will then indicate tests and design mixes required, to the testing laboratory. The testing laboratory shall also receive a copy of the materials specifications. After receiving the requisition for tests, the Contractor shall send materials per these specifications to the testing laboratory.

1.6 WATER

Water used in mixing concrete shall be fresh, clean and free from injurious amounts of sewage, oil, acid, alkali, salts, or organic matter, and its source shall be subject to the approval of the Engineer. The water used in mixing must be a minimum required for a plastic mix. No water will be permitted for purposes of hastening mixing and reducing tamping or vibration.

1.7 ADMIXTURES

1.7.1 Air-Entrainment. The air-entraining admixtures shall fully meet the requirements of ASTM Designation: C-260 and shall be subject to tests in accordance with ASTM Designation: C-233.

1.7.2 Retarding Agents. Approved types of retarding agents shall be included in the concrete mix when specified on drawings or authorized in writing by the Engineer.

1.7.3 Other Compounds. The use of calcium chloride or other accelerators or anti-freeze compounds will not be allowed.

1.8. CONSISTENCY

The consistency of any concrete shall be such that it can be worked readily into the corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface. The following ranges represent the extreme limits of allowable slump when tested, in accordance with ASTM Designation: C-143. Where vibrators are used, the Engineer may allow a slightly less slump than the specified minimum.

| <u>Class of Concrete</u> | <u>Slump Range (Inches)</u> |
|--------------------------|-----------------------------|
| Class A                  | 1½ to 3                     |

The quantity of mixing water shall not be changed without the consent of the Engineer.

1.9 AIR-ENTRAINED CONCRETE

1.9.1 General. When air-entrained concrete is specified, air-entrainment shall be accomplished by using an air-entrained Portland cement or by using an air-entraining admixture with normal Portland cement. If the entrained air content falls below the specified limit when using air-entrained cement, an air-entraining admixture shall be added in sufficient quantity to bring the entrained air content within the specified limits. If the entrained air content is found to be greater than the maximum specified, when using an

air-entrained cement, the use of an air-entraining cement shall be prohibited and air-entrainment shall be accomplished by using an air-entraining admixture with normal Portland cement. Air-entraining admixtures shall be added in solutions to a portion of the mixing water by means of a mechanical batcher in a manner that will insure uniform distribution of the agent throughout the batch. The air content of freshly mixed air-entrained concrete shall be determined as a percentage of the volume of the concrete by following the methods specified in ASTM Designation: C-138, C-173, or C-231. Air content determination shall be made on samples of concrete during placement of the concrete in the forms.

Unless otherwise specified the air content (by volume) of the concrete at the time of placement shall be:

| Maximum Size Aggregate      | Air Content (%) |
|-----------------------------|-----------------|
| 3/8 inch to 1/2 inch        | 6 to 9          |
| over 1/2 inch to 1 inch     | 5 to 8          |
| over 1 inch to 2 1/2 inches | 3 to 6          |

1.9.2 Adjustment of Mix Proportions. When air-entrained concrete is specified, the amount of water and fine aggregate prescribed for normal concrete shall be reduced to compensate for the increased volume of air contained in the air-entrained concrete. This is to maintain the concrete's strength.

#### 1.10 QUALITY OF CONCRETE

1.10.1 Control. The Contractor shall be responsible for the design of the concrete mixtures and the quality of the concrete including ready-mix. Prior to any concrete construction or any change in the mix during construction, the Contractor shall furnish a statement to the Engineer giving the proportions by dry weight of cement and of fine and coarse aggregate that will be used in the manufacture of each class of concrete contained in the contract. The Contractor will also furnish material samples to the laboratory for testing a design mix. Based on laboratory evidence, the Engineer will either approve the proposed mix or indicate the necessary proportions to meet the specified requirements.

1.10.2 Measurements. All materials entering into the concrete shall be mechanically measured by weight except the air-entraining admixture and water which may be measured by volume.

1.10.3 Delivery Ticket. Where truck mixers or ready-mix are used, the Contractor shall submit, for each load, a certified delivery ticket given the quantities of cement, fine and coarse aggregate, water, admixture, and the time that water was added to the batch.

## 1.11 DESIGN MIX AND CYLINDER TESTS

Standard tests of the strength of the concrete may be made by the Engineer at any time he elects to do so. The following tests will be performed by the methods indicated:

| Test                       | Method<br>(ASTM Designation) |
|----------------------------|------------------------------|
| Sampling                   | C-172                        |
| Slump Test                 | C-143                        |
| Air Content                | C-231 or C-173               |
| Compression Test Specimens | C-31 or C-42                 |
| Compressive Strength       | C-39 or C-42                 |
| Unit Weight                | C-138                        |

Test of a portion of a batch may be made on samples representative of that portion for any of the following purposes:

- (1) Determining uniformity of the batch.
- (2) Checking compliance with requirements for slump and air content when the batch is discharged over an extended period of time.
- (3) Checking compliance of the concrete with the specifications when the whole amount being placed in a small structure, or a distinct portion of a larger structure, is less than a full batch.

1.11.1 Slump Test. At least one slump test shall be made before first concrete pour, at the start of pouring any concrete and at each seven cubic yards deposited during one operation. These shall be made from same samples as those taken for cylinder tests, and records of same kept therewith. Tests shall be made according to ASTM Designation C-143 and as required under ASTM Designation C-94 for ready-mixed concrete. The Contractor shall furnish the necessary equipment and labor for making slump tests. Water in excess of the maximum required for a practical concrete mix will have adverse effects on shrinkage, durability, and strength of concrete. Concrete which has a greater slump than specified or directed by the Engineer can be rejected by the Engineer without cost to the Owner.

1.11.2 Entrained Air Tests. The Contractor shall furnish and have on the job at all times, one (2) LA-345 Chase Air Indicator Kit, one (1) LA-340 Spare Chase Air Indicator, and two (2) quarts of isoproyl alcohol (rubbing alcohol) for the Engineer's use in making entrained air measurements. The alcohol can be obtained locally at any drug store and the one (1) LA-345 and one (1) LA-340 can be procured from Forney's Inc., Route 18, R.D. No. 2, Wampum, Pennsylvania 16157, for approximately \$40.00.

The amount of measured entrained air shall be recorded by the Engineer. Mortar shall be sampled only from concrete taken directly from the mixer. At least one (1) air measurement shall be made for each test cylinder taken. Concrete which has more or less entrained air than specified or directed by the Engineer can be rejected by the Engineer without cost to the Owner.

1.11.3 Initial Design Mix Cylinder Tests. Where more than 50 cubic yards of concrete are placed: The testing laboratory selected by the Owner shall make a set of six (6) test cylinders from the design mix. Three (3) shall be tested at 7 days and three (3) shall be tested at 28 days per ASTM Designation C-39. Test cylinders shall have a compressive strength per Article 3 of this section. The CONTRACTOR shall pay the cost of the design mix and design mix cylinder tests, and the Owner shall not pay for additional design mixes and design cylinder tests, caused by negligence, indecision, or carelessness on the part of the Contractor or his suppliers.

It is important for the Contractor to pursue all concrete testing requirements with dispatch so that approval of concrete can be granted by the Engineer in writing after all tests are completed.

1.11.4 Periodic Cylinder Tests. All cylinders shall be made per ASTM C-31 and tested per ASTM C-39. The Contractor shall furnish all labor and equipment for sampling and curing cylinders on the job site and transportation to the laboratory for testing. The Owner shall select the laboratory and the Contractor shall bear the cost for testing the concrete cylinders.

At the start of concreting, three cylinders shall be made. One shall be tested at 7 days and two shall be tested at 28 days.

Throughout the remainder of the job, the Engineer shall direct when cylinders shall be taken and in what number they shall be taken. At each time when twenty (20) or more cubic yards of concrete are placed during one operation, and when the sum of smaller deposits of concrete equal thirty (30) cubic yards since previous test, and at any change in mix, three (3) cylinders shall be made. One (1) shall be tested at 7 days and two (2) shall be tested at 28 days.

For a strength test, three (3) test specimens will be made from a composite sample. The test result will be the average of the strength of the three specimens, except that, if one specimen in a test shows manifest evidence of improper sampling, molding, or testing, it shall be discarded and the remaining two strengths averaged. Should more than one specimen, representing a given test, show definite defects due to improper sampling, molding or testing, the entire test shall be discarded.

The Engineer will ascertain and record the batch number for the concrete and the exact location in the work at which each batch represented by a strength test is deposited.

The Engineer shall have free entry to the plant and equipment furnishing concrete under the contract. Proper facilities shall be provided for the Engineer to inspect materials, equipment and process and to obtain samples of the concrete. All tests and inspections will be conducted so as not to interfere unnecessarily with the manufacture and delivery of the concrete.

#### 1.12 FAILURE TO MEET STRENGTH REQUIREMENTS

If cylinders do not meet strength requirements, the Engineer can order shutdown on all concreting and redesign of concrete mix by the laboratory selected by the Owner. The cost of mix redesign shall be paid for by the Contractor. The Engineer can also order additional tests, such as load tests, Swiss Hammer tests, and/or core tests in the areas of the work represented by unacceptable cylinders. If areas of work are found to be under strength requirements, the Engineer can order the Contractor to strengthen or replace those areas as the expense of the Contractor.

When it is determined that such concrete shall be removed and replaced the Contractor shall be notified in writing, stating the extent of the replacement to be made.

#### 1.13 BATCHING AND MIXING

1.13.1 Equipment. The Contractor shall provide at the site of the work a modern and dependable batch-type mixing plant with a capacity consistent with the size of the job. The equipment shall be capable of combining the aggregate, cement and water into a uniform mixture and of discharging this mixture without segregation. Adequate facilities shall be provided for the accurate measurement and control of each of the materials entering the concrete. The complete plant assembly shall include provisions to facilitate the inspection of all operations at all times. Ready-mix concrete may be used, if approved by the Engineer, in which case the mixing plant at the site will not be required. All mixing requirements specified herein for concrete mixed at the site shall be applicable to ready-mixed concrete. Measurements of materials for ready-mixed concrete shall conform to ASTM Designation: C-94. The Engineer shall have free access to the mixing plant at all times. Truck mixers will be allowed, provided the use of this method will cause no violation of any applicable provisions of specifications for concrete contained herein. Truck mixers, unless otherwise authorized by the Engineer, shall be of the revolving drum-type, watertight, and so constructed that the concrete can be mixed to insure the uniform distribution of materials throughout the mass. Each truck mixer shall be equipped with a tank of known capacity which shall be equipped with an accurate device for measuring the amount of water added. Truck mixers and agitator shall be operated within the limits of capacity and speed of rotation designated by the manufacturer of the equipment.

1.13.2 Mixing Time. Neither the speed nor the volume capacity of the mixer shall exceed those recommended by the manufacturer. Excessive overmixing, requiring additions of water to preserve the required consistency, will not be permitted. The mixing time for



each batch after all solid materials are in the mixer drum, provided that all the mixing water shall be introduced before one-fourth (1/4) of the mixing time has elapsed, shall be not less than two (2) minutes for mixers having capacities up to two (2) cubic yards. For mixers of larger capacities, this minimum shall be increased fifteen (15) seconds for each cubic yard or fraction thereof of additional capacity.

When a truck mixer is used, each batch of concrete shall be mixed not less than fifty (50) nor more than three hundred (300) revolutions, at a mixing speed of not less than four (4) r.p.m. after all materials are in the mixer drum. In all such cases, however, the concrete shall be delivered to the job site and discharged within 1 1/4 hours or before the drum has revolved 300 times, whichever comes first, after the mixing water has been added.

#### 1.14 CONVEYING

Concrete shall be conveyed from mixer to forms as rapidly as practicable, by methods which will prevent segregation or loss of ingredients. There shall be no vertical drop greater than five (5) feet, except where suitable equipment is provided, to prevent segregation and where specifically authorized by the Engineer. Chuting from towers or elevated positions of the mixer will be permitted, but the water content will be subject to the Engineer's control and excess water will not be allowed, in order to force the concrete to flow clean from the chutes, unless all flushing of chutes is discharged outside the forms.

Belt conveyors, chutes or other similar equipment in which the concrete is delivered to the structure in a thin, continuously exposed flow, will not be permitted, except for very limited or isolated sections of the work and only then if approved in writing by the Engineer. Such equipment shall be arranged to prevent objectionable segregation.

Where wall forms exceed five (5) feet in height, suitable measures, such as the use of tremie tubes, where practicable, or portholes, shall be provided in the forms to limit the vertical drop of the concrete to a maximum of five (5) feet. Openings shall be spaced around the perimeter of the formed area so that lateral flow of fresh concrete will be limited to three (3) feet. Drop chutes which may be provided to convey the concrete through wall ports shall have an outside pocket under each form opening to stop the concrete and allow it to flow easily over into the form without separation.

No concrete shall be placed until the Engineer has given his approval of the subgrade, forms and reinforcing steel in place. If the reinforcing steel is not placed in accord with the drawings, the Engineer shall stop the Contractor from placing any concrete until the error is corrected. Under no circumstances will an attempt be made to correct errors by inserting additional unscheduled bars. No concrete shall be placed except in the presence of the Engineer or his representative, and the Contractor shall give reasonable notice of his intention to pour.

Before any concrete is placed, the forms and subgrade shall be free of chips, dirt, sawdust, or other extraneous materials.

## 1.15 PLACING

1.15.1 General. Concrete shall be placed within one and one-quarter (1-1/4) hours after the introduction of the water to the cement and aggregates. In hot weather or under conditions contributing to quick stiffening of the concrete, or where the temperature of the concrete is 85°F or above, the time shall be reduced to 45 minutes. The Engineer may allow a longer time, providing the setting time of the concrete is increased a corresponding amount by the addition of an approved set-retarding mixture. Concrete shall be deposited as closely as possible to its final position in the forms so that flow within the mass and consequent segregation are reduced to a minimum.

Vibrators may be used to aid in the placement of the concrete provided they are used under experienced supervision, and the forms designed to withstand their action. The duration of vibration shall be limited to that necessary to produce satisfactory consolidation without causing objectionable segregation. Vibration shall not be applied directly to the reinforcement steel or the forms nor to concrete which has hardened to the degree that it does not become plastic when vibrated.

The Contractor shall keep at least one spare vibrator on the job during all concrete placing operations.

When a vibrator is used the Contractor shall also spade the concrete along form surfaces a sufficient amount to prevent excessive size or numbers of air-void pockets in the concrete surface, except where an approved absorptive form lining is used; in which case the spading specified above will not be permitted.

1.15.2 Lifts in Concrete. The permissible depth of concrete placed in each lift shall be as shown on the drawings or specified herein. All concrete shall be deposited in horizontal layers not exceeding twenty (20) inches in thickness, unless otherwise authorized or directed. The placement shall be carried on at such a rate that the formation of cold joints will be prevented. If a delay occurs in excess of a thirty (30) minute interval between any two (2) consecutive batches or loads, or in case of any delay between placing batches that allows previously placed concrete to take initial set, the Contractor shall discontinue the placing of concrete and make, at his own expense, a construction joint satisfactory to the Engineer before proceeding with the placing operations. He shall remove any portion of the previously placed concrete that is deemed necessary for the proper formation of the construction joint and no payment shall be made to the Contractor for the concrete removed. The thirty (30) minute limitation, cited immediately above, may be extended in those cases where an approved type retarder is added to the concrete mixture to delay the set of the concrete. Use of a retarder in the mix shall be subject to approval of the Engineer.

Hoppers, chutes, and pipes shall be used as necessary to prevent splashing of mortar on forms and reinforcing above the layer being placed.

1.15.3 Placing Temperature. Concrete shall be mixed and placed only when the temperature is at least forty (40) degrees F. and rising, unless permission to pour is obtained from the Engineer, in which event all material shall be heated and otherwise properly prepared so that batching and mixing can proceed in full accord with the provisions of this specification. The methods proposed for heating the materials and protecting the concrete shall be approved by the Engineer. Salt, chemicals, or other materials shall not be mixed with the concrete for the purpose of preventing freezing. Accelerating agents shall not be used.

Concrete placement will not be permitted when, in the opinion of the Engineer, the sun, heat, wind, or humidity prevents proper placement and consolidation.

When the atmospheric temperature may be expected to drop below 40°F at the time concrete is delivered to the work site, during placement or any time during the curing period, the following provisions also shall apply:

- (1) The temperature of the concrete at the time of placing shall not be less than 50°F nor more than 90°F. The temperature of neither aggregates nor mixing water shall be more than 100°F just prior to mixing with the cement.
- (2) When the daily minimum temperature is less than 40°F, concrete structures shall be insulated or housed and heated after placement. The temperature of the concrete and air adjacent to the concrete shall be maintained at not less than 50°F nor more than 90°F for the duration of the curing period.
- (3) Methods of insulating, housing and heating the structure shall conform, to "Recommended Practice for Cold Weather Concreting," ACI Standard 306.
- (4) When dry heat is used to protect concrete, means of maintaining an ambient humidity of at least 40 percent shall be provided unless the concrete has been coated with curing compound or is covered tightly with an approved impervious material.

For obtaining the proper curing conditions for the concrete poured, steam heating equipment, oil-fired blowers (airplane heaters) located outside the enclosure and blowing hot air into the enclosure, or other similar equipment of a capacity sufficient to maintain the required minimum temperature all over, will be required. In conjunction with forced air heaters, means of supplying moisture to the area being cured will also be required. Oil or coke burning salamanders and other fuel-burning heaters produce carbon dioxide which combines with calcium hydroxide in fresh concrete to form a weak layer of calcium carbonate. When this occurs, the surface of the concrete floor will dust under traffic. For this reason, carbon dioxide producing heaters shall not be used while placing concrete and for the first 24 to 36 hours of the curing period unless they are properly vented.

The Contractor must have a sufficient steam retaining canvas or other protective covering at the site to cover all sides and tops of forms to be poured and concrete to be cured, before pouring of concrete will be allowed. This covering must be placed over and around forms and concrete being cured in such a manner that circulation of curing air will prove effective to the tops of floors and to the outside, top and corners of concrete structures, as well as to their interiors. Concrete shall be moist cured in accordance with paragraph 18 of this section. The Contractor may strip forms during curing period with covering removed, provided atmospheric temperatures are above specified curing temperatures, concrete surfaces are kept moist, and time and labor is available for recovering for lower night temperatures.

When climatic or other conditions are such that the temperature of the concrete may reasonably be expected to exceed 85°F at the time of delivery at the work site, during placement, or during the first 24 hours after placement, the following provisions also shall apply:

- (1) The Contractor shall maintain the temperature of the concrete below 85°F during mixing, conveying, and placing. Methods used shall conform to "Recommended Practice for Hot Weather Concreting," ACI Standard 605.
- (2) The concrete shall be placed in the work immediately after mixing. Truck mixing shall be delayed until only time enough remains to accomplish it before the concrete is placed.
- (3) Exposed concrete surfaces which tend to dry or set too rapidly shall be continuously moistened by means of fog sprays or otherwise protected from drying during the time between placement and finishing, and after finishing.
- (4) Finishing of slabs and other exposed surfaces shall be started as soon as the condition of the concrete allows and shall be completed without delay.
- (5) Concrete surfaces exposed to the air shall be covered as soon as the concrete has hardened sufficiently and shall be kept continuously wet for at least the first 24 hours of the curing period, and for the entire curing period unless curing compound is applied as specified in subsection 7, below.
- (6) Formed surfaces shall be kept completely and continuously wet for the duration of curing period (prior to, during and after form removal) or until curing compound is applied as specified in subsection 7, below.
- (7) If moist curing is discontinued before the end of the curing period, white pigmented curing compound shall be applied immediately.

1.15.4 Concrete on Rock Foundations. Rock surfaces upon which concrete is to be placed shall be clean, free from oil, standing or running water, mud, objectionable coatings, debris, loose semidetached, or unsound fragments. Faults or seams shall be cleaned to a depth satisfactory to the Engineer, and to firm rock on the sides. Immediately before concrete is placed, all such rock surfaces shall be cleaned thoroughly by use of high velocity air-water jets, wet sandblasting, or other means satisfactory to the Engineer. All rock surfaces shall be kept continuously wet for forty-eight (48) hours and all approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar of the same sand-cement ratio as used in the concrete.

1.15.5 Concrete on Earth Foundations. Unless otherwise authorized all concrete shall be placed upon clean, damp surfaces free from frost, ice, or deleterious materials, and standing or running water. Concrete shall not be placed in mud, dried porous earth or upon fill that has not been subject to approved rolling or tamping until optimum compaction has been obtained. The Contractor shall take all measures to accomplish the results specified in this paragraph.

1.15.6 Vertical Point Spacing. The layout of all monoliths shall be as shown on the drawings or as directed and approved by the Engineer before construction is started.

1.15.7 Placing Concrete Through Reinforcement. In dropping concrete through reinforcement, care shall be taken that no segregation of the coarse aggregate occurs.

#### 1.16 CONSTRUCTION JOINTS

Contractor shall furnish and install vinyl or plastic waterstops as manufactured by W.R. Meadows, Inc., Waterstops Inc., or B.F. Goodrich Inc., or approved equal quality. Waterstops shall be center bulb type 6 inches wide unless shown otherwise in the plans. Care and diligence shall be exercised in securing proper embedment in the concrete mix.

The waterstop shall be extruded from elastomeric polyvinyl-chloride material and joints shall be cemented as recommended by the manufacturer. The Contractor may use other waterstop materials subject to the Engineer's approval.

Construction joints shall be located as indicated on the contract drawings, or as approved by the Engineer. The surfaces of construction joints shall be clean when covered with fresh concrete. Cleaning shall consist of the removal of all laitance, loose or defective concrete and foreign material. Cleaning of the surface of construction joints shall be accomplished by the use of high velocity air-water jets, wet sandblasting, or other effective means satisfactory to the Engineer. Surfaces of construction joints that have been permitted to dry by reason of the succeeding lift or adjoining concrete not being placed within the specified post-curing period shall be moistened and kept continuously moist for at least forty-eight (48) hours immediately prior to the placing of the succeeding lift or adjoining concrete. All pools of water shall be removed from the surfaces of construction joints before the new concrete is placed.

## 1.17 FINISHING

1.17.1 Defective concrete, honeycombed areas, voids left by the removal of tie rods, ridges on all concrete surfaces permanently exposed to view or exposed to water on the finished structure, shall be repaired immediately after the removal of forms unless otherwise authorized or directed. Voids left by removal of tie rods shall be reamed and completely filled with dry-patching mortar.

Defective concrete shall be repaired by cutting out the unsatisfactory material and placing new concrete which shall be secured with keys, dovetails, or anchors. Defective areas shall be chipped away to a depth of not less than 1 inch with the edges perpendicular to the surface. The area to be patched and a space at least 6 inches wide entirely surrounding it shall be wetted to prevent absorption of water from the patching mortar. A grout of equal parts Portland Cement and sand, with sufficient water to produce a brushing consistency, shall then be well brushed into the surface, followed immediately by the patching mortar. The patch shall be made of the same material and of approximately the same proportions as used for the concrete except that the coarse aggregate shall be omitted. The mortar shall not be richer than 1 part cement to 3 parts sand. On exposed surfaces, white Portland Cement shall be substituted for a part of the grey Portland Cement to match the color of the surrounding concrete. The proportion of white and grey cements shall be determined by making a trial patch. The amount of mixing water shall be as little as consistent with the requirements of handling and placing. The mortar shall be retempered without the addition of water by allowing it to stand for a period of 1 hour during which time it shall be mixed occasionally with a trowel to prevent setting.

The mortar shall be thoroughly compacted into place and screeded off so as to leave the patch slightly higher than the surrounding surface. It shall then be left undisturbed for a period of 1 to 2 hours to permit initial shrinkage before being finally finished. The patch shall be finished in such a manner as to match the adjoining surface.

Excessive rubbing of formed surfaces will not be permitted. All unformed surfaces of concrete, exposed in the completed work, shall have a wood float finish without additional mortar.

1.17.2 When concrete is honeycombed, damaged or otherwise defective, the Contractor shall remove and replace the structure or structural member containing the defective concrete, or correct or repair the defective parts. The Engineer will determine the required extent of removal, replacement or repair.

Prior to starting repair work the Contractor shall obtain the Engineer's approval of his plan for making the repair. Such approval shall not be considered a waiver of the Contracting Officer's right to require complete removal of defective work if the completed repair does not produce concrete of the required quality and appearance. Repair work shall be

performed only when the Engineer is present. Repair of formed surfaces shall be started within 24 hours after removal of the forms.

Joints and edges of unformed surfaces that will be exposed to view shall be chamfered or finished with molding tools.

1.17.3 In order that the rubbing required by these specifications shall be effective, non-supporting forms may be stripped with 24 hours after concrete pouring is completed, and initial rubbing required completed with 48 hours. If possible, patching and rubbing shall be done at the same time. This requirement regarding form removal is secondary to heating requirements, and the specifications heretofore included regarding heating of concrete shall take precedence.

After the required curing time has elapsed, support forms may be removed to allow finishing. Finish shall be Type I, II, or III as required by the "Concrete Finishes" section. In general, surfaces that will show in the finished work will be rubbed down with a coarse carborundum stone. Floors and slabs shall be float finished as soon as possible after pouring unless otherwise specified. Cement or mortar coating will not be permitted. The Contractor should refer to the section on "Concrete Finishes" for complete finish requirements for all concrete units.

Rubbing is not required lower than 6 inches below water levels in basins, but all fins must be removed and holes patched. Exposed inside surfaces to be painted must be rubbed smooth.

The surfaces of exposed concrete roofs, walks, and copings shall be finished with a wooden float and left with a gritty surface similar to that in general use for sidewalks. This finish and floating must be done at the proper period in the setting of the concrete. These outside exposed surfaces of floors and roofs must be finished as one piece of work without a separate top coat.

Basin and channel floors shall be struck off smooth and finished with a steel float to produce a surface easily cleaned. The inside exposed floors must be finished with a steel float to even surfaces and present a neat, smooth, and satisfactory appearance. Finish with bevel around all curbs, and other openings. Floors must be finished to drain to floor traps and sump with slopes as shown on the plans. Floors at the walls must be level except where shown otherwise on the plans.

Surfaces of precast concrete members that are to be painted shall have all air holes and other imperfections filled and dressed to present surfaces comparable in smoothness and appearance to rubbed concrete as set forth above.

1.17.4 Watertightness. All concrete when finished must be watertight. Exposed concrete surfaces shall show no dampness when the interior of basins or exterior of pits have been filled with water for seven days. To obtain this result, the foregoing specifications must be

rigidly followed. In case any leakage or dampness shows on the surface of any such walls after testing the time stated, then such defects must be remedied by the Contractor and work will not be accepted until this is done.

1.17.5 Openings for Pipes and Joints to Pipes. Where pipes pass through concrete walls or floor pours they shall do so by the use of a mechanical joint wall sleeve. The sleeve shall be cast into the pour and it shall be of sufficient length to allow easy installation or removal of the main line pipe.

Where malleable pipe (steel, wrought iron, or copper), brittle pipe (hard rubber), rubber hose, or any pipe cut to fit on the job, passes through any concrete slab, floor or wall, a wrought or cast iron pipe nipple with about 1/2 inch greater diameter than the outside of the pipe shall be used as a sleeve and cast into the slab. In case of floors above ceilings, these sleeves shall extend 1/2 inch to 1 inch above floor surface, to prevent scouring water from running into them. If joint about pipe is required for watertightness or pipe support, the annular ring shall be caulked with dry, unbraided oakum to within 2 inches of surface. The ring at surface shall be filled with nonshrink grout, raked back 1/2 inch, and filled with 1/2 inch cap of Portland Cement grout as previously mentioned.

Where holes greater than 10 inch diameter have to be cut for pipe in existing concrete slabs or walls, the space about the pipe shall be formed to original surfaces and the pipe wrapped with 1/2 inch braided hemp. In grouting this space, use a nonshrink grout, such as Sonneborn "Ferrolith G" or Masters Builders "Embeco". Where walls and spaces give sufficient room for safely using large aggregate, this may be added in a quantity equal to the sand specified. After removal of forms, the yarn shall be removed for a depth of 2 inches from water side and/or exposed surfaces, and the space refilled to surface with a nonshrink grout. Then the joint shall be raked back 1/2 inch from the surface and filled with a one to two mix grout of Portland Cement and sand.

## 1.18 CURING AND PROTECTION

1.18.1 General. All concrete shall be cured for a period of not less than seven (7) consecutive days by an approved method, or combination of methods. The curing process shall be done so as to prevent loss of moisture from the concrete for the duration of the entire curing period. Unhardened concrete shall be protected from heavy rains and flowing water. All concrete shall be adequately protected from damage.

1.18.2 Moist Curing. Concrete shall be moist cured by maintaining all surfaces continuously (not periodically) wet for the duration of the entire curing period. Water for curing shall be clean and free from any elements which will cause staining or discoloration of the concrete. Where forms of wood are used and left in place during curing, the wood shall be kept wet at all times.



1.18.3 Membrane Curing. At the option of the Contractor and when approved by the Engineer, the concrete may be cured with an approved curing compound of the surface membrane type in lieu of moist curing with water provided a permanent stain is not produced and provided the concrete surface is not to receive rubbed finish, terrazzo, tile, paint, chemical hardening, grout, cement patch, or concrete topping. The curing compound shall be applied to formed surfaces immediately after the forms have been removed and the surfaces cleaned of any loose sand, mortar and debris. The surface to receive the compound shall be moistened thoroughly with water and the compound applied as soon as the moisture film has disappeared but when the surface is still damp. On unformed surfaces the compound shall be applied immediately after the surface loses its free water and has a dull appearance.

The curing compound shall be applied in a twocoat continuous operation by approved spraying equipment and at a coverage of not more than two hundred (200) square feet per gallon for both coats. The second coat shall be applied to overlap the first coat in a direction at approximately right angles to the direction of the first application. Concrete surfaces which are subjected to heavy rainfall within three (3) hours after the curing compound has been applied shall be resprayed by the method and at the coverage herein specified. All concrete surfaces on which curing compound has been applied shall be adequately protected for the duration of the entire curing period from any damage that would disrupt the continuity of the curing membrane.

The curing compound shall conform to Type 2 or Type 3 of ASTM Designation: C-309.

All curing compound shall be delivered to the site of the work in the original sealed container bearing the name of the manufacturer, the brand name and the manufacturer's batch number. The compound shall be approved prior to use. The compound shall be stored so as to prevent damage to the containers, and water-emulsion types shall be protected from freezing.

1.18.4 Cold Weather. The air and forms in contact with the concrete shall be maintained at temperatures above forty (40) degrees for at least seven (7) days and at a temperature above freezing for at least 21 days. Concrete, permitted to be cured with curing compounds, shall be provided the same protection against freezing and low temperatures as provided herein. No fire or excessive heat shall be permitted near or in direct contact with concrete at any time.

## 1.19 FORMS

1.19.1 Material. Forms shall be wood, steel, or other approved material. Wood forms shall be tongue-and-groove lumber of uniform width and thickness, or plywood having a minimum of five (5) plies, a minimum thickness of 9/16 inch, and a type made especially for concrete forms. Steel forms shall be of a type acceptable to, and commonly used in the construction field. The type, shape, size, quality and strength of all material of which the forms are made shall be subject to the approval of the Engineer.

1.19.2 Construction. Forms shall be true to line and grade, mortartight, and sufficiently rigid to prevent objectionable deformation under load. Where forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the complete surface so as to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall be constructed such that keyways, waterstops, and dowels can be placed as shown in the plans.

Responsibility for their adequacy shall rest with the Contractor. The form surfaces shall be smooth, free from irregularities, depressions, sags, or holes when used for permanently exposed faces. Bolts and rods used for internal ties shall be so arranged that, when all forms are removed, all metal will not be less than one (1) inch from any concrete surface. Wire ties will not be permitted. All forms shall be so constructed so that they can be removed without hammering or prying against the concrete. All exposed joints shall be chamfered and suitable molding shall be placed to bevel or round exposed edges or corners, unless otherwise directed by the Engineer.

Temporary openings shall be provided in the inside form of all wall forms and column forms to facilitate cleaning and inspection immediately before depositing concrete. When wood sheathing is used for the inside form, the bottom board shall be fitted and removed to provide a continuous cleanout space and if plywood is used, the forms shall be started with a 6- inch wide piece for the same purpose. Washing out of all forms and other concrete before pouring new materials must be done with water or air from a hose under pressure. The hose must be provided with a suitable nozzle for this work. The intent of these specifications is to produce a perfectly watertight structure in all cases, without any subsequent repair work. Forms shall be so assembled that their removal will not damage the concrete.

Contact surfaces of forms shall be divided into two categories; forms for exposed concrete, and forms for unexposed concrete. Exposed concrete shall mean concrete normally exposed to view and shall be considered extending 6 inches below planned regrade or water level. Exposed concrete shall exclude interior surfaces of covered water holding basins and unpainted, unfinished, interior surfaces of manholes and vaults. Unexposed concrete shall be concrete not normally exposed to view and shall include all concrete not included by exposed concrete, unless otherwise noted on the plans or in the specifications. Either unlined forms or lined forms (as hereinafter specified) shall be used for exposed concrete. A combination of lined forms for exposed concrete and unlined forms for unexposed concrete may be used in a structure where only a part of the structure is exposed. When this combination occurs, the Engineer will determine, upon request of the Contractor, if that portion of the structure which requires lined forms can be reduced in section to accommodate the liner without offsetting the liner backing from the sheathing used for the unexposed portion of the structure.

(1) Forms for Exposed Concrete

- (a) Unlined. The contact surface of forms shall be constructed from 5/8 inch or 3/4 inch 5 ply structural plywood of concrete form grade. All concrete form plywood shall be designated by grade marking each panel. Full sized sheets of plywood must be used except where smaller pieces will cover an entire area. The edges of all plywood sheets shall be straightened on the bench to insure close fitting, tight joints. All vertical joints shall be backed solidly and the edge of abutting sheet shall be nailed to the same stud.

When the one form is erected and reinforcement is in place, and before the other form is erected, the Engineer shall be notified and the other form shall not be placed until work already done is approved. Open joints which would permit leakage of grout shall be sufficient cause for rejection of forms. If, in the opinion of the Engineer, pointing of slightly open joints will prevent leakage, then such pointing shall be done with an approved mixture. Pointing shall be carefully done and there shall be no trace of the pointing mixture on the surface of the sheathing.

Contact surfaces of forms shall be in good condition. The Engineer has the right to reject forms which will not produce a smooth, uniform, concrete surface.

- (b) Lined. The backing for form lining shall be constructed of a good grade of form lumber that is solid, straight, and free from defects that might impair its strength but need not be of the quality used for contact forms. Square-edged, sized lumber may be used for form boarding in place of shiplap or tongue-and-groove.

The boarding for lined forms may be horizontal or vertical, depending upon convenience. Form sheathing shall be securely nailed to the studs and the edges of the boards shall be in contact to prevent any bulging of the lining.

Plywood faced panel or patented forms in good condition, with tight fitting joints, such as steel-ply forms, can be substituted for lined forms if a smooth wall surface, as required by these specifications, can be obtained. Minor variations in concrete texture at form joints will be permitted.

Lining material shall be 1/4 inch structural plywood securely nailed to the form sheathing. All lining material shall be used in as wide pieces as possible. Areas less than 4 feet in width shall be lined with a single width of plywood.

Joints in lining and backing shall not occur at the same place and butting edges of adjacent sheets shall be nailed to the same board. The lining material shall be nailed to the backing beginning at the center of the board and working toward the edges to prevent buckling. Lining material may be re-used, if it is in satisfactory condition and is approved by the Engineer. Open joints which would permit leakage of grout shall be sufficient cause for rejection of forms. If, in the opinion

of the Engineer, pointing of slightly open joints will prevent leakage, then such pointing shall be allowed.

In the case of lined circular forms where the backing for form lining is constructed in chords of a circle, the form lining shall be adequately supported by variable thickness shim strips on at least 6 inch centers so that the liner forms a circular surface within tolerances specified herein.

## (2) Forms for Unexposed Concrete

Forms shall be constructed of a good grade of form lumber that is solid, straight and free from defects which might impair its strength, but need not be of the quality required for contact surfaces of forms for exposed concrete. Forms shall be of shiplap of T & G No. 2 wood sheathing, 3/4 inch plywood, 5/8 inch plywood or approved equal. Panel or patented forms may be used upon approval of the Engineer.

## (3) Form Ties

Forms ties shall be as follows:

- (a) "Water-Seal" type of ties shall be used for water holding structures or structures subject to flooding.
- (b) Nonwater holding structures, which are not subject to flooding, shall have ties approved by the Engineer.

Form ties shall have a minimum working strength when fully assembled of at least 3,000 pounds. Ties shall be so adjustable in length as to permit tightening of forms and of such type as to leave no metal closer than 1 inch from the surface and they shall not be fitted with any lugs, cones, washers or other device to act as a spreader within the form or for any other purpose which will leave a hole larger than 7/8 inch in diameter or a depression back of the exposed surface of the concrete. Wire ties shall not be permitted.

1.19.3 Construction Tolerance. The forms shall be constructed and rigidly braced in place within the following tolerances:

- (1) Variation from true alignment as shown on the drawings in the lines and surfaces of walls:

|                    |          |
|--------------------|----------|
| In 10 feet         | 1/4 inch |
| In 20 feet maximum | 3/8 inch |
| In 40 feet or more | 3/4 inch |

- (2) Variation from the level or from the grades indicated on the drawings in floors or slabs:

|                    |          |
|--------------------|----------|
| In 10 feet         | 1/4 inch |
| In 20 feet maximum | 3/8 inch |
| In 40 feet or more | 3/4 inch |

- (3) Variation in sizes and/or locations of floor and/or wall openings:

1/4 inch

- (4) Variation in thickness of slabs and walls and in cross-sectional dimensions of columns and beams:

|       |          |
|-------|----------|
| Minus | 1/4 inch |
| Plus  | 1/2 inch |

- (5) Variation in plan dimension of footings:

|       |          |
|-------|----------|
| Minus | 1/2 inch |
| Plus  | 2 inches |

1.19.4 Wetting and Oiling Forms. The inside surface of wood board forms shall be soaked with clean water and kept continuously wet for 12 hours before any concrete is placed. In case forms have been erected for some time and have become dry so that joints have opened, then the forms shall be thoroughly soaked at least twice each day for at least 3 days prior to placing concrete. If the forms cannot be tightened to the satisfaction of the Engineer, they shall be torn down and rebuilt. Plywood forms may be treated with a nonstaining form oil, mineral oil or lacquer. If oil is used, all excess oil shall be wiped off with rags to leave the surface of the forms just oily to the touch. In freezing weather oil shall be used.

Coatings of dust shall be removed from contact surfaces of forms before placing concrete. Concrete shall not be placed in any form until inspected by the Engineer and permission is given to start placing.

1.19.5 Removal. Forms shall not be removed without approval of the Engineer. All form removal shall be accomplished in such a manner as to prevent injury to the concrete.

Forms shall not be removed sooner than the following minimum times after the concrete is placed. These periods represent cumulative number of days and fractions of days, not necessarily consecutive, during which the temperature of the air adjacent to the concrete is above 50°F.:

| Element  | Time     |
|--|----------|
| Beams, arches - supporting forms and shoring                     | 14 days  |
| Conduits, deck slabs - supporting (inside) forms and shoring     | 7 days   |
| Conduits (outside forms), sides of beams, small structures       | 24 hours |
| Columns, walls, spillway risers - with side or vertical load     | 7 days   |
| Columns, walls, spillway risers - with no side or vertical load  | 4 days   |
| Concrete supporting more than 30 feet of wall in place above it. | 7 days   |
| Concrete supporting 20 to 30 feet of wall in place above it.*    | 4 days   |
| Concrete supporting not more than 20 feet in place above it.*    | 24 hours |

\* Age of stripped concrete shall be at least 7 days before any load other than the weight of the column or wall itself is applied.

When conditions on the job are such as to justify the requirements, forms will be required to remain in place for longer periods. Forms for beams, girders, and flood slabs shall remain in place for at least seven (7) days and shall only be removed when test cylinders used under the same conditions as the members break with a compressive strength as required in these specifications.

1.19.6 Design, Inspection and Approval of Form Work. The design and engineering of the form work, as well as the construction, shall be the responsibility of the Contractor. The Engineer's approval of form work design and/or drawings, as submitted or as corrected in no way shall relieve the Contractor of his responsibility for adequately constructing and maintaining the forms so that they will function properly.

Forms, form joints, and reinforcing steel placement shall be checked by the Resident Engineer before closing up the forms. Concrete shall not be placed in any form until the placing of steel and erection of form work have been completed and approved in the completed state by the Resident Engineer. Immediately after completion of pouring, tops of all forms shall be adjusted to line and approved by the Resident Engineer as to conformity with the tolerances specified herein.

## 1.20 EXPANSION OR CONTRACTION JOINTS

1.20.1 General. Where required, joints shall be provided at the location indicated on the drawings and according to the details shown, or as otherwise approved. The methods and materials used shall be subject to approval and the materials shall conform to the specification applicable. In no case shall any fixed metal, embedded in concrete be continuous through an expansion or contraction joint, except as specifically detailed in the drawings.

1.20.2 Expansion Joint Filler. At all expansion joints shown on the drawings, a premolded joint filler of the thickness specified, shall be provided to prevent bond between and allow for the expansion and contraction of adjacent parts. The filler material shall be of sufficient length and width, and shall be accurately cut, matched and placed to prevent contact of the concrete in the parts of the structure to be separated.

Preformed expansion joint filler shall conform to the requirements of ASTM Specification D 1752, Type I, Type II or Type III, unless bituminous type is specified.

Bituminous type preformed expansion joint filler shall conform to the requirements of ASTM Specification D 994.

1.20.3 Asphalt-Treated Roofing Felt. Two layers of heavy, smooth surface asphalt-treated roofing felt, approximate weight 55 pounds per 100 square feet, shall be placed at expansion joints, as shown on the drawings.

1.20.4 Waterstops. Where required, waterstops shall be installed in joints as shown on the drawings or as otherwise directed to provide a continuous water-tight diaphragm in the joint. All joints in metal waterstops shall be brazed or welded. Joints in rubber and plastic waterstops shall be cemented, fused, or vulcanized as recommended by the manufacturer. Adequate provisions shall be made to support and completely protect the waterstops during progress of the work. The Contractor shall replace or repair, at his own expense, any waterstops punctured, ruptured, or otherwise damaged before final acceptance of the work.

Copper used for waterstops shall conform to ASTM Designation: B-248.

Steel used for waterstops shall conform to ASTM Designation: A-366 or ASTM Designation: A-93.

Wrought iron used for waterstops shall conform to ASTM Designation: A-162 or ASTM Designation: A-163.

Plastic material used for waterstops shall conform to ASTM Designation: D-742.

The rubber waterstop material shall meet the following physical requirements when and if tested, in accordance with the appropriate sections of Federal Test Method Standard No. 601, ASTM Designation: D-395, and ASTM Designation: D-1432.

Hardness. The Shore A durometer hardness shall be 60 to 70.

Elongation. The elongation shall be a minimum of 400 percent.

Tensile Strength. The tensile strength shall be a minimum of 2,500 pounds per square inch.

Water Absorption. The water absorption shall be a maximum of 5 percent by weight after immersion in water for two (2) days at 158°F.

Tensile Strength After Aging. The tensile strength after accelerated aging for five (5) days at 158°F., shall not be less than 80 percent of the original tensile strength.

Compression Set. The compression set after 22 hours at 158°F., shall not be more than 30 percent.

Specific Gravity. The specific gravity shall be 1.20 plus or minus .05.

1.20.5 Dowel Bar Assembly. Where required, dowel bar assembly shall be installed at the expansion joints as shown on the drawings. The dowel bars shall be plain, smooth steel bars of the size specified on the drawings and shall conform to ASTM Designation: A-15. An expansion sleeve shall be provided on one end of each dowel bar. The sleeve shall be metal of an approved type, crimped or capped on one end, and provided a minimum of three (3) inch length of covering of the dowel bar with a minimum of three-quarters (3/4) of an inch expansion chamber beyond the end of the dowel bar. The portion of the dowel bar on the expansion sleeve side of the joint shall be coated with a heavy grease to prevent bond between the bar and the concrete. The dowel bar assembly shall be securely held in place by use of metal dowel chairs at each intersection of a dowel bar and spacer bar. The dowel bars shall be installed on proper horizontal and longitudinal alignment to assure a workable expansion device. The premolded joint filler at these expansion joints shall be held in a true vertical plane by means of a header board. The header board shall remain in place for a minimum of thirty (30) minutes after the concrete has been placed on one side or until the concrete has set sufficiently to prevent sloughing, before the header is removed and the work of placing concrete continued.

#### 1.21 FURNISHING AND PLACING STEEL REINFORCEMENT

The furnishing and placing of reinforcing steel, when specified, is covered in a separate technical specifications.

#### 1.22 EMBEDDED ITEMS

1.22.1 General. Before placing concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings or required by the Engineer. All embedded items shall be thoroughly clean and free of oil and other foreign matter such as loose coatings, of rust, paint, and scale. The embedding of wood or other perishable materials in concrete shall be prohibited unless specifically directed or authorized by the Engineer. Any air lines, water lines, wall sleeves, or other materials embedded in structures, as construction expedients authorized by the Engineer, shall conform to the above requirements and, upon completion of their use, shall be backfilled with concrete or grout as directed by the Engineer.



1.22.2 Pipe Embedded in Concrete. Where pipe is partially or wholly encased in concrete, care shall be taken that the pipe is firmly and securely held in place so that the alignment and grade of the pipe is not disturbed while the concrete is placed around the pipe.

### 1.23 CONSTRUCTION

Concrete work shall be performed in accordance with these specifications on concrete. The vertical surfaces of the cradle, expansion and contraction joints shall be formed. The cradle shall be poured with the pipe in place and to line and grade. Construction joints that are used shall conform with the requirements of paragraph 16. Expansion and contraction joints shall conform with requirements of paragraph 20.

### 1.24 SEALING JOINTS IN CONCRETE AND CONCRETE PIPE

1.24.1 General. This specification covers the requirements for sealing or filling joints in concrete pipe and concrete structures where expansion joint material is not used.

1.24.2 Type. The sealing compound shall be a cold- application mastic, single component or multiple component type.

The single component type shall be a ready-mixed nondrying compound furnished in troweling consistency or in preformed rope or strip form.

The multiple component type shall be composed of two or more substances that are to be mixed prior to application.

1.24.3 Quality. Sealing compound shall conform to the requirements of one of the following specifications:

ASTM Specification D 1850; Concrete Joint Sealer, Cold- Application Type. Penetration, determined as specified in ASTM D 1850, shall be not greater than 120.

Federal Specification SS-S-00210; Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints.

Federal Specification TT-S-227; Sealing Compound; Rubber base, Two Component (For Caulking, Sealing and Glazing in Building Construction), Type II.

1.24.4 Application. The compound will be applied using manufacturer's instructions to joints identified in the plans or as otherwise required in accordance with good construction practices.

## SECTION 03002

### CONCRETE REINFORCEMENT

#### 1. GENERAL

1.1. Description of Work. This specification covers furnishing, cutting, bending, handling, and placing of steel reinforcement for all reinforced cast-in-place concrete included in this Contract.

1.2. Codes and Standards. The provisions of the following codes, specifications, and standards latest editions shall apply:

- (1) American Concrete Institute, ACI-315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures."
- (2) American Concrete Institute, ACI-318, "Building Code Requirements for Reinforced Concrete."
- (3) Concrete Reinforcing Steel Institute, "Placing Reinforcing Bars."

#### 1.3. Submittals.

1.3.1. Shop Drawings. Within 15 days after award of the Contract, the CONTRACTOR shall prepare and submit to the ENGINEER for review complete shop drawings in accordance with Section 1A of these Specifications. The CONTRACTOR shall not allow delivery of the reinforcing steel to the job site until a review of the shop drawings has been completed by the ENGINEER. Shop drawings shall include the following:

- (1) Reinforcement bar schedules complete with the quantity, shape and size, dimensions, weight per foot and total weights, and bending details.
- (2) Details of bar supports including types, sizes, and support spacing and sequence.
- (3) Plan and elevation views detailing reinforcing placement.
- (4) Location and arrangement of accessories.
- (5) All details and notes appearing on the Drawings.

1.3.2. Mill Tests. Mill tests of reinforcement shall be submitted prior to use for each 15 tons or less shipped to the job site. Tests shall be conducted in conformance with ASTM A-615, and the methods described therein. Cost of the test shall be borne by the

CONTRACTOR. Three (3) copies of each test report shall be submitted to the ENGINEER. The bars shall be properly tagged so as to permit identification of the heat number shown on the mill test report for any and all steel delivered to the Work.

## 2. MATERIALS

2.1. Reinforcing Steel Bars. All bar reinforcement shall be new billet steel deformed bars of American manufacture conforming to ASTM Designation: A-615, Grade 60. Bars shall be plainly marked showing size, type and grade in accordance with these Specifications.

2.2. Bar Supports. Bar supports shall conform to ACI-3125.

2.3. Wire Ties. Ties shall be 16-gage or heavier black annealed wire.

2.4. Other Materials. All other materials, not specifically described but required for proper completion of concrete reinforcement, shall be as selected by the CONTRACTOR subject to the approval of the ENGINEER.

2.5. Rejection of Materials. Reinforcement with any of the following defects will not be permitted in the Work:

- (1) Bar lengths, depth and bends exceeding the specified fabrication tolerances.
- (2) Bends or kinks not indicated on the Drawings or Shop Drawings.
- (3) Bars with reduced cross-section due to excessive rusting or other cause.

## 3. EXECUTION

3.1. Bending. Reinforcing bars may be mill or field bent. No bars partially embedded in the concrete shall be field bent. All bends shall be made in compliance with requirements of the American Concrete Institute Standard 315 and by approved machine methods except as noted otherwise on the drawings. All bends shall be made without heating.

### 3.2. Handling and Protection.

3.2.1. Protection. The CONTRACTOR shall use all means necessary to protect concrete reinforcement before, during, and after installation and to protect the installed work.

3.2.2. Storage. Steel reinforcement shall be stored above the surface of the ground upon platforms, skids, or other supports and shall be protected, as far as practicable, from mechanical injury, surface deterioration caused by conditions producing rust, and fouling with dirt, grease and other bond breaking coatings.

3.2.3. Identification. All necessary precautions to maintain identification of bars after bundles are broken shall be exercised.

### 3.3. Placing.

3.3.1. Surface Coatings. All reinforcement shall be free from dirt, oil, grease, paint, mill scale, loose or thick rust, or other coating which might destroy or reduce its bond with the concrete when the surrounding concrete is placed.

3.3.2. Bracing Reinforcement. All reinforcement shall be placed in accordance with the Drawings and shall be held so securely in position by wiring and blocking from the forms and by wiring together at intersections that it will not be displaced during the depositing and compacting of the concrete. Tack welding of bars will not be permitted.

### 3.4. Splices.

3.4.1. General. All splices in reinforcement shall be as shown on the Drawings or as directed by the ENGINEER. Unless otherwise specified on the Drawings, by statement or scaled distance, splices shall overlap at least 40 times the diameter of the smaller bar but not less than 12 inches.

3.4.2. Method of Splicing. Splice by lapping ends, placing bars in contact, and tightly wire tying.

3.4.3. Splices in Adjacent Bars. Alternate sides for splices of horizontal reinforcing bars in the riser.

### 3.5. Openings.

3.5.1. Amount of Reinforcement Removed. Where reinforcing bars must be field cut to allow for thimbles, manholes and other required openings, the amount of steel removed shall be the absolute minimum necessary to provide the opening and maintain the minimum concrete cover as required.

3.5.2. Additional Reinforcement for Cracking. All openings shall be reinforced against potential cracking by placing No. 5 bars or other size bars designated in the Drawings in both faces normal to the plane of cracking. The bars shall not be less than 3'-0" in length, except where otherwise shown on the Drawings, and shall be placed inside the main reinforcement and tied to the main reinforcement.

3.5.3. Supplemental Reinforcement. Where reinforcing bars are removed to provide an opening, supplemental reinforcement shall be provided in the direction of the bars removed. This reinforcement shall have a minimum area of the total bars removed, and shall extend at least 18 inches past the edges of the opening, unless shown otherwise in the Drawings.

### 3.6. Tolerances.

3.6.1. Minimum Cover. The minimum cover for all main reinforcement shall conform to the dimensions shown on the Drawings which will indicate the clear distance from the edge of the reinforcement to the concrete surface.

3.6.2. Allowable Tolerances. The following tolerances will be allowed in the placement of reinforcing bars as shown on the Drawings:

(1) Variation in protective cover

1/4 inch for 2.5-inch cover

1/2 inch for 4-inch cover

(2) Variation of spacing

1/12 of indicated spacing

### 3.7. Inspections.

3.7.1. Notice. The ENGINEER or his representative shall have 24 hours notice and the opportunity to inspect and approve the placement of reinforcing steel before concrete is placed.

3.7.2. Purpose. Such inspections are in the nature of assisting the CONTRACTOR to minimize errors, and in no case will they relieve the CONTRACTOR of his responsibility to provide the materials and workmanship required by the Contract Documents.

## 4. MEASUREMENT AND PAYMENT

No direct measurement or payment will be made for any concrete reinforcing. Payment shall be included in the payment for the work to which it is subsidiary in the Bid Schedule.

## SECTION 03003

### CONCRETE FINISHES

#### 1. GENERAL

These specifications are supplemental to the "Concrete" section and provide additional instructions to the requirements therein.

#### 2. CONCRETE FINISHES (EXCEPT FLOORS)

Hardened concrete surfaces shall be finished in accordance with this section of the specifications and the instructions in the "Concrete" section. The various types of finishes described shall be applied as per the schedule shown in the "Special Provisions" section of the specifications.

##### 2.1 TYPES

Type I - All holes left by removal of ends of ties, and all other holes, depressions or voids shall be filled solid with mortar after first being thoroughly wetted. Holes shall be filled with a small tool that will permit packing the hole solidly with mortar. Mortar shall consist of one part cement to three parts sand, and the amount of mixing water shall be as little as consistent with the requirements of handling and placing. Color of mortar shall match the adjacent wall surface.

Type II - After completing the Type I finish specified above, the Contractor shall also remove all fins, burrs and other projections left by the removed forms.

Type III - This finish shall be applied after the completion of the Type II finish. A smooth, uniform surface shall be obtained using the "carborundum-rub" finish which shall consist of the following procedure: Surfaces shall be rubbed with a carborundum stone to eliminate irregularities. Unless the nature of the irregularities require it, the general surface of the concrete shall not be cut into. Bulging or protruding areas, which result from slipping or deflecting forms shall be ground flush or chipped out and re-dressed as directed by the Engineer. Brush finishing or painting with grout or neat cement will not be permitted. Corners and edges shall be slightly rounded by the use of the carborundum stone. No rubbing shall be done before the concrete is seven (7) days old or until the concrete is thoroughly hardened and the mortar used for patching is firmly set.

### 3. CONCRETE FLOOR FINISHES

The finish of all floors and slabs shall be as described below, by types, and further outlined on the final pages in this section of the Specifications. Listed below are descriptions of the various type finishes.

3.1 TYPE "A" SCREEDED - This finish shall be obtained by placing screeds at frequent intervals and striking off to the surface elevation required. Unless otherwise stipulated, this type of finish shall be used on slabs over which quarry tile, ceramic tile, terrazzo, bituminous mixtures, grout swept in by mechanism, or similar type wearing surface is subsequently to be applied.

TYPE "B" WOOD FLOATED - This type of integral finish shall be obtained by working a previously screeded surface with a wood float until the desired texture is reached. Unless otherwise stipulated, this type finish shall be used for exterior paved areas, sidewalks, ramps and steps. Care shall be taken to prevent the formation of laitance and excess water on the finished surface.

TYPE "C" STEEL TROWELED - This type of integral floor finish shall be obtained by first screeding and then giving a preliminary wood float finish which shall be true, even and free from depressions.

After this operation, and when the concrete has hardened sufficiently to prevent excess fine material from working to the surface, the surface shall be compacted and smoothed with not less than two thorough and complete steel troweling operations. The finish shall be brought to a smooth, dense surface, free from defects and blemishes. In areas that are to be covered with resilient flooring, one complete steel trowling operation will be sufficient.

TYPE "D" SWEEP-IN GROUT TOPPING - This finish shall be applied to certain tank floors as specified. Grout topping shall be placed and spread on a previously screeded and hardened concrete slab. Before placing the grout, the surface shall be properly cleaned, washed, and coated with a mixture of water and Portland Cement. The grout shall then be plowed and swept into neat conformance with the blades or arms of the apparatus by turning or rotating the previously positioned mechanical equipment. Special attention is to be paid to true grades, shapes and tolerances as specified by the manufacturer of the equipment. Before beginning this finish, the Contractor shall notify the Engineer and the equipment manufacturer of the details of the operation, and obtain approval and recommendations, respectively, before commencing work.

TYPE "E" HARDENED FINISH - Floor surfaces requiring a hardened finish shall receive a concrete hardener of a type scheduled on the final pages of this section. Concrete hardeners shall be either a liquid applied to the floor surface or a metallic compound which is troweled into the floor surface and made integral with the floor. All concrete hardeners shall be applied in strict conformance with the manufacturer's directions and instructions.

TYPE "F" COLOR FINISH - Coloring agents shall be a product of an experienced manufacturer and shall be applied in complete accordance with the manufacturer's instructions. Colors and make will be specified on the final pages of this section, if their use is required.

#### 4. PAYMENT

No separate payment will be made for this item. Cost for this work shall be included in the bid for work to which it is subsidiary.



## SECTION 05002

### ANCHOR BOLTS AND EXPANSION ANCHORS

1. SCOPE. This section covers cast-in-place anchor bolts and expansion anchors to be installed in hardened concrete.

The General Equipment Stipulations set forth additional requirements for anchor bolts for equipment.

2. GENERAL. Unless otherwise specified or indicated on the drawings, all anchor bolts shall be cast-in-place bolts and shall have a minimum 3/4 inch diameter. Anchor bolts and expansion anchors for buried and immersion service and in splash zones shall be galvanized or zinc plated. All other anchor bolts and expansion anchors shall be carbon steel unless otherwise specified or indicated on the drawings.

#### 3. MATERIALS.

##### Bolts and Nuts

Carbon Steel     ASTM A307.

Stainless Steel     IFI-104, Grade 303 or 305.

Galvanized Steel     Carbon steel bolts and nuts; hot-dip galvanized ASTM A153 and A385, or zinc plated ASTM A164 Type GS.

Flat Washers     ANSI B18.22.1; of the same material as bolts and nuts.

##### Expansion Anchors

For Concrete Fed Spec FF-S-325; wedge type, Group II, Type 4, Class 1 or 2; self-drilling type, Group III, Type 1; or nondrilling type, Group VIII, Type 1 or 2; Phillips, Hilti, Rawlplug, USM< or Wej-It.

4. ANCHOR BOLTS. Anchor bolts shall be delivered in time to permit setting when structural concrete is placed. Anchor bolts which are cast-in-place in concrete shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or supporting template.

Two nuts, a jam nut, and washer shall be furnished for anchor bolts indicated on the drawings to have lock nuts; two nuts and a washer shall be furnished for all other anchor bolts.

5. EXPANSION ANCHORS. Expansion anchors shall be installed in conformity with the manufacturer's recommendations for maximum holding power, but in no case shall the depth of hole be less than four bolt hole diameters. Minimum distance between the center of any expansion anchor and an edge or exterior corner of concrete shall be at least 4-1/2 times the diameter of the hole in which the anchor is installed. Unless otherwise indicated on the drawings, the minimum distance between the centers of expansion anchors shall be at least 8 times the diameter of the hole in which the anchors are installed.

Nuts and washers for expansion anchors shall be as specified for anchor bolts.

