

RECEIVED

MAR 22 2013

PUBLIC SERVICE
COMMISSION

March 19, 2013

Ms. Linda Faulkner
Filings Division Director
KY Public Service Commission
211 Sower Blvd.
PO Box 615
Frankfort, Kentucky 40602-0615

Re: Columbia/Adair Utilities District
Case No. 2013-00095
Response to Filing Deficiencies

Dear Ms. Faulkner:

We offer the following and enclosed in response to the filing deficiencies in your letter dated March 15, 2013:

807 KAR 5:001, Section 15(2)(c):

Enclosed is a full description of the location of the existing 65,000 gallon ground water storage tank that is to be removed and the proposed location of the new 300,000 gallon elevated water storage tank. In addition are the names of the public utility, contractors, and persons with whom the project will have the construction performed in completion.

807 KAR 5:001, Section 15(2)(d):

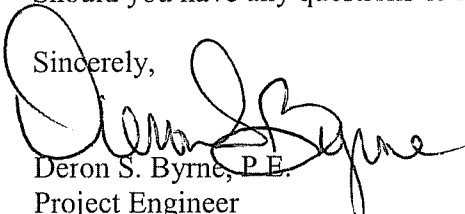
Enclosed are two copies, one paper copy and one electronic format, of the maps to suitable scale showing the location of the new construction of the tank site and the site location of the tank to be removed.

KRS 322.340:

Enclosed is one copy of the engineering plans, specifications, and plat of the proposed construction. All stamped, signed, and dated by a registered engineer in the State of Kentucky.

Should you have any questions or need additional information, please advise.

Sincerely,



Deron S. Byrne, P.E.
Project Engineer

/dsb

Enclosures



Steven L. Beshear
Governor

Leonard K. Peters
Secretary
Energy and Environment Cabinet

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

David L. Armstrong
Chairman

James W. Gardner
Vice Chairman

Linda Breathitt
Commissioner

March 15, 2013

RECEIVED

MAR 22 2013

PUBLIC SERVICE
COMMISSION

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

RE: Case No. 2013-00095
Filing Deficiencies

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

Filing deficiencies pursuant to:

- ✓ 807 KAR 5:001, Section 15(2)(c):
A full description of the proposed location, route, or routes of the new construction or extension, including a description of the manner in which same will be constructed and also the names of all public utilities, corporations, or persons with whom the proposed new construction or extension is likely to compete.
- ✓ 807 KAR 5:001, Section 15(2)(d):
Two copies, one electronic and one in paper format, of maps to suitable scale showing the location or route of the proposed new construction or extension, as well as the location to scale of like facilities owned by others located anywhere within the map area with adequate identification as to the ownership of the other facilities.
- ✓ KRS 322.340:
Engineering plans, specifications, plats and report of the proposed construction. The engineering documents prepared by a registered engineer, must be signed, sealed, and dated by an engineer registered in Kentucky.

Honorable W. Randall Jones
March 15, 2013
Page 2

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

Sincerely,



Linda Faulkner
Filings Division Director

COLUMBIA-ADAIR UTILITIES DISTRICT
PHASE 11-2 300,000 GALLON ELEVATED WATER STORAGE TANK
PROJECT FULL DESCRIPTION OF PROPOSED LOCATION
CASE NO. 2013-00095
807 KAR 5:001, SECTION 15(2)(c)

RECEIVED
MAR 22 2013
PUBLIC SERVICE
COMMISSION

Project consists of replacing an abandoned 65,000 gallon ground storage tank with a new 300,000 gallon elevated water storage tank and appurtenances along East Kentucky Highway 80 approximately 10.31 miles east of Columbia, Kentucky, near the Adair/Russell county line. The location of the existing 65,000 gallon tank site lies approximately 320 feet north of East Kentucky Highway 80 and approximately 250 feet west of the Adair/Russell county line (Latitude: 37° 04' 27.90" N, Longitude: 85° 08' 01.45" W). The new proposed 300,000 gallon elevated water storage tank will lie approximately 460 feet north of East Kentucky Highway 80 and approximately 295 feet west of the Adair/Russell County line (Latitude: 37° 04' 28.12" N, Longitude: 85° 08' 01.23" W). Project also consists of demolishing and removal of the existing 65,000 gallon ground storage tank by cutting the existing steel tank construction down and removing from site. In addition, the existing concrete foundation will be removed one foot below existing grade and backfilled with topsoil.

OWNER OF THE UTILITIES:

Columbia/Adair Utilities District
109 Grant Lane / PO Box 567
Columbia, Kentucky 42728
PH: 270-384-2181, Fax: 270-384-3437
Contact: Lennon Stone, Manager

DEMOLITION OF EXISTING TANK:

Iseler Demolition, Inc.
71231 Burlison Lane
Romeo, Michigan 48065
PH: 810-752-7335, Fax: 810-752-7335
PH: 517-428-4216, Fax: 517-428-4216
Contact: Scott Iseler

PROPOSED NEW TANK CONTRACTOR:

Caldwell Tanks, Inc.
4000 Tower Road
Louisville, KY 40219
PH: (502) 964-3361, Fax: 502-966-8732
Contact: Keith Eaton

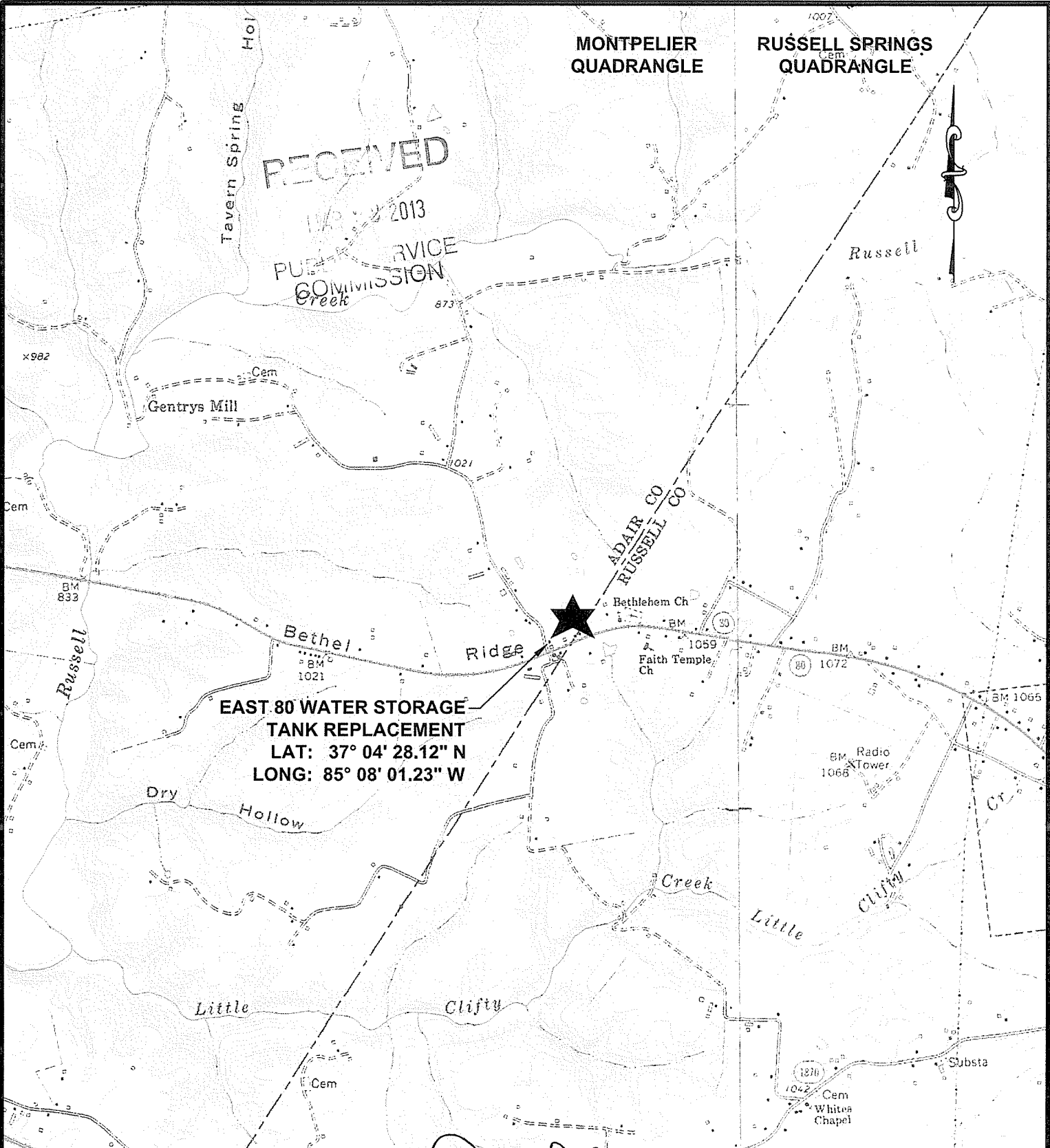


MONTPELIER
QUADRANGLE

RUSSELL SPRINGS
QUADRANGLE

RECEIVED

MAR 2 2013
PUBLIC SERVICE
COMMISSION



**EAST 80 WATER STORAGE
TANK REPLACEMENT**
LAT: 37° 04' 28.12" N
LONG: 85° 08' 01.23" W

SCALE 1" = 2,000'

