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August 6, 2018

HAND DELIVERED

Gwen R. Pinson
Executive Director
Kentucky Public Service Commission
211 Sower Blvd
Frankfort, KY 40601

Re: Case No. 2018-00206

Dear Ms. Pinson:

Enclosed please find an original and six copies of Kentucky American Water's Responses to Commission Staff's First Information Request in the above-referenced matter. Should you have any questions, please do not hesitate to contact me. Thank you for your assistance.

Very truly yours,

Stoll Keenon Ogden PLLC

Lindsey W. Ingram III

Enclosures

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

IN THE MATTER OF:	)	
	)	
THE APPLICATION OF KENTUCKY-AMERICAN	)	
WATER COMPANY FOR A CERTIFICATE OF	)	**CASE NO. 2018-00206**
PUBLIC CONVENIENCE AND NECESSITY	)	
FOR THE REPLACEMENT OF A WASTEWATER	)	
LAGOON LINER IN OWEN COUNTY	)	

CERTIFICATION OF RESPONSES TO INFORMATION REQUESTS

This is to certify that I have supervised the preparation of Kentucky-American Water Company's August 6, 2018 responses to the Commission Staff's First Request for Information and that the responses are true and accurate to the best of my knowledge, information and belief formed after reasonable inquiry.

Date: 8·03-18

Brent O'Neill
Director of Engineering
Kentucky-American Water Company

Witness: **Brent E. O'Neill**

1. Refer to the Application, Exhibit 1, Project Summary, Expected Project Cost at 4.

   a. Kentucky-American states that it is currently receiving cost estimates from vendors to perform the indicated work. Explain in detail the process Kentucky-American used to solicit bids from the vendors.
   b. Provide a schedule listing the estimated costs vendors have submitted to date, identify any bids that have been accepted, and provide copies of all supporting bid documentation.

Response:

a. Kentucky-American (KAWC) has obtained proposals for three (3) areas of the planned work regarding the Lagoon Liner Replacement Project. The three (3) areas are:

1. Sludge Dredging and Dewatering
2. Temporary Treatment
3. Removal and Installation of New Liner

Sludge Dredging and Dewatering

With regard to the Sludge Dredging and Dewatering, Kentucky-American chose to approach H&A Resource Management of Versailles, Kentucky to obtain a proposal for the dredging of the existing sludge, dewatering of the sludge on-site and disposal of the sludge in an approved landfill. The project team had discussions with other possible providers but these firms were not able to provide the following advantages that H&A Resource Management was able to provide:

- H&A Resource Management is familiar with the facilities and with KAWC. They have previously carried out work at other KAWC facilities and have performed there work in a professional manner.

- H&A Resource Management own and operate the necessary equipment to press the dredged material on site to reduce the transportation needs for disposal of the dredged material at certified landfills.

- H&A Resource Management has the understanding and experience to operate the press equipment and perform the necessary maintenance on the equipment due to their unique knowledge of their owned equipment.

- H&A Resources Management has significant understanding of the available landfills that will accept the dredged material and has the ability to alleviate potential delays from disruption of a single landfill operation.

Based on this information, KAWC sole sourced the Sludge Dredging and Dewatering portion of the project.

Temporary Treatment

Due to the unique nature of the work associated with the temporary treatment aspect of the project, KAWC requested proposals from two vendors based on their ability to provide the equipment and material needed for the temporary treatment process. One vendor provided anticipated costs for providing one (1) 300,000 gallon treatment tank and one (1) 500,000 gallon wet weather tank along with the material necessary to connect and operate the tanks on a temporary basis. The second vendor provided anticipated costs for providing six (6) temporary mobile treatment units. Upon receipt of the proposals, the project team reviewed the proposals and decided on the six (6) temporary mobile treatment units, which was $550,000 less than the temporary tanks option.

Removal and Installation of Liner

KAWC conducted a lump sum bid process for the Removal and Installation of the New Liner along with the other ancillary work associated with a general improvement of the operation of the Owenton Waste Water Treatment Plant. The bidders were asked for a lump sum base bid along with alternative equipment information. The bid documents indicated that best and lowest bidder will be determined based on the lowest Base Bid Contract Price and that KAWC reserved the right to select any, all or none of the proposed alternates offered. A copy of the Bid Documents is attached as exhibit KAW_R_PSCDR1_NUM001_Attachment 1.

b. Following is the schedule listing the estimated costs vendors have submitted to day and the indication of status of acceptance:

Owenton Lagoon Liner Replacement Project					
Proposal Summary					
Item	Original Proposal	Negotiated Savings	Revised Proposal	Proposer	Status
Sludge Dredging and Dewatering	$ 300,000.00	-	$ 300,000.00	H & A Resource Management	Proposal Accepted
Temporary Treatment	$ 200,000.00	-	$ 200,000.00	WesTech	Proposal Accepted
Removal and Installation of New Liner	$ 1,560,821.32	$ 407,177.40	$ 1,153,643.92	Todd Johnson Contracting	Proposal Accepted

A copy of the H&A Resource Management proposal is attached as exhibit KAW_R_PSCDR1_NUM001_Attachment 2. A copy of the WesTech proposal is attached as exhibit KAW_R_PSCDR1_NUM001_Attachment 3. The final revised proposal from Todd Johnson Contracting is attached as exhibit KAW_R_PSCDR1_NUM001_Attachment 4.

Specifications and Contract Documents

engineering | architecture | geospatial

Owenton WWTP Lagoon Improvements Project

Kentucky American Water

GRW Project No. 4483

MAY 2018

Bid Documents

Table of Contents

Division 46
Water and Wastewater Equipment

Appendix

Owenton WWTP Lagoon Improvements Geotechnical Exploration

****

BID FORM

PROJECT DESCRIPTION	Owenton WWTP Lagoon Improvements Project Kentucky American Water Owenton, KY
PROJECT NUMBER	GRW Project No.: 4483

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Kentucky American Water
2300 Richmond Road
Lexington, KY 40502

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

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No.	Addendum, Date

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

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

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Bidding Documents, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Bidding Documents, especially with respect to Technical Data in such reports and drawings.

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

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

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

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

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

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

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

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

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

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract.

ARTICLE 5 – BASIS OF BID

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

A. Notes:

1. Bids shall include sales tax, where required, and all other applicable taxes and fees.

2. All specific cash allowances are included in the price(s) set forth and have been computed in accordance with Paragraph 13.02 of the General Conditions.

BASE BID CONTRACT PRICE:

_____, ($_____)
(Use Words) **(Figures)**

LUMP SUM DEDUCTION - Alternates as Selected By Owner:

_____, ($_____)
(Use Words) **(Figures)**
(Above Is To Be Filled In By Owner After Review of Bid Alternates)

TOTAL BID:

_____, ($_____)
(Use Words) **(Figures)**
(Above Is To Be Filled In By Owner)

Base Bid Items			
Item No.	Description	Unit	Estimated Quantity
1.	12" HDPE Temporary Force Main (Above grade)	LF	300
2.	12" HDPE Temporary Force Main (Below grade)	LF	20
3.	12" HDPE Temporary Gravity Sewer	LF	300
4.	12" DI Flange Connection Piping	LF	10
5.	12" x 12" Wet Tap	EA	1
6.	12" DI Plug Valve	EA	1
7.	12" DI Gate Valve	EA	1
8.	12" Line Stop	EA	1
9.	10'-0" Precast Concrete Top Slab	EA	1
10.	Bypass Pumping	LS	1
11.	Liner Removal and Disposal	LS	1
12.	60 MIL HDPE Leak Location Liner System	SQ. YD.	10,680
13.	Ventilation System Geocomposite	SQ. YD.	10,680
14.	Floating Docks	LS	1
15.	Hydraulic Baffle	EA	1
16.	Installation of Mobile Treatment Units	LS	1
17.	Refurbishment of Existing Packed Tower Distributing Arm	LS	1

ALTERNATIVE EQUIPMENT INFORMATION			
Equipment Item	**Base Bid Equipment Manufacturer**	**Alternate Bid Equipment Manufacturer**	**Lump Sum Deduction**
1. HDPE Lining Membrane Section 334725	GSE Environmental, LLC	a.	a.
		b.	b.
2. Geocomposite Filtration and Drainage Section 334726	GSE Environmental, LLC	a.	a.
		b.	b.
3. Dock Equipment Section 461100	American Muscle Docks and Fabrication	a.	a.
		b.	b.
4. Hydraulic Baffles Section 464200	Lemna Environmental Technologies, Inc.	a.	a.
		b.	b.

B. Notes:

1. Where more than one Base Bid equipment manufacturer is listed above, the BIDDER has the option of including any of the listed manufacturers in the Base Bid. The BIDDER must indicate the Base Bid equipment included in the BID by circling the selected manufacturer at the time of the submission of the Bid. The design has been completed using the first listed Base Bid equipment manufacturer. Should the BIDDER list the second or third Base Bid equipment or the OWNER select other Alternate Bid equipment, the BIDDER, at no additional cost to the OWNER, shall make any changes to structure, piping controls, electrical, instrumentation, architectural, mechanical, etc. that may be necessary to accommodate this equipment.

2. Space is provided within the above list for BIDDERS to offer lump sum deductions for alternate equipment not listed under the Base Bid equipment manufacturer. BIDDERS are not required to offer deductive alternates. However, should the BIDDER choose to offer for consideration to the OWNER, any alternate manufacturers/products to those listed above, the BIDDER shall provide a detailed submittal of applicable items such as catalog cut sheets, pump curves, hydraulic calculations, specifications, wiring diagrams, P&ID's, technical literature, dimensional drawings, etc., or any other information requested by the OWNER. This submittal information shall be included with the BIDDER's bidding documents for proper evaluation by the OWNER. These submittal items shall be in addition to the submittal requirements listed in the respective technical specifications section of the equipment item or product hereinafter. Alternates will not be evaluated or pre-qualified prior to BID opening.

C. The best and lowest BIDDER will be determined based on the lowest Base Bid Contract Price. Bid Alternate equipment prices will **not** be used in determining the best and lowest BIDDER. After selection of the best and lowest BIDDER, the OWNER reserves the right to select any, all or none of the proposed alternates offered by the selected BIDDER.

Bonds required under Paragraph 6.01 of the General Conditions will be based on the Contract Price.

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete within 121 calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 151 calendar days after the date when the Contract Times commence to run.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The following documents are submitted with and made a condition of this Bid:

A. Required Bid security;

B. List of Proposed Subcontractors;

C. List of Project References;

D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;

E. Required Bidder Qualification Statement with supporting data

ARTICLE 8 – DEFINED TERMS

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

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

_____

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

_____

_____

DIVISION 01

GENERAL REQUIREMENTS

SECTION 012213 - BASIS OF MEASUREMENT AND PAYMENT - LUMP SUM

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. The Contractor shall furnish all necessary labor, machinery, tools, apparatus, equipment, materials, service and other necessary supplies and perform all Work shown on the Drawings and/or described in the Specifications and Contract Documents at the lump sum price as indicated by the Bidder in the Bid.

B. The Bidder declares that he has examined the site of the Work and informed himself fully in regard to all conditions pertaining to the place where the Work is to be done; that he has examined the Plans, Specification and Contract Documents for the Work, and has read all special provisions furnished prior to the opening of bids; and that he has further satisfied himself relative to the Work to be performed.

C. All excavation required of the work shall be done as part of the total price for the complete project. All excavation shall be unclassified.

D. Owner shall make payments on account of the Contract Price on the basis of Contractor's Applications for Payment as recommended by Engineer, on a monthly schedule during construction. All progress payments will be on the basis of the progress of the Work measured by the Schedule of Values established in Paragraph 2.05 of the General Conditions or, in the event there is no schedule of values, as provided in the General Requirements.

E. The Progress Payments shall include the cost of Stored Materials, LESS an amount of retainage equal to 10% of their total cost. Stored materials are defined as materials and equipment not incorporated in the Work but delivered, suitably stored and accompanied by documentation satisfactory to Owner as provided in Paragraph 15.01 of the General Conditions.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 012213

SECTION 012500 - PRODUCTS AND SUBSTITUTIONS

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. General: Substitution of materials and/or equipment is defined in Paragraph 6.7.1 of the General Conditions and more fully hereinafter.

B. Definitions: Definitions used in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents including such terms as "specialties", "systems", "structure", "finishes", "accessories", "furnishings", "special construction" and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the project or taken from the Contractor's previously purchased stock. The term "product" as used herein includes the terms "material", "equipment", "system" and other terms of similar intent.
2. "Named Products" are products identified by use of the manufacturer's name for a product, including such items as a make or model designation, as recorded in published product literature, of the latest issue as of the date of the Contract Documents.
3. "Materials" are products that must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form units of work.
4. "Equipment" is defined as a product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.

C. Substitutions: The Contractor's requests for changes in the products, materials, equipment and methods of construction required by the Contract Documents are considered requests for "substitutions", and are subject to the requirements specified herein. The following are not considered as substitutions:

1. Revisions to the Contract Documents, where requested by the Owner, Engineer are considered as "changes" not substitutions.
2. Substitutions requested during the bidding period, which have been accepted prior to the Contract Date, are included in the Contract Documents and are not subject to the requirements for substitutions as herein specified.
3. Specified Contractor options on products and construction methods included in the Contract Documents are choices available to the Contractor and are not subject to the requirements for substitutions as herein specified.
4. Except as otherwise provided in the Contract Documents, the Contractor's determination of and compliance with governing regulations and orders as issued by governing authorities do not constitute "substitutions" and do not constitute a basis for change orders.

D. Standards: Refer to Division-01 section "Definitions and Standards" for applicability of industry standards to the products specified for the project, and for acronyms used in the text of the specification sections.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-01 Specification sections, apply to Work of this Section.

1.3 SUBMITTALS

The information required to be furnished for evaluation of product substitution will be as follows:

A. Performance capabilities, and materials and construction details will be evaluated based upon conformance with the Specifications. Products that do not conform with the Specification shall not be accepted.

B. Manufacturer's production and service capabilities, and evidence of proven reliability will be acceptable if the following is furnished.

1. Written evidence that the manufacturer has not less than (3) years experience in the design and manufacture of the substitute product.
2. Written evidence of at least one application, of a type and size similar to the proposed substitute product, in successful operation in a wastewater treatment plant for a period of at least one year.
3. In lieu of furnishing evidence of a manufacturer's Experience and successful operation of an application of the product to be substituted, the Contractor has the option of furnishing a cash deposit or bond which will guarantee replacement if the product the furnished does not satisfy the other requirements specified in this section. The amount of each deposit or bond will be subject to the approval.

C. Specific reference to characteristics either superior or inferior to specified requirements will be evaluated based on their net effect on the project. Products with any characteristics inferior to those specified will not be acceptable unless offset by characteristics that, in the opinion of the Engineer, will cause the overall effect of the product on the project to be at least equal to that of those specified.

1.4 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same generic kind, from a single source, for each unit of work.

B. Compatibility of Options: Compatibility of products is a basic requirement of product selection. When the Contractor is given the option of selecting between two or more products for use on the project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to the Contractor is not assured by the various requirements of the Contract Documents, but must be provided by the Contractor.

C. The detailed estimate of operating and maintenance costs will be evaluated based on comparison with similar data on the specified products. Proposed substitute products which

have an operating and maintenance cost that, in the opinion of the Engineer, exceeds that of the specified products will not be considered equal and will not be acceptable.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

General: Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft. Control delivery schedules to minimize long-term storage at the site and to prevent overcrowding of construction spaces. In particular coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily dam aged, or sensitive to deterioration, theft and other sources of loss.

A. Deliver products to the site in the manufacturer's sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.

B. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

C. Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT COMPLIANCE

A. General: Requirements for individual products are indicated in the Contract Documents; compliance with these requirements is in itself a Contract Requirement. These requirements may be specified in any one of several different specifying methods, or in any combination of these methods. These methods include the following:

1. Proprietary.
2. Descriptive.
3. Performance.
4. Compliance with Reference Standards.

Compliance with codes, compliance with graphic details, allowances, and similar provisions of the Contract Documents also have a bearing on the selection process.

B. Procedures for Selecting Products: Contractor's options in selecting products are limited by requirements of the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by the Contractor on previous construction projects.

2.2 SUBSTITUTIONS

A. Conditions: Contractor's request for substitution will be received and considered when extensive revisions to the Contract Documents are not required, when the proposed changes are

in keeping with the general intent of the Contract Documents, when the request are timely, fully documented and properly submitted, and when one or more of the following conditions is satisfied, all as judged by the Engineer; otherwise the requests will be returned without action except to record non-compliance with these requirements.

1. The Engineer will consider a request for substitution where the request is directly related to an "or equal" clause or similar language in the Contract Documents.
2. The Engineer will consider a request for substitution where the specified product or method cannot be provided within the Contract Time. However, the request will not be considered if the product or method cannot be provided as a result of the Contractor's failure to pursue the work promptly or to coordinate the various activities properly.
3. The Engineer will consider a request for substitution where the specified product or method cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
4. The Engineer will consider a request for a substitution where a substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to the Engineer for redesign and evaluation services, the increased cost of other work by the Owner or separate contractors, and similar considerations.
5. The Engineer will consider a request for substitution when the specified product or method cannot be provided in a manner which is compatible with other materials of the work, and where the Contractor certifies that the substitution will overcome the incompatibility.
6. The Engineer will consider a request for substitution when the specified product or method cannot be properly coordinated with other materials in the work, and where the Contractor certifies that the proposed substitution can be properly coordinated.
7. The Engineer will consider a request for substitution when the specified product or method cannot receive a warranty as required by the Contract Documents and where the Contractor certifies that the proposed substitution receive the required warranty.
8. The Contractor shall reimburse the Owner any costs for review by the Engineer of proposed product substitutions which require major design changes, as determined by the Owner, to related of adjacent work made necessary by the proposed substitutions.

B. Work-Related Submittals: Contractor's submittal of and the Engineer's acceptance of shop drawings, product data or samples which relate to work not complying with requirements of the Contract Documents, does not constitute an acceptable or valid request for a substitution, nor approval thereof.

2.3 GENERAL PRODUCT REQUIREMENTS

A. General: Provide products that comply with the requirements of the Contract Documents and that are undamaged and, unless otherwise indicated, unused at the time of installation. Provide products that are complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

1. Standard Products: Where they are available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
2. Continued Availability: Where, because of the nature of its application, the Owner is likely to need replacement parts or additional amounts of a product at a later date, either

for maintenance and repair or replacement, provide standard, domestically produced products for which the manufacturer has published assurances that the products and its parts are likely to be available to the Owner at a later date.

B. Nameplates: Except as otherwise indicated for required labels and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view either in occupied spaces or on the exterior of the completed project.

1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface which, in occupied spaces, is not conspicuous.
2. Equipment Nameplates: Provide permanent nameplate on each item of service-connected or power operated equipment. Locate the nameplate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data.

a. Name of manufacturer
b. Name of product
c. Model number
d. Serial number
e. Capacity
f. Speed
g. Ratings

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

A. General: Except as otherwise indicated in individual sections of these Specifications, comply with the manufacturer's instructions and recommendations for installation of the products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work. Clean exposed surfaces and protect surfaces as necessary to ensure freedom from damage and deterioration at Time of Acceptance.

END OF SECTION 012500

SECTION 013323 - SHOP DRAWINGS, PRODUCT DATA, SAMPLES AND RFI'S

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. General: This section specifies procedural requirements for non- administrative submittals including shop drawings, product data, samples (when samples are specifically requested) and other miscellaneous work-related submittals. Shop drawings, product data, samples and other work-related submittals are required to amplify, expand and coordinate the information contained in the Contract Documents.

B. Refer to other Division-01 sections and other Contract Documents for Specifications on administrative, non-work-related submittals. Such submittals include, but are not limited to the following items:

1. Permits.
2. Payment applications.
3. Performance and payment bonds.
4. Insurance certificates.
5. Inspection and test reports.
6. Schedule of values.
7. Progress reports.
8. Listing of subcontractors.
9. Operating and Maintenance Manuals

C. Engineer prefers initial submittals be in electronic media along with one paper copy for review. Engineer utilizes Newforma software and will provide Contractor with the necessary links and instructions for submittal purposes. Upon completion of the review process, Contractor shall print two (2) copies of complete submittal, including transmittal cover page and stamp page, and deliver to Engineer.

If Contractor does not have capability to submit electronic submittals, then Contractor shall submit a request to Engineer for waiver. In the event a waiver is granted, paper submittals shall be provided as directed by the Engineer.

D. Submittals shall be checked and reviewed by the Contractor and stamped with Contractor's review stamp before submission to the Engineer. The review of the submittals by the Engineer shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory. Review of such submittals will not relieve the Contractor of the responsibility for any errors which may exist as the Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work.

E. All Requests for Information (RFI) to Engineer shall be submitted electronically via Engineer's Newforma software.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-01 Specification sections, apply to work of this section.

B. Section 017823 - Operating and Maintenance Manuals.

1.3 DEFINITIONS

A. Shop drawings are technical drawings and data that have been specially prepared for this project, including but not limited to the following items:

1. Fabrication and installation drawings.
2. Setting diagrams.
3. Shopwork manufacturing instructions.
4. Templates.
5. Patterns.
6. Coordination drawings (for use on site).
7. Schedules.
8. Design mix formulas.
9. Contractor's engineering calculations.

Standard information prepared without specific reference to a project is not considered to be shop drawings.

B. Product data includes standard printed information on manufactured products that has not been specially-prepared for this project, including but not limited to the following items:

1. Manufacturer's product specifications and installation instructions.
2. Standard color charts.
3. Catalog cuts.
4. Roughing-in diagram and templates.
5. Standard wiring diagrams.
6. Printed performance curves.
7. Operational range diagrams.
8. Mill reports.
9. Standard product operating and maintenance manuals.

C. Samples, where specifically required, are physical examples of work, including but not limited to the following items:

1. Partial sections of manufactured or fabricated work.
2. Small cuts or containers of materials.
3. Complete units of repetitively-used materials.
4. Swatches showing color, texture and pattern.
5. Color range sets.
6. Units of work to be used for independent inspection and testing.

D. Miscellaneous submittals are work-related, non-administrative submittals that do not fit in the three previous categories, including, but not limited to the following:

1. Specially-prepared and standard printed warranties.
2. Maintenance agreements.
3. Workmanship bonds.
4. Survey data and reports.
5. Testing and certification reports.
6. Record drawings.
7. Field measurement data.

1.4 SUBMITTAL PROCEDURES

A. General: Refer to the General Conditions and Paragraph 1.1 hereinbefore for basic requirements for submittal handling.

B. Coordination: Coordinate the preparation and processing of submittals with the performance of the work. Coordinate each separate submittal with other submittals and related activities such as testing, purchasing, fabrication, delivery and similar activities that require sequential activity.

1. It is the Contractor's responsibility to make such field measurements as are needed to base submittals on actual field conditions to assure proper connection, fit, function and performance of all work and equipment in the execution of the contract work.
2. Coordinate the submittal of different units of interrelated work so that one submittal will not be delayed by the Architect/Engineer's need to review a related submittal. The Architect/Engineer reserves the right to withhold action on any submittal requiring coordination with other submittals until related submittals are forthcoming.

C. Coordination of Submittal Times: Prepare and transmit each submittal to the Architect/Engineer sufficiently in advance of the scheduled performance of related work and other applicable activities. Transmit different kinds of submittals for the same unit of work so that processing will not be delayed by the Architect/Engineer's need to review submittals concurrently for coordination.

D. Review Time: Allow sufficient time so that the installation will not be delayed as a result of the time required to properly process submittals, including time for resubmittal, if necessary. Advise the Architect/Engineer on each submittal, as to whether processing time is critical to the progress of the work and if the work would be expedited if processing time could be shortened.

1. Allow a longer time period where processing must be delayed for coordination with subsequent submittals. The Architect/Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination.
2. No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Architect/Engineer sufficiently in advance of the work.

E. Submittal Preparation: Mark each submittal with a permanent label for identification. Provide the following information on the label for proper processing and recording of action taken.

1. Project name.
2. Date.
3. Name and address of Architect/Engineer.
4. Name and address of Contractor.

5. Name and address of subcontractor.
6. Name and address of supplier.
7. Name of manufacturer.
8. Number and title of appropriate specification section.
9. Drawing number and detail references, as appropriate.
10. Similar definitive information as necessary.

F. All submittals shall be referenced to the applicable item, section and division of the Specifications, and to the applicable drawing(s) or drawing schedule(s). Include only one item in a submittal.

G. The Contractor shall review and check submittals, and shall indicate his review by initials and date. Any submittal received without this evidence of review shall be returned to the Contractor without review.

H. If the submittals deviate from the Contract Drawings and/or Specifications, the Contractor shall advise the Engineer in writing of the deviation and the reasons therefore.

I. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Architect/Engineer, and to other destinations as indicated, by use of a transmittal form. Submittals received from sources other than the Contractor will be returned to the sender "without action".

J. Electronic Submittals: If the electronic method of submittals is agreed to by Contractor, Engineer, and Owner, the format and procedures will be determined and implemented prior to any submittals. Submittals will be processed through "Newforma" software. Each item of the submittal documents shall be in .pdf format and shall be oriented so that they are read from upper left corner to lower right corner, with no rotation of said document being required after receiving it. The .pdf file shall be named so that it describes the item being submitted. All other requirements herein are part of the electronic submittal process with the exception of the duplicate copies. Contractor stamp indicating review and any comments or notes must be on the .pdf submittal.