6. PAYMENT

No separate payment will be made for any anchors. Cost for these items shall be included in the items to which they are subsidiary in the Bid Schedule and no measurement of the quantities will be made.

SECTION 05003

MISCELLANEOUS METALS

1. GENERAL. The Contractor shall furnish all labor, materials, equipment and services necessary for fabrication and erection of all miscellaneous steel angles, beams, plates and channels as shown on the Drawings and specified herein and not specifically included under other sections of these Specifications.

2. APPLICABLE STANDARDS. In the absence of other instructions, all work under this section shall be governed by the latest edition of:

SPECIFICATIONS FOR THE DESIGN, FABRICATION AND ERECTION OF  
STRUCTURAL STEEL FOR BUILDINGS - American Institute of Steel  
Construction.

All welding shall conform to the latest code of the American Welding Society.

3. SUBMITTALS. Shop drawings, giving complete information necessary for fabrication, layout and installation of all metal work, shall be submitted to the Engineer for approval prior to fabrication.

The preparation of shop drawings for fabricated metal items shall be coordinated by the Contractor with the manufacturers of various equipment in order to comply with details, locations, openings, etc. required by the manufacturers.

Field measurements shall be made to verify all dimensions in the field which may affect installation of work before shop drawings are made and/or fabrication is performed.

4. STRUCTURAL STEEL. Steel shall conform to the requirements of ASTM A 36.

5. ANCHORAGE ITEMS. The Contractor shall furnish all bolts, nuts, shims, pins, screws, straps, nails and other anchors, which may be required by the Drawings or job conditions, to secure all items permanently in place, whether or not specifically called for or shown on the Drawings.

6. FABRICATION AND INSTALLATION OF METAL WORK. All metal items shall be accurately fabricated and erected with exposed joints close fitting. All joints shall be of such character and so assembled that they will be as strong and rigid as adjoining sections. Joints shall be located where least conspicuous. Items shall have smooth finished surfaces except where otherwise shown or specified.

Where welding is required or permitted, it shall conform to the requirements for shielding metal arc welding of the Standard Code for Arc and Gas Welding in Building

Construction of the American Welding Society. Shop drawings shall show welding and shall indicate the size, length, spacing and type of welds. Joints required to be welded shall be continuously welded or spot welded as specified and face of welds dressed flush and smooth where exposed to view.

Members or parts to be built in with masonry or concrete shall be in a form affording a suitable anchorage or shall be provided with approved anchors, expansion shields or other approved means of securing members.

Ferrous and non-ferrous metals shall be insulated at all contacts with felt washers, strips or sheets, bitumastic paints, or other approved means.

6.1 All required anchors, couplings, bolts, and nuts required to support miscellaneous metal work shall be furnished and installed as required.

6.2 Weights of connections and accessories shall be adequate to safely sustain and withstand stresses and strains to which they will be normally subjected.

6.3 Connections shall be bolted except where welding is called for in the Drawings. Bolts shall be 3/4 inch diameter unless noted or required otherwise.

6.4 Accurately place all miscellaneous metal items in the locations and to the required elevations.

6.5 Adequately brace any items which are cast in concrete masonry work.

6.6 Use concealed anchors wherever possible.

7. CLEANING. Remove and properly dispose of all debris and litter; leave the work area in a clean condition.

8. PAYMENT. No separate payment will be made for any of the miscellaneous metal items covered by this specification. Cost for these items shall be included in the items to which they are subsidiary in the Bid Schedule and no measurement of the quantities will be made.

## SECTION 13001

### **GLASS COATED, BOLTED STEEL WATER STORAGE TANK**

#### 1. GENERAL

##### 1.1 SCOPE OF WORK

1.1.1 Furnish and erect a glass-coated, bolted-steel water storage tank, including foundation, tank structure and tank appurtenances as shown on the contract drawings and described herein.

1.1.2 All required labor, materials and equipment shall be included.

##### 1.2 QUALIFICATIONS OF TANK SUPPLIER

1.2.1 The Engineer's selection of factory applied glass-fused-to-steel bolt together tank construction for this facility has been predicated upon the design criteria, construction methods specified, and optimum coating for resistance to internal and external tank surface corrosion. Deviations from the specified design, construction or coating details, will not be permitted.

1.2.2 The bidder shall offer a new tank structure as supplied from a manufacturer specializing in the design, fabrication and erection of factory applied glass-fused-to-steel, bolt together tank systems.

1.2.3 The tank shall be equal to model 17' dia. x 112' ht. Aquastore Tank System as manufactured by A.O. Smith Harvestore Products, Inc. of Barrington, Illinois.

1.2.4 Alternate glass-fused-to-steel tank products, as provided by other manufacturers, will be considered for approval by the Engineer. Manufacturers lacking the experience requirement will be considered, if the manufacturer provides a satisfactory 5-year 100% Performance Bond in lieu of evidence of experience and long term operation.

1.2.5 Strict adherence to the standards of design; fabrication; erection; product quality; and long term (30 year minimum) performance, established in this Specification will be required by the Owner and Engineer.

1.2.6 Tank suppliers shall submit the following to the Engineer/Owner with their bid:

- a. typical structure and foundation drawing(s);
- b. list of tank materials, appurtenances and tank coating specs;

## 2.2 TANK CAPACITY

2.2.1 Tank capacity shall be 184,000 gallons (nominal, U.S. gallons).

## 2.3 FLOOR ELEVATION

2.3.1 Finished floor elevation shall be set at Elevation 883.0.

## 2.4 TANK DESIGN STANDARDS

2.4.1 The materials, design, fabrication and erection of the bolt together tank shall conform to the AWWA Standard for "Factory-Coated Bolted Steel Tanks For Water Storage" - ANSI/AWWA D103, latest revision.

2.4.2 The tank coating system shall conform solely to Section 10.4 of ANSI/AWWA D103, latest revision.

2.4.3 All materials furnished by the tank manufacturer, which are in contact with the stored water shall be certified and listed by the National Sanitation Foundation (NSF) to meet ANSI/NSF Additives Standard No. 61. Certification of a coating type alone will not be sufficient to meet this requirement.

## 2.5 DESIGN LOADS

Specific Gravity      1.0  
Wind Force            100 mph  
Shape Factor          0.6  
Allowable Soil  
  Bearing Capacity    See Geotechnical Investigation  
Roof Live Load        25 psf  
Earthquake Seismic Zone, AWWA D103  
Effective Mass Procedure, Zone   1    
Site Amplification Factor, S,   1.0    
Use Factor, I,   1.25  

## 3.0 MATERIALS SPECIFICATIONS

### 3.1 PLATES AND SHEETS

3.1.1 Plates and sheets used in the construction of the tank shell, tank floor (optional) or tank roof, shall comply with the minimum standards of AWWA D103.

3.1.2 Design requirements for mild strength steel shall be ASTM A570 Grade 30 with a maximum allowable tensile stress of 14,566 psi.

3.1.3 Design requirements for high strength steel shall be ASTM A607 Grade 50 with a maximum allowable tensile stress of 26,000 psi.

3.1.4 The annealing effect created from the glass coated firing process shall be considered in determining ultimate steel strength. In no event shall a yield strength greater than 50,000 psi be utilized for calculations detailed in AWWA D103, Sections 3.4 and 3.5.

3.1.5 When multiple vertical bolt line sheets and plates of ASTM A607 Grade 50 are used, the effective net section area shall not be taken as greater than 85% of the gross area.

### 3.2 ROLLED STRUCTURAL SHAPES

Material shall conform to minimum standards of ASTM A36 or AISI 1010.

### 3.3 HORIZONTAL WIND STIFFENERS

3.3.1 Design requirements for intermediate horizontal wind stiffeners shall be of the "web truss" design, with extended tail to create multiple layers of stiffener, permitting wind loads to distribute around tank.

3.3.2 Web truss stiffeners shall be of steel with hot dipped galvanized coating.

3.3.3 Rolled steel angle stiffeners are not permitted for intermediate stiffeners.

### 3.4 BOLT FASTENERS

3.4.1 Bolts used in tank lap joints shall be ½" - 13 UNC-2A rolled thread, and shall meet the minimum requirements of AWWA D103, Section 2.2.

#### 3.4.2 Bolt Material:

A. SAE Grade 2 (1" bolt length)

1. Tensile Strength - 74,000 psi Min.
2. Proof Load - 55,000 psi Min.
3. Allowable shear stress - 18,163 psi (AWWA D103)

B. SAE Grade 8/ASTM A490 (1.5" - 2.25" bolt length)

1. Tensile Strength - 150,000 psi Min.
2. Proof Load - 120,000 psi Min.
3. Allowable shear stress - 36,818 psi (AWWA D103)

C. SAE Grade W/ASTM A 325 (1.25" bolt length) Heat Treated To:

1. Tensile Strength – 120,000 psi, Min.
2. Proof Load – 85,000 psi, Min.
3. Allowable Shear Stress – 29,454 psi, Min.

3.4.3 Bolt Finish – Zinc, Mechanically Deposited

2.0 Mils Minimum – underbolt head, on shank and threads.

3.4.4 Bolt Head Encapsulation

- a. High impact polypropylene copolymer encapsulation of entire bolt head up to the splines on the shank;
- b. Resin shall be stabilized with an ultraviolet light resistant material such that the color shall appear black. The bolt head encapsulation shall be certified to meet the ANSI/NSF Standard 61 for indirect additives.

3.4.5 All bolts on the vertical tank wall shall be installed such that the head portion is located inside the tank, and the washer and nut are on the exterior.

3.4.6 All lap joint bolts shall be properly selected such that threaded portions will not be exposed in the "shear plane" between tank sheets. Also, bolt lengths shall be sized as to achieve a neat and uniform appearance. Excessive threads extending beyond the nut after torquing will not be permitted.

3.4.7 All lap joint bolts shall include a minimum of four (4) splines on the underside of the bolt head at the shank in order to resist rotation during torquing.

3.5 SEALANTS

3.5.1 The lap joint sealant shall be a one component, moisture cured, polyurethane compound. The sealant shall be suitable for contact with potable water and shall be certified to meet ANSI/NSF Additives Standard 61 for indirect additives.

3.5.2 The sealant shall be used to seal lap joints and bolt connections and edge fillets for sheet notches and starter sheets. The sealant shall cure to a rubber-like consistency, have excellent adhesion to the glass coating, have low shrinkage, and be suitable for interior and exterior exposure.

3.5.3 Sealant curing rate at 73°F/50%RH



- a. Tack-free time: 6 to 8 hours;
  - b. Final cure time: 10 to 12 days.
- 3.5.4 Neoprene gaskets and tape type sealer shall not be used.

#### 4. GLASS COATING SPECIFICATIONS

##### 4.1 SURFACE PREPARATION

4.1.1 Following the decoiling and shearing process, sheets shall be steel grit-blasted on both sides to the equivalent of SSPC-SP10. Sand blasting and chemical pickling of steel sheets is not acceptable.

4.1.2 The surface anchor pattern shall be not less than 1.0 mil.

4.1.3 These sheets shall be evenly oiled on both sides to protect them from corrosion during fabrication.

##### 4.2 PREPARATION OF SHEET EDGES

4.2.1 After initial sheet preparation, all full height vertical wall sheets and all rectangular shaped floor sheets shall be machined and a thermal spray coating of a corrosion resistant alloy shall be applied to the exposed sheet edges.

4.2.2 The same glass coating as applied to the sheet surfaces shall be applied to the exposed edges.

##### 4.3 CLEANING

4.3.1 After fabrication and prior to application of the coating system, all sheets shall be thoroughly cleaned by a caustic wash and hot rinse process followed immediately by hot air drying.

4.3.2 Inspection of the sheets shall be made for traces of foreign matter or rust. Any such sheets shall be re-cleaned or grit-blasted to an acceptable level of quality.

##### 4.4 COATING

4.4.1 All sheets shall receive one coat of a glass precoat to both sides and then air dried.

4.4.2 A second coat to both sides of the sheets, of cobalt glass frit, shall be made.

4.4.3 The sheets shall then be fired at a minimum temperature of 1500°F in strict accordance with the manufacturer's quality process control procedures, including firing time, furnace humidity, temperature control, etc.

4.4.4 A final cover coat of milled galss shall then be applied to the inside of the sheet. This milled glass shall be formulated with titanium dioxide to produce a finished interior surface with optimum toughness and resistance to conditions normally found in potable water storage tanks.

4.4.5 The sheets shall then be fired a second time at a minimum temperature of 1500° F in strict accordance with the manufacturer's ISO 9001 quality process control procedures, including firing time, furnace humidity, temperature control, etc.

4.4.6 Minimum dry coating thickness shall be 7.0 mils. The finished inside color shall be cobalt blue. The finished outside color may be other than cobalt blue as specified, but the color shall be fired over a cobalt blue base.

#### 4.5 INSPECTION

4.5.1 All coated sheets shall be inspected for mil thickness (Mikrotest or equal).

4.5.2 All coated sheets shall be checked for color uniformity by an electronic colorimeter.

4.5.3 An electrical leak detection test shall be performed on the inside surface after fabrication of the sheet. Sheets with excessive electrical leakers shall be rejected so as to minimize field touch up (See Sec. 5.3.4).

4.5.4 An owner representative may be present during these inspection procedures.

#### 4.6 PACKAGING

4.6.1 All approved sheets shall be protected from damage prior to packing for shipment.

4.6.2 Heavy paper or plastic foam sheets shall be placed between each panel to eliminate sheet-to-sheet abrasion during shipment.

4.6.3 Individual stacks of panels will be wrapped in heavy mil black plastic and steel banded to special wood pallets built to the roll-radius of the tank panels. This procedure eliminates contact or movement of finished panels during shipment.

4.6.4 Shipment from the factory to the jobsite will be by truck, hauling the tank components exclusively.

#### 5. ERECTION

## 5.1 FOUNDATION

5.1.1 The tank foundation is a part of this contract and shall be installed by the tank CONTRACTOR.

The CONTRACTOR shall submit to the ENGINEER for approval the dimensions, layout, details, and recommended design of the foundation and footings for the proposed storage tank. A subsurface investigation has been performed by Fuller, Mossbarger, Scott and May, Lexington, Kentucky, and the indicated results of these investigations are included at the end of the Detailed Specifications and Drawings. The Owner does not guarantee that materials other than those disclosed by the borings will not be encountered nor that the proportions of the various materials encountered will not vary from those indicated by the borings. The CONTRACTOR may, at his option and expense, undertake such additional subsurface explorations as he may deem necessary to insure a proper foundation design.

Concrete foundations from the top of the foundation to a depth of six inches below grade shall be formed with removable forms. From six inches below grade and downward, the foundations may be formed using the sides of the excavation. Concrete shall be Class "A" in accord with Section 03001. Reinforcing steel shall conform to Section 03002.

The tops of all foundations shall be level and plane within one-quarter inch.

The prepared foundation shall be protected and kept dry until the floor of the tank is in place.

All areas that have been disturbed by construction or noted to be cleared on the DRAWINGS shall be cleared of underbrush and graded in a uniform and neat manner leaving the lot in a shape as near possible to the contours as shown on the construction drawings. All graded areas shall be left smooth and shall be sown with grasses as specified in other portions of these Specifications.

Upon the completion of all construction of tank and tank foundations, the CONTRACTOR shall remove all debris and surplus construction material resulting from the work.

5.1.2 The tank foundation shall be designed by the manufacturer to safely sustain the structure and its live loads.

5.1.3 Tank footing design shall be based on the soil bearing capacity as determined by geotechnical analysis performed by a licensed soils engineer. The cost of this investigation and analysis are not to be included in the bid price. A geotechnical investigation has been done and the results of that investigation are included in the Plans and Specifications.

## 5.2 CONCRETE TANK FLOOR

### 5.2.1 Concrete Tank Floor

5.2.1.1 The floor design is of reinforced concrete with an embedded glass coated steel starter sheet per the manufacturer's design and in accordance with AWWA D103, Sec. 11.4, Type - 6.

5.2.1.2 Leveling of the starter ring shall be required and the maximum differential elevation within the ring shall not exceed one-eighth (1/8) inch, nor exceed one-sixteenth (1/16) inch within any ten (10) feet of length.

5.2.1.3 A leveling plate assembly (per Harvestore Products, Inc. - U.S. Patent No. 4,483,607), consisting of two 18" anchor rods (3/4" dia.) and a slotted plate (3 1/2" x 11" x 3/8" thk) shall be used to secure the starter ring, prior to encasement in concrete. Installation of the starter ring on concrete blocks or bricks, using shims for adjustment, is not permitted.

5.2.1.4 Place One butyl rubber elastomer water stop seal on the inside surface of the starter ring below the concrete floor line. Place one bentonite impregnated water seal below the butyl rubber seal. These materials shall be installed as specified by the tank manufacturer.

## 5.3 SIDEWALL STRUCTURE

5.3.1 Field erection of the glass-coated, bolted-steel tank shall be in strict accordance with the procedures outlined in the manufacturer's erection manual, and performed by an authorized dealer of the tank manufacturer, regularly engaged in erection of these tanks, using factory trained and certified erectors.

5.3.2 Specialized erection jacks and building equipment developed and supplied by the manufacturer shall be used to erect the tanks.

5.3.3 Particular care shall be taken, in handling and bolting of the tank panels and members to avoid abrasion of the coating system. Prior to liquid test, all surface areas shall be visually inspected by the Engineer.

5.3.4 An electrical leak test shall be performed during erection using a wet sponge low voltage (max. nine (9) volt) leak detection device. All electrical leak points found on the inside surface shall be repaired in accordance with manufacturer's published touch up procedure.

5.3.5 The placement of sealant on each panel may be inspected prior to placement of adjacent panels. However, the Engineer's inspection shall not relieve the bidder from his responsibility for liquid tightness.

5.3.6 No backfill shall be placed against the tank sidewall without prior written approval and design review of the tank manufacturer. Any backfill shall be placed according to the strict instructions of the tank manufacturer.

#### 5.4 ROOF

5.4.1 Tanks with nominal diameters of 14 ft., 17 ft., 20 ft., 25 ft. and 31 ft. shall include a radially sectioned roof fabricated from glass-coated, bolted steel panels, as produced by the tank manufacturer, and shall be assembled in a similar manner as the sidewall panels utilizing the same sealant and bolting techniques, so as to assure a weather/air tight assembly. The roof shall be clear-span and self-supporting. Both live and dead loads shall be carried by the tank walls. The roof shall be of a rolled knuckle design with no rolled angle connection between sidewall and roof panels. The manufacturer shall furnish a roof opening which shall be placed near the outside tank ladder and which shall be provided with a hinged cover and a hasp for locking. The opening shall have a clear dimension of at least twenty-four (24") inches in one direction and fifteen (15") inches in the other direction. The opening shall have a curb at least four (4") inches in height, and the cover shall have a downward overlap of at least two (2") inches, or a gasketed weather-tight cover in lieu of the four (4") inch curb and two (2") inch overlap.

5.4.2 Roofs for tanks with nominal diameters of 22 ft., 28 ft. and all diameters greater than 31 ft. shall be constructed of non-corrugated triangular aluminum panels which are sealed and firmly clamped in an interlocking manner to a fully triangulated aluminum space truss system of wide flange extrusions, thus forming a dome structure.

5.4.2.1 The dome shall be clear-span and designed to be self-supporting from the periphery structure with primary horizontal thrust contained by an integral tension ring. The dome dead weight shall not exceed 3 pounds per square foot of surface area.

5.4.2.2 The dome and tank shall be designed to act as an integral unit. The tank shall be designed to support an aluminum dome roof including all specified live loads.

##### 5.4.2.3 Materials:

1. triangulated space truss: 6061-T6 aluminum struts and gussets;
2. triangular closure panels: .050"t 3003-H16 aluminum sheet;
3. tension ring: 6061-T6 aluminum

4. fasteners: 7075-T73 anodized aluminum or series 300 stainless steel;
5. sealant and gaskets: silicone rubber;
6. dormers, doors, vents and hatches: 6061-T6, 5086-H34 or 3003-H16 aluminum.

#### 5.4.3 Roof Vent

5.4.3.1 A properly sized vent assembly in accordance with AWWA D103 shall be furnished and installed above the maximum water level of sufficient capacity so that at maximum possible rate of water fill or withdrawal, the resulting interior pressure or vacuum will not exceed 0.5" water column; the maximum inlet rate is 750 gpm; the maximum withdrawal rate is 3750 gpm.

5.4.3.2 The overflow pipe shall not be considered to be a tank vent;

5.4.3.3 The vent shall be constructed of aluminum such that the hood can be unbolted and used as a secondary roof access.

5.4.3.4 The vent shall be so designed in construction as to prevent the entrance of insects, birds and/or animals by including an expanded aluminum screen (1/2 inch) opening. An insect screen of 23 to 25 mesh polyester monofilament shall be provided and designed to open should the screen become plugged by frost or debris.

#### 5.5 APPURTENANCES (PER AWWA D103, SECTION 5)

##### 5.5.1 Pipe connections

5.5.1.1 Where pipe connections are shown to pass through tank panels, they shall be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly, and the tank shell reinforcing shall comply with AWWA D103. A single component urethane sealer shall be applied on any cut panel edges or bolt connections.

5.5.1.2 Overflow piping shall be eight (8") inches diameter stainless steel. The overflow pipe shall extend down the outside of the tank and terminate at least ten (10) feet from the edge of the foundation. A 24 mesh non-corrodible screen and flap valve shall be installed on the end of the overflow pipe.

##### 5.5.2 Outside tank ladder

5.5.2.1 An outside tank ladder shall be furnished and installed as shown on the contract drawings.

5.5.2.2 Rest platforms shall be provided at intervals of 30 feet on tanks and standpipes with heights greater than 30 feet.

5.5.2.3 Ladders shall be fabricated of aluminum and utilize grooved, skid-resistant rungs and equipped with a hinged lockable entry device.

5.5.2.4 Safety cage and step-off platforms shall be fabricated of galvanized steel.

#### 5.5.3 Access doors

5.5.3.1 One (1) bottom access door shall be provided as shown on the contract drawings in accordance with AWWA D-103.

5.5.3.2 Such door shall be a minimum of 24 inches in diameter, shall include a properly designed per AWWA D103, Sec. 5.1 reinforcing frame and cover plate, and provide a hinged opening mechanism for cover opening.

#### 5.5.4 Identification Plate

A manufacturer's nameplate shall list the tank serial number, tank diameter and height, maximum design capacity, intended storage use, and date of installation. The nameplate shall be affixed to the tank exterior sidewall at a location approximately five (5') feet from grade elevation in a position of unobstructed view.

#### 5.5.5 Cathodic Protection

5.5.5.1 The manufacturer shall design and supply a passive, sacrificial magnesium anode cathodic protection system.

5.5.5.2 The anodes shall be floor mounted.

5.5.5.3 The resistivity of the water for design will be determined by the Contractor.

5.5.5.4 The design life shall be calculated at 10 years. The cathodic protection system shall be designed for protection of uncoated steel surfaces in the product zone, including rebar within an uncoated concrete tank floor.

5.5.5.5 When cathodic protection is specified, electrical continuity between all tank sidewall panels shall be the responsibility of the tank manufacturer.

### 6. FIELD TESTING

## 6.1 HYDROSTATIC

6.1.1 Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling tank to its overflow elevation.

6.1.2 Any leaks disclosed by this test shall be corrected by the erector in accordance with the manufacturer's recommendations.

6.1.3 Water required for testing shall be furnished by the CONTRACTOR. The rates for water used shall be the regular monthly rates charged by the Utility. Disposal of test water shall be the responsibility of the CONTRACTOR.

6.1.4 Labor and equipment necessary for tank testing is to be included in the price of the tank.

## 7. DISINFECTION

### 7.1 STANDARDS

7.1.1 The tank structure shall be disinfected at the time of testing by chlorination in accordance with AWWA Specifications C652-86 "Disinfection of Water Storage Facilities".

7.1.2 Disinfection shall not take place until tank sealant is fully cured (10 to 12 days at 73 F/50%RH).

7.1.3 Acceptable forms of chlorine for disinfection shall be:

- a. Liquid chlorine as specified in AWWA C652.
- b. Sodium hypochlorite as specified in AWWA C652.
- c. Calcium hypochlorite (HTH) is not acceptable.

7.1.4 Acceptable methods of chlorination per AWWA C652:

- a. Section 4.1.1
- b. Section 4.1.2 - chemical feed pump only (4.1.2.1)
- c. Section 4.3

7.1.5 Section 4.2 is not acceptable.

7.1.6 Water required for disinfection shall be supplied by the CONTRACTOR per Section 6.1.3 of this Specification.



8. WARRANTY

8.1 STRUCTURE

The warranty shall conform to Section 29 of the General Conditions.

8.2 GLASS COATING SYSTEM

If within a period of five (5) years from date of completion of the tank, the coating on the tank chips, cracks, spalls, or under-cuts during normal water service, the CONTRACTOR shall replace the defective part or repair the defect. This warranty is in addition to the normal one year period warranty.

9. INSPECTION

On or near the one year anniversary date of initial tank use the manufacturer's authorized dealer shall make a visual inspection of the tank interior coating and appurtenances; tank exterior coating and appurtenances; and the immediate area surrounding the tank. A written summary of this inspection will be filed with the tank owner and the tank manufacturer.

10. PAYMENT

Payment for this item shall be as shown in the Bid Proposal.

## SECTION 13100

### IN-PLANT AND VAULT PIPING

#### 1. GENERAL

1.1 Scope of Work. Provide all labor, materials, equipment and services required to furnish and install all plant process piping as shown on the Drawings and specified herein.

1.2 Related Work Specified Elsewhere.

A. Valves: Section 13500.

#### 2. PRODUCTS

2.1 Ductile Iron Pipe/Ductile and Cast Iron Fittings. Unless otherwise noted or required, all inside ductile iron piping shall be flanged pipe with threaded flanges in accordance with ANSI A21.51 (AWWA C151) and ANSI A21.15 (AWWA C115). All piping shall be rated for 250 psi unless otherwise noted and shall have ring gaskets, 1/8-inch thick.

All exposed iron pipe to be field painted shall be furnished with an external coating of rust inhibitive primer, Koppers Pug Primer, Tnemec 77 Chem-Prime, Degracon #91453 Phenolic Primer, or equal. Contractor and pipe manufacturer shall be responsible for compatibility of shop allied coatings with the field paint systems and products specified in Division 9, Section 09900. Do not apply asphalt or bituminous coatings on pipe to be painted.

The interior of all ductile iron pipe shall be cement-mortar lined with bituminous seal coat in accordance with AWWA C 104.80. Thickness of the lining shall be as set forth in Section 4-10.1 of the aforementioned specification unless otherwise directed by the Engineer.

Ductile iron fittings shall conform to ANSI A21.10 AWWA C110 with flanges faced and drilled 125-pound. Fittings shall be 250 psi ductile iron. Fittings shall have interior lining and exterior coating same as the pipe.

2.2 Plastic Pipe and Fittings. All inside PVC plastic process piping (unless noted otherwise) shall be ASTM D 1785, Schedule 80, threaded with ASTM D 2464, Schedule 80, threaded fittings. Use threaded flanged connections where required for flanged appurtenances or where indicated on the Drawings. All plastic pipe, fittings and joints shall be suitable for minimum 150 psi operating pressure.

2.3 Wall Pipe and Sleeves. All wall pipe shall be furnished with cast or welded collar waterstops. Welding of water stop collars on pipe shall be accomplished by the wall pipe manufacturer in their shop. All centrifugally cast wall pipe shall be ductile iron meeting the requirements of AWWA C151 for the pipe barrel, conforming to the pressure rating of the pipeline in which installed, and in no case be lighter than Class 53. All statically cast wall pipe shall be gray or ductile iron meeting the requirements of AWWA C110 for fittings. Mechanical joint end and cast-on flange end wall pipe shall conform to AWWA C110 and threaded flange wall pipe shall conform to AWWA C115. Where flanged or mechanical joint bell ends are flush with the wall, they shall be drilled and tapped for study bolts which are to be of 300 Series stainless steel. The length of all wall pipe shall be not less than the thickness of the wall in which installed. Wall pipe shall have the same pressure rating as connecting pipe. All wall pipe shall be cement-mortar lined per AWWA C104. The exposed end of wall pipe inside structures shall be shop primed for field painting; embedded portion left uncoated; exterior buried portion coated with standard bituminous coating.

Contractor may have the option to install wall pipe flush face-to-face of wall in lieu of the dimensioned length wall pipe shown on the Drawings, in order to eliminate form penetrations. This option will be subject to Engineer's review at each wall pipe location and covers both flanged and mechanical-joint bell-end wall pipe. Embedded flanged and M.J. bell-end bolt holes shall be tapped for stud bolts; tapped bolt holes in embedded flanges shall be plugged for protection during concrete pouring.

All pipe wall sleeves shall be plain end galvanized steel pipe of diameter noted on Drawings and length to fit flush face-to-face of wall.

2.4 Interlocking Link Pipe Seals. In all locations indicated on the Drawings, interlocking link pipe seals shall be used in lieu of lead packing a pipe wall sleeve. Seals shall be modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall sleeve. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely water-tight seal between the pipe and wall sleeve.

The Contractor shall determine the required diameter of each individual wall opening according to the manufacturer's recommendations before ordering and installing the seal. Pipe shall be accurately centered in the sleeve and the link seals shall be sized, installed and tightened in accordance with the manufacturer's instructions.

2.5 Coupling and Adapters. Flexible couplings shall be of the sleeve type with a middle ring, two round-wedge shaped rubber gaskets at each end, two following rings together and compress the gasket against the pipe. Flexible couplings shall be steel with minimum wall thickness of the middle ring or sleeve installed on pipe being 5/16-inch for pipe smaller than 10 inches, 3/8-inch for pipe 10 inches or larger. The minimum length of the

middle ring shall be 5-inches for pipe sizes up to 10 inches and 7 inches for pipe 10 inches to 30 inches. The pipe stop shall be removed. Gaskets shall be suitable for 250 psi pressure rating or at rated working pressure of the connecting pipe. Couplings shall be harnessed as shown on the Drawings and be designed for 250 psi. Provide reducing couplings where indicated.

Flanged adapters shall have one end suitable for bolting to a pipe flange and the other end of flexible coupling similar to that described hereinbefore. All flanged adapters shall be harnessed. The adapters shall be furnished with bolts of an approved corrosion resistant steel alloy, extending to the adjacent pipe flanges. The harness shall be designed for axial thrust due to a working pressure of not less than 250 psi. Not less than four special bolts shall be furnished for each adapter. Flanges on flanged adapter (unless otherwise indicated or required) shall be faced and drilled ANSI B16.1 Class 125.

Flexible couplings and flanged adapters shall be as manufactured by Dresser, Rockwell, or equal, per the following, unless otherwise specified and/or noted on the Drawings:

Steel couplings for joining same size, plain-end, steel, cast iron, and PVC plastic pipe -

| <u>Dresser</u> | <u>Smith-Blair</u> |
|----------------|--------------------|
| Style 38       | 411                |

Transition couplings for joining pipe of different outside diameters -

| <u>Dresser</u>       | <u>Smith-Blair</u>   |
|----------------------|----------------------|
| Style 162 (4" - 12") | 413 steel (2" - 24") |
| Style 62 (2" - 24")  | 415 steel (6" - 48") |

Flanged adapters for joining plain-end pipe to flanged pipe, fittings, valves and equipment; (use lock pins or anchor studs when noted on Drawings) -

| <u>Dresser</u>                      | <u>Smith-Blair</u>        |
|-------------------------------------|---------------------------|
| Style 127 cast (3" - 12")           | 912 cast (3" - 12")       |
| Style 128 steel (3"-48" C.I. pipe)  | 913 steel (3" and larger) |
| Style 128 steel (2"-96" steel pipe) |                           |

2.6 Flanged Joints. Flange bolts and nuts shall be ASTM A 307, Grade B and shall have hexagonal heads. All bolts, nuts and studs for flanged pipe in submerged locations shall be of 300 Series stainless steel. The flanges shall be drawn together until the joint is perfectly tight, with bolts of a length such that they will not project greater than 1/4-inch from the nut nor fall short of the end of the nut when drawn up. No washer shall be used. Gaskets

shall be carefully fabricated prior to installation and must be suitable for pressure rating for the pipe for which it is used.

All flanges (unless otherwise indicated or required) shall be faced and drilled ANSI A21.15 125-pound for ductile iron and rated for 250 psi.

**2.7 Metal Pipe Supports and Hangers.** The Contractor shall furnish and install all pipe hangers, inserts, brackets, plates, anchors, and other supports not specifically included under other items. Generally pipe supports are not shown on the Drawings, but shall be supplied as specified herein. However, any bracing or support details shown on the Drawings shall be followed.

Supports and hangers shall be as manufactured by Grinnell, Elcen, or Fee & Mason, or fabricated by the Contractor. Field fabricated supports may be used only for special conditions where manufactured items may not be suitable. In such cases, details of proposed supports shall be submitted to the Engineer for review. All such supports shall be galvanized.

Except as shown on the Drawings or as directed by the Engineer, supports and hangers shall be as follows:

A. Pipes with centerlines less than 24 inches from a wall shall be supported by a typical wall support bracket. Pipes with centerlines less than 6 feet above a floor shall be supported from below. All other pipes shall be hung from above. Piping shall be supported at no greater than 10 feet 0 inches on centers.

B. Pipe supported from underneath shall have adjustable pipe saddle supports on properly sized pipe stanchions. The saddle assembly shall be of cast iron.

C. Hangers are to be suspended from concrete work. Hangers shall be supported from approved metal inserts placed in concrete before the concrete is placed.

D. All pipe hangers, inserts, clamps, supports and other like items shall be submitted for review by the Engineer prior to installation.

E. All inside horizontal flanged piping shall be supported with approved split ring type adjustable hangers of malleable iron with suitable hanger rods unless shown otherwise on the Drawings. Special supports shall be constructed in accordance with details shown on the Drawings. Wall supports and/or hangers shall be placed not over 10 feet apart. All piping shall be rigidly supported to prevent loosening under vibration.

F. Pipe, valve operating stems, fixtures and conduits shall be bracketed or suspended from walls, ceilings, and beams at or near valves and fittings and where needed for firm support, by standard brackets, rods, turnbuckles, and rings made especially for pipe of sizes supported. Perforated strap iron and/or copper will not be acceptable.

G. Clevis hangers for "iron pipe size" O.D. pipe shall be Grinnell Figure 65, Elcen Figure 12, Fee & mason Figure 239, or equal. Clevis hangers for Cast Iron O.D. pipe shall be Grinnell Figure 260, Elcen Figure 12C, Fee & Mason Figure 104, or equal.

H. Turnbuckles shall be forged steel. Rods shall be of black steel, machine threaded of following sizes:

| <u>Pipe Size</u> | <u>Rod Diameter</u> |
|------------------|---------------------|
| 1/2" - 2"        | 3/8"                |
| 2 1/2" - 3"      | 1/2"                |
| 4" - 5"          | 5/8"                |
| 6"               | 3/4"                |
| 8" - 12"         | 7/8"                |
| 14" - 16"        | 1"                  |
| 18"              | 1 - 1/8"            |
| 20" - 24"        | 1 - 1/4"            |

I. Brackets shall be of standard castings of fabricated steel and shall be reviewed by the Engineer.

J. Column type pipe supports shall consist of pipe columns of size required to carry the full pipe and standard cast iron bases and saddles as required. Saddles shall be of proper size to fit the pipe being supported.

### 3. EXECUTION

#### 3.1 Installation.

A. All materials shall be new.

B. Each piece of iron pipe and each fitting shall be plainly marked at the foundry with class number and weight.

C. Where indicated on the Drawings, plain-end pipe shall be joined by means of flanged adapters or flexible couplings which shall be Rockwell, Dresser, or equal.

D. All pipe couplings shall be designed to safely withstand the operating pressure of the lines in which they are installed. All couplings shall be shop primed with an approved rust inhibitive primer.

E. Taps and connections to piping shall be made as required to connect equipment, sample lines, etc., and where otherwise shown on the Drawings.

F. Piping shall be installed straight and true, parallel or perpendicular to walls, with approved offsets around obstructions. Standard pipe fittings shall be used for changing direction of piping. No mitered joints or field fabricated pipe bends are permitted unless accepted by the Engineer.

G. All piping, fittings, valves and other accessories shall be thoroughly cleaned of dirt, chips and foreign matter before joint connections are made.

H. All plastic pipe shall be adequately supported and braced. Support spacing shall not exceed the recommendations of the Plastics Pipe Institute.

I. Teflon tape shall be used on all plastic pipe threaded connections.

J. Field cut male threads on plastic pipe shall be made with plastic pipe threading dies.

K. The annular space of plain wall sleeves shall be packed tight with lead wool to within 3/4" of wall face and then patch grouted flush to wall face with non-staining non-shrink grout, masterflow 713 by Master Builders, SonogROUT by Sonneborn-Contech, or equal.

L. All pipe sleeves passing through walls or floors of chlorine feed and storage areas shall be provided with gas tight seals.

M. All pipe threads shall conform to ANSI B2.1.

N. Piping shall be erected to provide for expansion and contraction.

O. Screwed or soldered unions shall be provided in all small piping as required to permit convenient removal of equipment, valves and piping accessories from the piping system.

P. Dielectric insulating couplings or brass adapters shall be used whenever the adjoining materials being connected are of dissimilar material such as connections between copper tubing and steel pipe.

Q. All inside piping shall be color coded, stenciled and label tagged for identification as specified in Section 09900.

#### 4. MEASUREMENT AND PAYMENT

No measurement of this item will be made. Payment will be included in the work to which it is subsidiary as described in the bid documents.

## SECTION 13104

### YARD PIPING AND VALVES

#### 1. GENERAL

1.1 Scope of Work. Provide all labor, materials, equipment and services required for furnishing and installing all yard piping and appurtenances specified herein.

#### 2. PRODUCTS

2.1 Ductile Iron Pipe. Ductile iron pipe shall conform to AWWA C151-76, (ANSI A21.51), Class 250, with push-on or mechanical joints.

The interior of the pipe shall be cement-mortar lined with bituminous seal coat in accordance with AWWA C104-80 (ANSI A21.4). Thickness of the lining shall be set forth in Section 4.10.1 of the aforementioned specification unless otherwise directed by the Engineer. The exterior of all pipe, unless otherwise specified, shall receive either coal tar or asphalt base coating a minimum of 1 mil thick.

Each piece of pipe shall bear the manufacturer's name or trademark, the year in which it was produced and the letters "DI" or the word "DUCTILE". Pipe manufacturer shall furnish notarized certificate of compliance to the above AWWA or ANSI specifications.

Fittings shall be 350 psi rated (through 24" size) ductile iron in accordance with AWWA C110-77 (ANSI A 21.10) and shall conform to the details and dimensions shown therein. Fittings shall have mechanical joints meeting the requirements of AWWA C111- 80 (ANSI A 21.11). Fittings shall have the same interior cement- mortar lining and exterior coating as specified for the pipe.

Joints shall be of the mechanical joint type conforming to AWWA C111-72 (ANSI A21-11). Mechanical joints shall be bolted and of the stuffing box type and shall consist of a bell, with exterior flange and interior recess for sealing gasket, a pipe or fitting plain end, a sealing gasket, a follower gland, tee-head bolts and hexagon nuts. Below floor slabs and on all high pressure lines, the mechanical joints shall also be fitted with retainer glands.

The cleaning and assembly of pipe and fitting joints shall be in accordance with the manufacturer's recommendations.

2.2 P.V.C. Sewer Pipe. P.V.C. gravity sewer pipe shall be ASTM D 3034, SDR 35, with ASTM D 32123 integral bell and spigot rubber gasketed joints.



2.3 Polyvinyl Chloride (PVC) Pipe and Fittings. Polyvinyl chloride plastic pipe shall be Class 200 (SDR 21) pressure rated pipe. All PVC pipe shall conform to the latest revisions of the following:

ASTM Specification D2241  
Department of Commerce PS22-70 (SDR-PR) (pressure rate pipe)  
National Sanitation Foundation Testing Laboratories  
(nsf)  
Standard Dimensional Ratio SDR-21 (200 psi)  
Health Properties - The seal of the National Sanitation Foundation Testing Laboratory  
must appear on each pipe.

Cast or ductile iron mechanical joint or push-on type fittings shall be used with PVC pipe. Fittings shall conform to the Section 15100, Article 2.1,D of these Specifications.

Adapters or specials shall be furnished, as required, to connect the plastic pipe to the cast iron mechanical joint valves, fittings and pipe.

Jointing material shall be non-toxic. Joints shall be amde with the use of rubber gasket couplings. Couplings shall be supplied with the pipe (not a pay item).

Pipe and fittings shall be visually inspected on the project site for proper markings which shall include manufacturer's name or trademark, nominal pipe size, class pressure rating for water at 73.4°F, plastic pipe material designation (e.g. PVC 1120), ASTM Designation D2241 and the NSF Logo.

2.4 Post Hydrants. Post hydrants shall be Dresser/M & H Style 133 or equal. Hydrants shall be 2-1/4" post type designed for 150 PSI working pressure. Hydrants shall have 3-9 inch mechanical joint bottom connection and 1-1/2" hose nozzle with cap and cap chain.

2.5 Fire Hydrants. The Contractor shall furnish and install fire hydrants where shown on the Drawings or directed by the Engineer. Hydrants are specified in specifications Section 15105.

2.6 Butterfly Valves. Butterfly valves shall conform to the specifications of Section 13500 except be designed for buried service, have mechanical joint ends, have all exterior surfaces shop painted with two coats of Fed. Spec. TT-V-51F Asphalt Varnish, with 2-inch square AWWA Class 150B nut operator in a vertical position for use in a valve box.

2.7 Gate Valves. Gate Valves shall conform to the specifications of Section 13500 except be designed for buried service, have mechanical joint ends, have all exterior surfaces shop painted with two coats of Fed. Spec. TT-V-51F Asphalt Varnish, with 2-inch square nut operator in a vertical position for use in a valve box.

2.8 Flap Valves. Flap valves shall be flanged (or other suitable connection for headwall mounting), iron body, bronze mounted, Mueller A-2540-6, M & H Style 47-02, Clow F-3012 or equal.

2.9 Plug Valves. Plug valves shall conform to the specifications of Section 13500 except be designed for buried service; have mechanical joint ends; have all exterior surfaces shop painted with two coats of Fed. Spec. TTV-51F Asphalt varnish, with 2-inch square nut operator in a vertical position for use in a valve box.

2.10 Swing Pipes. The swing pipes in size shown on the Drawings are to be fabricated from Class 50, ductile cast iron pipe. The swing connection shall be a flanged stainless steel 90° swivel joint Style 30 as manufactured by Chicksan Weco, or equal. The swing pipes shall be controlled by 1000 lbs. capacity enclosed worm gear winches with 1/4" stainless steel cable, as manufactured by Standard Handling Devices, Inc., (Model T4-62), or equal. The winch supports shall be fabricated from structural steel and shall be equipped with 1/4" winch support plates.

2.11 Valve Boxes. Valve boxes shall be of 5-1/4 inch standard cast iron, two-piece, screw type valve box with drop cover marked "WATER", "SEWER", "DRAIN", as applicable. Valve boxes shall be accurately centered over valve operating nut, and backfill thoroughly tamped about them. Valve box bases shall not rest on the valves but shall be supported on crushed stone fill. They shall be set vertically and properly cut and/or adjusted so that the tops of boxes will be at grade in any paving, walk or road surface, and 2 to 3 inches above ground in grass plots, fields, woods or other open terrain. In grass areas, provide concrete pad around valve box; slightly crown in all directions to shed water.

2.12 PE STATIC SENSING LINE. The static sensing line shall be 3/4" polyethylene (PE) water service pipe as per AWWA Specification C901 with minimum pressure rating of 200 psi. The corporation stop shall be equal to Ford F-Series. The saddle shall be equal to the Ford Style 202B.

### 3. EXECUTION

#### 3.1 LINES AND GRADES

The CONTRACTOR will be required to accomplish any detailed layout, including that required for establishing the grade of the pipe line.

#### 3.2 TRENCH EXCAVATION

3.2.1 General. The CONTRACTOR shall include in his bid, all trenching necessary for installation of all pipelines as planned and specified. Trenching shall include all clearing and grubbing, including all weeds, briars, small trees, stumps, etc. encountered in the trenching. The CONTRACTOR shall dispose of any such material by burning, burial, or hauling away (or as noted on the drawings), at no extra cost to the OWNER. It shall be

the CONTRACTOR'S responsibility to notify the appropriate State and local Air Pollution Control agencies when he conducts open burning of refuse.

The CONTRACTOR shall protect existing facilities against danger or damage while pipeline is being constructed and backfilled, or from damage due to settlement of this backfill. In case of damage to any existing structures, repair and restoration shall be made at once and backfill shall not be replaced until this is done. In all cases, restoration and repair shall be such that the damaged structures will be in as good condition and serve its purpose as completely as before and such restoration and repair shall be done without extra cost to the OWNER. The use of trench-digging machinery will be permitted except where its operations will cause damage to trees, buildings or existing structures above or below the ground. At such locations hand methods shall be employed to avoid such damage. All excavated material shall be piled in a manner that will not endanger the work or cause obstruction.

All excavation shall be open trenches, except where the drawings call for tunnelling, boring, or jacking under structures, railroads, sidewalks and roads.

3.2.2 Clearing. The CONTRACTOR shall accomplish all clearing and/or grubbing as required for the construction under this contract. Clearing and grubbing shall include the cutting and removal of trees, stumps, brush, roots, logs, fences and other loose or projecting material and natural obstructions which, in the opinion of the ENGINEER, must be removed to properly prosecute the construction and operate the facilities upon completion of construction. Trees, unless designated otherwise on the plans, shall remain and be properly protected. Ornamental shrubs, plantings, fences, walls, etc. shall be removed and replanted or replaced or protected from the construction activity. Clearing and/or grubbing shall be incidental to the various bid items and no additional compensation will be paid for same.

3.2.3 Trench Depth. Trenches shall be excavated to the line and grade required for the installation of pipe at the elevations indicated on the plans. The minimum depth of cover shall be 30 inches above the top of the pipe, unless shown otherwise on the plans or on the Standard Details. When the pipe is laying in or on solid rock, the minimum depth of cover shall also be 30 inches above the top of the pipe. No additional compensation will be made for extra depth where required by the plans or due to CONTRACTOR error. Excavation, except as required for exploration, shall not begin until the proposed work has been staked out. Materials which are not required for backfill and site grading shall be removed and disposed of as directed by the ENGINEER. Hauling, bedding, and backfilling shall be considered incidental to the various bid items and will not be paid for directly. Excavation shall be of sufficient depth to allow the piping to be laid on the standard pipe bedding in accordance with the Section 6 of this section. The trenches shall be excavated to a minimum of six (6) inches below the bottom of the pipe barrel in rock. In all cases where lines are under traffic a minimum cover of thirty-six (36") inches shall be provided. Should it be necessary to avoid existing utilities, culverts, outlets, or other structures, the water line shall be carried deeper at no additional expense to the OWNER.

Where the plans call for extra trench depth, this extra depth shall be provided at no extra cost.

3.2.4 Trench Width. Trench widths shall exceed the minimum width that will provide free working space on each side of the pipe and to permit proper backfilling around the pipe as shown in the accompanying table and unless specifically authorized by the ENGINEER, shall not be excavated to wider than two (2) feet plus the nominal diameter of the pipe at the top of the trench. Before laying the pipe, the trench shall be opened far enough ahead to reveal any obstruction that may necessitate changing the line and grade of the pipe. Should the CONTRACTOR fail to accomplish this, and changes are required, they shall be at his sole expense. In rock, all ledge rocks, boulders and large stones shall be removed to provide six (6) inches of clearance on each side and below all pipe and fittings.

MINIMUM TRENCH WIDTH  
IN EARTH AND PAY WIDTH  
FOR ROCK EXCAVATION

| <u>Size</u>   | <u>Width</u> | <u>Size</u> | <u>Width</u> |
|---------------|--------------|-------------|--------------|
| Up to 4" Pipe | 1'-6"        | 16" Pipe    | 2'-8"        |
| 6" Pipe       | 2'-0"        | 18" Pipe    | 3'-0"        |
| 8" Pipe       | 2'-0"        | 20" Pipe    | 3'-2"        |
| 10" Pipe      | 2'-4"        | 24" Pipe    | 3'-8"        |
| 12" Pipe      | 2'-6"        |             |              |
| 14" Pipe      | 2'-6"        |             |              |

3.2.5 Shoring, Sheet piling, and Bracing of Excavation. Where unstable material is encountered, or where the depth of the excavation in earth exceeds five (5) feet, the sides of the trench or excavation shall be supported by substantial sheet piling, bracing, or shoring. The design and installation of all sheet piling, sheet piling, bracing or shoring shall be based on computations of pressure exerted by the materials to be retained under retaining conditions. Adequate and proper shoring of all excavations will be the entire responsibility of the CONTRACTOR. The Standards of the Federal Occupational Safety and Health Act and the Kentucky Department of Labor shall be followed.

3.2.6 Removal of Water. The CONTRACTOR shall provide for adequate removal of all water and the prevention of surface water from entering the excavation. The CONTRACTOR shall maintain dry conditions within the excavations until the backfill is placed. No additional compensation will be paid for replacement and/or stabilization of prepared excavations due to flooding and/or deterioration from extended exposure. All water pumped or drained from the excavation shall be disposed of in a suitable manner without damage to adjacent property or to other work under construction.

3.2.7 Pavement Removal. Pavement removal shall be as indicated on the plans or directed by the ENGINEER. When so required, or when directed by the ENGINEER, only one-half (1/2) of the street crossings or road crossings shall be excavated before placing temporary bridges over the side excavated, for the convenience of the traveling public. All backfilled ditches shall be maintained in such a manner that they will offer no hazard to the passage of traffic. The convenience of the traveling public and the property OWNERS abutting the improvements shall be taken into consideration. All public or private drives shall be promptly backfilled or bridged at the direction of the ENGINEER. Pavement replacement shall be in accordance with Standard Drawings of these specifications. Excavated materials shall be disposed of so as to cause the least interference and in every case the disposition of excavated materials shall be satisfactory to the ENGINEER.

3.2.8 Traffic Maintenance. The CONTRACTOR must "red light" and guard all open trenches or obstructions placed on the streets or sidewalks. The lights must be burning from sunset to sunrise in order to effectually warn and safeguard the public against dangers connected with open trenches, excavations and other obstructions. The CONTRACTOR shall be held responsible for any damage that may occur to persons or property by reason of the failure of the CONTRACTOR to properly "red light" and guard all open trenches or obstructions along the routes of the water lines. This CONTRACTOR at his own expense shall also maintain warning signs, barricades and a watchmen or flagmen to control traffic at such times as his work would interfere with the flow of traffic. No excavation shall begin that may present a safety hazard unless the signs, barricades, lights, etc. are available to protect the open excavation at the conclusion of the day. The CONTRACTOR will comply with all Federal and State Occupational Safety and Health requirements for this type of construction. The CONTRACTOR shall also comply with all local and Kentucky Department of Highways requirements for signing and traffic control.

3.2.9 Line Location. The location of pipelines and their appurtenances as shown are those intended for the final construction. However, conditions may present themselves before construction on any line is started that would indicate desirable changes in location. In such cases, the OWNER reserves the right to make reasonable changes in line and structure locations without extra cost, except as may be determined by extra units of materials and construction actually involved. The OWNER is under no obligation to locate pipelines so they can be excavated by machine.

3.2.10 Solid Rock Excavation. No extra payment will be made for rock excavation. Cost shall be included in the work to which it is subsidiary.

#### 4. BEDDING OF PIPELINE

In all cases the foundation for pipe 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. The bells of the

pipe shall not carry any of the load of the backfill. The CONTRACTOR should refer to the Standard Details for pipe bedding shown in the plans. The bedding specifications shall govern the backfill from the bottom of the trench up to the centerline or spring line of the pipe.

4.1 Stable Earth Foundation. On all galvanized or copper lines, the CONTRACTOR may use either the "solid trench bottom method" or the "undercutting method" as shown in the Standard Details. The solid trench bottom method allows support of the pipe barrel by the trench bottom with holes dug out for the bells. The bottom must be leveled with soil and free of irregularities. The undercutting method calls for 4 inches of excavation below the barrel and then refill with evenly spread earth cushion or other standard bedding.

On all PVC pipelines, the trench bottoms shall be smooth and free of frozen material, clodded dirt and stones over 1/2" diameter. Bottom dirt left by trenching equipment will usually provide adequate material to level the trench bottom and provide bedding support for the pipe barrel. If the trench bottom is free of dirt, soft material may be shoveled off the side walls or shoveled under the pipe to insure proper pipe barrel bedding. In areas where the trench bottom is hard, a layer of soft backfill must be provided to insure the pipe barrel is properly cushioned. See the plans for proper bedding material depth.

If the foundation is good firm earth the pipe may be laid directly on the undisturbed earth provided the pipe barrel is supported for its full length.

Bedding of No. 9 stone, fine gravel, sand or compacted finely graded select earth shall be used to correct irregularities in the subgrade. Where bell and spigot is involved, bell holes shall be excavated to prevent the bells from being supported on undisturbed earth.

As an alternative to the above method, excavation in earth may be undercut to a depth below the required invert elevation that will permit laying the pipe on a bed of granular material or finely graded select earth to provide continuous support for the pipe barrel. Bedding depth shall be as shown on the plans.

All ductile iron pipe will be installed using the undercutting method and a crushed stone or clean earth refill bedding in accordance with the Standard Details. The bedding is not a separate pay item and shall be included as incidental expense in the unit price for the pipe bid per foot of pipe or lump sum cost for the item to which it is subsidiary.

4.2 Trenches In Rock. All installation in rock will utilize the undercutting method. Bedding will be with 6 inches crushed stone as shown in the Standard Details. The only exception to this will be with PVC, copper, or galvanized iron pipe 4 inches in diameter or smaller. These may be bedded on 6 inches of evenly spread earth backfill.

4.3 Unstable Trenches. If unstable material is encountered which may not provide a suitable foundation for the pipe, the unstable material will be removed and an adequate

layer of encasement concrete or other special bedding shall be placed for the pipe foundation in accordance with the Standard Details in the plans. Such "special pipe foundation" shall only be installed if directed by the ENGINEER in writing or on the plans. This special pipe foundation shall be considered a pay item and shall be paid for at the unit contract price for the type of bedding required.

## 5. PIPE LAYING

5.1 General. Proper instruments, tools and facilities satisfactory to the ENGINEER shall be provided and used by the CONTRACTOR for the safe and convenient prosecution of the work. Each pipe manufacturer shall have an experienced representative on the job for at least one day at the commencement of jointing and laying operations.

Before any length of pipe is placed in the trench, a careful inspection shall be made of the interior of the pipe to see that no foreign material is in the pipe. In order to properly remove any foreign materials, a swab of necessary length is to be available at all times.

All pipe shall be lowered carefully into the trench, properly aligned and properly jointed by use of suitable tools and equipment, in such a manner as to prevent damage to water line materials and protective coatings and linings. Excessive scratching of the exterior surface of the pipe will be cause for rejection of the pipe.

Under no circumstances shall pipeline materials be dropped or dumped into the trench. The pipe and fittings shall also be inspected for the purpose of determining if they are sound and free from cracks. Laying of pipe shall be commenced immediately after excavation is started. Pipe shall be laid with bell ends facing in the direction of laying.

When pipe laying is not in progress, the open ends of pipe shall be closed by approved means to prevent entrance of trench water into the line. Whenever water is excluded from the interior of the pipe, adequate backfill shall be deposited on the pipe to prevent floating. Any pipe which has floated shall be removed from the trench and relaid as directed by the ENGINEER. No pipe shall be laid in water or on frozen trench bottom, or whenever the trench conditions or the weather are unsuitable for such work.

If any defective pipe and fittings shall be discovered after the pipeline is laid, they shall be removed and replaced with a satisfactory pipe or fitting without additional charge to the OWNER. Open ends of unfinished pipe lines shall be securely plugged or closed at the end of each day's work or when the line is left temporarily at any other time.

5.2 Laying Ductile Iron Pipe. Ductile iron bolted joint, rubber ring slip joint, and ball and socket river crossing pipe shall first be thoroughly cleaned at joints, then joined according to instructions and with tools recommended by the manufacturer. Three (3) copies of instructions shall be furnished the ENGINEER and one (1) copy shall be available at all times at the site of the work. The lining inside ductile iron pipe must not be damaged by handling.

All pipes must be forced and held together, or "homed" at the joints, before sealing or bolting. Pipe must be aligned as each joint is placed, so as to present as nearly true, straight lines and grades as is practical, and all curves and changes in grades must be laid in such a manner that the manufacturer's recommended maximum deflection is not exceeded at any joint.

Cutting of pipe may be done by wheeled pipe cutters or saws, or by hammer and chisel, as the CONTRACTOR may elect, but the CONTRACTOR will be held responsible for breakage or damage caused by careless cutting or handling.

Ductile iron pipe shall be laid in accordance with Standard ANSI/AWWA C150/A21.50 Laying Conditions, Type 3 as shown in the Standard Drawings in these Specifications. Six (6") inches crushed stone bedding shall be used in rock. Sufficient space (limited to 2 feet longitudinally) shall be left out of 4 or 6 inch cushion for tightening of bolts where bolted joints are used. No pipe shall be laid resting on rock, blocking, or other unyielding objects. Jointing before placing in trench, and subsequent lowering of more than one section jointed together may be allowed, subject to the ENGINEER'S approval and direction.

When using pipe with push-on joints care must be exercised to make certain that the correct gasket is being used for the type of joint installed and that the gasket faces the proper direction. Before inserting the gasket, the groove and bell socket should be carefully cleaned of all dirt. If sand or dirt is permitted to remain in the groove, leaks may occur. Lubricant must be applied to bell socket, gasket and plain- end of pipe as required by manufacturer. Plain-end must be beveled before joint is made. Deflection required at the joint shall be obtained after the joint is made.

Cut pieces of ductile iron pipe 18 inches or more in length, shall be used in fitting to special conditions, and valves and fitting changes in grade and alignment, provided cutting is even enough to make first class joints and no cracks are evident.

Bell and spigot pipe with caulked joints may be used for special cases only. Where this type of pipe is required the joints shall be made as described in this paragraph. After placing a length of pipe on the prepared grade in the trench, the yarning material shall be held around the bottom of the spigot end of the next length so that it will enter the bell of the previously laid pipe as the pipe is shoved into position. The spigot shall be centered there with earth carefully tamped under and on each side of it, excepting at the bell holes. Care shall be taken to prevent dirt from entering the joint space. Two or more joints of pipe shall be in place ahead of each joint before it is poured. Yarning material for bell and spigot joints shall be rubber rings, asbestos rope, or treated paper rope. Joint material for bell and spigot pipe, unless otherwise shown on the drawings, shall be of the sulphur compound type "Leadite," "Mineralead", or approved equal. Jute shall not be used for joint material. Yarning material shall be thoroughly caulked into the joint to insure centering of the spigot and within the ball and prevent loss of molten joint material into



the interior of the pipe, but in no event shall a depth of less than 2-1/2 inches be left for the joint compound. Each length of material shall be such as to pass completely around the pipe and provide a lap of two inches. Joint compound shall be heated in accordance with the directions of the manufacturer, care being taken to prevent under and over heating and burning. Joints shall be run with the aid of a runner and metal pouring gate thoroughly clayed to the pipe to prevent the molten compound from breaking out of the joint. Each joint shall be run full to the top of the pouring gate in one continuous pour. Material contained in the pouring gate when it is cut free from the joint may be reused. No joint shall be run in a wet trench and no water shall be allowed to come in contact with the joint until it is thoroughly hardened. If, upon inspection by the ENGINEERS, imperfect joints are disclosed, the compound shall be cut out or otherwise removed and the joint re-run.

5.3 Laying Plastic Pipe. The trench bottom must be smooth and uniform and the alignment must conform with the plans. Bedding and cover as specified herein and shown in the Standard Details is required.