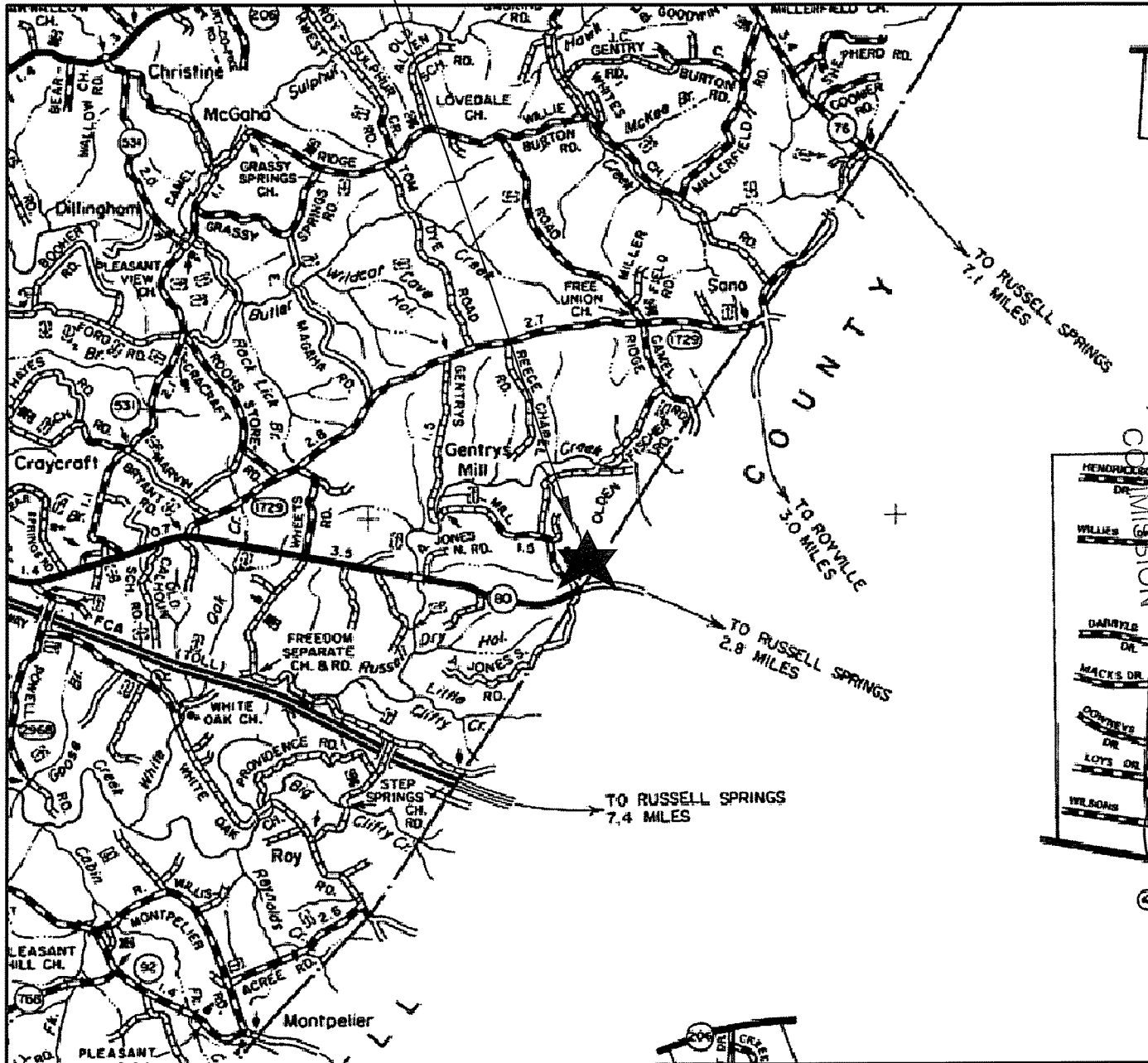
STATE OF KENTUCKY
DERON S. BYRNE
23127
LICENSED PROFESSIONAL ENGINEER
3/19/2013

**EAST 80 WATER STORAGE
TANK REPLACEMENT
COLUMBIA/ADAIR UTILITIES DISTRICT**

M Monarch Engineering, Inc.

556 Carlton Drive
Lawrenceburg, KY

TANK SITE



PUBLIC SERVICE
COMMUNICATIONS

MENORCA DR
WILLIE DR
DARRYL DR
MAC'S DR
CONVEY DR
LOYE DR
WILSONS

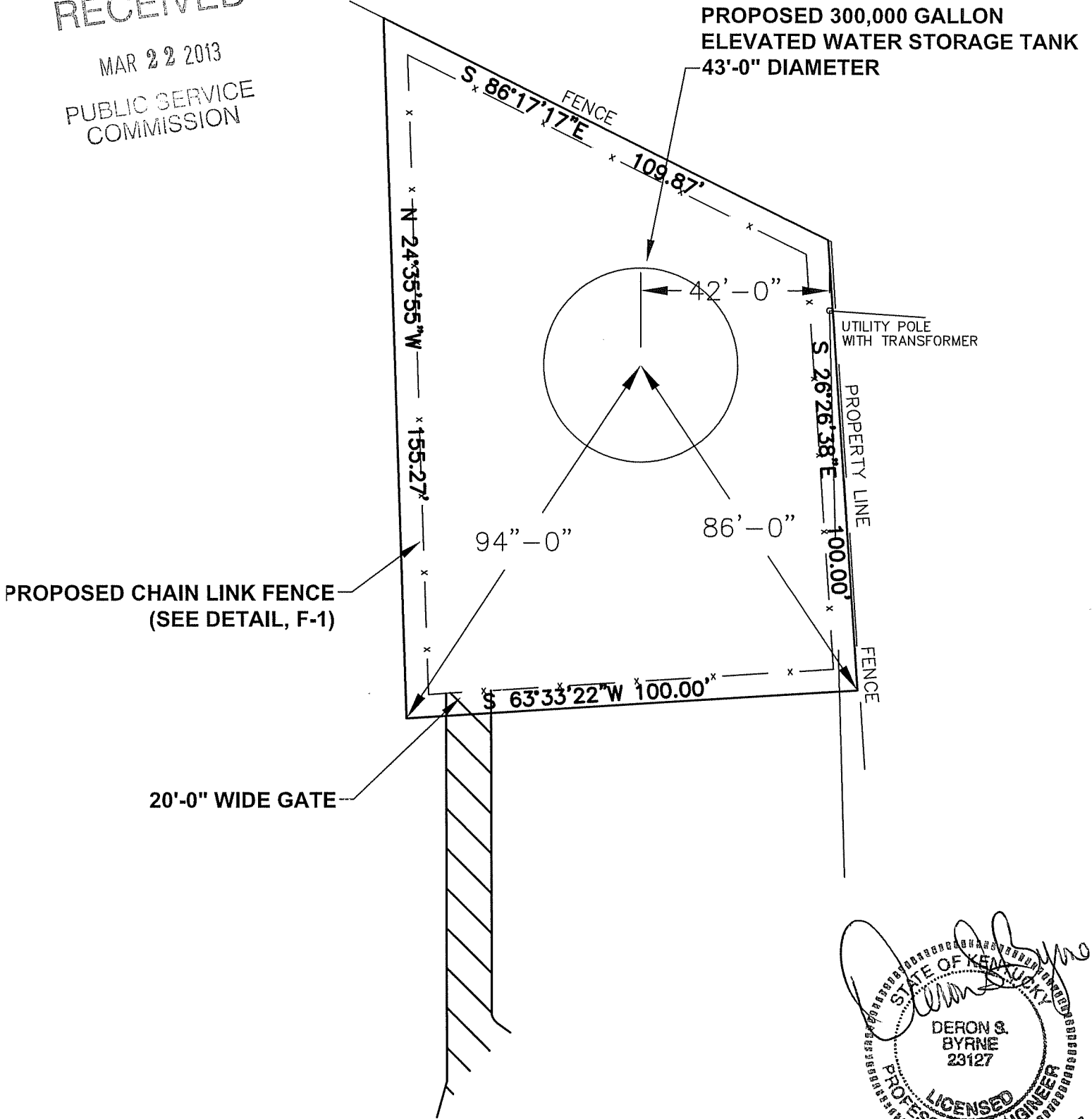
RECEIVED
MAR 22 2013

STATE OF KENTUCKY
DERON S. BYRNE
23127
LICENSED PROFESSIONAL ENGINEER
3/19/2013

RECEIVED

MAR 22 2013

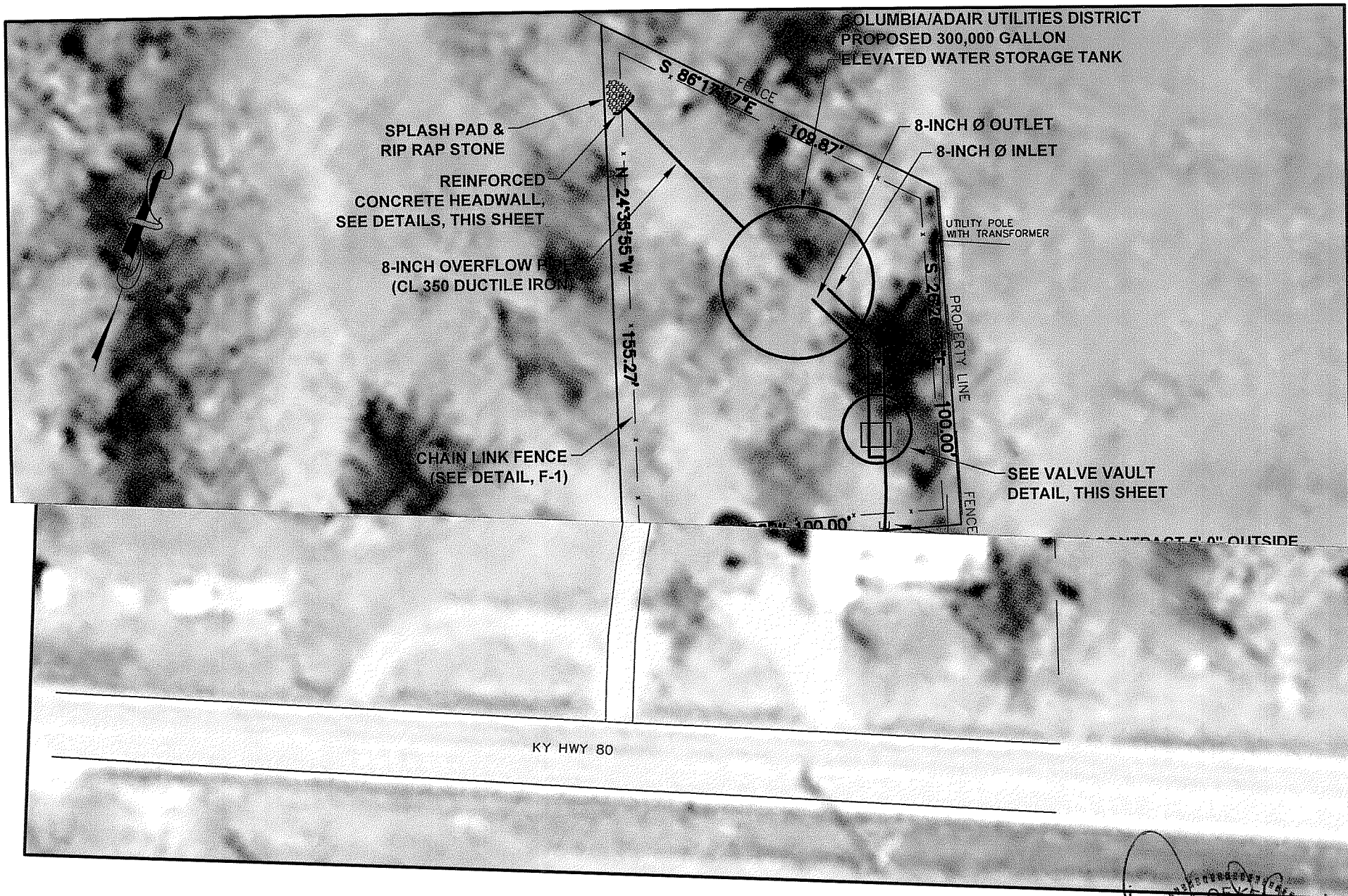
PUBLIC SERVICE
COMMISSION



**EAST 80 300,000 GALLON
WATER STORAGE TANK**

SCALE: 1"=30'