1.5 SPECIFIC SUBMITTAL REQUIREMENTS

A. Shop drawings shall be prepared by a qualified detailer. Details shall be identified by reference to sheet and detail numbers shown on Contract Drawings. Where applicable, show fabrication, layout, setting and erection details.

Shop drawings are defined as original drawings prepared by the Contractor, subcontractors, suppliers, or distributors performing work under this Contract. Shop drawings illustrate some portion of the work and show fabrication, layout, setting or erection details of equipment, materials and components. The Contractor shall, except as otherwise noted, have prepared the number of reviewed copies required for his distribution plus four (4) which will be retained by the Engineer. Shop drawings shall be folded to an approximate size of 8-1/2" x 11" and in such manner that the title block will be located in the lower right-hand corner of the exposed surface.

B. Project data shall include manufacturer's standard schematic drawings modified to delete information which is not applicable to the project, and shall be supplemented to provide additional information applicable to the project. Each copy of descriptive literature shall be

clearly marked to identify pertinent information as it applies to the project.

C. Where samples are required, they shall be adequate to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged. Provide sufficient size and quantity to clearly illustrate functional characteristics of product and material, with integrally related parts and attachment devices, along with a full range of color samples.

D. In the event the Engineer does not specifically reject the use of material or equipment at variance to that which is shown on the Drawings or specified, the Contractor shall, at no additional expense to the Owner, and using methods reviewed by the Engineer, make any changes to structures, piping, controls, electrical work, mechanical work, etc., that may be necessary to accommodate this equipment or material. Should equipment other than that on which design drawings are based be accepted by the Engineer, shop drawings shall be submitted detailing all modification work and equipment changes made necessary by the substituted item.

E. Additional information on particular items, such as special drawings, schedules, calculations, performance curves, and material details, shall be provided when specifically requested in the technical Specifications.

F. Submittals for all electrically operated items (including instrumentation and controls) shall include complete size, color coding, all terminations and connections, and coordination with related equipment.

G. Equipment shop drawings shall indicate all factory or shop paint coatings applied by suppliers, manufacturers and fabricators; the Contractor shall be responsible for insuring the compatibility of such coatings with the field-applied paint products and systems.

H. Fastener specifications of manufacturer shall be indicated on equipment shop drawings.

I. Where manufacturers brand names are given in the Specifications for building and construction materials and products, such as grout, bonding compounds, curing compounds, masonry cleaners, waterproofing solutions and similar products, the Contractor shall submit names and descriptive literature of such materials and products he proposes to use in this Contract.

J. No material shall be fabricated or shipped unless the applicable drawings or submittals have been reviewed by the Engineer and returned to the Contractor.

K. All bulletins, brochures, instructions, parts lists, and warranties package with and accompanying materials and products delivered to and installed in the project shall be saved and transmitted to the Owner through the Engineer.

1.6 REVIEW STATUS

A. Submittals will be returned, stamped with the following classifications: "Reviewed", "Furnish as Corrected", "Revise and Resubmit", "Rejected", or "Submit Specified Item".

B. In some instances, corrections to dimensions or clarification notations will be required, in which case the drawings will be marked "Furnish as Corrected." These shop drawings will not be required to be resubmitted for further approval. If the supplier makes additional modifications

after receiving a "Furnish as Corrected" disposition, the drawings must then be resubmitted for review.

C. If the shop drawing is returned with the notation "Revise and Resubmit", the Contractor shall promptly make the revisions indicated and repeat the submittal approval procedure.

D. If the shop drawing is returned with the notation "Submit Specified Item", this indicates that the submittal does not meet the specification, will not be reviewed, and is unacceptable. Upon return of a drawing so marked, the Contractor shall repeat the initial approval procedure, submitting acceptable materials or equipment.

E. The "Rejected" notation is used to indicate materials or equipment that are not acceptable and are not included in the project.

1.7 REMINDER OF CONTRACTOR RESPONSIBILITIES

A. Verify field measurements, field construction criteria, catalog numbers, and similar data.

B. Coordinate each submittal with requirements of work and of Contract Documents.

C. Notify Engineer, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.

D. Begin no work, and have no material or products fabricated or shipped which requires submittals until return of submittals with Engineer's stamp and initials or signature indicating review.

E. Upon review and close-out of a submittal, Contractor shall print two (2) copies of complete submittal, including transmittal cover page and stamp page, and deliver to Engineer.

F. It is emphasized that the review of shop drawings by the Engineer is for general conformance to the Contract Drawings and Specifications, but subject to the detailed requirements of the Contract Drawings and Specifications. Although the Engineer may check submitted data in more or less detail, such checking is an effort to discover errors and omissions in the Contractor's drawings and to assist the Contractor in coordinating and expediting his work, but shall in no way relieve the Contractor of his obligation and responsibility to properly coordinate the work, and to Engineer the details of the work in such a manner, that the purpose and intent of the Contract will be achieved nor shall any such detailed checking by the Engineer be construed as placing on him or on the Owner, any responsibility for the accuracy, proper fit, functioning or performance of any phase of the work included in this Contract. The Contractor is responsible for confirmation and correlation of dimensions at the job site; for information that pertains solely to the fabrication processes or to the techniques of construction; for the coordination of the work of all trades; and for performance of his work in a safe and satisfactory manner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 013323

SECTION 017400 - CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. Maintain premises free from accumulations of waste, debris, and rubbish.

B. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces. Leave project clean and ready for occupancy.

1.2 RELATED DOCUMENTS

A. Cutting and Patching: Section 01 73 29.

B. Project Closeout: Section 01 77 00.

C. Cleaning for Specific Products of Work: Specification Section for that work.

1.3 SAFETY REQUIREMENTS

A. Hazards Control:

1. Store volatile wastes in covered metal containers, and remove from premises daily.
2. Prevent accumulation of wastes which create hazardous conditions.
3. Provide adequate ventilation during use of violative noxious substances.

B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on project site.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.

B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 DURING CONSTRUCTION

A. Execute cleaning to ensure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.

B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.

C. At reasonable intervals during progress of work, clean site and public properties, and dispose of waste materials, debris and rubbish.

D. Provide on-site containers for collection of waste materials, debris and rubbish.

E. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.

F. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

G. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.2 FINAL CLEANING

A. Employ experienced workmen, or professional cleaners, for final cleaning.

B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.

C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-xposed interior or exterior finished surfaces; polish surfaces so designated to shine finish.

D. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.

E. Broom clean paved surfaces; rake clean other surfaces of grounds.

F. Maintain cleaning until project, or portion thereof, is occupied by Owner.

END OF SECTION 017400

SECTION 017839 - PROJECT RECORD DOCUMENTS - SEWER

PART 1 - GENERAL

1.1 MAINTENANCE OF DOCUMENTS

A. Maintain at job site, one copy of:

1. Contract Drawings
2. Specifications
3. Addenda
4. Reviewed Shop Drawings
5. Change Orders
6. Other Modifications to Contract

B. Store documents in approved location, apart from documents used for construction.

C. Provide files and racks for storage of documents.

D. Maintain documents in clean, dry, legible condition.

E. Do not use record documents for construction purposes.

F. Make documents available at all times for inspection by Engineer and Owner.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Shop Drawings, Product Data, and Samples: Section 01 33 23.

1.3 MARKING DEVICES

A. Provide colored pencil or felt-tip marking pen for all marking.

1.4 RECORDING

A. Label each document "PROJECT RECORD" in 2-inch high printed letters.

B. Keep record documents current.

C. Do not permanently conceal any work until required information has been recorded.

D. Contract Drawings: Legibly mark to record actual construction:

1. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.

2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
3. Field changes of dimension and detail.
4. Changes made by Change Order or Field Order.
5. Details not on original Contract Drawings.

E. Specifications and Addenda: Legibly mark up each section to record:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
2. Changes made by Change Order or Field Order.
3. Other matters not originally specified.

F. Shop Drawings: Maintain as record documents; legibly annotate shop drawings to record changes made after review. Coordinate and confirm with Engineer that electronic media versions of all shop drawings have been provided to Engineer.

1.5 SUBMITTALS

A. At completion of project, deliver record documents to Engineer.

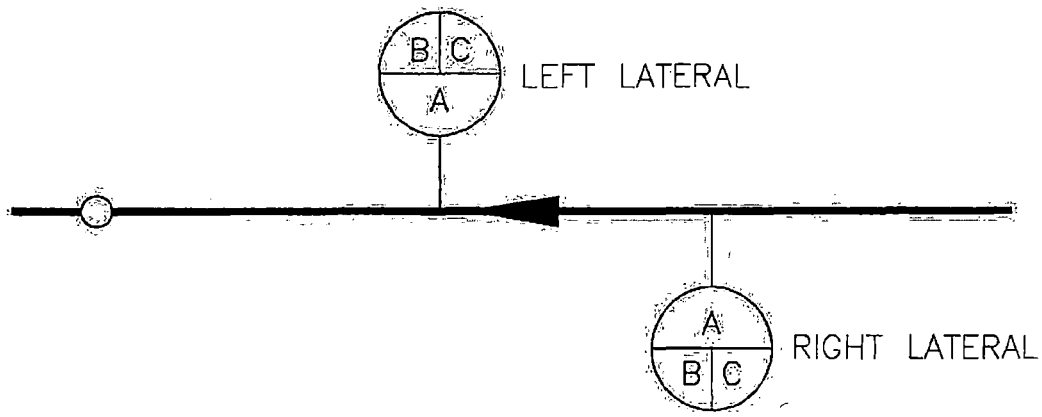
B. Accompany submittal with transmittal letter, in duplicate, containing:

1. Date.
2. Project Title and Number.
3. Contractor's Name and Address.
4. Title and Number of each Record Document.
5. Certification that each Document as Submitted is Complete and Accurate.
6. Signature of Contractor, or His Authorized Representative.

1.6 STANDARD PROCEDURE FOR AS CONSTRUCTED LOCATION OF LATERAL SERVICE CONNECTIONS

A. See Exhibit 1:

Exhibit 1 – Standard Procedure for as constructed location of lateral service connections.



EXPLANATION

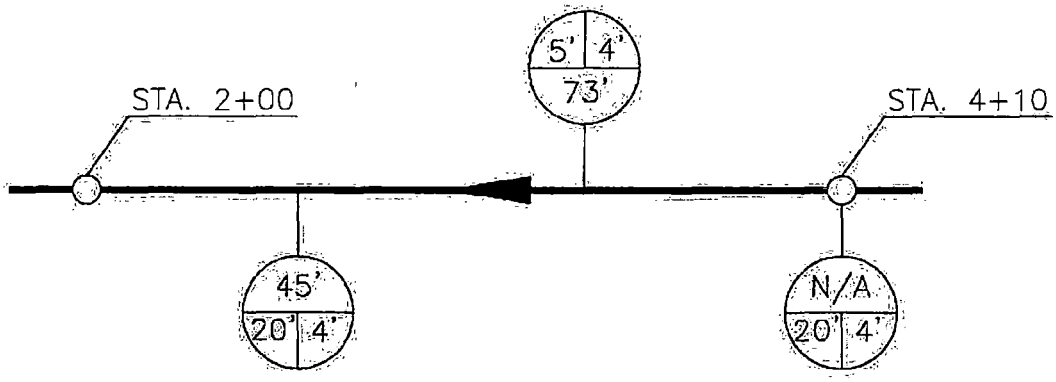
A. Laterals for service connections shall be located with reference to the nearest downstream manhole. The distance from the downstream manhole to the tee is measured along the centerline of the main sewer and noted as "A" in the circle diagram.

When the lateral is out of manhole, "A" is noted as "N/A" (not Applicable).

B. Distance from main sewer to the end of lateral is measured at right angles to the main sewer from centerline of tee to the end of lateral. Distance is shown as "B" in circle diagram. When only one length of pipe is installed, distance is given as 5-feet.

C. Depth at end of lateral is from top of ground to top of lateral and shown as "C" in circle diagram.

TYPICAL EXAMPLE



PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 017839

DIVISION 02

EXISTING CONDITIONS

SECTION 024100 - DEMOLITION & SALVAGE

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required for demolition as shown on the Drawings and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 31 20 00

1.3 PROCEDURE

A. The procedures proposed for the accomplishment of salvage and demolition work shall be submitted for review. The procedures shall provide for safe conduct of the work, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations.

B. It is the responsibility of the Contractor to visit the site to familiarize himself with the amount of Work that is included under this Section.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 DUST CONTROL

A. The amount of dust resulting from the demolition shall be controlled to prevent the spread of dust to occupied portions of the plant and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

3.2 DISCONNECTION OF UTILITY SERVICES

A. Utilities shall be disconnected at the points indicated by the Owner or Engineer and left in a safe condition.

3.3 BURNING

A. The use of burning at the project site for the disposal of refuse and debris will not be permitted, unless authorized in writing by the Owner.

3.4 PROTECTION OF EXISTING WORK

A. Existing work to remain shall be protected from damage. Work damaged by the Contractor shall be repaired to match existing work.

3.5 BACKFILL OF STRUCTURES

A. All existing structures to be abandoned shall have equipment removed and walls demolished a minimum of two feet below finish grade. The portion of the demolished structures remaining below grade shall be backfilled with concrete, masonry, etc., from the demolition or any backfill material which is acceptable to the Engineer. The top two (2) feet of the backfill shall be made up of topsoil and graded to match the existing ground. It shall be free of any of the demolition material. The entire backfill shall be compacted in such a manner as to prevent settlement.

B. All existing demolished basins shall have some method of positive drainage thru the bottom slab as approved by the Engineer.

C. It is the responsibility of the Contractor to dispose of all excess demolition material from the site as soon as practicable.

3.6 SALVAGE MATERIAL

A. All equipment, pumps, controls, valves, piping, etc., is the property of the Owner and care shall be taken in its removal so not to damage it in any way. Such salvage material shall be removed and delivered to the Owner to a site designated by him. The Owner has the right to refuse any salvage material, and in such cases it is the responsibility of the Contractor to dispose of the unwanted material.

END OF SECTION 024100

DIVISION 03

CONCRETE

SECTION 033100 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required to furnish and install all cast-in-place concrete as indicated on the Drawings and specified herein.

B. All concrete construction shall conform to all applicable requirements of ACI 301 (latest), Specifications for Structural Concrete for Buildings, except as modified by the supplemental requirements specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 31 20 00

1.3 SUBMITTALS

The Contractor shall submit the following data for Engineer's review in accordance with Section 01 33 23.

A. Concrete mixture proportions, test results and curves plotted to establish water-cementitious materials ratio if ACI 301-05 Section 4.2.3.4.b is followed.

B. Proposed mix designs and all necessary substantiating data used to establish the proposed mix designs if ACI 301-05 Section 4.2.3.1 is followed.

C. Mix designs shall be submitted for all mixes proposed or required to be used, including all mixes containing admixtures.

D. A certified copy of the control records of the proposed production facility establishing the standard deviation as defined in Paragraph 4.2.3.2. of ACI 301.

E. Submit shop drawings as specified in ACI 301. Submit shop drawing showing the location of proposed construction and control joints separate from the steel reinforcement shop drawings.

1. Construction Joints
2. Control Joints
3. Steel Reinforcement

1.4 QUALITY ASSURANCE

The Contractor shall obtain and have available in the field office at all times, the following references:

A. ACI 301 Specifications for Structural Concrete for Buildings ACI 301 (latest Revision).

B. SP-15 (05) Field Reference Manual: Specifications for Structural Concrete for Buildings with selected ACI references.

Available from:

The American Concrete Institute
Publications Department
P.O. Box 9094
Farmington Hills, Michigan 48333-9094

C. Manual of Standard Practice - CRSI. (Latest Edition).

D. Placing Reinforcing Bars - CRSI (Latest Edition).

Available from:

Concrete Reinforcing Steel Institute
933 North Plum Grove Road
Schaumburg, Illinois 60173-4758

E. ACI 318-08 Building Code Requirements for Structural Concrete and Commentary.

F. ACI 347 Guide to Form Work for Concrete.

PART 2 - PRODUCTS

2.1 CLASSES OF CONCRETE AND USAGE

A. Structural concrete of the various classes required shall be proportioned by either Method 1 or Method 2 of ACI 301 to produce the following 28-day compressive strengths:

1. Selection of Proportions for Class A Concrete:

   a. 4,500 psi compressive for strength at 28 days.
   b. Type II cement plus supplementary cementitious materials.
   c. Max. water-cementitious materials ratio = 0.45.
   d. Min. cement content = 584 lbs.
   e. Nominal max. size coarse aggregate = No. 67 (3/4" max.) or No. 57 (1" max.). Walls with architectural treatment shall use No. 67 (3/4" max.).
   f. Air content = 6% plus or minus 1% by volume.
   g. Slump = 3" - 4" when tested in accordance with ASTM C 143/C 143M. Slump shall not exceed 8 inches when high-range water-reducers are used.

2. Selection of Proportions for Class B Concrete:

   a. 3,000 psi compressive strength at 28 days.
   b. Type I cement plus supplementary cementitious materials.
   c. Max. water-cementitious materials ratio = 0.45.

d. Min. cement content = 470 lbs. (5.0 bags)/cu. yd. concrete.
e. Nominal max. size coarse aggregate = No. 67 (3/4" max.) or No. 57 (1" max). Walls with architectural treatment shall use No. 67 (3/4" max.).
f. Air content = 6% plus or minus 1% by volume.
g. Slump = 3" - 4" when tested in accordance with ASTM C 143/C 143M. Slump shall not exceed 8 inches when high-range water-reducers are used.

B. Concrete shall be used as follows:

1. Class A concrete for all concrete work except as noted below.
2. Class B concrete for fill concrete, thrust blocks and topping over hollow-core slabs, and where indicated on the Drawings.

C. Type II cement conforming to ASTM C 150 shall be used in all structural concrete. Cement for exposed to view concrete shall have a uniform color classification.

D. Coarse aggregate for concrete shall be size No. 57, as specified in ASTM C 33 unless a smaller size aggregate is required to conform to provisions of Section 4.2.2.3 of ACI 301. Coarse aggregate shall conform to all requirements of ASTM C 33.

E. Manufactured sand shall not be used as fine aggregate in concrete.

2.2 ADMIXTURES

A. An air entraining admixture shall be used on all concrete exposed to freezing and thawing cycles. Product shall be MB-AE 90, MB-VR or Micro Air by BASF Construction Chemicals or approved equal. Certification attesting to the percent of effective solids and compliance of the material with ASTM C 260 shall be furnished, if requested.

B. Water-Reducing Admixture shall conform to ASTM C 494/C 494M Type A. Product shall be "Pozzolith" Series or "PolyHeed" Series by BASF Construction Chemicals or approved equal.

C. High-Range Water-Reducing Admixture shall conform to ASTM C 494/C 494M Type F. Product shall be Rheobuild 1000, "Glenium" Series or PS 1466 by BASF Construction Chemicals or approved equal.

D. Accelerating Admixture shall conform to ASTM C 494/C 494M Type C or E. Products shall be Pozzolith NC 534 or Pozzutec 20+ by BASF Construction Chemicals or approved equal.

E. Retarding Admixture shall conform to ASTM C 494/C 494M Type B or D. Product shall be "Pozzolith" Series or "DELVO" Series by BASF Construction Chemicals.

F. A water-reducing, set controlling admixture (nonlignin type) shall be used in all concrete. The admixture shall be a combination of polyhydroxylated polymers including catalysts and components to produce the required setting time based on job site conditions, specified early strength development, finishing characteristics required, and surface texture, as determined by the Engineer.

G. 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.

H. The admixture manufacturer, when requested, shall provide a qualified concrete technician employed by the manufacturer to assist in proportioning concrete for optimum use. He shall also be available when requested to advise on proper addition of the admixture to the concrete and on adjustment of the concrete mix proportions to meet changing job conditions.

I. The use of admixtures to retard setting of the concrete during hot weather, to accelerate setting during cold weather, and to reduce water content without impairing workability will be permitted if the following conditions are met:

J. The admixture shall conform to ASTM C494, except that the durability factor for concrete containing the admixture shall be at least 100 percent of control, the water content a maximum of 90 percent of control and length change shall not be greater than control, as defined in ASTM C 494.

K. 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 retarding admixture for mass concrete 2.5 feet or more thick for all concrete whenever the temperature at the time concrete is cast exceeds 80oF. 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.

L. When more than one (1) admixture is used, all admixtures shall be compatible. They should preferably be by the same manufacturer.

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

2.3 REINFORCEMENT

A. The minimum yield strength of the reinforcement shall be 60,000 pounds per square inch. Bar reinforcement shall conform to the requirements of ASTM A 615/A 615M. All bar reinforcement shall be deformed.

B. Wire-mesh reinforcement shall be continuous between expansion joints. Laps shall be at least one full mesh plus 2 inches, staggered to avoid continuous lap in either direction, and securely wired or clipped with standard clips.

C. Smooth dowels shall be plain steel bars conforming to ASTM A 615/A615M, Grade 60, or steel pipe conforming to ASTM A 120, Schedule 80. Pipe, if used, shall be closed flush at each end with mortar or metal or plastic cap. 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.

D. Reinforcement supports and other accessories in contact with the forms for members which will be exposed to view in the finished work shall be of stainless steel or shall have approved

high-density polyethylene tips so that the metal portion shall be at least one-quarter of an inch from the form or surface. Supports for reinforcement, when in contact with the ground or stone fill, shall be precast stone concrete blocks. Particular attention is directed to the requirement of Paragraph 3.3.2.4 of ACI Standard 301. These requirements apply to all reinforcement, whether in walls or other vertical elements, inclined elements or flatwork.

E. Particular care shall be taken to bend tie wire ends away from exposed faces of beams, slabs and columns. In no case shall ends of tie wires project toward or touch formwork.

2.4 OTHER MATERIALS

A. Anchorage items shall be of standard manufacture and of type required to engage with the anchors to be installed therein under other sections of the Specifications and shall be subject to approval by the Engineer.

1. Slots shall be galvanized dovetail-type as specified in Section "Masonry Work".
2. Inserts shall be malleable iron or steel, and of sturdy design adequate strength for the load to be carried. All inserts shall be galvanized. Adjustable wedge inserts shall have an integral loop or strap at the back, or shall be slotted to receive a special-headed bolt not smaller than 5/8-inch in diameter and of the required length and fitted with hexagonal nut. Other inserts shall be either threaded or slotted as required by their usage. Threaded inserts shall have integral lugs to prevent running.
3. Concrete anchors shall be an approved expansion type conforming to Federal Specification FF-S-325, Groups I, II, III, or VIII and shall be installed in strict accordance with the manufacturer's recommendations. Material for anchors shall be as specified in Section 05500 "Miscellaneous Metals". Anchors shall develop ultimate shear and pull out loads of not less than the following values in Class A concrete:

Bolt Diameter (Inches)	Min. Shear (Pounds)	Min. Pull-Out Load (Pounds)
2	4,500	4,600
5/8	6,900	7,700
3/4	10,500	9,900

B. Epoxy bonding adhesive used to bond fresh plastic concrete to sound, hardened concrete shall meet the following Specification. Contractor shall furnish a notarized certification by the manufacturer that the proposed material meets the Specification.

1. Material:

The epoxy material shall consist of a 2-component system whose components conform to the following requirements:

a. Component A - Component A shall be a modified epoxy resin of the epichlorohydrin bisphenol A condensation type, containing suitable viscosity control agents and having an epoxide equivalent of 180-200.
b. Component B - The B component shall be primarily a reaction product of one mole of an aliphatic polyamine and two moles of mono-functional epoxide containing compounds modified with 2, 4, 6 tri (dimethylaminomethyl) phenol.

c. The component ratio of B to A by volume shall be as specified by the manufacturer.

2. Properties of Mixed Components:

a.	Solids Content	100% by weight
b.	Pot Life	25-35 min. @ 73oF.
c.	Tack-Free Time	4-5-1/2 hrs @ (Thin Film) 73oF.
d.	Final Cure ASTM D 695	3 days at 73oF. (75% ultimate strength)
e.	Initial Viscosity (A+B)	2,000 cps. min at 73oF.
f.	Color Mixed	Straw

3. Properties of Cured Material (Neat Material):

a.	Tensile Strength ASTM D 638	3,000 psi min. @ 14 days 73oF. cure
b.	Tensile Elongation ASTM D 638	2 - 2% at 14 modified days 73oF. cure
c.	Compressive Strength ASTM D 695	12,500 psi min. at 73o F. cure
d.	Compressive Modules ASTM D 695	470,000 psi min. @ 28 days, 73oF cure
e.	Compressive Strength ASTM D 695	5,500 psi min. @ 24 days 73oF cure
f.	Water Pick-up ASTM D 570	1.5 max.

C. Flashing reglets shall be as specified in Section 075300. Reglets shall be correctly placed into forms prior to placing concrete in formwork.

D. Premolded expansion-joint filler strips shall conform to ASTM D 1752 and shall be 3/8-inch thick unless otherwise shown.

E. Joint sealants shall conform to ANSI A 116.1. The following joint sealants are acceptable:

1. Colma by Sika Chemical Corporation
2. Hornflex by A.C. Horn, Inc.
3. Sonolastic by BASF Construction Chemicals.

F. Nonshrink grout shall be Embeco 885 grout by BASF Construction Chemicals, Euco Firmix grout by the Euclid Chemical Company, or approved equal. The approved product shall be delivered to the site of the Work in the original sealed containers, each bearing the trade name of the material and the name of the manufacturer.

G. Hardeners and dustproofers shall be colorless, aqueous solution of zinc or magnesium fluosilicate. Each gallon of solution used for the first application shall contain not less than one pound of crystals. Each gallon of solution used for subsequent application shall contain not less than two pounds of crystals. Materials shall be reviewed by the Engineer. Product shall be Lapidolith by BASF Construction Chemicals or approved equal.