To make a clean and unobstructed joint, it is necessary to wipe the ring, groove and pipe spigot free from all foreign materials at the time of assembly (welded joints will be allowed only in special cases and will be required as shown on the plans). The ring must be positioned properly in the fitting to receive the pipe by a worker who is not in contact with the lubricant. In general, the lubricant is applied to the spigot (not the ring or groove). However, the manufacturer's instructions are to be followed in all cases. Only an approved lubricant may be used in accordance with the manufacturer's recommendations. All plastic pipe shall be joined by hand.

Where good bedding conditions are attained PVC pipe smaller than 4 inches may be assembled outside the trench in longer sections (as conditions allow) and then lowered into the trench. At any time when improper bedding is discovered or the pipe is severely deflected the pipe will be removed from the trench and the condition corrected. Pipe in sizes 4 inch and above may be assembled outside the trench but must be lowered into the trench as each joint is assembled. Regardless of installation methods all couplings must be inspected after laying in trench for proper insertion and alignment. Field cuts and bevels will be allowed in accordance with the manufacturer's recommendations for these operations. A new reference mark shall be installed before joining any field cut pipe. The same requirements for clearance from rock or other objects, thrust blocking and deflections shall apply to PVC pipe as for other pipe materials.

Municipal PVC pipe of all sizes must be assembled in the trench in strict accordance with the manufacturer's requirements.

## 6. BACKFILLING

Backfilling must be started as soon as practicable after pipe has been laid and joints hardened sufficiently, and jointing and alignment approved. Spading of crushed rock,

sand, or mechanical tamping of earth, around pipe (as specifically required) between joints shall be the usual procedure as the laying progresses. This is in order to avoid danger or misalignment from slides, flooding or other causes. The ENGINEER shall be given a minimum of 24 hours for inspection before backfilling. The backfill shall be crushed rock, sand, or finely divided earth free from debris, organic material and stones, placed simultaneously on both sides of pipe to the same level by hand.

In backfilling of the lower part of the trench beginning at the top of the bedding, the backfill material shall be carefully and solidly tamped by hand or approved mechanical methods in 6" layers around the pipe and up to a point 8 inches higher than the top of the pipe. For PVC only the backfill shall be select material and may be walked-in. Walking or working on the completed pipe line, except as necessary in tamping or backfilling, shall not be permitted until the trench has been backfilled to a point one diameter higher than the top of the pipe. The filling of the trench and the tamping of the backfill shall be carried on simultaneously on both sides of the pipe in such a manner that the completed pipe line will not be disturbed and injurious side pressures do not occur.

After the above specified backfill is hand placed, rock may be used in the backfill in pieces no larger than 18 inches in any dimension and to an extent not greater than one-half (1/2) the backfill materials used. If additional earth is required, it must be obtained and placed by the CONTRACTOR. Filling with rock and earth shall proceed simultaneously, in order that all voids between rocks may be filled with earth. Above the hand placed backfill, machine backfilling may be employed without tamping, (if not contrary to specified conditions for the location) provided caution is used in quantity per dump and uniformity of level of backfilling. Backfill material must be uniformly ridged over trench and excess hauled away, with no excavated rock over 1-1/2 inch in diameter or pockets of crushed rock or gravel in top 6 inches of backfill. Ridged backfill shall be confined to the width of the trench and not allowed to overlap onto firm original earth and its height shall not be in excess of needs for replacement or settlement of backfill. All rock, including crushed rock or gravel from construction, must be removed from yards and fields. Streets, roadways and walks shall be swept to remove all earth and loose rock immediately following backfilling.

In the case of street, highway, railroad, sidewalk and driveway crossings or within any roadway paving or about manholes, valve and meter boxes, the backfill must be machine tamped in not over 4-inch layers, measured loose in accordance with the standard details. Where backfill is under paved driveways, streets, highways, railroads, sidewalks, paved parking areas and other areas where settlement is not allowed, crushed stone or coarse sand backfill only shall be used up to the paving surface. Crushed stone shall be Kentucky Department of Highways Standard Specification No. 78 or finer. Coarse sand backfill shall be spread in layers not over 4 inches thick and thoroughly compacted. Sand may be moistened to aide compaction. Tunnels shall be backfilled in not over 3-inch layers, measured loose, with selected material suitable for mechanically tamping. If material suitable for tamping cannot be obtained, sand, gravel or crushed rock (No. 78) shall be blown, packed or sluiced to complete fill all void spaces.

Where local conditions permit, pavement shall not be placed until 30 days have passed since placing backfill. Crushed stone is specified for roads and parking areas and sidewalks or their bases, shall be placed and compacted to the top of trench. Backfills shall be maintained easily passable to traffic at original ground level, until acceptance of project or replacement of paving or sidewalks.

Where the final surfacing is to be crushed stone, compacted earth backfill may be used in the trench to within 6 inches of the top as shown in the Standard Details.

Railroad Company and Highway Department requirements in regard to backfilling will take precedence over the above general specification where they are involved.

Excavated materials from trenches and tunnels in excess of quantity required for trench backfill shall be disposed as shown on the plans or as directed by the ENGINEER.

The CONTRACTOR shall protect all sewer, gas, electric, telephone, water and drain pipes or conduits, power and telephone poles and guy wires from danger of damage while pipelines are being constructed and backfilled, or from danger due to settlement of his backfill.

In case of damage to any such existing structures, repair and restoration shall be made at once and backfill shall not be replaced until this is done. In all cases, restoration and repair shall be such that the damaged structure will be in as good condition and serve its purpose as completely as before uncovering and such restoration and repair shall be done without extra charge.

No extra charge shall be made for backfilling of any kind, except as provided in the Bid. Backfilling shall be included as a part of the unit price bid for which it is subsidiary. No extra charge shall be made for supplying outside materials for backfill.

Before completion of contract, all backfills shall be reshaped, holes filled and surplus material hauled away, and all permanent walks, street, driveway and highway paving, and sod, replaced (if such surface replacement items are included in the contract) and reseeding performed.

Any deficiency in the quantity of material for backfilling the trenches or for filling depressions caused by settlement, shall be supplied by the CONTRACTOR.

#### 7. TIE-INS TO EXISTING PIPELINES

This work shall consist of connecting new water pipes to the existing system where shown on the plans and shall include the necessary fittings, tapping sleeves, valves and necessary equipment and material required to complete the connection.

Knowledge of pipe sizes in the existing system may not be accurate, therefore, it is recommended that the CONTRACTOR check outside diameters of existing pipe and types of pipe prior to ordering the required accessories. No additional payment will be allowed for matching pipe and/or accessories when the proper size is not ordered.

Neither the OWNER nor the ENGINEER can guarantee the location of the existing lines. The CONTRACTOR shall verify the location of all existing water mains and valves pertaining to the proposed improvements before excavation is started.

The necessary regulation or operation of the valves on existing mains, to allow for the connections being made, shall be supervised by the ENGINEER. Before shutting down an existing water main or branch main for a proposed connection, prior approval for a specific time and time interval shall be obtained from a representative of the OWNER. At no time shall an existing main be shut down without the OWNER'S knowledge and permission.

Excavation to existing water mains shall be carefully made, care being exercised not to damage the pipe. The excavation shall not be of excessive size or depth beneath the pipe. The sides of the excavation shall be as nearly vertical as possible.

The CONTRACTOR shall be responsible for any damage to the existing system and any such damage shall be repaired to the satisfaction of the ENGINEER at the CONTRACTOR'S expense.

The CONTRACTOR shall verify, by field inspection, the necessary sizes, lengths and the types of fittings needed for each inter-connection. Typical connections are shown on the plans and any modifications or changes shall be subject to the approval of the ENGINEER. The exact length of the proposed water main needed for this work shall also be determined by field measurement as required.

The probing required to locate existing mains is not a separate pay item.

#### 8. PIPE ENTERING STRUCTURES

Ductile iron, steel or PVC pressure pipe, 4-inch diameter or larger, entering structure below original earth level, unsupported by original earth for a distance of more than six (6') feet, shall be supported by Class B concrete, where depth of such support does not exceed three (3') feet, and by Class B Concrete piers where depth exceeds three (3') feet. All other pressure pipe entering buildings or basins below original earth level, which have more than 3 feet span between wall and original earth and having a cover of more than 24 inches of earth, or under roadway, shall be supported on compacted granular fill, in order to prevent breakage from settlement of backfill about the structure. Concrete and reinforcing steel for such supports are to be included in the unit price of work to which it is subsidiary, and not as extra concrete, in order to discourage excessive excavation

outside the limits of structures. Pipe entering structures shall have flexible joint within 16 inches of exterior of structure.

9. OWNERSHIP OF OLD MATERIALS

A. Pipe - Unless otherwise indicated, all existing pipe that is to be abandoned that interferes with construction or is easily removed shall become the property of the CONTRACTOR. All pipe that is not easily removed or not required to be removed as a result of the new construction, shall be abandoned in place by this CONTRACTOR.

B. Pipe Line Fittings and Appurtenances - All pipe line fittings, valves, hydrants and other like appurtenances that are removed as a result of new construction shall be removed by this CONTRACTOR but shall become the property of the OWNER. All such fittings and appurtenances shall be delivered to a point by the CONTRACTOR. Said point shall be on the OWNER'S property and shall be designated by the ENGINEER.

C. Other Materials - All other materials or items that are to be removed, demolished, or abandoned as a part of this contract shall become the property of the CONTRACTOR and shall be disposed of by him.

10. THRUST BLOCKING AND ANCHORAGE

All angles or bends in the pipe line, either vertical or horizontal, shall be braced or anchored against the tendency of movement with concrete thrust blocking per the Standard Details, or approved equivalent joint harness or anchors to the satisfaction of the ENGINEER. Where joint harness is used, all component parts shall be stainless steel. Concrete thrust blocking or joint harness materials shall be considered incidental to the expense of installing the line and shall be included in the cost for the pipe line. No separate payment will be made for these items.

Thrust blocks for plastic pipe will not be attached to couplings.

Where thrust blocks are used for extra fittings ordered by the ENGINEER, payment shall be made using the bid price for Class "B" concrete and the thrust block dimensions shown in the Standard Details. This payment shall cover all work required for extra thrust blocks.

11. TESTING PRESSURE LINES

The CONTRACTOR will be required to test all pipelines and appurtenances, with water, at pressure class of pipe installed.

The pipe shall be slowly filled with water, care being taken to expel all air from the pipes. If necessary, the pipe shall be tapped at high points to vent the air. Pressure at least equal

to 200 PSIG (or the operating pressure if higher) as measured at the point of lowest elevation shall be applied.

Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, 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. No pipe shall be accepted unless or until the leakage, determined by this test, is less than 0.08 U.S. gallons per hour, per 1,000 feet, per inch nominal diameter of pipe. The leakage test shall be applied to the pipe for a period of not less than 4 hours.

To determine the rate of leakage, the CONTRACTOR shall, as required, furnish a suitable pump, pressure gauge and water meter or other appliance for measuring the amount of water pumped. The instrument used to measure leakage shall be tested for accuracy as frequently as directed by the ENGINEER. The CONTRACTOR shall furnish all necessary labor and materials to make the test and to perform any work incidental thereto. Where it is impractical to test between the valves, the CONTRACTOR shall as directed, at his own expense and cost, temporarily place caps and plugs on the lines and test sections of the new line.

Where any section of the main is provided with concrete reaction blocking, the hydrostatic pressure test shall not be made until at least five days have elapsed after the concrete reaction blocking was installed. If high early strength cement is used in the reaction blocking, the hydrostatic pressure test shall not be made until at least two days have elapsed.

Should there be leakage over the allowable amount, the CONTRACTOR will be required to locate and repair the leaks and retest the section. It is suggested, but not required, that the CONTRACTOR have a geophone (underground listening device) on the job at the time of testing.

If the leakage of the section of pipeline being tested is below the allowable amount, but leakage is obvious in the opinion of the ENGINEER, due to water at the surface of the ground, or by listening the leak can be heard underground with a geophone, or any other means of determining a leak, the CONTRACTOR will be required to repair these leaks.

The CONTRACTOR shall furnish a meter or suction tank, pipe test plugs and by-pass piping and make all connections for conducting the above tests. The pumping equipment used shall be centrifugal pump, or other pumping equipment which will not place shock pressures on the pipeline. Power plunger or positive displacement pumps will not be permitted for use on closed pipe systems for any purpose.

Inspection of pipe laying shall in no way relieve the CONTRACTOR of the responsibility for stopping leakage or correcting poor workmanship.

12. DISINFECTION OF POTABLE WATER LINES

The new potable water lines shall not be placed in service either temporarily or permanently--until they have been thoroughly disinfected in accordance with the following requirements and to the satisfaction of the Engineer.

After 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 ppm in the 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 dosage 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 be allowed to remain in the pipe for 24 hours, after which a residual of at least 25 ppm shall be obtained. The disinfection shall be repeated until 25 ppm is obtained after which time the main shall be thoroughly flushed until the residual chlorine content is not greater than 1.0 ppm, and then may be connected to the system.

13. MAINTENANCE OF FLOW OF DRAINS AND SEWERS

Adequate provision shall be made for the flow of sewers, drains and water courses encountered during construction. Any structures which are disturbed shall be satisfactorily restored by the CONTRACTOR.

14. INTERRUPTION OF UTILITY SERVICES

No valve, switch or other control on any existing utility system shall be operated for any purpose by the CONTRACTOR without approval of the ENGINEER and the Utility. All consumers affected by such operations shall be notified by the CONTRACTOR as directed by the ENGINEER and utility before the operation and advised of the probable time when service will be restored.

15. 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. Cleanup shall be in accordance with Section 15102 of these Specifications.

16. MEASUREMENT AND PAYMENT

Yard piping and valves are generally not a separate pay item. The cost for this work shall be included in the work to which it is subsidiary unless otherwise shown in the Bid Schedule.

## SECTION 13500

### HOUSED VALVES

#### 1. GENERAL

1.1 Scope of Work. Provide all materials, labor, equipment and services required to furnish and install all valves shown on the Drawings and specified herein.

#### 1.2 Related Work Specified Elsewhere.

- A. Piping is included in 13100.
- B. Hangers and supports are included in 13100.
- C. Valves associated with yard piping (buried service) are included in Section 13104.

#### 2. PRODUCTS

2.1 Shear Gates. Shear gates shall be iron body bronze mounted double wedge type with pull rod and handle. Rod length is as shown on plans. Shear gates shall be M & H Figure No. 44, Clow Model F-3002 or approved equal.

2.2 Air and Vacuum Valve for Vertical Turbine Pumps. Air valves for Vertical Turbine Pumps shall be designed to allow large quantities of air to escape out the orifice when the pump is started and close water tight when the liquid enters the valve. The air valve shall also permit large quantities of air to re-enter thru the orifice when the pump is stopped to prevent a vacuum from forming in the pump column.

The valve shall consist of body, cover, baffle, float and seat. The baffle will be designed to protect the float from direct contact of the rushing air and water to prevent the float from closing prematurely in the valve. The seat shall be fastened into the valve cover, without distortion, and shall be easily removed, if necessary.

The entire float and baffle assembly must be shrouded with a perforated water diffuser to prevent the water column entering the valve, from slamming the float shut and eliminate water hammer in the system.

The discharge orifice shall be fitted with an adjustable throttling device to regulate the flow of air escaping to establish a pressure loading on the rising column of water to minimize shock to the pump and check valve.



The float shall be stainless steel, designed to withstand a minimum of 1000 psi. The float shall be center guided and not free floating for positive seating.

Valve may have either threaded or flanged inlet and outlet. The outlet shall be piped to clearwell or atmosphere as shown on the DRAWINGS.

Valve exterior to be painted with Red Oxide Phenolic Primer Paint as accepted by the FDA for use in contact with Potable Water.

All materials of construction shall be certified in writing to conform to ASTM specifications as follows:

|                      |                 |                   |
|----------------------|-----------------|-------------------|
| Body, cover & baffle | Cast iron       | ASTM A48 Class 30 |
| Float                | Stainless Steel | ASTM A240         |
| Seat                 | Buna-N          |                   |
| Water diffuser       | Brass           | Commercial        |
| Throttling device    | Malleable iron  | Commercial        |

Valve to be APCO Air & Vacuum Valve for Vertical Turbine Pumps, as manufactured by Valve & Primer Corp., Schaumburg, Illinois.

An automatic air release valve shall be provided on the high service pumps to exhaust small pockets of air which may collect in the Air and Vacuum Valve. The automatic air release valve shall have a 1/2" threaded inlet and be equal to APCO Model No. 55.

2.3 Combination Air Release Valves. Combination air release valves (single body, double orifice) shall be designed to allow large volumes of air to escape out the large air vacuum orifice when filling a pipeline and to close water tight when the liquid enters the valve. During large orifice closure, the small air release orifice shall open to allow small pockets of air to escape automatically and independently of the large orifice. The large air vacuum orifice shall also allow large volumes of air to enter through the orifice during pipeline drainage to break the vacuum. The body inlet must be baffled to protect the lower float from direct contact of the rushing air and water to prevent premature valve shut off. The top float must be protected in similar manner for the same purpose. The Buna-N seat must be fastened to the valve cover without distortion for drop tight shut off. All floats shall be heavy stainless steel, hermetically sealed; designed to withstand 1000 psi or more. The upper float shall be center guided for positive shut off. Valve exterior to be painted red lead TT86B Type IV for high resistance to corrosion. Materials certified to ASTM specifications as follows:

Body & Cover & Baffle - Cast Iron  
Stainless Steel Float  
Buna-N Seat & Needle  
Plug & Bronze Forging

Delrin Level Frame  
ASTM A48 Class 30  
ASTM A240  
Nitrile Rubber ASTM SB 800  
ASTM D638

Combination air release valves shall be as shown in the valve schedule manufactured by APCO or equal.

#### 2.4 Check Valves.

A. Swing Check Valves. Check valves shall be iron body, bronze mounted, horizontal swing check type, spring loaded suitable for horizontal or vertical service, American Darling, M&H, Clow or equal.

B. Double Door Check Valves. Double door check valves shall be APCO Series 9000 as manufactured by Valve and Primer Corporation, Schaumburg, Illinois, or equal. Check valve shall be lug style, pressure class 150 pounds with cast iron body, aluminum bronze doors, T316 stainless steel hinge pin and stop pin, Buna-N set and T316 stainless steel spring.

C. Air Cushion Swing Check. Air Cushion Swing Check Valve body shall be cast iron per AWWA C508 having integral flanges.

The seat shall be centrifugally cast bronze with an o-ring seal and be locked in place with stainless steel lock screws and be field replaceable, without the use of special tools.

The shaft shall be single and continuous stainless steel, extending both sides of the body with a lever and weight, using an air cushion cylinder side mounted.

The air cushion cylinder shall be constructed of corrosion - resistant material and the piston shall be totally enclosed within the cylinder and not open at one end.

The cushion cylinder assembly shall be externally attached to either or both sides of the valve body and will permit adjustability to cushion the closure of the valve. Cushioning shall be by air trapped in the cushion cylinder which shall be fitted with a one way adjustable control check valve to cushion disc contact to the seat at the shut-off point. The bottom cylinder head shall be swivel mounted and not rigid to follow the change of force angles as the lever raises or lowers to open or close the check valve.

This valve shall prevent backflow of the media on normal pump shut-off or power failure, at zero velocity and be water tight.

The disc shall be cast iron utilizing a double clevice hinge connected to a Ductile iron disc arm. The disc arm assembly shall be suspended from a stainless steel shaft which passes thru a seal retainer on both sides of the valve body.

Valve exterior to be painted with Red Oxide Phenolic Primer Paint as accepted by the FDA for use in contact with Potable Water.

Materials shall be certified to the following A.S.T.M. Specifications:

Valve to be APCO Series 6000 Cushion Swing Check Valve - Air Cushion Side Mounted as manufactured by Valve & Primer Corporation, Schaumburg, Illinois, or equal.

D. Rubber Flapper Check Valve. The check valve shall be an APCO Series 100 rubber flapper serving check valve as manufactured by Valve and Primer Corporation, Schaumburg, Illinois, or approved equal. This check valve shall have a cast iron body and cover and the body shall be long pattern design with integrally cast on end flanges. The flapper shall be Buna-N having an "O"-ring seating edge and shall be internally reinforced with steel.

E. Electric Check Valves. Electric solenoid operated check valves shall be of cast iron body, globe pattern, with all bronze or non-corrosive trim construction. The valves shall be flanged, faced and drilled to conform to 250# Stds. B16.1. The electric check valves shall be rated for a normal working pressure of 200 psi. The valves shall be Figure No. 173-D, Globe Body as manufactured by GA Industries, Inc., Cla-val, Ross or approved equal as specified herein.

The valves shall be constructed with complete bronze or non-corrosive lining which shall extend down to and form the seat of the valve. The liner shall be provided with cast "V" port openings. The piston shall be bronze. The pilot shall be of the 3-way type and of all bronze construction.

The design of the valve shall be such as to provide air and water cushioning to reduce hammer and shock. Speed of valve closing/opening shall be adjustable by a hand operated regulating valve. Wear on valve moving parts shall be absorbed by renewable leather composition or rubber cups and seat. The design of valve shall be such that the area above the piston shall be approximately twice the area on the small end of the piston.

The valve shall be designed to provide full pipe line flow when open, and it shall shut off tight, when closed.

Valve shall provide for normal automatic opening and closing function, plus emergency closing on electrical outage. It shall also provide for manual-hydraulic control for opening main valve.

The Sequence of operation for the electric check valve shall be as follows:

a. Valve openings:

-Pump motor starter, three-way solenoid pilot, emergency solenoid pilot simultaneously energized by control circuit.

-Valve opens as pump reaches full speed.

-Limit switch contacts close interlocking with motor starter circuit.

b. Valve closing:

-Three-way solenoid pilot de-energized by control circuit.

-Pump motor circuit and emergency solenoid pilot remain energized.

-Valve starts to close, pump running.

-As piston nears its seat, limit switch contacts open, de-energizing pump circuit and emergency solenoid pilot.

In the event of a power failure, the motor starter circuit solenoid operated three-way pilot, and the solenoid operated two-way pilot will become de-energized simultaneously. De-energizing both pilots simultaneously will cause the main valve piston to move rapidly to its seat. The speed of emergency closing is adjustable by regulating valve. The emergency closing speed is always at a faster rate than that of the normal closing speed.

The emergency sequence of operation would also pertain in the event of motor undervoltage, motor overload, or by depressing the emergency stop button if same is used.

2.5 Surge Relief Valves. The water pressure relief valve shall function to open to atmosphere when the system pressure exceeds the intensity for which the pilot is set. It shall open rapidly, and close slowly at a predetermined rate of speed. Provision shall be made on the valve to regulate the closing speed of the valve.

The valve shall be of the angle body or globe body design with inlet pressure entering the valve under the piston. It shall be possible to install the valve in any position without impairing its function.

The valve shall be hydraulically operated, designed with a differential type piston such that the piston will expose a greater area to the closing force than to the opening force. A vent to atmosphere from the side of the valve body shall produce the differential piston area, and also serve to provide air cushion to prevent hammer and shock.

The body and lid of the valve shall be constructed of high grade cast iron. Interior parts of the valve, including the piston, liner and seat, shall be of bronze. The liner and piston shall be equipped with renewable leather cups and the piston shall additionally have a leather or rubber seat ring. All wear on the valve shall be absorbed by the cups and seat ring and there shall be no metal to metal contacts within the main valve.

The pilot valve shall be of cast bronze conforming to ASTM Specifications B-62. It shall be of the diaphragm operated, spring loaded type, single seated, balanced design. Adjustment of the opening pressure of the main valve shall be accomplished by regulation of the handwheel on the pilot and shall provide for a range of 20 psi.

The valve shall provide full pipe line opening when opened its full stroke, and it shall be drop tight when closed. It shall be possible to open the relief valve at any time by exhausting the pressure from above the piston to atmosphere. The overall body test shall be made hydraulically at a pressure of no less than 50 percent above the maximum working pressure of the valve. The purchaser reserves the right to witness all or any tests, and must be given free access to the place of manufacture at all times. The valve shall be Golden-Anderson Valve Co. Figure No. 66-D for angle body or 67-D for globe body. The valve shall be factory tested to relieve at 200 psi.

#### 2.6 Gate Valves\*.

A. Housed. Gate valves for fabricated pipe systems shall be resilient seat type, iron body, flanged, fully bronze mounted with O-ring seals, and suitable for working water pressures of not less than 250 PSIG. Housed valves shall be left uncoated to allow painting without the use of tar stop. Valves shall be of standard manufacture and of the highest quality both of materials and workmanship and shall conform to the latest revision of AWWA Specification C-500. Unless otherwise shown on the plans, all housed gate valves shall be non rising stem. Valves shall be rated for a working pressure of not less than 250 psi and shall have flanges drilled 125 lbs. pattern. Unless otherwise shown on the Drawings, housed valves and valves in basins shall be handwheel operated. Handwheels shall be ANSI B16.1 Class 125. Handwheels shall have not less than the following diameters:

| <u>Size Valves</u> | <u>Diameter</u> |
|--------------------|-----------------|
| 1"                 | 3 1/8"          |
| 1 1/2"             | 4 1/4"          |
| 2"                 | 6"              |
| 3"                 | 8"              |

\*Buried service gate valves specified in Section 13104.

| <u>Size Valves</u> | <u>Diameter</u> |
|--------------------|-----------------|
| 4"                 | 10"             |
| 6"                 | 12"             |
| 8"                 | 14"             |
| 10"                | 16"             |
| 12"                | 18"             |

| <u>Size Valves</u> | <u>Diameter</u> |
|--------------------|-----------------|
| 14"                | 20"             |
| 16"                | 22"             |
| 18"                | 24"             |

Valve stand handwheels and handwheels on extended stems, shall have the same minimum diameters as those shown for handwheels directly on valves. Extension stems for O.S&Y valves shall be non-rising, with clamp to valve handwheel and hollow shaft for rising stem of valve, with adjustable cast iron guides per each eight (8) feet of extension stem length maximum. All extension stems shall be connected with suitable coupling castings for connection to and removal from valves and stands. Nuts and bolts on all extension stem connections shall be stainless steel.

2.7 Plug Valves. Plug valves shall be non-lubricated eccentric type with synthetic rubber faced plugs, corrosion resistant nickel seats, replaceable stainless steel sleeve type bearings in the upper and lower journals. Furnish with flanges faced and drilled ANSI B16.1 125-pound.

Valve shall provide drip-tight shut-off up to the full rated pressure. All plug valves shall be provided with limit stops and rotated 90 degrees from fully opened to fully closed. Plug valves shall be manually operated with worm gear operator handwheel or lever actuated. Plug valves located 6 feet or more above the floor shall be furnished with chainwheel operators.

Eccentric plug valves shall be as manufactured by DeZurik, Clow, or equal.

2.8 Butterfly Valves\*. All butterfly valves shall be of tight closing, rubber or synthetic rubber seat type with seats securely fastened to valve body. No metal-to-metal seating surfaces will be permitted. Valves shall be bubble tight at the rated pressure in either direction and shall be satisfactory for applications involving throttling service and/or frequent operation and for applications involving valve operation after long periods of inactivity.

The valve discs shall rotate 90° from the full open position to the tight shut position.

The valve bodies themselves shall be of the lugged wafer or flanged type design except where specifically noted on the Drawings. Valve bodies shall be constructed of cast iron ASTM A 126, Class B, and shall be suitable for use with 125# ANSI flanges. Valves shall meet the full structural requirements of the applicable classes of AWWA C 504-74.

The valve discs shall be cast iron, semi-steel or bronze with a welded nickel edge free of ribbing or protrusions which may collect solids. The disc-to-shaft connections shall be via polished 316 SS pins. Sprayed or plated discs are not acceptable. All disc seating edges shall be smooth and polished.

The shafts shall be turned, ground and polished. They shall be 300 Series or 400 Series Stainless Steel with diameters per AWWA Spec. C504-70, Class 75B. The shafts shall be of one-piece construction.

The shaft seals shall be of Hycar or Hypalon and shall be provided to prevent leakage into the bearing chest areas.

The valve bearings shall be Teflon coated, self-lubricating, stainless steel design and construction.

The valve seats shall be Neoprene or Hypalon and shall be simultaneously molded, vulcanized and bonded to the valve body or a rigid reinforcing ring.

All surfaces of the valve shall be clean, dry and free from grease before painting. The valve surfaces except for disc, seating and finished portions shall be evenly coated at the factory with a suitable rust inhibitive primer. Hydrostatic and leakage tests shall be conducted in strict accordance with AWWA C 504-74, Section 12.

The valves shall be manufactured by M & H, Dresser, Dezurik or approved equal and supplied as listed in the valve schedule specified herein.

\*Buried service butterfly valves are specified in Section 13104.

A. High Pressure Butterfly Valves. High performance butterfly valves, 2" - 12" in ANSI Class 300 design, shall be of the flanged or lugged wafer body style. Bodies shall be of carbon steel or cast 316 stainless steel construction. ANSI Class 300 valves shall provide drip tight shutoff to 740 psi.

All valves shall be furnished with upper and lower body bearings and with thrust bearings to assure disc centering in the seat. Valves to be furnished with adjustable v-ring packing of PTFE and an adjustable gland. The one piece shaft shall be high strength Condition "B" type 316 stainless steel, and shall be centerless ground and polished to minimize bearing and packing wear.

Valve seats shall be of PTFE with integral titanium control ring capable of service in temperature ranges of -100°F to 300°F.

Discs shall be cast 316 stainless steel with concave face to reduce dynamic torque and decrease turbulence.

Valve actuators shall provide external disc position indication. Actuators to be weather proof, factory lubed and equipped with fully adjustable mechanical open and closed position stops.

Valves shall be as manufactured by DeZURIK, M & H or approved equal.

B. Manually Operated Butterfly Valves. Manually operated valves shall be operated using a cast iron housed handwheel or chain wheel, as required, available in standard weatherproof construction. All units shall have adjustable open and close position stops and valve position indicator with provision to prevent accidental adjustment changes. The operating shaft shall be supported, axially and radially, at the input end by permanently lubricated bronze thrust and sleeve bearings.

Manually operated butterfly valves shall be furnished and installed as listed in the Butterfly Valve Schedule contained herein.

C. Hydraulically Operated Butterfly Valves. All hydraulically operated butterfly valves shall meet the requirements of Section 2.08 contained herein.

The valves supplied with hydraulic cylinder operators shall be designed and sized according to torque requirements of the valve. The method for calculating torques shall be as outlined in AWWA, Appendix A. Operator shall produce the full AWWA Standard C504 Table 1 output torque throughout entire travel. All hydraulically operated butterfly valves shall be furnished with manual override solenoid valves.

Cylinder actuators shall have working mechanisms fully enclosed and shall be sized for operation using water supply at 40 psi to 100 psi. Contractor shall coordinate cylinder pressure requirements and settings on the plant water pressure reducing valve.

Cylinder pivots shall have bearings. All Cylinder actuators shall be provided with stationary supply connections and flexible cylinder supply lines to allow rigid supply piping to the valve.

Cylinder operator shall be of the base mounted configuration. Cylinder barrel shall be of molybdenum-disulfide lined glass fiber reinforced epoxy tubing, to provide a corrosion-free, self-lubricated high strength barrel. Rod seal shall be of urethane, molybdenum-disulfide filled, to provide a self-lubricated, long life seal.



Piston rod shall be of hard chromium plated 18-8 stainless steel, and shall be top and bottom guided in a heavy cast iron mechanism housing for positive alignment. Guiding shall be accomplished by bronze bearings at end of housing straddling all side loads imposed in operation. Entire operator including piston rod shall be fully enclosed.

The open/close valves shall be supplied with 4-way pre-piped solenoid valves with manual override - NEMA 4 115 V coils, energize to operate.

Open/Closed Valves shall be supplied with speed control for both opening and closing speeds.

Solenoids for open/hold/close (backwash) valves shall be dual coil 4-way with manual override.

Hydraulically operated butterfly valves shall be furnished and installed as listed in the Butterfly Valve Schedule contained herein.

D. Electric Motor Operators. Electric motor operators shall be designed to move the valve from fully open to fully closed with operating speeds such that no undue surge or water hammer occurs when electrical power is applied, and hold the valve disc in any intermediate position between full open and fully closed without creeping or fluttering. Valve, gear, reducer, electric motor operator and accessories shall be furnished complete, ready for installation. Accessories shall include pre-wired control stations with indicating lights, controls and integral reversing contactor furnished for remote operation, and a valve position transmitter and feedback potentiometer enclosed in a NEMA IV housing furnished for remote indication of valve disc position. The motors shall be heavy duty, operating from 120 VAC single phase input source and shall be fused locally. Control compartment shall have internal heater to prevent condensation, a thermal cut-out switch in case of motor overload and four (4) limit switches, 2 to prevent disc overtravel in each direction and 2 for signal-controlled intermediate position stop. Limit switches shall be field adjustable, independent of each other. Limit switches gearing shall be totally enclosed, permanently lubricated. Operator housing shall be heavy, cast aluminum, fully gasketed, capable of remaining watertight for 48 hours submersion in 20 feet of water with conduit access ports sealed.

One handwheel operator shall be furnished for each valve. Operator shall have manual over-ride in which the motor is disconnected when handwheel is in use and the handwheel is not engaged when the motor is in operation.

Motor operation and controls shall be Henry Pratt, AUMA Actuators, or equal.

All valves to be integrated to a flow tube to provide means of rate of flow control shall be equipped with a proportional positioning system to be internally wired to the electric operator for remote indication and control of position of the disc. This system shall be capable of converting a DC milliampere output signal from rate of flow controller to

accuate the valve operator to the position required. All valves equipped with electric operators for open and close service shall have on and off position indicators and transmitters.

### 3. EXECUTION

3.1 Installation. Installation shall be in accordance with manufacturer's recommendations.

### 4. MEASUREMENT AND PAYMENT

Valves are included in the fabricated piping of a structure or specific bid item and separate payment will not be made unless provided for in the Bid Schedule. Costs are to be included in the work to which they are subsidiary.



1409  
North Forbes Road  
Lexington, Kentucky  
40511-2050  
606-233-0574  
606-254-4800 FAX

August 31, 1998

O.1.1.98202R01

Mr. Ken Taylor, P.E.  
Kenvirons, Inc.  
452 Versailles Road  
Frankfort, Kentucky 40601

Re: Report of Geotechnical Exploration  
US 127/US 62 Water Tank  
South Anderson Water District  
Anderson County, Kentucky

Dear Mr. Taylor:

As requested, Fuller, Mossbarger, Scott and May Engineers, Inc. (FMSM) has performed a geotechnical exploration at the above referenced site. Included in this report are the results of the exploration and conclusions and recommendations relative to the design and construction of the proposed tank foundation system.

## 1. General Site Description

The project site is located approximately 2,000 feet northwest of the intersection of US 127 and US 62, and approximately 2,000 feet west of Anderson County High School just to the west of Lawrenceburg, in central Anderson County, Kentucky. The site is shown on a portion of the Lawrenceburg, Kentucky USGS 7½-minute topographic quadrangle in Figure 1.

At the time of the exploration, the site was covered with a thick growth of grass and is presently being utilized as farmland. At the proposed tank location, the terrain slopes gently to the southwest at an approximate rate of 8 percent. A sinkhole is located approximately 125 feet southwest of the proposed tank location.

## 2. General Site Geology

Available geologic mapping (Geologic Map of the Lawrenceburg Quadrangle, Anderson and Franklin Counties, Kentucky, USGS, 1972) shows the site to be underlain by bedrock belonging to the Clays Ferry Formation. The Clays Ferry Formation was formed in the Upper Ordovician geologic period. This formation is described as consisting of about 45 percent limestone, 50 percent shale and 5 percent siltstone. The limestone occurs in three types: 1) medium to dark gray, micrograined and argillaceous with beds ranging

between 0.1 and 1.5 feet thick; 2) medium gray, micrograined in a calcite matrix containing abundant fossils with beds ranging from 0.2 to 0.5 feet thick; and 3) medium gray and crinoidal with beds up to 1.5 feet thick. The shale is described as medium gray to olive gray and fissile, while the siltstone is yellowish brown, calcareous and thin bedded.

The Clays Ferry Formation is generally poorly exposed, and forms moderate to steep slopes. Bedrock of this unit weathers to form a clayey, impervious soil. In addition, small sinkholes are common below an abundant zone of Sowerbyella fossils which is shown on the geologic mapping at approximate elevation 850 feet near the site.

Structure contours drawn on the base of the Brannon Member of the Lexington Limestone Formation show bedrock to be relatively flat at the project site. No faults or other significant geologic features are shown on the geologic mapping within the immediate vicinity.

### **3. Scope of Work Performed**

A total of five borings were drilled during the exploration. These borings (identified herein as Borings 1 through 5) were located in the field by FMSM personnel based on information provided by Kenvirons, Inc. Following the field work, the boring locations were surveyed by Hayden Surveying of Lawrenceburg, Kentucky and the information provided to us for use in this report.

The borings were drilled using a truck mounted drill rig equipped with eight-inch diameter hollow-stem augers following a carbide tipped tooth bit. Each of the borings was advanced to auger refusal. In addition, the boring drilled at the center of the proposed tank footprint (Boring 1) was cored into bedrock using NQ-size (two-inch diameter) rock coring equipment. The purpose of the rock coring was to confirm the presence of bedrock, and to determine general bedrock stratigraphy and quality.

The soil materials were logged by an engineer observing the soil cuttings as they were conveyed to the surface during the augering process, with particular attention given to color, consistency and moisture content. Soil sampling was performed using procedures outlined in ASTM D-1586, "Penetration Test and Split-Barrel Sampling of Soils" and ASTM D-1587, "Thin-Walled Tube Sampling of Soils". A bag sample of the predominant soil horizon was collected for engineering classification and standard Proctor testing. Upon completion of drilling, the borings were checked for the presence of ground water and then backfilled with the auger cuttings.

Upon completion of the field work, the soil samples were transported to our laboratory for testing and analysis. The bag sample was subjected to standard engineering classification tests consisting of Atterberg limits (ASTM D-4318), sieve and hydrometer analysis (ASTM D-422), and specific gravity (ASTM D-854). Also, a standard Proctor moisture-density test (ASTM D-698) was performed. The standard penetration test samples were subjected to

natural moisture content determinations (ASTM D-2216), while the Shelby tube sample was extruded and a selected specimen subjected to an unconfined compressive strength and unit weight determination.

The rock core samples recovered from Boring 1 were placed in a standard wooden core box and transported to our Lexington storage facility. The rock core will be available for viewing by interested parties for an approximate period of six months. After this period, the core will be discarded unless instructed otherwise.

#### 4. Results of The Exploration

The drawing included at the end of this report shows the boring layout, logs of borings, results of laboratory tests and other pertinent geotechnical data. A summary of the borings is presented in Table 1 (all measurements are expressed in feet).

Table 1. Summary of Borings

| Boring           | Surface   | Top of Rock <sup>(1)</sup> |           | Bottom of Boring |           |
|------------------|-----------|----------------------------|-----------|------------------|-----------|
|                  | Elevation | Depth                      | Elevation | Depth            | Elevation |
| 1 <sup>(2)</sup> | 881.3     | 16.3                       | 865.0     | 22.6             | 858.7     |
| 2                | 882.3     | 12.5                       | 869.8     | 12.9             | 869.4     |
| 3                | 880.6     | 11.6                       | 869.0     | 11.9             | 868.7     |
| 4                | 880.7     | 11.7                       | 869.0     | 15.1             | 865.6     |
| 5                | 881.8     | 14.9                       | 866.9     | 16.8             | 865.0     |

<sup>(1)</sup> Top of rock indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, slabs, or rock remnants. An exact determination cannot be made without performing rock coring.

<sup>(2)</sup> Boring 1 was drilled at the center of proposed tank location. Rock coring was performed in this boring.

#### 4.1. Soil Conditions

Underlying a thin mantle of topsoil (less than one-foot thick) at each boring location, one predominant soil material was encountered. This soil is residual in origin, and referred to herein as Soil 1. Soil 1 consists of a fat clay which is brown to light brown in color, moist in natural moisture content and stiff to very stiff in consistency. In addition, limestone remnants and slabs were encountered throughout Soil 1, generally below a depth of three. The

engineering classification tests performed on Soil 1 resulted in classifications of CH and A-7-6(37) according to the Unified Soil Classification System (USCS) and the American Association of State Highway and Transportation Officials (AASHTO) method, respectively.

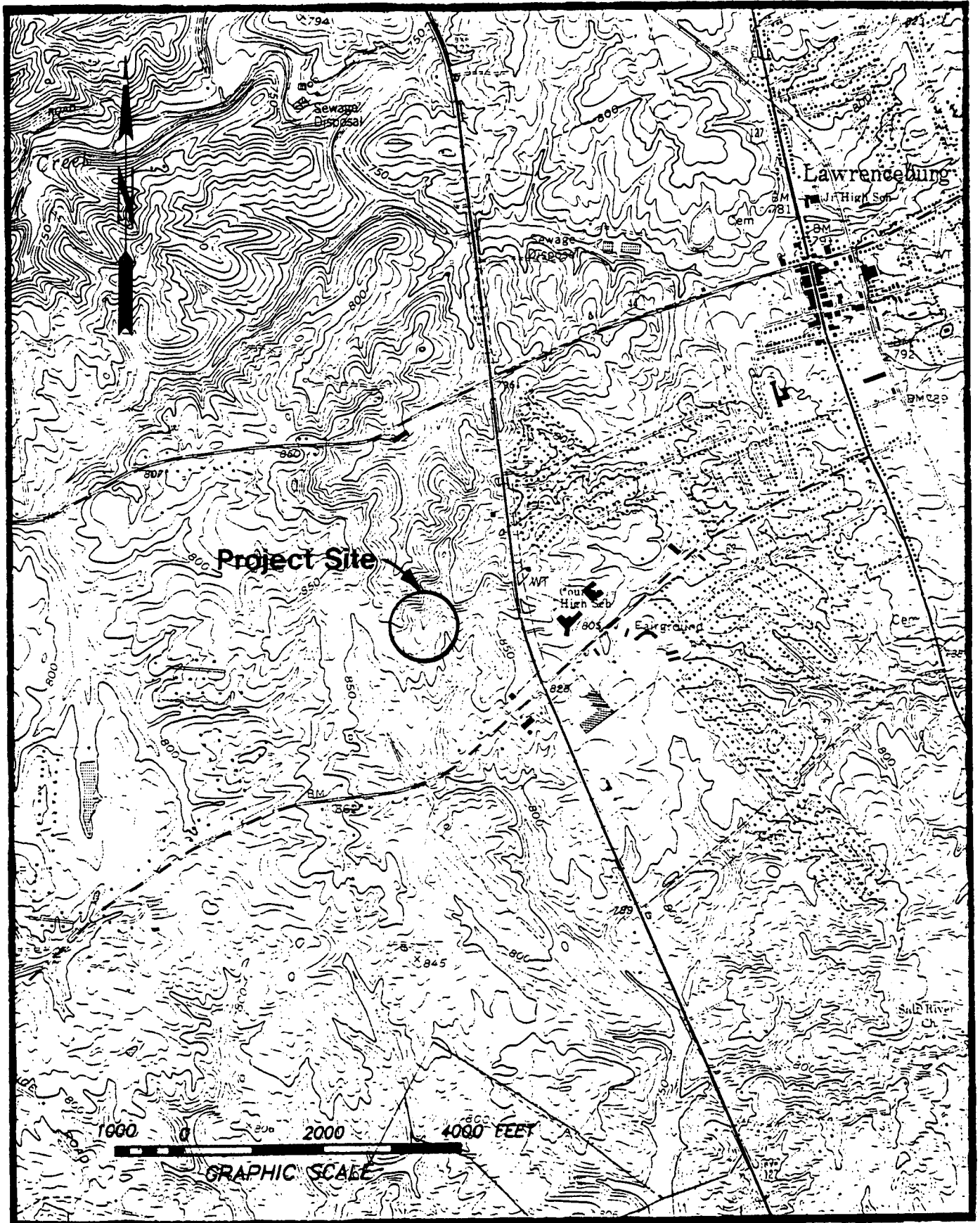
In addition, the results of a standard Proctor test indicate a maximum dry density of 104.3 pounds per cubic foot (pcf), at an optimum moisture content of 20.6 percent. A standard Proctor curve for Soil 1 is included in the appendix.

In-situ soil sampling and testing were performed in Borings 2 through 5. Laboratory testing performed on the Shelby tube sample obtained in Boring 2 resulted in an unconfined compressive strength of 2.2 tons per square foot (tsf). A summary of the standard penetration tests is presented in Table 2.

**Table 2. Summary of Standard Penetration Tests**

| Boring | Sample Interval |                     | Hammer Blows<br>Per 6-Inch<br>Penetration | SPT<br>"N" Value<br>(blows) | Moisture<br>Content<br>(percent) |
|--------|-----------------|---------------------|---|-----------------------------|----------------------------------|
|        | Depth<br>(feet) | Elevation<br>(feet) |   |                             |                                  |
| 2      | 5.5 - 7.0       | 876.8 - 875.3       | 4/6/10                                    | 16                          | 26                               |
|        | 8.5 - 10.0      | 873.8 - 872.3       | 6/9/11                                    | 20                          | 19                               |
|        | 10.0 - 11.5     | 872.3 - 870.8       | 10/13/14                                  | 27                          | 21                               |
| 3      | 2.5 - 4.0       | 878.1 - 876.6       | 6/8/12                                    | 20                          | 22                               |
|        | 5.0 - 6.5       | 875.6 - 874.1       | 11/12/15                                  | 27                          | 20                               |
|        | 9.5 - 11.0      | 871.1 - 869.6       | 8/12/13                                   | 25                          | 25                               |
| 4      | 3.0 - 4.5       | 877.7 - 876.2       | 5/8/18                                    | 26                          | 24                               |
|        | 5.0 - 6.5       | 875.7 - 874.2       | 9/13/14                                   | 27                          | 21                               |
|        | 7.5 - 9.0       | 873.2 - 871.7       | 7/14/14                                   | 28                          | 20                               |
|        | 9.5 - 11.0      | 871.2 - 869.7       | 22/9/11                                   | 20                          | 23                               |
|        | 14.5 - 15.1     | 866.2 - 865.6       | 15/100+                                   | 100+                        | 17                               |
| 5      | 2.5 - 4.0       | 879.3 - 877.8       | 4/6/8                                     | 14                          | 25                               |
|        | 4.5 - 6.0       | 877.3 - 875.8       | 9/7/9                                     | 16                          | 24                               |
|        | 10.0 - 11.1     | 871.8 - 870.7       | 8/11/100+                                 | 100+                        | 20                               |
|        | 12.5 - 14.0     | 869.3 - 867.8       | 9/22/18                                   | 40                          | 22                               |

The standard penetration test "N" value is defined as the number of blows required to drive a two-inch diameter split-spoon sampler the final 12 inches of an 18-inch test interval using a 140-pound hammer falling 30 inches. Based on the "N" values, the in-situ soil material (Soil 1) is stiff to very stiff in consistency. It should be noted, however, that some of the



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Figure 1  
US 127/ US 62 Water Tank  
Anderson County, Kentucky  
Portion of USGS 7½-Minute Topographic Map  
(Lawrenceburg Quadrangle, Kentucky)  
Showing Project Site

standard penetration tests encountered limestone remnants which tend to substantially increase the "N" value. The moisture content of the soil was found to be near or slightly above the plastic limit.

#### **4.2. Bedrock Conditions**

As shown in Table 1, the bedrock surface ranged from a high elevation of 869.8 feet in Boring 2, to a low elevation of 865.0 feet in Boring 1. It should be understood, however, that the top of bedrock indicated in Borings 2 through 5 may actually be limestone slabs since no rock coring was performed to confirm bedrock at these locations. A slab encountered at a depth of 4.2 feet in Boring 1 was mistaken as bedrock based on resistance to the advancement of the augers. The rock coring performed in Boring 1, however, shows the actual bedrock surface to be at elevation 865.0 feet. This is 1.9 to 4.8 feet lower in elevation than the bedrock surface encountered in the other borings.

The rock core samples from Boring 1 show the upper portion of the bedrock to consist of a highly weathered shale which is brown in color and earthy (clay-like), extending downwardly to elevation 864.3 feet. Below this elevation, the bedrock was found to be competent, consisting of shale (65 percent) interbedded with limestone (35 percent) exhibiting little or no signs of weathering. The shale is gray in color, laminated to thin bedded, calcareous and soft to moderately hard, while the limestone is gray in color, fine to coarsely crystalline grained, very thin to thin bedded and fossiliferous with shale stringers, partings and inclusions. Additionally, a vertical fracture was noted between elevations 860.9 and 860.7 feet.

#### **4.3. Ground Water Conditions**

Ground water was not encountered in any of the borings at the time of drilling. Based on our past experience, however, the presence of ground water near or along the bedrock surface is common in this region.

### **5. Conclusions and Recommendations**

5.1. It is FMSM's understanding that the proposed water tank will measure approximately 17 feet in diameter and 112 feet in height, and will have a storage capacity of approximately 200,000 gallons. According to information from Kenvirons, Inc., the proposed tank will bear on a concrete mat, however, the base elevation of the tank is unknown at this time. The recommendations which follow are based on the information stated above, and on the interpretation of the subsurface conditions encountered in the borings. If changes are made to the tank location or tank geometry we should be notified so that the changes can be reviewed and the following recommendations modified as necessary.



5.2. Based on the subsurface conditions, depth to bedrock and type of structure proposed for the site, it is recommended that the foundation system be either soil bearing or rock bearing, and not a combination of the two. Foundation systems bearing partially on soil and partially on bedrock are prone to differential settlement.

5.3. The presence of a sinkhole within 125 feet of the site indicates that the general area is prone to karst activity. Although no voids or other signs of karst development were encountered in the borings at the immediate tank location, the Owner assumes a degree of risk in using a soil bearing foundation system in any area susceptible to karst activity. Piping of soils below the site resulting from future karst activity could undermine a soil bearing foundation system. If this risk is unacceptable, then a rock bearing foundation system should be utilized. Recommendations for soil bearing and rock bearing foundations are presented in Items 5.4. and 5.5., respectively.

#### **5.4. Soil Bearing Option**

5.4.1. Provided the recommendations presented herein are followed, a concrete mat founded on Soil 1 in undisturbed condition should be designed for a net allowable bearing value of two-thousand, five-hundred (2,500) pounds per square foot.

5.4.2. The bottom of the concrete mat should extend a minimum of 3.0 feet below final grade to protect against frost heave. In addition, reinforcing steel should be placed in the concrete mat to provide rigidity and strength to bridge over any weak or more compressible foundation materials which may come in contact with the foundation system. Although no shear failures are expected if the recommended allowable bearing value in Item 5.4.1. is not exceeded, a small amount of settlement could occur and should be anticipated. This precaution will tend to cause any settlement which may occur to be of a more uniform nature and prevent damage to the concrete mat.

5.4.3. The foundation excavation should not be left open to allow the accumulation of water or prolonged exposure to inclement weather conditions. The excavation should be concreted and backfilled immediately after excavation is complete, or if this cannot be done, the last four to six inches of foundation material should not be removed until preparations for placing concrete are ready. In no case should concrete be placed in an excavation which contains water. In addition, a geotechnical engineer or qualified engineering technician should observe the foundation excavation to determine if the actual bearing conditions encountered are the same as those anticipated as a result of this exploration.

5.4.4. In the event that the on-site soil (Soil 1) is used as cover over the concrete mat to help resist uplift and/or overturning forces, it is recommended that the soil cover be placed in maximum eight-inch (loose thickness) horizontal lifts, with each lift being compacted to a minimum 95 percent of the standard Proctor dry density at a moisture content within  $\pm 3$  percent of optimum as determined by ASTM D-698. Based on the moisture contents for

Soil 1 determined from the SPT samples (see Table 2), some of the soil may require drying by aeration and some wetting by the addition of water to achieve the moisture range for proper compaction. Provided soils are placed and compacted in this manner, it is recommended that a wet unit weight of 120 pounds per cubic foot be used in estimating the weight of the soil cover.

5.4.5. The residual clay soil encountered on site (Soil 1) is moderately to highly plastic. Soils of this type can undergo significant volume changes with changes in moisture content. As the soil increases in moisture it may swell, and likewise as the soil decreases in moisture it may shrink. Consequently, care should be exercised during design, construction and usage of the proposed structure to minimize the potential for changes in moisture content. Site grading should be maintained during construction so that positive drainage is promoted at all times. Final site grading should be accomplished in such a manner as to direct surface runoff and subsurface drainage away from the concrete mat.

## **5.5. Rock Bearing Option**

5.5.1. If a rock bearing foundation system is selected, it is recommended that drilled shafts (caissons) be used, and that the shafts be embedded (socketed) a minimum of one-foot into competent bedrock. Based on the rock core obtained in Boring 1, the recommended bearing elevation for drilled shafts (with embedment) is 863.3 feet.

5.5.2. During shaft construction, it is recommended that a 1.5-inch diameter percussion test hole be drilled every 10 feet around the tank perimeter to a depth of five (5) feet below the proposed bearing elevation to verify the soundness of the underlying rock, and to identify any weathered zones, clay seams and voids that might affect foundation support. Each hole should be inspected by a qualified engineer or technician, using a "hooked" probe to insure that at least 24 inches of competent rock, free of voids and compressible (clay) zones, is present directly beneath each foundation element. Any zones of questionable bearing capacity encountered in the five-foot percussion holes should be evaluated by a qualified geotechnical engineer and the proposed bearing elevations adjusted accordingly.

5.5.3. Observing the recommendations presented herein, drilled shafts extending a minimum of one-foot into competent bedrock should be designed for a net allowable bearing value of twenty thousand (20,000) pounds per square foot.

5.5.4. During foundation construction, the contractor should ensure that water does not accumulate within the drilled shafts. Any water that seeps into the shafts should be removed completely prior to the placement of concrete and reinforcing steel.

Kenvirons, Inc.  
August 31, 1998  
Page 9

5.6. The conclusions and recommendations presented in this report are based on data and indicated subsurface conditions from the borings advanced during this exploration using that degree of care and skill ordinarily exercised under similar circumstances by competent members of the engineering profession. No warranties can be made regarding the continuity of conditions between borings.

We appreciate the opportunity to have provided these geotechnical services. If you should have any questions concerning the contents of this report, please call.

Respectfully submitted,

FULLER, MOSSBARGER, SCOTT AND MAY  
ENGINEERS, INC.