STATE OF KENTUCKY
DERON S.
BYRNE
23127
LICENSED
PROFESSIONAL ENGINEER
3/19/2013



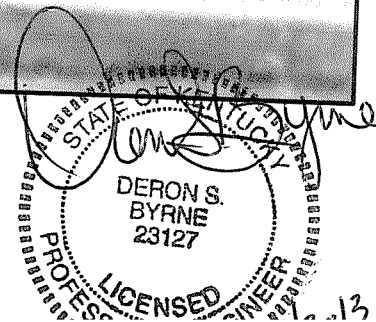
SITE PLAN

SCALE: 1"=40'

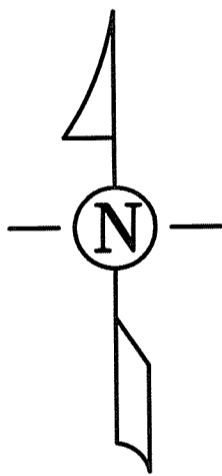
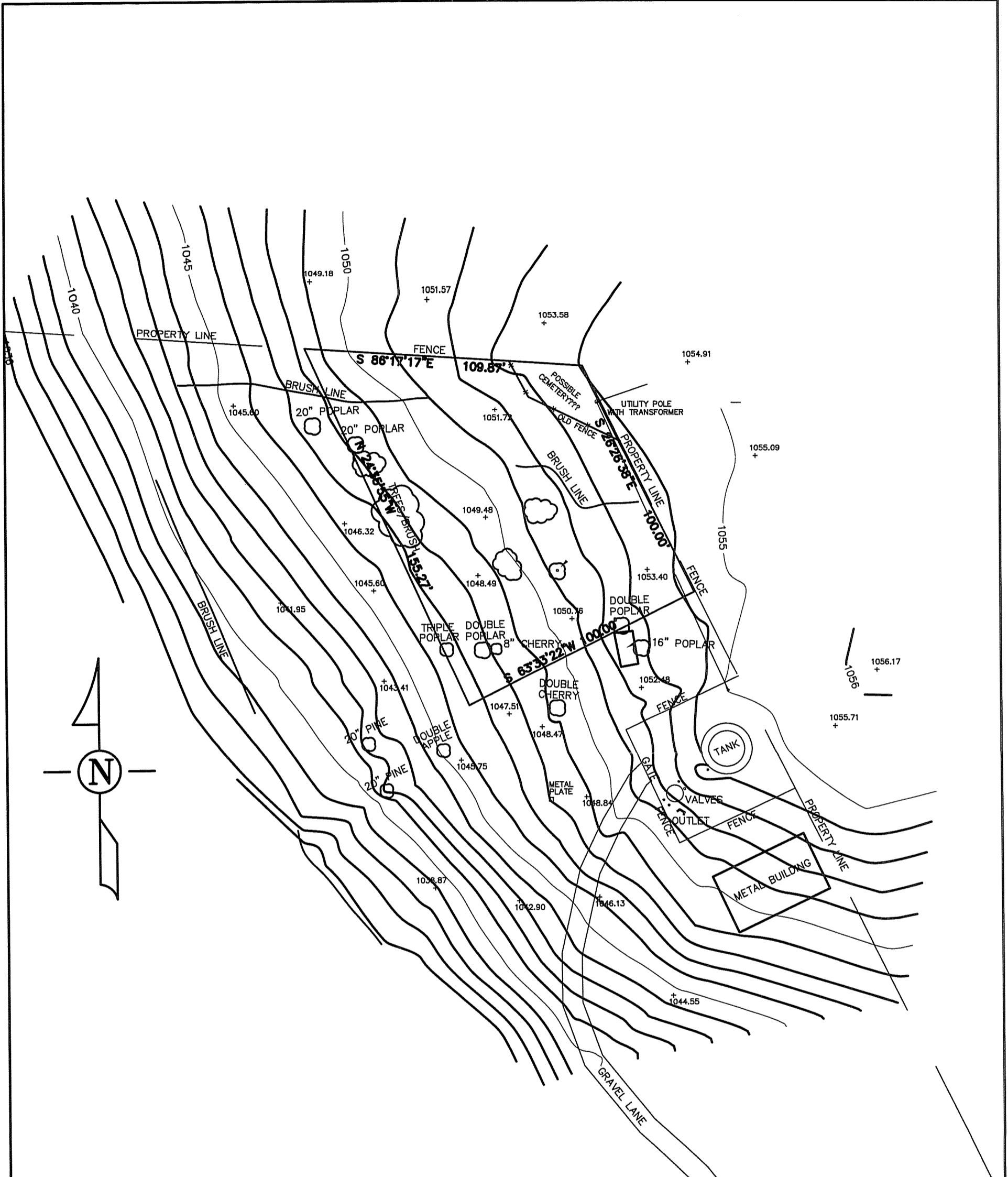
PUBLIC SERV
COMMISSIC

MAR 22 20

RECEIVED



2013



PLAT FOR EAST 80
200,000 GALLON WATER
STORAGE TANK

SCALE: 1"=40'

RECEIVED
MAR 22 2013
PUBLIC SERVICE
COMMISSION

Deron S. Byrne
STATE OF KENTUCKY
DERON S. BYRNE
23127
LICENSED
PROFESSIONAL ENGINEER
3/19/2013

**TECHNICAL SPECIFICATIONS
WATER SYSTEM IMPROVEMENTS
COLUMBIA/ADAIR UTILITIES DISTRICT
ADAIR COUNTY, KENTUCKY**

**EAST KY 80 WATER STORAGE TANK REPLACEMENT
ELEVATED WATER STORAGE TANK**

RECEIVED

MAR 22 2013

PUBLIC SERVICE
COMMISSION

**PROJECT NO.
1050**

NOVEMBER 2012

M
Monarch Engineering, Inc.

Deron S. Byrne
STATE OF KENTUCKY
DERON S.
BYRNE
23127
LICENSED
PROFESSIONAL ENGINEER
3/19/2013

**TECHNICAL SPECIFICATIONS
WATER SYSTEM IMPROVEMENTS
COLUMBIA/ADAIR UTILITIES DISTRICT
ADAIR COUNTY, KENTUCKY**

**EAST KY 80 WATER STORAGE TANK REPLACEMENT
ELEVATED WATER STORAGE TANK**

**PROJECT NO.
1050**

NOVEMBER 2012

TABLE OF CONTENTS

SECTION 1 - ELEVATED STORAGE TANK	SECTION 1-1
SECTION 2 - CAST IN PLACE CONCRETE	SECTION 2-1
SECTION 3 - PIPE WORK	SECTION 3-1
SECTION 4 - SITE WORK	SECTION 4-1
SECTION 5 – TANK DEMOLITION & REMOVAL	SECTION 5-1
SECTION 6 – FLUSH HYDRANT	SECTION 6-1

SECTION 1 - ELEVATED STORAGE TANK

1.0 Work Included. Under this item, the CONTRACTOR shall furnish all labor, tools, materials and equipment necessary to furnish and to erect the elevated storage tank as per the bid schedule and as shown on the drawings complete with foundation and appurtenances. The tank shall be developed and constructed in accordance with AWWA D100-96 or latest revision.

The storage tank required under this item include:

Minimum Volume = 300,000 Gallons

Overflow Elevation = 1170.0 MSL

Tank Height = 120 Feet

For the storage tank, the CONTRACTOR shall be responsible for the overflow pipe, site work, and appurtenances as shown on the Drawings. The location of the yard piping, tank drain line and overflow line shall be field located with the approval of the ENGINEER.

1.1 Tank Foundation. The Contractor shall submit as a part of the shop drawings, a detailed analysis of the foundation on which the tank structure will be supported. This determination shall be as a result of the geotechnical information contained elsewhere in these Contract Documents. In the event that the Contractor is not satisfied that the geotechnical information is sufficient to ensure that the tank will safely rest on the subsurface, the Contractor shall perform additional investigations at his own cost.

The entire work area shall be stripped of all vegetation, roots, and boulders, and the area within which foundations are to be constructed shall be stripped of all top soil to a minimum of six inches deep and excavated until level within three inches. The entire leveled area shall be in layers not exceeding six inches in depth loose and compacted to 90% Modified Proctor. No filling to obtain grade shall be done without the ENGINEER'S supervision.

The concrete foundations and concrete appurtenances shall be constructed for the tank as specified herein. The depth of the concrete foundation shall be 48 inches minimum. The bottom of all foundations shall be at least deep enough to reach undisturbed soil or rock.

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 accordance with these specifications. Reinforcing steel shall conform to these specifications.

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 or pedestals 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.

1.2 Steel Storage Tank. The tank shall be furnished and erected in strict conformity with the current requirements of AWWA D100-96 "Welded Steel Tanks for Water Storage" latest revision. The tank shall be of welded construction.

Each storage tank shall be fabricated, transported and erected on the prepared foundation, as shown on the plans and as specified herein. The steel tank shall be of the volume and dimensions shown in the plans. Bottom plates, shell plates and top plates shall be of the thickness required, but in no case shall plates adjacent to stored water be less than one fourth (1/4) inch in thickness.

A fixed ladder shall be provided on the inside of the tank extending from the manhole in the roof to the bottom of the tank.

The tank shall be furnished with manholes, a vent and finial. Two roof hatches 24-inches square, with locking cover, shall be located on the tank bowl and one shall be located over the inside ladder in the roof in accordance with AWWA D100.

The roof vent shall be capable of reducing dangerous air pressures that could develop by the maximum flow of water either leaving or entering the tank. The vent and finial may be combined. The overflow pipe shall not be considered as a tank vent. The vent and finial shall be so designed as to prevent the ingress of birds, insects, and animals. All screening shall be corrosion resistant.

The storage tank shall be provided with an overflow as shown on the plans. The overflow shall be provided with a weir or funnel at the elevation of high water line.

All hinges, hasps, and similar items shall be constructed using corrosion resistant materials such as brass, stainless steel, or copper.

1.3 Cleaning and Painting. All paint, materials, and methods of cleaning to be used in the shop and field shall conform to the latest edition of AWWA D102-97 "Coating Steel Water Storage Tanks" and as specified herein.