H. Porous fill shall be crushed rock or gravel of such size that all will pass a 1-1/2 inch screen and not more than 5 percent will pass a No. 4 screen, free from earth clay or other foreign substances.

I. Waterstops: Waterstops shall be polyvinyl chloride, flat dumbbell shape (no center bulb), of size shown on Drawings, complete with fittings as required such as unions, vertical tees, vertical ells, flat crosses, flat ells, flat tees, etc. Waterstops shall be securely wired into place to maintain proper position during placement of fresh concrete, as shown on the Drawings. Care shall be taken in the installation of the waterstop and the placing of the concrete to avoid "folding" while concrete is being placed, and to prevent voids in the concrete surrounding the waterstop.

J. Form Liners: Form liners for construction of fluted wall treatment shall be prefabricated plastic liners as manufactured by Greenstreak Plastic Products, Interform Company, or Symons Corporation.

1. Liners shall be fiberglass or ABS (acrylonitrile - butadiene - styrene) of such configuration as to obtain the fluted pattern shown or indicated on the Drawings.
2. For purposes of designating type and quality of material required, form liners shall be pattern 361 trapezoidal liners as manufactured by Greenstreak Plastic Products.
3. Preparation of forming materials, sealing of joints to prevent grout leakage and form release treatment (if required) shall be in strict compliance with the manufacturer's printed instructions and recommendations.

PART 3 - EXECUTION

3.1 FINISHES

A. Exposed to Public View Concrete Surfaces:

1. All concrete exposed to view in the completed structure shall be produced using materials and workmanship to such quality that only nominal finishing will be required. The provisions of paragraphs 6.2.2.1 and 6.3.6 of ACI 301 shall apply to all exterior exposed to public view concrete surfaces, including the outside surfaces of tanks.
2. Forms for exposed concrete surfaces shall be exterior grade, high-density overlay plywood, steel, or wood forms with smooth tempered hard-board form-liners.
3. Forms shall be coated with an approved release agent before initial pour and between subsequent pours, in accordance with the manufacturer's printed instructions. Form boards shall not be wet prior to placing concrete.
4. Recessed joints in concrete shall be formed using lacquer-coated wood battens or forms, milled to indicated profiles. Battens and corner strips shall be carefully inspected before concrete is placed and damaged pieces replaced.
5. Chamfer strips shall be one (1) inch radius with leg, polyvinyl chloride strips by Gateway Building Products, Saf-T-Grip Specialties Corp., Vinylex Corp., or equal.
6. Form panels shall be provided in the maximum sized practicable in order to minimize form joints. Wherever practicable, form joints shall occur at recessed joints. All form joints in exterior exposed to view surfaces shall be carefully caulked with an approved nonstaining caulking compound. Joints shall not be taped. Form oil or other material which will impart a stain to the concrete shall not be allowed to contact concrete surfaces.

7. Care shall be taken to prevent chipping of corners or other damage to concrete when forms are removed. Exposed corners and other surfaces which may be damaged by ensuing operations shall be protected from damage by boxing, corner boards or other approved means until construction is completed.
8. Form ties shall remain in the walls and shall be equipped with a waterseal to prevent passage of water through the walls. Minimum set back of form ties shall be 1-1/2 inches from faces of wall. The hole left by removal of tie ends shall be sealed and grouted in accordance with the procedure described hereinafter in Par. 3.01.F. Form ties will be permitted to fall within as-cast areas of architecturally treated wall surfaces; this does not apply to walls receiving decorative waterproof masonry coating.
9. All formed exposed to view concrete surfaces shall have a "smooth rubbed finish". Exterior vertical surfaces shall be rubbed to one foot below grade. Interior exposed to public view vertical surfaces of liquid containers shall be rubbed to one (1) foot below the minimum liquid level that will occur during normal operations.

B. All vertical surfaces in liquid containing structures shall have a "smooth form" finish.

1. All "smooth form" concrete vertical surfaces shall be a true plane within 1/4 inch in ten (10) feet as determined by a ten (10) foot straightedge placed anywhere on the surface in any direction. Abrupt irregularities shall not exceed 1/8 inch.

C. Basin, flume, conduit and tank floors shall have a "troweled" finish unless shown otherwise on Drawings.

D. Weirs and overflow surfaces shall be given a "troweled" finish.

E. 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.

F. Patching of holes due to removal of tie ends and other repairable defective areas, shall be as follows: Entire contact area of hole shall be coated with two-part moisture insensitive epoxy bonding compound as specified in Par. 2.04.B. in accordance with manufacturer's specifications, and prior to placing of freshly mixed patching mortar. Parching mortar shall be mixed and placed in general accordance with ACI 301, Par. 5.3.7.5.

G. For floors and slabs in which drains occur, special care shall be exercised to slope the floors uniformly to the drains. All floors with drains shall be sloped not less than 1/8 inch per foot unless otherwise shown. In all areas where quarry tile or other materials requiring more than 1/4 inch drop are to be overlaid, the concrete base slab shall be depressed to provide a finished floor at the same elevation as surrounding areas.

3.2 TESTING

A. All testing shall be in accordance with provisions of ACI 301. Testing services listed in ACI Sections 1.6.4 shall be performed by a testing agency acceptable to the Engineer and Owner.

B. The testing services of ACI sections 1.6.4.2 and 1.6.4.3 shall be performed at the Contractor's expense. The Owner-approved third party testing agency shall be responsible for making

concrete test cylinders, storing and protecting concrete cylinders and delivering cylinders to the Owner-approved testing laboratory.

C. Testing services of ACI Section 1.6.4.4 shall be paid for by the Contractor. Test shall be made for each 50 cubic yards of concrete and/or each day concrete is placed.

3.3 ADDITIONAL REQUIREMENTS

A. Unless otherwise directed by the Engineer, the vertical surfaces of footings shall be formed. Excavations and reinforcement for all footings shall have been inspected by the Engineer before any concrete is placed.

B. The installation of underground and embedded items shall be inspected before slabs are placed. Pipes and conduits shall be installed below the concrete unless otherwise indicated. Fill required to raise the subgrade shall be placed as specified in Section 312000 "Earthwork". Porous fill not less than 6 inches in compacted thickness shall be installed under all slabs, tank bottoms, and foundations. The fill shall be leveled and uniformly compacted to a reasonably true and even surface. The surfaces shall be clean, free from frost, ice, mud and water. Waterproof paper, polyethylene sheeting of nominal 4-mil minimum thickness, or polyethylene-coated burlap shall be laid over all surfaces receiving concrete.

C. Concrete shall be placed in layers not over 18 inches deep and each layer shall be compacted by mechanical internal-vibrating equipment supplemented by hand spading, rodding and tamping as directed. Vibrators shall not be inserted into lower courses that have begun to set.

D. Concrete Mixing

1. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M and furnish batch ticket information.

    a. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and deliver time to 60 minutes.

2. Project site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

    a. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at lease 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
    b. For mixer capacity larger than 1 cu. Yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd.
    c. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

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

F. All concrete surfaces shall be moist cured by the application of absorptive mats or double thicknesses of fabric kept continuously wet. Forms shall be kept continuously wet. Use of other curing methods will not be permitted unless written authorization is received from the Engineer.

G. The unit of operation shall not exceed 30 feet for tank walls and walls exposed to weather, and 45 feet for other work in any horizontal direction 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 to be made at 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 by roughening the surface of the concrete in an acceptable manner which will expose the aggregate uniformly and will not leave laitance, loosened particles of aggregate or damaged concrete at the surface. Joints in walls and columns shall be maintained level. Concrete shall be placed in layers not over 18 inches deep and each layer shall be compacted by mechanical internal-vibrating equipment supplemented by hand spading, rodding and tamping as directed. Vibrators shall not be inserted into lower courses that have begun to set.

H. Formwork for beam soffits and slabs and other parts that support the weight of concrete, shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified or permitted.

I. Concrete Walks and Curbs:

1. Subgrade shall be true and well compacted at the required grades. Spongy and otherwise unsuitable material shall have been removed and replaced with approved material. Concrete walks shall be placed upon porous fill covered with waterproof paper, polyethylene sheeting of nominal 4-mil minimum thickness or polyethylene-coated burlap.
2. Concrete walks shall be not less than 4 inches in thickness. Walks shall have contraction joints every 5 linear feet in each groove in the top surface of the slab to a depth of at least one-fourth the slab thickness with a jointing tool. Transverse expansion joints shall be installed at all returns, driveways, and opposite expansion joints in adjacent curbs. Where curbs are not adjacent, transverse expansion joints shall be installed at intervals of approximately forty (40) feet. Sidewalks shall receive a "broomed" finish. Scoring shall be in a transverse direction. Edges of the sidewalks and joints shall be edged with a tool having a radius not greater than 1/6 inch. Sidewalks adjacent to curbs shall have a slope of 1/4 inch per foot toward the curb. Sidewalks not adjacent to curbs shall have a slope of 1/4 inch per foot. The surface of the concrete shall show no variation in cross section in excess of 1/4 inch in 5 feet. Concrete walks shall be reinforced with 6 x 6-W1.4xW1.4 welded wire reinforcement.
3. Concrete curbs shall be constructed to the section indicated on the Standard Detail, and all horizontal and vertical curves shall be incorporated as indicated or required. Forms shall be steel as approved by the Engineer. At the option of the Contractor, the curbs may be precast or cast-in-place. Cast-in-place curbs shall be divided into sections 8 to 10

feet in length using steel divider plates. The divider plates shall extend completely through the concrete and shall be removed. Precast curbs shall be cast in lengths of 4 to 5 feet. All exposed surfaces of concrete shall be finished smooth. All sharp edges and the edges of joints and divisions shall be tooled to 1/4 inch radius. Steel reinforcement shall be installed where the curb crosses pipe trenches or other insecure foundations. Such reinforcement shall consist of two (2) No. 4 deformed bars near the bottom of the curb and shall extend at least 24 inches beyond the insecure area. Transverse expansion joints shall be installed at all curb returns and at intervals of approximately 40 feet.

J. Column base plates, bearing plates for beams and similar structural members, machinery and equipment bases shall, after being plumbed and properly positioned, be provided with full bearing with nonshrink grout. Concrete surfaces shall be rough, clean, free of oil, grease, and laitance and shall be moistened thoroughly immediately before grout is placed. Metal surfaces shall be clean and free of oil, grease and rust. Mixing and placing shall be in conformance with the material manufacturer's printed instructions. After the grout has set, exposed surfaces shall be cut back one (1) inch and covered with a parge coat of mortar consisting of one (1) part Portland cement, two (2) parts sand and sufficient water to make the mixture placeable. Parge coat shall have a smooth dense finish. Exposed surfaces of grout and parge coat shall be water cured with wet burlap for seven (7) days.

K. Grout fill which is formed in place by using rotating equipment as a screen, such as clarifiers and similar types of equipment, shall be mixed in proportions and consistencies as required by the manufacturer or supplier of the equipment.

L. Watertightness:

1. The structures which are intended to contain liquids and/or will be subjected to exterior hydrostatic pressures shall be so constructed that, when completed and tested, there shall be no loss of water and no wet spots shall show.
2. As soon as practicable, after the completion of the structures, the Contractor shall fill them with water and if leakages develop or wet spots show, the Contractor shall empty such structures and correct the leakage in an approved manner. Any cracks which appear in the concrete shall be dug out and suitably repaired. Temporary bulkheads over pipe openings in walls shall be provided as required for the testing.
3. After repairs, if any are required, the structures shall be tested again and further repaired if necessary until satisfactory results are obtained. All work in connection with these tests and repairs shall be at the expense of the Contractor.
4. Waterstops shall be placed in other locations as indicated on the Drawings and as may be required to assure the watertightness of all containers of liquids. Special shop fabricated ells, tees and crosses shall be provided at junctions. Waterstops shall be extended at least 6 inches beyond end of placement in order to provide splice length for subsequent placement. In slabs and tank bottoms, water stops shall be turned up to be made continuous with waterstops at bottom of walls or in walls.
5. Joints between pipe (except cast iron wall pipe) and cast-in-place concrete walls shall be sealed by means of a groove cast completely around the pipe; the groove shall be filled with a quick setting hydraulic compound similar and equal to Waterplug as made by BASF Construction Chemicals mixed and applied in accordance with the manufacturer's instructions.

M. Unless otherwise shown or directed, all pumps, other equipment, and items such as lockers, motor control centers and the like, shall be installed on concrete bases. The bases shall be

constructed to the dimensions shown on the plans or as required to meet plan elevations. Where no specific plan elevations are required, the bases shall be 6 inches thick and shall extend 3 inches outside the metal equipment base. In general, the concrete bases shall be placed up to 2 inches below the metal base. The equipment shall then be properly shimmied to grade and the 2- inch void filled with nonshrink grout.

N. Concrete which, in the opinion of the Architect-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.

O. Manhole or access steps shall be plastic, constructed of copolymer polypropylene meeting the requirements of ASTM D 2146 for Type II, Grade 16906 material. Step shall be reinforced with ASTM A 615, Grade 60, #4 deformed steel reinforcing bar, be 9" deep, 14" wide, provided with notched tread ridge, foot retainer lugs on each side of tread and penetration stops for press fit installation. Plastic steps shall be PS2-PF as manufactured by M.A. industries, Inc., Peachtree City, Georgia. Steps shall be installed by drilling 1" diameter holes, minimum 3-3/4 inches deep into the wall, and then driving steps into hole to the penetration stop, resulting in a press fit condition.

P. Tank pressure relief valves shall be 6" diameter Neenah Foundry Company R-5001-1, American Valve & Hydrant B315.1, or equal, floor type, with outside hooks or inside self-contained lock; quantity and spacing as shown on structural drawings. No part of pressure relief valves shall project above the neat line of the tank floor to prevent fouling of scraper mechanisms where used.

Q. All existing contact surfaces with new patch shall be coated with moisture insensitive epoxy bonding adhesive, Sikadur Hi-Mod, Concresive LPL Liquid by BASF Construction Chemicals, or approved equal. Patch shall consist of base pour of 4,000 psi structural concrete, then a topping of non-shrink natural aggregate grout, Masterflow 713, Sonogrout by BASF Construction Chemicals, or approved equal, mixed and placed in accordance with manufacturer's instructions, to the thicknesses shown on Drawings. Coat base pour with epoxy bonding adhesive prior to placing grout course.

END OF SECTION 033100

SECTION 034000 – PRECAST CONCRETE STRUCTURES

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required to furnish and install all precast concrete structures and accessories appurtenances as shown on the Drawings and specified herein.

B. Delegated Design: Design precast concrete structures, including comprehensive engineering analysis by a qualified professional engineer, licensed in the state in which the project using performance requirements and design criteria indicated.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Cast-in-Place Concrete: Section 03 31 00

B. Access Hatches: Section 08 31 10

1.3 SUBMITTALS

The Contractor shall submit the following data for Engineer's review in accordance with Section 013323.

A. Delegated Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data, calculations, and erection drawings signed and sealed by the qualified professional engineer responsible for their preparation.

B. Product Data: For each type of product indicated included but not limited to standard precast units, proprietary precast units, embedded items, and accessories.

C. Design Data: Submit calculations prepared under the direct supervision of a professional engineer supporting the structural design, including resistance to buoyancy with groundwater table to the top of the structure, resistance to uplift and resistance to wheel loads in accordance with requirements and references indicated. The calculations shall be sealed by a professional engineer licensed in the state in which the project is located.

D. Test Reports: Submit test reports for the following:

1. Material certifications and/or laboratory test reports, including mill tests and all other test data, for Portland cement, blended cement, pozzolans, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this Project.
2. Test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Such tests may include compressive strength, flexural strength, plastic or hardened air content, freeze

thaw durability, abrasion and absorption. Clearly detail in the specifications special tests for precast concrete or cast-in items.

3. Sufficient documentation, when the use of self-consolidating concrete (SCC) is proposed, showing a minimum of 30-days production track records demonstrating that SCC is appropriate for casting of the product.
4. In-plant QA/QC inspection reports, upon the request of the Project Representative.

E. Shop Drawings: Submit shop drawings for standard precast units and custom-made precast units prepared under direct supervision of a professional engineer licensed in the state in which the project is located. Shop drawings shall include:

1. The criteria and loads used in the design of the precast components.
2. All materials used, their specifications and their design strengths.
3. Layout, piecemark, dimensions, reinforcing, and connection details of each precast member, including openings.
4. Details and instructions for lifting, rigging, erection, and installation of each precast component.
5. Lists and descriptions of all loose accessory materials supplied.
6. Instructions on secondary pours (in the field) when required.
7. Professional Engineer's seal.

F. Quality Control Procedures: Submit certificate from the NPCA QC Manual that the precast concrete structure manufacturer participates in their QA/QC program.

G. Manufacturer's Instructions.

1.4 QUALITY ASSURANCE

A. Manufacturer of precast concrete structures shall be quality certified by NCPA. Inspect manufacture of structures in accordance with ASTM C1037.

B. Installer of precast concrete structures shall have a record of at least three (3) years of successful installation of similar products on similar projects.

C. Inspection of earthwork, compaction and backfill shall be in accordance with the earthwork specifications in Division 31.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver precast units to the site in accordance with the delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite, all precast concrete units will be inspected by the Project Representative for quality and final acceptance.

B. Store units off the ground or in a manner that will minimize potential damage.

C. Handle, transport, and store products in a manner to minimize damage. Lifting devices or holes shall be consistent with industry standards. Perform lifting with methods or devices intended for this purpose as indicated on Shop Drawings.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE STRUCTURES

A. Circular precast vaults and structures shall conform to ASTM C478. Access hatch and pipe penetrations shall be cast in the top slab as indicated on the drawings.

B. Structural design of precast concrete structures is hereby delegated.

C. All precast concrete structures shall be designed to resist the lateral soil pressures and fluid pressures in accordance with ASTM C857.

D. All precast concrete structures have integral flanges at the base to engage enough soil resistance to resist the buoyant force from full submergence.

E. All precast concrete structures shall be designed to support HL-93 or HS25-44 wheel loads in accordance with the AASTHO HB-17 anywhere on the top surface of the structure.

F. Joints: Joints shall be watertight and shall be sealed with one of the following:

1. Rubber gaskets conforming to ASTM C443.
2. Pre-formed flexible butyl type joint sealant conforming to AASHTO M198.

    a. Hamilton Kent "Kent Seal No. 2"
    b. K.T. Snyder Company "Rub'r Nek"
    c. Press Seal Gasket "E Z Stik"

G. Corrosion Control: Follow recommendations outlined in ACPA 01-110 when hydrogen sulfide is indicated as a potential problem.

PART 3 - EXECUTION

3.1 FABRICATION

A. Fabricate precast concrete structures in accordance with NPCA QC Manual.

3.2 INSTALLATION

A. Install precast concrete structures in accordance with ASTM C891 and the manufacturer's instructions.

B. Lift precast components at designated lifting points in accordance with the manufacturer's instructions and other applicable safety standards.

C. Install precast concrete structures in proper location, with the proper alignment and level.

D. Backfill around the precast concrete structures in accordance with Division 31 specifications.

3.3 JOINTS

A. Joints shall be sealed with an approved sealant as specified in Part 2, and shall be mortared or grouted.

B. When making joints with mastic compound prime and seal all joints with primer supplied with the joint compound.

C. Joints shall be watertight.

D. Pipe Connections into Precast Structures:

1. Precast Openings:

a. Pipe shall be sealed in the precast section pipe opening with a resilient connector meeting the requirements of ASTM C923. Resilient connector shall be "Dura-Seal III" by Dura-Tech, Dayton, Ohio; "A-Lok" by A-LOK Products, Inc.; or approved equal.

b. Resilient connector shall be cast integrally into the wall of the precast section at the time of manufacture. There shall be no mortar placed around the connector on the outside of the manhole and no mortar shall be placed around the top half of the connector on the inside of the manhole when completing the invert work.

2. Cored Openings:

a. Pipe shall be sealed in cored precast section pipe opening with a resilient mechanical connector meeting the requirements of ASTM C923. Resilient connector shall be "NPC Kor-N-Seal I" (with stainless steel wedge) by Trelleborg Pipe Seals Milford, Inc.; "PSX: Direct Drive" by Press-Seal Gasket Corporations; interlocking link pipe seal; or approved equal. All fasteners and hardware shall be Type 304 stainless steel.

b. There shall be no mortar placed around the connector on the outside of the structure and no mortar shall be placed around the top half of the connector on the inside of the structure when completing the invert work.

3.5 CLEAN UP

A. Upon completion of installation of the precast structures and appurtenances, the Contactor shall remove all debris and surplus construction materials resulting from the Work. The Contractor shall grade the ground around and adjacent to the construction area in a uniform and neat manner to the final grade lines.

END OF SECTION 034000

DIVISION 05

METALS

SECTION 055202 – ALUMINUM HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Extent and dimensions of handrails and railings are indicated on Drawings and include miscellaneous handrails and railing systems not included in other Sections of these Specifications.

B. Type of handrails and railing systems in this Section is aluminum pipe handrails and railing systems.

C. Products furnished but not installed under this Section include inserts and anchors preset in masonry and concrete for anchorage of hand rails and railing systems.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to Work of this Section.

B. Division 5 - Metals

C. Dock Equipment Section 461100

1.3 SUBMITTALS

A. Product Data: Manufacturer's technical data for products and processes used in handrails and railing systems, including finishes and grout.

B. Shop Drawings: Shop details of fabrication and installation for each type and material of handrail and railing system required including plans, elevations, sections, profiles of rails, fittings, connections, and anchors.

C. Samples: Prepare samples of each type of metal finish required on metal of same thickness and alloy indicated for final work. Where finish involves normal color and texture variations, include sample sets composed of two (2) or more units showing limits of such variations expected in completed work. Include 6" long samples of each distinctly different railing member including handrails, top rails, posts, and samples of fittings and brackets.

1.4 DEFINITIONS

A. Definitions in ASTM E 985 for railing-related terms apply to this Section.

1.5 SYSTEM DESCRIPTION

A. Structural Performance of Handrails and Railing Systems: Design, engineer, fabricate, and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems.

1. Top Rail of Guardrail Systems: Concentrated load of 200 lbf (890 N) applied at any point and in any direction and a uniform load of 50 lbf per linear foot (730 N/m) applied horizontally and concurrently with a uniform load of 100 lbf per linear foot (1460 N/m) applied vertically downward. Concentrated and uniform loads need not be assumed to act concurrently.
2. Handrails Not Serving as Top Rails: Concentrated load of 200 lbf (890 N) applied at any point and in any direction and a uniform load of 50 lbf per linear foot (730 N/m) applied in any direction. Concentrated and uniform loads need not be assumed to act concurrently.
3. Infill Area of Guardrail Systems: Horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in the system including gates, panels, intermediate rails, balusters, or other elements composing the infill area. Loads on infill area need not be assumed to act concurrently with loads on top rails.

B. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

C. Material for rails and gates shall be a minimum of 1-1/2" diameter Schedule 40 and for posts, a minimum of Schedule 80.

1.6 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain handrails and railing systems of each type and material from a single manufacturer.

B. Design Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of structural computations for handrails and railing systems to determine compliance with structural performance requirements indicated.

1.7 STORAGE

A. Store handrails and railing systems in clean, dry location, away from uncured concrete and masonry, protected against damage of any kind. Cover with waterproof paper, tarpaulin, or polyethylene sheeting; allow for air circulation inside the covering.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide handrails and railing systems of one of the following, or an approved equal. Handrail System shall be equal to "TUFRAIL" as manufactured by Thompson Fabricating Company.

1. Thompson Fabricating Company, Inc., Birmingham, Alabama.
2. Superior Railing Company
3. Alumaguard

2.2 METALS

A. General: Comply with standards indicated for forms and types of metals indicated or required for handrail and railing system components.

B. Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for type of use and finish indicated, and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required.

1. Extruded Bar and Shapes: ASTM B 221, 6063-T6.
2. Extruded Pipe and Tube: ASTM B 429, 6063-T6.
3. Plate and Sheet: ASTM B 209, 6061-T6.
4. Die and Hand Forgings: ASTM B 247, 6061-T6.
5. Castings: ASTM B 26, 356-T6.

2.3 MISCELLANEOUS MATERIALS

A. Nonshrink Nonmetallic Grout: Pre-mixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this Section.

B. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS Specifications, and as required for color match, strength, and compatibility in fabricated items.

C. Fasteners: Use fasteners of stainless steel for aluminum components, unless otherwise indicated. Do not use metals which are corrosive or incompatible with materials joined.

D. Provide concealed fasteners for interconnection of handrail and railing components and for their attachment to other work except where exposed fasteners are unavoidable or are the standard fastening method for handrail and railing system indicated.

E. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

F. Anchors and Inserts: Provide anchors of type, size, and material required for type of loading and installation condition shown, as recommended by manufacturer, unless otherwise indicated. Use nonferrous metal of hot-dipped galvanized anchors and inserts for exterior locations and

elsewhere as required for corrosion resistance. Use toothed steel or expansion bolt devices for drilled-in-place anchors.

G. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel: Sherwin-Williams Zinc-Clad Galvanizing Compound #143-0255 or equal.

H. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

I. Zinc Chromate Primer for Galvanized Metals: Sherwin-Williams Galvite, B50W3 or equal; for Ferrous Metals: Sherwin-Williams KemKromik Universal, B50Z Series or equal.