Barry L. Bryant, P.E.  
Senior Project Engineer



Jeffrey H. Hay, P.E.  
Project Manager

/blb/esh

Appendix

Proctor Curve

# Moisture-Density Data Sheet

Project: South Anderson Water District Water Storage Tank

Project No.: 98202

Source: Bag

Sample No.: 1

Sample Description: Lean clay (CL), Light brown

Visual Notes:

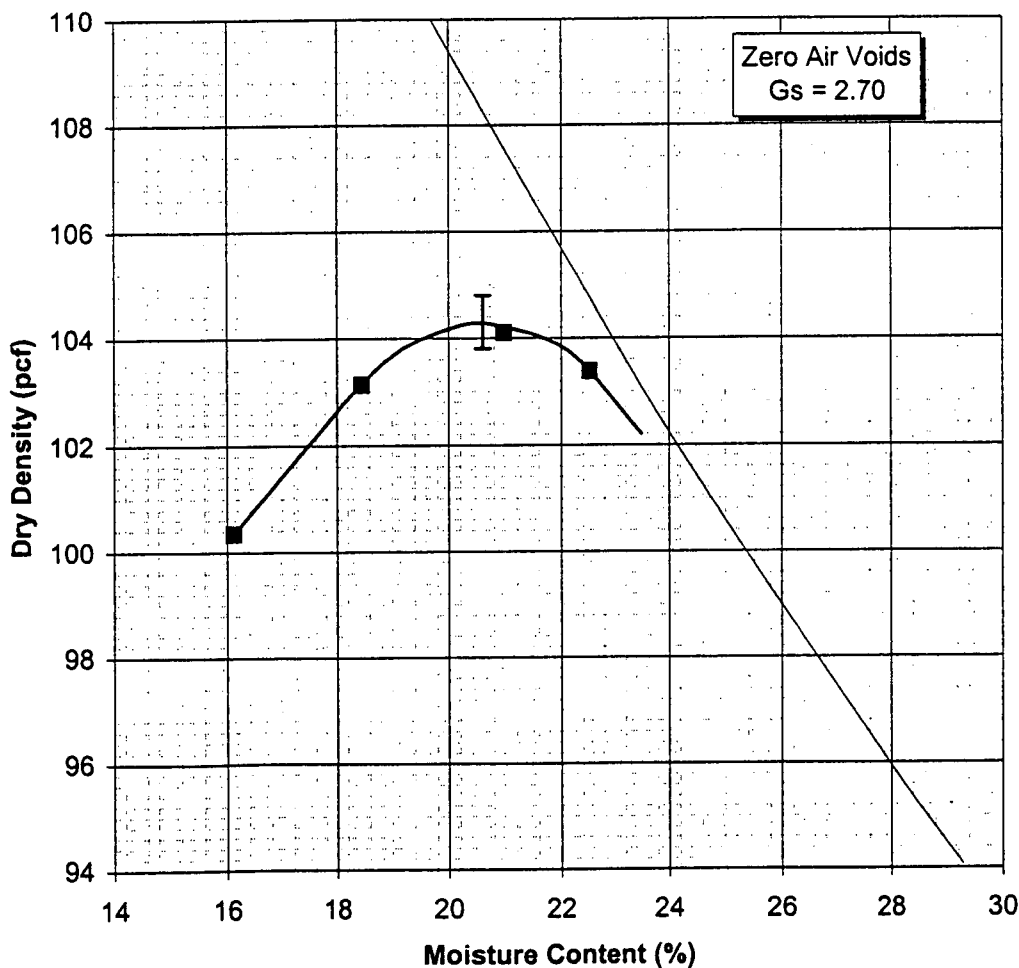
Test Method: ASTM D698 - Method A

Prepared: Moist

Oversized Fraction: 0 % Rammer: Manual

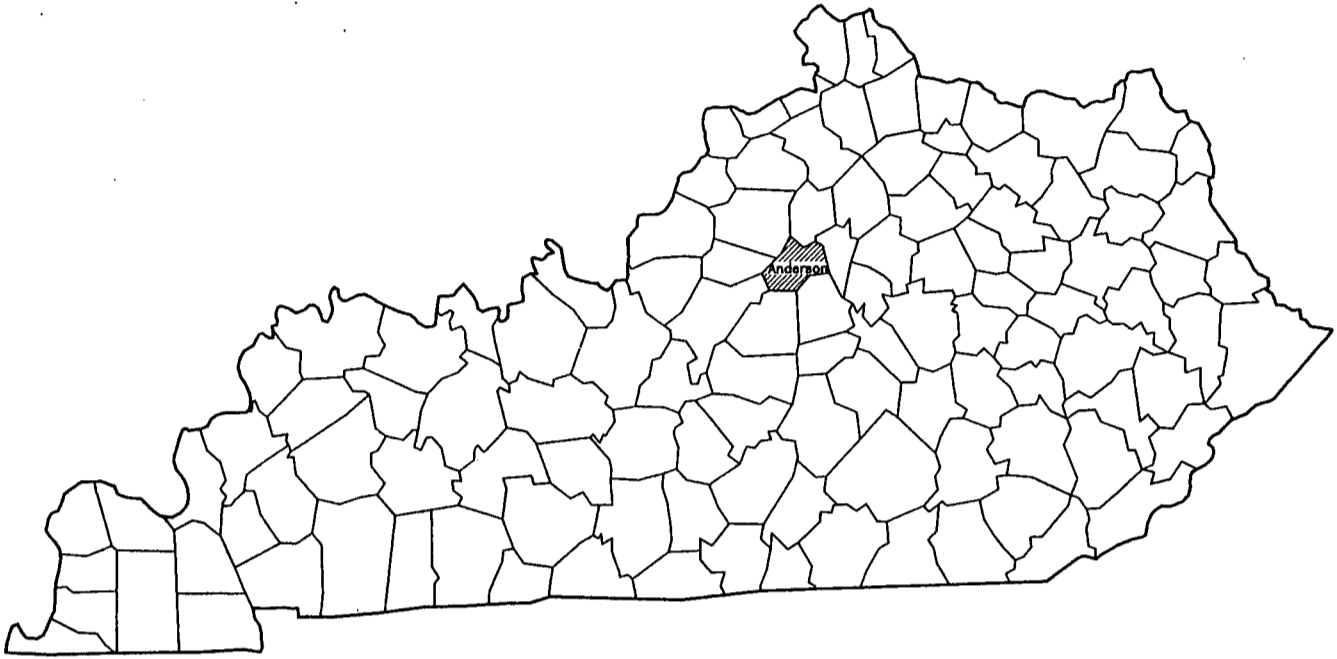
Gs - Fines: Assumed

| Mold Weight 4354 grams       |                               | Moisture Determination          |                                 |                    |                   |                   |
|------------------------------|-------------------------------|---------------------------------|---------------------------------|--------------------|-------------------|-------------------|
| Wet Weight plus Mold (grams) | Wet Weight minus Mold (grams) | Wet Soil and Can Weight (grams) | Dry Soil and Can Weight (grams) | Can Weight (grams) | Water Content (%) | Dry Density (pcf) |
| 6197                         | 1843                          | 599.00                          | 517.15                          | 73.43              | 18.4              | 103.1             |
| 6254                         | 1900                          | 602.85                          | 511.03                          | 73.16              | 21.0              | 104.1             |
| 6112                         | 1758                          | 633.67                          | 556.82                          | 80.16              | 16.1              | 100.3             |
| 6265                         | 1911                          | 679.04                          | 567.65                          | 73.13              | 22.5              | 103.4             |

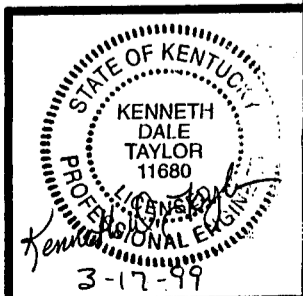


Maximum Dry Density 104.3 PCF

Optimum Moisture Content 20.6 %



SET NO. \_\_\_\_\_

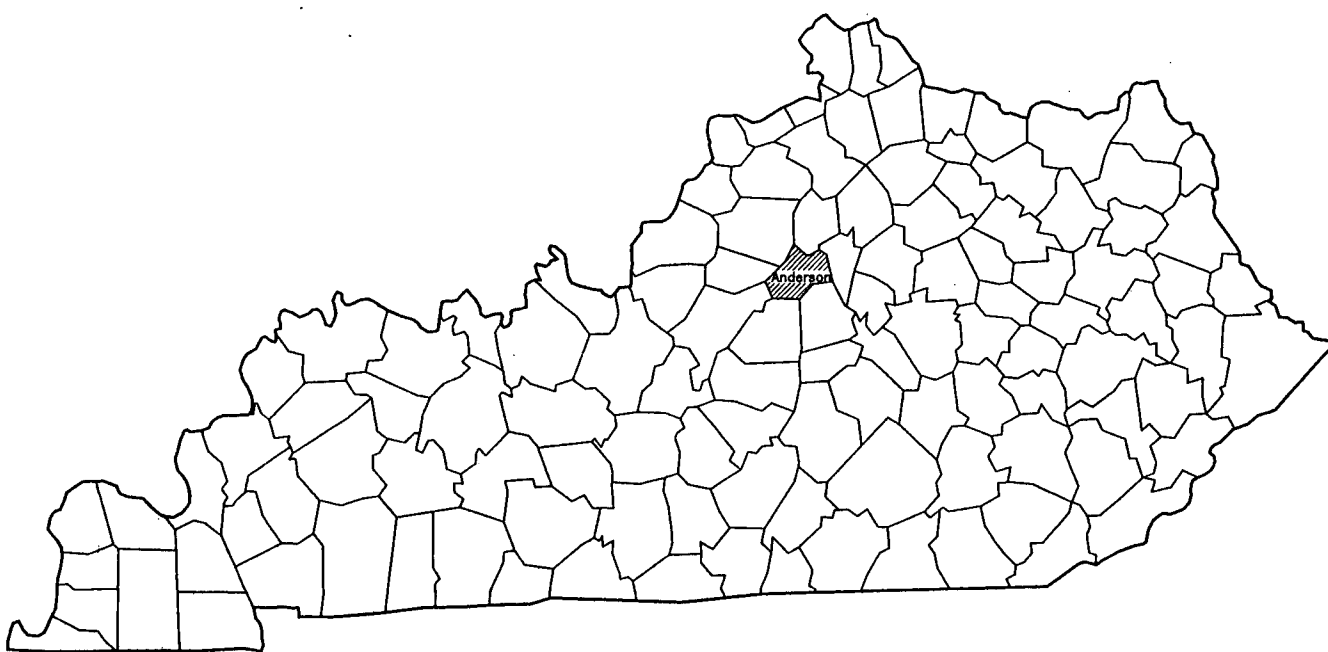


**DISTRICT**

**PIPE**

**TANK**

**TUCKY**



**Anthony Stratton  
County Judge-Executive**

**Commissioners:**

**Bob Kincer, Chairman  
George Kinne  
Janet Bryant  
Alton Warford, Mgr.**



**CONTRACT 5**

**Prepared By:**

**KENVIRONS, INC.  
FRANKFORT, KENTUCKY**



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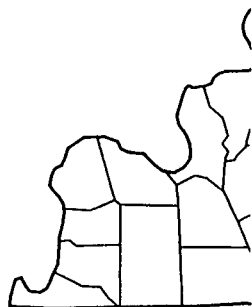
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**Anthony Stratton**  
**County Judge-Executive**

**Commissioners:**

**Bob Kincer, Chairman**  
**George Kinne**  
**Janet Bryant**

**Alton Warford, Mayor**



**Anth  
County**

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**INDEX OF SHEETS**

SHEET NO.

- 1
- 2
- 3
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**SOUTH ANDERSON  
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DESCRIPTION

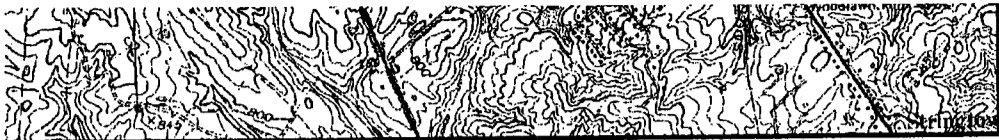
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- TANK SITE
- GLASS-LINED DETAILS
- GEOTECHNICAL INVESTIGATION

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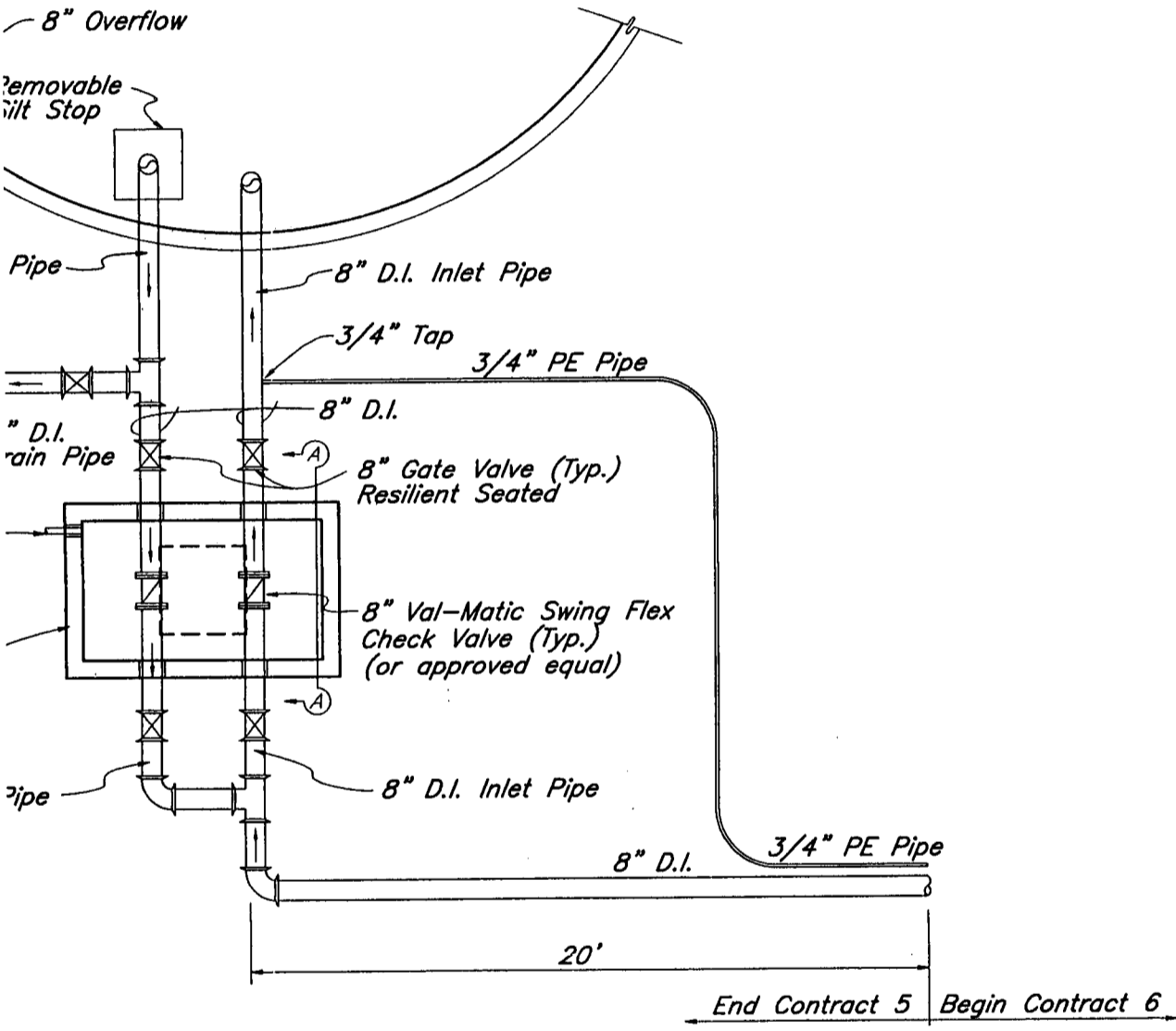
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TITLE SHEET  
TANK SITE  
GLASS-LINED DETAILS  
GEOTECHNICAL INVESTIGATION



**LOCATION MAP**

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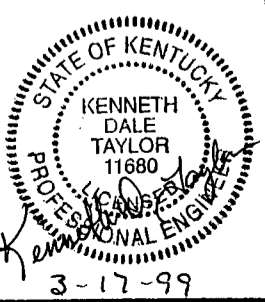


**PIPE VAULT & PIPING PLAN**

N.T.S.

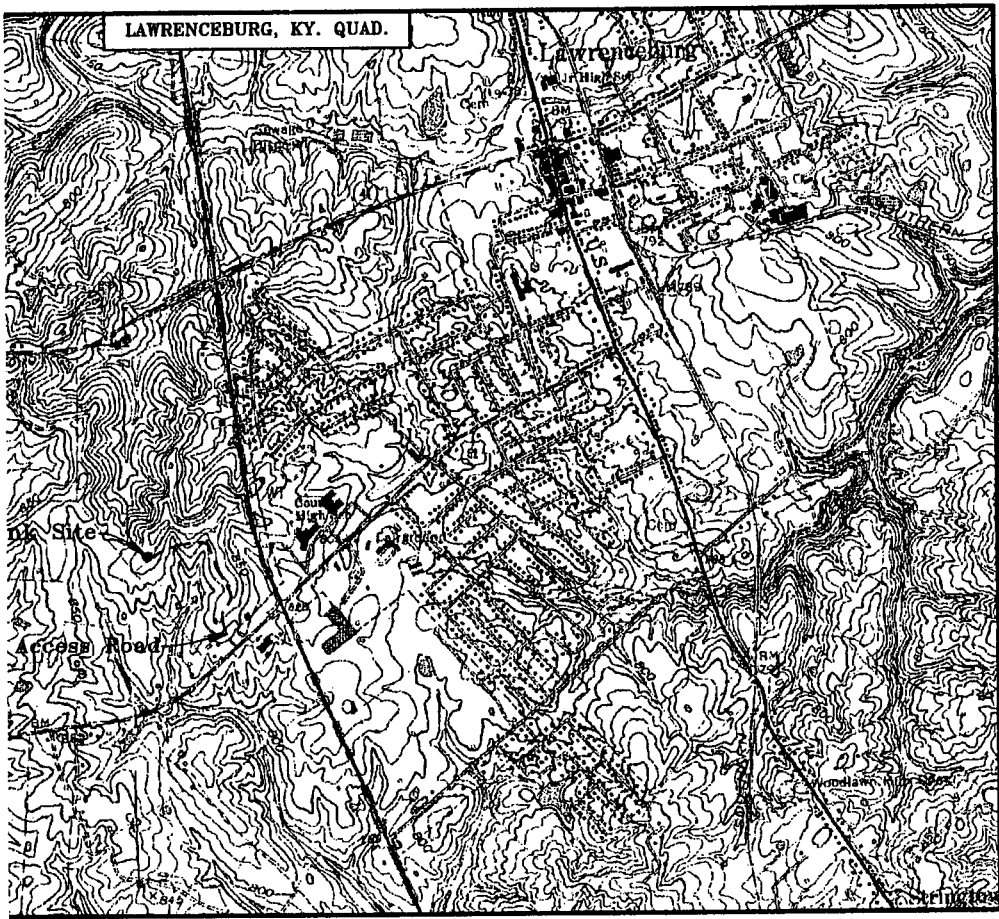
**CONTRACT 5  
SOUTH ANDERSON WATER DISTRICT  
ANDERSON COUNTY, KENTUCKY**

**184,000 GALLON STANDPIPE DETAILS**



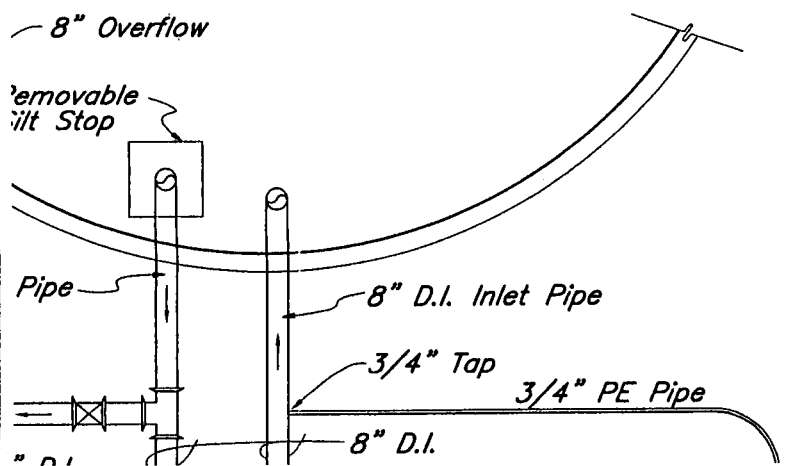
**KENVIRONS, INC.**  
FRANKFORT - PIKEVILLE

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| DRAWN BY   | JKP | DATE        | 2-99     | REVISED |   | SHEET |
| CHECKED BY |     | SCALE       | As Noted | 1       | 3 | 2     |
| CHECKED BY | KDT | PROJECT NO. | 97185    | 2       | 4 |       |



**LOCATION MAP**

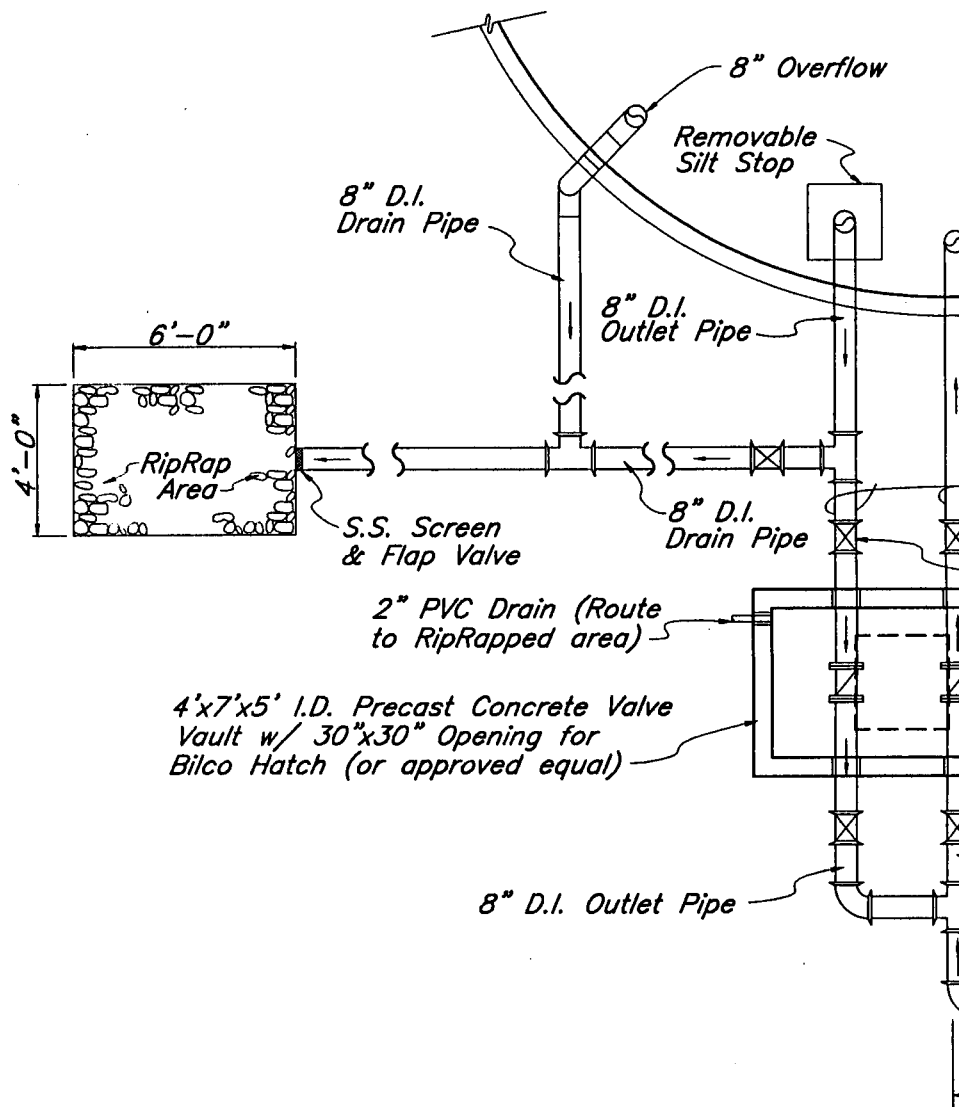
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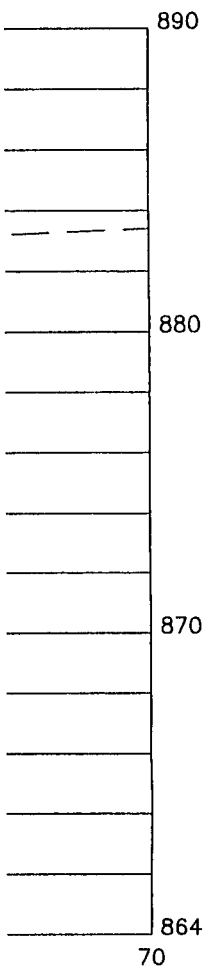
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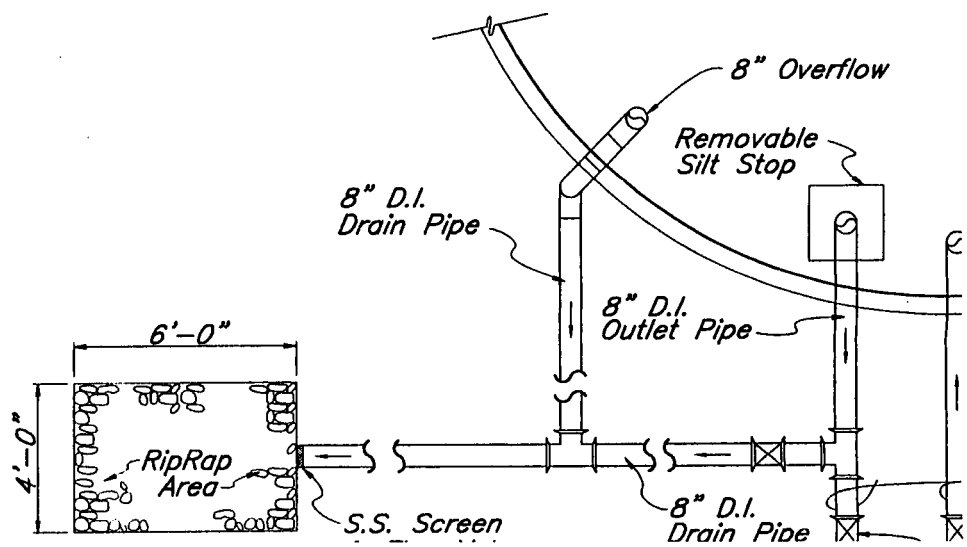
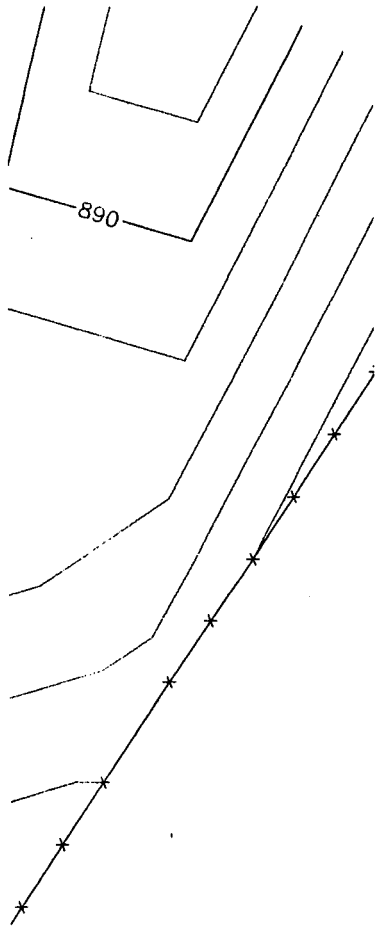
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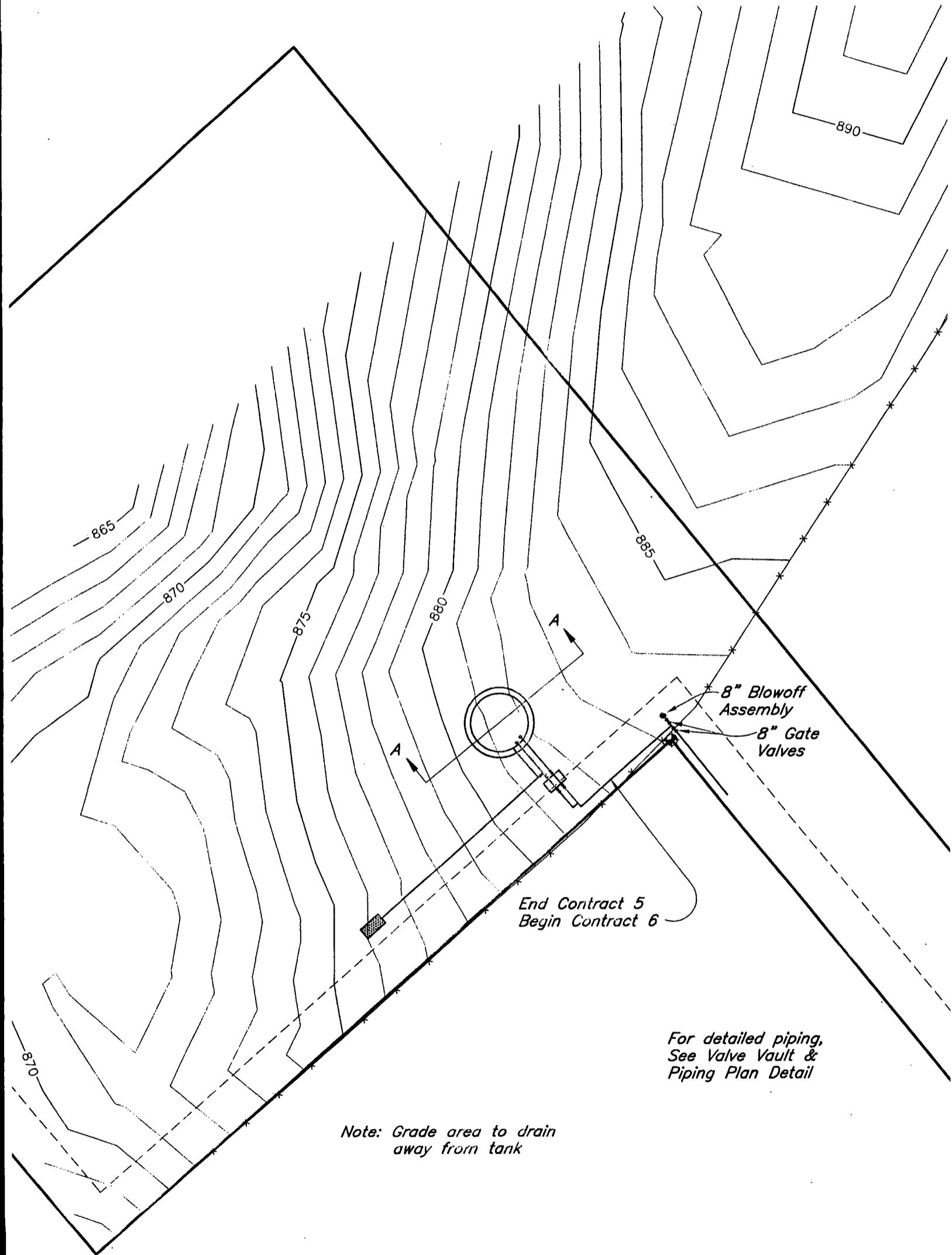


**LOCATIO**





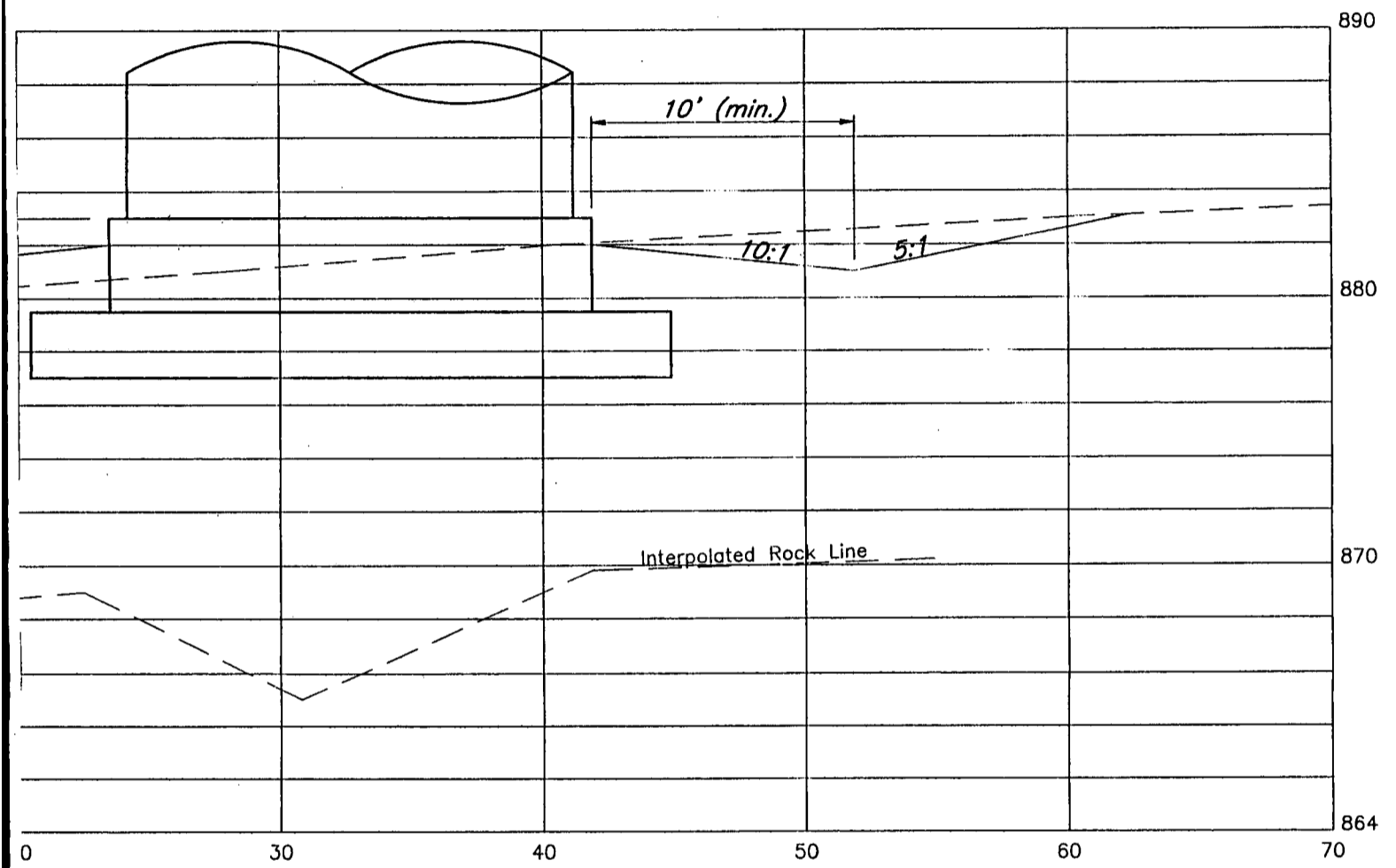
**SECTION A-A**  
1"=5'-0"



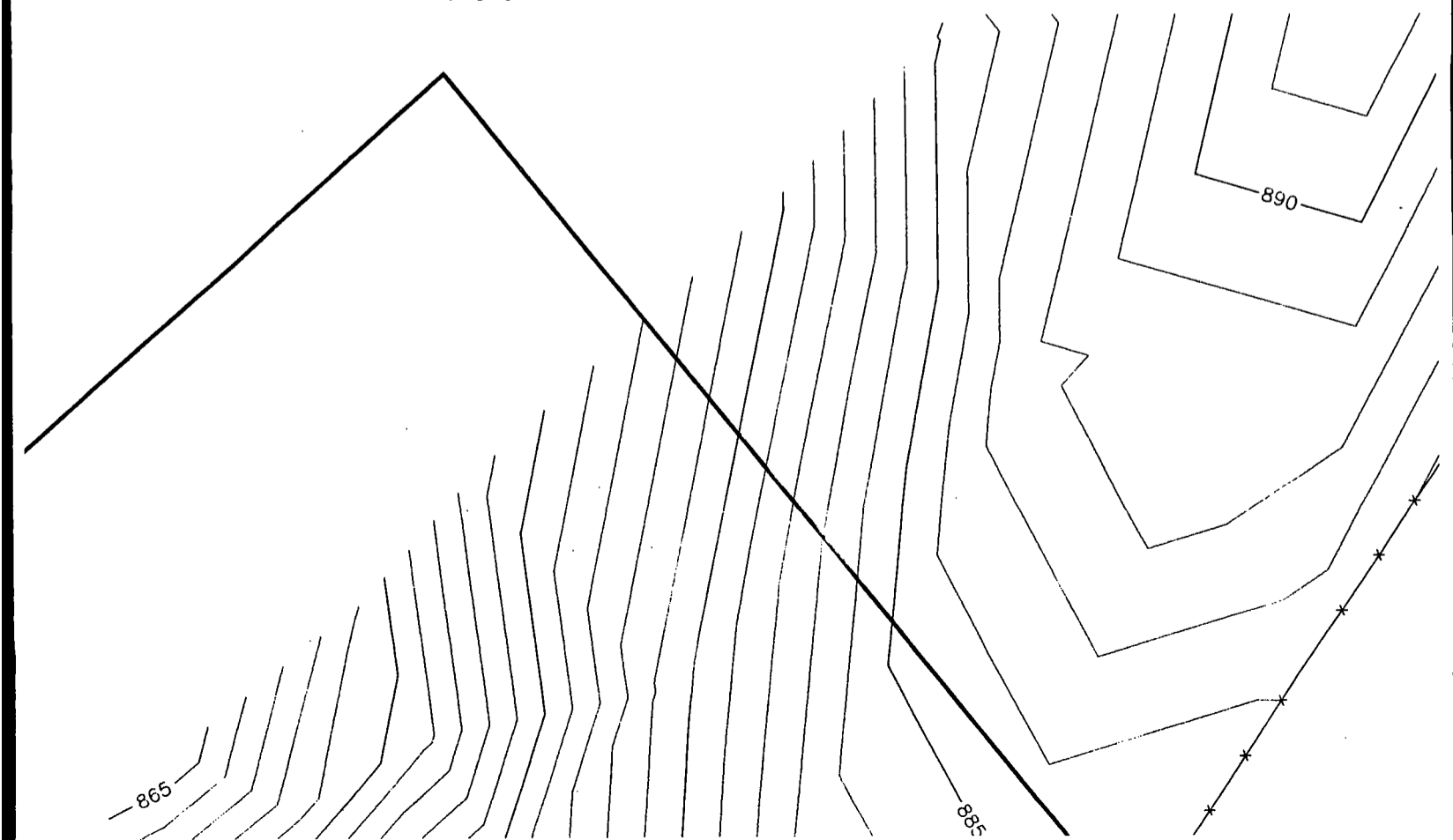
*For detailed piping,  
See Valve Vault &  
Piping Plan Detail*

*Note: Grade area to drain  
away from tank*

**TANK SITE LAYOUT**  
1"=30'



**SECTION A-A**  
1"=5'-0"

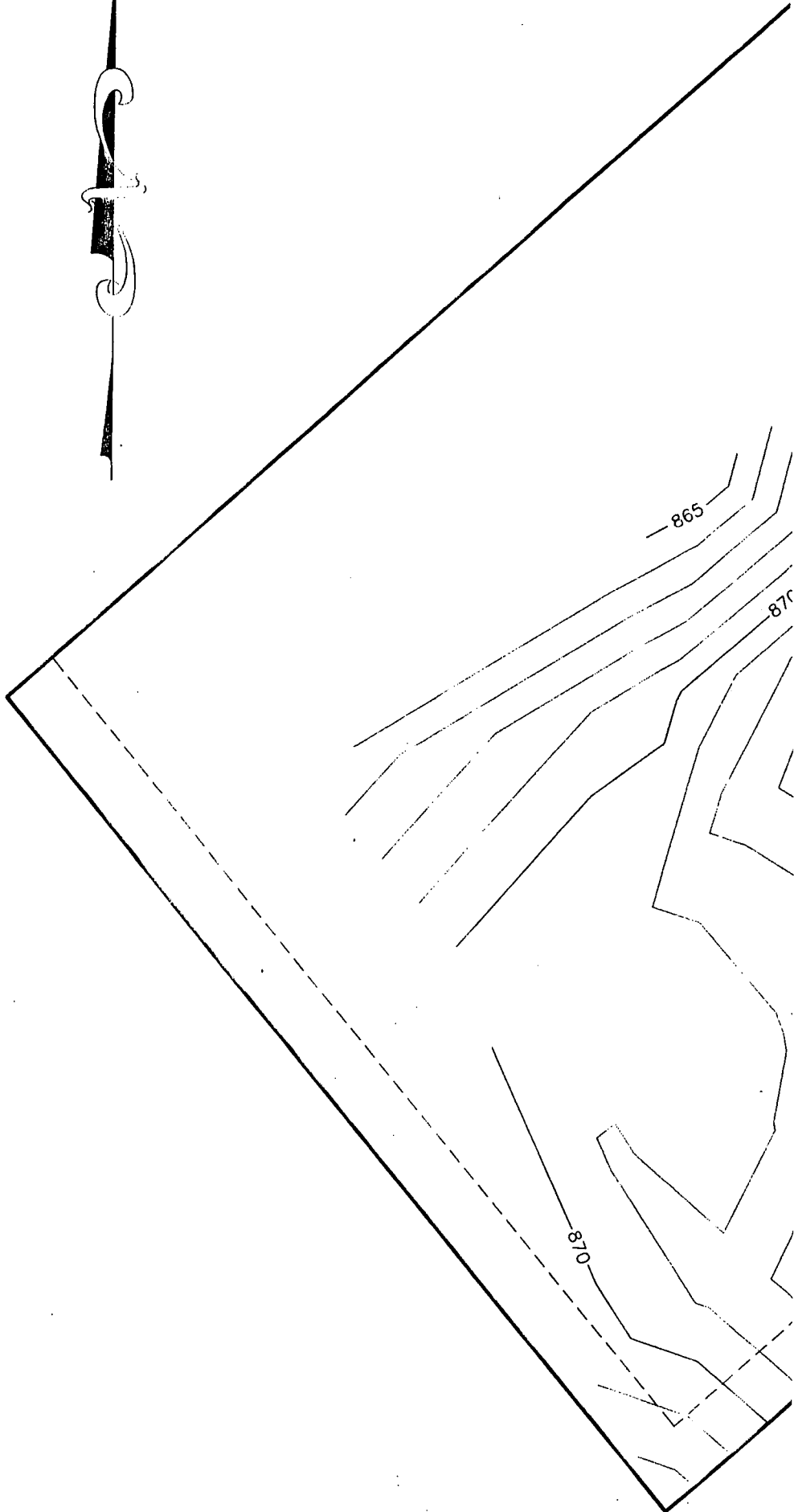


864

0

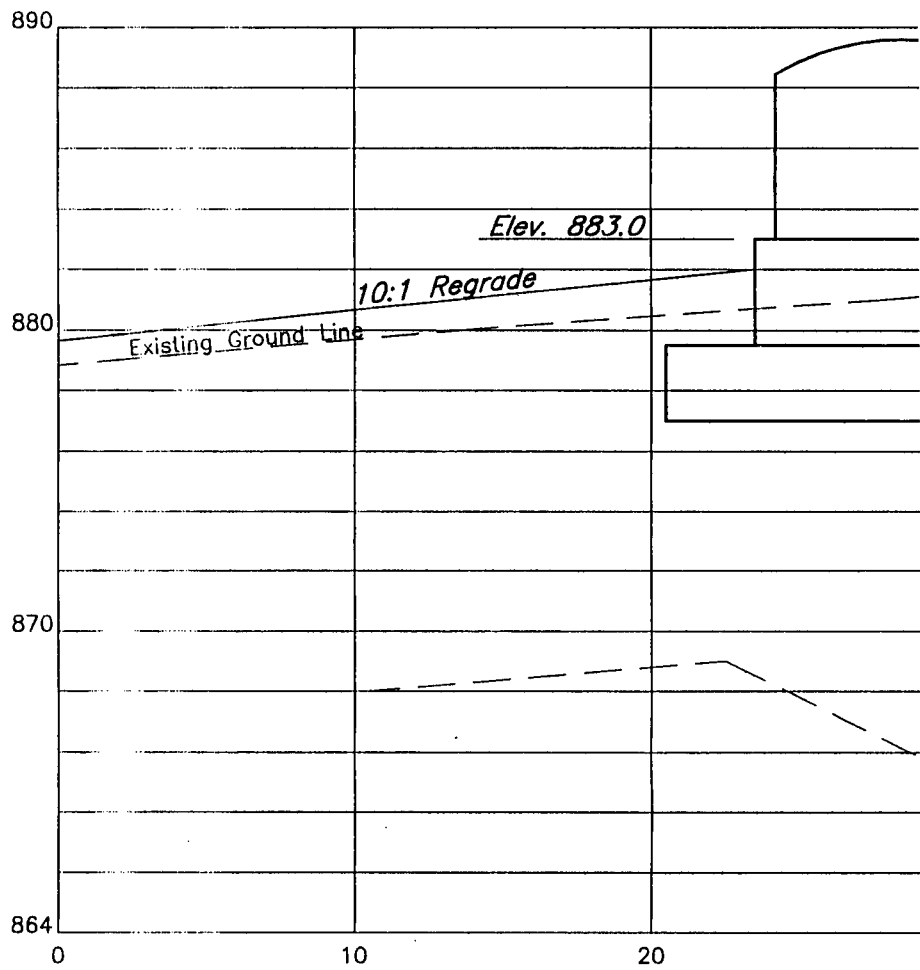
10

20



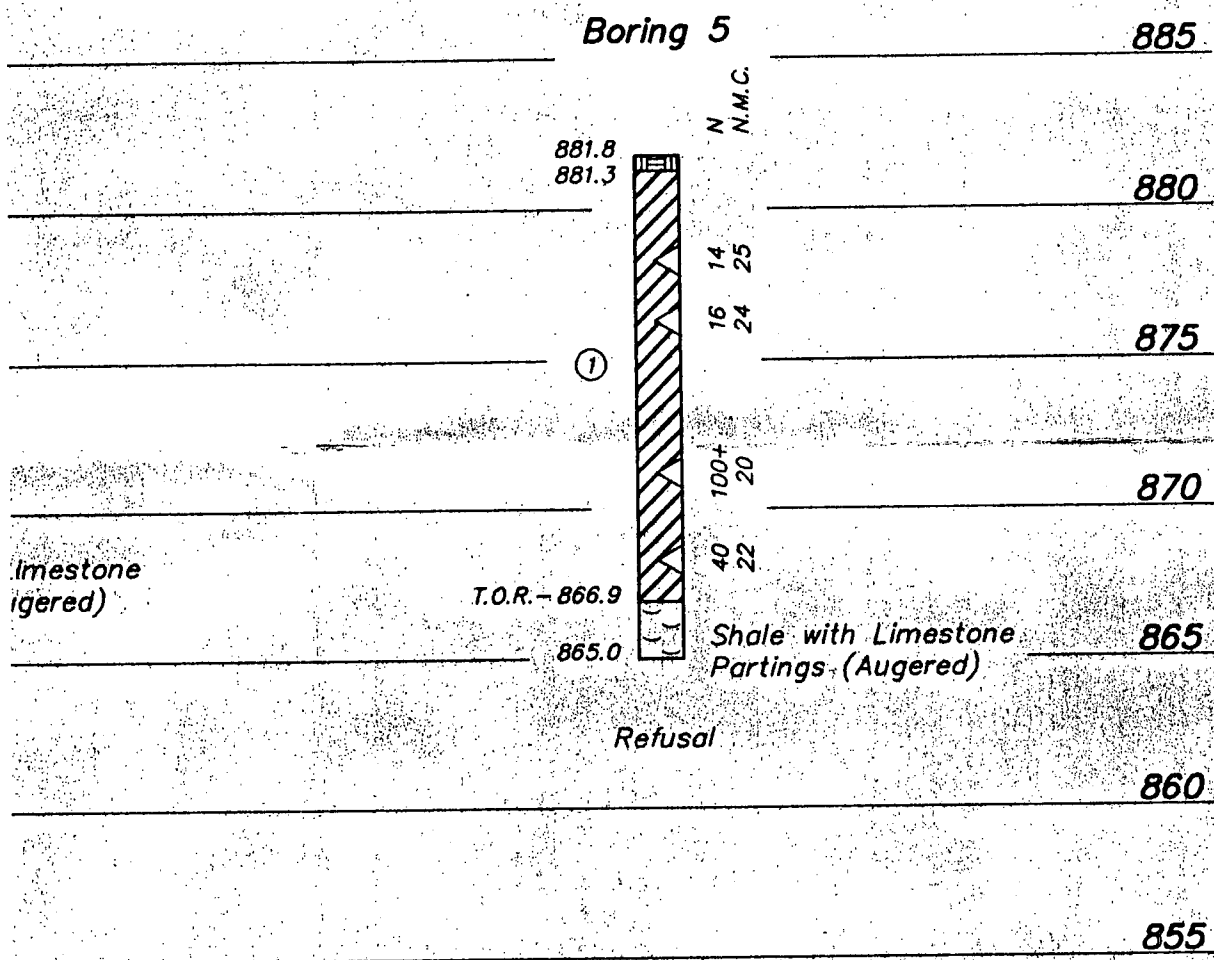
N:\P\57185\MISC\TANK.DWG Mon Mar 01 15:38:13 1999 JKF

TA

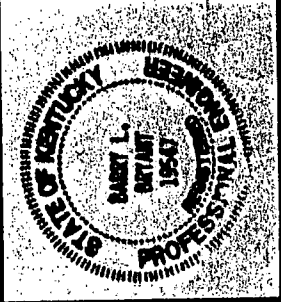


**NOTES:**

1. The boring logs and related information shown on this drawing depict approximate subsurface conditions only at the specific boring locations noted and at the time of drilling. Conditions at other locations may differ from those occurring at the boring locations. Also, the passage of time may result in a change in the subsurface conditions at the boring locations. Any correlations shown between borings are generally based on straight line interpolation. Actual conditions between borings are unknown and may differ from those shown.
2. Topographic and survey information for the boring layout was taken from a survey drawing supplied by Kenvirons, Inc., Frankfort, Kentucky. The information is believed to be correct, but is not to be used by the Contractor for construction of the project.
3. The project baseline shown on this drawing was established to locate test boring positions only. It should not be used for construction or any other purpose.



Fuller  
Mossba  
Scott &  
May



**GEOTECHNICAL EXPLORATION**

**US 127/US 62 WATER STORAGE TANK**

**SOUTH ANDERSON WATER DISTRICT**

**LAWRENCEBURG, ANDERSON COUNTY, KENTUCKY**

PROJECT NO. 98202  
 DATE AUGUST, 1998  
 DRAWN BY JRF  
 CHECKED BY BLB  
 CHECKED BY JAH  
 SCALE AS SHOWN

| REVISION | DATE |
|----------|------|
| 1        |      |
| 2        |      |
| 3        |      |
| 4        |      |
| 5        |      |
| 6        |      |
| 7        |      |
| 8        |      |

SHEET

**1 OF 1**

**LEGEND**

- ⊙ Soil Boring with Undisturbed (Shelby) Tube Samples and/or Standard Penetration Tests
- Soil Boring with Rock Core
- ▒ Topsoil
- ① ▨ Fat Clay, brown to light brown, moist in natural moisture content, stiff to very stiff in consistency, with occasional limestone remnants and slabs
- Undisturbed Thin-Walled (Shelby) Tube Sample
- △ Standard Penetration Test Interval
- N Standard Penetration Test Blow Count (blows/ft.)
- N.M.C. Natural Moisture Content (%)
- U.W.W. Unit Weight Wet (lbs./cu.ft.)
- U.W.D. Unit Weight Dry (lbs./cu.ft.)
- U.C. Unconfined Compressive Strength (tons/sq. ft.)
- T.O.R. - Top of Rock (Indicates the beginning of rock-like resistance to the advancement of the augers. This may indicate the beginning of weathered bedrock, boulders or rock remnants. An exact determination cannot be made without performing rock coring.)
- B.C. - Begin Rock Core
- Refusal Auger Refusal using a carbide-tipped tooth auger bit
- R.Q.D. Rock Quality Designation(%)
- REC. Recovery(%)

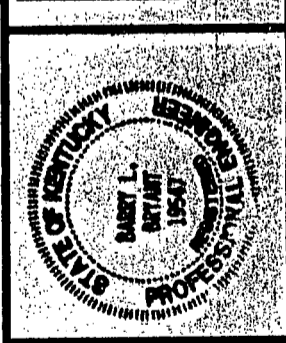
**NOTES:**

1. The boring logs and related information shown on this drawing depict approximate subsurface conditions only at the specific boring locations noted and at the time of drilling. Conditions at other locations may differ from those occurring at the boring locations. Also, the passage of time may result in a change in the subsurface conditions at the boring locations. Any correlations shown between borings are generally based on straight line interpolation. Actual conditions between borings are unknown and may differ from those shown.
2. Topographic and survey information for the boring layout was taken from a survey drawing supplied by Kenvirons, Inc., Frankfort, Kentucky. The information is believed to be correct, but is not to be used by the Contractor for construction of the project.
3. The project baseline shown on this drawing was established to locate test boring positions only. It should not be used for construction or any other purpose.

FULLER  
MOSSBARGER  
SCOTT AND MAY  
ENGINEERS, INC.  
1409 N. Forbes Rd.  
Lexington, Kentucky  
40511-2050  
606-253-0574

**FMSM**  
**ENGINEERS**  
LEXINGTON, LOUISVILLE, CHICAGO

Fuller  
Mossbarger  
Scott &  
May



EXPLORATION  
STORAGE TANK  
WATER DISTRICT  
IN COUNTY, KENTUCKY

**NOTES:**

1. The boring drawing depicting specific boring conditions occurring at the time the borings were taken are actual conditions from those borings.
2. Topographic map was taken by Frank Inc., Frankfurt, Mo. to be corrected for construction.
3. The project established. It should not be used for other purposes.

Approximate Property Boundary

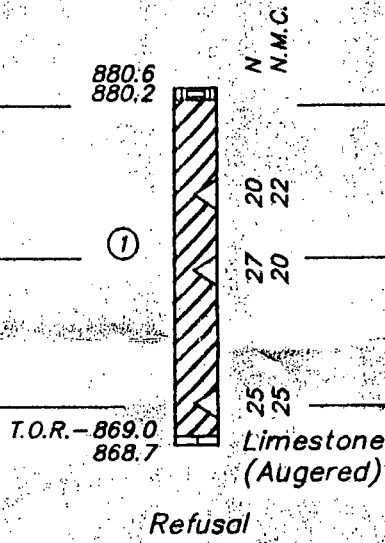
**BORING LOCATION TABLE**

| No. | Baseline Station | Offset (Feet) | Elevation (Feet) |
|-----|------------------|---------------|------------------|
|     | 1+40.6           | 44.0 Rt.      | 881.3            |
|     | 1+28.9           | 48.0 Rt.      | 882.3            |
|     | 1+53.9           | 43.0 Rt.      | 880.6            |
|     | 1+45.4           | 55.6 Rt.      | 880.7            |
|     | 1+38.6           | 31.9 Rt.      | 881.8            |

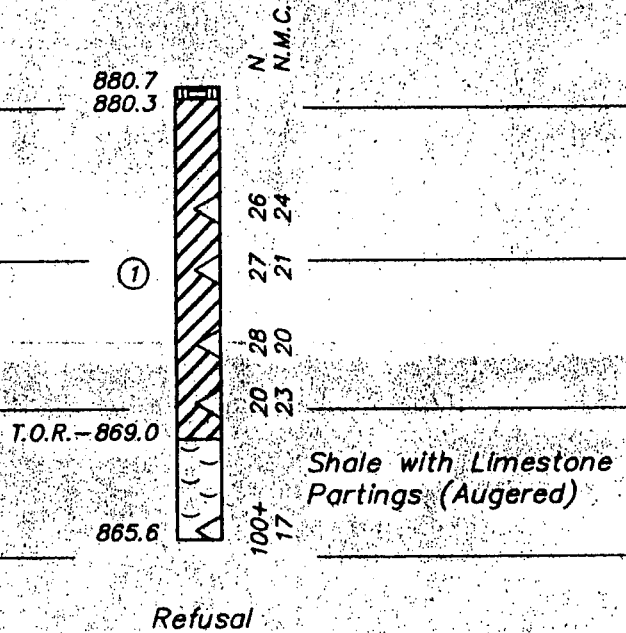
**SOIL SUMMARY**

|                             |                          |    |
|-----------------------------|--------------------------|----|
| SAMPLE NO.                  | 1                        |    |
| STATION                     | BORING 2                 |    |
| OFFSET                      | -                        |    |
| DEPTH                       | 0.6'-10.0'               |    |
| Composition of Total Sample | GRAVEL (-3" + No.4)      | 2  |
|                             | SAND (-No.4 + No.200)    | 6  |
|                             | SILT (-No.200 + 0.005mm) | 30 |
|                             | CLAY (-0.005mm)          | 62 |
| LIQUID LIMIT                | 57                       |    |
| PLASTIC LIMIT               | 20                       |    |
| PLASTICITY INDEX            | 37                       |    |
| ACTIVITY INDEX              | 0.75                     |    |
| SPECIFIC GRAVITY            | 2.75                     |    |
| AASHTO CLASSIFICATION       | A-7-6(37)                |    |
| UNIFIED CLASSIFICATION      | CH                       |    |
| CALIF. BEARING RATIO        | -                        |    |
| MAXIMUM DRY DENSITY (pcf)   | 104.3                    |    |
| OPTIMUM MOISTURE (%)        | 20.6                     |    |

**Boring 3**



**Boring 4**



**LOGS OF BORINGS**

SCALE: 1"=5' (VERTICAL ONLY)



### LEGEND

- ⊙ Soil Bo and/or
- Soil Bo
- ▭ Topsoil
- ⊙ ▨ Fat Cla stiff to remnan
- Undistu
- ◁ Standar
- N Standar
- N.M.C. Natural
- U.W.W. Unit We
- U.W.D. Unit We
- U.C. Unconfi
- T.O.R. - Top of the ad weather minatic
- B.C. - Begin
- Refusal Auger
- R.Q.D. Rock-C
- REC. Recover

### NOTES:

1. The boring drawing dep specific bor Conditions c occurring a time may r the boring borings are Actual conc from those
2. Topographic was taken Inc., Frankf to be corre for constru
3. The project established It should no other purpo

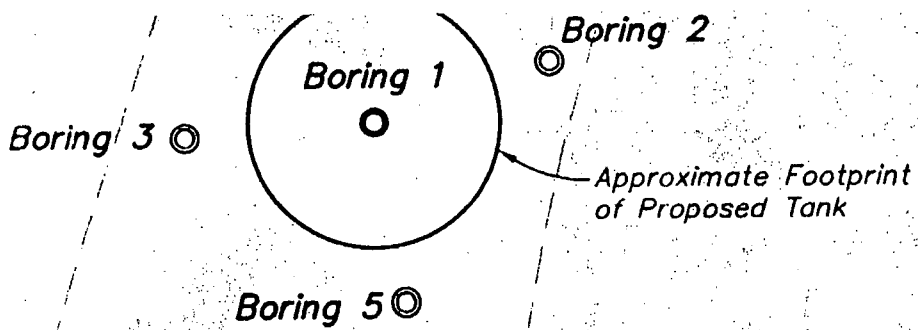
Approximate Property Boundary

**BORING LOCATION TABLE**

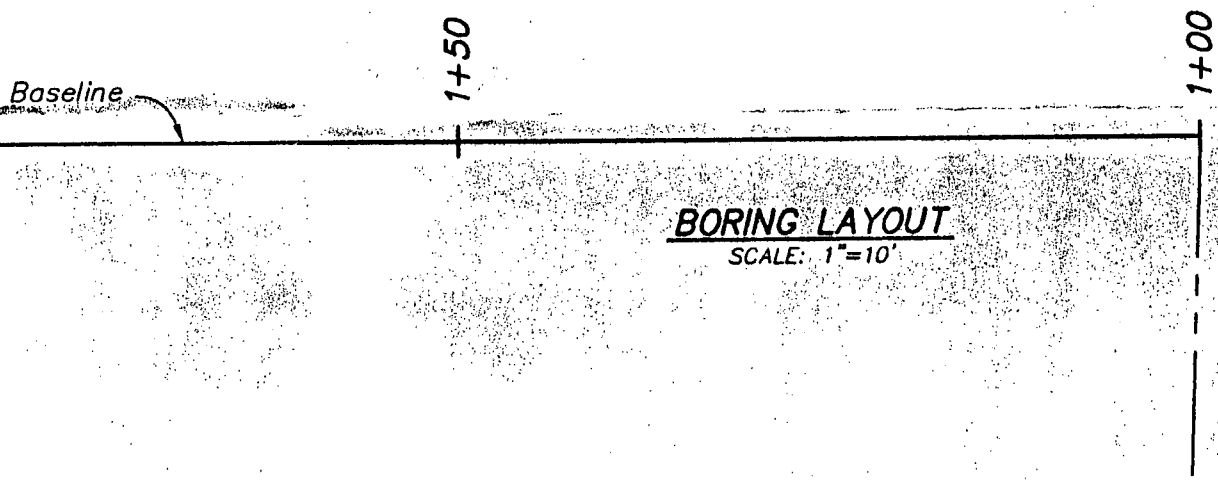
| No. | Baseline Station | Offset (Feet) | Elevation (Feet) |
|-----|------------------|---------------|------------------|
|     | 1+40.6           | 44.0 Rt.      | 881.3            |
|     | 1+28.9           | 48.0 Rt.      | 882.3            |
|     | 1+53.9           | 43.0 Rt.      | 880.6            |
|     | 1+45.4           | 55.6 Rt.      | 880.7            |
|     | 1+38.6           | 31.9 Rt.      | 881.8            |

### SOIL SUMMARY

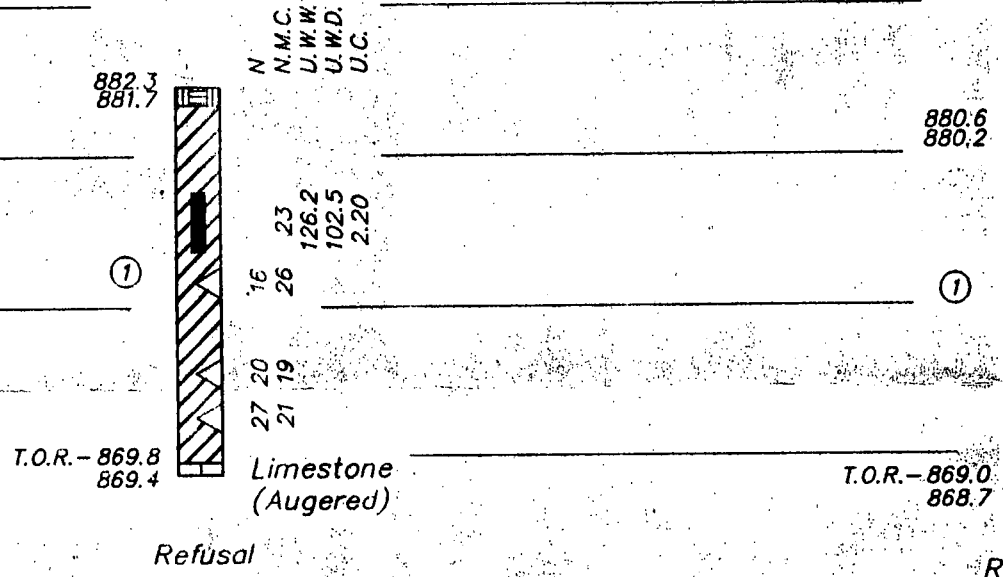
|                             |                        |    |
|-----------------------------|------------------------|----|
| SAMPLE NO.                  | 1                      |    |
| STATION                     | BORING 2               |    |
| OFFSET                      | -                      |    |
| DEPTH                       | 0.6'-10.0'             |    |
| Composition of Total Sample | GRAVEL(-3" +No.4)      | 2  |
|                             | SAND(-No.4 +No.200)    | 6  |
|                             | SILT(-No.200 +0.005mm) | 30 |
|                             | CLAY(-0.005mm)         | 62 |
| LIQUID LIMIT                | 57                     |    |
| PLASTIC LIMIT               | 20                     |    |
| PLASTICITY INDEX            | 37                     |    |
| ACTIVITY INDEX              | 0.75                   |    |
| SPECIFIC GRAVITY            | 2.75                   |    |
| AASHTO CLASSIFICATION       | A-7-6(37)              |    |
| UNIFIED CLASSIFICATION      | CH                     |    |
| CALIF. BEARING RATIO        | -                      |    |
| MAXIMUM DRY DENSITY (pcf)   | 104.3                  |    |



| BORING LOCA |                  |
|-------------|------------------|
| Boring No.  | Baseline Station |
| 1           | 1+40.6           |
| 2           | 1+28.9           |
| 3           | 1+53.9           |
| 4           | 1+45.4           |
| 5           | 1+38.6           |

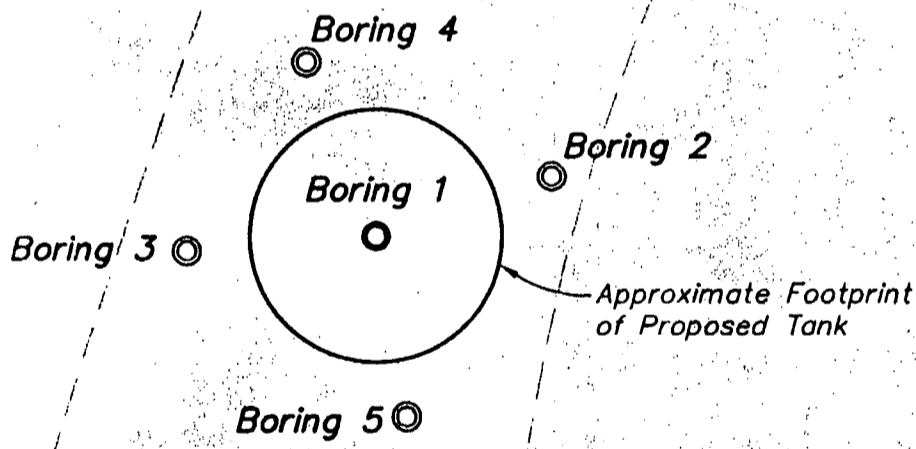


**Boring 2**



thly weathered shale,  
own, earthy  
ale (65%) interbedded  
h Limestone (35%).  
ale is gray, laminated to  
n bedded, calcareous,  
ft to moderately hard;  
estone is gray, fine to  
arsely crystalline grained,  
y thin to thin bedded,  
siliferous, with shale  
ingers, partings and  
usions  
Vertical fracture, weathered  
at 860.9-860.7

**LOGS OF B**  
SCALE: 1"=5' (VER)



| BORING LOCA |                  |
|-------------|------------------|
| Boring No.  | Baseline Station |
| 1           | 1+40.6           |
| 2           | 1+28.9           |
| 3           | 1+53.9           |
| 4           | 1+45.4           |
| 5           | 1+38.6           |

Baseline

1+50

1+00

**BORING LAYOUT**  
SCALE: 1"=10'

2+00

Project Baseline

Approximate Property Boundary

Boring 1

885

880

875

870

865

860

855

881.3  
880.7

B.C. - 877.1

①

T.O.R. - 865.0  
864.3

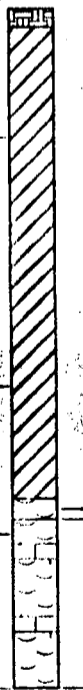
858.7

R.C.D.  
REC.