All materials shall be brought to the job site in the original sealed and labeled containers of the paint manufacturer, and shall be subject to inspection by the Engineer on the job. Colors, where not specified, shall be as selected by the Engineer.

The painter shall apply each coating at the rate and in the manner specified by the manufacturer. If material has thickened or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material. Deficiencies in film thickness shall be corrected by the application of an additional coat of paint. Where thinning is necessary, only the products of the manufacturer furnishing the paint, and for the particular purpose, shall be allowed. All thinning shall be done strictly in accordance with the manufacturer's instructions, as well as with the full knowledge and approval of the Engineer. No paint shall be applied when the surrounding air temperature, as measured in the shade, is below 40°F. No paint shall be applied when the temperature of the surface to be painted is below 35°F. Paint shall not be applied to wet or damp surfaces, and shall not be applied in rain, snow, fog or mist, or when the relative humidity exceeds 85%. No paint shall be applied when it is expected that the relative humidity will exceed 85% or that the air temperature will drop below 40°F. within 18 hours after the application of the paint. Dew or moisture condensation should be anticipated, and if such conditions are prevalent, painting shall be delayed until midmorning to be certain that the surfaces are dry. The Contractor shall furnish the necessary measuring equipment to monitor temperature and humidity. Further, the day's painting should be completed well in advance of the probable time of day when condensation will occur, in order to permit the film an appreciable drying time prior to the formation of moisture.

The Contractor shall submit to the Engineer, immediately upon completion of the job, certification from the manufacturer indicating that the quantity of each coating purchased was sufficient to properly coat all surfaces. Such certification shall make reference to the square footage figures provided to the manufacturer and the Engineer by the Contractor.

1.3.1 Paint Certification. The Contractor shall deliver to the Owner all paint, primers, coatings, etc., to be used. The Owner shall then select samples of each coating which will be tested at a laboratory of the Owners choice for verification of the coating material and this cost shall be the responsibility of the Contractor.

1.3.2 Exterior Tank Surfaces. All Exterior painting shall conform to the latest revision of AWWA D-102. The steel surface shall be sand blasted in the shop in accordance with the Steel Structures Painting Council Specifications SSPC-SP6 commercial blast cleaning.

The profile of the steel prepared for painting shall not exceed 2 mils. Within eight (8) hours after the surface preparation, apply on (1) shop coat of Tnemec Series 90-97 primer to a minimum dry film thickness of 2.5 to 3.5 mils. This primer shall be as otherwise specified herein or an approved equal.

A two (2) inch margin around the edge of each plate shall not be primed.

Subsequent to the erection of the structure all welds shall be free of any rough projections and the unprimed margins shall be sand blasted to an SSPC-SP6 commercial grade finish as specified above. The ripples of the weld need not be ground smooth so long as a uniform weld is provided. All surfaces shall be cleaned just before painting and all unpainted abraded areas cleaned as above to remove any oxides which may have formed. Feather all edges of existing primer to remove any loose or lifted primer. All dirt, slag, blast products and other foreign debris shall be removed from the tank bottom and riser pipe prior to any painting work.

Prior to applying subsequent fieldcoats make sure all metal surfaces are clean and dry.

Apply Tnemec Series 90-97, or equal, on all blasted areas to a dry film thickness of 2.0-3.0 mils. Allow 12 hours before applying topcoat.

Apply one intermediate coat of TNEMEC Series 66 Epoxoline, or equal, to a dry film thickness of 2.0-3.0 mils.

Apply one finish coat of Tnemec Series 73/74, or equal, to a dry film thickness of 2.0-3.0 mils.

The total dry film thickness of the exterior coating system shall not be less than 6.5 mils.

1.3.3 Interior Tank Surfaces. All interior painting shall conform to the latest revision of AWWA D-102.

The profile of the steel prepared for painting shall not exceed 2 mils.

Within eight (8) hours after the surface preparation, apply one (1) shop coat of Tnemec Series 20-1255 Potapox Beige primer to a minimum dry film thickness of 3.0-5.0 mils. This primer shall be as otherwise specified herein or an approved equal. If more than one (1) coat is necessary to obtain the specified thickness, a second coat shall be tinted to contrast with the first coat to indicate coverage.

A two (2) inch margin around the edge of each plate shall not be primed.

Subsequent to the erection of structure all welds shall be free of any rough projections and the unprimed shall be sand blasted to an SSPC-SP-10 near white metal finish as specified above. The ripples of the weld need not be ground smooth so long as a uniform

weld is provided. All surfaces shall be cleaned just before painting and all unpainted abraded areas cleaned as above, to remove any oxides which may have formed. Feather all edges of existing primer to remove any loose or lifted primer. All dirt, slag, blast products and other foreign debris shall be removed from the tank bottom and riser pipe prior to any painting work.

Prior to applying subsequent finish coat, make sure all metal surfaces are clean and dry.

Apply Tnemec Series 20-1255 Potapox Beige Primer, or equal, on all blasted areas to a dry film thickness 3.0-5.0 mils.

Apply one finish coat of Tnemec Series 20-AA90 Potapox white, or equal, to dry film thickness of 4.0-6.0 mils.

The total dry film thickness of the interior coating system shall not be less than 7.0 mils.

1.3.4 Tank Lettering. The Contractor shall be prepared to paint the Owners name on two sides of the tank in letter heights that encompass the majority of the side of the tank barrel. The lettering shall be black and a schematic shall be submitted for the Owner's approval as a part of the shop drawings. The lettering shall read "Columbia/Adair Utilities District".

1.4 Hydrostatic Test. Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling tank to its overflow elevation. Any leaks disclosed by this test shall be corrected by the erector in accordance with the manufacturer's recommendations. Water required for testing shall be furnished by the CONTRACTOR. The rates for water used shall be at a rate of \$2.00/1000 gallons. It is anticipated that each tank will be filled twice at the CONTRACTOR'S expense.

1.5 Disinfection. The tank structure shall be disinfected at the time of testing by chlorination in accordance with AWWA Specifications D105 "Disinfection of Water Storage Facilities", latest edition. The CONTRACTOR shall submit as part of his shop drawings the method he intends to use.

1.6 Liquid Level Indicator. The CONTRACTOR shall install a liquid level indicator at the location directed by the ENGINEER. This indicator shall operate over the full height of the tank and shall read in feet.

1.7 Submittal Documents. 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;

- c. list of five (5) tanks presently in potable water service, of size and character specified herein, operating satisfactorily for a minimum of five (5) years.

1.8 Shop Drawings. The CONTRACTOR is required to furnish, for the approval of the Engineer and at no increase in contract price, 5 sets of complete specifications and construction drawings for all work not shown in complete detail on the bidding drawings. This includes all foundations, structural tank details, piping within valve vaults. A complete set of structural calculations shall be provided for the tank structure and foundation. All such submissions shall be stamped by a Registered Professional Engineer licensed in the state of project location, as well as, by a Registered Professional Engineer employed on the tank manufacturer's engineering staff.

When approved, one set of such prints and submittal information will be returned to the bidder marked "APPROVED FOR CONSTRUCTION" and these drawings will then govern for the work detailed thereon. The approval by the Engineer of the tank supplier's drawings shall be an approval relating only to their general conformity with the bidding drawings and specifications and shall not guarantee detail dimensions and quantities.

1.9 Payment. Payment for this item shall be at the Unit Price Bid as shown in the Bid Proposal.

SECTION 2 - STRUCTURAL CONCRETE

2.0 Work Included. Under this section the Contractor shall provide all labor, tools, equipment and materials to place concrete at the locations as shown on the Drawings. This shall include formwork, concrete specifications, reinforcement, finishes and any work related to the placement of concrete.

2.1 Quality Assurance.

2.1.1 Consistency. Concrete shall be of such consistency that it can be worked readily into all parts of the forms and around embedded work, without permitting the materials to segregate, or free water to collect on the surface.

2.1.2 Compression Tests. During the progress of work, at least one set of three compression test cylinders shall be made for each 50 cubic yards of structural concrete or major fraction thereof, and not less than one such set for each type of concrete for each days pouring. Cylinders made in the field shall be made and cured in accordance with the ASTM Standard Method of Making and Curing Concrete Test Specimens in the Field, designation C31, except that wherever possible molds shall be left on cylinders until they reach the laboratory.

One cylinder of each set shall be broken in accordance with ASTM C-39 at seven days and the other two at 28 days. Two copies of these test results shall be submitted to the Engineer on the same day of the tests.

Additional tests of the in-place concrete shall be made when test results indicate specified concrete strengths and other characteristics have not been attained in the structure. Cored cylinders used to test concrete adequacy shall comply with ASTM C42. All test procedures and results shall be subject to the review and approval of the Engineer. The Contractor shall pay for such tests when unacceptable concrete is verified. On evidence of these tests, any concrete that fails to meet the specified strength requirements shall be strengthened or replaced as directed by the Engineer at the Contractor's expense.

2.1.3 Inserts in Concrete. All castings, inserts, conduits, and other metalwork shall be accurately built into or encased in the concrete by the Contractor as directed and all necessary precautions shall be taken to prevent the metalwork from being displaced or deformed. The installation shall be inspected before concrete is placed. All anchor bolts shall be set by means of substantial templates.

2.1.4 Testings. Concrete testing shall be performed by a testing agency hired by the Contractor, at his expense.

The testing agency shall perform the following tests on the sampled concrete:

- a. Slump
- b. Air Content
- c. Concrete Temperature
- d. Compression Test of Cylinders

If, in the opinion of the Engineer, there is reasonable doubt that the concrete aggregates comply with ASTM C33, the testing agency shall test the fine aggregate and coarse aggregate for compliance with these specifications.

Upon completion of the tests, written reports shall be submitted to the Engineer clearly identifying the tests performed, the results, and the batch of concrete in which the tests were performed.

2.2 Concrete Mix. Structural concrete of the various classes required shall be proportioned by Section 3.9 of ACI 301 to produce the following 28-day compressive strengths:

Selection of Proportions for Class A Concrete:

1. 4,000 psi compressive for strength at 28 days.
2. Type II cement plus water reducing dispersing agent and air. Type I cement may be used if the C3A content of the cementitious material is less than 8 percent.
3. Maximum (water)/(cement and water reducing dispersing agent) ratio = 0.45.
4. Minimum cement content = 564 lbs. (6.0 bags)/cu. yd. concrete.
5. Nominal maximum size coarse aggregate = No. 67 (3/4" maximum).
6. Air content = 6% plus or minus 1% by volume.
7. Slump = 2" - 3" in accordance with ASTM C-143.