2.4 FABRICATION

A. General: Fabricate handrails and railing systems to design, dimensions and details shown. Provide handrail and railing members in sizes and profiles indicated, with supporting posts and brackets of size and spacing shown, but not less than required to comply with requirements indicated for structural performance. Handrail systems which use fittings which are glued or pop-riveted will not be acceptable.

B. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Nonwelded Connections: Fabricate railing systems and handrails for interconnection of members by means of railing manufacturer's standard concealed mechanical fasteners and fittings unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

D. Welded Connections for Aluminum Pipe: Fabricate aluminum pipe handrails and railing systems for interconnection of members by concealed internal welds, which eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

E. Form changes in direction of railing members by bending members, insertion of prefabricated elbow fittings, radius bends, or by mitering.

F. For handrails and railing systems with nonwelded connections which are exposed to exterior or to moisture from condensation or other sources, provide weepholes or other means for evacuation of entrapped water in hollow sections of railing members.

G. Toe Boards: Where required by O.S.H.A. and where indicated on the Drawings, provide toe boards at railing systems around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details shown or, if not shown, use manufacturer's standard detail. Toe boards shall be 4" high.

H. Brackets, Flanges, Fittings and Anchors: Provide manufacturer's standard wall brackets, flanges, hinges, miscellaneous fittings and anchors for interconnection of handrail and railing members to other work, unless otherwise indicated.

I. Furnish inserts and other anchorage devices for connecting handrails and railing systems to concrete or masonry work. Fabricate anchorage devices which are capable of withstanding

loadings imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.

J. For railing posts set in concrete provide preset sleeves of steel, not less than 6" long and inside dimensions not less than 2" greater than outside dimensions of post, with steel plate forming bottom closure.

K. Provide slip-fit metal sockets to receive removable railing posts. Fabricate sockets for a close fit with posts and to limit deflection of post without lateral load, measured at top, not to exceed 1/12 of post height. Design and fabricate socket covers to resist accidental dislodgement.

L. Gates: Provide gates of equal structural properties of railing system, with toe board. Hinges shall be capable of providing a swing of 180 degrees. Provide positive latching device which shall be operable from both sides of gate.

2.5 METAL FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations and designations of finishes, except as otherwise indicated.

B. Class I Clear Anodized Finish: AA-M10C22A41 (medium satin directional textured mechanical finish; chemical etch, medium matte; 0.7 mil min. thick clear anodic coating) complying with AAMA 607.1.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete as masonry construction. Coordinate delivery of such items to project site.

B. Field Measurements: Take field measurements prior to fabrication.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections accurately together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installation of handrails and railing systems. Set work accurately in location, alignment, and elevation, plumb, level, true, and free of rack, measured from established lines and levels. Do not weld, cut or abrade surfaces of handrails and railing components which have been coated or finished after fabrication, and are intended for field connection by mechanical means without further cutting or fitting.

C. Field Welding: Comply with applicable AWS Specification for procedures of manual shielded metal-arc welding, for appearance and quality, of welds made, and for methods used in

correcting welding work. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed welded joints smooth and restore finish to match finish of adjacent rail surfaces.

D. Corrosion Protection: Coat concealed surfaces of aluminum, which will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint or zinc chromate primer.

E. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at 5'-0" o.c. MAX but not more than that required by design loadings.

3.3 ANCHORING POSTS

A. Anchor aluminum handrail posts to concrete with manufacturer's base flange assembly (3 anchors per base) for top and side mount brackets recommended for meeting the design criteria. Base flanges and side mount brackets will not be welded to the post but will be mechanically fastened so as to achieve a rigid construction without annealing the post. All connections to concrete will be made using stainless steel wedge anchors, which are to be sized and furnished by the handrail manufacturer as an integral part of their handrail system. Anchor post on new concrete shall be side mounted except where shown otherwise on the drawings.

B. Anchor posts to metal surfaces with manufacturer's standard fittings designed for this purpose unless otherwise indicated.

C. Provide removable railing sections as indicated, using slip-fit metal sockets. Accurately locate sockets to match post spacing.

3.4 RAILING CONNECTIONS

A. Nonwelded Connections: Use manufacturer's standard mechanical joints for permanently connecting railing components. Components that are glued or pop riveted at the joints will not be acceptable. All components must be mechanically fastened with stainless steel hardware. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic filler cement colored to match finish of handrails and railing systems.

B. Welded Connections: Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use manufacturer's standard fittings designed for this purpose.

3.5 ANCHORING RAILING ENDS

A. Anchor railing ends into concrete or masonry with manufacturer's standard fittings designed for this purpose, unless otherwise indicated.

B. Anchor railing ends to metal surfaces with manufacturer's standard fittings using concealed fasteners, unless otherwise indicated.

C. Expansion Joints: Provide expansion joints at locations indicated or, if not indicated, at intervals not to exceed 40 feet. Provide slip-joint internal sleeve extending 2" beyond joint on either side; fasten internal sleeve securely to one side, locate joint within 6" of post.

3.6 ATTACHMENT OF HANDRAILS TO WALLS

A. General: Secure handrails to walls with manufacturer's standard wall brackets and end fittings, unless otherwise indicated.

B. For concrete and solid masonry, use drilled-in expansion shields and concealed hanger bolts, unless otherwise indicated.

C. For hollow masonry anchorage, use toggle bolts with square heads, unless otherwise indicated.

3.7 PROTECTION

A. Protect finishes of railing systems and handrails from damage during construction period by use of temporary protective coverings approved by railing manufacturer. Remove protective covering at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items which cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units as required.

END OF SECTION 055202

DIVISION 31

EARTHWORK

SECTION 312000 - EARTHWORK

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all materials, labor, equipment and services necessary to do all clearing and grubbing, excavation, backfilling, providing of additional fill material and topsoil, control of surface drainage and ground water, finished site grading and erosion control required to construct the work as shown.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. State and local code requirements shall control the disposal of trees and shrubs.

B. All burning shall be controlled by applicable local regulations.

C. EXCAVATION SUPPORT AND PROTECTION – Section 31 50 00

D. EROSION AND SEDIMENTATION CONTROL – Section 31 25 00

1.3 JOB CONDITIONS

A. Weather: Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained on account of rain, snow, ice, drought or other adverse weather conditions.

B. 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, provide adequate means of protection during earthwork operations.

C. Use of Explosives: The Contractor (or any of his Subcontractors) shall not bring explosives onto site or use in work without prior written permission from the Owner. All activities involving explosives shall be in compliance with the rules and regulations of the State Department of Mines, and Minerals, Division of Explosives and Blasting. Contractor is solely responsible for handling, storage, and use of explosive materials when their use is permitted.

D. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this work and post with warning lights.

a. Operate warning lights as recommended by authorities having jurisdiction.
b. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

E. Dust Control: Use all means necessary to control dust on or near the project site where such dust is caused by the Contractor's operations or directly results from conditions left by the Contractor.

1.4 UTILITY LINE ACTIVITIES COVERED UNDER NATIONWIDE PERMIT # 12

All activities involving utility line construction covered under NATIONWIDE PERMIT # 12 shall meet the following conditions:

A. The general Water Quality Certification is limited to the crossing of intermittent and perennial streams by utility lines.

B. The construction of permanent or temporary access roads will impact less than 300 linear feet of intermittent and perennial streams and less than one acre of jurisdictional wetlands.

C. Utility lines shall be located at least 50 feet away from a stream which appears as a blue line on a USGA 7 ½ minute topographic map except where the utility line alignment crosses the stream. Utility lines that cross streams shall be constructed by methods that maintain normal stream flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to re-entering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the utility line excavation shall not be allowed to enter the flowing portion of the stream.

D. The activities shall not result in any permanent changes in preconstruction elevation contours in waters or wetlands or stream dimension, pattern or profile.

E. Utility line construction projects through jurisdictional wetlands shall not result in conversion of the area to non-wetland status.

F. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction form entering the watercourse.

G. Removal of riparian vegetation in the utility line right-of-way shall be limited to that necessary for equipment access. Effective erosion and sedimentation control measures must be employed at all times during the project to prevent degradation of waters of the Commonwealth. Site regarding and reseeding will be accomplished with 14 days after disturbance.

H. To the maximum extent practicable, all in stream work under this certification shall be performed during low flow.

I. Heavy equipment, e.g. bulldozers, backhoes, draglines, etc., if required for this project, should not be used or operated within the stream channel. In those instances where such in stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize turbidity and disturbance to substrates and bank or riparian vegetation.

J. Any fill shall be of such composition that it will not adversely affect the biological, chemical, or physical properties of the receiving waters and/or cause violations of water quality standards. If riprap is utilized, it is to be of such weight and size that bank stress or slump conditions will not be created because of its placement.

K. Removal of existing riparian vegetation should be restricted to the minimum necessary for project construction.

L. Should evidence of stream pollution or jurisdictional wetland impairment and/or violations of water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling 800/928-2380.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Definitions:

1. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, SP, GC, SC, ML, and CL.
2. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups MH, CH, OL, OH and PT. The Contractor shall notify the Engineer if these soil materials are encountered.
3. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.
4. Drainage Fill: Washed, evenly graded mixture of crushed stone, or uncrushed gravel, with 100 percent passing a 1/2 inch sieve and not more than 5 percent passing a No. 4 sieve.
5. Backfill and Fill Materials: Satisfactory soil materials free of debris, waste, frozen materials, vegetable, and other deleterious matter.

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

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

B. Trees, bushes, and all natural vegetation shall only be removed with the approval of the Engineer. No cleared or grubbed materials shall be used in backfills or embankment fills. All stumps, roots, and other objectionable material shall be grubbed up so that no roots larger than 3 inches in diameter remain less than 18 inches below the ground surface. All holes and depressions left by grubbing operations shall be filled with suitable material and compacted to grade, as recommended in Paragraph 3.06.

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

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

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

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

3.2 EROSION CONTROL

A. Temporary measures shall be applied throughout the construction period to control and to minimize siltation to adjacent properties and waterways. Such measures shall include, but not be limited to, the use of berms, silt barriers, gravel or crushed stone, mulch, slope drains and other methods.

B. These temporary measures shall be applied to erodible material exposed by any activity associated with the construction of this project.

C. Refer to Section 31 25 00, Erosion and Sedimentation Control for requirements.

3.3 EXCAVATION

A. Excavation of every description and of whatever substances encountered within the grading limits of the project shall be performed to the lines and grades indicated on the Drawings. All excavation shall be performed in the manner and sequence as required for the work.

B. All excavated materials that meet the requirements for fill, subgrades or backfill shall be stockpiled within the site for use as fill or backfill, or for providing the final site grades. Where practicable, suitable excavated material shall be transported directly to any place in the fill areas within the limits of the work. All excavated materials that are not suitable for fill, and any surplus of excavated material that is not required for fill shall be disposed of by the Contractor.

C. The site shall be kept free of surface water at all times. The Contractor shall install drainage ditches, dikes and shall perform all pumping and other work necessary to divert or remove rainfall and all other accumulations of surface water from the excavations. The diversion and removal of surface water shall be performed in a manner that will prevent flooding and/or damage to other locations within the construction area where it may be detrimental. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose piping, well points, deep wells, etc., necessary to depress and maintain the ground water level at least two (2) feet below the base of the excavation during all stages of construction operations. The ground water table shall be lowered in advance of excavation and maintained a minimum of two (2) feet below the lowest excavation subgrade made until the excavation is backfilled or the structure has sufficient strength and weight to withstand horizontal and vertical soil and water pressures from natural ground water.

D. Excavations for concrete structural slabs on grade shall extend two (2) feet below the indicated bottom of slabs. The over-excavation shall be backfilled with 18 inches, compacted thickness, of over lot fill material or suitable material as herein specified. The remaining six (6) inches of over-excavation shall be backfilled with porous fill material. The porous fill layer shall extend beyond the limits of the concrete slab a minimum of two (2) feet on all sides as indicated on the Drawings. The porous fill shall be crushed stone or gravel and shall have the following U.S. Standard Sieve gradation:

Sieve	1-1/2	1	3/4	1/2	3/8
% Passing	Min 100	95±5	58±17	Max 15	Max 5

E. Excavations for the construction shall be carefully made to the depths required. Bottoms for footings and grade beams shall be level, clean and clear of loose material, the lower sections true to size. Bottoms of footings and grade beams, in all locations, shall be at a minimum depth of 30 inches below adjacent exterior finished grade or 30 inches below adjacent existing grade, whichever is lower, whether so indicated or not. Footings and grade beam bottoms shall be inspected by the Engineer before any concrete is placed thereon.

F. In excavations for structures where, in the opinion of the Engineer, the ground is spongy or otherwise unsuitable for the contemplated foundation, the Contractor shall remove such unsuitable material and replace it with suitable material properly compacted.

G. Sheeting and shoring shall be provided as necessary for the protection of the work and for the safety of the personnel. The clearances and types of the temporary structures, insofar as they affect the character of the finished work, will be subject to the review of the Engineer, but the Contractor shall be responsible for the adequacy of all sheeting, bracing and cofferdamming. All shoring, bracing and sheeting shall be removed as the excavations are backfilled in a manner such as to prevent injurious caving; or, if so directed by the Engineer, shall be left in place. Sheeting left in place shall be cut off 18 inches below the surface.

H. Excavation for structures which have been carried below the depths indicated without specific instructions shall be refilled to the proper grade with suitable material properly compacted, except that in excavation for columns, walls or footings, the concrete footings shall extend to this lower depth. All work of this nature shall be at the Contractor's expense.

3.4 FILL

A. All existing fill below structures and paved areas must be stripped. The upper six (6) inches of the natural subgrade below shall be scarified and recompacted at optimum moisture to at least ninety-five percent (95%) of Standard Proctor Density ASTM D 698 (latest revision).

B. All vegetation, such as roots, brush, heavy sods, heavy growth of grass and all decayed vegetable matter, rubbish and other unsuitable material within the area upon which fill is to be placed shall be stripped or otherwise removed before the fill is started. In no case will such objectionable material be allowed to remain in or under the fill area. Existing fill from excavated areas on site shall be used as fill for open and/or planted areas. Additional fill stockpiled at the site can be used for structural fill if approved by the Engineer. Any additional material necessary for establishing the indicated grades shall be furnished by the Contractor and approved by the Engineer. All fill material shall be free from trash, roots and other organic

material. The best material to be used in fills shall be reserved for backfilling pipe lines and for finishing and dressing the surface. Material larger than 3 inches maximum dimension shall not be permitted in the upper 6 inches of the fill area. Fill material shall be placed in successive layers and thoroughly tamped or rolled in a manner approved by the Engineer, each layer being moistened or dried such that the specified degree of compaction shall be obtained. No fill shall be placed or compacted in a frozen condition or on top of frozen material. No fill material shall be placed when free water is standing on the surface of the area where the fill is to be placed and no compaction of fill will be permitted with free water on any point of the surface of the fill to be compacted.

C. Where concrete slabs are placed on earth, all loam and organic or other unsuitable material shall be removed. Where fill is required to raise the subgrade for concrete slabs to the elevations as indicated on the Drawings or as required by the Engineer, such fill shall consist of suitable material and shall be placed in layers. Each layer shall be moistened or dried such that the specified degree of compaction shall be obtained. All compaction shall be accomplished in a manner and with equipment as approved by the Engineer. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for adjacent fill.

3.5 BACKFILLING

A. After completion of footings, grade beams and other construction below the elevation of the final grades and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris. Material for backfilling shall be as specified for suitable material, placed and compacted as specified hereinafter. Backfill shall be placed in horizontal layers of the thickness specified and shall have a moisture content such that the required degree of compaction is obtained. Each layer shall be compacted by mechanical tampers or by other suitable equipment approved by the Engineer to the specified density. Special care shall be taken to prevent wedging action or eccentric loading upon or against the structure. Trucks and machinery used for grading shall not be allowed within 45 degrees above the bottom of the footings or grade beams.

B. The trenches shall be backfilled following visual inspection by the Engineer and prior to pressure testing. The trenches shall be carefully backfilled with the excavated materials approved for backfilling, or other suitable materials, free from large clods of earth or stones. Each layer shall be compacted to a density at least equal to that of the surrounding earth and in such a manner as to permit the rolling and compaction of the filled trench with the adjoining earth to provide the required bearing value, so that paving, if required, can proceed immediately after backfilling is completed.

3.6 COMPACTION

A. Suitable material as hereinbefore specified shall be placed in maximum 8" horizontal layers. Compaction shall be performed by rolling with approved tamping rollers, pneumatic-tired rollers, three wheel power rollers or other approved equipment. The degree of compaction required is expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D-698. Laboratory moisture density tests shall be performed on all fill material. Material shall be moistened or aerated as necessary to provide the moisture

content that will readily facilitate obtaining the specified compaction. Compaction requirements shall be as specified below:

Fill Utilized For	Required Density (%)	Maximum Permissible Lift Thickness As Compacted, Inches
Backfill & Utility Trenches Under Foundations & Pavements	95-100	8
Backfill Around Structures	95-100	8
Field and Utility Trench Backfill Under Sidewalks and Open Areas	90-100	8

B. Field density tests shall be performed in sufficient number to insure that the specified density is being obtained. Tests shall be in accordance with ASTM Standards D 1556 or D 2922/D 3017 and shall be performed as authorized by the Engineer. Payment for field density tests shall be by the Contractor. Contractor shall provide suitable notification for coordination of testing. Delays due to the lack of adequate advance notification shall be the responsibility of the Contractor.

3.7 SITE GRADING

A. Where indicated or directed, topsoil shall be removed without contamination with subsoil and spread on areas already graded and prepared for topsoil, or transported and stockpiled convenient to areas for later application, or at locations specified. Topsoil shall be stripped to full depth and, when stored, shall be kept separate from other excavated materials and piled free of roots, stones, and other undesirable materials.

B. Following stripping, fill areas shall be scarified to a minimum depth of six (6) inches to provide bond between existing ground and the fill material. Material should be placed in successive horizontal layers not exceeding twelve (12) inches uncompacted thickness. In general, layers shall be placed approximately parallel to the finished grade line.

C. In general and unless otherwise specified, the Contractor may use any type of earth moving equipment he has at his disposal, provided such equipment is in satisfactory condition and of such type and capacity that the work may be accomplished properly and the grading schedule maintained. During construction, the Contractor shall route equipment at all times, both when loaded and empty, over the layers as they are placed, and shall distribute the travel evenly over the entire area.

D. The material in the layers shall be of the proper moisture content before rolling or tamping to obtain the prescribed compaction. Wetting or drying throughout the layer shall be required. Should the material be too wet to permit proper compaction or rolling, all work on the fill thus affected shall be delayed until the material has dried to the required moisture content. If the material is too dry, it shall be sprinkled with water and manipulated to obtain the uniform moisture content required throughout a layer before it is compacted.

E. Each layer of the fill shall be compacted by rolling or tamping to the standard specified in Paragraph 3.06 and not less than 90% maximum density at optimum moisture content as

determined by field density tests made by the Standard Proctor method. In general and unless otherwise specified, the Contractor may use any type of compaction equipment such as sheepsfoot rollers, pneumatic rollers, smooth rollers and other such equipment he has at his disposal, provided such equipment is in satisfactory condition and is of such design, type, size, weight, and quantity to obtain the required density in the embankment. If at any time the required density is not being obtained with the equipment then in use by the Contractor, the Engineer may require that different and/or additional compaction equipment be obtained and placed in use at once to obtain the required compaction.

F. The Contractor shall be responsible for the stability of all embankments and shall replace any portion which, in the opinion of the Engineer, has become displaced due to carelessness or negligence on the part of the Contractor.

3.8 TOPSOIL

A. Provide all labor, materials, equipment and services required for furnishing and placing topsoil. Samples of topsoil shall be submitted to the Engineer for review before topsoil is placed. The material shall be good quality loam and shall be fertile, friable, mellow; free from stones larger than one (1) inch, excessive gravel, junk metal, glass, wood, plastic articles, roots and shall have a liberal amount of organic matter. Light sand loam or heavy clay loam will not be acceptable.

B. The topsoil shall be 3 inches thick in all areas to be seeded. No topsoil shall be placed until the area to be covered is excavated or filled to the required grade. Imported backfill material will be stockpiled on site for structure backfilling and top soiling.

END OF SECTION 312000

SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor and equipment required to dewater all excavations.

B. Dewatering of all excavations shall be the responsibility of the Contractor, and no additional compensation will be allowed for same unless specifically included as a bid item.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork is included in Section 31 20 00.

B. Erosion and Sedimentation Control is included in Section 31 25 00.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 GENERAL

A. Dewatering equipment shall be of adequate size and quantity to assure maintaining proper conditions for installing pipe, concrete, backfill or other material or structure in the excavation.

B. Dewatering shall include proper removal of any and all liquid, regardless of its source, from the excavation and the use of all practical means available to prevent surface runoff from entering any excavation.

C. The site shall be kept free of surface water at all times. The Contractor shall install drainage ditches, dikes and shall perform all pumping and other work necessary to divert or remove rainfall and all other accumulations of surface water from the excavations. The diversion and removal of surface water shall be performed in a manner that will prevent flooding and/or damage to other locations within the construction area where it may be detrimental. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose piping, well points, deep wells, etc., necessary to depress and maintain the ground water level at least two (2) feet below the base of the excavation during all stages of construction operations. The ground water table shall be lowered in advance of excavation and maintained a minimum of two (2) feet below the lowest excavation subgrade made until the structure has sufficient strength and weight to withstand horizontal and vertical soil and water pressures from natural ground water.

D. Dewatering operations should not discharge into the sanitary sewer system, or into any ditch, pipe or other conveyance that leads to a regulated water body, except as authorized by a KPDES permit.

END OF SECTION 312319

SECTION 312502 - EROSION AND SEDIMENTATION CONTROL-KPDES REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, and equipment required for erecting, maintaining and removing temporary erosion and sedimentation controls as shown on the Drawings and as specified herein and as recommended by state and local regulatory agencies.

B. The contractor shall at all times minimize disturbance and the period of time that the disturbed area is exposed without stabilization practices. In "critical areas" (within 25 feet of a stream) erosion prevention measures such as erosion control mats/blankets, mulch, or straw blown in and stabilized with tackifiers or by treading, etc shall be implemented on disturbed areas within 24 hours or "as soon as practical" after completion of disturbance/grading or following cessation of activities.

C. Temporary erosion controls include, but are not limited to grassing, mulching, seeding, providing erosion control and turf reinforcement mats on all disturbed surfaces including waste area surfaces and stockpile and borrow area surfaces; scheduling work to minimize erosion and providing interceptor ditches at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits.

D. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, and appurtenances on sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits.

E. Contractor is responsible for providing and maintaining effective temporary erosion and sediment control measures prior to and during construction or until final controls become effective.

F. The Contractor shall be responsible for placement of erosion and sedimentation controls. Prior to construction, the Contractor shall develop a Stormwater Pollution Prevention Plan per state regulations. Prior to excavation, fill or grade work, the Contractor shall place controls in locations required by the plan. If during the course of construction, the state and/or local regulatory agency determines additional controls are required, the Contractor shall furnish, install and maintain additional mulching, blankets and/or sediment barriers to control erosion and sedimentation to the satisfaction of the regulatory agency.

G. The Contractor shall inspect and repair all erosion and sedimentation controls every seven (7) days and after each rainfall of 0.5 inch or greater.

H. Bare soil areas must be seeded, mulched, or covered after 14 days if no work will be done in the area within the next 7 days. If areas are to be left bare for more than 14 days, erosion controls and sediment barriers are required to be installed.

I. Erosion Control prevention measures shall be installed prior to removal of vegetation and/or stripping of topsoil.

J. The Contractor is responsible for preparing and submitting the Notice of Intent and attachments and obtaining permit approval prior to the beginning of any construction activities.

1.2 PERMIT AND NOTIFICATION REQUIREMENTS

A. The Contractor shall submit a Notice of Intent Specifically for Construction Activities (NOI-SWCA) before beginning any site disturbance, and shall implement erosion control measures as may be required by state, local and federal agencies. Contractor shall submit an electronic Notice of Intent form and required attachments to the Division of Water at least seven working (7) days, prior to beginning of construction activity. See Paragraph 3.8 in this section for detailed requirements.

B. The Contractor shall comply with all additional requirements of the local regulatory agency.

1.3 RELATED WORK

A. Dewatering is included in this Division, Section 31 23 19.

B. Final erosion protection measures where required are included in this Section.

C. Utility Line Stream Crossings – Division 33.

PART 2 – PRODUCTS

2.1 SEED

A. The seed mixture to be sown shall be in the following proportions:

Common Name	Proportion By Weight	% of Purity	% of Germination
Kentucky 31 Tall Fescue	75	90	85
Italian Rye Grass	10	90	85
Red Top	10	90	85
White Clover	5	95	90

B. All seed shall be fresh and clean and shall be delivered mixed, in unopened packages, bearing a guaranteed analysis of the seed mixture.

C. Seed for temporary stabilization shall be annual rye grass, oats or wheat.

2.2 FERTILIZER

A. Just prior to the planting of turf, evenly broadcast 15 pounds per thousand square feet of fertilizer, 10-10-10 (nitrogen, phosphorus, potassium). Disc or harrow fertilizer 2 to 4 inches into the soil.

B. Fertilizer shall be delivered to the site in the original unopened container bearing the manufacturer's guarantee analysis. Any fertilizer that becomes caked or damaged making it unsuitable for use, will not be accepted.

2.3 SOD

A. Sod shall be at least 70% Bluegrass, strongly rooted and free of weeds.

B. It shall be mowed to a height not to exceed 3" before lifting, and shall be of uniform thickness with ½" to 1- ½" of soil.