0  
43

10  
48

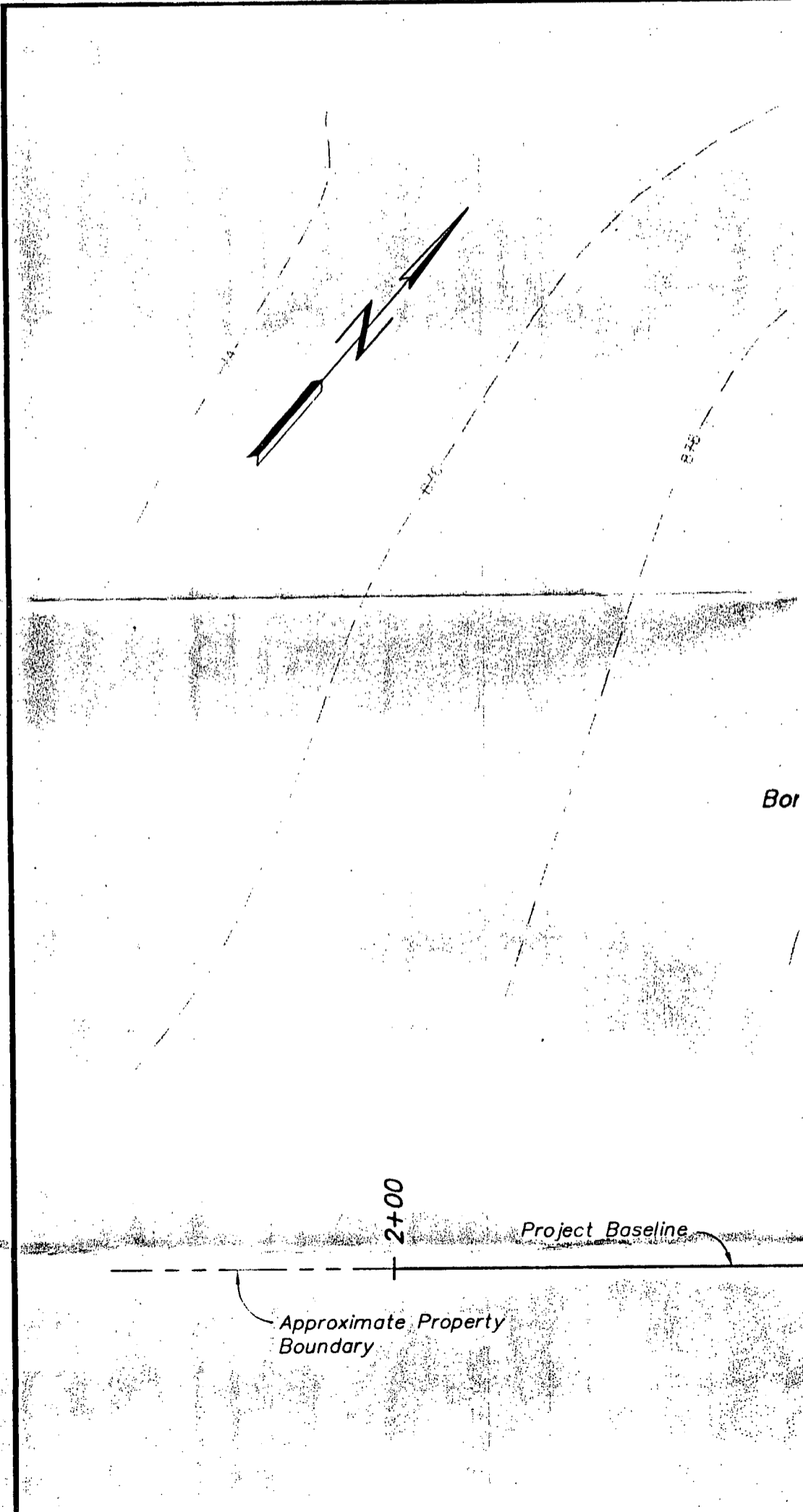
14  
98



Highly weathered shale brown, earthy

Shale (65%) interbedded with Limestone (35%). Shale is gray, laminated thin bedded, calcareous soft to moderately hard. Limestone is gray, fine to coarsely crystalline gray, very thin to thin bedded fossiliferous, with shale stringers, partings and inclusions

Vertical fracture, well developed at 860.9-860.7



Bor

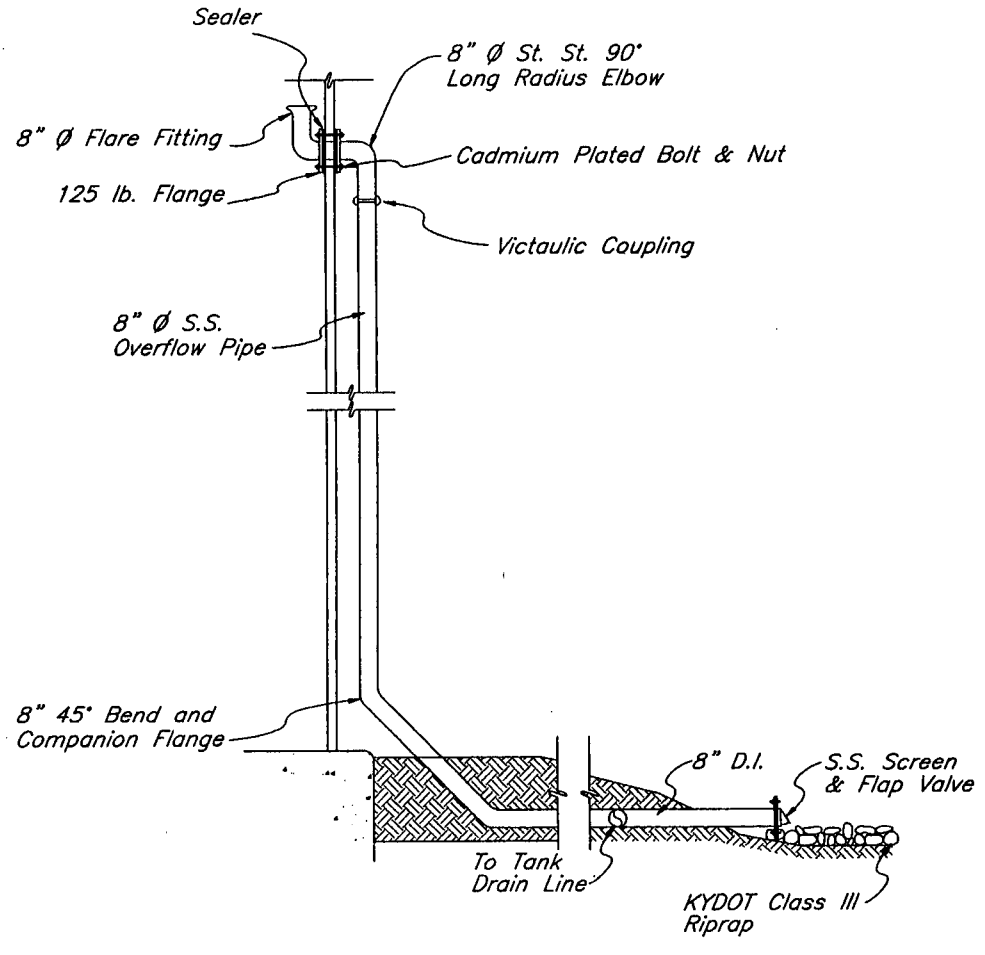
Approximate Property Boundary

Project Baseline

2+00

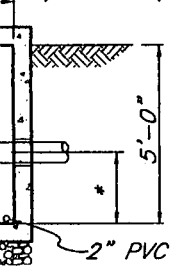
Thick Plate

Tank Roof



**TYPICAL OVERFLOW**  
N.T.S.

30"x30" Opening w/ Hatch (not shown)



Pipe Support

to get clearance

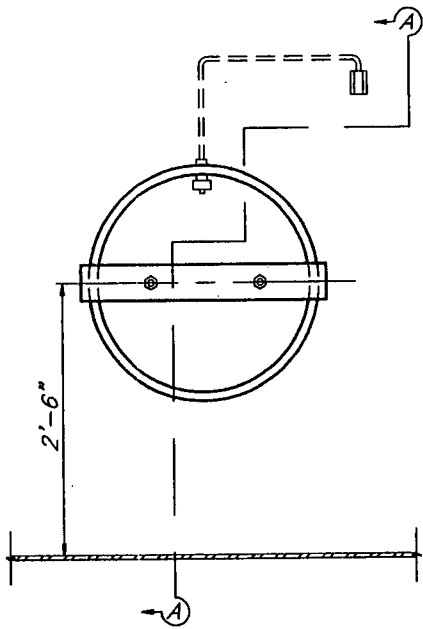
A-A

**CONTRACT 5  
SOUTH ANDERSON WATER DISTRICT  
ANDERSON COUNTY, KENTUCKY**

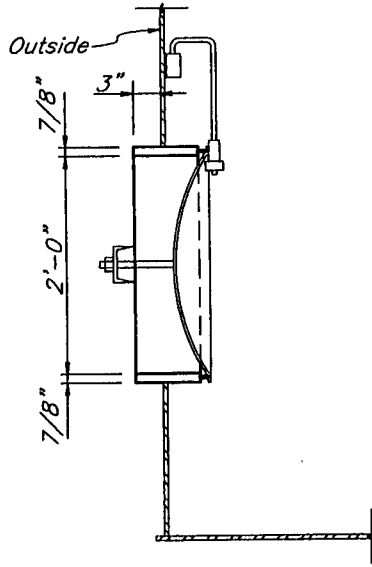
**184,000 GALLON GLASS-LINED BOLTED STEEL STANDPIPE**

**KENVIRONS, INC.**  
452 VERSAILLES ROAD, FRANKFORT, KENTUCKY  
(502) 695-4357

|            |     |             |          |         |   |       |
|------------|-----|-------------|----------|---------|---|-------|
| DRAWN BY   | JKP | DATE        | 2-99     | REVISED |   | SHEET |
| CHECKED BY |     | SCALE       | As Noted | 1       | 3 | 3     |
| CHECKED BY | KDT | PROJECT NO. | 97185    | 2       | 4 |       |



PLAN

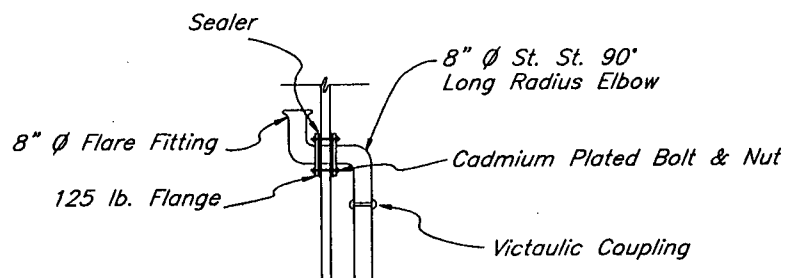


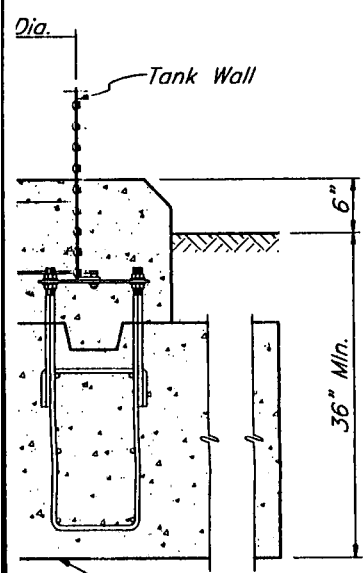
SECTION A-A

**24" SHELL MANHOLE**  
N.T.S.

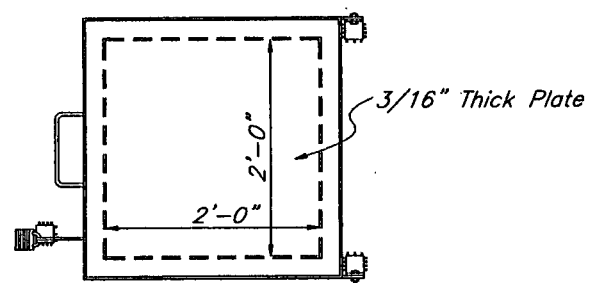
" Thick Plate

-Tank Roof

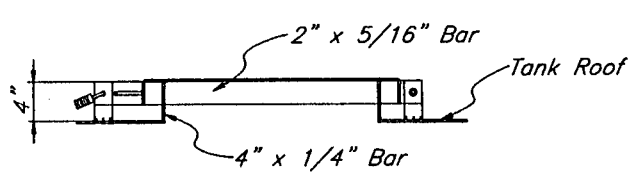




Required Bearing Area based on recommendations contained in the Geotechnical Exploration Report.



PLAN



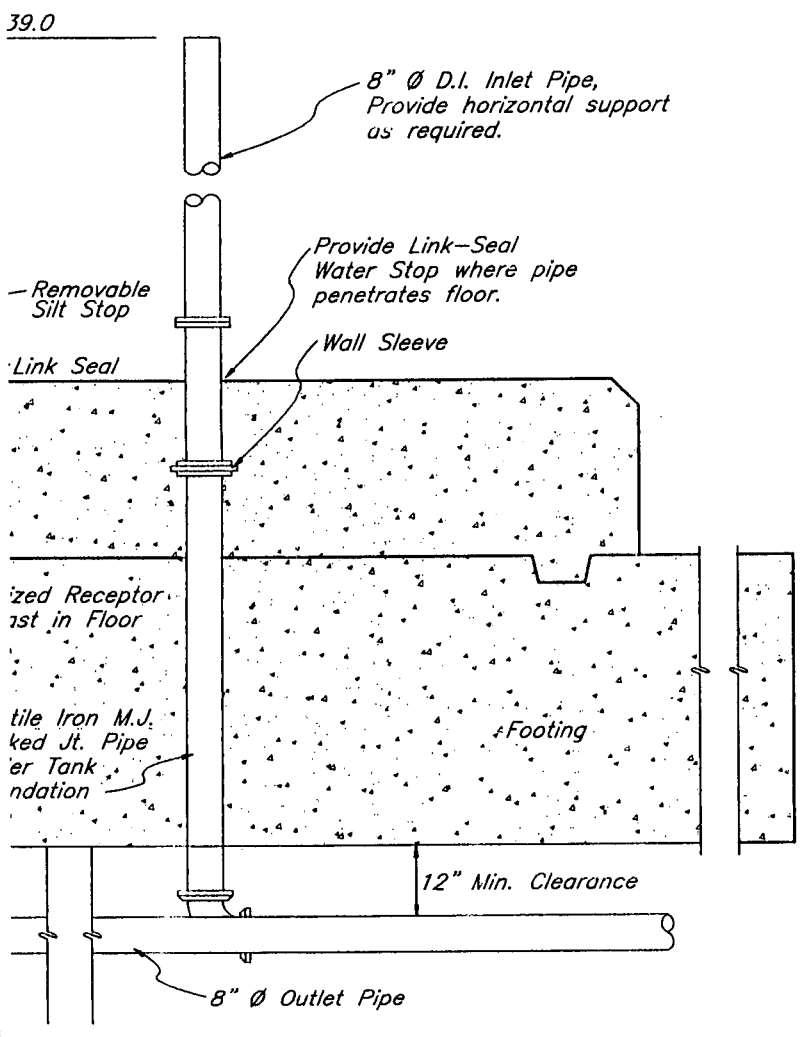
ELEVATION

**24" ROOF MANHOLE**

N.T.S.

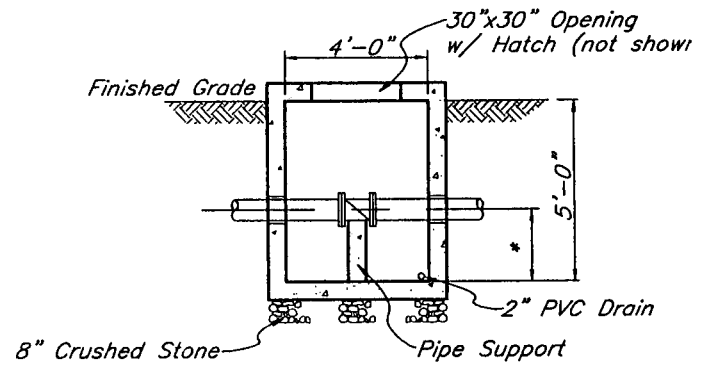
**E TANK BOTTOM**

N.T.S.



**PUMP INLET & OUTLET**

N.T.S.

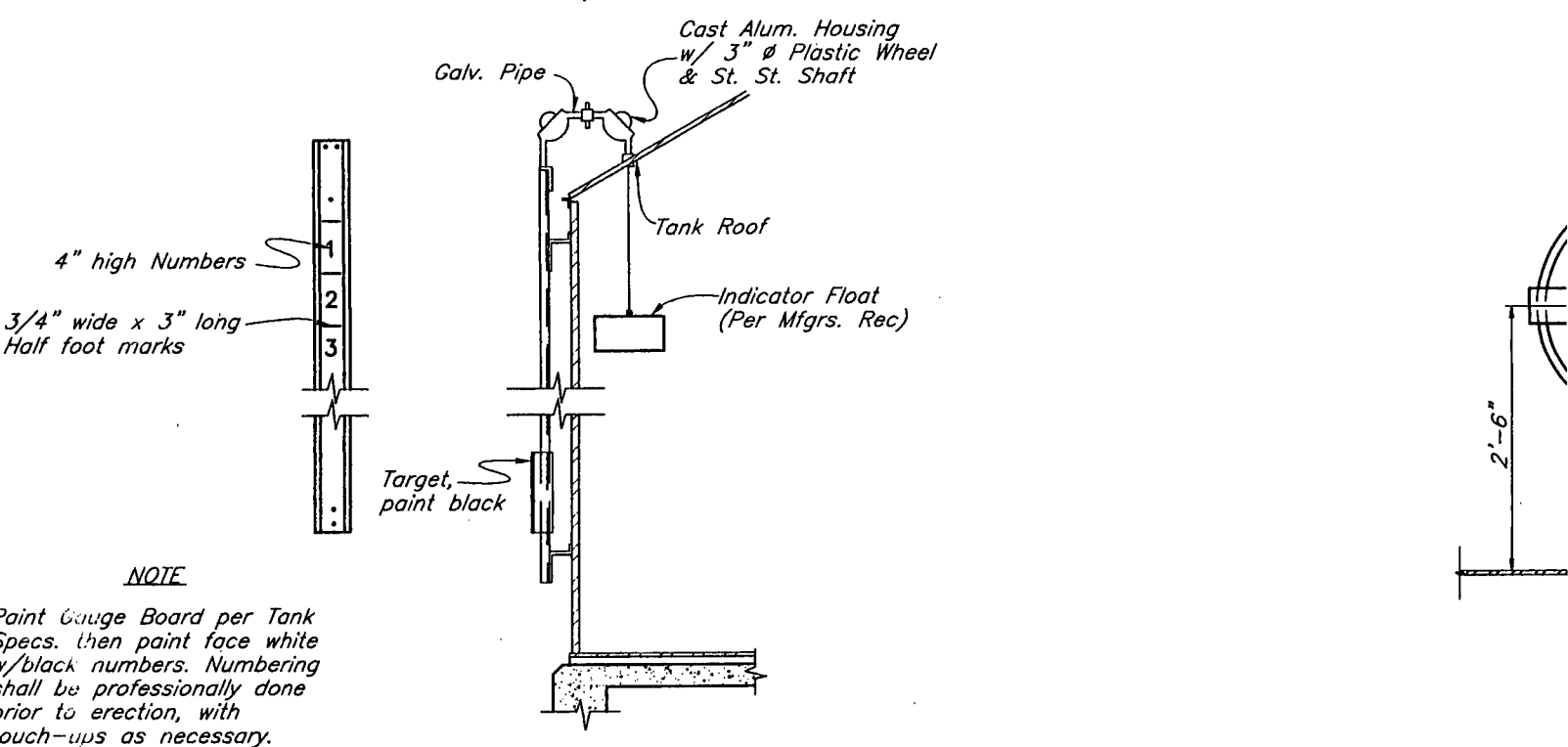


\* As necessary to get minimum clearance under foundation

**SECTION A-A**

N.T.S.

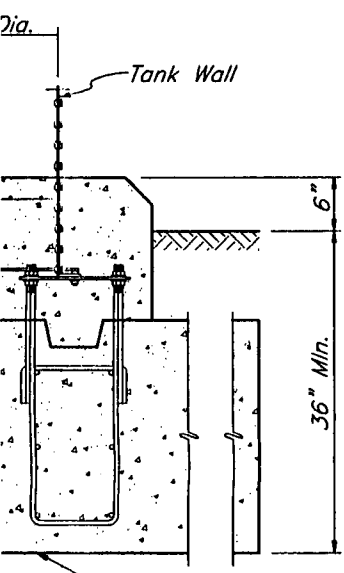




**NOTE**  
 Paint Gauge Board per Tank specs. then paint face white w/black numbers. Numbering shall be professionally done prior to erection, with touch-ups as necessary.

**WATER LEVEL INDICATOR**

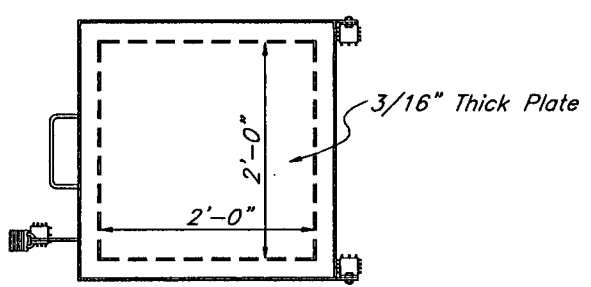
N.T.S.



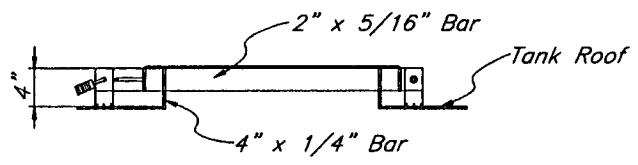
Required Bearing Area based on recommendations contained in the Geotechnical Exploration Report.

**TANK BOTTOM**

N.T.S.



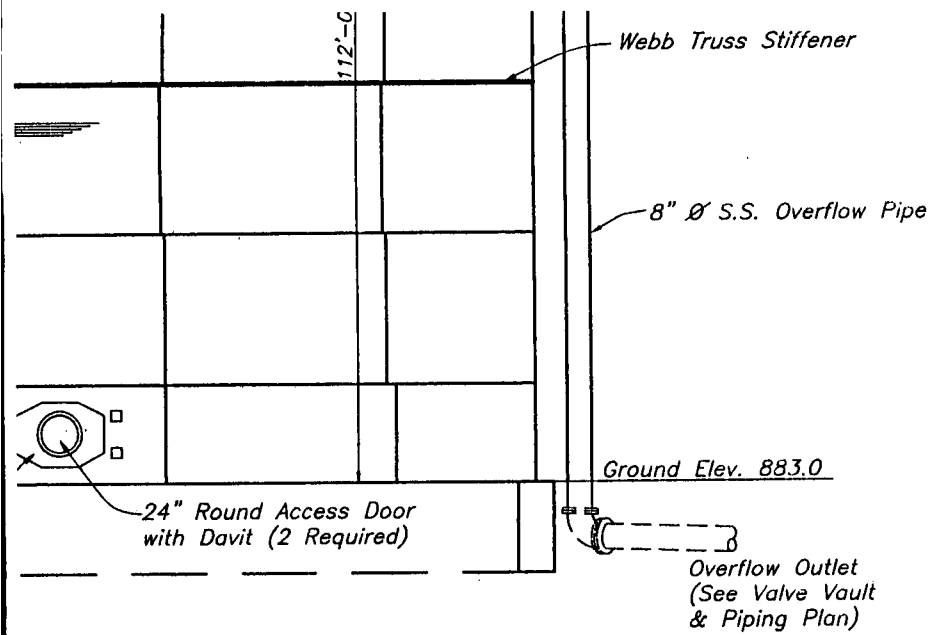
**PLAN**



**ELEVATION**

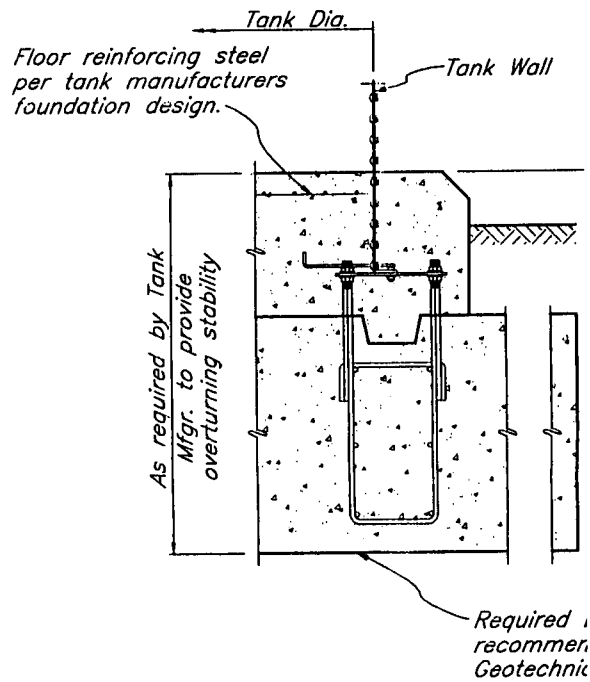
**24\"/>**

N.T.S.



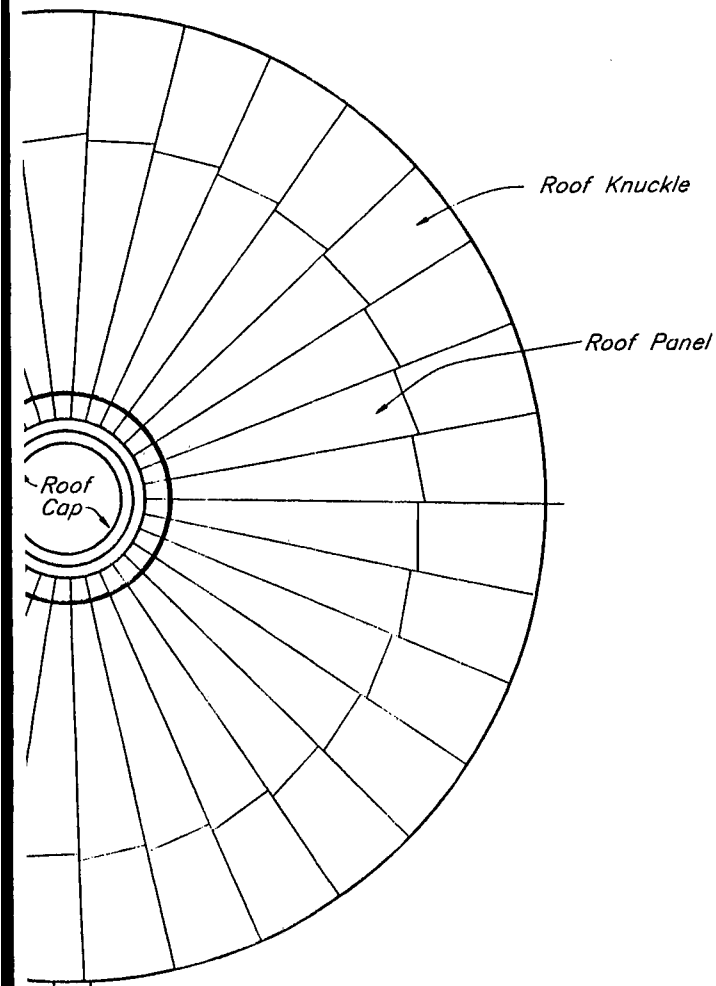
**R ELEVATION**

N.T.S.



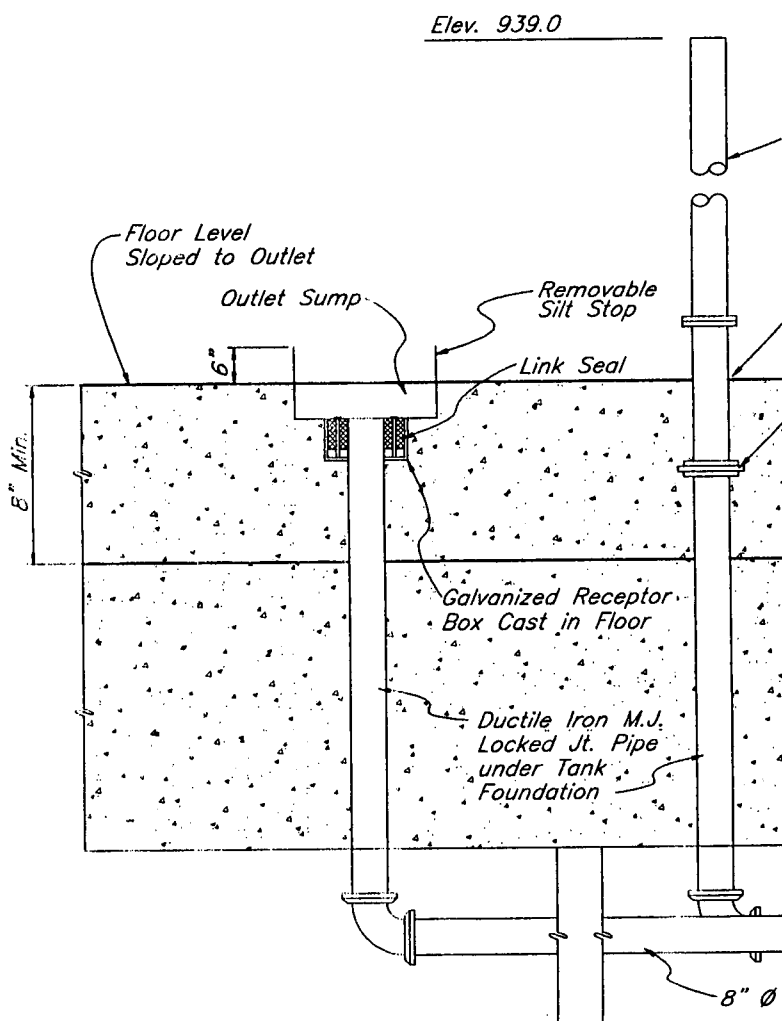
**CONCRETE TANK BOTTOM**

N.T.S.



**VOIR PLAN**

N.T.S.

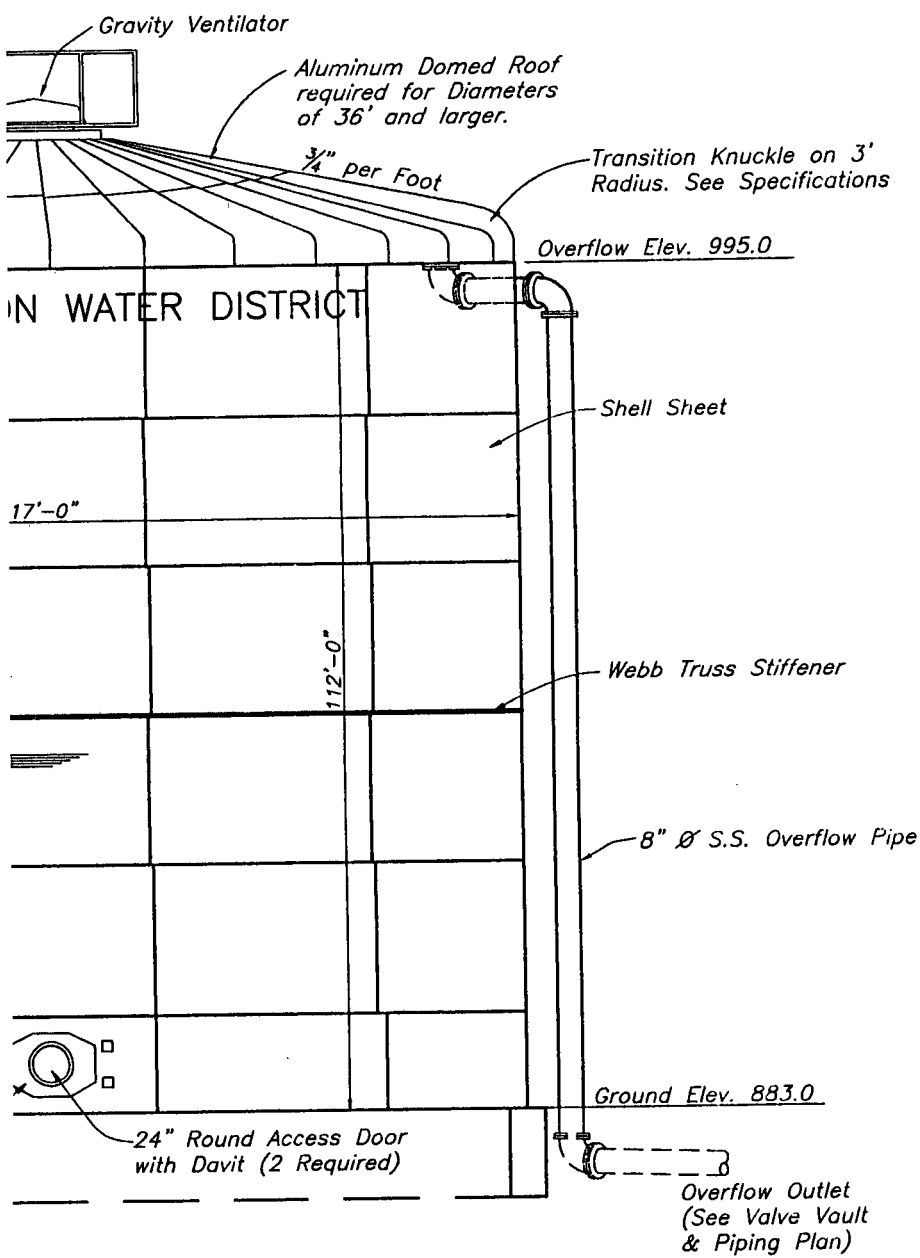


**TYPICAL SUMP INLET &**

N.T.S.

4" high Numbers

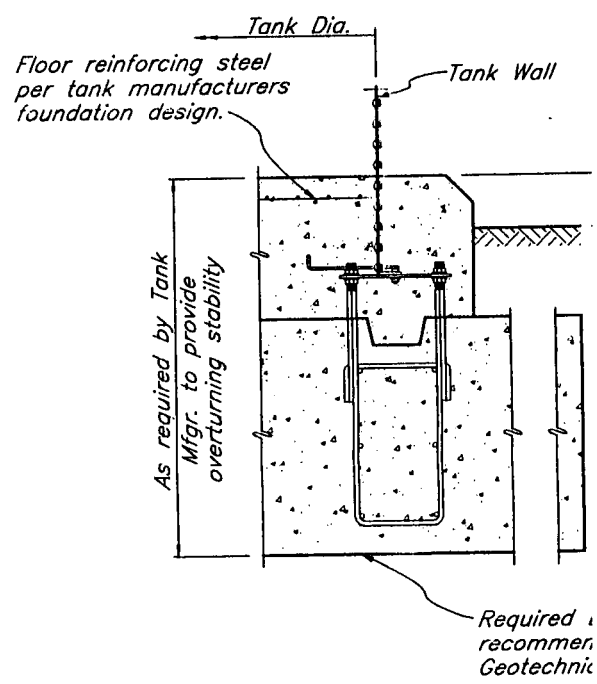
3/4" wide x 3" long -  
Half foot marks



**NOTE**

Paint Gauge Board per Specs. then paint face w/black numbers. Numbers shall be professionally done prior to erection, with touch-ups as necessary.

**WA**

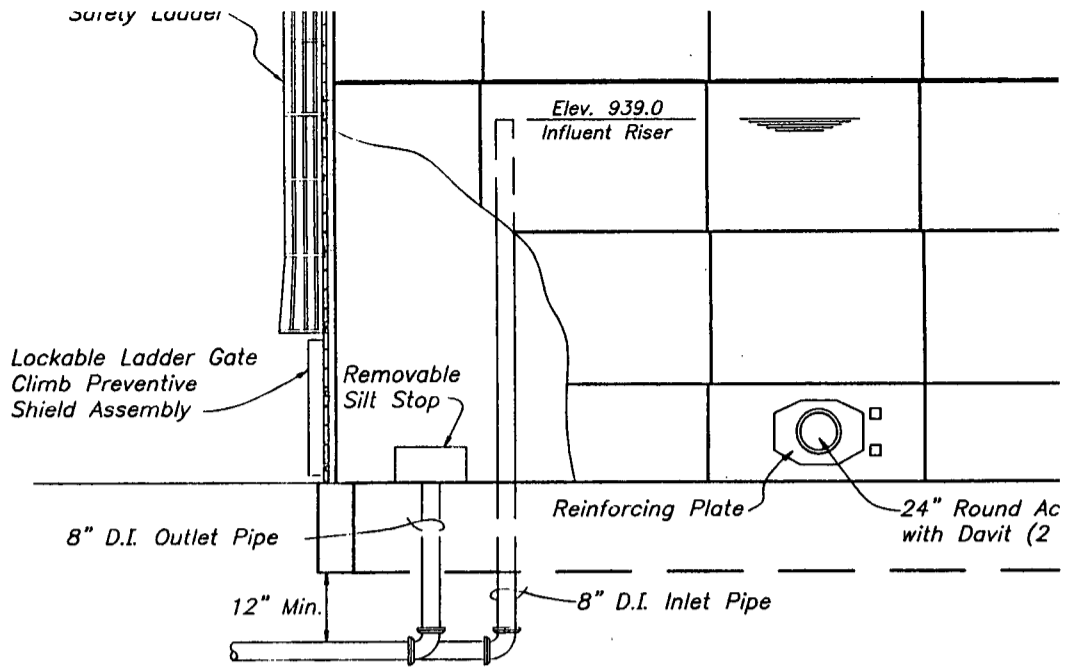


**R ELEVATION**

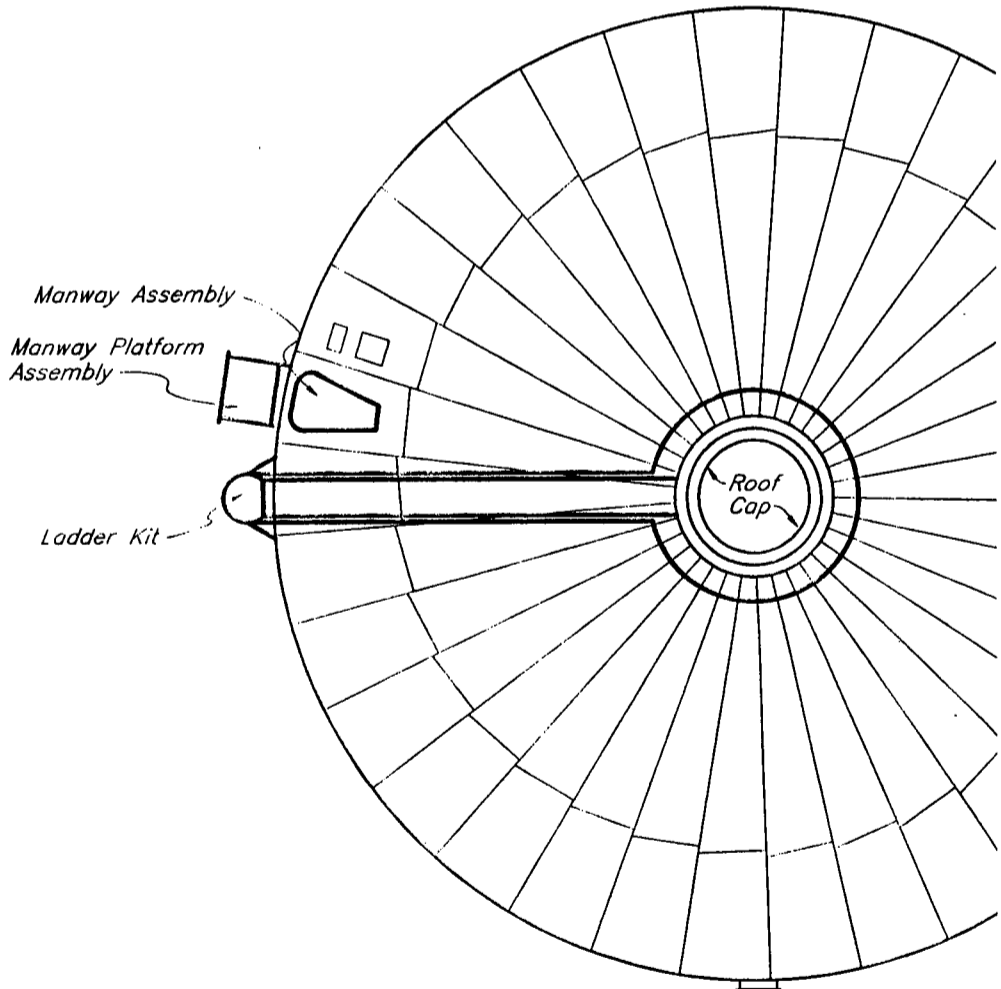
I.T.S.

**CONCRETE TANK BOTTOM**

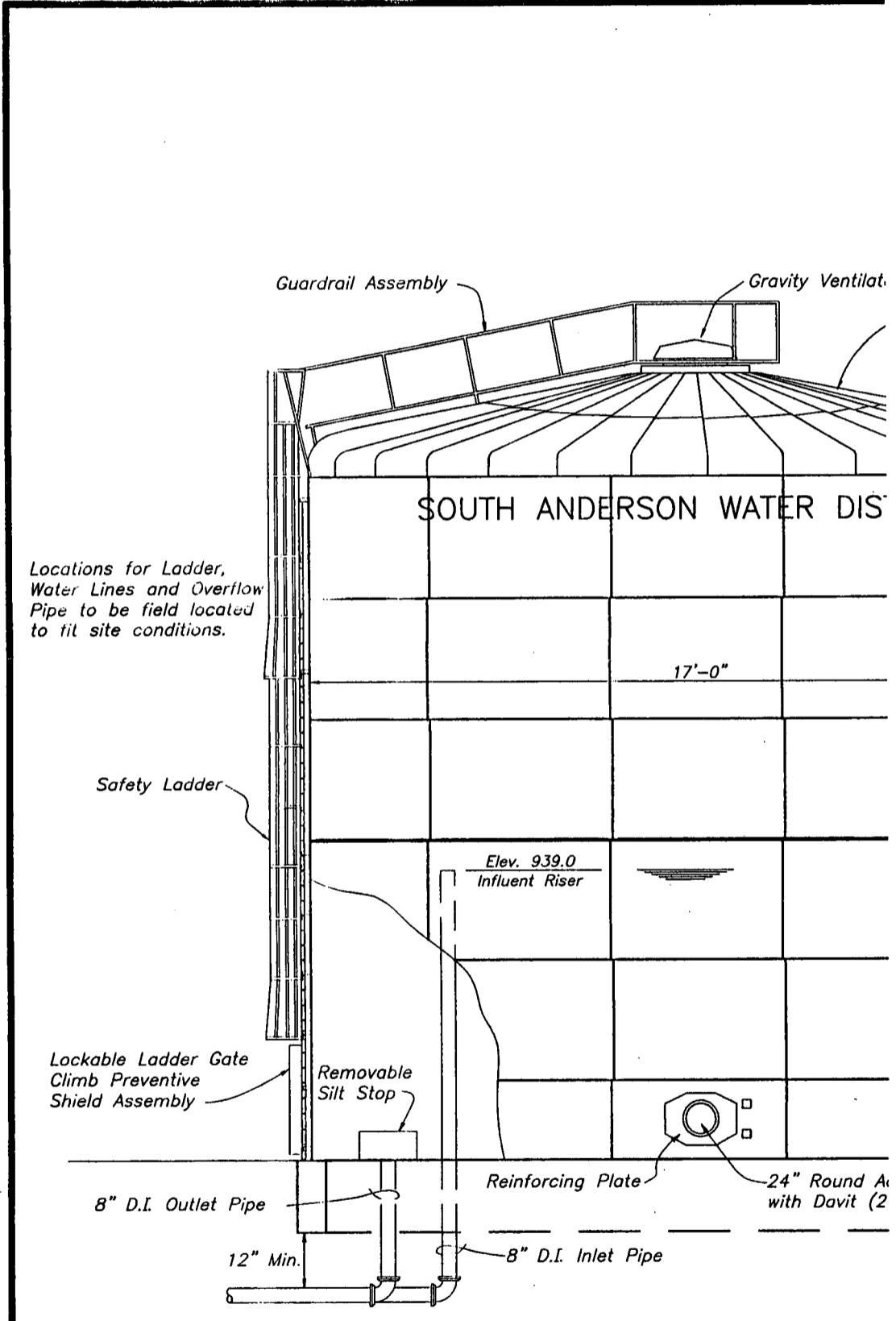
N.T.S.



**RESERVOIR ELEVATION**  
N.T.S.



**RESERVOIR PLAN**  
N.T.S.



Locations for Ladder,  
Water Lines and Overflow  
Pipe to be field located  
to fit site conditions.

SOUTH ANDERSON WATER DIST

17'-0"

Elev. 939.0  
Influent Riser

Lockable Ladder Gate  
Climb Preventive  
Shield Assembly

Removable  
Silt Stop

8" D.I. Outlet Pipe

Reinforcing Plate

24" Round A  
with Davit (2

12" Min.

8" D.I. Inlet Pipe

**RESERVOIR ELEVATION**  
N.T.S.

**Attachment 6**

99-068-6412<sup>3</sup>  
5/19



**TECHNICAL SPECIFICATIONS  
WATER DISTRIBUTION SYSTEM IMPROVEMENTS**

KENVIRONS

*for*

**SOUTH ANDERSON WATER DISTRICT**

**90**  
RECEIVED

JUL 12 1999

PUBLIC SERVICE  
COMMISSION

**CONTRACT 6: POST OFFICE BOOSTER PUMP STATION  
AND  
TRANSMISSION LINE**

*Prepared By:*

**KENVIRONS, INC.  
452 VERSAILLES ROAD  
FRANKFORT, KENTUCKY 40601**

**PROJECT NO. 97185**

**Kenvirons, Inc.**

**MARCH, 1999**

*Civil & Environmental Engineering and Laboratory Services*

**BIN #** 90

**TECHNICAL SPECIFICATIONS  
WATER DISTRIBUTION SYSTEM IMPROVEMENT PLANROOM**

for **ADD #** \_\_\_\_\_ **REC'D** \_\_\_\_\_

**SOUTH ANDERSON WATER DISTRICT** **ADD #** \_\_\_\_\_ **REC'D** \_\_\_\_\_

**ADD #** \_\_\_\_\_ **REC'D** \_\_\_\_\_

**ADD #** \_\_\_\_\_ **REC'D** \_\_\_\_\_

**CONTRACT 6: POST OFFICE BOOSTER PUMP STATION**

**AND**

**TRANSMISSION LINE**

**RECEIVED**

JUL 12 1999

PUBLIC SERVICE  
COMMISSION

*Prepared By:*

**KENVIRONS, INC.  
452 VERSAILLES ROAD  
FRANKFORT, KENTUCKY 40601**

**PROJECT No. 97185**

**MARCH, 1999**

Professional Engineer Seal for Kenneth Dale Taylor, License No. 11680, State of Kentucky. Includes handwritten signature and date 7-20-99.

TABLE OF CONTENTS

Page

---

**Bid Documents**

|   |                   |
|---|-------------------|
| Advertisement for Bids.....   | A-1 thru A-2      |
| Information for Bidders. ....   | A-3 thru A-7      |
| <b>Contract 6: Post Office Booster Pump Station and<br/>Transmission Line</b> |                   |
| Bid.....  | B-1 thru B-3      |
| Bid Bond.....   | B-4 thru B-5      |
| Notice of Award .....   | B-6               |
| Agreement.....  | B-7 thru B-9      |
| Payment Bond. ....  | B-10 thru B-11    |
| Performance Bond.....   | B-12 thru B-13    |
| Notice to Proceed.....  | B-14              |
| Change Order. ....  | B-15              |
| General Conditions. ....  | GC-1 thru GC-21   |
| Supplemental General Conditions. ....   | SGC-1 thru SGC-35 |



**BID DOCUMENTS**

## ADVERTISEMENT FOR BIDS

Separate Sealed BIDS for the construction of **Contract 6: Post Office Booster Pump Station and Transmission Line** will be received by the Water District, at 246 Court Street, P.O. Box 16, Lawrenceburg, Kentucky 40342 until 2:00 p.m. local time on May 19, 1999, and then at said office publicly opened and read aloud. The project will consist of the fabrication and installation of a canned booster pump station (450 gpm nominal capacity) and the installation of approximately 1,670 linear feet of eight inch PVC water line and appurtenances.

The CONTRACT DOCUMENTS may be examined at the following locations:

SOUTH ANDERSON WATER DISTRICT, 246 COURT STREET, LAWRENCEBURG, KY 40342  
KENVIRONS, INC., 452 VERSAILLES ROAD, FRANKFORT, KY 40602

Copies of the CONTRACT DOCUMENTS may be obtained at Kenvirons, Inc., 452 Versailles Road, Frankfort, Kentucky 40601, upon payment to Kenvirons, Inc. of \$25.00 for each non-refundable set.

The OWNER reserves the right to waive any informalities or to reject any and all bids. Any bid that is obviously unbalanced may be rejected.

All proposals shall be made on the forms furnished by the Engineer. Each BIDDER must deposit with his BID, security in the amount, form and subject to the conditions provided in the Information for Bidders. The BIDDER awarded the Contract shall execute a 100% Performance Bond and a 100% Payment Bond and shall furnish insurance as required by the General Conditions. CONTRACT shall be completed within 90 calendar days after authorization to start work. Liquidated damages will be \$300.00 per calendar day.

Federal law prohibits discrimination on the grounds of race, color, national origin, religion, age, handicap, and sex in this project. Minority contractors are encouraged to bid the project. Prime contractors are encouraged to use minority subcontractors.

No BIDDER may withdraw his bid within 90 days after the actual date of the opening thereof.

\_\_\_\_\_  
May 4, 1999

Date

\_\_\_\_\_  
Bob Kincer, Chairman  
South Anderson Water District

## INFORMATION FOR BIDDERS

BIDS will be received by the South Anderson Water District (herein called the "OWNER"), at 246 Court Street, P.O. Box 16, Lawrenceburg, Kentucky 40342, until 2:00 p.m. local time, May 19, 1999, and then at said building publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to the South Anderson Water District at P.O. Box 16, Lawrenceburg, Kentucky 40342. Each sealed envelope containing a BID must be plainly marked on the outside as BID for South Anderson Water District, Contract 6: Post Office Booster Pump Station and Transmission Line and the envelope should bear on the outside the BIDDER'S name, address and license number if applicable, and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER, South Anderson Water District, P.O. Box 16, Lawrenceburg, Kentucky 40342.

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. Only one copy of the BID form is required.

The OWNER may waive any 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. No BIDDER may withdraw a BID within 90 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves on the accuracy of the estimated quantities in the BID schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve the CONTRACTOR from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a BID BOND payable to the OWNER for five percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed, the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the PAYMENT BOND and PERFORMANCE BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A PERFORMANCE BOND and a PAYMENT BOND each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

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.

The party 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 when the NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall 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.

The OWNER within ten (10) days of receipt of acceptable PERFORMANCE BOND, PAYMENT BOND and AGREEMENT signed by the party 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.

The NOTICE TO PROCEED shall be issued within ten (10) 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 ten (10) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the AGREEMENT without further liability on the part of either party.

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 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 contemplated herein.

A conditional or qualified BID will not be accepted.

Award will be made to the lowest responsible BIDDER.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to its BID.

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provisions of the equal opportunity clause set forth in the SUPPLEMENTAL GENERAL CONDITIONS.

The low BIDDER shall supply the names and addresses of the major material SUPPLIERS and SUBCONTRACTORS when required to do so by the OWNER.

A pre-bid inspection trip has not been scheduled for this contract.

The ENGINEER is Kenvirons, Inc. The ENGINEER'S address is 452 Versailles Road, Frankfort, Kentucky 40601.

**BID**

Proposal of \_\_\_\_\_ (hereinafter called "BIDDER"),  
organized and existing under the laws of the State of \_\_\_\_\_  
doing business as \_\_\_\_\_\*.

To the South Anderson Water District (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of CONTRACT 6: POST OFFICE BOOSTER PUMP STATION AND TRANSMISSION LINE in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

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

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within 90 consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of \$300.00 for each consecutive calendar day thereafter as provided in Section 15 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

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

\*Insert "a corporation", "a partnership", or "an individual" as applicable.



Respectfully submitted,

\_\_\_\_\_  
Signature Address

\_\_\_\_\_  
Title Phone

Employer Identification No. \_\_\_\_\_  
SEAL - (if BID is by a Corporation) Date



**BID BOND**

NOW, ALL MEN BY THESE PRESENTS, that we, the undersigned, \_\_\_\_\_ as Principal, and \_\_\_\_\_ as Surety, are hereby held and firmly bound unto South Anderson Water District 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 \_\_\_\_\_, 19\_\_\_\_\_. 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 the Construction of Contract 6: POST OFFICE BOOSTER PUMP STATION AND TRANSMISSION LINE.

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 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.

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.

\_\_\_\_\_(L.S.)  
Principal

\_\_\_\_\_  
Surety

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

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

**Notice of Award**

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PROJECT Description: Contract 6: Post Office Booster Pump Station and Transmission Line.

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated May 4, 1999, and Information for Bidders.

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

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

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

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

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 1999.

Owner

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

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

**Acceptance Of Notice**

Receipt of the above NOTICE OF AWARD is hereby acknowledged by \_\_\_\_\_  
\_\_\_\_\_ this the \_\_\_\_\_ day of \_\_\_\_\_, 1999.

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

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

## AGREEMENT

THIS AGREEMENT, made this \_\_\_ day of \_\_\_\_\_, 1999, by and between South Anderson Water District, hereinafter called "OWNER" and \_\_\_\_\_ doing business as a \_\_\_\_\_ hereinafter called "CONTRACTOR". WITNESSETH: That for and in consideration of the payments and agreements herein after mentioned:

1. The CONTRACTOR will commence and complete the construction of Contract 6: POST OFFICE BOOSTER PUMP STATION AND TRANSMISSION LINE.

2. The CONTRACTOR will furnish all of the materials, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the PROJECT described herein.

3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS within 10 calendar days after the date of the NOTICE TO PROCEED and will complete the same within 90 calendar days unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.

4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of \$\_\_\_\_\_ based on bid contract quantities at the unit prices shown in the BID schedule.

5. The term "CONTRACT DOCUMENTS" means and includes the following:

- A) Advertisement for BIDS
- B) Information for BIDDERS
- C) BID
- D) BID BOND
- E) Agreement
- F) General Conditions

G) SUPPLEMENTAL GENERAL CONDITIONS

H) Payment BOND

I) Performance BOND

J) NOTICE OF AWARD

K) NOTICE TO PROCEED

L) CHANGE ORDER FORM

M) DRAWINGS prepared by Kenvirons, Inc. dated March, 1999

N) SPECIFICATIONS prepared or issued by Kenvirons, Inc., dated March, 1999.

O) ADDENDA:

No. \_\_\_\_\_, dated: \_\_\_\_\_

No. \_\_\_\_\_, dated: \_\_\_\_\_

6. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized official, this Agreement in 4 copies each of which shall be deemed an original on the date first above written.

OWNER:

SOUTH ANDERSON WATER DISTRICT

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

Employer Identification  
Number \_\_\_\_\_

(SEAL)

ATTEST:

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

Secretary

CONTRACTOR:

\_\_\_\_\_

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

Employer Identification  
Number \_\_\_\_\_

(SEAL)

ATTEST:

**PAYMENT BOND**

KNOW ALL PERSONS BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called  
(Corporation, Partnership or Individual)

Principal, and \_\_\_\_\_,  
(Name of Surety)

hereinafter called SURETY, are held and firmly bound unto the South Anderson Water District, hereinafter called OWNER, and unto all persons, firms, and corporations who or which may furnish labor or who furnish materials to perform as described under the contract and to their successors and assigns in the total aggregate penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the PRINCIPAL entered into a certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, a copy of which is hereto attached and made a part hereof for the construction of \_\_\_\_\_

NOW, THEREFORE, if the PRINCIPAL shall promptly make payment to all persons, firms, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extensions or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and for all labor cost incurred in such WORK including that by a SUBCONTRACTOR, and to any mechanic or materialman lienholder whether it acquires its lien by operation of State or Federal law; then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, that beneficiaries or claimants hereunder shall be limited to the SUBCONTRACTORS, and persons, firms, and corporations having a direct contract with the PRINCIPAL or its SUBCONTRACTORS.

PROVIDED, FURTHER, that the said SURETY for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of this contract or to the WORK or to the SPECIFICATIONS.

PROVIDE, FURTHER, that no suit or action shall be commenced hereunder by any claimant: (a) Unless claimant, other than one having a direct contract with the PRINCIPAL shall have given written notice to any two of the following: The PRINCIPAL, the OWNER, or the SURETY above named within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the PRINCIPAL, OWNER, or SURETY, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer. (b) After the expiration of one (1) year following the date of which PRINCIPAL ceased work on said CONTRACT, is being understood, however, that if any limitation embodied in the BOND is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by law.