2.2.1 Grout. Provide the following grout mixture at locations noted on the plans to be grouted, such as fillets, tank and trough bottoms:

- (1) Less than 2" in depth

<u>Material</u>	<u>Volume</u>
Cement	1 part
Sand	2 part
Water = 5 gals./100 lbs. cement	

- (2) From 2" to 12" in depth

<u>Material</u>	<u>Volume</u>
Cement	1 part
Pea Gravel	2.5 parts
Sand	2 parts
Water = 5 gals./100 lbs. cement	

- (3) Greater than 12" in depth

Material

Class A Concrete

The grout mixtures shown above are not to be used in areas that are to receive non-shrink grout.

Grout fill which is formed in place by using rotating equipment as a screed shall be mixed in proportions and consistencies as required by the manufacturer or supplier of the equipment.

2.2.2 Admixtures. An air entraining admixture shall be used on all concrete and shall be the Master Builders MB-VR, or MicroAir, Euclid Chemical Company AIR-MIX, W. R. Grace Darex, or equal. The admixture shall meet the requirements of ASTM C-260. Certification attesting to the percent of effective solids and compliance of the material with ASTM C-260 shall be furnished.

A water-reducing, admixture for concrete shall conform to ASTM C-494 for type A (water-reducing and normal setting admixtures) and shall be Master Builders Pozzolith 344N, Nox-Crete Plastiflow, Plastocrete 161 by Sika, or an approved equal. The water-reducing, set retarding mixture for concrete shall conform to ASTM C-494 for Type D (water-reducing and retarding admixtures) and shall be Master Builders, Pozzolith 100-XR, Daratard-17 by W. R. Grace, or an approved equal. Certification shall be furnished attesting that the admixture exceeds the physical requirements of ASTM C-494, Type A, water-reducing and normal setting admixture, and when required, for ASTM C-494, Type D, water reducing and retarding admixture when used with local materials with which the subject concrete is composed. The admixture manufacturer shall provide a qualified concrete technician employed by the manufacturer to assist in proportioning concrete for optimum use. He also will be available to advise on proper addition of the admixture to the concrete and on adjustment of the concrete mix proportions to meet changing job conditions.

Where the Contractor finds it impractical to employ fully the recommended procedures for hot weather concreting, the Engineer may at his discretion require the use of a set retardant admixture for mass concrete 2.5 feet or more thick and for all concrete whenever the temperature at the time concrete is cast exceeds 80 degrees F. The admixture shall be selected by the Contractor subject to the review of the Engineer. The admixture and concrete containing the admixture shall meet all the requirements of these specifications. Preliminary tests of this concrete shall be required at the Contractor's expense.

When more than one admixture is used, all admixtures shall be compatible. They should preferably be by the same manufacturer.

Calcium chloride will not be permitted as an admixture in any concrete.

Water-reducing, non chloride, accelerators shall conform to ASTM C-494 Type E and shall be Accelguard 80 by the Euclid Chemical Company or Pozzolith High Early by Master Builders or an approved equal.

2.2.3 Water. The water for concrete shall be clean, fresh, and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances.

2.2.4 Aggregates. Fine aggregates shall be natural and having clean, hard, uncoated grains, and shall be free from injurious amounts of clay, dust, organic matter or other deleterious substances, and shall conform to ASTM C-33. Sand shall be graded as follows:

	<u>Percent</u>
Passing 3/8 Inch Sieve	100
Passing No. 4 Sieve.....	90-100
Passing No. 16 Sieve.....	45-80
Passing No. 50 Sieve.....	5-25
Passing No. 100 Sieve.....	0-8

Coarse aggregates shall be crushed stone having clean, hard, uncoated particles, and shall be free from injurious amounts of soft, friable, thin, elongated or laminated pieces. Coarse aggregates shall conform to ASTM C-33 and shall be graded in accordance with the following:

	<u>Percent by Weight</u>	
	<u>No. 57</u>	<u>No. 67</u>
Passing 1-1/2 Inch Square Sieve.....	100	---
Passing 1-Inch Square Sieve.....	95-100	---
Passing 3/4-Inch Square Sieve.....	---	90-100

Passing 1/2-Inch Square Sieve.....	25-60	---
Passing 3/8-Inch Square Sieve.....	---	20-55
Passing No. 4 Square Sieve	0-10	0-10
Passing No. 8 Square Sieve	0-5	0-5

Refer to the Specification of ACI 301 for maximum size of coarse aggregate.

2.2.5 Aggregates and Determining Proportions. No concrete shall be used in the work until the materials and mix designs have been tested by the testing laboratory and accepted by the Engineer. The Engineer shall have the right to order changes as may be necessary to meet the specified requirements. If concrete of the required characteristics is not being produced as the work progresses, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure concrete of the specified quality. The Contractor shall make such changes at his own expense and no extra compensation will be allowed because of such changes.

2.2.6 Mixing. All central plant and rolling stock equipment and methods shall conform to the Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready Mixed Concrete Assn., as well as the ACI Standards for Measuring, Mixing, Transporting, and Placing Concrete ACI 304R-89, and with the ASTM specification for Ready Mixed Concrete, Designation C94-89b.

2.3 Placing and Compacting Concrete. At least 20 hours before the Contractor plans to make any placement of concrete, he shall notify the Engineer of his intention and procedure. Unless otherwise planned, the work shall be so executed that a section begun on any day shall be completed during daylight of the same day.

Ready mixed concrete shall be transported to the site in watertight agitator or mixer trucks. The quantity of concrete to be mixed or delivered in any one batch shall not exceed the rated capacity of the mixer or agitator for the respective conditions as stated on the nameplates.

Information necessary to calculate the total mixing water shall be recorded on the delivery slip for the Engineer's information. Total mixing water includes free water on the aggregates, water and ice batched at the plant, and water added by the truck operator. The Contractor may request permission to add water at the job site, and when the addition of water is permitted by the Engineer, the quantity added shall be the responsibility of the Contractor and in no case shall the total water per bag of cement exceed that determined by the designed mix. Mixing and discharge time shall be as recommended in ACI-304.

Concrete which has become compacted or segregated during transportation to or on the site of the work shall be satisfactorily remixed just prior to being placed in the forms.

Partially hardened concrete shall not be deposited in the forms. The retempering of concrete which has partially hardened (that is, the remixing of concrete with or without additional cement, aggregate, or water) will not be permitted.

The concrete shall be mixed only in the quantity required for immediate use. Concrete that has developed an initial set shall not be used. The Contractor shall have sufficient plant capacity and transporting apparatus to insure continuous delivery at the rate required.

The temperature of the concrete mixture immediately before placement shall be between 50 degrees F and 90 degrees F.

Concrete that is truck mixed or transported in truck mixers or truck agitators shall be delivered to the site of the work and discharge completed in the forms within 1 1/2 hours or before the drum has revolved 300 revolutions whichever comes first after the introduction of the mixing water to the cement and aggregates, or the introduction exceeds 85 degrees F, the time shall be reduced to 45 minutes. Concrete shall be placed in the forms within 15 minutes after discharge from the mixer at the job site.

If concrete is placed by pumping, no aluminum shall be used in any parts of the pumping system which contact or might contaminate the concrete. Aluminum chutes and conveyors shall not be used.

No concrete shall be placed on frozen subgrade or in water, or until the subgrade, forms, and preliminary work have been accepted. No concrete shall be placed until all materials to be built into the concrete have been set and have been accepted by the various trades and by the Engineer. All such materials shall be thoroughly clean and free from rust, scale, oil, or any other foreign matter.

Forms and excavations shall be free from water and all dirt, debris, and foreign matter when concrete is placed. Except as otherwise directed, wood forms and embedded wood called for or allowed shall be thoroughly wetted just prior to placement of concrete.

Chutes for conveying concrete shall be metal or metal lined and of such size, design and slope as to ensure a continuous flow of concrete without segregation. The slope of chutes shall have approximately the same slope. The discharge end of the chute shall be provided with a baffle, or if required, a spout and the end of the chute or spout shall be kept as close as practicable to, but in no event more than 5 feet above the surface of the fresh concrete. When the operation is intermittent, the chute shall discharge into a hopper.

In thin sections of considerable height (such as walls and columns), concrete shall be placed in such manner as will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the mass of concrete being placed. To

achieve this end, suitable hopper spouts with restricted outlets, etc. shall be used as required or permitted unless the forms are provided with suitable openings.

Chutes, hoppers, spouts, etc. shall be thoroughly cleaned before and after each run and the water and debris shall not be discharged inside the form.

For any one placement, concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section, and so as to maintain until the completion of the unit, an approximately horizontal plastic surface.

No wooden spreaders shall be left in the concrete.

During and immediately after being deposited, concrete shall be thoroughly compacted by means of suitable tools and methods, such as internal type mechanical vibrators operating at not less than 5,000 rpm or other tool spading to produce the required density and quality of finish. Vibration shall be done only by experienced operators under close supervision and shall be carried in such manner and only long to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents, "pumping" of air, or other objectionable results. All vibrators shall be supplemented by proper spade puddling approximately 2 to 3 inches away from forms to remove included bubbles and honeycomb. Excessive spading against the forms, causing the deposition of weak mortar at the surface shall be avoided.

The concrete shall be thoroughly rodded and tamped about embedded materials so as to secure perfect adhesion and prevent leakage. Care shall be taken to prevent the displacement of such materials during concreting.

The distance between construction joints shall not exceed 25 feet for all concrete construction and not less than 48 hours shall elapse between casting of adjoining units unless these requirements are waived by the Engineer. Provision shall be made for jointing successive units as indicated or required. Where joints are not shown on the Drawings, they are required to be made at a spacing of approximately 25 feet. Additional construction joints required to satisfy the 25 foot spacing shall be located by the Contractor subject to the review of the Engineer. The Contractor shall submit for review Drawings separate from the steel reinforcing Drawings, showing the location of all proposed construction joints. All construction joints shall be prepared for bonding as specified in ACI 301 for Bonding Concrete at Construction Joints. Joints in walls and columns shall be maintained level.

The subgrades for slab on grade for the plant works building only shall be covered with a vapor barrier consisting of a 6 mil minimum thickness polyethylene sheet with joints lapped a minimum of 12 inches unless otherwise required or permitted.

2.4 Bonding Concrete at Construction Joints. In order to secure full bond at construction joints, the surface of the concrete previously placed (including vertical, inclined, and substantially horizontal areas) shall be thoroughly cleaned of foreign materials and laitance, if any. The previously placed concrete at the joint shall be damp but free of standing water. The surface shall be prepared as per ACI 301. The referenced cement grout shall be between one and two inches thick on all wall pours. Waterstops shall be used on all construction joints.

2.5 Sealing Concrete at Construction Joints. All Construction joint surfaces shall receive Sikaflex-2C NS Polyurethane Elastomeric sealant or approved equal. Surface preparation and manufacturer's specified primer shall be applied in accordance to the manufacturer's recommendations. Minimum joint size shall be 1/4" deep by 1/2" wide unless shown otherwise on the Drawings.