2.4 MULCH

A. Mulch for seeded areas shall be Conwed Hydro Mulch, Silva-Fiber, or equal. It shall be suitable for use in a water slurry or for application with hydraulic equipment. The moisture content shall be 9-15%, and mulch shall have an organic matter content of minimum 98%.

B. Clean straw is acceptable as mulch. It shall be spread at the rate of one (1) bale per 1,000 feet (approximately 2" loose depth).

C. Mulch on slopes at or greater than 3:1 shall be held in place with turf reinforcement mat.

D. Mulch on areas subject to surface water run-off or in drainage ditches shall be held in place with turf reinforcement mat.

2.5 EROSION CONTROL BLANKETS

A. Erosion Control Blanket shall be made up of biodegradable and/or photodegradable products such as jute, wood fiber, coconut fiber, straw and degradable plastic netting. They shall degrade at a rate of approximately 6 months to 24 months.

B. Erosion Control Blanket shall be installed on slopes less than 3:1.

2.6 TURF REINFORCEMENT MAT

A. Where indicated on the Contract Drawings or as described in the Specifications, in all ditches and drainage channels and on all slopes equal to or greater than 3:1, Turf Reinforcement Mat shall be installed for long-term erosion control.

B. Turf Reinforcement Mat shall consist of top and bottom heavy weight netting and biodegradable matrix such as coconut fiber or aspen curled wood excelsior, as manufactured by Western Excelsior Excel PP5-8 Turf Reinforcement Mat or equal. Product shall degrade at a minimum rate of 36 months.

C. Where slope and hydraulic conditions are severe, a synthetic matrix may be used, based on manufacturer's recommendations.

2.7 SILT FENCE

A. Temporary Silt Fence shall consist of woven geotextile fabric attached to 2" X 2" X 48" tall hardwood stakes.

1. Exposed Fabric shall be 36" and a minimum of 4" shall be buried in trench as shown on the Detail Drawings.
2. Stakes shall be at 6' centers unless stated otherwise on Contract Documents.

B. Temporary Reinforced Silt Fence

1. For areas of steep slopes and high flows, where indicated on the Contract Drawings, or as directed by state or local regulations, Reinforced Silt Fence shall be installed.
2. Fabric shall be woven monofilament geotextile attached to 11 gauge steel fencing of 2" X 4" grid.
3. Stakes shall be 5' tall steel and shall be installed on 4' centers.
4. Fabric and fencing shall be buried in trench as shown on the Detail Drawings.

C. Spacing of Silt Fences on slopes shall be according to the following table, or as directed by state or local regulatory agencies:

Slope Angle	Soil Type		
	Silty	Clays	Sandy
Very Steep (1:1)	50 ft.	75 ft.	100 ft.
Steep (2:1)	75 ft.	100 ft.	125 ft.
Moderate (4:1)	100 ft.	125 ft.	150 ft.
Slight (10:1)	125 ft.	150 ft.	200 ft.

D. If runoff flows along the uphill side of the silt fence, Contractor shall install "J-hooks" every 40 to 80 feet. These are curved sections of silt fence above the continuous fence that serve as small dams to stop and hold the flow to allow sediment to settle.

2.8 FIBER ROLLS

A. On long slopes less than 10:1, and where indicated on the Contract Drawings or recommended by the regulatory agency, Fiber Rolls shall be installed.

B. Fiber Rolls shall be made of wood shavings, coconut fiber or other similar material encased in heavy duty netting.

C. Wooden stakes at 4'-0" on center shall be used to anchor the Fiber Rolls along the contours of the slope.

2.9 AGGREGATE SILT CHECKS

A. Where needed to slow flow velocity, to cause ponding or to protect storm water inlet structures, Aggregate Silt Checks shall be installed.

B. Aggregate Silt Checks shall consist of rock of various sizes ranging from 2" to 6" contained in or placed on geotextile filter fabric. Pea-stone or gravel-filled bags are acceptable for temporary silt checks in low-flow conditions.

2.10 RIP RAP

A. Rip Rap shall be installed at the outlets of storm drains and on channel banks as noted on the Contract Drawings and/or recommended by state and local regulatory agencies.

B. Rip Rap shall have no less than 80%, by volume, of individual stones that range in size from 0.0247 to 1.483 cubic feet.

2.11 CONSTRUCTION ENTRANCE PAD

A. Contractor shall construct entrance pads at all locations where vehicles will enter or exit the site.

B. Pad shall be a minimum of 20 feet wide, 50 feet long and 6" thick, and consist of No. 2 stone laid on top of filter fabric.

PART 3 - EXECUTION

3.1 GENERAL

A. Erosion and sediment control practices shall be consistent with the requirements of the state and local regulatory agencies and in any case shall be adequate to prevent erosion of disturbed and/or regraded areas.

B. Contractor is responsible for notifying the state regulatory agency concerning inclusion under the KPDES General Permit for Storm Water Discharges From Construction Activities.

C. Gravity sewer lines, force mains and water lines that cross steams shall be constructed by methods that maintain normal stream flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to reentering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the line excavation shall not be allowed to enter the flowing portion of the stream. The provisions of this condition shall apply to all types of utility line stream crossings.

D. Removal of riparian vegetation in the utility line right-of-way shall be limited to that necessary for equipment access. Effective erosion and sedimentation control measures must be employed at all times during the project to prevent degradation of waters of the Commonwealth. Site regrading and reseeding will be accomplished with 14 days after disturbance.

3.2 TEMPORARY AND PERMANENT STABILIZATION REQUIREMENTS

A. Temporary Stabilization is required for all disturbed areas where active work is not being performed. Rough graded areas and topsoil piles that are not in active use must be seeded immediately. The Contractor shall follow the guidelines in the table below:

Temporary Stabilization Table

Area requiring temporary stabilization	**Time frame to apply erosion controls**
Any disturbed areas within 25 feet of a stream	Within 24 hours of the most recent disturbance if the area will remain idle for more than 21 days
For all construction activities, any disturbed areas that will be dormant for more than 21 days but less than one year, and not within 25 feet of a stream	Within seven days of the most recent disturbance within the area
Disturbed areas that will be idle over winter	Prior to the onset of winter weather
All areas where activity has temporarily ceased	Within 14 days

B. Permanent control measures to minimize erosion and sedimentation shall be through the stabilization of soil as soon as possible with perennial vegetation. The contractor shall follow the guidelines for Permanent Stabilization as specified in the table below.

Permanent Stabilization Table

Area requiring permanent stabilization	**Time frame to apply erosion controls**
Any areas that will lie dormant for 180 days or more	Within 14 days of the most recent disturbance
Any areas within 25 feet of a stream and at final grade	Within 24 hours of reaching final grade
Any other areas at final grade	Within 7days of reaching final grade within that area

If permanent seeding is not practical due to the time of year, the disturbed area shall be seeded immediately with an annual rye grass at a rate of 3 lb. per 1,000 sq. feet and mulched with straw at a rate of 2.5 tons per acre. Mulch shall be anchored at 6 to 12-inch intervals across the slope by crimping into soil.

3.3 SEEDING

A. The areas to be seeded shall be thoroughly tilled to a depth of at least 4" by discing, harrowing, or other approved methods until the condition of the soil is acceptable to the Engineer. After harrowing or discing, the seed bed shall be dragged and/or hand raked to finish grade.

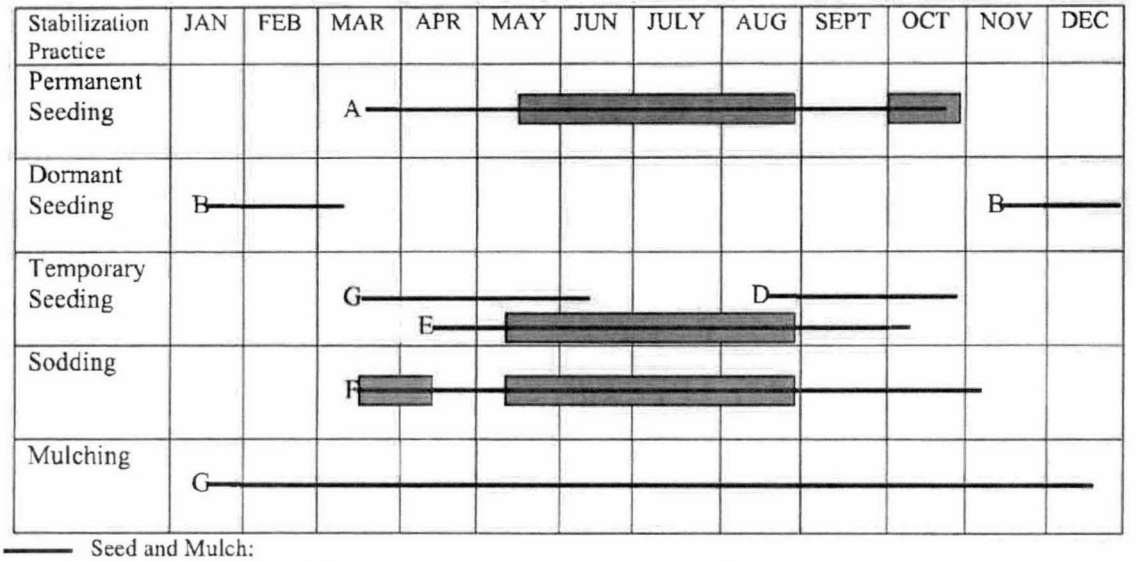
B. The incorporation of the fertilizer and the agricultural lime may be a part of the tillage operation and shall be applied no less than 24 hours nor more than 48 hours before the seed is to be sown.

C. Seed shall be broadcast either by hand or approved sowing equipment at the rate of ninety (90) pounds per acre (two pounds per 1,000 square feet), uniformly distributed over the area. Broadcasting seeding during high winds will not be permitted. The seed shall be drilled or raked into a depth of approximately 2 inch and the seeded areas shall be lightly raked to cover the seed and rolled. Drilling seeding shall be done with approved equipment with drills not more than 3 inches apart. All ridges shall be smoothed out, and all furrows and wheel tracks likely to develop into washes, shall be removed.

D. After the seed has been sown, the areas so seeded shall be mulched with clean straw at the rate of one (1) bale per 1,000 feet (approximately 2 inch loose depth). Mulch on slopes and in all ditches and drainage channels shall be held in place with erosion control blankets.

E. Areas seeded shall be watered and protected until a uniform stand develops, and then inspected periodically and maintained appropriately. Displaced mulch shall be replaced or any damage to the seeded area shall be repaired promptly, both in a manner to cause minimum disturbance to the existing stand of grass. If necessary to obtain a uniform stand, the Contractor shall refertilize, reseed and remulch as needed. Scattered bare spots up to one (1) square yard in size will be allowed up to a maximum of 10 percent of any area.

F. The following table is a guide to schedule seeding and mulching:



Seed and Mulch:

A = Fescue, Clover, Ryegrass Mixture: 160 lbs/acres or 4 lbs/1,000 s.f. plus 2 tons mulch per acre

B = Fescue, Clover, Ryegrass Mixture: 160 lbs/acres or 4 lbs/1,000 s.f. plus 2 tons mulch per acre

C= Oats: 120 lbs/acre

D=Wheat or Rye: 120 lbs/acre

E=Perennial Ryegrass: 40 lbs/acre or 1 lb/1,000 s.f.

F=Install Sod

G= Mulch 2 tons per acre

Irrigation Needed: May through August and October and two to three weeks after installing sod in March or April

3.4 SOD

A. To install, bring soil to final grade and clear of trash, wood, rock, and other debris. Apply topsoil, fertilizer at approximately 1000 lbs per acre.

B. Use sod within 36 hours of cutting. Lay sod in straight lines. Butt joints tightly, but do not overlap joints or stretch sod. Stagger joints in adjacent rows in a brickwork type pattern. Use torn or uneven pieces on the end of the row.

C. Notch into existing grass. Anchor sod with pins or stakes if placed on slopes greater than 3:1. Roll or tamp sod after installation and water immediately. Soak to a depth of 4 to 6 inches. Replace sod that grows poorly. Do not cut or lay sod in extremely wet or cold weather. Do not mow regularly until sod is well established.

3.5 INSTALLATION OF EROSION AND SEDIMENT CONTROL DEVICES

A. All erosion and sediment control products and materials shall be installed per manufacturer's recommendations and in accordance with the Kentucky Erosion Prevention and Sediment Control Field Guide.

B. Contractor shall pay special attention to the trenching-in of the bottoms of silt fence, the staking of sediment barriers, and the stapling of erosion control blankets.

3.6 MAINTENANCE OF EROSION AND SEDIMENT CONTROL DEVICES

A. Erosion and sedimentation controls shall be inspected weekly and after rain events of 0.5 inch or greater. Replace silt fencing as needed, filter stone which is dislodged, erosion control blanket which is damaged, and make other necessary repairs.

B. Remove sediment from fences and barriers when it accumulates to half the height of the barrier, or more often as needed.

3.7 CLEAN UP

A. Upon completion of the project and/or establishment of satisfactory turf, vegetation or permanent erosion control structures, Contractor shall remove all temporary devices and properly dispose of such.

3.8 KPDES GENERAL PERMIT FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

A. The Contractor is responsible for filing the electronic Notice of Intent (NOI-SWCA) form at least seven (7) days prior to start of construction activity. The Notice of Intent (NOI) is a Kentucky Pollution Discharge Elimination System (KPDES) permit application as provided by the Kentucky Revised Statutes, Chapter 224. This application is required to be submitted for construction projects that disturb one or more acres of land.

B. The NOI requires the inclusion of the descriptions of (but is not limited to) the following items:

1. Names and designated uses of any receiving waters
2. Anticipated number and locations of discharge points
3. Identification of planned construction in or along a water body

A project map showing property boundaries, areas to be disturbed, locations of anticipated discharge points and receiving waters is also required to be submitted with the NOI.

C. If the construction site is near a designated "Impaired Water" or a "Cold Water Aquatic Habitat Waters, Exceptional Waters, Outstanding National/State Resource Waters", additional items and/or individual permits may be required.

D. The NOI form requires an SIC code. The link to the SIC codes is http://www.osha.gov/pls/imis/sicsearch.html. The following are the typical construction SIC codes utilized:

1542 – Building Construction, nonresidential, except industrial and warehouses
1623 – Water Main Construction, Sewer Construction
1629 – Water and Wastewater Treatment Plant Construction
1711 – Water Pump Installation
1781 – Drilling Water Wells

E. The Contractor is responsible for developing, implementing and continuously updating a Stormwater Pollution Prevention Plan (SWPPP) before commencement of site disturbance. The SWPPP should include erosion prevention measures and sediment control measures which are installed and maintained to minimize discharges of sediments and other pollutants from a 2-year, 24-hour storm event. The SWPPP must be kept at the site and available for review by State officials, and must be updated as necessary through the course of the construction project.

F. The Contractor should receive notification from the Kentucky Division of Water of permit coverage within seven (7) days of the electronic submittal. Until receipt of notification that NOI is acceptable, site disturbance is not permitted.

G. The permit, fact sheet, and links to permitting forms and more information can be found at http://water.ky.gov/permitting/Pages/WastewaterDischarge.aspx, General Permit KYR10.

H. Unless otherwise noted, the Contractor is responsible for completing and maintaining the required Self-Inspection Forms. A sample is included at the end of this specification section.

I. Upon completion of the project and establishment of all permanent erosion and sediment control structures and devices, the Contractor shall submit the Notice of Termination (NOT) form to the Division of Water.

J. All subcontractors are required to comply with the requirements of the Permit and the Stormwater Pollution Prevention Plan (SWPPP).

3.10 WHERE TO SUBMIT

A. Submit an Electronic Notice of Intent (NOI) Form to:
https://dep.gateway.ky.gov/eForms/default.aspx?FormID=48

3.11 REQUIRED FOR THIS CONTRACT

A. The Contractor shall submit the signed electronic NOI to the Kentucky Division of Water (address noted above) at least seven (7) days prior to the start of work activities for an electronic submittal, or thirty (30) days for a paper submittal. Do not begin site work until receiving notice of permit approval from the Division of Water.

B. Submit the NOI and locally required documents to the local regulatory agency.

C. Develop, implement, and continuously update the Stormwater Pollution Prevention Plan (SWPPP).

D. Inspect and document the condition of runoff controls every seven (7) days and after each rain event of one-half inch or more. Maintain inspection reports at the site.

E. The Contractor shall file an electronic Notice of Termination (NOT) when General Permit coverage is no longer needed (General Permits describe how this is done).

END OF SECTION 312502

KENTUCKY CONSTRUCTION SITE INSPECTION REPORT

Utility Line Projects

KENTUCKY EROSION AND SEDIMENT CONTROL
PERMIT COMPLIANCE INSPECTION REPORT

General Site Information:

Company:	**County:**
Site:	**Date:**

Permit Compliance Information:

	Yes	No
Copy Of Permit kept on site		
Copy of Best Management Practices (BMP) Plan kept on site		
Site specific description of project timing/phasing and implementation		
Adequate site map showing:		
• Drainage patterns indicated on plan		
• Receiving waters (stream, river, lake, wetland, etc.) named		
• Approximate slopes after major grading		
• Area of soil disturbance		
• Undisturbed areas and vegetative buffer zones		
• Location of structural and non-structural controls (BMPs)		
• Areas where stabilization practices are to be employed		
• Storm water discharge locations		

Specific Site Information:

Name of receiving stream:	
Total area of site:	
Area disturbed:	

Inspection Results:

Inspection Criteria: **Satisfactory, Marginal, Unsatisfactory**	**S**	**M**	**U**
Condition of receiving stream is BMP Plan adequately implemented?			
Timely seedling and mulching			
• Revegetation on cut/fill/cleared areas			
• Condition of slope areas			
Structural Controls			
• Drainage ditch protection/liners installed			
• Inlet protection for curb drains, etc.			
• Outlet protection – no erosion or scour			
• Silt fences below bare soil areas			
• Rock check dams in ditches			
• Sediment traps/ponds maintained			
• Other controls			

Kentucky Best Management Practices Plan • Construction Site Inspection Report

Company:	**Site:**	**County:**
Site Operator:		**Date:**
Receiving Water:	**Total Site Area (acres):**	**# Disturbed Acres:**
Inspector Name:	**Inspector Qualifications:**	
Inspection Type: Weekly or ½ Inch Rain	**Days Since Last Rainfall** ____ **# Inches of Last Rainfall:** _____	

Field Inspection Observations

BMP Category	Compliance Yes	No	N/A	Field Indicators for Compliance
Project Operations				Notice of Intent (KPDES permit) and other local/state permits on file BMP Plan on site and available for review Project timing/schedule and activities following BMP Plan Weekly inspection and rain-event reports on BMPs available for review Diversions, silt checks/traps/basins, and silt fences/barriers installed prior to clearing Grading and clearing conducted in phases to minimize exposed soil areas No vegetation removal or operations in stream or sinkhole buffer area (25-50 ft min) Rock pad in place on all construction site exits leading to paved roads No sediment, mud, or rock on paved public roads in project area Dust control if needed when working in residential areas during dry conditions
Drainage Management				Upland runoff diverted around bare soil areas with vegetated/lined ditches/berms Drainage channels exiting the site are lined with grass/blanket/rock and stabilized Discharges from dewatering operations cleaned in silt fence enclosure or other filter No muddy runoff leaving site after rains up to 1½ inches
Erosion Protection				Exposed soil seeded/mulched after 2 weeks if no work is planned for the next 7 days Soils on steep slopes seeded/mulched/blanketed as needed to prevent rutting
Sediment Barriers				Silt fence, rock filter, or other sediment barrier below all bare soil areas on slopes Barrier installed across slope on the contour, trenched in, posts on downhill side Multiple sediment barriers at least 125 ft apart on unseeded slopes steeper than 4:1 J-hook interceptors along silt fence where heavy muddy flows run along fencing No visible undercutting or bypassing or blowout of sediment barrier Accumulated sediment is less than halfway to the top of sediment barrier
Slope Protection				Slopes tracked, disked, or conditioned after final grade is established Slopes seeded, mulched, or blanketed within 21 days, no unmanaged rills or gullying Heavy downslope flows controlled by lined downdrain channels or slope drain pipes No muddy runoff from slopes into streams, rivers, lakes, or wetlands
Inlet Protection				Inlet dam/device or filtration unit placed at all inlets receiving muddy flows No visible undercutting, bypassing, or blowout of inlet protection dam or device Accumulated sediment is less than halfway to the top of the inlet protection dam/device
Outlet Protection				High flow discharges have rock or other flow dissipaters of adequate sizing at outlet Culvert outlets show no visible signs of erosion/scour, bank failure, or collapse
Ditch and Channel Stabilization				No unmanaged channel bank erosion or bottom scouring visible within or below site Ditches with slopes more than 3% have check dams spaced as needed, if not grassed Ditch check dams tied in to banks, with center 4" lower than sides, and no bypassing Ditches with slopes of up to 5% are thickly seeded with grass (minimum requirement) Ditches 5% to 15% are lined with thick grass and erosion control blankets as needed Ditches 15% to 33% are lined with thick grass and matting or other approved product Ditches exceeding 33% are paved or lined with rock or other approved product

Sediment Traps and Basins				Storage volume is at least 134 cubic yards for each acre of bare soil area drained Trap or basin is seeded/mulched and stabilized; no collapsing sidewalls or banks Outlet structure is stable and consists of rock-lined notched overflow or outlet riser Rock overflow is 6" lower in center to control overflow discharge Outlet riser pipe has concrete & rock base, ½ inch holes every 3" to 6", and trash rack Area near pipe outlet or overflow is stable, with no scour or erosion Sediment removed before trap or basin is halfway full; disposal is away from ditches
Maintenance of EPSC Management Practices				Sediment behind silt fence and other filters does not reach halfway to top Sediment traps and basins are less than half full of sediment Gullies repaired, silt fences and other controls inspected and repaired/replaced Written documentation of controls installed, inspection results, and repairs performed All controls removed and areas graded, seeded, and stabilized before leaving site
Materials Storage, Handling, and Cleanup				Materials that may leach pollutants stored under cover and out of the weather Fuel tanks located in protected area with double containment system Fuel and/or other spills cleaned up promptly; no evidence of unmanaged spills No evidence of paint, concrete, or other material washouts near drain inlets No storage of hazardous or toxic materials near ditches or water bodies
Waste Disposal				Trash, litter, and other debris in proper containers or properly managed No litter or trash scattered around on the construction site Provisions made for restroom facilities and/or other sanitary waste management Sanitary waste facilities clean and serviced according to schedule No disposal of any wastes into curb or other inlets, ditches, streams, or water bodies

Inspection Notes and Key Observations

List of Stabilized Areas: Vegetation is Established; Ditches are Stabilized; No Exposed Soil

Other Notes or Observations:

Corrective Actions Taken and/or Proposed Revisions to BMP Plan:

I certify under penalty of law that I understand the terms and conditions of the general Kentucky Pollutant Discharge Elimination System (KPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Signature of Inspector: _____

SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This Section includes, but is not limited to, the following:

1. Shoring and bracing necessary to protect existing buildings, streets, walkways, utilities, and other improvements and excavation against loss of ground or caving embankments.
2. Maintenance of shoring and bracing.
3. Removal of shoring and bracing, as required.

B. Types of shoring and bracing systems include, but are not limited to, the following:

1. Steel H-section (soldier) piles.
2. Timber lagging.
3. Steel sheet piles.
4. Portable Steel Trench Box.

C. Building excavation is specified in another Section.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Section 013323.

Layout drawings for excavation support system and other data prepared by, or under the supervision of, a qualified professional engineer. System design and calculations must be acceptable to local authorities having jurisdiction. This submittal is for information only. Engineer's review is not for adequacy design, but to verify that it has been designed by a licensed professional. Design of shoring is part of means and methods of construction and remains solely the responsibility of the contractor.

1.4 QUALITY ASSURANCE

A. Engineer Qualifications: A professional engineer legally authorized to practice in jurisdiction where Project is located, and experienced in providing successful engineering services for excavation support systems similar in extent required for this Project.

B. Supervision: Engage and assign supervision of excavation support system to a qualified professional engineer foundation consultant.

C. Regulations: Comply with codes and ordinances of governing authorities having jurisdiction.

1.5 JOB CONDITIONS

A. Before starting work, verify governing dimensions and elevations. Verify condition of adjoining properties. Take photographs to record any existing settlement or cracking of structures, pavements, and other improvements. Prepare a list of such damages, verified by dated photographs, and signed by Contractor and others conducting investigation.

B. Survey adjacent structures and improvements, employing qualified professional engineer, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

C. During excavation, resurvey benchmarks weekly, maintaining accurate log of surveyed elevations for comparison with original elevations. Promptly notify Engineer if changes in elevations occur or if cracks, sags, or other damage is evident.

1.6 EXISTING UTILITIES

A. Protect existing active sewer, water, gas, electricity and other utility services and structures.

B. Notify municipal agencies and service utility companies having jurisdiction. Comply with requirements of governing authorities and agencies for protection, relocation, removal, and discontinuing of services.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide adequate shoring and bracing materials which will support loads imposed. Materials need not be new, but should be in serviceable condition.

B. Structural Steel: ASTM A 36.

C. Steel Sheet Piles: ASTM A 328.

D. Timber Lagging: Any species, rough-cut, mixed hardwood, nominal 3 inches thick, unless otherwise indicated.

E. Portable Steel Trench Box shall be OSHA approved.

PART 3 - EXECUTION

3.1 SHORING

A. Wherever shoring is required, locate the system to clear permanent construction and to permit forming and finishing of concrete surfaces. Provide shoring system adequately anchored and braced to resist earth and hydrostatic pressures.