PROVIDED, FURTHER, that it is expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND, the contract or the loan Documents shall include any alteration, addition, extension or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in 4 counterparts, each of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_\_.

ATTEST:

\_\_\_\_\_  
Principal

\_\_\_\_\_  
(Principal) Secretary

(SEAL) By \_\_\_\_\_

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Surety



ATTEST:

\_\_\_\_\_  
Witness as to Surety

\_\_\_\_\_  
(Address)  
\_\_\_\_\_

By \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
(Address)  
\_\_\_\_\_

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners should execute BOND.

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

**PERFORMANCE BOND**

KNOW ALL PERSONS BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter  
(Corporation, Partnership, or Individual)

called Principal, and \_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_  
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto the South Anderson Water District, hereinafter called OWNER, in the total aggregate penal sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_, a copy of which is hereto attached and made a part hereof for the construction of: \_\_\_\_\_

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the SURETY and during the one year guaranty period and if the PRINCIPAL shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said SURETY, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that it is expressly agreed that the BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the CONTRACT as so amended. The term "Amendment", wherever used in this BOND, and whether referring to this BOND, the Contract or the Loan Documents shall include any alteration, addition, extension, or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER and the PRINCIPAL shall abridge the right of the other beneficiary hereunder, whose claim may be unsatisfied. The OWNER is the only beneficiary hereunder.

IN WITNESS WHEREOF, this instrument is executed in 4 counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_\_.

ATTEST:

\_\_\_\_\_  
(Principal) Secretary

(SEAL)

\_\_\_\_\_  
(Witness as to Principal)

\_\_\_\_\_  
(Address)

ATTEST:

\_\_\_\_\_  
Witness to Surety

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Principal

By \_\_\_\_\_

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
Surety

By \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
(Address)

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners should execute BOND.

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

## NOTICE TO PROCEED

Date: \_\_\_\_\_

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

RE: Contract 6: Post Office Booster Pump Station and Transmission Line

You are hereby notified to commence WORK in accordance with the Agreement dated \_\_\_\_\_, 1999, on or before \_\_\_\_\_, and you are to complete the WORK within 90 consecutive calendar days thereafter. The date of completion of all WORK is therefore \_\_\_\_\_, 1999.

South Anderson Water District

\_\_\_\_\_  
Bob Kincer  
Chairman

### ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by \_\_\_\_\_ this the \_\_\_\_\_ day of \_\_\_\_\_, 1999.

Employer Identification  
Number \_\_\_\_\_



# GENERAL CONDITIONS

GENERAL CONDITIONS

- |  |  |
|--|--|
| 1. Definitions                                 | 17. Subsurface Conditions                      |
| 2. Additional Instructions and Detail Drawings | 18. Suspension of Work, Termination, and Delay |
| 3. Schedules, Reports, and Records             | 19. Payments to Contractor                     |
| 4. Drawings and Specifications                 | 20. Acceptance of Final Payment as Release     |
| 5. Shop Drawings                               | 21. Insurance                                  |
| 6. Materials, Services, and Facilities         | 22. Contract Security                          |
| 7. Inspection and Testing                      | 23. Assignments                                |
| 8. Substitutions                               | 24. Indemnification                            |
| 9. Patents                                     | 25. Separate Contracts                         |
| 10. Surveys, Permits, Regulations              | 26. Subcontracting                             |
| 11. Protection of Work, Property, Persons      | 27. Engineer's Authority                       |
| 12. Supervision by Contractor                  | 28. Land and Rights-of-Way                     |
| 13. Changes in the Work                        | 29. Guaranty                                   |
| 14. Changes in Contract Price                  | 30. Arbitration                                |
| 15. Time for Completion and Liquidated Damages | 31. Taxes                                      |
| 16. Correction of Work                         | 32. Environmental Requirements                 |

1. DEFINITIONS

1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated and shall be applicable to both the singular and plural thereof:

1.2 ADDENDA - 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.

1.3 BID - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER - Any person, firm, or corporation submitting a BID for the WORK.

1.5 BONDS - Bid, Performance, and Payment Bonds and other instruments of surety, furnished by the CONTRACTOR and the CONTRACTOR'S surety in accordance with the CONTRACT DOCUMENTS.



1.6 CHANGE ORDER - 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.

1.7 CONTRACT DOCUMENTS - The contract, including Advertisement For BIDS, Information For BIDDERS, BID, BID BOND, Agreement, Payment BOND, Performance BOND, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, and ADDENDA.

1.8 CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10 CONTRACTOR - The person, firm, or corporation with whom the OWNER has executed the Agreement.

1.11 DRAWINGS - The parts 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.

1.12 ENGINEER - The person, firm, or corporation named as such in the CONTRACT DOCUMENTS.

1.13 FIELD ORDER - A written order effecting a change in 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.

1.14 NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED - Written communication issued by the OWNER to the CONTRACTOR authorizing him/her to proceed with the WORK and establishing the date for commencement of the WORK.

1.16 OWNER - A public or quasi-public body or authority, corporation, association, partnership, or an individual for whom the WORK is to be performed.

1.17 PROJECT - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS - 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.

1.20 SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.21 SUBCONTRACTOR - An individual, firm, or corporation having a direct contract with CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.22 SUBSTANTIAL COMPLETION - That date 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.

1.23 SUPPLEMENTAL GENERAL CONDITIONS - Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by applicable state laws.

1.24 SUPPLIER - Any person 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.

1.25 WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.26 WRITTEN NOTICE - 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 their last given address, or delivered in person to said party or their authorized representative on the WORK.

## 2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

2.1 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.

2.2 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.

3. SCHEDULES, REPORTS AND RECORDS

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

3.2 Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which the CONTRACTOR proposes to carry on the WORK, including dates at which the various parts of the WORK will be started, estimated date of completion of each part and, as applicable:

3.2.1 The dates at which special detail drawings will be required; and

3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

3.3 The CONTRACTOR shall also submit a schedule of payments that the CONTRACTOR anticipates will be earned during the course of the WORK.

4. DRAWINGS AND SPECIFICATIONS

4.1 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.

4.2 In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over general DRAWINGS.

4.3 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 discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR'S risk.

5. SHOP DRAWINGS

5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING which substantially deviates from the requirement of the CONTRACT DOCUMENTS shall be evidenced by a CHANGE ORDER.

5.2 When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

#### 6. MATERIALS, SERVICES AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2 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.

6.3 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

6.4 Materials, supplies, and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.

6.5 Materials, supplies, or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.

7.3 The CONTRACTOR shall provide at the CONTRACTOR'S expense the testing and inspection services required by the CONTRACT DOCUMENTS.

7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.

7.5 Inspections, tests, or approvals by the engineer or others shall not relieve the CONTRACTOR from the obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

7.6 The ENGINEER and the ENGINEER'S representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records or personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection or testing thereof.

7.7 If any WORK is covered contrary to the written instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for the ENGINEER'S observation and replaced at the CONTRACTOR'S expense.

7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, if, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate CHANGE ORDER shall be issued.

#### 8. SUBSTITUTIONS

8.1 Whenever a material, article, or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalogue numbers, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. 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 CONTRACT DOCUMENTS 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 approve its substitution and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, 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 will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

#### 9. PATENTS

9.1 The CONTRACTOR shall pay all applicable royalties and license fees, and shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or product of a particular manufacturer or manufacturers is specified, however, if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent, the CONTRACTOR shall be responsible for such loss unless the CONTRACTOR promptly gives such information to the ENGINEER.

10. SURVEYS, PERMITS, REGULATIONS

10.1 The OWNER shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pipe locations and other working points, lines, elevations and cut sheets.

10.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, shall be charged with the resulting expense and shall be responsible for any mistake that may be caused by their unnecessary loss or disturbance.

10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, the CONTRACTOR shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

11. PROTECTION OF WORK, PROPERTY, AND PERSONS

11.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the WORK. The CONTRACTOR will take all necessary precautions for the safety of, will provide the necessary precautions for the safety of, and will 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.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. The CONTRACTOR will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. The CONTRACTOR will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone directly or indirectly employed by any of them or anyone of whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACTOR or to the acts or omissions of the OWNER, of the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instructions or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. The CONTRACTOR will 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.

## 12. SUPERVISION BY CONTRACTOR

12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the WORK.

## 13. CHANGES IN THE WORK

13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.



13.2 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 the CONTRACTOR to a change in CONTRACT PRICE or TIME, or both, in which event the CONTRACTOR shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

#### 14. CHANGES IN CONTRACT PRICE

14.1 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

- a. Unit prices previously approved.
- b. An agreed lump sum.

#### 15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

15.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.

15.4.1 To any preference, priority or allocation order duly issued by the OWNER.

15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1 and 15.4.2 of this article.

#### 16. CORRECTION OF WORK

16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and reexecute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

16.2 All removal and replacement WORK shall be done at the CONTRACTOR'S expense. If the CONTRACTOR does not take action to remove such rejected WORK within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

#### 17. SUBSURFACE CONDITIONS

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.2 Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.

17.2 The OWNER shall promptly investigate the conditions, and if it is found that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless the required WRITTEN NOTICE has been given; provided that the OWNER may, if the OWNER determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

18. SUSPENSION OF WORK, TERMINATION, AND DELAY

18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume that WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 If the CONTRACTOR is adjudged a bankrupt or insolvent, or makes a general assignment for the benefit of its creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of its property, or if CONTRACTOR files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or disregards the authority of the ENGINEER, or otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and its surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method the OWNER may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

18.3 Where the CONTRACTOR'S services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

18.4 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.

18.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within thirty (30) days of its approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days written notice to the OWNER and the ENGINEER stop the WORK until 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.

18.6 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

19. PAYMENT TO CONTRACTOR

19.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. 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 the OWNER'S interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing approval of payment, and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing the 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 of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate less the retainage. The retainage shall be an amount equal to 5% of said estimate. If at any time thereafter when the progress of the WORK is not satisfactory, additional amounts may be retained. Upon substantial completion of the work, any amount retained may be paid to the CONTRACTOR. When the WORK has been substantially completed except for WORK which cannot be completed because of weather conditions, lack of materials or other reasons which in the judgment of the OWNER are valid reasons for noncompletion, the OWNER may make additional payments, retaining at all times an amount sufficient to cover the estimated cost of the WORK still to be completed.

19.2 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.

19.3 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.

19.4 The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

19.5 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 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.

19.6 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demand 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, the CONTRACTOR'S 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.

19.7 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 the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

## 20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

20.1 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and others relating to or arising out of this WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or its sureties from any obligations under the CONTRACT DOCUMENTS or the Performance and Payment BONDS.

21. INSURANCE

21.1 The CONTRACTOR shall purchase and maintain such insurance as will protect it from claims set forth below which may arise out of, or result from, the CONTRACTOR'S execution of the WORK, whether such execution be by the CONTRACTOR, any SUBCONTRACTOR, or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

21.1.1 Claims under workmen's compensation, disability benefit and other similar employee benefit acts;

21.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of employees;

21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than employees;

21.1.4 Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person; and

21.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

21.2 Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

21.3 The CONTRACTOR shall procure and maintain, at the CONTRACTOR'S own expense, during the CONTRACT TIME, Liability insurance as hereinafter specified:

21.3.1 CONTRACTOR'S General Public Liability and Property Damage Insurance including vehicle coverage issued to the CONTRACTOR and protecting the CONTRACTOR from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by the CONTRACTOR or by any SUBCONTRACTOR employed by the CONTRACTOR or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR employed by the CONTRACTOR. Insurance shall be written with a limit of liability of not less than \$500,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; and a limit of liability of not less than \$500,000 aggregate for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than \$200,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than \$200,000 aggregate for any such damage sustained by two or more persons in any one accident.

21.3.2 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

21.4 The CONTRACTOR shall procure and maintain, at the CONTRACTOR'S own expense, during the CONTRACT TIME, in accordance with the provisions of the laws of the state in which the WORK is performed, Workmen's Compensation Insurance, including occupational disease provisions, for all of the CONTRACTOR'S employees at the site of the PROJECT and in case any WORK is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, and shall cause each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of its employees not otherwise protected.

21.5 The CONTRACTOR shall secure, if applicable, "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, and the OWNER.



## 22. CONTRACT SECURITY

22.1 The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance BOND and a Payment BOND in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such 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 Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared a 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 accepted on Federal Bonds, CONTRACTOR shall within ten (10) 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 payment shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

## 23. ASSIGNMENTS

23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign, or otherwise dispose of the Contract or any portion thereof, or of any right, title or interest therein, or any obligations thereunder, without written consent of the other party.

## 24. INDEMNIFICATION

24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission 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.

26.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(s), in excess of fifty (50%) percent of the CONTRACT PRICE, without prior written approval of the OWNER.

26.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of its SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as the CONTRACTOR is for the acts and omissions of persons directly employed by the CONTRACTOR.

26.4 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 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 provision of the CONTRACT DOCUMENTS.

26.5 Nothing contained in this CONTRACT shall create any contractual relationship between any SUBCONTRACTOR and the OWNER.

#### 27. ENGINEER'S AUTHORITY

27.1 The ENGINEER shall act as the OWNER'S representative during the construction period, shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed, and shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship, and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

#### 28. LAND AND RIGHTS-OF-WAY

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at its own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

#### 29. GUARANTEE

29.1 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. 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.

#### 30. ARBITRATION BY MUTUAL AGREEMENT

30.1 All claims, disputes, and other matters in question arising out of, or relating to, the CONTRACT DOCUMENTS or the breach thereof, except for claims which have been waived by making an acceptance of final payment as provided by Section 20, may be decided by arbitration if the parties mutually agree. Any agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

30.2 Notice of the request for arbitration shall be filed in writing with the other party to the CONTRACT DOCUMENTS and a copy shall be filed with the ENGINEER. Request for arbitration shall in no event be made on any claim, dispute, or other matter in question which would be barred by the applicable statute of limitations.

30.3 The CONTRACTOR will carry on the WORK and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

31. TAXES

31.1 The CONTRACTOR will pay all sales, consumer, use, and other similar taxes required by the laws of the place where the WORK is performed.

32. ENVIRONMENTAL REQUIREMENTS

The CONTRACTOR, when constructing a project involving trenching and/or other related earth excavation, shall comply with the following environmental constraints.

32.1 WETLANDS - The CONTRACTOR, when disposing of excess, spoil, or other construction materials on public or private property, WILL NOT FILL IN or otherwise CONVERT WETLANDS.

32.2 FLOODPLAINS - The CONTRACTOR, when disposing of excess, spoil, or other construction materials on public or private property, WILL NOT FILL IN or otherwise CONVERT 100 YEAR FLOODPLAIN areas delineated on the latest FEMA Floodplain Maps.

32.3 HISTORIC PRESERVATION - Any excavation by the Contractor that uncovers an historical or archaeological artifact shall be immediately reported to the PROJECT ENGINEER and a representative of RUS. Construction shall be temporarily halted pending the notification process and further directions issued by RUS after consultation with the State Historic Preservation Officer (SHPO).

32.4 ENDANGERED SPECIES - The 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 the CONTRACTOR, the CONTRACTOR will immediately report this evidence to the PROJECT ENGINEER and a representative of RUS. Construction shall be temporarily halted pending the notification process and further directions issued by RUS after consultation with the U.S. Fish and Wildlife Service.

**SUPPLEMENTAL GENERAL CONDITIONS**

## RUS Supplemental General Conditions

The provisions of the Rural Utilities Service (RUS) Supplemental General Conditions as described herein change, amend, or supplement the General Conditions and shall supersede any conflicting provisions of this CONTRACT. All provisions of the General Conditions which are not changed, amended, or supplemented, remain in full force.

- |                                     |                          |
|-------------------------------------|--------------------------|
| 1. CONTRACT APPROVAL                | 9. SMALL, MINORITY AND   |
| 2. CONTRACT CHANGE ORDERS           | WOMEN'S BUSINESSES       |
| 3. PARTIAL PAYMENT ESTIMATES        | 10. ANTI-KICKBACK        |
| 4. CONFLICT OF INTEREST             | 11. VIOLATING FACILITIES |
| 5. PROTECTION OF LIVES AND PROPERTY | 12. STATE ENERGY POLICY  |
| 6. REMEDIES                         | 13. EQUAL OPPORTUNITY    |
| 7. GRATUITIES                       | REQUIREMENTS             |
| 8. AUDIT AND ACCESS TO RECORDS      | 14. CERTIFICATE OF       |
|                                     | OWNER'S ATTORNEY         |
|                                     | 15. RUS CONCURRENCE      |

1. Contract Approval.

1.1 The OWNER and the CONTRACTOR will furnish the OWNER'S Attorney such evidence as required so that the OWNER'S Attorney can complete and execute "Certificate of Owner's Attorney" (Section 14) before the OWNER submits the executed Contract Documents to RUS for approval.

1.2 Concurrence by the State Program Official or designee in the award of the CONTRACT is required before it is effective and the "RUS Concurrence" (Section 15), shall be attached and made a part of the Agreement.

1.3 Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located. [Revision 1, 07/11/1997]

1.4 This CONTRACT is expected to be funded in part with funds from the RUS. Neither the United States nor any of its departments, agencies, or employees is or will be a party to this CONTRACT or any SUBCONTRACT.

2. Contract Change Orders.

2.1 All changes affecting the project's construction cost or modifications of the terms or conditions of the contract must be authorized by means of a written contract change order which is mutually agreed to by the OWNER and CONTRACTOR and is approved by RUS. The contract change order will include extra work, work for which quantities have been altered from those shown in the bidding schedule, as well as decreases or increases in the quantities of installed units which are different than those shown in the bidding schedule because of final measurements. All changes must be recorded on a contract change order before they can be included in a partial payment estimate.

2.2 FORM RD 1924-7, "Contract Change Order" or similar form approved by RUS shall be used to record CONTRACT changes.

2.3 When the CONTRACT sum is, in whole or in part, based on unit prices, the OWNER reserves the right to increase or decrease a unit price quantity as may be deemed reasonable or necessary in order to complete the work contemplated by this CONTRACT.

3. Partial Payment Estimates.

3.1 FORM RD 1924-18, "Partial Payment Estimate," or similar form approved by RUS shall be used when estimating periodic payments due the CONTRACTOR.

3.2 The OWNER may after consultation with the ARCHITECT/ENGINEER withhold or, on account of subsequently discovered evidence, nullify the whole or part of any approved partial payment estimate to such extent as may be necessary to protect the OWNER from loss on account of:

3.2.1 Defective work not remedied.

3.2.2 Claims filed.

3.2.3 Failure of CONTRACTOR to make payments properly to subcontractors or suppliers.

3.2.4 A reasonable doubt that the WORK can be completed for the balance then unpaid.

3.2.5 Damage to another CONTRACTOR.

3.2.6 Performance of WORK in violation of the terms of the CONTRACT DOCUMENTS.

3.3 Where WORK on unit price items is substantially complete but lacks testing, clean-up and/or corrections, amounts shall be deducted from unit prices in partial payment estimates to amply cover such testing, clean-up and/or corrections.

3.4 When the items in 3.2 and 3.3 are cured, payment shall be made for amounts withheld because of them.

3.5 Payments will not be made that would deplete the retainage nor place in escrow any funds that are required for retainage nor invest the retainage for the benefit of the CONTRACTOR.

4. Conflict of Interest.

4.1. Unacceptable bidders. An ENGINEER (individual or firm including persons they employ) who has prepared plans and specifications will not be considered an acceptable bidder. Any firm or corporation in which such ENGINEER (including persons they employ) is an officer, employee, or holds or controls a substantial interest will not be considered an acceptable bidder. Contracts or purchases by the CONTRACTOR shall not be awarded or made to a supplier or manufacturer if the ENGINEER (firm or individual) who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer. Bids will not be awarded to firms or corporations which are owned or controlled wholly or in part by a member of the governing body of the OWNER or to an individual who is such a member.

4.2. The 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: (a) the employee, officer or agent; (b) any member of their immediate family; (c) their partner or (d) an organization which employs, or is about to employ, any of the above has financial or other interest in the CONTRACTOR. The OWNER'S officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from the CONTRACTOR or subcontractor.

5. Protection of Lives and Property

5.1 In order to protect the lives and health of its employees under the CONTRACT, the CONTRACTOR shall comply with all pertinent provisions of the Occupational Safety and Health Administration (OSHA) and any State Safety and Health agency requirements.



5.2 The CONTRACTOR alone shall be responsible for the safety, efficiency, and adequacy of its plant, appliances, and methods, and for any damage which may result from their failure or their improper construction, maintenance or operation.

6. Remedies. Unless otherwise provided in this CONTRACT, all claims, counterclaims, disputes, and other matters in question between the OWNER and the CONTRACTOR arising out of or relating to this CONTRACT or the breach thereof will be decided by arbitration if the parties mutually agree, or in a court of competent jurisdiction within the State in which the OWNER is located.

6.1 The arbitration provisions of this section may be initiated by either party to this CONTRACT by filing with the other party and the ENGINEER a WRITTEN REQUEST for arbitration.

6.2 Each party to this CONTRACT will appoint one arbitrator; the two arbitrators will select a third arbitrator.

6.3 The arbitrators will select a hearing location as close to the OWNER'S locale as possible.

6.4 The procedure for conducting the hearings will follow the Construction Industry Arbitration Rules of the American Arbitration Association.

7. Gratuities.

7.1 If the OWNER finds after a notice and hearing that the CONTRACTOR, or any of the CONTRACTOR'S agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of the OWNER, the State, or RUS officials in an attempt to secure this CONTRACT or favorable treatment in awarding, amending, or making any determinations related to the performance of this CONTRACT, the OWNER may, by written notice to the CONTRACTOR, terminate this CONTRACT. The OWNER may also pursue other rights and remedies that the law or this CONTRACT provides. However, the existence of the facts on which the OWNER bases such findings shall be an issue and may be reviewed in proceedings under the Remedies clause of this CONTRACT.

7.2 In the event this CONTRACT is terminated as provided in paragraph 7.1 the OWNER may pursue the same remedies against the CONTRACTOR as it could pursue in the event of a breach of the CONTRACT by the CONTRACTOR. As a penalty, in addition to any other damages to which it may be entitled by law, the OWNER may pursue exemplary damages in an amount (as determined by the OWNER) which shall be not less than three nor more than ten times the costs the CONTRACTOR incurs in providing any such gratuities to any such officer or employee.

8. Audit and Access to Records. For all negotiated contracts (except those of \$10,000 or less), the RUS, the Comptroller General, the OWNER 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. The CONTRACTOR shall maintain all required records for three years after final payment is made and all other pending matters are closed.

9. Small, Minority and Women's Businesses. If the CONTRACTOR intends to let any subcontracts for a portion of the work, the 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.

10. Anti-Kickback. The CONTRACTOR shall comply with the Copeland Anti-Kickback Act (18 USC 874) as supplemented in Department of Labor regulations (29 CFR, Part 3). This act provides that each CONTRACTOR 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. The OWNER shall report all suspected or reported violations to RUS.

11. Violating Facilities. Where 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 U.S.C. 1857(h)), section 508 of the Clean Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency regulations 40 CFR Part 15 which prohibit the awarding of non-exempt federal contracts, grants, or loans to facilities included on EPA's list of violating facilities. The CONTRACTOR will report violations to the EPA.

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

13. Equal Opportunity Requirements. For all contracts in excess of \$10,000, the CONTRACTOR shall comply with Executive Order 11246, entitled "Equal Employment Opportunity," as amended by Executive Order 11375, and as supplemented in Department of Labor regulations (41 CFR Part 60).

13.1 If the CONTRACT exceeds \$10,000, the CONTRACTOR will execute Form RD 400-6, "Compliance Statement."

13.2 The CONTRACTOR'S compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action 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 the CONTRACTOR shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project for the sole purpose of meeting the CONTRACTOR'S goals shall be a violation of the CONTRACT, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

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

GENERAL SPECIFICATIONS

- 1.1 Definitions
- 1.2 Engineering Terms
- 1.3 Right-of-Way
- 1.4 Materials and Workmanship
- 1.5 Experimental Apparatus Prohibited
- 1.6 Support and Protection
- 1.7 Completeness of Data
- 1.8 Materials, Appliances and Equipment
- 1.9 Existing Utilities
- 1.10 Project Safety
- 1.11 Cleanup
- 1.12 Final Inspection
- 1.13 Preconstruction Conference and Schedule of Work
- 1.14 Definitions of "Furnish and Install" and "Payment"
- 1.15 Earthwork Control
- 1.16 Traffic Control Devices and Maintenance of Traffic
- 1.17 Shop Drawings
- 1.18 Contractor's Responsibility for Materials
- 1.19 Maintenance of Work
- 1.20 District Notifications
- 1.21 Right-of-Entry

## 1.0 GENERAL SPECIFICATIONS

### 1.1 Definitions.

Engineer - Engineer as used in the Detailed Specifications may refer to the DEVELOPER's engineer, who is responsible for the design, layout and construction certification of the extension or the DISTRICT's Engineer.

District - DISTRICT means South Anderson Water District, 246 Court Street, Lawrenceburg, Kentucky 40342, Phone (502) 839-6919.

Contractor - The construction company performing the work and/or the developer.

1.2 Engineering Terms. The various initials and terms used in the contract document are defined as and shall mean the following:

IEEE - Institute of Electrical and Electronic Engineers

ACI - American Concrete Institute

AISC - American Institute of Steel Construction

ANSI - American National Standards Institute

ASA - See USASI

ASME - American Society of Mechanical Engineers

ASTM - American Society for Testing Materials

AWG - American Wire Gauge

AWS - American Welding Society

AWWA - American Water Works Association

GPM or  
gpm - Gallons Per Minute

MGD - Million Gallons Per Day

NBFU - National Bureau of Fire Underwriters

NEC - National Electric Code

structures as are for the CONTRACTOR'S own convenience in executing the work, shall be done without additional compensation, unless otherwise specifically provided for in the contract documents.

1.7 Completeness of Data. The term "structures" shall apply to all surface, subsurface, and overhead structures of whatever character within the zone of influence to the work, including buildings situated in or adjacent to the excavation. Where these structures are shown or indicated on the plans, the information given is approximate only. The data are not warranted to be either complete or correct, and the CONTRACTOR shall assume all risks resulting from the conditions differing from the approximation shown.

1.8 Materials, Appliances and Equipment. The CONTRACTOR shall furnish to the ENGINEER and secure written approval therefrom prior to placing any order, a tabulated list of standard appliances, materials, fixtures, equipment, etc., showing the name of the manufacturer, the catalog number, type and description of said appliances, materials, fixtures, equipment, etc., he proposes to furnish, together with such dimensions, specifications, samples or other data as may be required to permit intelligent judgment of the acceptability of such items.

1.9 Existing Utilities. The ENGINEER has endeavored to show existing underground utilities on the plans which may be expected to be encountered during the construction of the work. While it is believed that these locations are reasonably correct, neither the ENGINEER nor the DISTRICT 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 suspension of service, and make arrangements to locate and avoid interference with all utilities (including house connections) that are not shown on the plans. The ENGINEER and the DISTRICT 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 for locating and avoiding or repairing damage to said existing utilities.

While aboveground utilities may not be shown on the plans, the CONTRACTOR shall make his own observations as to their location.

Where existing utilities or appurtenant structures, either underground or aboveground, 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. Temporary relocation and replacement of all utilities and appurtenant structures to accommodate the construction work shall be at the CONTRACTOR'S expense.

Permanent relocation of such facilities to accommodate the construction work shall be at the DEVELOPER's expense, unless the temporary or permanent relocation and replacement is by statute or agreement the responsibility of the owner of the utility. The CONTRACTOR shall be responsible for the repair and/or replacement of any existing utility which is damaged during construction.

1.10 Project Safety. It shall be the entire responsibility of the CONTRACTOR to provide the necessary safety provisions to protect the project, property, both private and public, and the life and limb of all persons during the course of the work under this contract.

The CONTRACTOR shall designate a Superintendent or other responsible representative to be available on call 24 hours per day, every day, for emergencies, or other events which require action by the CONTRACTOR. The CONTRACTOR shall, in writing, advise the ENGINEER and the DISTRICT of the name of the individual along with his telephone number.

1.11 Cleanup. The CONTRACTOR shall maintain continuous cleanup throughout the construction of the project. The CONTRACTOR shall be responsible for cleanup of materials, earth, stone, etc., which may be spilled from vehicles connected with the work, whether on or off the project site.

The CONTRACTOR shall remove from the site all temporary structures, excess soil, rubbish, and other objectionable material resulting from his operations and shall leave the site in a clean and orderly condition acceptable to the DISTRICT. The work under this contract will not be considered as completed and final payment will not be made until all final cleanup has been done.

1.12 Final Inspection. Final inspection shall be made jointly by the ENGINEER, the DISTRICT, the CONTRACTOR, any Subcontractor, and representatives of the funding and regulatory agencies as appropriate.

The CONTRACTOR shall be responsible for securing any inspection which may be required by or for regulatory or inspection agencies.

As a prerequisite to acceptance of the work, all inspections shall have been completed to the satisfaction of the DISTRICT.

1.13 Preconstruction Conference and Schedule of Work. Upon issuance of the "Notice to Proceed" the ENGINEER shall promptly schedule a preconstruction conference with the DISTRICT and the CONTRACTOR. The CONTRACTOR shall be represented by a principal of the firm, and the superintendent who will be assigned to direct the CONTRACTOR'S work in the field on a day-to-day basis. He shall bring to this conference a prepared schedule of work.

Following the preconstruction conference, the CONTRACTOR shall make any adjustments in the work schedules as mutually agreed upon and issue the revised schedule to the DISTRICT and the ENGINEER.

1.14 Definitions of "Furnish and Install" and "Payment". Under the Detailed Specifications, the expression "Furnish and Install" shall be deemed to mean that the CONTRACTOR shall furnish all labor, tools, equipment, materials and services of factory technicians for installing the work complete.

Likewise, the term "Payment" whether by lump sum or unit price, shall be deemed to be full compensation for all work required to furnish and install the work as specified and directed.

1.15 Earthwork Control. The CONTRACTOR shall minimize siltation and soil erosion during construction. He shall restore disturbed areas as specified in the detailed specifications.

1.16 Traffic Control Devices and Maintenance of Traffic. To protect persons from injury and to avoid property damage, adequate traffic control devices shall be placed and maintained during construction in accordance with Part VI of the "Manual on Uniform Traffic Control Devices for Streets and Highways", latest edition published by the U.S. Department of Transportation.

1.17 Shop Drawings. The CONTRACTOR shall prepare complete assembly and detailed shop drawings of all items to be furnished under the Contract, and submit six prints of each drawing to the ENGINEER for review. All drawings shall have a blank white space about 3 inches by 3 inches near the lower right hand corner, in which approval or notations may be made. The ENGINEER will, within ten days after receipt of drawings, forward three copies to the CONTRACTOR with his review or comments noted thereon. Any work done or material ordered by the CONTRACTOR prior to receipt of said drawings shall be at the CONTRACTOR'S risk, except that drawings which have been corrected in accordance with exceptions noted may be used for fabrication or manufacture unless specifically stated otherwise by the ENGINEER.

Three (3) sets of parts catalogs, where applicable, and operating instructions especially prepared covering all equipment furnished under this Contract, which may be needed or useful in operation, maintenance, repairs, assembling or dismantling, and for identification of parts for ordering replacements, shall be furnished and assembled under a suitable common cover.

1.18 CONTRACTOR'S Responsibility for Materials.

(a) Responsibility for Materials Furnished By CONTRACTOR: The CONTRACTOR shall be responsible for all materials furnished by him. All such material



JAMES E. BICKFORD  
SECRETARY



*Kenvirons, Inc.*  
PAUL E. PATTON  
GOVERNOR

COMMONWEALTH OF KENTUCKY  
**NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET**  
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

FRANKFORT OFFICE PARK  
14 REILLY RD  
FRANKFORT KY 40601

April 16, 1999

RECEIVED

APR 22 1999

South Anderson Water District  
246 Court Street  
Lawrenceburg, Kentucky 40342

KENVIRONS, INC.

RE: DW #0030660-99-001  
Water System Improvements  
Contract 5 & 6  
Anderson County, Kentucky

Dear Sirs:

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. If PVC piping is used, it must be NSF approved and manufactured in accordance with ASTM standards.
2. Upon completion of construction, disinfection shall be strictly in accordance with the procedure designated in the State Regulations, which reads as follows:

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



New or repaired water distribution lines shall not be placed into service until bacteriological samples taken at the points specified in 401 KAR 8:150 Section 4 (2) are examined and are shown to be negative following disinfection.

3. An alternate acceptable method for storage tank disinfection is as follows:

Fill tank with enough water (containing a free chlorine concentration of at least 250 mg/l) to spray all inside tank surfaces with the chlorinated water. Repeat the spraying again at no less than 1.0 hour from the end of the first spraying. Drain the tank at no less than 30 minutes from end of second spraying before filling for use.

4. The interior coating system for the proposed storage tank must be of a type approved by the Division of Water for use in contact with potable water.
5. A minimum pressure of 30 psi must be available on the discharge side of all meters.
6. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sewer. A sewer is defined as any conduit conveying fluids other than potable water. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot separation, this office may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. This deviation will not be allowed for force mains.

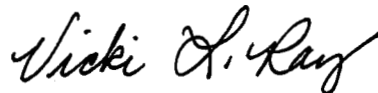
Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossings, one full length of the water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.

7. The proposed standpipe's inlet pipe elevation shall be placed at or near the "pump-on" set point selected for normal operating conditions.
8. When this project is completed, the owner shall submit a written certification to the Division of Water that the above referenced water supply facilities have been constructed and tested in accordance with the approved plans and specifications and the above stipulations. Such certification shall be signed by a registered professional engineer.

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 approvals, permits or licenses required by this Cabinet and other state, federal and local agencies.

Unless construction of this project is begun within one year from the date of approval, the approval shall expire. If you have any questions concerning this project, please contact Bob Arnett, PE at 502/564-2225, extension 578.

Sincerely,



Vicki L. Ray, Branch Manager  
Drinking Water Branch  
Division of Water

VLR:RNA:lm

Enclosures

Contract 5 & 6  
April 16, 1999  
Page four

C: Kenvirons, Inc.  
Anderson County Health Department  
Public Service Commission  
Frankfort Regional Office  
Drinking Water Files

# DESIGN SPECIFICATIONS

TECHNICAL SPECIFICATIONS

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DETAILED SPECIFICATIONS1.0 WATER MAINS

1.1 Work Included. Under these items, the CONTRACTOR shall provide all labor, tools, equipment and materials to furnish and install the water mains as shown on drawings and as directed by the ENGINEER.

1.2 Water Pipe Materials. All pipe materials listed below shall conform to manufacturer's standard lengths and diameters. Testing when required by the OWNER shall be done in accordance with the appropriate ASTM Specs for the material selected.

1.2.1 Main Type. Main type should be PVC water pipe, Ductile Iron water pipe or Polyethylene pipe as shown on the drawings.

1.3 Water Main Specifications.

1.3.1 Polyvinyl Chloride (PVC) Pipe (SDR 26, 21, and 17). PVC pipe shall comply with ASTM D-1784 and shall be Class 160 (SDR-26) Class 200 (SDR 21) or Class 250 (SDR 17) as shown on the drawings or indicated in the proposal form. (SDR PR, Type 1, Grade 1). All PVC pipe shall conform to the latest revisions of the following specifications:

ASTM D2241 (PVC Plastic Pipe SDR-PR and Class T)  
Commercial Standard CS 256 (pressure rated type)  
National Sanitation Foundation Testing Laboratories  
(NSF)

The name of the manufacturer of the plastic pipe to be used must be found on the current listing of Plastic Materials for Potable Water Application, published by the NSF (National Sanitation Foundation), Ann Arbor, Michigan, and must meet the requirements of the Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe, D1784, 12454-B (PVC 1120) published by ASTM. Rubber gaskets shall conform to ASTM D3139.

Wall thickness shall be in accordance with ASTM D-2241. Pipe ends shall be beveled to accept the gasketed joint. The ball section shall be designed to be at least as strong as the pipe wall.

Samples of pipe, physical and chemical data sheets shall be submitted to the ENGINEER for approval and his approval shall be obtained before pipe is purchased.

The pipe shall be homogeneous throughout and free from cracks, holes, foreign inclusions, or other defects. The pipe shall be as uniform as commercially practical in color.

Pipe shall have a ring painted around spigot ends in such a manner as to allow field checking of setting depth of pipe in the socket. Pipe must be delivered to the job site by means that will adequately support it, and not subject it to undue stresses. In particular, the load shall be so supported that the bottom rows of pipe are not damaged by crushing. Pipe shall be unloaded carefully and strung or stored as close to the final point of placement as is practical.

Pipe markings shall include the following, marked continuously down the length:

- Manufacturer's Name
- Nominal Size
- Class Pressure Rating
- PVC 1120
- NSF Logo
- Identification Code

Lubricant shall be water soluble, non-toxic, non-objectionable in taste and odor imparted to the fluid, non-supporting of bacteria growth, and have no deterioration effect on the PVC or rubber gaskets.

1.3.2 Polyvinyl Chloride (PVC) Pipe - C.I. Pipe Size. This pipe shall meet the requirements of AWWA C900 for Polyvinyl Chloride (PVC) Pressure Pipe. The size shall be PVC 1120 pipe with cast iron pipe equivalent O.D.'s. All Class 150 pipe shall meet the requirements of DR 18, and Class 200 meet the requirements of DR 14.

Provision must be made for expansion and contraction at each joint with a rubber ring. The bell shall consist of an integral wall section with a solid cross-section rubber ring which meets the laboratory performance of ASTM D3139. The bell section shall be designed to be at least as strong as the pipe wall.

1.3.3 Ductile Iron Pipe. Ductile iron pipe shall be designed and manufactured in accordance with ANSI Specification A21.50 and A21.51 using 60,000 psi tensile strength, 42,000 psi yield strength and ten (10) percent elongation. All pipe shall be designed for a minimum 350 psi water pressure, 2 1/2' - 8' cover, laying condition Type 2 and at least 100 psi surge allowance and a 2 to 1 factor of safety. Each pipe shall be pressure tested at 500 psi minimum at point of manufacturer.

Pipe shall have standard pipe coating outside and be cement lined and seal coated inside in accordance with ANSI Specification A21.4.



The class or nominal thickness, net weight without lining and name of manufacturer shall be clearly marked on each length of pipe. The letters "D.I." of "Ductile" shall be cast or stamped on the pipe.

Joints to be Mechanical Joint or Push on type, such as U.S. Pipe's "TYTON JOINT", American's Fastite or Clow's Bell Tite.

Joints to be furnished according to ANSI Specifications A21.11, complete with all necessary accessories.

All pipe and fittings housed and in vaults shall be lined and coated on the inside as specified herein for buried cast iron pipe and fittings, but shall be left uncoated on the outside so that it may be painted without the use of tar stop.

1.3.4 Polyethylene Pipe Polyethylene pipe shall conform with ASTM D-3350 "Polyethylene Plastic Pipe and Fitting Materials" for high density pressure pipe manufactured of grade P34 resin material with a hydrostatic-design basis (HDB) rating of 1,600 psi at 73.4 degrees F (23 degrees C).

High density polyethylene pipe shall be manufactured and tested in conformance to the requirements of the latest revision of the American Society for Testing and Materials designation ASTM D-3350, "Polyethylene Plastic Pipe and Fitting Materials".

High density polyethylene pipe shall have a grade designation of PE 3406 and a cell classification designation of PE 355434C.

High density polyethylene pipe shall be joined by means of butt fusion as per the manufacturer's recommendations.

The high density polyethylene pipe shall be SDR 11 as manufactured by Phillips Driscopipe, Inc. or approved equal.

#### 1.3.5 P E Static Sensing Line.

The static sensing line shall be ¾" polyethylene (PE) water service pipe as per AWWA Specification C901 with minimum pressure rating of 200 psi.

#### 1.3.6 Fittings and Adapters.

Fittings and accessories shall be Mechanical Joint in accordance with ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11. The wall thickness of fittings shall be the equivalent of Ductile Iron Class 54. The working pressure rating shall be 350 psi. Fittings shall have a bituminous outside coating in accordance with ANSI/AWWA C110/A21.10. Fittings shall be cement lined and seal coated with bituminous material in

accordance with ANSI/AWWA C104/A21.4. Fittings shall be equal to U.S. Pipe's "TRIM-TYTE" OR "TRIM-TYTON" or engineer's approved equal.

No PVC fittings will be allowed.

1.3.7 Pipe Handling. Pipe delivered to the site, in general, will be stored, handled, distributed, placed, joined together, etc. in accordance with the manufacturer's recommendations unless instructed otherwise by these specifications or by the Engineer.

1.4 Bid Proposal. The bidder shall name the type of water pipe proposed to be furnished to the project on the Bid Schedule, if different from that shown.

1.5 Water Line Location. The CONTRACTOR shall be responsible for construction stakeout, based upon horizontal and vertical control points furnished by the ENGINEER. Changes in either vertical or horizontal alignment, as may be required during construction due to unforeseen obstacles or to accommodate changes in right-of-way, shall be made by the CONTRACTOR at the direction of the ENGINEER. Such modifications in alignment shall be accommodated by the CONTRACTOR and the completed work shall be paid for under the unit prices bid for the work.

1.6 Excavation. The CONTRACTOR shall make trench excavations to only such width to provide ample room for proper construction. Sheeting and shoring shall be provided as required for proper safety and compliance with OSHA regulations. Rock excavation shall be taken to a depth of 6-inches below bottom of pipe. If poor foundation conditions exist due to organic material or quicksand, the trench shall be under-excavated to the depth required and filled with stone to obtain proper bearing capacity.

Watchmen or barricades, lanterns and other such signs and signals as may be necessary to warn the public of the dangers in connection with open trenches, excavations and other obstructions, shall be provided by and properly maintained at the expense of the CONTRACTOR.

Only one-half of street crossings and road crossings shall be excavated before placing temporary bridges over the side excavated for the convenience of the traveling public.

The cost of all excavations shall be included in the unit price bids for water lines.

1.7 Blasting and Rock Excavation. The CONTRACTOR shall make his own investigation as he deems necessary to ascertain the sub-surface conditions to be encountered in the work.

All blasting operations shall be conducted in accordance with municipal ordinances, state and federal laws and Section 9, Explosives, of the "Manual of Accident Prevention in Construction, published by the Associated General Contractors of

America, Inc. Soil particle velocity shall not exceed limit set by Kentucky law. All explosives shall be stored in conformity with said ordinances, laws and safety regulations. No blasting shall be done within five feet of any water mains, sewer lines, natural or manufactured gas lines, liquid petroleum product lines or other utilities. Any damage done by blasting is the responsibility of the CONTRACTOR and shall be promptly and satisfactorily repaired by him.

The CONTRACTOR shall use delay caps or other approved methods to reduce earth vibrations and noise. Mud capping, as defined in the above manual, will not be permitted as a method of breaking boulders. No blasting shall be permitted on Sundays or after dark.

Prior to commencing with the work, the CONTRACTOR shall, during a preconstruction conference with the OWNER and ENGINEER, state clearly his approach to performing the excavations on the project. He shall be familiar with the laws and ordinances covering blasting and shall also give consideration to the use of hydraulically operated rock breaking devices in lieu of blasting where considered necessary. If blasting is not handled in an expert manner at all times, the ENGINEER reserves the right to suspend blasting and require the work to proceed without it.

Prior to blasting, the CONTRACTOR shall make his own detailed preblast survey of adjacent walks, curbs, retaining walls, house foundations, etc. to determine conditions prior to the work. Such a file of information, including photographs, may be certified in such a manner as the CONTRACTOR believes necessary since this is information that may stand in his defense.

1.8 Storage of Excavated Material. All excavated material shall be stored in a manner that will not endanger the work and that will avoid obstructing roadways, sidewalks, and driveways. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, fire and police call boxes or other utility controls shall be left unobstructed and accessible. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural watercourses shall not be obstructed.

1.9 Shoring, Sheeting, and Bracing. The CONTRACTOR shall furnish, place and maintain such sheeting and bracing as may be required to support the sides of the excavation or to protect other structures from possible damage. All sheeting and bracing shall be removed upon completion of the work, unless permitted to be left in place by the ENGINEER. Any sheeting or bracing left in place shall be cut off at least two feet below the finished ground surface elevation. The cost of furnishing, placing, maintaining and removing sheeting and bracing shall be included in the unit price bid for water lines. All work shall conform to OSHA requirements.

1.10 Removal of Water. The CONTRACTOR shall provide adequate pumps, temporary drains and appurtenant equipment to dewater excavations in such a manner that will not interfere with the progress of work.

1.11 Bedding. All water lines shall be bedded with 6-inches of #610 stone under and on both sides of the pipe where necessary when rock or poor foundation conditions exist.

1.12 Thrust Blocks and Anchorage. Thrust blocks shall be installed whenever the pipe line changes direction, as at trees, bends, crosses, stops, as at a dead end; or at valves. The locations of thrust blocks depend on the direction of thrust and type of fitting. Their size and type depends on pressure, pipe size, kind of soil, and the type of fitting. Where thrusts act upward (as at vertical curves) the weight of the pipe, the water in the pipe and the weight of the soil over the pipe should be determined to make certain that the total weight is sufficient to resist upward movement. If there is not enough soil or if it will not compact over the pipe or it is too soft and mushy to resist movement, then ballast or concrete may be placed around the pipe in sufficient weight and volume to counteract the thrust. Where a fitting is used to make a vertical bend, the fitting may be anchored to a concrete thrust block designed to key in to undisturbed soil and to have enough weight to resist upward and outward thrust, since the newplaced backfill may not have sufficient holding power.

Thrust blocks shall be constructed of not less than Class B concrete conforming to KBH Specification 601 and placed between the fitting and the trench wall. It is important to place the concrete so it extends to undisturbed (freshly cut) trench wall.

1.13 Backfill. Trenches shall be backfilled and tamped thoroughly at once up to the height specified under pipe laying. Backfill material shall be such that it may be compactly tamped around the pipe. No rock larger than two inches will be permitted within six inches of the pipe. No loose rock larger than six inches shall be less than 12 inches from the pipe. In open, unpaved, or unsurfaced areas the remainder of the fill may be thrown in loose and ridged up over the top of the trench. Mechanical backfilling shall be done with a rotobackfiller or angle dozer. When trenches are in the traveled areas or other places where property will be damaged by settlement of fill, sufficient compaction shall be made immediately. The remainder of the dirt shall be ridged up over the trench unless otherwise ordered by the ENGINEER. The CONTRACTOR at no time shall open up more than 1,000 feet of trench ahead of backfill and cleanup.

Minimum trench dirt shall be left outside trench and no soil outside trench shall be removed. Wherever it is necessary to tamp the trench because of traffic, sodding, or other conditions, the ENGINEER will so instruct the CONTRACTOR who will include this cost in laying price bid. This tamping must have a compaction of at least 90 percent. The CONTRACTOR will be responsible for any settlement or damage due to settlement where tamping has been done. The tamping must be done the same day that trenching is done if there appears to be any danger of precipitation. If the weather appears to be safe, the ENGINEER may permit the CONTRACTOR to

complete the tamping the following day. Where tamping is ordered, all excess dirt must be removed the day trenching is done or the following day.

Any damage to underground structures, pipes, wires, drains, etc. shall not be backfilled until they have been satisfactorily repaired or replaced to the original serviceability at the CONTRACTOR'S expense and as approved by the ENGINEER. Settlement of backfill may be done with water furnished by the CONTRACTOR under the direction of the ENGINEER where such will not endanger traffic or damage property. When excavated rock is used for backfilling, it shall have sufficient dirt or fine material to fill all voids and shall not be used within six inches of the pipe. All excess rock shall be cleaned up and taken away. No rock larger than two inches shall be left. In areas to be mowed, area shall be raked and smoothed with no rock larger than one inch.

1.14 Underground Marking Tape and Wire. At all locations where PVC pipe is utilized, a detectable underground marking tape and wire shall be placed in the trench.

The marking tape shall be placed approximately six inches below the finished grade. The tape used shall be mylar encased aluminum foil with the printing "CAUTION - Buried Water Line Below". Printing shall be readable through the clear mylar and surface printing is not acceptable. Tape size shall be 2 inch width as provided by Lifeguard, Inc. or approved equal. Color of the tape shall be blue.

The marking wire shall be placed approximately 12" above the pipe. The wire used shall be No. 12 insulated copper wire. Extreme care shall be exercised in connecting and taping splices and joints to assure continuity. At each valve box the wire shall be looped to the surface extending 12-inches above the concrete valve box pad (see Std. Dwg. for valve). When the entire project or pipeline segment is complete, including meter installation and leak repairs, the locating wire system shall be checked for continuity.

1.15 Temporary Surfacing. All trenches in streets, roads or drives shall, following compacted backfill, receive a top layer of compacted #610 stone. Such temporary surfacing shall be maintained, including nights and weekends, and such areas shall be paved as soon as weather permits. All public or private drives shall be promptly backfilled or bridged.

1.16 Testing. The water line and appurtenances, as rapidly as valves are installed, shall be tested to not less than 1.25 times the working pressure at the highest point along the pipe or as directed by the ENGINEER. Defective joints of pipe shall be cut out and replaced as directed by the ENGINEER. Cracked or defective pipe fittings, valves or hydrants disclosed in the pressure test shall be replaced by the CONTRACTOR with sound material, and the test shall be repeated until the test results are satisfactory to the ENGINEER.

The CONTRACTOR shall maintain required pressure for a minimum of six hours and shall measure the amount of water necessary to maintain this pressure for this length of time. The amount of water used to maintain the pressure shall not exceed in gallons per hour, the length of pipe tested, in feet times the nominal diameter of the pipe, in inches times the square root of the average test pressure during the leakage test in psi divided by 133,200.

All leaks shall be repaired whenever or wherever there is evidence of a leak and the location is known or can be reasonably found. Water used by the CONTRACTOR shall be paid for by the CONTRACTOR at the rate of \$2.00 per 1,000 gallons.

1.17 Sterilization. Upon completion of a section, disinfection shall be done strictly in accordance with the procedure designated in Kentucky Division of Water regulations which reads as follows: "A water distribution system, including storage distribution tanks, repaired portions of existing systems or all extensions to existing systems, shall be thoroughly disinfected before being placed in service. A water distribution system shall disinfect with chlorine or chlorine compounds, in amounts as to produce a concentration of at least fifty (50) ppm and a residual of at least twenty-five (25) ppm at the end of twenty-four (24) hours and the disinfection shall be followed by thorough flushing." Putting small amounts of powdered chlorine in each joint will not be acceptable. Where the new system is connected to the present system the CONTRACTOR will install a 3/4" water meter for the purpose of measuring the volume of water used and the CONTRACTOR shall pay the DISTRICT for the water used at the rate of \$2.00 per 1000 gallons.

The CONTRACTOR shall mix a chlorine solution of at least 50 ppm and fill the line with it. If the solution is 200 ppm it can be drained to succeeding sections several times without replenishing the chlorine, provided the residual can be maintained. The services shall all be in before the chlorine is drained. After 24-hours the line can be pressure tested. When pressure test is accepted, the line may be drained to the next section.

New water distribution lines shall not be placed into service until bacteriological samples are examined and are shown to be negative following disinfection and flushing. A core zone, which includes up to the first one-half (1/2) mile, shall be established. Two (2) samples shall be taken from the core zone of each extension. Additionally, one (1) sample shall be taken from each additional mile of line. The CONTRACTOR shall be responsible for taking the samples, having them analyzed by a laboratory certified by the state to conduct such analyses and all associated costs.

When customers start using the line the CONTRACTOR will move the meter to the valve beyond the last customer. At all times the CONTRACTOR will use water through the meter. This will prevent tanks being drained and inconvenience to customers.

1.18 Service Connections. Any utility connections encountered in the work shall be preserved and protected. Where relocation or repair is required to accommodate the work, they shall be made in a manner acceptable to the utility having jurisdiction over the service connection. Accommodation of service connections shall not constitute any basis for extra payment.

1.19 As-built Drawings. As each line is installed, i.e. Line A, etc., the CONTRACTOR shall maintain a carefully marked-up set of plans to show exact "as-built" location of all valves, fire hydrants, tees, blind flanges, tie-ins to existing lines, altitude valves, etc. All drawings shall pinpoint locations by two measured distances from prominent landmarks. As-built drawings shall also show the accurate location of other structures and utilities adjacent to or crossing the work. As-built drawings shall be periodically delivered to the DISTRICT.

1.20 Coordinations With Utilities. The Plans show the general location of existing utilities, such information having been determined from the utilities. However, such information shall be considered general and is not guaranteed by OWNER, ENGINEER or the UTILITY.

Prior to construction, the CONTRACTOR shall arrange to meet with representatives of all utilities, and provide them with his anticipated work schedule. The CONTRACTOR shall have the utilities make their best determination of utility locations in the areas in which he is working. Throughout the progress of the work, such field markings of utilities shall be kept current.

Repairs to any utilities damaged by the CONTRACTOR shall normally be performed by the utility at the CONTRACTOR'S expense, unless the CONTRACTOR and the utility negotiate other understandings and/or procedures.

1.21 Payment for Water. All water used from the DISTRICT shall be metered with meters supplied by the CONTRACTOR. The CONTRACTOR shall pay for such water monthly at the rate of \$2.00/1,000 gallons. Water lost during water line breakage shall be computed at the rate of \$2.00/1,000 gallons. The quantity lost shall be computed on the basis of a discharge velocity of 7 feet/second, the diameter of the line, and the estimated duration of free uncontrolled discharge.

1.22 Cleanup. The CONTRACTOR shall provide effective cleanup of the work as it progresses. Procrastination of cleanup will not be tolerated. At the time of final inspection, no trenches shall show any undue evidence of the previous construction. All areas shall be left free of ruts due to construction equipment and shall have a clean and neat appearance without rubble or debris. The areas shall not be mounded up and shall be completely restored, and all yards and fields shall be reseeded so land may be cultivated, mowed, etc. Straw and fertilizing shall accompany the seeding and the seed mixture shall match existing ground cover. If necessary to hasten proper restoration of terraces, principally along ditch lines, the CONTRACTOR shall sod such

areas at the ENGINEER'S direction. For all line segments, final cleanup shall be performed within 30 days from day of installation.

1.23 Protection of Adjacent Landscape. Reasonable care shall be taken during construction of the water lines to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks receiving damage from equipment shall be treated with a tree dressing.

In the course of construction, the CONTRACTOR may deflect horizontal alignment of the water line to avoid trees and to keep from damaging their roots. The CONTRACTOR shall be fully responsible for settling all claims by private property owners concerning damage to trees and shrubs.

1.24 Connection to Existing Water Mains. The CONTRACTOR shall be responsible for connecting the new water main to the existing water lines at the locations shown on the plans and capping of any abandoned lines. The DISTRICT shall be notified at least 48 hours prior to commencing the connection.

1.25 Measurement and Payment. The unit prices bid for water lines shall constitute full payment for furnishing and installing such lines, including all work as specified hereinabove. The distance shall be precisely measured as work progresses.



## 2.0 VALVES AND VALVE BOXES AND TAPPING SLEEVES

2.1 Work Included. The CONTRACTOR shall provide all labor, materials, equipment and tools to install gate valve and valve boxes shown on the Plans and as directed.

2.2 Materials. Valves shall be designed for a minimum water working pressure of not less than 200 pounds per square inch. Valves shall have ends required for the piping in which they are installed. Gate valves shall have a clear water way equal to the nominal diameter, and shall be opened by turning to the left. The operating nut or wheel shall have an arrow cast in the middle, indicating the direction of opening. Each valve shall have the maker's initials, pressure rating and the year in which manufactured, cast on the body. Prior to shipment from the factory each valve shall be tested by hydraulic pressure of at least 300 pounds per square inch.

Valves two inches and larger shall be iron body, bronze mounted, non-rising stem, resilient-seated gate valves and shall conform to standard specifications of the American Water Works Association. The CONTRACTOR shall furnish the ENGINEER catalogs showing description, type, and dimensions of valves he proposes to use subject to approval by the ENGINEER.

Valve boxes shall be of cast iron of extension type with screw or slide adjustments and with flared base. The minimum thickness of metal shall be 3/16 inch. The cover shall have the word "WATER" cast in the metal. Valve boxes shall be installed over each outside gate valve unless otherwise shown on the drawings. The boxes shall be of such lengths as will provide a cover of not less than 30 inches over the pipe.

2.3 Tapping Sleeve and Valve. For making wet taps, a Mueller Tapping Sleeve and Valve or equal shall be used. CONTRACTOR shall ascertain the type and size of pipe to which the connection is to be made prior to selection.

2.4 Installation. Valve boxes shall be set plumb and straight and with the operating nut directly in the center in thoroughly compacted earth with the top of the box level and projecting one fourth inch above high type streets, and an inch above other unpaved streets. The valve boxes, except in high type streets, shall have a four inch thick concrete slab three feet in diameter around and sloping away from the valve box. The Contractor shall be responsible for the installation of a steel fence post adjacent to each valve to assist in future location. Each post shall extend a minimum of three (3) feet above the top of the valve box cover and each post shall be painted with red paint for visibility purposes.

2.5 Payment. The unit price bid shall constitute full compensation for furnishing and installing valves, valve boxes and tapping valves and sleeves.

### 3.0 BLOW-OFF ASSEMBLIES

3.1 Work Included. Under this item the CONTRACTOR shall provide all labor, materials, tools and equipment to furnish and install the blow-off assemblies in the locations as shown on the drawings or as directed by the ENGINEER.

3.2. Materials. Valves shall be in accordance with those specified herein. Pipe and fittings shall be as specified herein. The protective housing shall be a concrete Meter Box or equal with appropriate risers. The CONTRACTOR shall provide 1 threaded extension pipe to direct flow away from the blow-off pit for each size blow-off installed. The caps shall be removable. The CONTRACTOR shall be responsible for the installation of a steel fence post adjacent to each blow-off assembly to assist in future locations. Each post shall extend a minimum of three (3) feet above the top of the assembly pit and shall be painted with red paint for visibility purposes.

3.3 Payment. The unit price bid shall constitute full compensation for the furnishing and installation of the complete Blow-Off Assembly, including valve, valve box, fittings, meter box, etc.

#### 4.0 AIR RELEASE VALVES

4.1 Work Included. Under this item, the CONTRACTOR shall provide all labor, tools, materials and equipment to furnish and install air release valves and boxes as shown on the PLANS and as directed.

4.2 Valve Specifications. Valves shall be APCO Model 65 or approved equal designed for 150 psi working pressure.

4.3 Installation. Installation shall include the complete assembly with box and top, shut-off valve, blow-off, air valve, and piping, fittings and union, all complete and ready for operation in general conformance with the drawings contained elsewhere in these specifications. Work in and around the box will be done in a workmanlike manner leaving the top of the box one inch above the original ground surface.

4.4 Payment. The unit price bid shall constitute full compensation for furnishing and installing the complete air release valve assembly including all materials, labor, incidentals, etc.

## 5.0 BOOSTER PUMP STATION

5.1 Scope of Work. The CONTRACTOR shall furnish all labor, tools, equipment, materials and perform all work and services necessary for or incidental to the furnishing and complete installation of the underground, factory built, water booster pump station as shown on the drawings and as specified in accordance with provisions of the contract documents and completely coordinated with that of all other trades.

Although such work is not specifically shown or specified, all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, complete and compatible installation shall be furnished and installed as part of this work. The booster pump station shall be constructed to normally operate off of a pressure control switch connected to an isolated sensing line from the corresponding water storage tank with back-up timer controls. Automatic pump alteration will be provided.

The approved manufacturer shall submit complete manufacturers information on the equipment capsule construction and on all individual items that make up the underground factory built water booster pump station and will provide 24" x 36" drawings with at least three (3) different views of vault. Submit six (6) individually bound booklets for approval.