2.6 Curing and Protection. All concrete, particularly slabs and including finished surfaces, shall be treated immediately after concreting or cement finishing is completed, to provide continuous moist curing for at least seven days, regardless of the adjacent air temperature. Walls and vertical surfaces may be covered with continuously saturated burlap, or kept moist by other acceptable means. Horizontal surfaces, slabs, etc. shall be ponded to a depth of 1/2" wherever practicable, or kept continuously wet by the use of lawn sprinklers, a complete covering of continuously saturated burlap, or by other acceptable means.

For at least seven days after having been placed, all concrete shall be so protected that the temperature at the surface will not fall below 45 degrees F. No manure, salt, or other chemicals shall be used for protection. The above mentioned seven day periods may be reduced if compression tests, in accordance with ASTM C-39, on field cured cylinders indicate that expected seven day strength gain has been achieved, and approval is granted by the Engineer. Wherever practicable, finished slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

2.7 Trimming and Repair of Surface Defects. The Contractor shall use suitable forms, mixture of concrete, and workmanship so that concrete surfaces, when exposed, will require no patching. Concrete which, in the opinion of the Engineer has excessive honeycomb, aggregate pockets, or depressions will be rejected and the Contractor shall, at his own expense, remove the entire section containing such defects and replace it with acceptable concrete. As soon as the forms have been stripped and concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties shall be filled and surface defects which do not impair structural strength shall be repaired.

Defective concrete shall be cut perpendicular to the surface until sound concrete is reached, but not less than 1" deep. The remaining concrete shall be thoroughly roughed and cleaned. Concrete in an area at least 6" wide surrounding the area to be patched shall be dampened. A bonding grout shall be prepared using a mix of approximately one part

cement to one part fine passing a No. 30 mesh sieve, mixed to the consistency of thick cream, and then well brushed into the surface. The patching mixture shall be made of the same materials and approximately the same proportions as used for the concrete except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one part cement to 2 1/2 parts sand by damp loose volume. White portland cement shall be substituted for a portion of the gray portland cement on exposed concrete in order to produce a color matching the color of the surrounding concrete. The quantity of mixing water shall be no more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.

After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least one hour before being finally finished. The patched area shall be kept damp for seven days. Metal tools shall not be used in finishing a patch in a formed wall which will be exposed.

After being cleaned and thoroughly dampened, the tie holes shall be filed solid with patching mortar.

The use of mortar patching as above specified shall be confined to the repair of small defects in relatively green concrete. If substantial repairs are required, the defective portions shall be cut out to sound concrete and the defective concrete replaced by means of gunite, or the structure shall be taken down and rebuilt, all as the Engineer may decide or direct.

2.8 Concrete Finishes. All concrete exposed to view in the completed structures shall be produced using materials and workmanship to such quality that only nominal finishing will be required. The provisions of paragraphs 13.3, 13.4 and 13.6 of ACI 301 shall apply to all exterior exposed to view concrete surfaces, including the outside surfaces of tanks.

All formed, exterior, exposed to view, concrete shall be prepared, then rubbed. Exterior vertical surfaces shall be rubbed to one foot below grade. Interior vertical surfaces of dry pits shall not be rubbed. Interior vertical surfaces of open topped liquid containers shall be rubbed to one foot below the minimum liquid level that will occur during normal operations. Walls inside a building shall not be rubbed. Overhead slabs (exterior or interior) shall not be rubbed.

All vertical surfaces below minimum liquid level in liquid containing structures and all other surfaces that are not to be rubbed shall have a smooth form finish.

All smooth form concrete vertical surfaces shall be true plane within 1/4" in 10 feet as determined by a 10 foot straight edge place anywhere on the surface in any direction. Abrupt irregularities shall not exceed 1/8". Basin, flume, conduit and tank floors shall have a "troweled" finish unless shown otherwise on Drawings. Weirs and overflow surfaces shall be given a troweled finish.

Exterior platforms, steps and landings shall be given a broom finish. Broom finish shall be applied to surfaces which have been steel troweled to an even smooth finish. The troweled surface shall then be broomed with a fiber bristle brush in the direction transverse to that of the main traffic.

Walking surfaces of slabs shall have a troweled finish unless shown otherwise on Drawings.

Nox-Crete Harbeton, Chem Hard by L & M Construction Chemicals, Lapidolith by Sonneborn hardener treatment, or an approved equal shall be applied to all exposed concrete floors in occupied spaces. The floors shall be thoroughly cured, cleaned, and perfectly dry with all work above them completed. The hardener shall be applied evenly and freely and in conformance with manufacturer's instructions, using not less than three coats, allowing 24 hours between coats. One gallon of hardener shall cover not more than 100 square feet. After the final coat is completed and dry, surplus hardener shall be removed from the surface of the concrete by scrubbing and mopping with water.

2.9 Concrete Form Materials. Plywood shall be Douglas Fir species, medium density overlaid one side grade; sound, undamaged sheets with straight edges. Forms shall be sufficiently rigid to prevent displacement or sagging between supports, and so constructed that the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy. For surfaces to be given rubbed finish, the form in contact with the concrete shall be made of plywood, metal, metal framed plywood faced, or other acceptable panel-type materials, to provide continuous straight, smooth, exposed surfaces. Forms shall not be pieced out by use of material different from those in the adjacent form or in such manner as will detract from the uniformity of the finished surface. For surfaces other than those to be given rubbed finish, forms shall be made of wood, metal or other acceptable material. Wooden forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots. Plywood shall be in reasonably good condition. Metal forms shall be of an acceptable type for the work involved.

Form ties to be encased in concrete shall not be made of through bolts or common wire, but shall be of a well established type, so made and installed as to embody the following features:

1. After removal of the protruding part of the tie, there shall be no metal nearer than 1-1/2" to the face of the concrete.

2. That part of the tie which is to be removed shall be at least 1/2" in diameter, or if smaller, it shall be provided with a wood, metal, or plastic cone 1" long placed against the inside of the forms. Cones shall be carefully removed from the concrete after the forms have been stripped.
3. Ties which pass through walls of liquid retaining basins and all dry rooms below grade shall be provided with acceptable water stop, securely fastened to the ties.

The Form Release Agent shall be a colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete. Acceptable products include Nox-Crete Form Coating Release Agent, Debond Form Coating by L & M Construction Chemical, Inc., or approved equal.

Fillets for chamfered corners shall be wood strip type to the size and shape as shown on the Drawings.

Nails, spikes, lag bolts, through bolts and anchorages shall be sized as required of strength and character to maintain formwork in place while placing concrete.

Earth or rock forms shall not be permitted. The vertical surface of all footings shall be formed.

Forms for walls, columns, or piers shall have removable panels at the bottom for cleaning, and inspection. Forms for thin sections (such as walls or columns) of considerable height shall be arranged with suitable openings so that the concrete can be placed in a manner that will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the fresh concrete, unless special spouts are used to place concrete and so that construction joints can be properly keyed and treated. Forms for exposed surfaces shall be built with 3/4" chamfer strips attached to produce smooth, straight chamfers at all sharp edges of concrete.

Before form material is reused, all surfaces that are in contact with the concrete shall be thoroughly cleaned, all damaged places repaired, and all projecting nails withdrawn.

2.9.1 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 three 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.

2.9.2 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 degrees F.:

<u>Element</u>	<u>Time</u>
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 seven 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 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.

2.10 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

2.11 Expansion and Contraction/ Construction Joints. Unless otherwise shown, waterstops for construction and control joints shall be 4 inches wide, 3/16" minimum thickness, flat-ribbed, or dumbbell polyvinyl chloride (PVC), in accordance with Corps of Engineers Specifications CRD-C-572, latest revision, as manufactured by Vinylex Corp., W.R. Grace Company, Greenstreak, or equal. Split-ribbed waterstops may be used where appropriate.

Unless otherwise shown, waterstops for expansion joints shall be nine inches wide, 1/4" minimum thickness, ribbed with center bulb polyvinyl chloride (PVC) in accordance with Corps of Engineers Specifications CRD-C-572, latest revision as manufactured by Vinylex Corp., W.R. Grace Company, Greenstreak, or equal.

Only where indicated on the drawings, the Contractor shall install a self-expanding waterstop impregnated with sodium bentonite similar to Volclay Waterstop-RX. The manufacturer's recommended installation procedures shall be followed. Self expanding waterstops shall not be used at expansion joints and water containment structures.

Joint filler shall conform to ANSI/ASTM D994 and they shall be bituminous impregnated fiberboard, closed cell polyethylene or self-expanding cork; of the sizes detailed and in the locations indicated on the Drawings. Bituminous impregnated fiberboard shall not be used to fill joints in liquid retaining structures. Where the application requires cementing the joint filler into place, a pressure sensitive adhesive recommended by the filler manufacturer shall be used.

2.12 Reinforcing Steel. The Contractor shall place reinforcing steel at the location as shown on the Drawings.

2.12.1 Materials. The minimum yield strength of the reinforcement shall be 60,000 pounds per square inch. Bar reinforcement shall conform to the requirements of ASTM A-615, A-616, or A-617. All bar reinforcement shall be deformed. Smooth dowels shall be plain steel bars conforming to ASTM A-615, Grade 40. Welded wire fabric when specified shall conform to ASTM 185, welded steel wire fabric for concrete reinforcement. Reinforcements supports and other accessories in contact with the forms for members which will be exposed to view in the finished work shall have approved high density polyethylene tips so that the metal portion shall be at least one quarter of an inch from the form or surface. Supports for reinforcement, when in contact with the ground or stone fill, shall be precast stone concrete blocks.

2.12.2 Fabrication. Reinforcement shall be bent cold. It shall be accurately to the dimensions and shapes shown on the plans and to within tolerance specified in the ACI code and the CRSI Manual of Standard Practice. Reinforcement shall be shipped with bars of the same size and shape, fastened securely with wire and with metal identification tags using size and mark.

2.12.3 Placing and Fastening. Before being placed in position, reinforcement shall be cleaned of loose mill and rust scale, dirt and other coatings that will interfere with development of proper bond. Reinforcement shall be accurately placed in positions shown on the drawings and firmly held in place during placement and hardening of concrete by using annealed wire ties. Bars shall be tied as required to prevent displacement under foot traffic and during casting operations, and shall be placed within tolerances allowed in Section 5.6.2 of ACI 301. Distance from the forms shall be maintained by means of stays, blocks, ties, hangers or other approved supports. If fabric reinforcement is shipped in rolls, it shall be straightened into flat sheets before being placed.