B. Shoring systems retaining earth on which the support or stability of existing structures is dependent must be left in place at completion of work.

3.2 BRACING

A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.

B. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Engineer.

C. Install internal bracing, if required, to prevent spreading or distortion of braced frames.

D. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

E. Remove sheeting, shoring, and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities, and utilities.

F. Repair or replace, as acceptable to Engineer, adjacent work damaged or displaced through installation or removal of shoring and bracing work.

END OF SECTION 315000

DIVISION 33

UTILITIES

SECTION 331216 - VALVES

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required to furnish and install all valves shown on the Drawings and/or specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this Section.

B. Piping is specified in Division 33 Specification sections.

1.3 SUBMITTALS

A. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the Engineer for review before ordering. Comply with provisions of Section 013323.

B. At the time of submission, the Contractor shall, in writing, call Engineer's attention to any deviations that the submittals may have from the requirements of the Engineer's Contract Drawings and Specifications.

C. In accordance with the requirements of the General and Special Conditions and this Section, the following table includes, but is not limited to, the items required to be submitted:

Item Description	Shop Drawings	Product Data	Schedules	Installation Data	Parts Lists	Wiring Diagram	Samples	O & M Manual	Certificates	Warranty	Report	Other
Valves	X	X			X							
Valve Boxes		X										
Access Manhole	X	X										
Yard Hydrant	X	X			X							
Tapping Sleeve, Valve	X	X		X	X							

PART 2 - PRODUCTS

2.1 GATE VALVES

A. Gate valves shall conform with AWWA C-509 or AWWA C-515 standard, and shall be of the resilient seat type, iron body, fully bronze mounted, non-rising stem and have a design working pressure of 250 psi. All assembly bolts shall be stainless steel. Valves shall be of standard manufacturer and of the highest quality both as to materials and workmanship.

B. All gate valves shall be furnished with mechanical joint connections, unless otherwise shown on the Drawings or specified hereinafter.

C. An epoxy coating conforming to AWWA C-550 shall be applied to the interior and exterior ferrous surfaces of the valve except for finished or seating surfaces.

D. All gate valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working water pressure cast on the body of the valve.

E. Gate valves 12" and smaller shall be installed in a vertical position. Gate valves greater than 12"shall have the bonnet mounted in the horizontal position and have a bevel gear actuator. Gate valves shall be provided with a 2-inch square operating nut and shall be opened by turning to the left (counter-clockwise). All valve operating nuts shall be set within a cast iron valve box. There shall be a maximum 48" depth of valve operating nut. Contractor must use extension stems, if necessary, to raise operator nut within 48" of final grade.

2.2 PLUG VALVES

A. All plug valves shall be eccentric plug valves unless otherwise specified.

B. Valves shall be of the non-lubricated eccentric type with resilient faced plugs and shall be furnished with end connections as shown on the plans. Flanged valves shall be faced and drilled to the ANSI 125/150 lb. standard. Mechanical joint ends shall be to the AWWA Standard C111-64, grooved ends per AWWA C606-87. Screwed ends shall be to the NPT standard.

C. Valve bodies shall be flushing body type and made of ASTM A126 Class B cast iron. Valves shall be furnished with a 1/8" welded overlay seat of not less than 95% pure nickel. Seat area shall be raised, with raised surface completely covered with weld to insure that the plug face contacts only nickel. Screwed-in seats shall not be acceptable.

D. Plugs shall be made of ductile iron. The plug shall have a cylindrical seating surface eccentrically offset from the center of the plug shaft. The interference between the plug face and body seat, with the plug in the closed position, shall be externally adjustable in the field with the valve in the line under pressure. Plug shall be resilient faced with neoprene or hycar, suitable for use with sewage.

E. Valves shall have replaceable sleeve type bearings and grit seals at the upper and lower journals.

F. Valve shaft seals shall be of the multiple V-ring type and shall be externally adjustable and repackable without removing the bonnet or actuator from the valve under pressure. Valves utilizing O-ring seals or non-adjustable packing shall not be acceptable.

G. Valve pressure ratings shall be 175 psi through 12" and 150 psi for 14" through 72". Each valve shall be given a hydrostatic and seat test with test results being certified when required by the specifications.

H. Buried valves shall be manually operated with 2-inch square operating nuts in vertical position for use in a valve box unless otherwise indicated on the plans. Buried valves shall have extension stems that bring the 2-inch square operating nut to within 2 feet of finished grade. Each buried valve shall be supplied with a two (2) T-handle wrenches that allow the valve to be operated with the T- handle at waist height. All valves 6-inch and larger shall be equipped with gear actuators. All gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft shall be stainless steel and the quadrant shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque and to provide seat adjustment to compensate for change in pressure differential or flow direction change. All exposed nuts, bolts, washers and appurtenances shall be stainless steel.

I. Valves and gear actuators for buried or submerged service shall have seals for all shafts and gaskets on the valve and actuator covers to prevent the entry of water. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals. All exposed nuts, bolts, springs, washers and appurtenances shall be stainless steel.

J. Cylinder actuators shall be equipped with a 2-inch operating nut to allow manual valve operation in case of supply failure.

K. Valves shall provide drip tight shutoff up to the full pressure rating. Valves shall be provided with adjustable limit stops and rotate 90 degrees from fully opened to fully closed.

L. Valves shall have rectangular port openings for throttling service, and shall open to 100% of the corresponding pipe diameter.

M. All buried service plug valves shall have mechanical joint ends and have all exterior surfaces shop painted with two coats of Fed. Spec. TT-C-494A Asphalt Varnish.

N. All valves and actuators shall be as manufactured by DEZURIK or approved equal.

2.3 VALVE BOXES - BURIED VALVES (EXCEPT AIR RELEASE AND SEWAGE COMBINATION VALVES)

A. Valve boxes shall be of 5-1/4 inch standard cast iron, two-piece, screw type valve box with drop cover marked "WATER", "SEWER", "DRAIN", as applicable. Valve boxes for gate valves larger than 8 inches shall be three-piece. Valve boxes shall be accurately centered over valve operating nut, and backfill thoroughly tamped about them. Valve boxes shall not rest on

the valves but shall be supported on crushed stone fill. They shall be set vertically and properly cut and/or adjusted so that the tops of boxes will be at grade in any paving, walk or road surface, and in grass plots, fields, woods or other open terrain. Valve boxes and covers shall be as manufactured by Tyler Corporation, Opelika Foundry, Bingham & Taylor, or equal.

B. Wherever valve boxes fall outside of the pavement, the top of the box shall be set in a cast-in-place concrete slab 18" x 18" x 4" thick with the top of the slab and box flush with the top of the ground. This provision shall apply to all new and all existing valve boxes which fall within the limits of the contract, unless otherwise stated on the plans or ordered by the Engineer.

2.4 TAPPING SLEEVES AND VALVES

A. DI tapping sleeves for use in connections to existing water lines, where indicated on the drawings or as directed by the Engineer, shall be constructed of ductile iron conforming to the requirements of ASTM A-536, and have the body of the tapping sleeve seal around the carrier pipe by use of mechanical joints on each end. Tapping outlet connections shall be flanged with drillings in accordance with ANSI class 125#/150#. Tapping sleeves shall be suitable for working pressures of 250 psi and shall be Mueller No. H-615, American Valve and Hydrant No. 2800-C, or approved equal.

B. SST tapping sleeves for use in connections to existing water lines, where indicated on the drawings or as directed by the Engineer, shall have the body and neck constructed of ASTM A-240 type 304 stainless steel and shall be compressed to the carrier pipe by use of heavy gauge triangular sidebars running the length of the body. Bolts, nuts and washers shall be constructed of type 304 stainless steel. The gasket between the tapping sleeve and carrier pipe shall be constructed of Buna N rubber and be NSF 61 approved. The gasket shall have a grid pattern to help secure it in place and have seal around the full circumference of the pipe. Tapping outlet connections shall be constructed of ductile iron conforming to ASTM A-536 and have either a mechanical joint connection conforming to AWWA C-111, or a flanged connection with drillings in accordance with ANSI class 125#/150#. Tapping Sleeves shall be suitable for the following working pressures: 4"-12" 250 psi, 14"-24" 200 psi and shall be Mueller No. H-304, Romac Industries SST III, or approved equal.

C. Tapping valves shall meet the requirements of paragraph 2.01 hereinbefore and shall be coordinated to connect to the tapping sleeve with either a flanged end or a mechanical joint end.

D. All existing force mains to be tapped under this contract shall be exposed in order to verify line sizes prior to ordering tapping sleeves and valves.

2.5 Line Stop

A. The Line Stop shall consist of three subassemblies: the Fitting Body, which shall be mounted pressure tight around the main; the Completion Plug, which shall be inserted, under full line pressure, into the Fitting Body; and the Closure Flange, which shall secure and seal the Completion Plug Cartridge into the Fitting Body. Line Stops shall be available for installation on 4", 6", 8", 10", 12" and 16" nominal pipe sizes.

B. Fitting Body: The fitting body shall consist of a two-part 304 stainless steel tapping saddle with a stainless steel tapping/insertion outlet, welded to the upper half of the saddle. The two part body shall be assembled around the pipe and pressure-sealed to the main by a single griddled

resilient sheet gasket and throat gasket. The gasket shall fully encircle the pipe, providing a 360-degree full area seal. Suitable fasteners and supporting lugs shall be provided, as specified below.

1. Saddles shall be fabricated of Type 304 stainless steel. The design of the saddles, bolts, lugs and armor plates shall be such that the saddle halves can be mounted, without further modification, pressure-tight around the pipe. Contractor shall excavate and expose the existing pipe to verify the existing pipe type and size prior to ordering the insertion valve.

2. Bolting lugs shall be Type 304 stainless steel weldments and shall be designed and positioned on the saddle halves to insure accurate assembly of both halves. After assembly around the pipe, the vertical spacing of the bolting lugs between the two saddle halves shall allow adjustment to accommodate the range of pipe diameters specified above.

3. Bolting studs, nuts, along with any formed metal washers shall be fabricated from Type 304 stainless steel. All screw threads shall be 5/8-11UNC-2 (coarse). Nuts shall be heavy series.

4. Sheet Gasket shall be molded from a virgin SBR elastomer compound that will resist compression set and is compatible with cold drinking water in the normal 32 to 120 deg. A griddled ("waffle") pattern shall be molded on the inner side of the gasket. Each side (which lies parallel to the run of the pipe) of the Gasket shall be tapered to allow uniform distribution of clamping (gasket) pressure over the entire circumference of the pipe. A stainless steel Armor Plate shall be attached to each side of the Gasket to bridge the gap between the saddle halves.

5. The tapping/insertion outlet on the upper saddle half shall be fabricated from Type 304 stainless steel, and shall have a flange welded to the outlet neck with locking pins to mate with the top groove of the Stuffing Box Plate (which is part of the Valve Cartridge). Below these locking pins, the interior of the outlet shall be accurately bored to seal against the "O"- ring contained in the stuffing box plate. The bore shall be further machined to provide a shoulder to vertically locate the Valve Cartridge when it is inserted into the Body. Two opposing rectangular keyways shall be machined into the interior wall of the outlet to receive the guide keys on the Valve Cartridge carrier.

C. Completion Plug: The completion plug shall consist of a reinforced composite polymer with SAE Grade 8 Steel Zinc coated plug pins and 304 stainless steel pin plugs. This plug shall be inserted into the outlet under full line pressure by means of a Cartridge Inserter.

D. Closure Flange: The closure flange shall consist of 304 stainless steel blind flange and 304 stainless steel hardware. The closure flange with a flat flange gasket shall be installed after the installation of the Line Stop.

E. The Line Stop shall be HSF 250 Patriot as manufactured by Hydra-Stop, Burr Ridge, Il. The HSF 250 Patriot shall be rated to 250 PSI working pressure and 375 PSI test pressure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All valves shall be installed in accordance with details on the Contract Drawings and with the manufacturer's recommendations.

B. All valves shall be anchored in accordance with the details on the Contract Drawings.

END OF SECTION 331216

SECTION 333113 - GRAVITY SEWER PIPING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required for furnishing and installing all piping and appurtenances as shown on the Drawings and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 312000

B. Excavation Support and Protection: Section 315000

1.3 SUBMITTALS

A. Submit manufacturer's data as specified herein. Comply with all requirements of Section 013323.

1.4 INTERNAL PIPE DIAMETER

A. All sewer pipe provided shall have a minimum actual internal diameter which is equal to or greater than the diameter indicated on the Contract Drawings.

1.5 UTILITY LINE ACTIVITIES COVERED UNDER NATIONWIDE PERMIT # 12

A. All activities involving utility line construction covered under the US Army Corps of Engineers NATIONWIDE PERMIT # 12 shall meet the following conditions:

1. Utility Line Activities. Activities required for the construction, maintenance, repair, and removal of utility lines and associated facilities in waters of the United States, provided the activity does not result in the loss of greater than 1/2-acre of waters of the United States for each single and complete project. Utility lines: This NWP authorizes the construction, maintenance, or repair of utility lines, including outfall and intake structures, and the associated excavation, backfill, or bedding for the utility lines, in all waters of the United States, provided there is no change in pre-construction contours. This NWP also authorizes temporary structures, fills, and work necessary to conduct the utility line activity.

2. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be

removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

3. Notification: The permittee must submit a pre-construction notification to the US Army Corps district engineer prior to commencing the activity if any of the following criteria are met: (1) The activity involves mechanized land clearing in a forested wetland for the utility line right-of-way; (2) a section 10 permit is required; (3) the utility line in waters of the United States, excluding overhead lines, exceeds 500 feet; (4) the utility line is placed within a jurisdictional area (i.e., water of the United States), and it runs parallel to or along a stream bed that is within that jurisdictional area; (5) discharges that result in the loss of greater than 1/10-acre of waters of the United States; (6) permanent access roads are constructed above grade in waters of the United States for a distance of more than 500 feet; or (7) permanent access roads are constructed in waters of the United States with impervious materials.

B. All activities involving utility line construction covered under KENTUCKY GENERAL CERTIFICATION of Nationwide Permit # 12 shall meet the following conditions:

The general Water Quality Certification applies to surface waters of the Commonwealth as defined in 401KAR10:001 Chapter 10, Section 1(80): Surface waters means those waters having well-defined banks and beds, either constantly or intermittently flowing, lakes and impounded waters; marshes and wetlands; and any subterranean waters flowing in well-defined channels and having a demonstrable hydrologic connection with the surface.

1. The activity will not occur within surface waters of the Commonwealth identified by the Kentucky Division of Water as Outstanding State or National Resource Water, Cold Water Aquatic Habitat, or Exceptional Waters.

2. The activity will not occur within surface waters of the Commonwealth identified as perpetually-protected (e.g. deed restriction, conservation easement) mitigation sites.

3. This general water quality certification does not authorize the installation of utility lines in a linear manner within the stream channel or below the top of the stream bank.

4 For a single crossing, impacts from the construction and maintenance corridor in surface waters shall not exceed 50 feet of bank disturbance.

5. This general certification shall not apply to nationwide permits issued for individual crossings which are part of a larger utility line project where the total cumulative impacts from a single and complete linear project exceed ½ acre of wetlands or 300 linear feet of surface waters. Cumulative impacts include utility line crossings, permanent or temporary access roads, headwalls, associated bank stabilization areas, substations, pole or tower foundations, maintenance corridor, and staging areas.

6. Stream impacts under Conditions 4 and 5 of this certification are defined as the length of bank disturbed. For the utility line crossing and roads, only one bank length is used in calculation of the totals.

7 Stream impacts covered under this General Water Quality Certification and undertaken by those persons defined as an agricultural operation under the Agricultural Water

Quality Act must be completed in compliance with the Kentucky Agricultural Water Quality Plan (KWQP).

8. The Kentucky Division of Water may require submission of a formal application for an individual certification for any project if the project has been determined to likely have a significant adverse effect upon water quality or degrade the waters of the Commonwealth so that existing uses of the water body or downstream waters are precluded.

9. Activities that do not meet the conditions of this General Water Quality Certification require an Individual Section 401 Water Quality Certification.

10. Blasting of stream channels, even under dry conditions, is not allowed under this general water quality certification.

11. Utility lines placed parallel to the stream shall be located at least 50 feet from an intermittent or perennial stream, measured from the top of the stream bank. The cabinet may allow construction within the 50 foot buffer if avoidance and minimization efforts are shown and adequate methods are utilized to prevent soil from entering the stream.

12. Utility line stream crossings shall be constructed by methods that maintain flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to re-entering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the excavation shall not be allowed to enter the flowing portion of the stream.

13. The activities shall not result in any permanent changes in pre-construction elevation contours in surface waters or wetlands or stream dimension, pattern or profile.

14. Utility line activities which impact wetlands shall not result in conversion of the area to non-wetland status. Mechanized land clearing of forested wetlands for the installation or maintenance of utility lines is not authorized under this certification.

15. Activities qualifying for coverage under this General Water Quality Certification are subject to the following conditions:
    a. Erosion and sedimentation pollution control plans and Best Management Practices must be designed, installed, and maintained in effective operating condition at all times during construction activities so that violations of state water quality standards do not occur.
    b. Sediment and erosion control measures, such as check-dams constructed of any material, silt fencing, hay bales, etc., shall not be placed within surface waters of the Commonwealth, either temporarily or permanently, without prior approval by the Kentucky Division of Water's Water Quality Certification Section. If placement of sediment and erosion control measures in surface waters is unavoidable, design and placement of temporary erosion control measures shall not be conducted in such a manner that may result in instability of streams that are adjacent to, upstream, or downstream of the structures. All sediment and erosion control devices shall be removed and the natural grade restored within the completion timeline of the activities.
    c. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction from entering the watercourse.

d. Removal of riparian vegetation shall be limited to that necessary for equipment access.
e. To the maximum extent practicable, all in-stream work under this certification shall be performed under low-flow conditions.
f. Heavy equipment, e.g. bulldozers, backhoes, draglines, etc., if required for this project, should not be used or operated within the stream channel. In those instances in which such in-stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize turbidity and disturbance to substrates and bank or riparian vegetation.
g. Any fill shall be of such composition that it will not adversely affect the biological, chemical, or physical properties of the receiving waters and/or cause violations of water quality standards. If rip-rap is utilized, it should be of such weight and size that bank stress or slump conditions will not be created because of its placement.
h. If there are water supply intakes located downstream that may be affected by increased turbidity and suspended solids, the permittee shall notify the operator when such work will be done.
i. Should evidence of stream pollution or jurisdictional wetland impairment and/or violations of water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling (800) 928-2380.

16. Non-compliance with the conditions of this general certification or violation of Kentucky state water quality standards may result in civil penalties.

1.6 CONSTRUCTION IN A FLOODPLAIN

A. No material shall be placed in the stream or in the flood plain to form construction pads, coffer dams, access roads, etc. unless prior approval has been obtained from the Environmental and Public Protection Cabinet.

B. The trench shall be backfilled as closely as possible to the original contour. All excess material from construction of the trench shall be disposed of outside the flood plain unless the applicant has received prior approval from the Cabinet to fill within the flood plain.

PART 2 - PRODUCTS

2.1 GRAVITY SEWER PIPE

A. High Density Polyethylene Pipe

1. General:

a. High density polyethylene pipe shall be "Driscopipe" as manufactured by Phillips Product Company, Inc., PLEXCO as manufactured by Chevron, POLYPIPE, or equal.

2. Materials for Polyethylene Pipe:

a. The polyethylene pipe and fittings shall be made of polyethylene resins classified in ASTM D 1248 as Type III, Category 5, Grade P34 (pipe designation PE 3408 defined per ASTM D 3035), having specific base resin densities of 0.941 g/cc minimum and 0.955 g/cc maximum respectively; and having melt index less than 0.15 grams/10 min.
b. Pipe made from these resins must have a long-term strength rating of 1,600 psi or more.
c. The polyethylene resin shall contain antioxidants and shall be stabilized with carbon black against ultra-violet degradation to provide protection during processing and subsequent weather exposure.
d. The polyethylene resin compound shall have a resistance to environmental stress cracking as determined by the procedure detailed in ASTM D 1693, Condition B with sample preparation by procedure C of not less than 200 hours.
e. Polyethylene shall have cell classification of 345434C as defined by ASTM 3350-84.

3. Polyethylene Pipe and Fittings:

a. The pipe shall be designed for a normal internal working pressure and earth cover over top of the pipe to suit the conditions of proposed use.
b. Each length of pipe shall be marked, at no more than 10 foot intervals, with the following information:

Nominal Pipe Size

Type Plastic Material - PE3408

Pipe Pressure Rating

Manufacturer's Name, Trademark and Code

c. All pipe shall be made from virgin material. No rework compound.
d. Pipe shall be homogenous throughout, and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
e. Fittings for the polyethylene pipe line shall be molded or fabricated from the same material as specified hereinbefore for the high density polyethylene pipe.
f. Fittings for bends 22-1/2o or greater shall be provided as shown on the Drawings. For alignment changes of less than 20o deflection, the pipe may be laid in curves with a radius of 100 feet or greater.
g. All run-of-the-pipe fittings shall be fusion welded into the pipeline. Tee branches shall be of the size shown on the Drawings and shall be furnished with flanged ends per ANSI B-16.1. All fittings shall be factory made.
h. Fittings shall be capable of withstanding the same pressure and loading conditions specified for the pipe.
i. Wye branches shall be true wyes.

4. Pipe Jointing:

a. Pipe to be joined by leakproof , thermal, butt fusion joints. All fusion must be done by personnel trained by the pipe supplier using tools approved by the pipe supplier.

b. The fusion machine shall have hydraulic pressure control for fusing 2 pipe ends together; it shall include pressure fusion indicating gauges to correctly monitor fusion pressures. The machines correctly monitor fusion pressures. The machines shall be equipped with an electric or gasoline engine powered facing unit to trim irregularities from the pipe ends. The heating plate on the fusion machine shall be electrically heated and thermostatically controlled and shall contain a temperature gauge for monitoring temperature.

c. Joint strength must be equal to that of adjacent pipe as demonstrated by tensile test. In addition, results of tensile impact testing of joint should indicate a ductile rather than a brittle fracture. External appearance of fusion bead should be smooth without significant juncture groove.

d. Threaded or solvent cement joints and connections are not permitted.

5. Joining, Terminating or Adapting by Mechanical Means:

a. The polyethylene pipe shall be connected to systems or fittings of other materials by means of an assembly consisting of a polyethylene flange adapter butt-fused to the pipe, a backup ring of either cast iron, steel, or high silica aluminum alloy made to ANSI B-16.1 dimensional standards (with modified pressure ratings), bolts of compatible material (insulated from the fittings where necessary) and a gasket of reinforced black rubber, or other material approved by the Engineer, cut to fit the joint. In all cases, the bolts shall be drawing up evenly and in line.

b. Termination of valves, or fittings such as tees, bonds, etc., made of other materials shall be by the flange assemblies specified hereinbefore. The pipe adjacent to these joints and to joints themselves must be rigidly supported for a distance of one pipe diameter or 1 foot, whichever is greater, beyond the flange assembly.

c. Appurtenances must be placed on their own foundations, unsupported by the pipe, in accordance with the detail plans.

6. Tools and Procedures:

a. Fusion jointing and other procedures necessary for correct assembly of the polyethylene pipe and fittings will be done only by personnel trained in those skills by the pipe supplier.

b. Only those tools designed for aforementioned procedures and approved by the pipe supplier shall be used for assembly of pipe and fittings to insure proper installation.

7. Standard Dimension Ratio (SDR) for Pipe:

a. All gravity sewer installations shall be SDR 32.5.

2.2 COMPRESSION COUPLINGS

A. When joining different types of pipe together or new pipe to existing pipe, the Contractor shall use Fernco Compression Couplings, or equal, that are resistant to corrosion by soil and sewage and that will provide a permanent watertight joint.

B. The compression coupling shall meet the physical test and joint-leak requirements specified in ASTM C-1173. The bands for attaching pipes shall be stainless steel conforming to ASTM C-

1173. Each coupling shall bear the manufacturer's name and an indication of its size.

PART 3 - EXECUTION

3.1 LAYING PIPE

A. The laying of pipe on the existing grade shall be commenced at the lowest point so the spigot ends point in the direction of flow.

B. All pipes shall be laid with ends abutting and true to line and grade as given by the Engineer.

C. Before installation of each piece of pipe, it shall be thoroughly inspected to insure its being clean. No piece of pipe or fitting which is known to be defective shall be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, they shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.

D. Pipe shall not be laid on solid rock.

E. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood or fabricated plug fitted into the pipe bell, so as to exclude earth or other material, and precautions taken to prevent flotation of pipe by runoff into trench.

3.2 GRAVITY SEWER CONNECTION OF NEW SANITARY SEWER TO EXISTING MANHOLES

A. New sanitary sewer shall be extended through the lid of the existing manhole.

3.3 CLEAN UP

A. Upon completion of installation of the piping and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from the Work. The Contractor shall grade the ground along each side of pipe trenches in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

END OF SECTION 333113

SECTION 333413 - SEWAGE FORCE MAINS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required for furnishing and installing all piping and appurtenances specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 312000

B. Sewage Pumping Stations: 333210

C. Valves - Site Utilities: 331216

1.3 SUBMITTALS

A. Submit manufacturer's data and shop drawings for all materials and as specified herein. Comply with all requirements of Section 013323.

B. A notarized certification shall be furnished for all pipe and fittings that verifies compliance with all applicable specifications. The requirement for this certification does not eliminate the need for shop drawings submittals in compliance with Section 013323.