The CONTRACTOR shall furnish and install the underground factory built water booster pump station, with all the necessary piping, controls and appurtenances as shown on the plans and as specified herein. The underground factory built water booster pump station shall be complete with all necessary equipment installed in a fabricated steel capsule. Entrance to the equipment capsule will be gained through a rectangular entrance hatch, with an access ladder provided.

The manufacturer of this equipment shall be one recognized and established in the design and production of underground factory built water booster pump stations. The underground factory built water booster pump station manufacturer shall maintain regular production facilities at their place of business. Those facilities shall be open for inspection by a representative of the owner at the time during construction and testing of this equipment. Equipment manufactured by a fabricator independent of the firm of record on the equipment submittal will not be allowed. Manufacturer shall have not less than 5 similar installations in the U.S. and shall have been in business manufacturing underground factory built water booster pump station under the same name for not less than 5 years.

5.1.1 Booster Pumps – General. The booster pumps employed within the packaged water booster pumping station shall meet the hydraulic and drive data as set forth in the specification section titled, "OPERATING CONDITIONS". The booster pumps can be either installed prior to the station delivery or can be installed in the field under the

direction and at the cost of the station manufacturer. The installation of the booster pumps shall be as shown on the plans covering this project.

Prior to acceptance of an equipment proposal covering the packaged water booster pumping station, detailed data shall be furnished to the ENGINEER or the OWNER and shall include the following booster pump information:

1. A data sheet covering each pump completely filled in.
2. Performance Curve showing expected performance at points other than the design conditions. Curve shall show head, capacity, efficiency and horsepower based on performance and shall cover the complete operating range of the pump from zero capacity to the maximum capacity. The curve is to also include a net positive suction head required curve.
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.

#### 5.2 Equipment Capsule

- a. The plate steel employed throughout the equipment capsule shall meet or exceed the requirements for ASTM A-36. The structural shall meet or exceed the requirements for A-36. The design of all members shall be in accordance with the recommended practice for design as specified in the Manual of Steel Construction, published by the American Institution of Steel Construction, Inc.
- b. The equipment capsule shall be one completed unit when delivered. Field welding to complete the structure or attach the entrance tube will not be allowed. Steel plate of  $\frac{1}{4}$  inch minimum thickness will be used throughout the equipment capsule walls, top and bottom. All welds shall be continuous and water tight.

The plate forming the top and bottom of the capsule shall be cold formed prior to assembly so as to form a lap joint with the side wall. The lap joint shall be continuously welded on the interior by hand and the exterior by machine to form an airtight seal. The lower side all continuous weld shall be an average  $1 \frac{1}{2}$  inches above the capsule floor, which removes the lower weld from incidental water impingement. Capsules without lap joints will not be accepted.

The lap joint shall be in full conformance with Steel Tank Institute (STI) P-3 specifications Section 4.2.6 and Underwriters Laboratories (UL) 58 specifications for steel vessels in buried service, and the American Welding Society (AWS) Structural Welding Code, Section 9.10, for dynamically loaded structures.

- c. All equipment capsule joints shall be welded both inside and outside. Any ferrous metal device passing through the equipment capsule wall will be welded fully along its circumference or length on both sides of the capsule wall.
- d. The equipment capsule shall be a rolled, vertical cylinder and have a minimum inside diameter of 12'-0" and a minimum inside clear height of 8'0".
- e. The bottom of the equipment capsule shall be reinforced by two (2) paralleled 8" channels at 11.5 pounds. There shall also be three (3) paralleled 6x2x8.2 pound per foot channels, placed perpendicular to the 8 inch channels. The top of the equipment capsule shall be reinforced by a minimum of four (4) 4-inch by 4-inch by ¼-inch angles.
- f. Four (4) lifting plates of minimum thickness, as determined by supplier's design to be structurally adequate, but not less than 3/8" thick shall be placed about the perimeter of the equipment capsule to facilitate the lifting and handling of the station. These lifting plates shall be so located as to insure proper balance of the entire pumping station during the setting operation.
- g. The equipment capsule entrance manway shall be a prefabricated metal roof scuttle, rectangular in shape with a minimum clear inside opening of 30 inches by 54 inches. The scuttle cover shall be made of 11 gauge aluminum on the exterior with a three (3) inch beaded, vertical flange, neatly welded and sized to cover the scuttle riser section. The scuttle cover shall be insulated with a minimum of one (1) inch of fiberglass insulation, covered and protected by an 18 gauge aluminum liner. The scuttle riser section shall be formed with an integral 3 ½ inch flange with holes provided for securing the entrance manway to the angle framing on the top of the equipment capsule. The scuttle riser shall be provided with an integral metal cap-flashing of the same gauge and material as the riser, full welded at the corners to be absolutely weather tight. Scuttle shall be BILCO type MNB-50 or equal.
- h. The scuttle shall be completely assembled with heavy pintle hinges, compression spring operators, enclosed in telescopic tubes and a full perimeter, foam draft seal. The cover shall be equipped with an automatic hold open arm complete with red vinyl grip handle to permit easy, one hand release. When the scuttle cover is in the open position, the hold open arm will engage a lock-open device to prevent accidental closing of the scuttle cover. All entrance manway hardware shall be zinc plated. The lock will be of the pin tumbler type, dead bolt, with an inside safety release. Two (2) keys will be provided, on a key ring complete with the manufacturer's identification. No locking devices or other penetrations of the cover shall be allowed.
- i. An all aluminum access ladder will be provided. The ladder will meet UL and OSHA approval under the Type I, Heavy Duty Specifications. The ladder will

have 1 ¼ inch diameter, tempered, serrated rungs with 3-inch by 1 1/8 inch full I-Beam side rails. The uppermost ends of the side rails will be protected by plastic caps. The complete access ladder will be bolted into place, at a minimum of two (2) points both top and bottom, so as to be easily removable to facilitate equipment maintenance.

- j. The equipment capsule will be complete with a sump to accommodate one (1) automatic sump pump specified elsewhere herein. The sump shall be 16" diameter by 8" deep and shall be fabricated of steel plate ¼ inch minimum thickness. The sump shall be located so as to insure proper and complete drainage of the equipment capsule floor.
- k. The equipment capsule floor walkway area shall be covered with a ridged, neoprene floor mat. The floor mat shall not be glued to the floor surface.

5.3 Corrosion Protection. After welding is entirely completed, all surfaces of the entire structure shall be sandblasted to a bright metal appearance, equal to commercial blast cleaning (SSPC-SP6), including the removal of all rust, mil scale and other foreign or interference materials and then thoroughly wiped clean with a dry, clean cloth prior to the application of the protective coating system.

The protective coating shall take place immediately after surface preparation. The protective coating shall be a two (2) component, high solids, amine cured epoxy system formulated for high built application having excellent chemical and corrosion resistant properties. The epoxy system shall be self priming and require no intermediate coatings. The protective coating shall provide in two (2) applications a high film built over welds, joints, bolts and sharp angles. The protective coating shall be applied at a wet film mil thickness of no less than 6.0 mils per application, with a total dry mil thickness of 8.0 mils.

The station manufacturer shall furnish two (2) seventeen (17) pound packaged magnesium anodes for cathodic protection. The anodes shall be buried equally spaced around the station and connected by heavy copper wire to lugs on the station provided for that purpose.

5.4 Operating Conditions. The pump station shall contain two (2) pumps, each capable of delivering 420 GPM @ 77.2' TDH. Pumps shall be driven by 15 H.P. 1750 RPM, three phase, 60 cycle, 230/460 volt motors. Pumps shall be Peerless Horizontal close coupled, end suction, centrifugal Model C 1030 A or approved equal.

5.5 Piping. All internal transmission piping and fitting shall be of Schedule 40 black, seamless steel pipe and will be manufactured in accordance with the dimensional tolerances and materials specifications of the AWWA C-200-75 for steel pipe and steel butt-weld fittings. Piping within the part of the unit shall be sized as shown on drawings.

Steel transmission piping shall have applied to it a Fusion Bonded epoxy coating on the interior pipe surface that conforms to AWWA C-213-91 for steel water pipelines. The powder coating product shall be National Sanitation foundation (NSF) Standard 61 certified material. The final product shall be capable of meeting Salt Spray resistance ASTM B117 (1000 hour) with no blistering, undercutting or rust bleed; Humidity Resistance ASTM D2247 (1000 hour) with no blistering, undercutting or rust bleed; and Impact Resistance of ASTM G14-72 (160 in. lbs.)

Prior to shipment of the station, the station manufacturer shall provide in writing to the Engineer certification that the proper fusion bonded epoxy coating has been applied to all internal surfaces of the steel piping using the proper method. Said certification shall show under the station manufacturer letterhead.

- Date of application
- Material manufacturer and product designation including a product data sheet for the coating
- Applier of the fusion bonded coating, name, address and phone number
- Notarized signature of an officer of station manufacturing company stating the fusion bonded epoxy coating was applied to AWWA Standard C213-91 or the latest revision.

5.6 Butterfly Valves. The isolating valves used throughout the equipment capsule shall be of the wafer design. The body of each isolating valve shall be constructed of cast iron and be equipped with a minimum of four (4) alignment holes with which to pass mating flange studs so as to assure proper butterfly alignment within the piping system. The valve disc shall be constructed of ductile iron and be machined to close tolerance on both the floats and O.D., then cadmium plated on the seating surfaces to assure drop tight shutoff and reduce operating torque. The valve stems will be constructed of 416 stainless steel and the stem bushings will be luberized bronze. The disc will be affixed to the shaft by a pair of taper pins. The valve seat will be a phenolic backed Buna N resilient seat designed to be easily field replaceable.

Valves sized six (6) inches and smaller shall be equipped with lever operator and 10 degree increment throttling plate. Valve sized eight (8) inches and larger shall be equipped with a weatherproof, heavy duty, gear operator complete with a position indicator. Inlet and outlet valves shall be rated 175 pounds.

5.7 Compression Couplings. Each pump suction and discharge pump run shall include a compression type, flexible coupling to prevent binding of the pump, pump suction or control valve. Each coupling shall consist of two (2) follower rings, a flared middle ring with end flares generous enough to provide adequate gasket seat areas, two (2) resilient rubber gaskets and steel bolts. The coupling when installed shall provide a permanent, leak-proof, flexible installation.



In lieu of a compression coupling, a restraint, removable flange such as Uni-Flange or a flanged coupling adapter (FCA) may be used to relieve strain on a pump or control valve. The flanged coupling adapter will be of the same manufacturer as the compression couplings used elsewhere in the equipment capsule and shall be a regular product of that manufacturer. Flanged coupling adapters shall be complete on the flanged end with an integral rubber flange gasket and on the open end with a triangular section rubber follower gasket and follower ring. Bolts for the flanged coupling adapter will be individual to the FCA and be supplied with the FCA.

5.8 Pressure Gauges. All pressure gauges within the booster pumping station shall have 4 ½ inch minimum diameter faces. The case shall be black, cast aluminum, flanged back type with close type ring and clear glass face. The gauge connections shall be at the bottom of the gauge and will be ¼ inch N.P.T. The gauge internal construction shall include phosphor bronze bourdon tube with a brass movement, bronze bushed independently mounted. Pressure gauge range and scale graduations shall be in feet of water and psi. Each gauge shall be protected by a combination pulsation dampener-shut off valve. Gauges shall be wall mounted as detailed on the drawings. A total of three (3) gauges shall be installed as follows:

Suction: 0-100 pounds  
Pump Discharge: 0-100 pounds  
Sensing Line: 0-100 pounds

5.9 Non Slam Check Valves. Each pump discharge pipe run shall include a wafer-type, non-slam check valve. The body of the check valve shall be semi-steel. The plug, seat and guide bushings shall be bronze and conform to ASTM Designation B-143. The valve spring and seat retainers shall be stainless steel and conform to ASTM Designation A-276. The valve plug shall be guided at both ends by a center shaft integral with the valve plug. Alignment of the center shaft shall be provided through the usage of guide bushings. The check valve shall be designed to prevent water hammer by returning the valve plug to the seat before reversal of flow occurs. The check valves shall be designed so as to be easily repaired in the field. Screwed in valve seats will not be accepted. The valves shall be as shown on drawing and be rated for 300 psi.

5.10 Electrical apparatus-Switch gear. The electrical apparatus shall consist of all equipment associated with motor control and motor starting , including the equipment used to protect the electrical facilities. All circuit breakers, motor starters, time delay relays and control relays, shall be incorporated into one NEMA 1 control panel. The electrical service shall be 230 volt, 3 phase, 60 cycle 3 wire. Three phase monitor and protections are required.

There shall be provided, thermal-magnetic trip circuit breakers as required in each pump station.

One (1) Main Breaker, 150 amp

Two (2) Branch Breakers, one each per pump, 80 amps  
 Two (2) Transformer Breaker, Primary Size, 60 amps, secondary size, 60 amps  
 Eight (8) auxiliary Circuit Breakers, as follows:

- |                      |                           |
|----------------------|---------------------------|
| 1. Controls          | 5. Exhaust Fan            |
| 2. Lights            | 6. Convenience Outlets    |
| 3. Heater            | 7. Dehumidifier-Sump pump |
| 4. Telemetry(future) | 8. Spare                  |

Pump starting equipment shall be three(3) phase, full voltage magnetic starters connecting the pump motor directly across the line complete with overload relay with correctly sized heater elements on each line.

All electrical work shall be done in accordance with applicable electric codes.

Elapsed run timers shall be provided for each pump mounted in the panel face, to indicate in hours, the amount of time each pump has been in operation. A phase/voltage sensing relay shall be provided.

Automatic pump alternation shall be provided through a solid state sequence relay. The relay shall be enclosed in a plastic cover and shall plug into a twelve (12) terminal socket. Control wiring for the sequence relay shall terminate at the socket. Replacement of the alternator shall not disturb control wiring.

Balanced 240/120 single phase power for the auxiliary circuits within the scope of each booster station shall be obtained by use of a 5 KVA dry, step down transformer. The transformer shall be wall mounting type, dust tight and operate with low noise level. Transformer insulation shall be class H. The unit shall be "UL" approved for indoor applications.

5.11 Electrical Apparatus Pressure Control. Control of the pumping operation shall be provided by a rugged snap action pressure switch. The switch action shall be actuated by a single brass bellow. Each switch assembly will feature straight in-line and relatively friction free construction and be complete with a single pole, double throw contact block with silver, 5 amp rated contacts at 120 volts. The set points of the on/off cycle shall be independently adjustable through the full range of the switch differential.

- |    |  |
|----|--|
| A. | Low Suction Cut-out 2-80 psi range       |
| B. | Adjustable Differential, 1-12 psi range. |

The unit shall have a repeat accuracy of  $\pm 1.0\%$  range. The start/stop settings shall be clearly visible on a calibrated scale on the front of the assembly. The start/stop switches shall be wired to electronic time delays and relays to provide "electronic" surge suppression. The action shall cause the controls to not change state unless the pressure is at or past the desired pressure setting for an adjustable time as set on the time delay. The

pressure controls shall ignore momentary fluctuations in pressure that exceed the stop/start pressure settings for time periods less than the time delay setting, without the use of pressure snubbers.

A single 4-1/2 inch dial, flanged back pressure gauge shall be sub-panel mounted adjacent to the pressure switch. The gauge and switch shall be so plumbed with the suction header sensing line that a common blow-off valve can relieve pressure in both simultaneously for purposes of checking and calibrating the low suction lock-out.

5.12 Electrical Apparatus-time control. The automatic controls shall be complete with a fifteen (15) minute multiple interval time control, with a twenty-four (24) hour dial, ninety-six (96) self-contained trippers, skip-a-day feature and single pole double throw (SPDT) isolated contacts rated at ten (10) amp at 120 volts, and 125 volt ampere pilot duty. The time control shall be driven by a heavy duty, industrial type synchronous motor suitable for operation between -40° F and +140° F.

The function of the time control will be as auxiliary controls to automatically start and stop the booster station at such time or times as are programmed.

5.13 Electrical Apparatus-Devices. Two (2) time delay relays shall be provided to perform the following functions:

1. Low Suction timer

The time delay relays shall be solid state plug in type. Interchangeability of the timers shall not disturb control wiring. Timers shall be provided with a red neon light to indicate timing cycle. The timers shall be adjustable.

Hand-off automatic switches shall be oil tight, 3 position maintained and be located on the main control panel door and control the following circuits:

1. Pump #1
2. Pump #2
3. Exhaust Fan

Indicating lights to indicate equipment operation shall be oil tight, with a full voltage pilot light. Indicating lights shall be provided in the colors and functions as follows:

1. Red-Low Suction Pressure
2. Green-Pump #1 in Operation
3. Green-Pump #1 in Operation

Nameplates shall be furnished on all panels front mounted switches and lights. Name tags shall also indicate proper nomenclature of control panel internal parts.

The control panel door shall include a plastic pocket on the interior to hold one (1) copy of the panel wiring diagram. The wiring diagram shall be corrected "As-Built" copy and contain individual wire numbers, circuit breaker numbers, switch designations and control function explanations.

5.14 Wiring. It shall be the responsibility of the installing electrician to furnish and install the correct size service wires from the service pole outside of the equipment capsule to the connection terminals inside the power or control panel designated for that purpose. No splice will be allowed in the service wires. It shall also be the responsibility of the installing electrician to furnish and install, if required, any exterior disconnects or other switching mechanisms.

Rigid conduit, sized to adequately accept the inbound service connectors, shall be installed from the main power or control panel through the equipment capsule side sheet and terminate in a threaded coupling exterior to the equipment capsule. The service entrance conduit connection shall be plugged for shipment. A separate rigid conduit  $\frac{3}{4}$  inch in size will be installed on the opposite side of the main control panel from the service entrance, at the direction of the ENGINEER, to facilitate the entrance of the leased telephone lines required for hard wire telemetry instrumentation.

All wiring within the equipment capsule and outside of the control panel or panels shall be run in conduit except for the watertight flexible conduit and fittings properly used to connect pump drivers, fan motors, solenoid valves, limit switches, etc., where flexible connections are best utilized. Such accessories with a UL approved rubber cord and plug, may be plugged into polarized receptacles designated for that purpose. All internal equipment conduit and wire will meet or exceed the conduit, wiring schedule and electrical codes set forth as follows:

5.14.1 Service Entrance. Rigid, heavy wall, hot dipped galvanized steel conduit with threaded watertight connections adequately sized to handle the type, number and size of the incoming service conductors – in compliance with Article 346 of the National Electrical Code.

5.14.2 Equipment Capsule Conduit. Rigid, heavy wall Schedule 40 PVC with solvent weld moisture-proof connections adequate sized to handle the typed number and size of equipment conductors to be carried – in compliance with Article 347 of the National Electrical code and NEMA TC-2, Federal WC-1094A and UL-651 Underwriters Laboratory Specifications.

5.14.3 Flexible Connections. Where flexible conduit connections are necessary, the conduit used shall be liquid-tight flexible metal conduit having an outer non-metallic,

sunlight resistant jacket over an inner flexible metal cord, sized to handle the type, number and size of equipment conductors to be carried-in compliance with Article 351 of the National Electrical Code.

5.14.4 Motor Circuit Conductors. Sized for load. All branch circuit conductors supplying a single motor of one (1) h.p. or more full load current rating, type THHN, asset forth in Article 310 and 430-B of the National Electrical Code, Schedule 310-13 for flame retardant, heat resistant thermoplastic, copper conductors in nylon or equivalent outer covering.

5.14.5 Control and Accessory Wiring. Sized for load, type MTW/AWM (Machine Tool Wire/Appliance wiring Material) as set forth in Article 310 and 670 of the National Electrical Code, Schedule 310-13 and NFPA standard 79 for flame retardant, moisture, heat and oil resistant thermoplastic, copper conductors in compliance with NMTBA and as listed by Underwriter's Laboratories (AWM), except where accessories are furnished with a manufacturer supplied UL approved rubber cord and plug. Four (4) duplex, grounding type, three (3) wire, polarized convenience receptacles shall be furnished about the periphery of the equipment capsule. One (1) duplex receptacle shall be adjacent to the main control panel. The equipment ground wire from each equipment ground post of the polarized receptacles shall be affixed at the main control panel terminal board solely designated for that purpose and separated from the neutral buss.

#### 5.15 Ancillary Equipment.

5.15.1 Sump Pump. One (1) automatic submersible sump pump(s), with a rated capacity of twenty (20) gpm at fifteen (15) feet TDH shall be installed in the equipment capsule sump. The sump pump(s) shall be complete with a fractional horsepower motor, oil filled and hermetically sealed, designed to operate at 1550 RPM, or a 120 volt, 1 phase, A.C. power source and draw no more than 8 amps. A carbon and ceramic shaft seal shall prohibit the pumped fluid from entering the motor housing. The switch cap, pump and motor housing shall be made of cast iron, the impeller shall be glass filled Valox and the base and strainer plate shall be glass filled polypropylene. A safety protected power cord of UL approved 14/3 wire construction with 3 spade plug will be provided. The actuating float switch shall be NEMA 6 rated replaceable and adjustable without removing the pump or motor so as to operate within a size (4 ½) inch differential.

The sump pump discharge piping within the equipment capsule shall be size 1 ½. The sump pump discharge piping material will be PVC Schedule 80 steel. The discharge piping system will be complete with a vertical check and gate valve for each pump that employs a union on both upper and lower connection points. The vertical check shall have resilient seat, designed to be easily field replaceable. An optional dewatering drain system for freeze protection shall be designed into the sump pump discharge piping system. The dewatering line shall be included with the equipment and will be field installed, if required, by the startup technician.

5.15.2 Dehumidifier. A packaged dehumidifier with a sealed refrigeration type compressor rated at 1/5 h.p., 5.0 full load amps and 420 watts shall be wall mounted within the equipment capsule in such a manner that the condensate shall discharge to the sump through tubing provided for that purpose. The dehumidifier shall operate on a 120 volt, single phase A.C. power source and be provided with a safety protected power cord of UL approved 3 wire construction with 3 spade plug. The dehumidifier shall be capable of removing twenty-seven (27) pints of water in twenty-four (24) hours when the room temperature is 80 degrees F and at 60 percent relative humidity (AHAM Standard DH-1). The dehumidifier shall be actuated by a dial-controlled adjustable humidistat which will automatically cycle the unit at preselected moisture levels. The humidistat shall also have "Off" and "Continuous Run" positions. The dehumidifier shall be listed by Underwriters Laboratories.

5.15.3 Heater. The equipment capsule will be provided with an electric heater. The heater will have a rating of 1650 watts, 5,630 BTU-HR output when operating on a 240 volt, single phase A.C. power source. The heater will be equipped with a 600 rpm low speed axial vane blower designed to deliver 175 cfm of down flow air and be driven by a four (4) pole motor. The heating element shall be of the sealed tubular type with large parallel steel fins for quick heat transfer. The heater will be complete with a thermal overload cut off and a built in thermostat calibrated to provide a range of 55 degrees Fahrenheit to 85 degrees Fahrenheit.

The heater shall be wall mounted, hand wired and complete with an individual 240 volt circuit, protected by a 2-pole, 15 amp circuit breaker. The heater will be listed with Underwriters Laboratories, NEMA Standard 3-9-1967, HEZ-Z-02 Type 1.

5.15.4 Exhaust Fan. There shall be included in the equipment capsule one (1) exhaust fan, flange mounted to the exhaust air piping as near the equipment capsule roof as is practical. The fan capacity shall be 232 cfm at 0.2 inch static pressure (inches of water). The fan shall feature a shaded pole motor with a squirrel cage blower. The blower wheel shall be statically balanced to assure quiet performance and maximum air delivery. The fan motor will be complete with a conduit box. The exhaust fan shall operate on an independent 120 volt, single phase A.C. power source with single pole, 15 amp circuit breaker protection. Automatic control of the exhaust fan shall be by thermostat, air conditioning type (make on the rise) wired in parallel with a three (3) position maintained (H-O-A) selector switch located on the face of the main control panel. The exhaust fan control equipment shall be wall mounted in a receptacle box expressly designated for that purpose and in a location convenient for the use intended.

The exhaust air piping system shall be size three (3) inch and be welded through the roof and terminate at a point sixteen (16) inches above the roof. The cold air return piping system shall also be size three (3) inch and on the exterior begin with a screened vent and terminate on the interior as near the equipment capsule floor as is practical. Both exterior air system pipes will be complete with white, PVC 180 degree return bends that are equipped with removable aluminum wire mesh insect screening. Exhaust and return air

Piping must be rigid and permanently fixed. Flexible, spiral wound or cloth ducts will not be accepted.

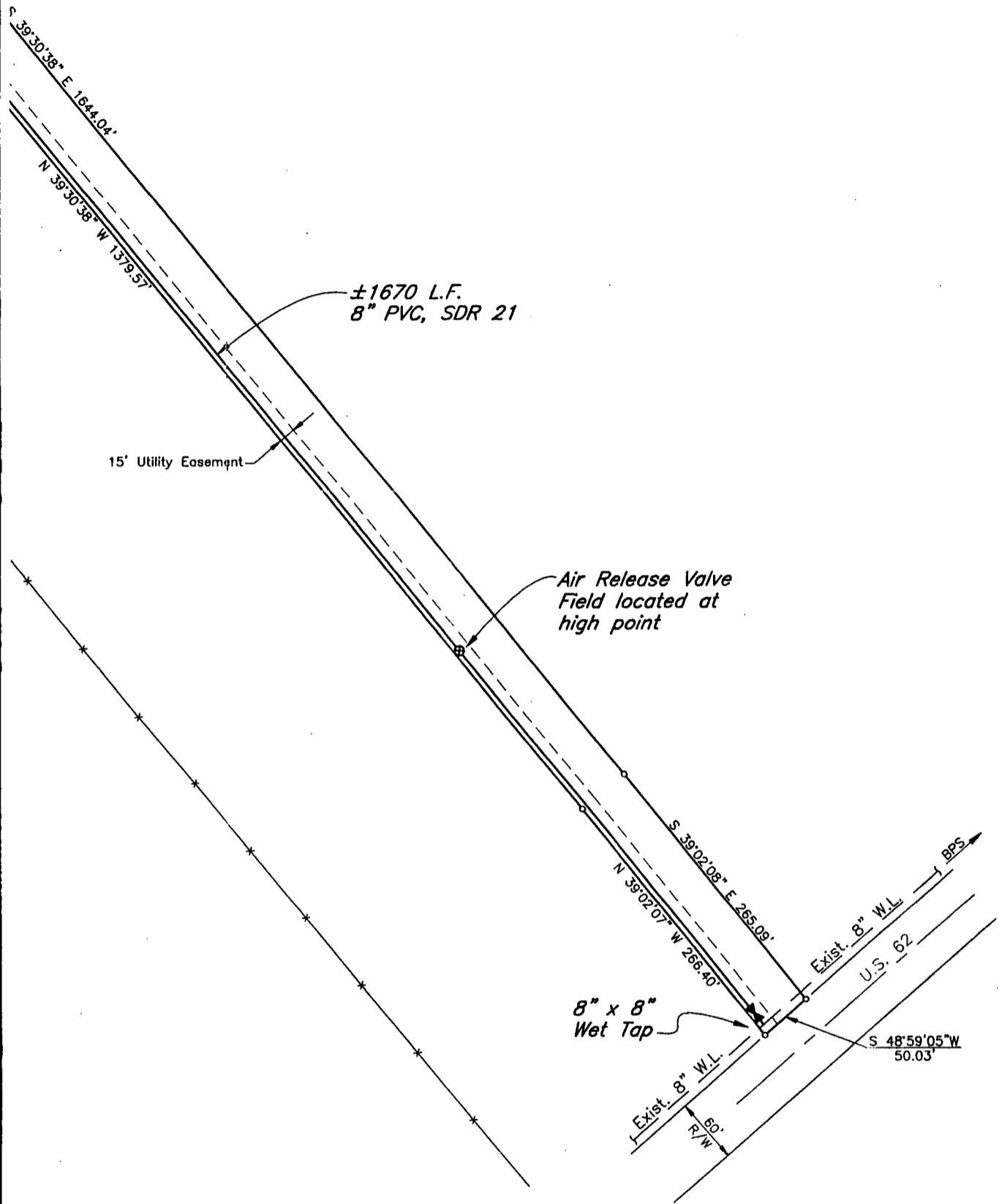
5.15.5 Lighting. There shall be two (2), two (2) tube, 40 watt per tube, rapid start, "OSHA" approved enclosed and gasketed fluorescent light fixture installed within the equipment capsule. If one (1) light fixture is installed, it shall be located directly over the main control panel and be of forty-eight (48) inch minimum length. The light switch shall be one of the night glow type and be located in the entrance manway, conveniently adjacent to the equipment capsule entrance ladder. This switch also turns on exhaust blower. Open or incandescent fixtures without OSHA approval will not be accepted.

5.16 Factory Start-Up Service. After the packaged water booster pump station has been completely installed including the electrical service, and has been put under pressure by the installer, then a factory service representative will be scheduled to visit the job site and put the booster station into trouble free, automatic operation. The service representative will be a regular employee of the booster pump station manufacturer.

The service representative will spend at least one (1) full day at the job site. In addition to his start-up duties he shall explain and demonstrate the operation of the booster pump station to a representative of the OWNER. Three (3) bound copies of the booster pump station's Maintenance and Operation Manual shall be supplied.

5.17 Power. The CONTRACTOR shall have the required power service installed in his name and said service shall be his responsibility until such time as the station is tested and accepted by the ENGINEER and OWNER for use.

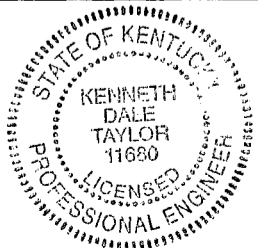
5.18 Payment. The unit price for the lump sum item for the booster pump station shall constitute full payment for furnishing, installing, making fully operable and furnishing the required power service for that pump station.



**PLAN VIEW**  
1"=100'

**CONTRACT 6  
SOUTH ANDERSON WATER DISTRICT  
ANDERSON COUNTY, KENTUCKY**

**WATER LINE EXTENSION**

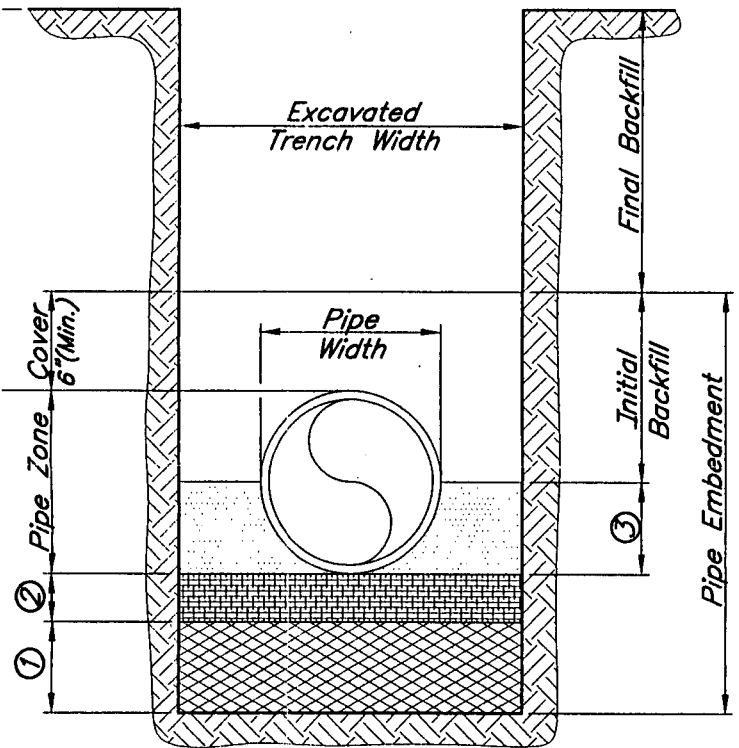
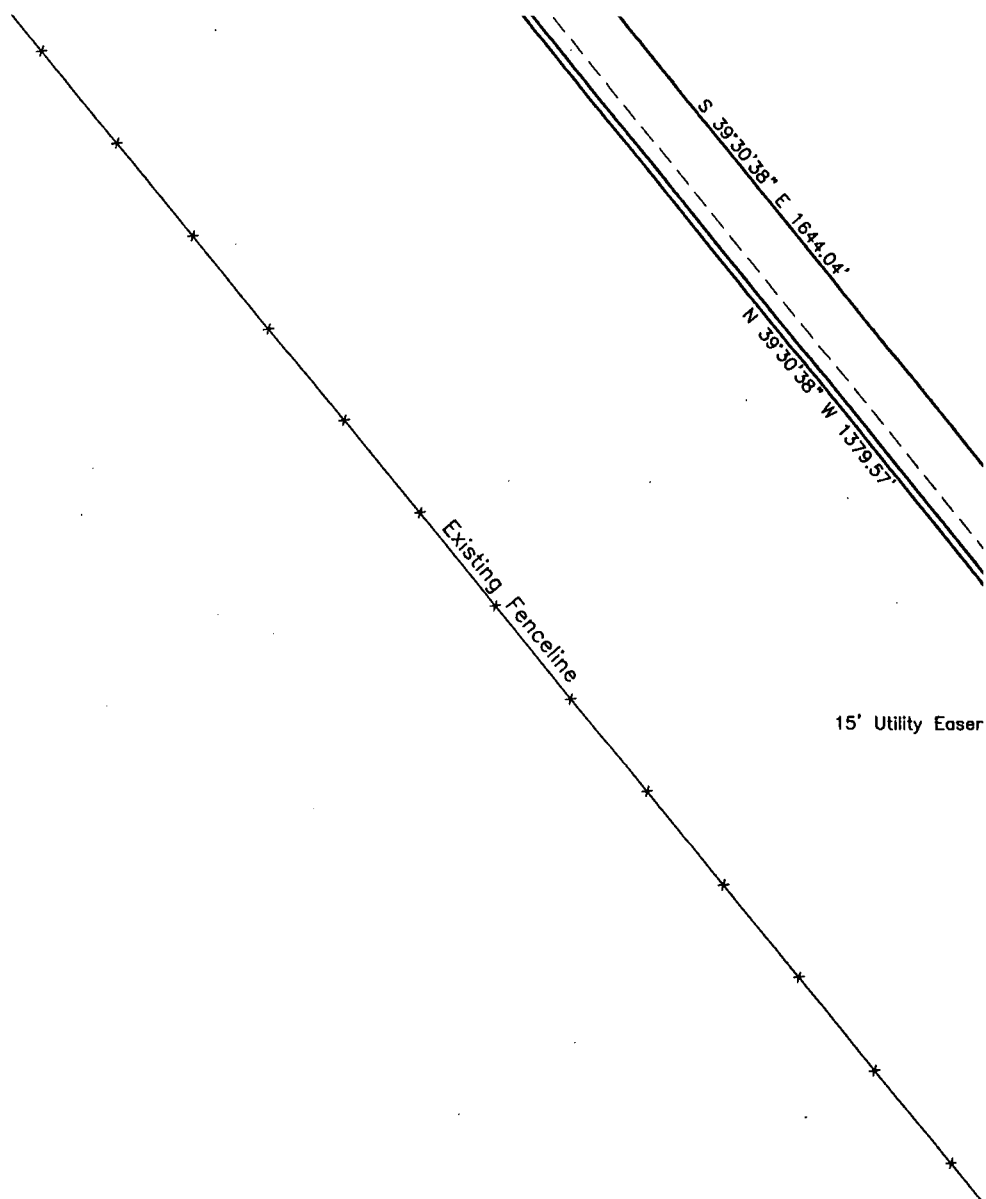


**KENVIRONS, INC.**  
FRANKFORT - PIKEVILLE

|            |     |             |          |         |   |
|------------|-----|-------------|----------|---------|---|
| DRAWN BY   | JKP | DATE        | 2-99     | REVISED |   |
| CHECKED BY |     | SCALE       | As Noted | 1       | 3 |
| CHECKED BY | KDT | PROJECT NO. | 97185    | 2       | 4 |

90



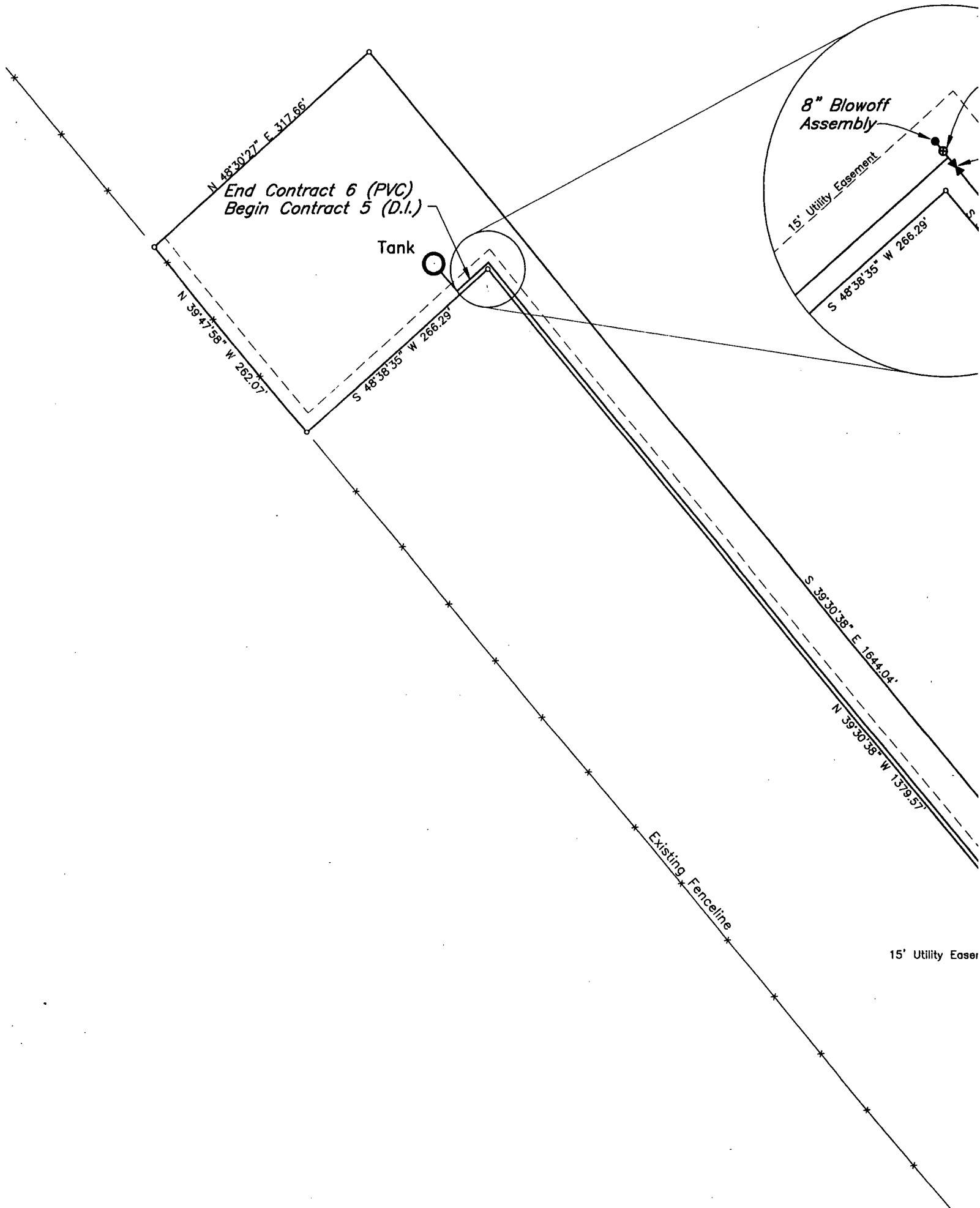


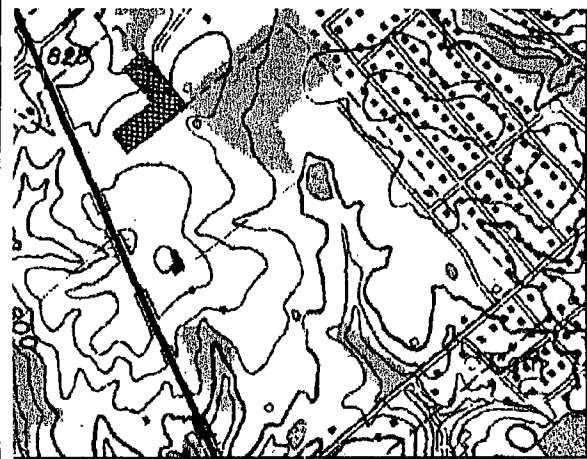
**PLAN VIEW**  
1"=100'

- ① Foundation (may not be required)
- ② Bedding
- ③ Haunching

TE : PVC Pipe installation  
will meet the requirements  
AWWA Manual NO. 23.

**PVC INSTALLATION IN TRENCH**  
N.T.S.

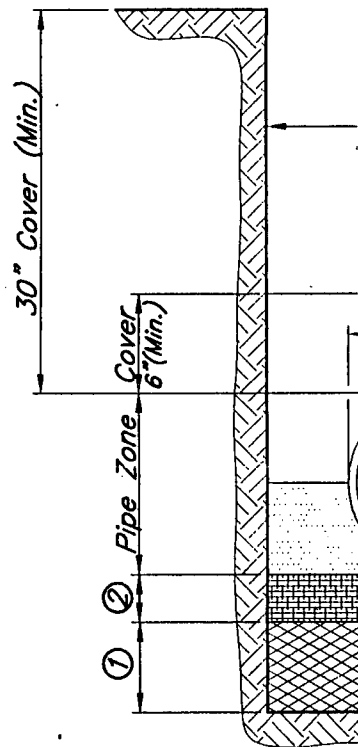
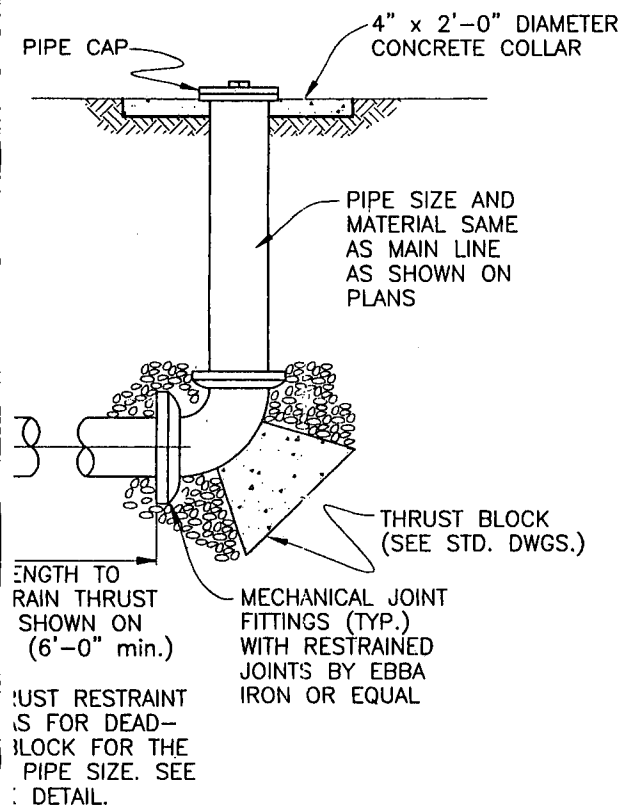




Y. QUADRANGLE

**LOCATION**

1" = 1000' ±



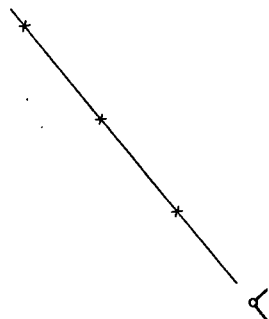
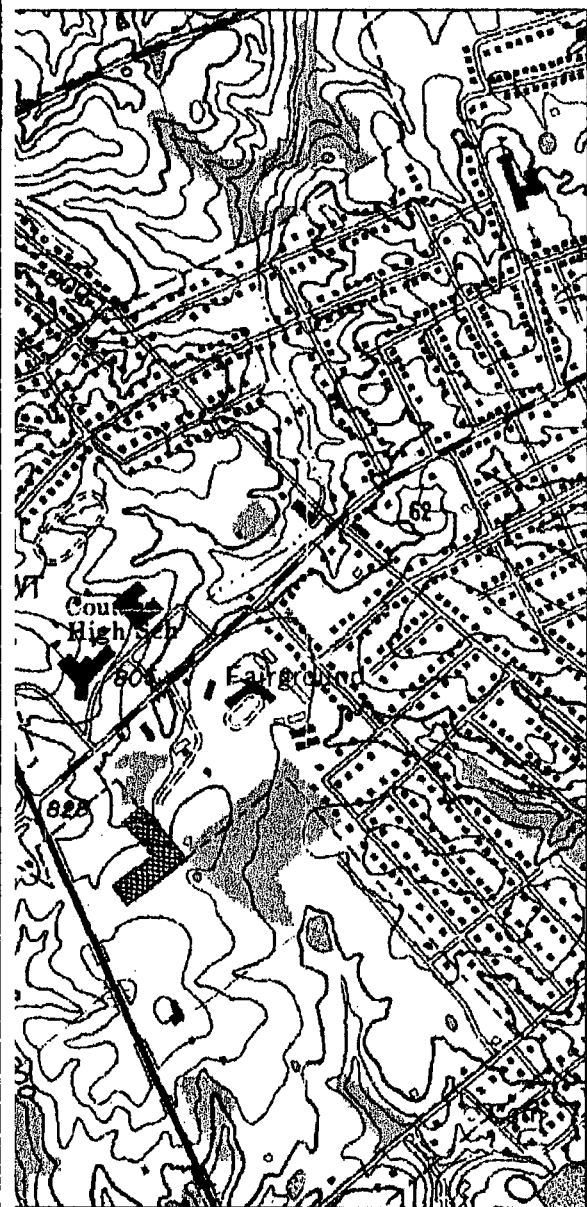
- ① Foundation
- ② Bedding
- ③ Haunching

NOTE : PVC Pipe installation shall meet the requirements of AWWA Manual NO. 9.

**DETAIL (TYPE 2)**

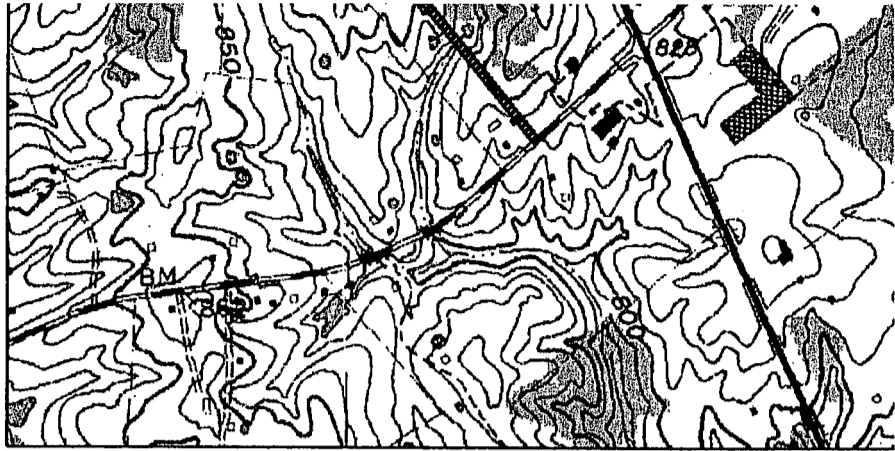
M.T.S

**PVC INS**



7. QUADRANGLE

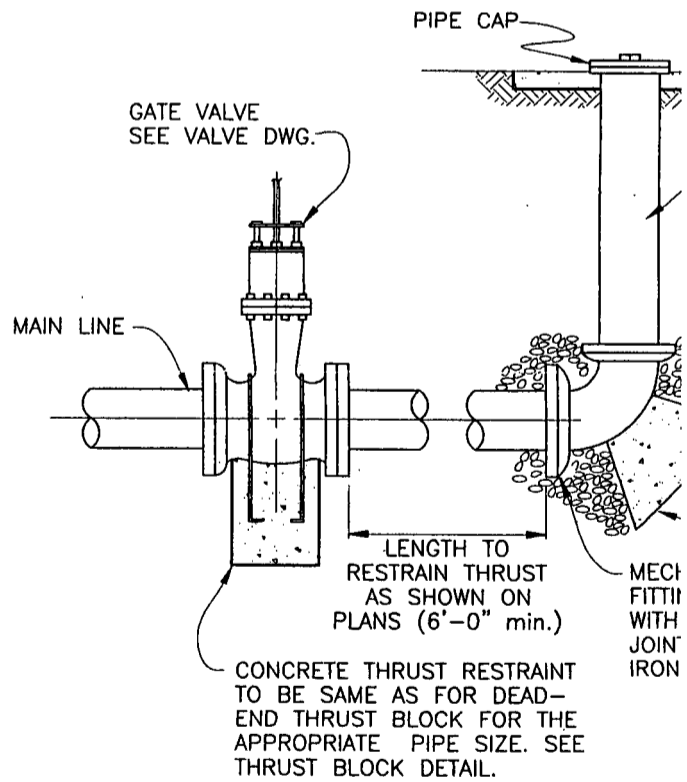
**ICATION**  
1"=1000'±



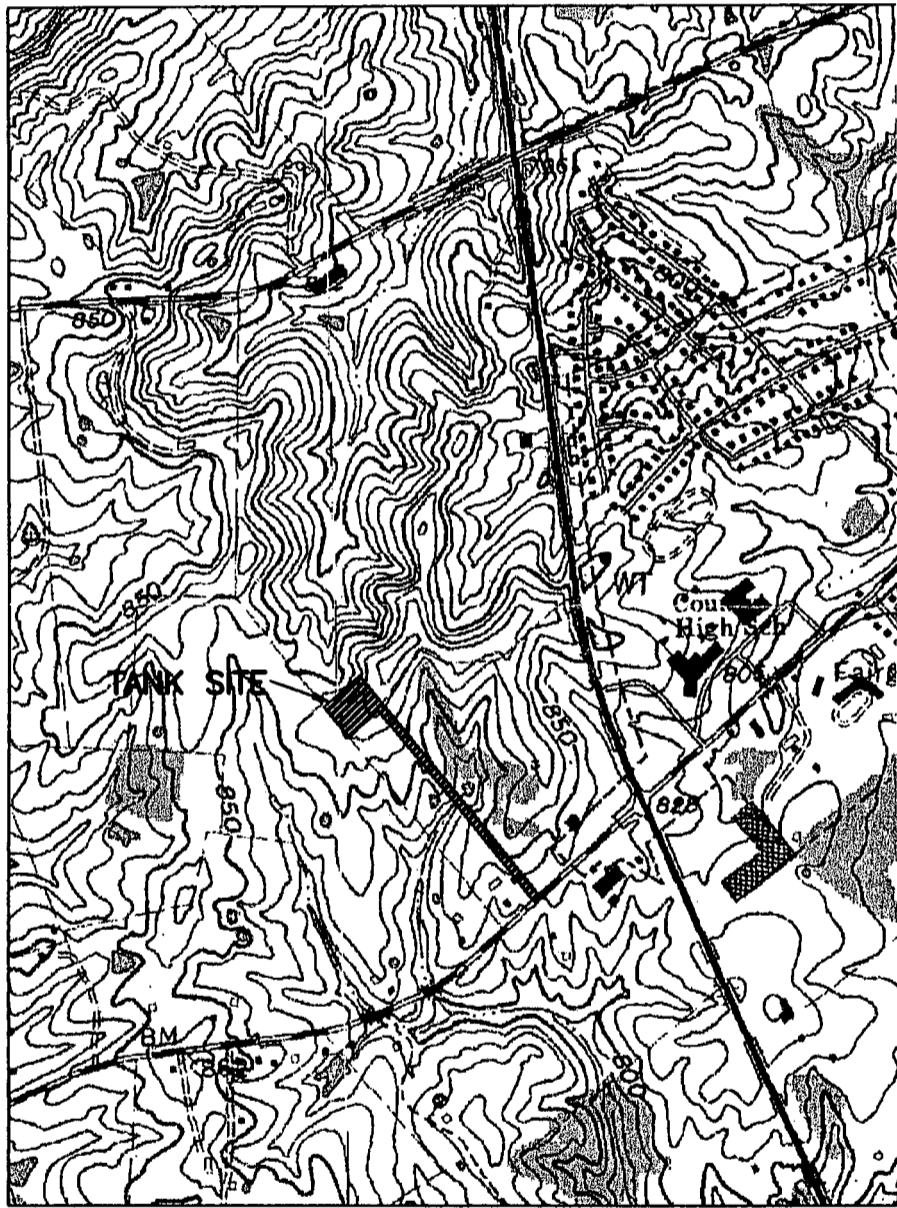
LAWRENCEBURG, KY. QUADRANGLE

**SITE LOCATION**

1"=1000'±



**BLOWOFF DETAIL (TYPE**



LAWRENCEBURG, KY. QUADRANGLE

**SITE LOCATION**  
1"=1000'±

This restrained joint system must be approved by the Engineer.

3. Concrete shall be 2500 psi minimum conforming to KDH Specifications 601.
4. Accessibility to fittings and bolts must be maintained.

VERTICAL THRUST BLOCK SCHEDULE

| PIPE SIZE (INCHES) | 90° BEND |     | 45° BEND |     | 22 1/2° BEND |     | 11 1/4° BEND |    |
|--------------------|----------|-----|----------|-----|--------------|-----|--------------|----|
|                    | V        | A   | V        | A   | V            | A   | V            | A  |
| 4                  | 25       | 2.5 | 18       | 1   | 10           | 1   | 5            | 1  |
| 6                  | 57       | 5.7 | 40       | 1.6 | 22           | 1   | 11           | 1  |
| 8                  | 101      | 10  | 71       | 3   | 38           | 1   | 20           | 2  |
| 10                 | 157      | 16  | 111      | 5   | 60           | 1   | 32           | 3  |
| 12                 | 226      | 23  | 161      | 7   | 86           | 2   | 45           | 5  |
| 14                 | 308      | 31  | 219      | 9   | 117          | 2.5 | 62           | 6  |
| 16                 | 402      | 40  | 285      | 12  | 153          | 3   | 81           | 8  |
| 18                 | 509      | 51  | 361      | 15  | 194          | 4   | 102          | 10 |
| 20                 | 628      | 63  | 446      | 18  | 239          | 5   | 126          | 13 |

VERTICAL THRUST BLOCK

N.T.S.

CONTRACT 6  
SOUTH ANDERSON WATER DISTRICT  
ANDERSON COUNTY, KENTUCKY

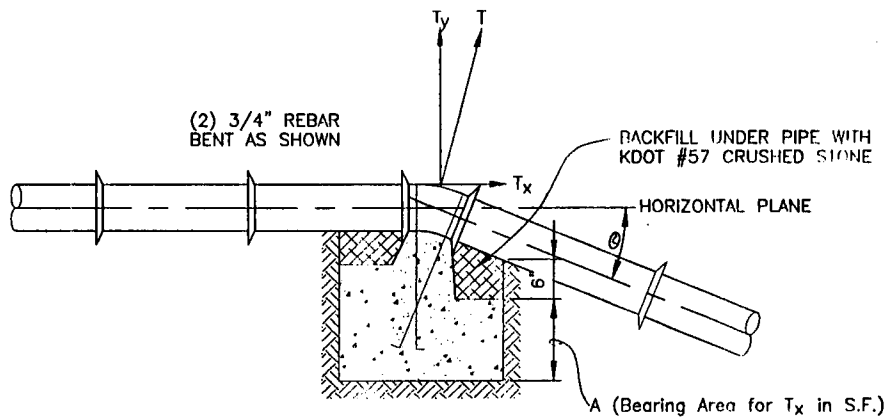
WATER LINE EXTENSION



KENVIRONS, INC.  
FRANKFORT - PIKEVILLE

| DRAWN BY   | DATE        | REVISED |
|------------|-------------|---------|
| JKP        | 2-99        |         |
| CHECKED BY | SCALE       |         |
| KDT        | As Noted    | 1 3     |
| CHECKED BY | PROJECT NO. |         |
| KDT        | 97185       | 2 4     |

90



V (Volume of gravity block in C.F.)

### GRAVITY THRUST BLOCK

#### NOTES

1. Thrust restraint table is based on pipeline pressure of 200 psi and earth bearing capacity of 1500psf. During construction, the specific soil type may be evaluated and concrete thrust block size revised at the discretion of the engineer.
2. On large diameter pipes where space limitations or construction difficulties render concrete thrust blocks not feasible or impractical, joint system may be used. This restrained joint system must be approved by the Engineer.
3. Concrete shall be 2500 psi minimum conforming to KDH Specifications 601.
4. Accessibility to fittings and bolts must be maintained.

VERTICAL THRUST BLOCK SCHEDULE

| PIPE SIZE (INCHES) | 90° BEND |     | 45° BEND |     | 22 1/2° BEND |     | 11 1/4° BEND |    |
|--------------------|----------|-----|----------|-----|--------------|-----|--------------|----|
|                    | V        | A   | V        | A   | V            | A   | V            | A  |
| 4                  | 25       | 2.5 | 18       | 1   | 10           | 1   | 5            | 1  |
| 6                  | 57       | 5.7 | 40       | 1.8 | 22           | 1   | 11           | 1  |
| 8                  | 101      | 10  | 71       | 3   | 38           | 1   | 20           | 2  |
| 10                 | 157      | 16  | 111      | 5   | 60           | 1   | 32           | 3  |
| 12                 | 226      | 23  | 161      | 7   | 86           | 2   | 45           | 5  |
| 14                 | 308      | 31  | 219      | 9   | 117          | 2.5 | 62           | 6  |
| 16                 | 402      | 40  | 285      | 12  | 153          | 3   | 81           | 8  |
| 18                 | 509      | 51  | 361      | 15  | 194          | 4   | 102          | 10 |
| 20                 | 628      | 63  | 446      | 18  | 239          | 5   | 126          | 13 |

### VERTICAL THRUST BLOCK

N.T.S.



ity of recover during construction, the specific size type  
 ated and concrete thrust block size revised at the discretion  
 er.

eter pipes where space limitations or constuction difficulties  
 te thrust blocks not feasible or impractical, joint system may be used.  
 I joint system must be approved by the Engineer.

be 2500 psi minium conforming to KDH Specifications 601.

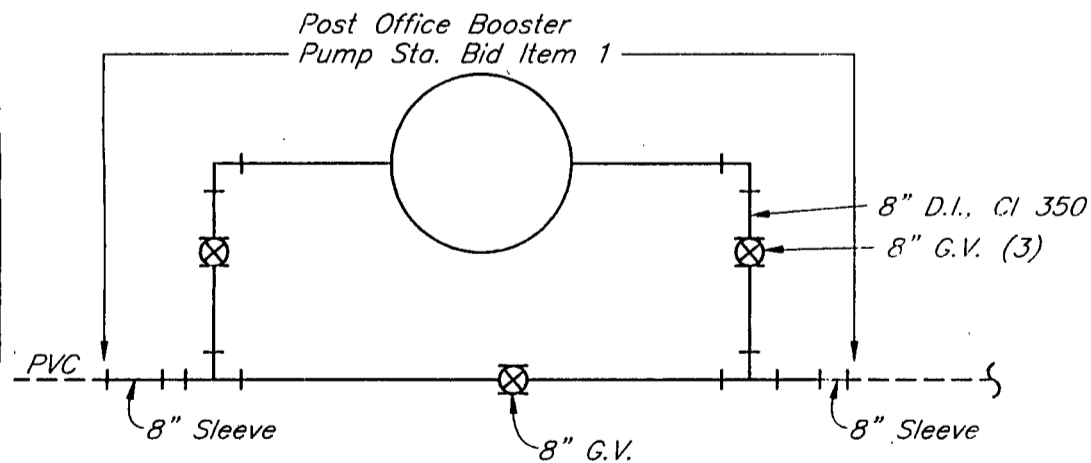
> fittings and bolts must be maintained.