Before any concrete is placed, the Engineer shall have inspected the placing of the steel reinforcement and given permission to deposit the concrete. Concrete placed in violation of this provision will be rejected and thereupon shall be removed.

Unless otherwise specified, reinforcement shall be furnished in the full lengths indicated on the plans. Splicing of bars, except where shown on the plans, will not be permitted

without the approval of the Engineer. Where splices are made, they shall be staggered insofar as possible.

Wire mesh reinforcement shall be continuous between expansion joints. Laps shall be at least one full mesh plus two inches, staggered to avoid continuous lap in either direction and securely wired or clipped with standard clips.

Dowels shall be installed at right angles to construction joints and expansion joints. Dowels shall be accurately aligned parallel to the finished surface, and shall be rigidly held in place and supported during placing of the concrete. One end of dowels shall be oiled or greased or dowels shall be coated with high density polyethylene with a minimum thickness of 14 mils.

2.12.4 Shop Drawings. The Contractor shall submit a complete set of shop drawings including schedules and bending drawings for all reinforcement used in the work in accordance with ACI 315, and ACI 315R. Review of drawings by the Contractor and the Engineer is required before shipment can be made.

2.13 Measurement and Payment. Payment will be based on one of the following criteria as specified and described in the Contract Bid Item Descriptions and on the Drawings:

- A. Cost shall be included in the work to which it is subsidiary and no separate measurement and payment will be made.

Payment as specified above shall be considered as full compensation for all labor, materials, equipment and incidentals necessary to perform the work as required.

Payment for concrete placed outside the lines shown on the Drawings due to over excavation or Contractor error will not be made. Where extra concrete is authorized by the Engineer in writing, payment will be made at a price agreed upon by the Contractor and the Engineer.

SECTION 3 - PIPE WORK

3.0 Work Included. Under these items, the CONTRACTOR shall provide all labor, tools, equipment and materials to furnish and install the process piping as shown on PLANS and as directed.

3.1 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.

3.2 Pipe Specifications.

3.2.1 Polyvinyl Chloride (PVC) Pipe (SDR 17) or (SDR 21) PVC pipe shall comply with ASTM D-1784 for material and shall be Class 250 (SDR 17) or Class 200 (SDR 21) as shown on the PLANS 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)
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 coupling. The bell 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.

3.2.2 Polyvinyl Chloride (PVC) Pipes - C.I. - Pipe Size. This pipe shall meet the requirements of AWWA C900-75, latest revision, "Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4" through 12" for water" and shall be furnished in cast-iron pipe equivalent outside diameters with rubber- gasketed separate couplings.

The pipe shall be made from Class 12454-A or Class 12454-B virgin compounds as defined in ASTM D-1784. The standard code designation shall be PVC 1120. The PVC compounds shall be tested and certified as suitable for potable water products by the NSF Testing Laboratory and shall carry the NSF approval marking.

Solvent-cement couplings or joints shall not be used. PVC joints using elastomeric gaskets shall be tested as assembled joints and shall meet the laboratory performance requirements specified in ASTM D-3139.

Pipe shall be pressure Class 200, DR 14 or Class 150, DR 18 (Dimension Ratio), as shown on the plans or the bid form.

Pipe and couplings shall be marked as follows:

- a. Nominal size and OD base.
- b. Material code designation (PVC 1120).
- c. Dimension ratio number.
- d. AWWA pressure class.
- e. AWWA designation number (AWWA C900).
- f. Manufacturers name or trade-mark and production record code.
- g. Seal of the NSF Laboratory.

Pipe and couplings shall meet or exceed the following test requirements:

<u>Sustained Pressure</u>	=	<u>ASTM D-1598 (1000 Hrs.)</u>
<u>DR</u>		<u>Sustained Pressure</u>
14		650
18		500
<u>Burst Pressure</u>	=	<u>ASTM D-1599 (60-70 seconds)</u>
<u>DR</u>		<u>Minimum Burst Pressure</u>
14		985
18		755

Each standard and random length of pipe shall be proof-tested at four times its rated class pressure for a minimum of 5 seconds. Bells or couplings shall be tested with pipe.

The pipe shall not split, crack, or break when tested by the parallel-plato method as specified by ASTM D-2241.

The pipe shall not flake or disintegrate when tested by the acetone-immersion method as specified in ASTM D-2241.

Pipe shall be furnished in standard laying lengths of 20 ft. \pm 1 in. A maximum of 15 percent of each pipe size may be furnished in random lengths of not less than 10 ft. each.

3.2.3 Ductile Iron Pipe. Ductile iron pipe shall be designed in accordance with AWWA (ASA A21.50) and for pressures and conditions as stated in these specifications or called for on the plans. Ductile iron pipe shall conform to AWWA C-151 (ASA A21.51.). Pipe shall be cement lined in accordance with AWWA C104 (ASA A21.4) and all exposed pipe and fittings shall have a shop prime coat applied that is compatible with the subsequent field enamel paint coats.

The specified thickness will be determined for the given internal and external loading requirements in accordance with ASA A21.50. The class of pipe, wall thickness, and coatings required will be shown on the plans or the bid form for all ductile iron pipe installation.

Pipe may be furnished in 12, 16, 16 1/2, 18 or 20 feet nominal laying lengths.

Hydrostatic and acceptance tests shall be in accordance with AWWA Specification C-106 for "Cast Iron Pipe Centrifugally Cast In Metal Molds" or C-108 for sand molds. The ENGINEER shall be provided with five (5) copies of each of the following tests for each contract involved:

- a. Talbot strip test.
- b. Ring and full length bursting tests.

- c. Chemical analysis of pipe.
- d. Certification that pipe was hydrostatically tested.

Any pipe not meeting the AWWA Specifications quoted above shall be rejected in accordance with the procedure outlined in the particular specifications.

The net weight, class or nominal thickness and sampling period shall be marked on each pipe.

Pipe joints shall be mechanical joint, rubber ring slip joint, flanged, or locked mechanical joint equal to AWWA C- 111.

Exposed piping shall be field painted and the colors shall match that of the existing piping.

3.2.4 Fittings. Cast or ductile iron mechanical joint fittings with appropriate adapters shall be used with PVC pipe. All such fittings shall be approved by the pipe manufacturer, and complete data sent to the ENGINEER, including the manufacturer's approval, for review. Fittings shall comply with AWWA C-110 or C-111 and shall be manufactured for the size and pressure class of the line on which they are used.

Mechanical joint fittings shall be used with ductile iron pipe for below ground burial and flange fittings shall be used for all interior piping where ductile iron pipe is used.

3.2.5 Pipe Handling. Pipe delivered to site in general, will be stored, handled, distributed, placed, joined together, etc. in accordance with the Manufacturer's recommendation unless instructed otherwise by these specifications or by the ENGINEER.

3.3 Process 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.

3.4 Excavation. The CONTRACTOR shall make trench excavations to only such width to provide ample room for proper construction. Sheet piling 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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.

3.9 Bedding. All process lines shall be bedded with 6- inches of #9 or approved equal stone under and on both sides of the pipe where necessary when rock or poor foundation conditions exist.

3.10 Thrust Blocks and Anchorage. Thrust blocks shall be installed whenever the pipe line changes direction, as at tees, 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 new placed 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.

The thrust blocks shall be sized as shown on the DRAWINGS contained elsewhere in these Specifications.

3.11 Backfill. Trenches shall be backfilled and "walked in" at once up to the height specified and shown in the PLANS. 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 500 feet of trench ahead of backfill and cleanup.

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 twelve 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.

The CONTRACTOR shall maintain the job in a neat and cleaned up condition at all times so as to cause minimum nuisance to the people. Procrastination of clean up and repair will not be tolerated. 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 unit 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.

3.12 Temporary Surfacing. All trenches in streets, roads or drives shall, following compacted backfill, receive a top layer of compacted #610 dense grade stone. Such temporary surfacing shall be maintained, including nights and weekends, and such areas shall be paved within two weeks as soon as conditions permit. All public or private drives shall be promptly backfilled or bridged.

3.13 Testing. The water line and appurtenances, as rapidly as valves are installed, shall be tested to the pressure rating of the pipe, or as directed by the ENGINEER, at point of maximum pressure. 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 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 five gallons per 24 hours per mile of pipe per inch nominal diameter of the pipe except in special hardship cases.

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.

3.14 Sterilization. Upon completion of a section, disinfection shall be done strictly in accordance with the procedure designated in Kentucky State Department of Health regulations which reads as follows: "All new water distribution systems including storage distribution tanks and repaired portions of or extensions to existing systems shall be thoroughly disinfected before being placed in service by the use of chlorine or chlorine compounds in such amounts as to produce a concentration of not less than 50 ppm and a residual of not less than 25 ppm at the end of 24 hours and 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 CONTRACTOR on a regular water meter customer basis except that the CONTRACTOR will be charged a flat rate of \$2.00 per 1,000 gallons.

3.15 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.

3.16 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 ENGINEER.

3.17 Coordination With Utilities. 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.

3.18 Payment for Water. All water used from the OWNER supply shall be metered by 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.

3.19 Cleanup. The CONTRACTOR shall provide effective cleanup of the work as it progresses. 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.

3.20 Protection of Adjacent Landscape. Reasonable care shall be taken during construction of the process 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.

3.21 Payment. Payment shall be included in the payment for the work to which it is subsidiary in the Bid Schedule.

SECTION 4 - SITE WORK

4.0 Work Included. Under this section the Contractor shall provide all labor, tools, equipment and materials to perform the sitework which consists of topsoil removal, excavation, the removal and proper utilization or disposal of all excavated materials, necessary borrow, fill requirements, the shaping and finishing of all excavation work to the required lines and grades, preparation of subgrade for tanks, basins, building slabs, walks and pavements, engineered fill for support of building or basin slabs, backfilling of tanks, basins, basements, and trenches within building lines, pavement replacements, and seeding and mulching.

4.1 Geotechnical Data. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that the Owner will not be responsible for interpretation or conclusions drawn therefrom by the Contractor. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

4.2 Existing Utilities. Prior to commencement of work, the Contractor shall locate existing underground utilities in areas of the work. If utilities are to remain in place, the Contractor shall provide adequate means of protection during earthwork operations.

4.3 Use of Explosives. The Contractor (or any of his subcontractors) shall not bring explosives onto the site or use in the work without prior written permission from the Owner. The Contractor shall present a blasting plan to the Owner and Engineer and not commence blasting operations until such plan is approved by the Engineer and Owner. All activities involving explosives shall be in compliance with all the Federal, State and Local laws and regulations pertaining to blasting and use of explosives. The Contractor is solely responsible for handling, storage, and the use of explosive materials and the safety of others in the area when their use is permitted. The Contractor shall review all blasting procedures with the Owner and Engineer prior to commencement of all blasting work. The Contractor is responsible for all blasting procedures. The particle velocity of all affected, adjacent structures shall be monitored with a seismograph located at that structure. The peak particle velocity shall not exceed two inches per second at a distance of 50 feet, or any velocity that may cause damage to adjacent structures. The Contractor is responsible for repair of any damaged structure.