C. In accordance with the requirements of the General and Special Conditions and this Section, the following table includes, but is not limited to, the items required to be submitted:

Item Description	Shop Drawings	Product Data	Schedules	Installation Data	Parts Lists	Wiring Diagram	Samples	O & M Manual	Certificates	Warranty	Report	Other
Pipe	X	X		X					X			
Fittings	X	X		X								
Detectable Tape	X	X		X								
Trench Baffles	X	X		X								

1.4 UTILITY LINE ACTIVITIES COVERED UNDER NATIONWIDE PERMIT # 12

All activities involving utility line construction covered under NATIONWIDE PERMIT # 12 shall meet the following conditions:

A. The general Water Quality Certification is limited to the crossing of intermittent and perennial streams by utility lines.

B. The construction of permanent or temporary access roads will impact less than 300 linear feet of intermittent and perennial streams and less than one acre of jurisdictional wetlands.

C. Utility lines shall be located at least 50 feet away from a stream which appears as a blue line on a USGS 7 ½ minute topographic map except where the utility line alignment crosses the stream. Utility lines that cross streams shall be constructed by methods that maintain normal stream flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to re-entering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the utility line excavation shall not be allowed to enter the flowing portion of the stream.

D. The activities shall not result in any permanent changes in preconstruction elevation contours in waters or wetlands or stream dimension, pattern or profile.

E. Utility line construction projects through jurisdictional wetlands shall not result in conversion of the area to non-wetland status.

F. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction form entering the watercourse.

G. Removal of riparian vegetation in the utility line right-of-way shall be limited to that necessary for equipment access. Effective erosion and sedimentation control measures must be employed at all times during the project to prevent degradation of waters of the Commonwealth. Site regarding and reseeding will be accomplished with 14 days after disturbance.

H. To the maximum extent practicable, all in stream work under this certification shall be performed during low flow.

I. Heavy equipment, e.g. bulldozers, backhoes, draglines, etc., if required for this project, should not be used or operated within the stream channel. In those instances where such in stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize turbidity and disturbance to substrates and bank or riparian vegetation.

J. Any fill shall be of such composition that it will not adversely affect the biological, chemical, or physical properties of the receiving waters and/or cause violations of water quality standards. If riprap is utilized, it is to be of such weight and size that bank stress or slump conditions will not be created because of its placement.

K. Removal of existing riparian vegetation should be restricted to the minimum necessary for project construction.

L. Should evidence of stream pollution or jurisdictional wetland impairment and/or violations of

water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling 800/928-2380.

1.5 CONSTRUCTION IN A FLOODPLAIN

A. No material shall be placed in the stream or in the flood plain to form construction pads, coffer dams, access roads, etc. unless prior approval has been obtained from the Environmental and Public Protection Cabinet.

B. The trench shall be backfilled as closely as possible to the original contour. All excess material from construction of the trench shall be disposed of outside the flood plain unless the applicant has received prior approval from the Cabinet to fill within the flood plain.

PART 2 - PRODUCTS

2.1 HIGH DENSITY POLYETHYLENE PIPE

A. General: High density polyethylene pipe shall be "Driscopipe" as manufactured by Phillips Product Company, Inc., PLEXCO as manufactured by Chevron, POLYPIPE, or equal.

B. Materials for Polyethylene Pipe:

1. The polyethylene pipe and fittings shall be made of polyethylene resins classified in ASTM D 1248 as Type III, Category 5, Grade P34 (pipe designation PE 3408 defined per ASTM D 3035), having specific base resin densities of 0.941 g/cc minimum and 0.955 g/cc maximum respectively; and having melt index less than 0.15 grams/10 min.
2. Pipe made from these resins must have a long-term strength rating of 1,600 psi or more.
3. The polyethylene resin shall contain antioxidants and shall be stabilized with carbon black against ultra-violet degradation to provide protection during processing and subsequent weather exposure.
4. The polyethylene resin compound shall have a resistance to environmental stress cracking as determined by the procedure detailed in ASTM D 1693, Condition B with sample preparation by procedure C of not less than 200 hours.
5. Polyethylene shall have cell classification of 345464C as defined by ASTM 3350-05.

C. Polyethylene Pipe and Fittings:

1. The pipe shall be designed for a normal internal working pressure and earth cover over top of the pipe to suit the conditions of proposed use.
2. Each length of pipe shall be marked, at no more than 10 foot intervals, with the following information:

Nominal Pipe Size

Type Plastic Material - PE3408

Pipe Pressure Rating

Manufacturer's Name, Trademark and Code

3. All pipe shall be made from virgin material. No rework compound.
4. Pipe shall be homogenous throughout, and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
5. Fittings for the polyethylene pipe line shall be molded or fabricated from the same material as specified hereinbefore for the high density polyethylene pipe.
6. Fittings for bends 22-1/2o or greater shall be provided as shown on the Drawings. For alignment changes of less than 20o deflection, the pipe may be laid in curves with a radius of 100 feet or greater.
7. All run-of-the-pipe fittings shall be fusion welded into the pipeline. Tee branches shall be of the size shown on the Drawings and shall be furnished with flanged ends per ANSI B-16.1. All fittings shall be factory made.
8. Fittings shall be capable of withstanding the same pressure and loading conditions specified for the pipe.
9. Wye branches shall be true wyes.

D. Pipe Jointing:

1. Pipe to be joined by leakproof , thermal, butt fusion joints. All fusion must be done by personnel trained by the pipe supplier using tools approved by the pipe supplier.
2. The fusion machine shall have hydraulic pressure control for fusing 2 pipe ends together; it shall include pressure fusion indicating gauges to correctly monitor fusion pressures. The machines correctly monitor fusion pressures. The machines shall be equipped with an electric or gasoline engine powered facing unit to trim irregularities from the pipe ends. The heating plate on the fusion machine shall be electrically heated and thermostatically controlled and shall contain a temperature gauge for monitoring temperature.
3. Joint strength must be equal to that of adjacent pipe as demonstrated by tensile test. In addition, results of tensile impact testing of joint should indicate a ductile rather than a brittle fracture. External appearance of fusion bead should be smooth without significant juncture groove.
4. Threaded or solvent cement joints and connections are not permitted.

E. Joining, Terminating or Adapting by Mechanical Means:

1. The polyethylene pipe shall be connected to systems or fittings of other materials by means of an assembly consisting of a polyethylene flange adapter butt-fused to the pipe, a backup ring of either cast iron, steel, or high silica aluminum alloy made to ANSI B-16.1 dimensional standards (with modified pressure ratings), bolts of compatible material (insulated from the fittings where necessary) and a gasket of reinforced black rubber, or other material approved by the Engineer, cut to fit the joint. In all cases, the bolts shall be drawing up evenly and in line.
2. Termination of valves, or fittings such as tees, bonds, etc., made of other materials shall be by the flange assemblies specified hereinbefore. The pipe adjacent to these joints and to joints themselves must be rigidly supported for a distance of one pipe diameter or 1 foot, whichever is greater, beyond the flange assembly.
3. Appurtenances must be placed on their own foundations, unsupported by the pipe, in accordance with the detail plans.

F. Tools and Procedures:

1. Fusion jointing and other procedures necessary for correct assembly of the polyethylene pipe and fittings will be done only by personnel trained in those skills by the pipe supplier.
2. Only those tools designed for aforementioned procedures and approved by the pipe supplier shall be used for assembly of pipe and fittings to insure proper installation.

G. Standard Dimension Ratio (SDR) for Pipe:

1. All pipe for force main applications shall be SDR 11.

2.2 CONCRETE PIPE ANCHORS, THRUST BLOCKS, CRADLE OR ENCASEMENT

A. Where indicated on the Drawings, required by the specifications or as directed by the Engineer, concrete pipe anchors, thrust blocks, cradles or encasements shall be installed. Concrete shall be 2000 psi, and reinforcing bars shall be as installed as indicated on the details.

2.3 PRE-FABRICATED TRENCH BAFFLES

A. Where indicated on the Drawings, required by the specifications, or as directed by the Engineer, Contractor shall install pre-fabricated trench baffles in the pipeline trench. The Baffle shall be self-supporting, made of ABS (Acryonitrile Butadiene Styrene) or comparable material, and shall provide a watertight seal around the pipe by use of an elastomeric PVC flexible coupling. The purpose of the baffle is to stop the flow of groundwater along the trench, and around the pipe. The trench baffle shall be "Ripley's Dam" as manufactured by EJP, or equal.

PART 3 - EXECUTION

3.1 EXCAVATION FOR PIPELINE TRENCHES

A. Unless otherwise directed by the Engineer, trenches in which pipes are to be laid shall be excavated in open cut to the depths required by field conditions or as specified by the Engineer. In general this shall be interpreted to mean that machine excavation in earth shall not extend below an elevation permitting the pipe to be properly bedded. Installation shall be in accordance with ASTM-D-2321 except as modified herein.

B. If the foundation is good firm earth and the machine excavation has been accomplished as set out hereinbefore, the remainder of the material shall be excavated by hand, then the earth pared or molded to give full support to the lower quadrant of the barrel of each pipe. Where bell and spigot is involved, bell holes shall be excavated during this latter operation to prevent the bells from being supported on undisturbed earth. If for any reason the machine excavation in earth is carried below an excavation that will permit the type of bedding specified above, then a layer of granular material shall be placed so that the lower quadrant of the pipe will be securely bedded in compact granular fill.

C. Excavation may be undercut to a depth below the required invert elevation that will permit

laying the pipe in a bed of granular material to provide continuous support for the bottom quadrant of the pipe. When this method is used, the bedding shall be as set out in Paragraph 3.02 hereinafter.

D. Trenches shall be of sufficient width to provide free working space on each side of the pipe and to permit proper backfilling around the pipe, but unless specifically authorized by the Engineer, trenches shall in no case be excavated or permitted to become wider then 2'-0" plus the nominal diameter of the pipe at the level of or below the top of the pipe. If the trench does become wider than 2'-0" at the level of or below the top of the pipe, special precaution may be necessary, such as providing compacted, granular fill up to top of the pipe or providing pipe with additional crushing strength as determined by the Engineer after taking into account the actual trench loads that may result and the strength of the pipe being used. The Contractor shall bear the cost of such special precautions as are necessary.

E. All excavated materials shall be placed a minimum of two feet (2') back from the edge of the trench.

F. Before laying the pipe, the trench shall be opened far enough ahead to reveal obstructions that may necessitate changing the line or grade of the pipeline.

G. The trench shall be straight and uniform so as to permit laying pipe to lines and grades given by the Engineer. It shall be kept free of water during the laying of the pipe and until the pipeline has been backfilled. Removal of trench water shall be at the Contractor's expense. Dry conditions shall be maintained in the excavations until the backfill has been placed. During the excavation, the grade shall be maintained so that it will freely drain and prevent surface water from entering the excavation at all times. When directed by Owner, temporary drainage ditches shall be installed to intercept or direct surface water which may affect work. All water shall be pumped or drained from the excavation and disposed of in a suitable manner without damage to adjacent property or to other work.

H. Minimum cover of 30" shall be provided for all pipelines, except those located in the State Highway Right of Way. Those shall have a minimum cover of 42".

3.2 PIPE BEDDING

A. All sewer pipe shall be supported on a bed of granular material unless the trench has been prepared in accordance with Paragraph 3.1B. In no case shall pipe be supported directly on rock. Bedding shall not be a separate pay item unless otherwise set out in the Detailed Specifications. Bedding shall be provided in earth bottom trenches, as well as rock bottom trenches. Bedding material shall be free from large rock, foreign material, frozen earth, and shall be acceptable to the Engineer. Bedding shall be a minimum of 6" below pipe barrel.

B. In all cases the foundation for pipes shall be prepared so that the entire load of the backfill on top of the pipe will be carried on the barrel of the pipe so that none of the load will be carried on the bells.

C. Where flexible pipe is used, the bedding shall be placed up to at least the spring line (horizontal center line) of the pipe. The bedding material and procedures shall conform to ASTM D 2321 and any Technical Specifications set out hereinafter. If conditions warrant, the Engineer may require the bedding to be placed above the springline of the pipe. Granular bedding shall be

Size #9-m or ASTM C 33, Size #7 crushed stone, fine gravel, or sand, and is not a separate pay item.

D. Where undercutting and granular bedding is involved it shall be of such depth that the bottom of the bells of the pipe will be at least three inches above the bottom of the trench as excavated. Undercutting is not a separate pay item.

E. In wet, yielding mucky locations where pipe is in danger of sinking below grade or floating out of line or grade, or where backfill materials are of such a fluid nature that such movements of the pipe might take place during the placing of the backfill, the pipe must be weighted or secured permanently in place by such means as will prove effective. When ordered by the Engineer, yielding and mucky materials in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe. Crushed stone or other such granular material, if necessary, as determined by the Engineer to replace poor subgrade material, shall be a separate pay item and classified as "Fill". Removal of poor material is not a separate pay item.

F. Installation shall be in accordance with ASTM D 2321 except as modified hereinafter.

3.3 BELOW GRADE PIPE LAYING

A. The laying of pipe in finished trenches shall be commenced at the lowest point so the spigot ends point in the direction of flow.

B. All pipes shall be laid with ends abutting and true to line and grade as given by the Engineer. Supporting of pipes shall be as set out hereinbefore under "Pipe Bedding" and in no case shall the supporting of pipes on blocks be permitted.

C. Before each piece of pipe is lowered into the trench, it shall be thoroughly inspected to insure it's being cleaned. Each piece of pipe shall be lowered separately unless special permission is given otherwise by the Engineer. No piece of pipe or fitting which is known to be defective shall be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, they shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.

D. Pipe shall not be laid on solid rock. A pad of granular material as specified in Paragraph 3.02 "Pipe Bedding", shall be used as a pipe bedding. Pipe bedding is not a separate pay item. Irregularities in subgrade in an earth trench shall be corrected by use of granular material.

E. When ordered by the Engineer, unsuitable materials in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe.

F. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood or fabricated plug fitted into the pipe bell, so as to exclude earth or other material, and precautions taken to prevent flotation of pipe by runoff into trench.

G. No backfilling (except for securing pipe in place) over pipe will be allowed until the Engineer has had an opportunity to make an inspection of the joints, alignment and grade, in the section laid.

3.4 ABOVE GRADE PIPE LAYING

A. The laying of pipe on the existing grade shall be commenced at the lowest point so the spigot ends point in the direction of flow.

B. All pipes shall be laid with ends abutting and true to line and grade as given by the Engineer.

C. Before installation of each piece of pipe, it shall be thoroughly inspected to insure it's being cleaned. No piece of pipe or fitting which is known to be defective shall be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, they shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.

D. Pipe shall not be laid on solid rock.

F. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood or fabricated plug fitted into the pipe bell, so as to exclude earth or other material, and precautions taken to prevent flotation of pipe by runoff into trench.

3.5 BACKFILLING PIPELINE TRENCHES

A. Backfilling of pipeline trenches shall be accomplished with the requirements set forth in "Earthwork" Section 31 20 00 as shown on the Drawings and with details set forth hereinafter.

B. Method "A" - Backfilling in Open Terrain:

Backfilling of pipeline trenches in open terrain shall be accomplished in the following manner:

1. The lower portion of the trench, from the pipe bedding to a point 12" above the top of the pipe, shall be backfilled with material free from rock and/or material acceptable to the Engineer. This material shall be placed in a manner approved by the Engineer, and shall be carefully compacted to avoid displacement of the pipe.

    a. Compaction shall be accomplished by hand-tamping or by approved mechanical methods.

2. The upper portion of the trench above the compacted portion shall be backfilled with material which is free from large rock. Incorporation of rock having a volume exceeding one-half cubic foot is prohibited. Backfilling this portion of the trench may be accomplished by any means approved by the Engineer. The trench backfill shall be heaped over or leveled as directed by the Engineer.

E. Trenches outside existing sidewalks, driveways, streets, and highways shall be backfilled in accordance with Method "A". Trenches within the limits of sidewalk and unpaved driveways shall be backfilled in accordance with Method "B". Trenches within the paving limits of existing streets, highways and driveways shall be backfilled in accordance with Method "C". All methods are shown on Sheet SD-2 of the Drawings. When directed by the Engineer, the Contractor shall wet backfill material to assure maximum compaction.

F. Before final acceptance, the Contractor will be required to level off all trenches or to bring the trench up to grade. The Contractor shall also remove from roadways, rights-of-ways and/or private property all excess earth or other materials resulting from construction.

G. In the event that pavement is not placed immediately following trench backfilling in streets and highways, the Contractor shall be responsible for maintaining the trench surface in a level condition at proper pavement grade at all times.

3.6 CONCRETE THRUST BLOCKS, CRADLE, ANCHORS OR ENCASEMENT

A. Concrete thrust blocks, cradle, anchors or encasement shall be placed where shown on the Drawings, required by the specifications, or as directed by the Engineer.

B. For cradle and encasement, concrete shall be 2000 psi and shall be mixed sufficiently wet to permit it to flow under the pipe to form a continuous bed.

C. For thrust blocks and anchors, concrete shall be 2000 psi, and shall be formed or be sufficiently stiff to maintain the forms indicated on the Details.

D. When tamping concrete, care shall be taken not to disturb the grade or line of the pipe or injure the joints. Concrete placed outside the specified limits or without authorization from the Engineer will not be subject to payment.

3.7 TESTING BELOW GRADE PIPE

A. All pressure piping (lines not laid to grade) shall be given a hydrostatic test of at least 1.5 times the normal operating pressure of the pipe (at its lowest elevation), but not to exceed the rated working pressure of the pipe or valves. Note: Engineer shall verify test pressure. Loss of pressure during the test shall not exceed 0 psi in a 4 hour period and 5 psi in a 24 hour period. Any test results that do not meet either of these requirements shall constitute a failure of the pressure test.

B. No water leakage in pipelines, when tested under the hydrostatic test described above, shall be allowed.

C. Contractor shall furnish a recording gauge and recording pressure charts during duration of test. Recording pressure charts shall be turned over to the Engineer at conclusion of tests. The pressure recording device shall be suitable for outside service, with a range from 0-200 psig, 24-hour clock, and shall be approved by the Engineer.

D. Pipelines shall be tested before backfilling at joints except where otherwise required by necessity or convenience.

E. Duration of test shall be not less than four (4) hours where joints are exposed and not less than 24 hours where joints are covered.

F. Where leaks are visible at exposed joints, evident on the surface where joints are covered, and/or identified by isolating a section of pipe, the joints shall be repaired and leakage must be

minimized, regardless of total leakage as shown by test.

G. All pipe, fittings, valves, and other materials found to be defective under test shall be removed and replaced at no additional expense to the Owner.

H. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with.

I. Where nonmetallic joint compounds are used, pipelines should be held under normal operating pressure for at least three days before testing.

J. The Owner will provide initial water for testing the pressure piping. Should the first test fail to pass, all additional water required for subsequent tests shall be furnished at the Contractor's expense.

K. The cost of testing of pressure piping is incidental and is to be included in the Contractor's unit Contract Price.

3.8 CLEAN UP

A. Upon completion of installation of the piping and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from the Work. The Contractor shall grade the ground along each side of pipe trenches in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

END OF SECTION 333413

SECTION 334725 – HDPE LINING MEMBRANES

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, material, equipment, and services necessary to install the lining material to the manufacturer's recommendations. These specifications describe High Density Polyethylene (HDPE) Lining Membranes. The supply and installation of these materials shall be in strict accordance with the Engineer's specifications and engineering drawings and be subject to the terms and conditions of the contract.

1.2 RELATED WORK

A. Earthwork Section 312000

1.3 SUBMITTALS

A. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the Engineer for review before ordering. Submittals shall be in accordance with Section 013323.

B. In accordance with the requirements of the General and Special Conditions and this Section, the following table includes, but is not limited to, the items required to be submitted:

Item Description	Shop Drawings	Product Data	Schedules	Installation Data	Parts Lists	Wiring Diagram	Samples	O & M Manual	Certificates	Warranty	Report	Other
Lining Material	X	X		X					X	X	X	
Field Test Weld									X		X	

1.3 MANUFACTURER'S EXPERIENCE

A. The manufacturer of the lining material described hereunder shall have previously demonstrated his ability to produce this membrane having successfully manufactured a minimum of one hundred million square feet of similar linear material for hydraulic lining installations. The manufacturer must be listed by the NSF (National Sanitation Foundation) Standard 54.

PART 2 - PRODUCTS

2.1 LINING MATERIAL

A. The new membrane liner shall comprise HDPE material manufactured of new, first-quality products designed and manufactured specifically for the purpose of liquid containment in hydraulic structures.

B. The Contractor shall, at the time of bidding, submit a certification from the manufacturer of the sheeting, stating that the sheeting meets physical property requirements for the intended application.

C. The liner material shall be so produced as to be free of holes, blisters, undispersed raw materials, or any sign of contamination by foreign matter. Any such defect shall be repaired using the extrusion fusion welding technique in accordance with the manufacturer's recommendations.

D. The lining material shall be manufactured a minimum of 22.5 feet seamless widths. Labels on the roll shall identify the thickness, length, and manufacturer's roll number. There shall be no factory seams.

E. The liner material shall be GSE 60 mil White HDPE Leak Location Liner System, as manufactured by GSE Environmental, LLC, Houston, Texas, or equal and meet the specification values according to the following,

Property	Test Method	Unit	Gauge (Nominal) 60 mil (1.5 mm)
Density	ASTM D1505	g/cc	0.94 min.
Melt Flow Index	ASTM D1238, Condition E (190°C, 2.16 kg.)	G/ 10 minutes	0.3 max.
Tensile Properties: Strength at Yield Strength at Break Elongation at Yield Elongation at Break	ASTM D6693 Type IV, gauge length 2 in. break, 1.3 in. (33 mm) yield Dumb-bell @ 2 ipm (50 mmpm)	 PPI* PPI* % %	 132 115 13 200
Carbon Black Content**	ASTM D1603	%	2-3
Carbon Black Dispersion	ASTM D5596	Rating	A-1, A-2, B-1
Tear Resistance	ASTM D1004, Die C	Pounds	45
Puncture Resistance	ASTM D4833	Pounds	130
Dimensional Stability	ASTM D1204, 100°C, 1 Hr.	% change	±2 max.
Seam Strength: Peel Strength (fusion) Peel Strength (extrusion) Shear Strength	ASTM D6392	 PPI PPI PPI	 98 78 121
Low Temperature Brittleness	ASTM D746, Procedure B	Degree F (°C)	-107 (-77) max
Coefficient of Linear Therman Expansion	ASTM D696	x 10-4 cm/cm°C	2.0 max.
Water Absorption	ASTM D570	%	0.1max.
Hydrostatic Resistance	ASTM D751	PSI (kPa)	400 (2760)
Water Vapor Transmission	ASTM E96	$g/m^2/dy$	0.1 max.

Property	Test Method	Unit	Gauge (Nominal) 60 mil (1.5 mm)
* Approximate corresponding stress specifications are: Yield, 2300 psi (16 N/mm^2) ** Note: GSE Green/Line may have an overall ash content greater than 3% dur to the green/white layer. These values apply to the black layer only.			

2.2 FACTORY QUALITY CONTROL

A. Raw Material:

1. All compound ingredients of the HDPE materials shall be randomly sampled on delivery to the HDPE manufacturing plant to ensure compliance with specifications. Tests to be carried out shall include Density ASTM D1505 and Melt Index ASTM D1238, Condition E.

B. Manufactured Roll Goods:

1. Samples of the production run shall be taken and tested according to ASTM D638 to ensure that tensile strength at yield and break, elongation at yield and break meet the minimum specifications. A quality control certificate shall be issued with the material.

C. All welding material shall be of a type supplied by the manufacturer.

2.3 INSTALLATION

A. Area Subgrade Preparation:

1. Surfaces to be lined shall be smooth and free of all rocks, stones, sticks, roots, sharp objects, or debris of any kind. The surface should provide a firm, unyielding foundation for the membrane with no sudden, sharp or abrupt changes or break in grade. No standing water or excessive moisture shall be allowed. The installation contractor shall certify in writing that the surface on which the membrane is to be installed is acceptable before commencing work.

B. Contractor Approval:

1. The installation of the HDPE must be done by the manufacturer using the manufacturer's extrusion or hot wedge welding equipment and installation methods. All supervisors overseeing the liner installation must have ten million square feet of supervisory liner experience. All field technicians must have over one million square feet of seaming experience.

C. Field Seams:

1. Individual panels of liner material shall be laid out and overlapped by a maximum of four inches for extrusion weld prior to welding or five inches for hot wedge weld prior to welding. Extreme care shall be taken by the installer in the preparation of the areas to be welded. The area to be welded shall be cleaned and prepared according to the procedures laid down by the material manufacturer. All sheeting shall be welded together by means of integration of the extrudate head with the lining material. The composition of the extrudate shall be identical t the lining material, or all sheeting

shall be welded together using the hot wedge welding system.

D. The welding equipment used shall be capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine is actually fusing the lining material so as to ensure that changes in environmental conditions will not affect the integrity of the weld.

E. No "fish mouths" shall be allowed within the seam area. Where "fish mouths" occur, the material shall be cut, overlapped, and an overlap extrusion weld shall be applied.

2.4 FIELD SEAM TESTING/QUALITY CONTROL

A. The installer shall employ on-site physical nondestructive testing on all welds.

B. A quality-control technician shall inspect each seam. Any area showing a defect shall be marked and repaired in accordance with HDPE repair procedures.