HORIZONTAL THRUST BLOCK SCHEDULE

| BEND   | 45° BEND |        | 22 1/2° BEND |       | 11 1/4° BEND |       | TEE, DEAD END |       |
|--------|----------|--------|--------------|-------|--------------|-------|---------------|-------|
|        | A        | B      | A            | B     | A            | B     | A             | B     |
| 1'-0"  | 2'-0"    | 1'-0"  | 2'-0"        | 1'-0" | 2'-0"        | 1'-0" | 2'-0"         | 1'-0" |
| 1'-6"  | 2'-6"    | 1'-3"  | 2'-0"        | 1'-0" | 2'-0"        | 1'-0" | 3'-0"         | 1'-6" |
| 2'-3"  | 3'-3"    | 1'-8"  | 2'-4"        | 1'-2" | 2'-0"        | 1'-0" | 4'-0"         | 2'-0" |
| 2'-0"  | 4'-0"    | 2'-0"  | 3'-0"        | 1'-6" | 2'-2"        | 1'-1" | 4'-8"         | 2'-4" |
| 2'-9"  | 5'-0"    | 2'-6"  | 3'-6"        | 1'-9" | 2'-6"        | 1'-3" | 5'-6"         | 2'-9" |
| 3'-10" | 5'-8"    | 2'-10" | 4'-2"        | 2'-1" | 3'-0"        | 1'-6" | 6'-5"         | 3'-3" |
| 4'-4"  | 6'-6"    | 3'-3"  | 4'-8"        | 2'-3" | 3'-4"        | 1'-8" | 7'-6"         | 3'-8" |
| 5'-0"  | 7'-3"    | 3'-8"  | 5'-4"        | 2'-8" | 4'-0"        | 2'-0" | 8'-6"         | 4'-0" |
| 5'-6"  | 8'-0"    | 4'-0"  | 6'-0"        | 3'-0" | 4'-4"        | 2'-2" | 9'-2"         | 4'-7" |

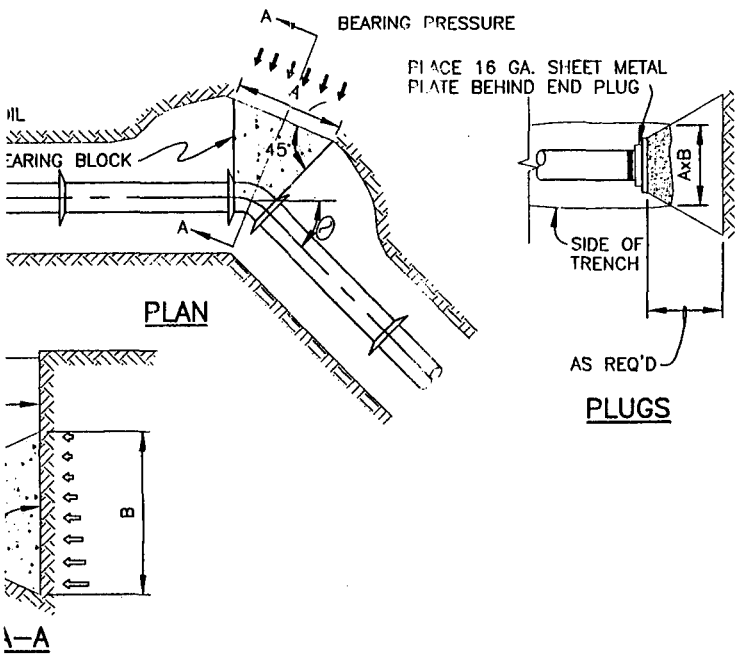
**HORIZONTAL THRUST BLOCK**

N.T.S.



**CONNECTION TO MAINLINE**

N.T.S.



**NOTES**

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Table is based on pipeline pressure of 200 psi and earth  
 strength of 1500psf. During construction, the specific soil type  
 and concrete thrust block size revised at the discretion  
 of the Engineer.

For larger pipes where space limitations or construction difficulties  
 make thrust blocks not feasible or impractical, joint system may be used.  
 This joint system must be approved by the Engineer.

Minimum pipe strength must be 2500 psi minimum conforming to KDH Specifications 601.

Proper fittings and bolts must be maintained.

**HORIZONTAL THRUST BLOCK SCHEDULE**

| BEND   |       | 45° BEND |       | 22 1/2° BEND |       | 11 1/4° BEND |       | TEE, DEAD END |       |
|--------|-------|----------|-------|--------------|-------|--------------|-------|---------------|-------|
| A      | B     | A        | B     | A            | B     | A            | B     | A             | B     |
| 1'-0"  | 2'-0" | 1'-0"    | 2'-0" | 1'-0"        | 2'-0" | 1'-0"        | 2'-0" | 2'-0"         | 1'-0" |
| 1'-6"  | 2'-6" | 1'-3"    | 2'-0" | 1'-0"        | 2'-0" | 1'-0"        | 3'-0" | 3'-0"         | 1'-6" |
| 2'-3"  | 3'-3" | 1'-8"    | 2'-4" | 1'-2"        | 2'-0" | 1'-0"        | 4'-0" | 4'-0"         | 2'-0" |
| 2'-0"  | 4'-0" | 2'-0"    | 3'-0" | 1'-6"        | 2'-2" | 1'-1"        | 4'-8" | 4'-8"         | 2'-4" |
| 2'-9"  | 5'-0" | 2'-6"    | 3'-6" | 1'-9"        | 2'-6" | 1'-3"        | 5'-6" | 5'-6"         | 2'-9" |
| 3'-10" | 5'-8" | 2'-10"   | 4'-2" | 2'-1"        | 3'-0" | 1'-6"        | 6'-5" | 6'-5"         | 3'-3" |
| 4'-4"  | 6'-6" | 3'-3"    | 4'-8" | 2'-3"        | 3'-4" | 1'-8"        | 7'-6" | 7'-6"         | 3'-8" |
| 5'-0"  | 7'-3" | 3'-8"    | 5'-4" | 2'-8"        | 4'-0" | 2'-0"        | 8'-6" | 8'-6"         | 4'-0" |
| 5'-6"  | 8'-0" | 4'-0"    | 6'-0" | 3'-0"        | 4'-4" | 2'-2"        | 9'-2" | 9'-2"         | 4'-7" |

**HORIZONTAL THRUST BLOCK**  
 M.T.S.

THREADED IAP/SAADDLE

WATER MAIN

BRICK

NO. 57 LIMESTONE BASE AS DIRECTED BY ENGINEER IN SOFT FOUNDATION AREAS

bearing capacity of respective bedding material may be evaluated and concrete thrust block of the engineer.

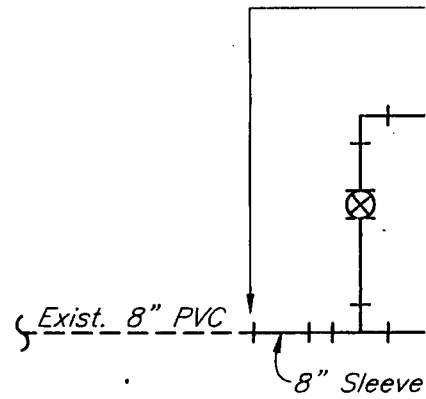
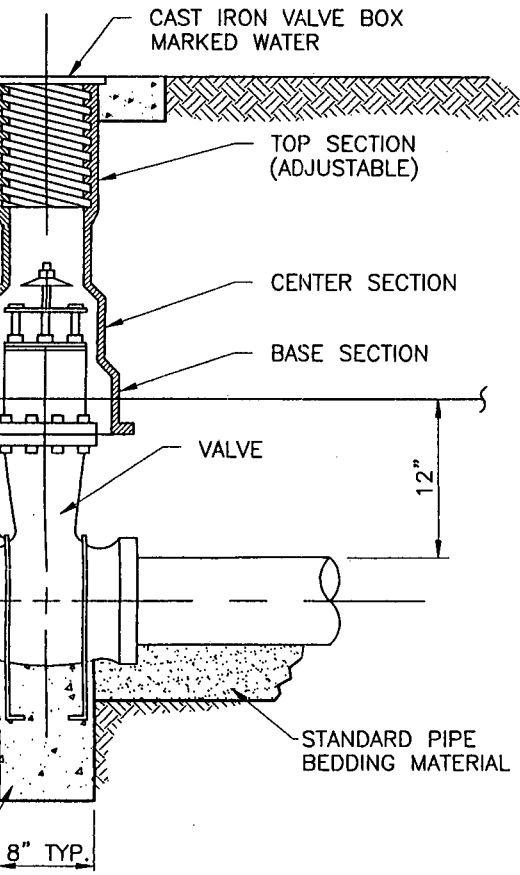
2. On large diameter pipes where space limit render concrete thrust blocks not feasible This restrained joint system must be appr
3. Concrete shall be 2500 psi minium confor
4. Accessibility to fittings and bolts must be

HORIZONTAL THRUST

| PIPE SIZE (INCHES) | 90° BEND |        | 45° BEND |        | 22 1/2° |
|--------------------|----------|--------|----------|--------|---------|
|                    | A        | B      | A        | B      | A       |
| 4                  | 2'-6"    | 1'-0"  | 2'-0"    | 1'-0"  | 2'-0"   |
| 6                  | 3'-8"    | 1'-6"  | 2'-6"    | 1'-3"  | 2'-0"   |
| 8                  | 4'-4"    | 2'-3"  | 3'-3"    | 1'-8"  | 2'-4"   |
| 10                 | 7'-6"    | 2'-0"  | 4'-0"    | 2'-0"  | 3'-0"   |
| 12                 | 5'-6"    | 2'-9"  | 5'-0"    | 2'-6"  | 3'-6"   |
| 14                 | 7'-8"    | 3'-10" | 5'-8"    | 2'-10" | 4'-2"   |
| 16                 | 8'-9"    | 4'-4"  | 6'-6"    | 3'-3"  | 4'-8"   |
| 18                 | 10'-0"   | 5'-0"  | 7'-3"    | 3'-8"  | 5'-4"   |
| 20                 | 11'-0"   | 5'-6"  | 8'-0"    | 4'-0"  | 6'-0"   |

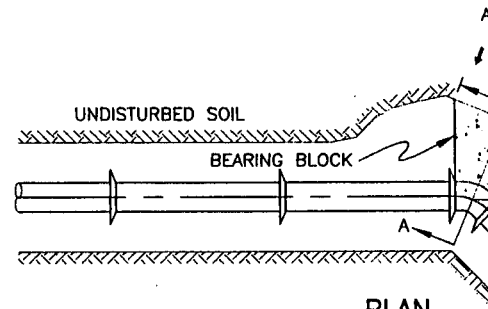
VE  
N.T.S.

HORIZONTAL THR

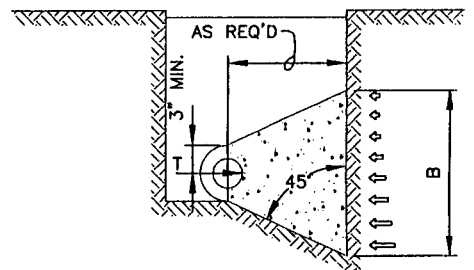


X DETAIL  
N.T.S.

COI



PLAN



SECTION A-A

NOTES

1. Thrust restraint table is based on pipeline bearing capacity of 1500psf. During constr may be evaluated and concrete thrust bloc of the engineer.
2. On large diameter pipes where space limit render concrete thrust blocks not feasible This restrained joint system must be appre
3. Concrete shall be 2500 psi minium conformi
4. Accessibility to fittings and bolts must be

HORIZONTAL THRUST I

| PIPE SIZE (INCHES) | 90° BEND |        | 45° BEND |        | 22 1/2° |
|--------------------|----------|--------|----------|--------|---------|
|                    | A        | B      | A        | B      |         |
| 4                  | 2'-6"    | 1'-0"  | 2'-0"    | 1'-0"  | 2'-0"   |
| 6                  | 3'-8"    | 1'-6"  | 2'-6"    | 1'-3"  | 2'-0"   |
| 8                  | 4'-4"    | 2'-3"  | 3'-3"    | 1'-8"  | 2'-4"   |
| 10                 | 7'-6"    | 2'-0"  | 4'-0"    | 2'-0"  | 3'-0"   |
| 12                 | 5'-6"    | 2'-9"  | 5'-0"    | 2'-6"  | 3'-6"   |
| 14                 | 7'-8"    | 3'-10" | 5'-8"    | 2'-10" | 4'-2"   |
| 16                 | 8'-9"    | 4'-4"  | 6'-6"    | 3'-3"  | 4'-8"   |
| 18                 | 10'-0"   | 5'-0"  | 7'-3"    | 3'-8"  | 5'-4"   |
| 20                 | 11'-0"   | 5'-6"  | 8'-0"    | 4'-0"  | 6'-0"   |

HORIZONTAL THR

OX COVER

METER BOX (PE EXCEPT IN TRAFFIC AREAS)

AIR RELEASE VALVE

BRASS NIPPLE

BALL VALVE

BRASS RISER PIPE

THREADED TAP/SADDLE

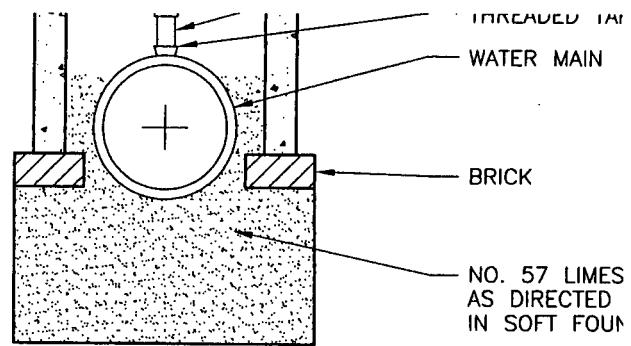
WATER MAIN

BRICK

NO. 57 LIMESTONE BASE AS DIRECTED BY ENGINEER IN SOFT FOUNDATION AREAS

VE  
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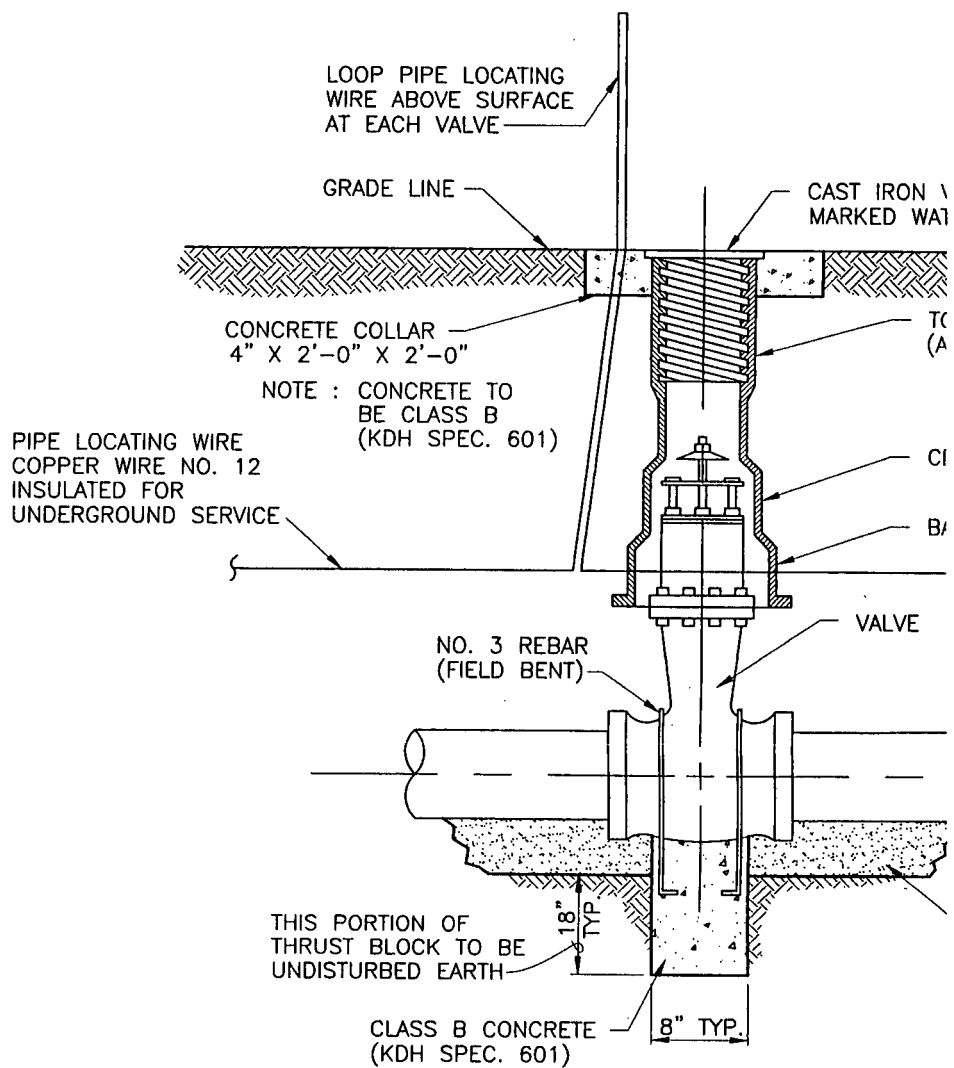
CAST IRON VALVE BOX  
MARKED WATER



NOTE: WHEN THE WATER MAIN IS LOCATED IN A STREET OR ROAD, THE AIR RELEASE VALVE AND BOX ARE TO BE LOCATED OFF THE ROAD AND CONNECTED BY A 1" SERVICE PIPE, AS DIRECTED BY THE ENGINEER.

## AIR RELEASE VALVE

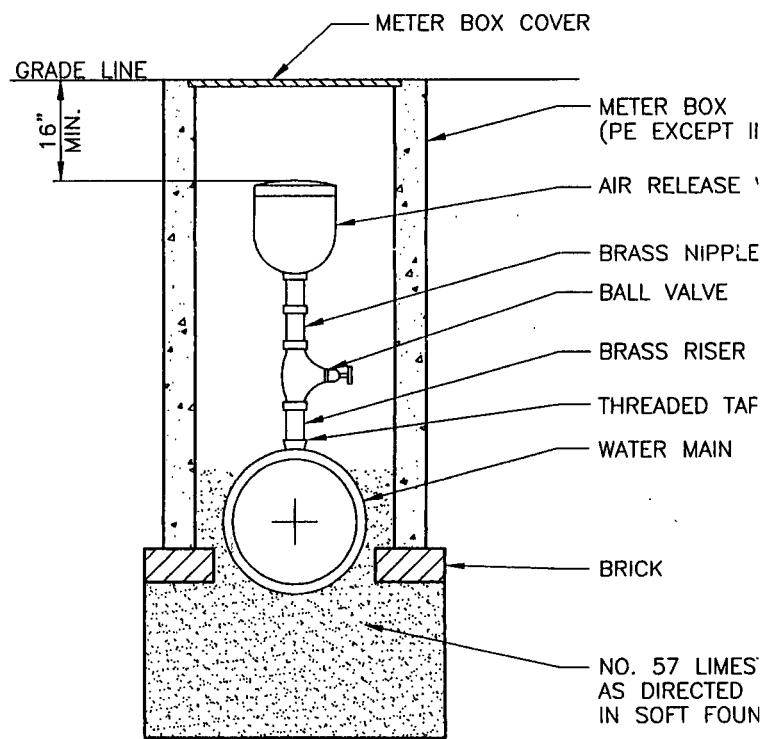
N.T.S.



NOTE: SEE SPECIFICATIONS FOR PIPING MATERIALS AND PIPING JOINTS

## VALVE BOX DETAIL

N.T.S.



NOTE: WHEN THE WATER MAIN IS LOCATED IN A STREET OR ROAD, THE AIR RELEASE VALVE AND BOX ARE TO BE LOCATED OFF THE ROAD AND CONNECTED BY A 1" SERVICE PIPE, AS DIRECTED BY THE ENGINEER.

**AIR RELEASE VALVE**

*N.T.S.*

LOOP PIPE LOCATING WIRE ABOVE SURFACE AT EACH VALVE

GRADE LINE

CAST IRON MARKED WITH

rust at four places  
both suction and

ing shall be coated with a  
poxy. After coating is  
will be allowed.

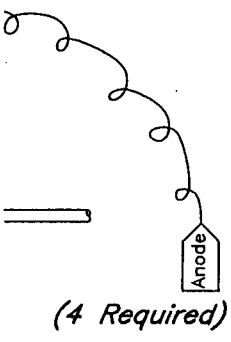
drawn utilizing standard  
fit and organization within  
welded and threaded  
is preferred by the  
hetics and servicability

For connections of the  
refer to the schematic  
igs.

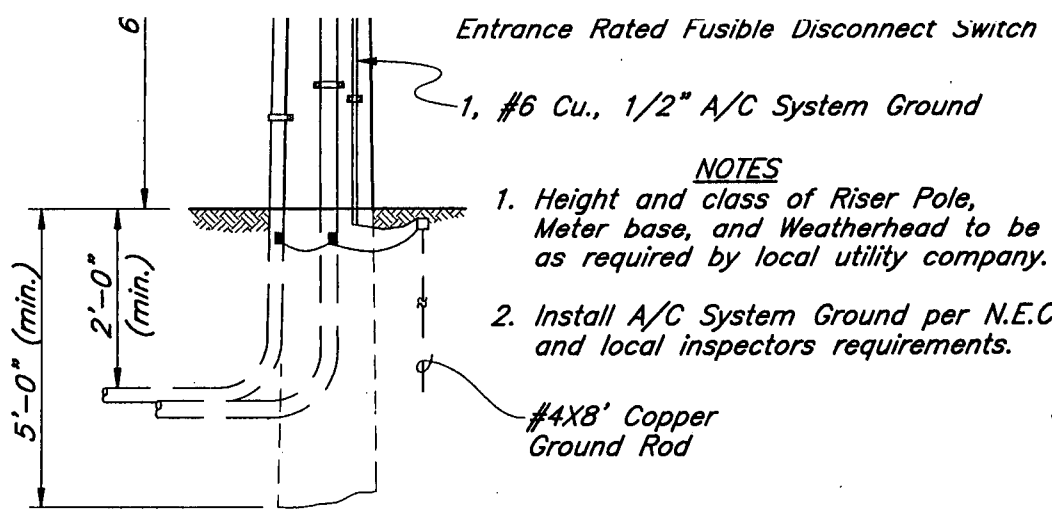
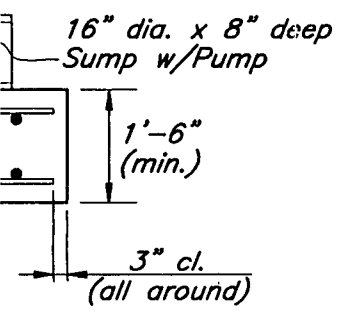
ed of Class B Concrete  
own.

ble for providing all labor,  
y to make the pump  
with the switches and timer.

Eye-  
Steel Plate  
(required)



Dehumidifier  
PVC Check Valve



Entrance Rated Fusible Disconnect Switch

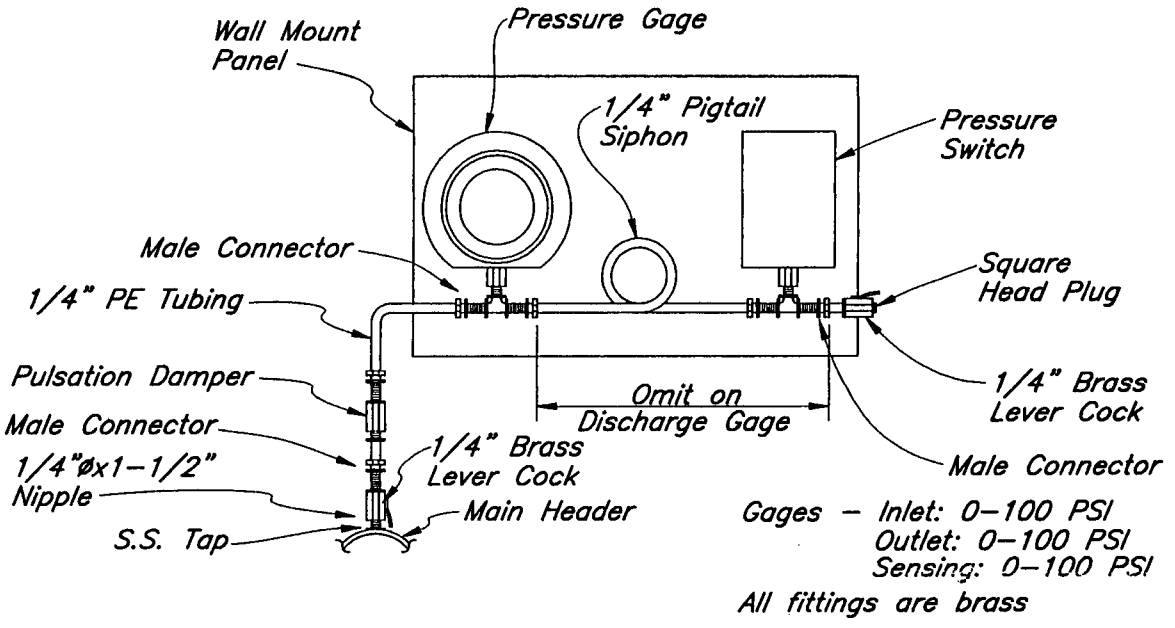
1, #6 Cu., 1/2" A/C System Ground

**NOTES**

1. Height and class of Riser Pole, Meter base, and Weatherhead to be as required by local utility company.
2. Install A/C System Ground per N.E.C. and local inspectors requirements.

#4x8' Copper Ground Rod

**UTILITY RISER POLE DETAIL**  
N.T.S.



**GAGE PANEL (TYP.)**  
3 Required N.T.S.

**CONTRACT 6**  
**SOUTH ANDERSON WATER DISTRICT**  
**ANDERSON COUNTY, KENTUCKY**

**POST OFFICE BOOSTER PUMP STATION**

**KENVIRONS, INC.**  
452 VERSAILLES ROAD, FRANKFORT, KENTUCKY  
(502) 695-4357

|            |     |             |          |         |   |
|------------|-----|-------------|----------|---------|---|
| DRAWN BY   | JKP | DATE        | 2-99     | REVISED |   |
| CHECKED BY |     | SCALE       | As Noted | 1       | 3 |
| CHECKED BY | KDT | PROJECT NO. | 97185    | 2       | 4 |

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S-

cal, enclosed cylinder  
steel plate.

shall be knuckle  
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odel MNB-50, or  
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receive a dual  
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will be allowed.

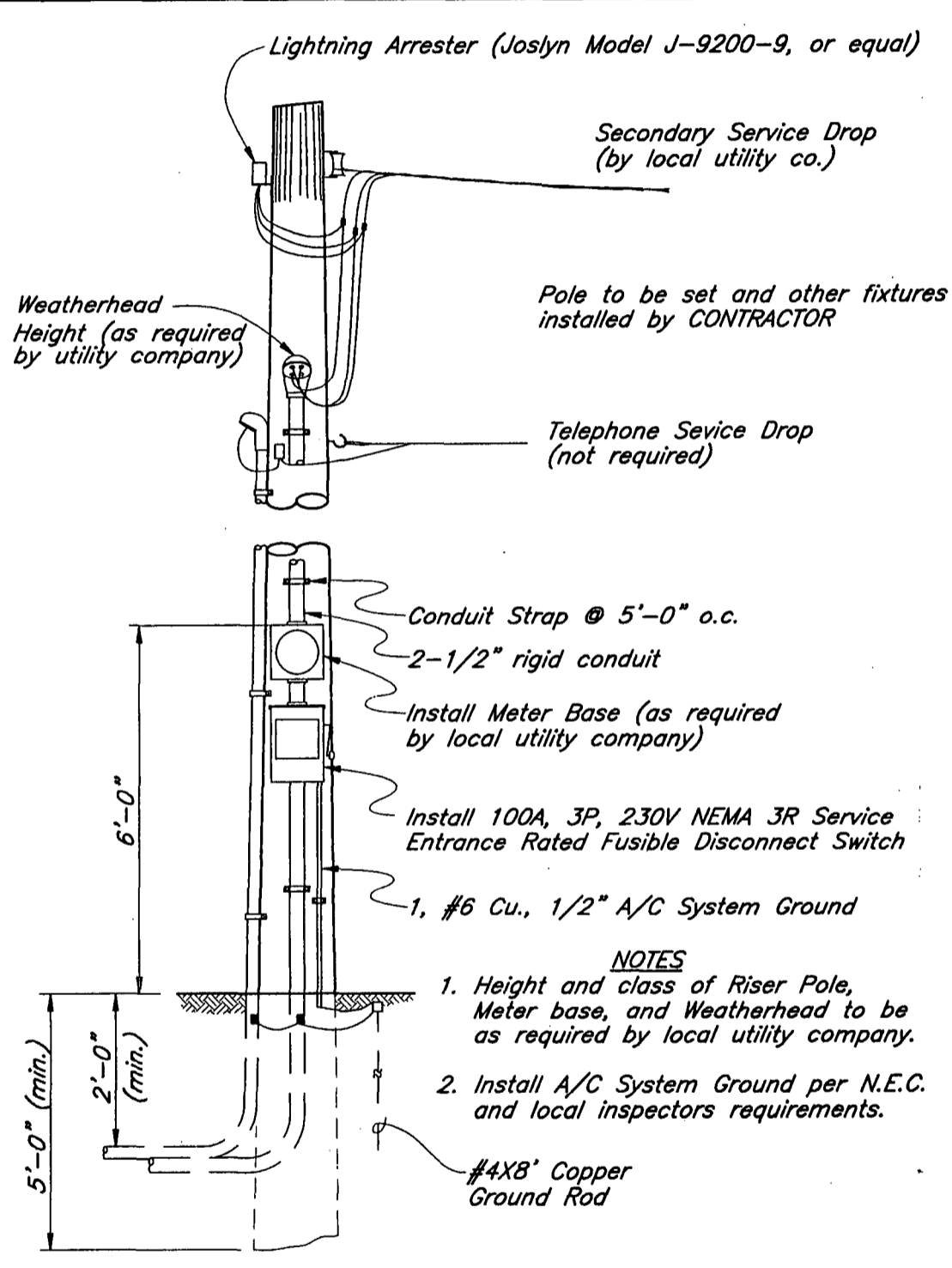
drawn utilizing standard  
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For connections of the  
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ed of Class B Concrete  
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ble for providing all labor,  
y to make the pump  
with the switches and timer.

Eye-  
Steel Plate  
quired)



**UTILITY RISER POLE DETAIL**

N.T.S.



switches  
 Allen Bradley Model 836-C5A, or equal

lampener  
 Ashcroft Model 1106, or equal

240 V, 10,000 Btu, 3000 W (minimum)  
 Berko Model HUH - 324 SA, or equal

ns  
 Dual Mount, Steel Squirrel Cage - type  
 Dayton Model 4C447, or equal

r  
 EBCO Model OD-25L, or equal

p  
 Zoeller Model 53, or equal

seamless steel pipe, supported at least at four places (total) near the pump verticals for both suction and discharge piping.

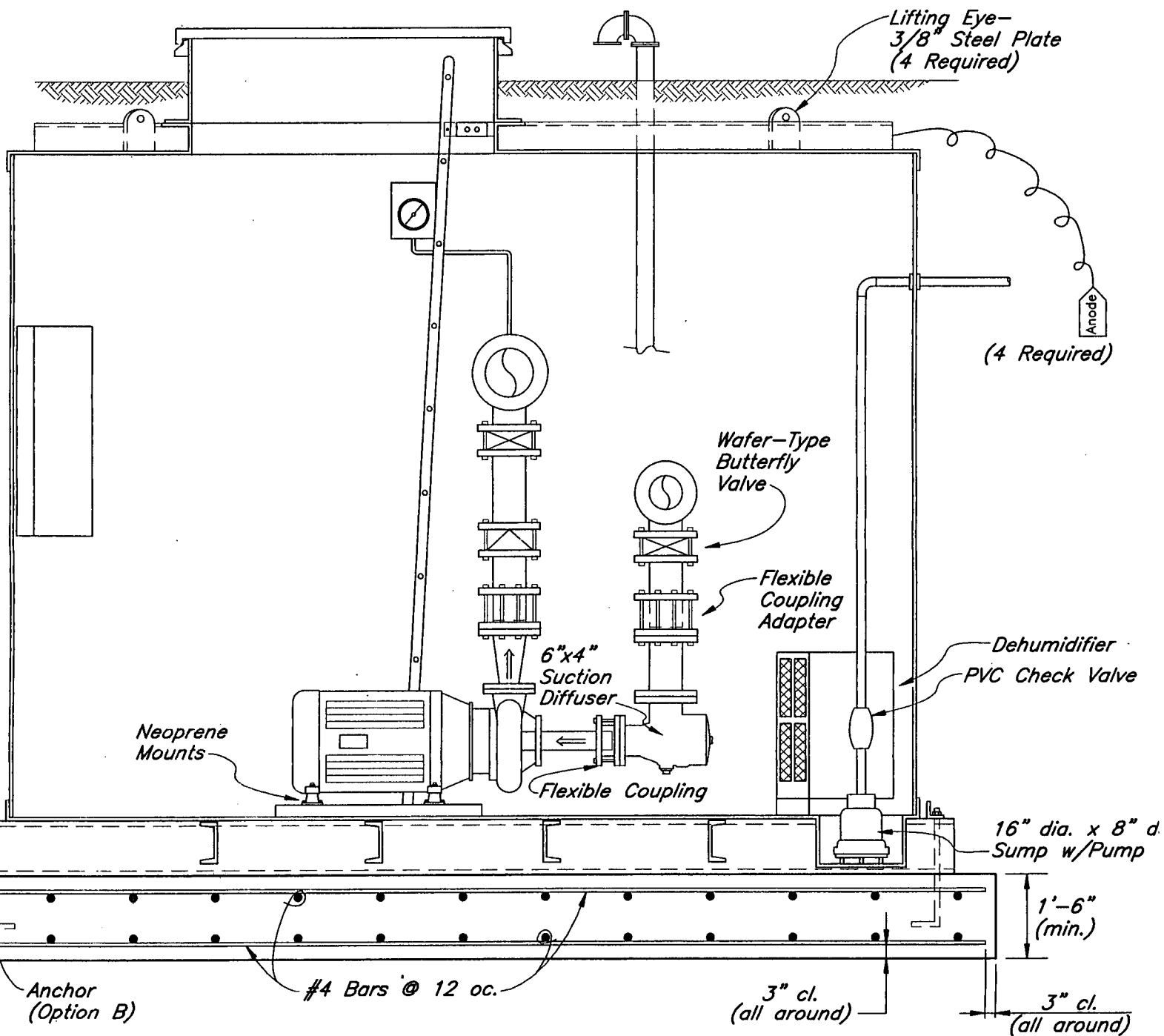
7-For longevity, Steel transmission piping shall be coated factory - applied fusion-bonded epoxy. After coating applied, no welding of these pipes will be allowed.

8-Piping, fittings & valves have been drawn utilizing standard flanges and dimensions to assure fit and organization of the available space. The use of welded and threaded fittings, and comparable couplings, is preferred by the District provided the integrity, aesthetics and serviceability of the facility is maintained.

9- Exterior piping shall be ductile iron. For connections at station to the existing water main, refer to the schedule shown on Sheet 3 of these Drawings.

10- Leveling/anchoring slab to be poured of Class B Conc. (KyTC Spec) and reinforced as shown.

11- The CONTRACTOR shall be responsible for providing all materials, equipment, etc. necessary to make the pump controls operational and compatible with the switches.



**SECTION B-B**  
 N.T.S.

**-PUMP DATA-**

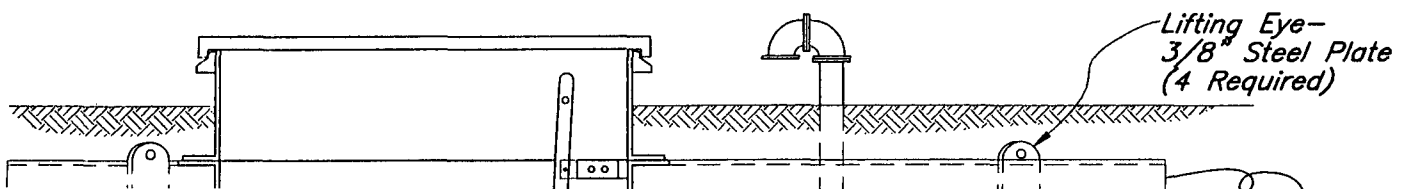
Type: Horizontal, Close Coupled,  
 End Suction, Centrifugal  
 Pump No. 1 & 2:  
 Capacity: 420 G.P.M. at 77.2 Feet T.D.H.  
 Size: 3" x 4" x 10"  
 Motor: 15.0 H.P., 1750 R.P.M.

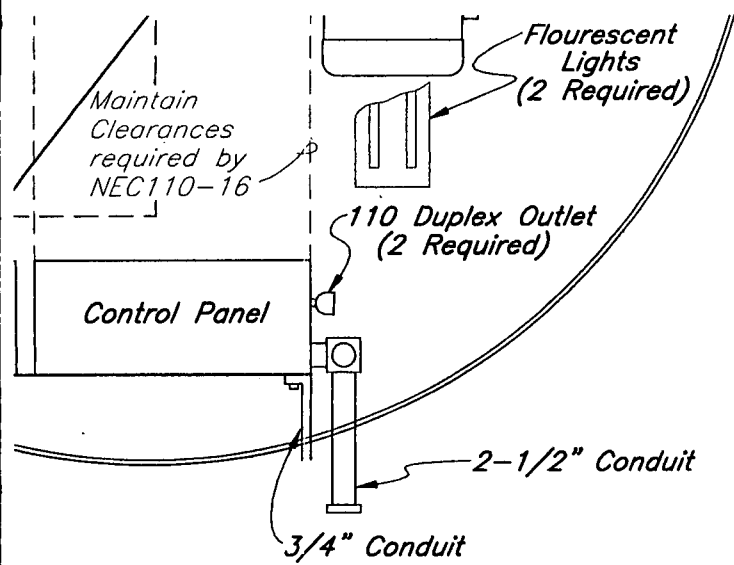
**-GENERAL NOTES-**

**OTHER MAJOR COMPONENTS-**

- Valves *Wafer Type, w/bronze disc & lever operator; APCO, et. al.*
- Valves *Wafer-type, non-slam; Valmatic, APCO, et. al.*
- Couplings } *Flange Coupling Adapters shown; by American, Dresser, et. al. --- flexible couplings for steel pipes; by Victaulic, Style 75 (for 3" & 4") and Style 77 (for 6"), or equal by Tyler (No. 500), et. al.*
- Diffusers } *aka Suction Diffusers w/6"x4" reduction; Mueller #1011, Victaulic #731, or equal*
- Gages *4-1/2" Dial w/1/4" nipple (for pressures shown) Ashcroft Model 1279ASL, or equal*
- Switches *Allen Bradley Model 836-C5A, or equal*
- Dampener *Ashcroft Model 1106, or equal*
- Heaters *240 V, 10,000 Btu, 3000 W (minimum) Berko Model HUH - 324 SA, or equal*
- Traps *Dual Mount, Steel Squirrel Cage - type Dayton Model 4C-47, or equal*
- Drains *EBCO Model OD-25L, or equal*
- Pumps *Zoeller Model 53, or equal*
- Control Panel
- Power - SKVA (and Panel)

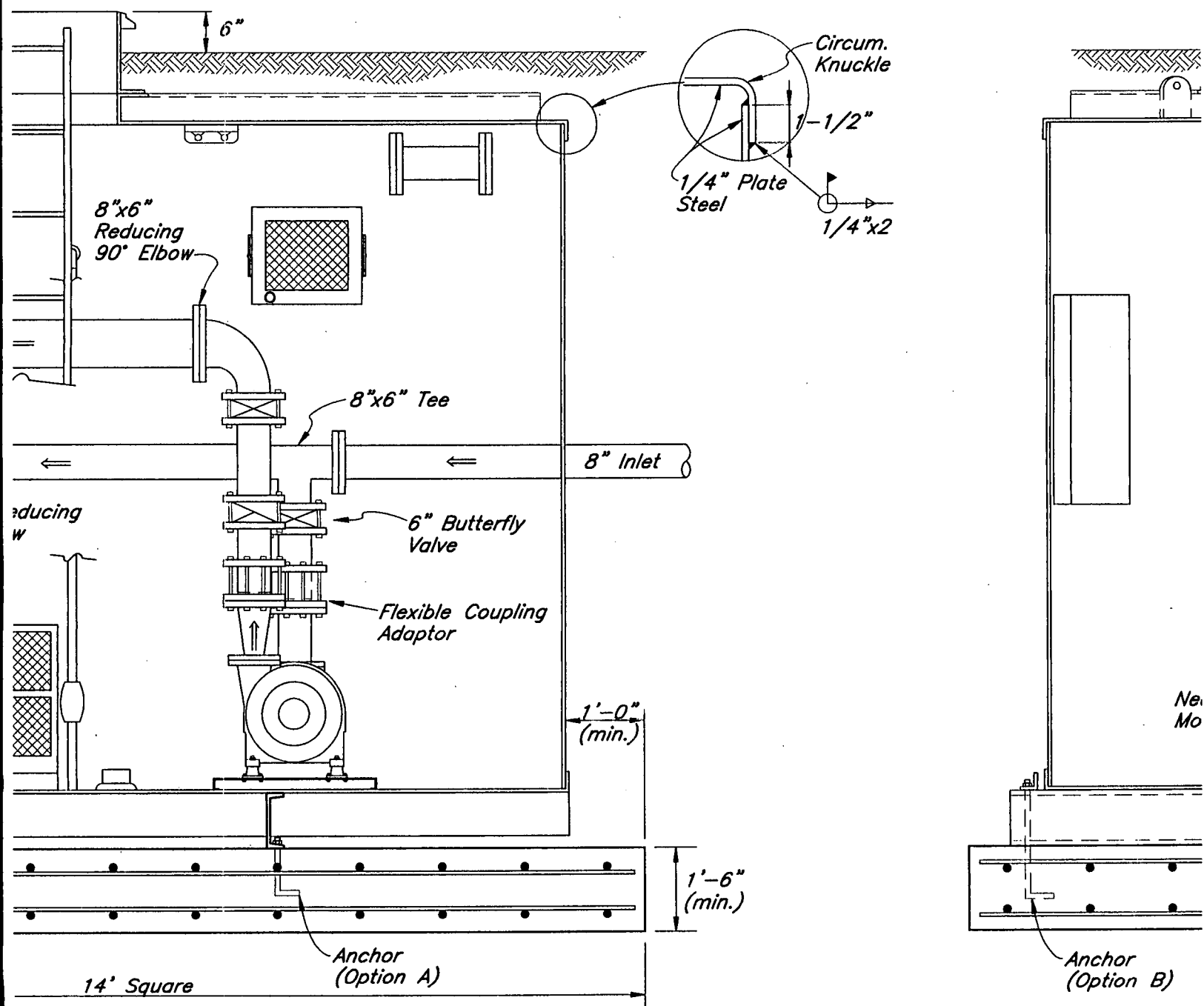
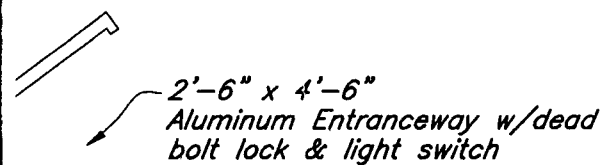
- 1-The Capsule shall be a rolled, vertical, enclosed cylinder fabricated of 1/4" (minimum) thick steel plate.
- 2-The top and bottom of the capsule shall be knuckle radiused forming a lap joint to facilitate machine welding of the lapped side.
- 3-All joints shall be welded both inside and out. Field welding will not be allowed.
- 4-The roof scuttle shall be a Bilco Model MNB-50, or equal, with a dead bolt lock, fitted with a "Best" cylinder (to be re-keyed by the District), and inside safety release.
- 5-Following testing, the capsule shall receive a dual application of an amide-cured epoxy to form an 8-mil dry thickness on all interior and exterior surfaces. Colors to be specified by District.
- 6-All internal transmission piping shall be Schedule 40 seamless steel pipe, supported at least at four places (total) near the pump verticals for both suction and discharge piping.
- 7-For longevity, Steel transmission piping shall be coated factory - applied fusion-bonded epoxy. After coating applied, no welding of these pipes will be allowed.
- 8-Piping, fittings & valves have been drawn utilizing standard flanges and dimensions to assure fit and organization of the available space. The use of welded and threaded fittings, and comparable couplings, is preferred by the District provided the integrity, aesthetics and serviceability of the facility is maintained.
- 9-Exterior piping shall be ductile iron. For connections from station to the existing water main, refer to the schedule shown on Sheet 3 of these Drawings.
- 10-Leveling/anchoring slab to be poured of Class B Concrete (KyTC Spec) and reinforced as shown.
- 11-The CONTRACTOR shall be responsible for providing all materials, equipment, etc. necessary to make the pump controls operational and compatible with the switches



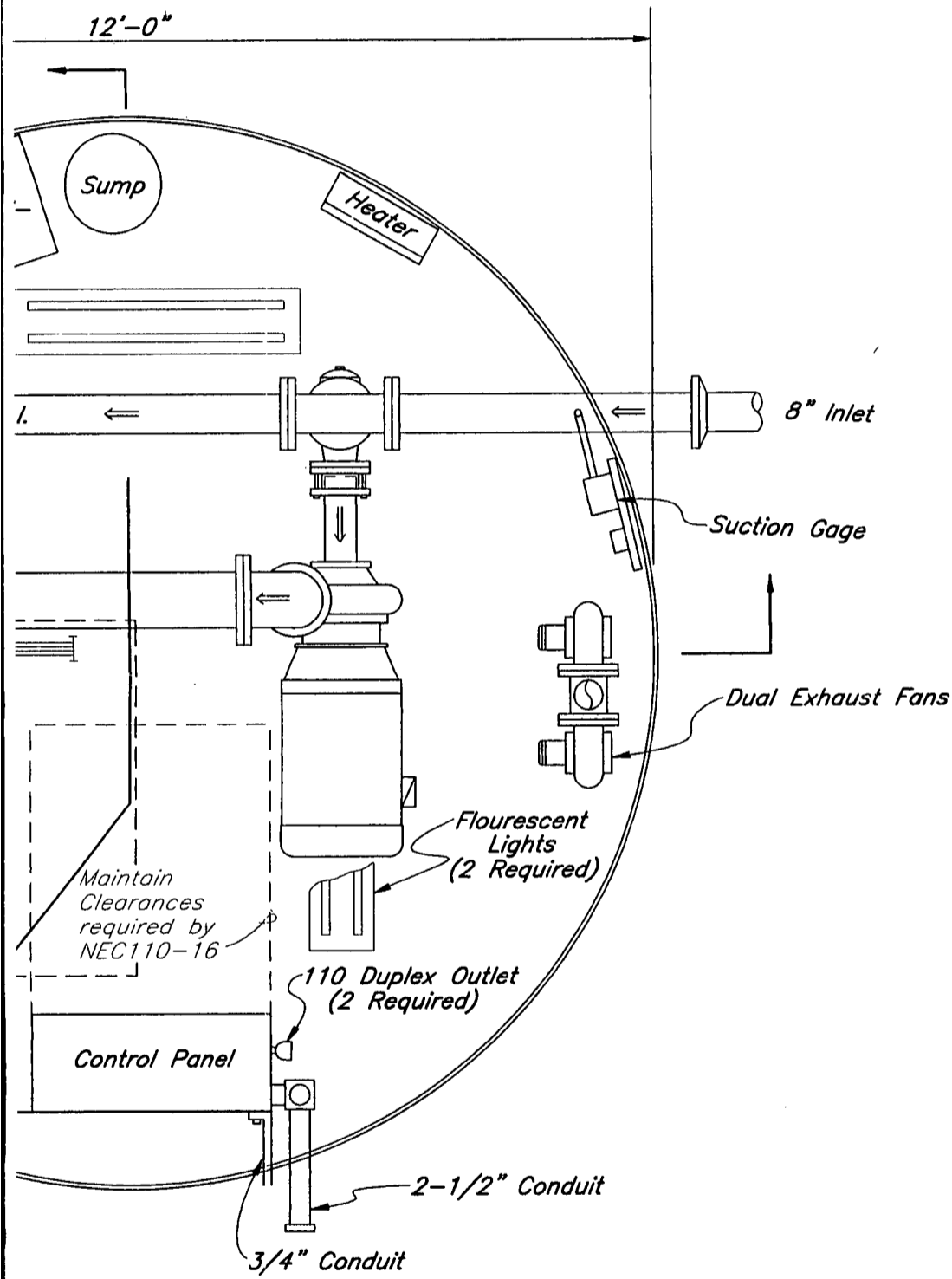


- 2 Pressure Switches
- 2 Pulsation Dampener
- 1 Heater
- 2 Exhaust Fans
- 1 Dehumidifier
- 1 Sump Pump
- 1 Pump Control Panel
- 1 Transformewr - SKVA (Controls and Panel)

**PLAN VIEW**  
N.T.S.



**SECTION A-A**  
N.T.S.



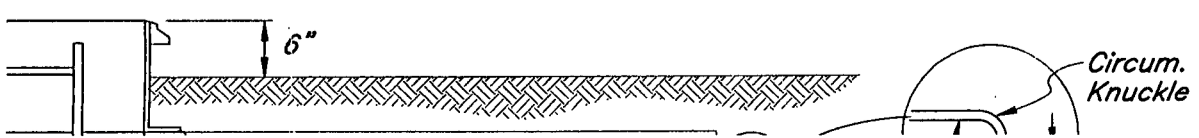
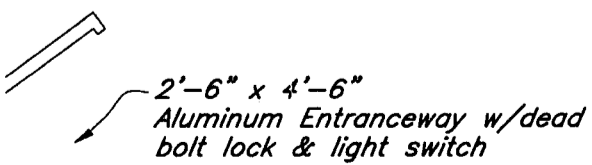
**-PUMP**

Type: Horizontal, Close End Suction, Centrifugal  
 Pump No. 1 & 2:  
 Capacity: 420 G.  
 Size: 3" x 4" x 4"  
 Motor: 15.0 H.P.

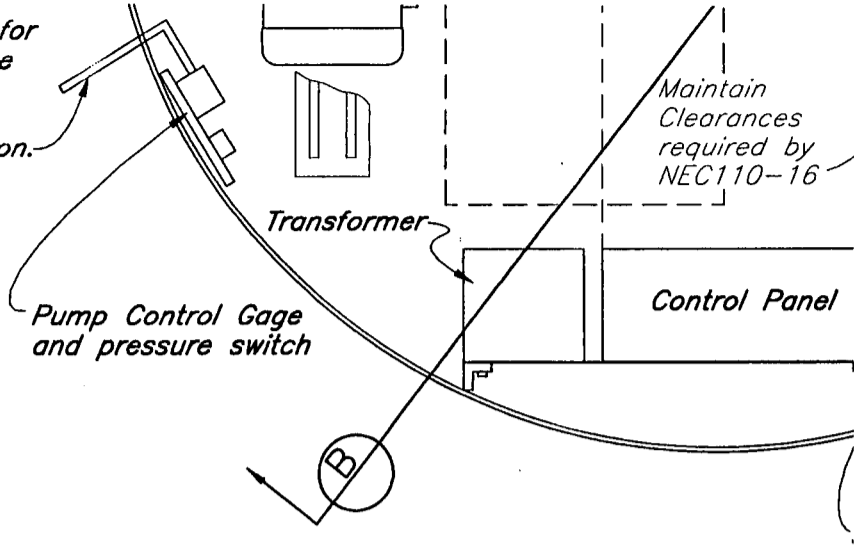
**-OTHER MAJOR**

- 4 6" Butterfly Valves
- 2 6" Check Valves
- 4 6" Flexible Couplings
- 2 4" Flexible Couplings
- 2 Angle Strainers
- 3 Pressure Gages
- 2 Pressure Switches
- 2 Pulsation Dampener
- 1 Heater
- 2 Exhaust Fans
- 1 Dehumidifier
- 1 Sump Pump
- 1 Pump Control Panel
- 1 Transformewr - SKVA (Controls and Panel)

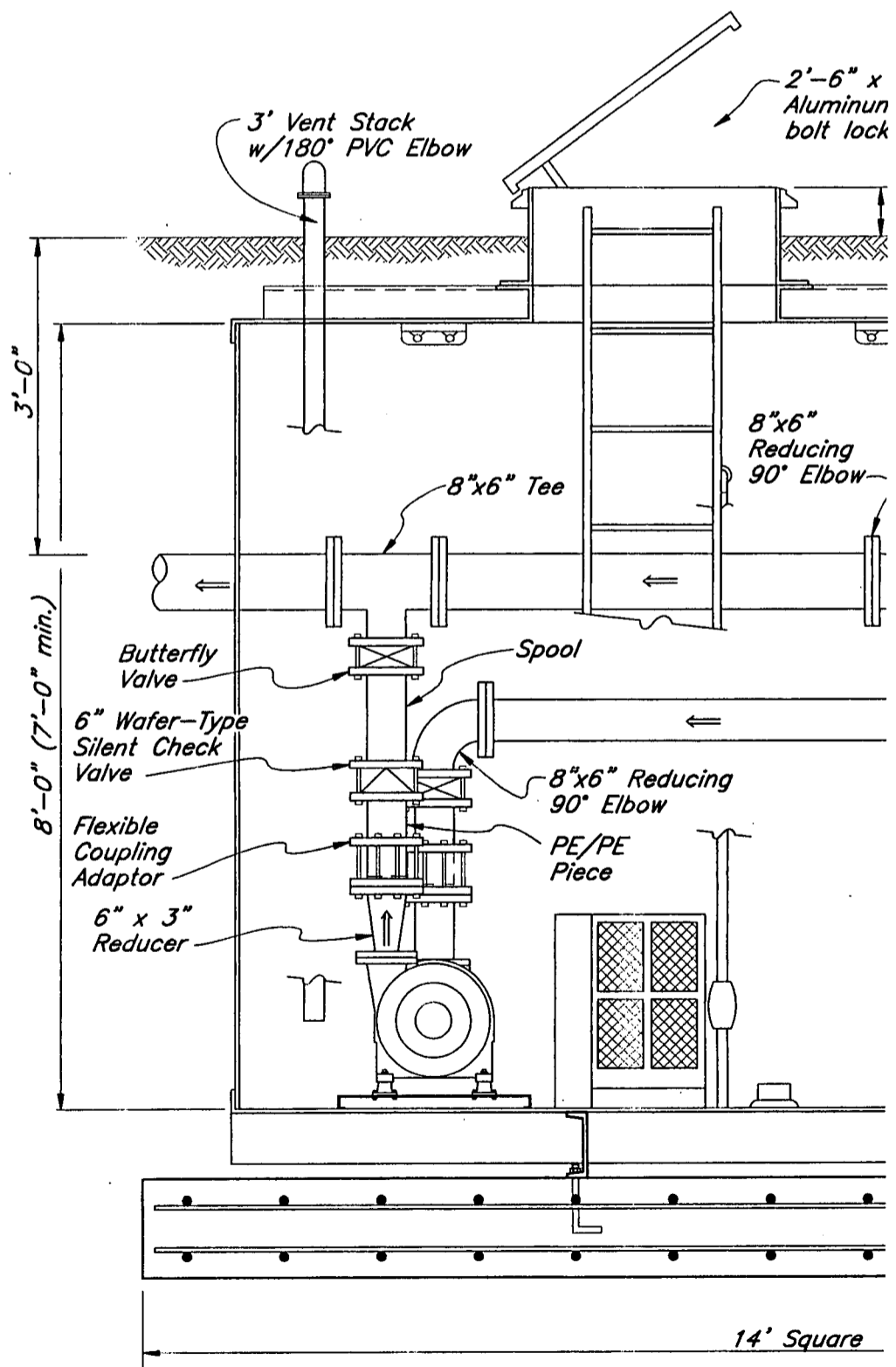
**PLAN VIEW**  
 N.T.S.



1-1/2" Conduit for static sensing line with Water Tight connections and capsule penetration.



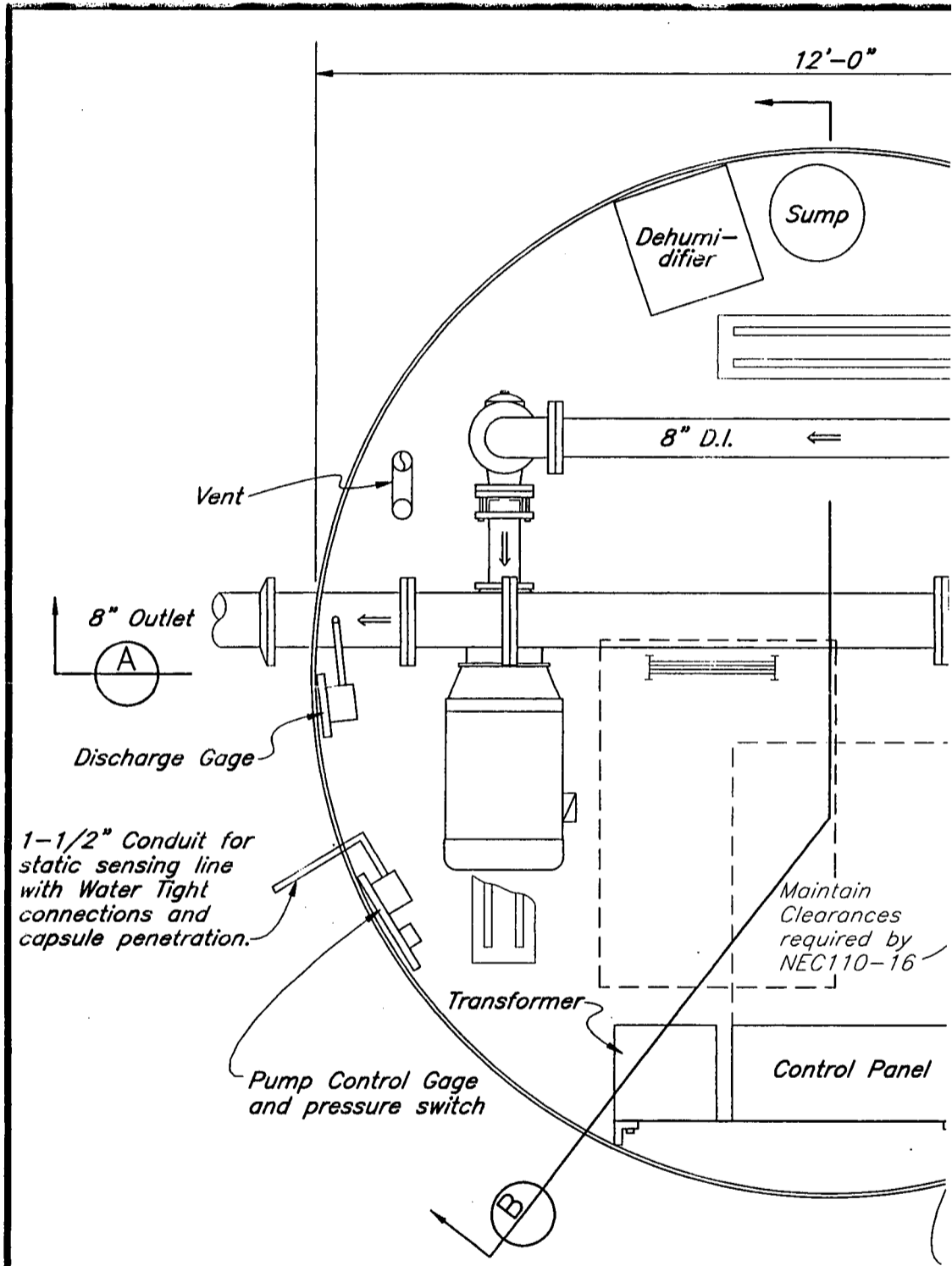
**PLAN VIEW**  
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**SECTION A**

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**PLAN VIEW**  
N.T.S.