No blasting shall be performed in areas where structural concrete is less than seven days old without the express written consent of the Engineer.

Protective material covering shall be used at all times to prevent flying rocks from damaging property or injuring personnel.

A copy of the required blasting log shall be available to the Owner and Engineer.

4.4 Excavation. Excavation includes excavation to subgrade elevations including excavation of earth, rock, bricks, wood, cinders and other debris. All excavation of materials shall be included in the lump sum portion of the work and will be unclassified and no additional payment will be made regardless of type of material encountered.

Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.

4.4.1 Clearing & Grubbing. The Contractor shall cut and remove designated trees, stumps, brush, logs, fences, or other materials such as stumps, roots and other natural obstructions. 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 three 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.

The Contractor shall 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.

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.

4.4.2 Excavation for Structure. Excavation for structures shall conform to the elevations and dimensions shown within a tolerance of plus or minus 0.10 feet and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection. All loose material shall be removed from the excavation just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

Protruding rock formations that would interfere with uniform footing bearing shall be removed such that the structure will bear upon uniform engineered fill at least 24 inches thick.

No slab shall bear directly upon rock. All excavations shall extend to a depth that allows a minimum of six-inches crushed stone base under slab.

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 over excavation 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 dry weather conditions. No excavation shall be made in wet weather or where frozen materials exist without written approval.

4.5 Disposal of Material. All surplus excavated material and/or waste materials shall be disposed of outside the floodplain in an area provided by the Contractor and approved by the Engineer. The material shall be compacted to a smooth condition and sloped to provide positive drainage.

Any material removed from an impoundment, river, stream or shore shall be removed from the area and disposed of outside of the floodplain as described above. Where shore areas are excavated and/or disturbed, the final contours shall be established by using rip-rap stone or other materials as shown on the Drawings.

4.6 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.

4.7 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 sightly appearance and

so as not to interfere in any way with the operation, usefulness or stability of the permanent structures.

4.8 Backfill and Fill Material. All material to be used as backfill material shall be approved by the Engineer prior to backfilling excavations. With the exception of the organic debris, existing fill material, and topsoil, the on-site soil removed from the excavations will be used as fill or backfill material that is approved by the Engineer.

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.

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

Where structures or other appurtenances are constructed on fill, the fill shall be placed in layers not over six inches deep, as measured before compaction and be thoroughly compacted. 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 compaction tests per each two feet of fill on a structure location shall be performed by a geotechnical engineer.

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 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 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. Any pipe or structure 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 backfilled.

4.9 Borrow Material. Borrow material 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 sightly 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.

4.10 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.

4.11 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. 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.

4.12 Seeding and Mulching. All disturbed areas shall be seeded, fertilized and mulched as shown on the Drawings. The application of materials shall be as follows:

4.12.1 Lime. Two tons of agricultural limestone per acre shall be required.

4.12.2 Fertilizer. The following amounts of fertilizer are required per acre:

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

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

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

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

4.12.4 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.

4.12.5 Execution. The seeding shall be completed within two weeks after completion of the work or as soon thereafter as conditions are favorable. Immediately prior to seedbed preparation, the Contractor shall apply the agricultural lime and fertilizer uniformly over the area to be seeded. 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.

The seeding operations shall be performed immediately after, or as soon as practicable, after the seedbed has been prepared. The seed shall be drilled or broadcast uniformly over the seedbed with regular approved type of equipment or method acceptable to the Engineer. 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. After all construction work is complete, prior to final payment, all exposed areas shall be cleaned and left in a sightly manner. All unused material shall be removed from the site.

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.

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.

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.

4.13 Bituminous Pavement. At the completion of construction, all roads shall be regraded and areas to be paved with bituminous shall be prepared for a prime coat of emulsified asphalt RT-2 applied at the rate of 0.35 gallon per square yard. A two-inch thick Class "T" Bituminous Concrete Binder shall be placed above the prime coat in accordance with the Kentucky Bureau of Highways Specifications. The three feet wide

shoulders of dense graded aggregate shall be graded and rolled to the top of the binder course and shall slope out and away from pavement.

After roadway has been traveled for a period of at least 60 days and all plant construction and piping is complete, a 1 1/2-inch thick layer of Class "T" Bituminous Concrete shall be placed as a finished and complete roadway surface.

The roadways and parking areas shall be constructed in accordance with good paving practices. Problems due to unequal settlement shall be properly handled to prevent an uneven road surface. In any case, the Contractor is responsible for providing roads with neat lines and smooth surfaces throughout the plant site.

Damage to the existing paving caused by the Contractor will be patched to the full road width in the damaged area. All patching shall be to neat lines and even surfaces.

4.14 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, borrow excavation, backfill, sheeting, shoring, topsoil, crushed stone or gravel, drainage, pumping, embankment fills, pavement, seeding and mulching, 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.

SECTION 5 – TANK DEMOLITION AND REMOVAL

5.0 Scope of Work. The work consists of the demolition and removal of the existing 65,000 gallon standpipe storage tank located off of East Kentucky Highway 80 as shown on the Plans. The work shall include removing all remnants of the tank structure, foundation, valve vault and all other related appurtenances to a point one foot below existing ground level.

The Contractor shall furnish all labor, materials, equipment, tools, supplies, transportation and other incidentals necessary to successfully complete the project.

5.1 Ownership of Materials. All salvaged materials except those noted in these specifications shall become the property of the successful bidder.

5.2 Specifications Which Apply. The General Conditions and Supplemental General Conditions, both of which are a part of these specifications, shall apply except as altered or modified in these Technical Specifications.

5.4 Disposal of Materials. All materials and debris resulting from the demolition operations shall be disposed of by the Contractor at locations outside the project site in a manner that will comply with all local, State and Federal regulations and as per OSHA (29CFR192663 and 354) and EPA Regulations.

A suitable disposal site shall be arranged for and secured by the Contractor, and he shall assume full responsibility for acceptable disposition of the material as well as for any damages resulting from his disposal operations. Final acceptance of the work will not be made until the disposal areas are in acceptable condition with respect to the Contractor's obligations as expressed above. The Contractor shall pay for any required permits or dumping fees.

Access to the site is available from East Kentucky Highway 80.

The Contractor shall provide the District with information and evidence concerning disposal details and arrangements. Salvaged materials may be stored on the site temporarily, but not beyond seven days from the time of removal from their original position.

5.5 Retained Salvaged Materials. Items to be salvaged from the existing East Kentucky 80 water storage tank includes the following:

- A. All Telemetry Related Equipment.

5.6 Execution. The Contractor shall not proceed with the demolition and removal of the existing 65,000 gallon water storage tank until after the completion and successful operation of the District's new 300,000 gallon elevated water storage tank.

5.7 Working Area. The working area is shown on the tank and water main location map on the Drawings. The working area is defined as the new 100' x 100' x 155.27' x 109.87' lot for the new 300,000 gallon elevated water storage.

5.8 Pipe Disconnection. The Contractor will be responsible for the disconnection and capping of the existing water lines to the water tank as shown on the Drawings and as directed by the Engineer. This will be done before the tank demolition is started.

5.9 Examination of Site. Prior to presentation of Bid Proposal, the bidder or qualified representative of the bidder must visit the project site and review the conditions in the field.

5.10 Final Cleanup. The Contractor shall remove all salvageable and non-salvageable materials, rubbish, and other debris from the site. The site shall then be leveled smooth to the contours existing prior to the demolition operations.

5.11 Basis of Payment. Payment shall be made on the basis of terms agreed upon on the proposal form.

5.12 Restoration. Any areas affected by the demolition procedures will be filled with topsoil, seeded with a lawn mixed seed, and mulched at a rate of one ton per acre.

5.13 Payment. Payment shall be included in the payment for the work to which it is subsidiary in the Bid Schedule.

SECTION 6 – FLUSH HYDRANT

6.0 Work Included. Under this item the Contractor shall provide all labor, tools, equipment, and materials to install the hydrants as shown on the drawings and as directed by the Engineer.

5.1 Materials. The hydrant shall conform to all of the applicable requirements of ANSI/AWWA C502 Standard. They shall have a sealed oil reservoir that will provide positive lubrication of the stem threads and bearing surfaces each time the hydrant is opened. The hydrant shoe shall be designed for maximum full flow and the hydrant working pressure shall be 200 PSI. The hydrant shall be two way type with two 2 1/2-inch openings or three way type with two 2 1/2-inch openings and one 4 1/2-inch opening as shown on the details/drawings and as outlined in the Bid Schedule.

6.2 Installation. The hydrants shall be set in accordance with the detailed drawings complete with gate valve and connecting pipe. The hydrant shall be installed perpendicular to the surrounding ground surface and the hydrant riser shall be completely buried. The depth of bury shall be the same as the adjoining water line. The shoe of the hydrant shall be encased in Class B concrete and the concrete shall extend to undisturbed earth. Gravel shall be placed around the hydrant on top of the concrete thrust restraint and at the weep hole a minimum depth of twelve inches in depth. Select earth backfill shall be compacted to fill the remaining excavated void and the surface shall match the surrounding surface. The hydrant shall be secured to the companion gate valve by means of a hydrant adapter and pipe restrainer or by other approved means. The hydrant adapter shall be the swivel by solid adapter with swivel gland type as manufactured by Tyler Pipe/Union Foundry Company, or approved equal. The direct connection of mechanical joint (MJ) fittings between the valves the tee and shall be made using Foster adapters where flush hydrants are indicated on the Construction Drawings. The Foster adapters shall be constructed of ductile iron and comply with applicable AWWA Standards. The Foster adapters shall be designed for a working pressure of 200 psi and to withstand a test pressure of 250 psi. Foster adapters shall be lined and coated in accordance with AWWA C104 and C110. Foster Adapter shall be as manufactured by Infact Corporation, or approved equal. The pipe restrainer shall be Grip Ring® Pipe Restrainer as manufactured by Romac Industries, Inc., or approved equal. The hydrant shall be coated with a prime coat and two finish coats of paint as suggested by the manufacturer and approved by the Engineer. The shop drawings shall indicate the coating and color proposal.

6.3 Payment. The unit price bid shall constitute full compensation for furnishing and installing the hydrant, gate valve, up to ten feet of water line, and any associated pipe fittings required to install the hydrant to the main water line.

Case No. 2013-00095

CONTAINS

LARGE OR OVERSIZED

MAP(S)

RECEIVED ON: March 22, 2013