C. A test weld three (3) feet tong from each welding machine shall be run each day prior to liner welding and under the same conditions as exist for the liner welding. The test weld shall be marked with date, ambient temperature, and welding machine number. Samples of weld 1/4" to 1/2" wide shall be cut from the test weld and pulled by hand in peel. The weld should not peel. Seams should exhibit a film tear bond. The weld sample shall be kept for subsequent testing on laboratory tensometer equipment in accordance with the applicable ASTM standards. Random weld samples may be removed from the installed welded sheeting at a frequency to be agreed (e.g. 1/500' of weld).

D. The end user company, or his designated representative, reserves the right of access for inspection of any or all phases of this installation at their expense.

2.5 WARRANTY AND GUARANTEE

A. The manufacturer/installer shall provide a five (5) year unconditional warranty against defects, workmanship, leaks, floating membranes, air bubbles, and other items not a result of damage to the material or installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the lining material in accordance with the manufacturer's recommendation. A factory authorized representative/contractor shall supervise installation and placement into service of the lagoon lining.

END OF SECTION 334725

SECTION 334726 – GEOCOMPOSITE FILTRATION AND DRAINAGE

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all labor, material, equipment, and services necessary to install the lining material to the manufacturer's recommendations. These specifications describe geocomposite filtration and drainage layer. The supply and installation of these materials shall be in strict accordance with the Engineer's specifications and engineering drawings and be subject to the terms and conditions of the contract.

1.2 RELATED WORK

A. Earthwork Section 312000

1.3 SUBMITTALS

A. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the Engineer for review before ordering. Submittals shall be in accordance with Section 013323.

B. In accordance with the requirements of the General and Special Conditions and this Section, the following table includes, but is not limited to, the items required to be submitted:

Item Description	Shop Drawings	Product Data	Schedules	Installation Data	Parts Lists	Wiring Diagram	Samples	O & M Manual	Certificates	Warranty	Report	Other
Geocomposite Material	X	X		X					X	X	X	

1.3 MANUFACTURER'S EXPERIENCE

A. The manufacturer of the geocomposite material described hereunder shall have previously demonstrated his ability to produce this geotextile having successfully manufactured a minimum of one hundred million square feet of similar linear material for hydraulic lining installations. The manufacturer must be listed by the NSF (National Sanitation Foundation) Standard 54.

PART 2 - PRODUCTS

2.1 GEOCOMPOSITE MATERIAL

A. The new geotextile material shall be a nonwoven needle punched geotextile. The non-woven needle punched geotextile specified herein shall be staple fiber. The geotextile shall be made from prime quality virgin polymer.

B. The Contractor shall, at the time of bidding, submit a certification from the manufacturer of the sheeting, stating that the sheeting meets physical property requirements for the intended application.

C. The geotextile material shall be so produced as to be free of holes, blisters, undispersed raw materials, or any sign of contamination by foreign matter. Any such defect shall be repaired in accordance with the manufacturer's recommendations.

D. Labels on the roll shall identify the thickness, length, and manufacturer's roll number. There shall be no factory seams.

E. The geotextile material shall be FabriNet HS Geocomposite, as manufactured by GSE Environmental, LLC, Houston, Texas, or equal and meet the specification values according to the following,

Property	Test Method	Unit	Minimum Average Values
Double-Sided Geocomposite			
Transmissivity Metal plate/geocomposite/metal plate gradient = 0.1 @ 10,000 psf 15 min seat time	ASTM D4716	m^2/sec	$3x10^{-4}$
Geonet			
Polymer Composition		% polyethylene by weight	97
Density	ASTM D792	g/cc	0.940
Melt Index (Max.) condition 190/2.16	ASTM D1238	g/10 minutes	1.0 (max)
Carbon Black Content	ASTM D1603/4218	%	2
Nominal Thickness	ASTM D5199	mil	250
Tensile Strength (MD)	ASTM D7179	lbs/in	55
Geotextile			
Unit Weight	ASTM D5261	oz/yd^2	10
Grab Tensile	ASTM D4632	lbs	260
CBR Puncture Resistance	ASTM D4833/D6241	lbs	725
Trapezoidal Tear	ASTM D4533	lbs	100
AOS	ASTM D4751	sieve	100
Flow Rate	ASTM D4491	gal/min-ft^2	75

Property	Test Method	Unit	Minimum Average Values
UV Resistance (500 hrs)	ASTM D4355	% retained	70

2.2 FACTORY QUALITY CONTROL

A. Raw Material:

1. All compound ingredients of the geotextile materials shall be randomly sampled on delivery to the geotextile manufacturing plant to ensure compliance with specifications. Tests to be carried out shall include Density ASTM D1505 (0.94 g/cm^3) and Melt Index ASTM D1238 (1.0 g/10 min).

B. Manufactured Roll Goods:

1. Samples of the production run shall be taken and tested according to test methods and frequencies listed above. A quality control certificate shall be issued with the material.

2.3 INSTALLATION

A. Area Subgrade Preparation:

1. Surfaces to be lined shall be smooth and free of all rocks, stones, sticks, roots, sharp objects, or debris of any kind. The surface should provide a firm, unyielding foundation for the geocomposite with no sudden, sharp or abrupt changes or break in grade. No standing water or excessive moisture shall be allowed. The installation contractor shall certify in writing that the surface on which the geocomposite is to be installed is acceptable before commencing work.

B. Contractor Approval:

1. The installation of the geocomposite must be done by the manufacturer using the manufacturer's installation methods. All supervisors overseeing the geocomposite installation must have ten million square feet of supervisory liner experience. All field technicians must have over one million square feet of seaming experience.

C. Field Seams:

1. Adjacent edges of the geonet along the length of the geocomposite roll shall be placed with the edges of each geonet butted against each other.
2. The overlaps shall be joined by tying the geonet structure with cable ties. These ties shall be spaced every 5 feet along the roll length.
3. Adjoining geocomposite rolls (end to end) across the roll width should be shingled down in the direction of the slope, with the geonet portion of the top overlapping the geonet portion of the bottom geocomposite a minimum of 12 inches across the roll width. Geocomposite rolls shall be terminated in sumps, swales, or anchor trenches as detailed in the Construction Drawings.
4. The geotextile panels shall be sewn together or thermally bonded as approved by the ENGINEER. The thread used to sew the panels shall be of the same composition as the geotextile and as recommended by the MANUFACTURER. The amount of overlap and type of stitch used to join geotextile panels shall be as recommended by the MANUFACTURER and approved by the ENGINEER. For thermal bonding,

fusion welding techniques recommended by the MANUFACTURER shall be used. If thermal bonding is used, care shall be taken to avoid burn through of the geotextile, and the area welded shall be clean and dry.

D. For protection and proper performance, no machinery or equipment shall be allowed on the geocomposite unless previously approved by the ENGINEER and MANUFACTURER. Use of a low ground pressure All-Terrain Vehicle (ATV) that exerts a maximum of 6 psi may be used to install the geosynthetics if approved by the ENGINEER and MANUFACTURER. Vehicles, machinery, and equipment shall be operated to avoid abrupt stops, starts, and/or turns

2.4 REPAIR

A. Prior to covering the deployed geocomposite, each roll shall be inspected for damage resulting from construction.

B. Any rips, tears or damaged areas on the deployed geocomposite shall be removed and patched. The patch shall be secured to the original geonet by tying every 6 inches with the approved tying devices. If the area to be repaired is more than 50 percent of the width of the panel, the damaged area shall be cut out and the two portions of the geonet shall be joined in accordance with Section 2.3.C.

2.5 WARRANTY AND GUARANTEE

A. The manufacturer/installer shall provide a five (5) year unconditional warranty against defects, workmanship, leaks, floating membranes, air bubbles, and other items not a result of damage to the material or installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the geocomposite material in accordance with the manufacturer's recommendation. A factory authorized representative/contractor shall supervise installation and placement into service of the lagoon lining.

END OF SECTION 334726

DIVISION 46

WATER AND WASTEWATER EQUIPMENT

SECTION 461100 – FLOATING DOCK EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 055202 – Aluminum Handrails and railings

C. Section 033100 – Cast in Place Concrete

1.2 SUMMARY

A. Section includes all equipment, labor, and materials necessary to manufacture and supply and install prefabricated floating docks, gangways, pile guides, ramps, dock anchorage system, and accessories.

1.3 REFERENCES

A. ASTM C 272 - Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.

B. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For dock equipment.

1. Technical product data for all major components.
2. Layout and fabrication drawings for all structural units, bridges/gangways and ramps.
3. Complete details for flotation for each dock unit.
4. Complete fabrication details for any anchorage system components for floating docks.
5. Decking layout.
6. Details of all connections between dock units and access structures.
7. Float buoyancy information covering floats to be used on this project, obtained by submergence testing and certified by an officer of the float manufacturing company.
8. Submit design drawings and engineering calculations showing compliance with the design criteria specified herein. All drawings and calculations shall be signed and sealed by a qualified engineer, registered in Kentucky and submitted as part of the shop drawing submissions defined herein.

1.5 INFORMATIONAL SUBMITTALS

A. Material test reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 DOCK AND GANGWAY MANUFACTURER

A. The dock manufacturing is to be performed in accordance with these specifications and shall be accomplished by one firm, corporation, or contractor, qualified by actual consistent dock manufacturing experience.

B. The dock and gangway shall be designed in accordance with current Americans with Disabilities Act of 1990 (ADA) standards. These standards, set forth in the "2010 ADA Standards for Accessible Design", are the minimum requirements.

C. The dock and gangway shall be manufactured by American Muscle Docks and Fabrication, Wellsburg, West Virginia, or equal.

2.2 DESIGN LOADS

A. Dead Load Design

1. Dead load is defined as the combined weight of the docking system, gangway, and any permanently attached equipment or accessories.

2. Dead load freeboard shall be 18 to 20 inches.

3. The floating dock supplier shall list the freeboard of each dock unit on the submittal drawings. Actual dead load freeboard shall be no more than +/- 2 inch of the freeboard listed on the Drawings with the following exceptions:

a. The dock under gangways may be up to 2 inches higher than the freeboard listed on the Drawings, provided, little or no additional stresses or tilting occurs when such floats are interconnected.

B. Vertical Live Load Design

1. All dock walking surfaces shall have a minimum of 20 pounds per square foot of gross flotation.

2. Gangways shall be designed to withstand a minimum live load of 100 pounds per square foot applied vertically.

3. A concentrated live load of 400 pounds applied at any point on the dock, but no closer than 12 inches from the edge of the float shall not create a cross-slope greater than ¼ inch per foot in any direction on the walking surface.

4. Current flow velocity of 2 FPS shall be anticipated.

5. Additional flotation shall be provided under docks at gangways and ramps so as to prevent loss of freeboard under the bottom of the gangways or ramps under normal loading conditions.

2.3 MATERIALS

A. Structural Steel

1. All steel members of the structural frame shall be ASTM A-36 or stronger, with minimum material thickness of 3/16" for hot-rolled or cold-formed shapes. All angle in the structural frame shall be a minimum of 1.5" x 1.5" x 3/16". All round rod shall be a minimum of 1/2".

2. All steel members shall be hot dip galvanized after fabrication in accordance with ASTM A-123. Bolt holes, slots, etc. shall be drilled in the center of the angle prior to galvanizing. Welding after galvanizing shall not be permitted.

B. Bumpers on Rub Rails, and Corner Bumpers

1. Bumpers shall be installed on all rub rails. They shall be 3-chamber, heavy-duty black vinyl, non-marring, and provided where boats may contact docks. PVC corner bumpers shall be provided at the end of the dock.

C. Rigid Connections

1. Fastening of metal structural members to each other shall be a combination of bolts and welds. Bolted connections shall conform to standard AISC specifications with lock washers or lock nuts. Welds shall be executed in accordance with the provisions of the American Welding Society specifications. All fasteners shall be hot dip galvanized with adequate coating thickness so that the fasteners will not show rust during the warranty period.

D. Flotation

1. Flotation material shall be expanded-in-place polystyrene, with a minimum density of 1.0 pounds per cubic foot and water absorption less than 3.0 pounds per cubic foot when tested by "The Seven Day Hunt Absorption Test". Any and all test samples shall meet this requirement.

2. Encasements shall be fully foamed inside on all six surfaces with no voids or loose beads.

3. Flotation encasement shall be high, medium or linear low density polyethylene, black in color, with no regrind material, totally watertight, and with the following properties:

a. Nominal thickness: 0.150" (unless listed otherwise on drawings).
b. Minimum density: 0.939 grams per cubic centimeter.
c. Minimum ultimate tensile strength; 2600 pounds per square inch (ASTM D-638).
d. Minimum flexural modulus: 97,000 pounds per square inch (ASTM D-790).

E. Dock Substructure

1. Individual dock units shall be made up of steel welded together to make a 12" high structural frame. The structure shall carry all design loads. Decking and flotation shall not contribute to structural strength calculations.

2. All structural steel frames shall be hot-dip galvanized, as set forth herein, after being completely assembled and all welds, drilled holes, etc. are performed.

F. Flotation

1. Individual flotation units shall be attached directly to the structural frame, using a minimum 3/8" bolt, washer, lock washer and nut which have a life expectancy as long as the flotation unit itself. Fasteners are not permitted to penetrate float encasements under any circumstances. Attachment shall be in all four corners and on maximum of 2' intervals on sides and end or as recommended by the float manufacturer.

2. Both sides and ends of float shall be continually supported by the dock frame. Minimum frame support of float drum must be every 48" by 48" or 16 square feet.

3. Flotation units shall be attached in such a manner as to allow easy removal or replacement of damaged units.

4. Flotation shall be designed and protected so that no damage occurs during shipping, handling, or under normal use. Docks which arrive on the job site with damaged flotation units shall have floats replaced at no cost to Owner.

5. Floats carry a 15-year warranty with the first 10 years being non-prorated.

G. Decking on Docks

1. Deck material shall be laid perpendicular to the length of the dock and shall span the entire width of the dock.

2. Deck material shall be attached to 2"x4" nailing strips that are attached to the structural frame with self-tapping flat head screws at a maximum of 2 foot centers. Deck screws shall be a minimum of #9 x 2-1/2 inch screw, hot dip galvanized to ASTM A-153. They shall be driven flush, 2 screws per deck support a minimum of ¾ inch from the board ends and sides. Screws shall be in straight-line patterns.

3. Structural metal supports for deck boards shall be a minimum of 1.5" x 1.5" x 3/16".

4. Composite decking material shall be NyloDeck composite decking 15/16" x 5-1/2", color: Desert Spice, or approved equal, and installed in accordance with the manufacturer's recommendations.

5. All planks shall be laid crosswise, and no deck board splices are allowed. Planks shall be supported on minimum of 1.5" x1.5" x 3/16" structural supports spaced at a maximum of 24".

H. Rub Rails

1. Rub rails shall be 2" x 8" NyloDeck composite boards, with single planks in runs up to 20 foot.

   a. Attachment shall be carriage bolts, 6 per 20'.
   b. Rub rails shall be installed everywhere a boat may come in contact with a dock.

I. Connections

1. Connections between docks and shoreline abutments or dock abutments (where required) shall be made flexible, and indicated on the approved shop drawings. Connections shall be made by double shear connectors at the outer edges of dock units with a maximum opening of 1½ inches.

2. Structural parts of connectors shall be of the same base metal as the dock's structural frame. Bolts, nuts & lock washers shall be stainless or galvanized steel.

3. Connections shall not protrude above the level of the deck and shall present a relatively smooth top surface with no sharp edges, or upward projections. Connections may have sufficient "play" to permit them to work freely, but such "play" shall be controlled to prevent no more than ½ inch transverse movement.

2.4 ACCESSORIES

A. Dock cleats shall be bolted thru the deck boards and into the dock structural framework. Cleats and bolts shall be hot-dip galvanized.

B. Bumpers/rub strips shall be attached to dock fascia boards with 1½" stainless steel roofing nails or 1½" x 1" wide staples at 4 inch maximum centers for nails and alternating top and bottom for staples in a neat and repeated pattern on both top and bottom flanges.

C. Dock fascia boards are to be attached to the frame with carriage bolts, 6 per 20'.

D. Exposed corners of floating docks shall have corner deck edging attached to the corner with stainless steel fasteners.

E. The Aluminum gangway shall be constructed from 6063 aluminum alloy and utilize stainless steel fasteners. It shall have a minimum of 100 lbs. per square foot live load design (up to 30' in length), and in accordance with "2010 ADA Standards for Accessible Design". The aluminum decking shall have a non-skid surface.

F. Deck material shall be attached to 2"x4" nailing strips that are attached to the structural frame with self-tapping screws.

G. All Gangways and Floating Docks shall be fitted with handrails at all locations in compliance with specification section 055202. At locations where aerators are to be accessed, removable chains shall be installed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install dock equipment as required for a complete installation.

B. Adjust dock equipment to function smoothly and safely. This includes replacing and/or adding flotation needed to meet design criteria as specified.

C. After completing installation of dock equipment, inspect exposed finishes and repair or replace damaged items.

3.2 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, and maintain dock equipment.

END OF SECTION 461100

SECTION 464200 – HYDRAULIC BAFFLES

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required to furnish and install Hydraulic Baffles with appurtenances necessary to complete work as directed in the project specifications and drawings.

B. The hydraulic baffles described in this specification shall be custom manufactured factory prefabricated hydraulic barrier curtain (s) designed to improve flow characteristics in an existing lagoon system. The lagoon baffle support hardware shall be manufactured in prefabricated kits to minimize field cutting and drilling. The clearwell baffles shall be designed for ease of installation in an existing lagoon.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.

1.3 SUBMITTALS

A. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the Engineer for review before ordering. Comply with provisions of Section 013323.

B. At the time of submission, the Contractor shall, in writing, call Engineer's attention to any deviations that the submittals may have from the requirements of the Engineer's Contract Drawings and Specifications.

PART 2 – MATERIALS

2.1 MATERIALS

A. Hydraulic Baffle System:

1. The floating baffles shall be fabricated from NSF 61 approved polyester reinforced geomembrane material ENV-4513-12 (Reinforced Polypropylene).

2. The flow through window shall equal a minimum of one (1) square foot per 30 GPM of peak flow.

3. The hydraulic baffle shall be Lemna Hydraulic Baffle System, as manufactured by Lemna Environmental Technologies, Inc., Vadnais Heights, Minnesota.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The installation contractor shall install the hydraulic baffle(s) in the position(s) shown on the project drawings.

B. The hydraulic baffle(s) shall be installed in accordance with the manufacturer's drawings, instructions and recommendations.

C. The manufacturer shall, upon request, provide the services of a qualified on-site installation supervisor to ensure proper installation of the baffle system.

3.2 WARRANTY

A. Hydraulic baffles shall have a limited 2-year warranty from the date of shipment covering workmanship and materials. All warranties must be submitted in writing by the manufacturer and confirmed by the end user.

END OF SECTION 464200

SECTION 464300 – ROTARY DISTRIBUTOR MECHANISM

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required to refurbish the existing rotary distributor mechanism with appurtenances necessary to complete work as directed in the project specifications and drawings.

B. The refurbish work shall include the following items:

a. Disassembly of Rotary Distributor.

b. Transportation of the Rotary Distributor to and from the rehabilitation facility, if necessary.

c. Overhaul of the Amwell Model "RH-8" reaction driven rotary distributor SO# 90905-5.

d. Replacement and re-installation of the rotary distributor.

e. Start-up and re-training by factory authorized personnel

1.2 SUBMITTALS

A. Descriptive literature, parts list, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the Engineer for review before ordering. Comply with provisions of Section 013323.

B. At the time of submission, the Contractor shall, in writing, call Engineer's attention to any deviations that the submittals may have from the requirements of the Engineer's Contract Drawings and Specifications.

C. Contractor shall provide qualifications of rehabilitation facility, if necessary.

1.3 REHABILITATION FACILITY'S EXPERIENCE

A. An acceptable rehabilitation facility shall be regularly engaged in the rehabilitation of Rotary Distributors or related wastewater treatment equipment and can demonstrate providing rehabilitation services for a period of not less than ten (10) years will be considered as acceptable manufacturers.

PART 2 – PRODUCTS

2.1 REPLACEMENT PARTS

A. The replacement parts shall be provided by Amwell – A Division of McNish Corporation, N. Aurora, Illinois. The Contractor shall reference drawings D706-10267-176 and D206-30782-255 and provide the following replacement parts for rotary distributor as indicated on the referenced drawing and included herein,

Quantity	Description	Part #
1	Lower Grease Seal	9208-6A
1	C.I. Babbitt Lined Bearing	9208-7A
1	Upper Grease Seal	9208-8A
1	C.I. Seal and Bearing Sleeve	9208-10A
1	Top Roller Bearing	9208-12A
1	Bronze Grease Baffle Ring	9208-16A
1 lot	Misc. Hardware Items	9208- 1B, 1D, 1E, 1J, 2B, 4B & 2D

B. All hardware supplied will be ZPS as per the original scope of supply.

2.2 SHOP PAINTING AND SURFACE PREPARATION

A. Prior to assembly of the rotary distributor unit, the castings shall have been sandblasted (SSPC-SP10) and thoroughly cleaned to remove any foreign particles in the drive base.

a. Surface preparation (SSPC-SP10) prior to epoxy coating.

b. Primer, Intermediate, and Topcoat: Tnemec Series N69, Hi-Build Epoxoline II,

c. Finish color: Owner selection

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor shall reference the instruction/service manual for the rotary distributor's disassembly and assembly procedures.

B. Disassemble of the four (4) rotary distributor arms and sway braces from the center column support.

C. Removal of the rotary distributor from the concrete support pedestal.

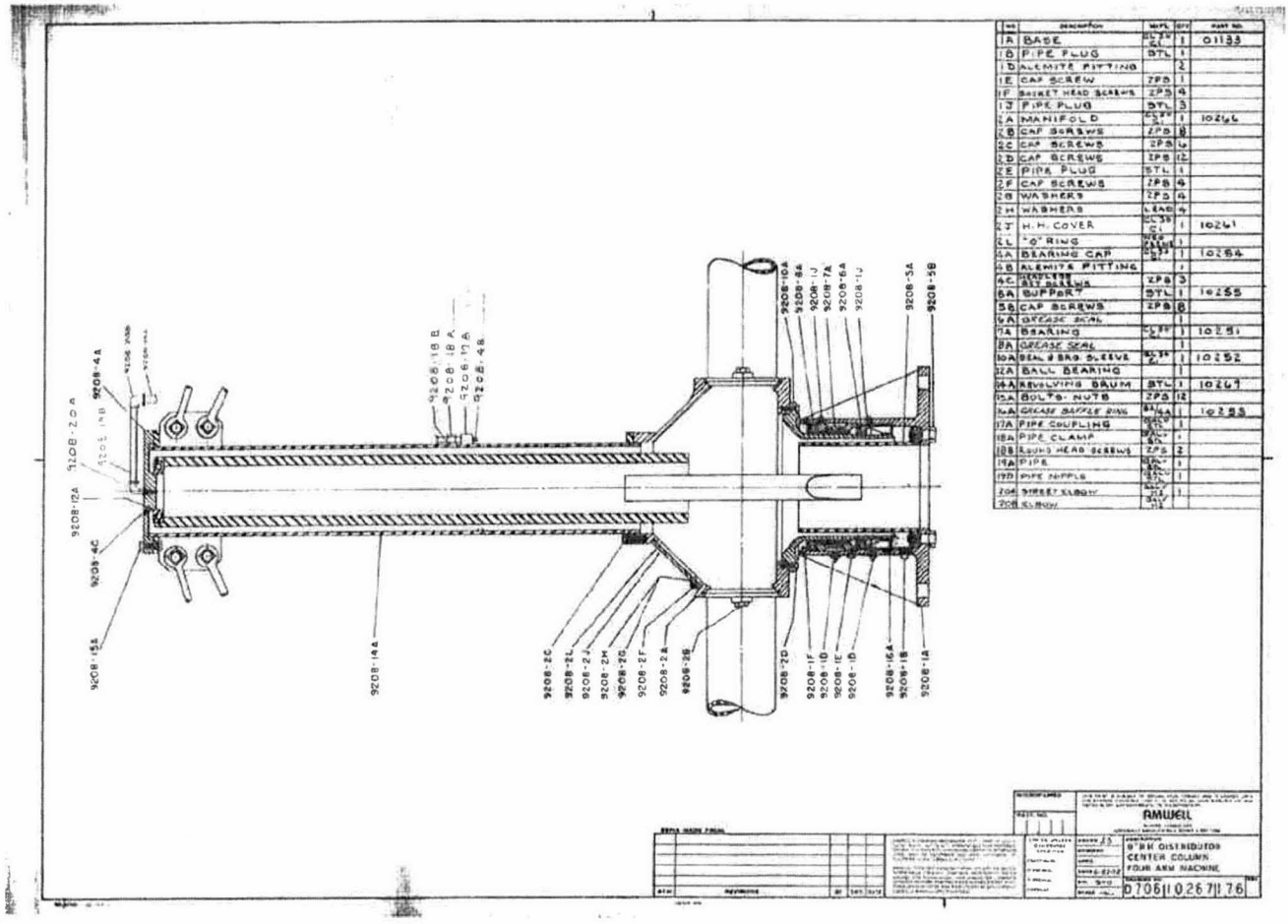
D. Reinstall rotary distributor on support pedestal and attach distributor arms and sway braces per installation instructions. Grout as required.

E. The distributor arms shall be installed such that the end of the distributor arm shall be lower than

the connection to the rotary distributor manifold to provide drainage away from the distributor.

F. Field services of a factory trained representative to review installation and train the operators on the proper use and lubrication of the equipment for not less than one (1) trip and one (1) day on site.

END OF SECTION 464300

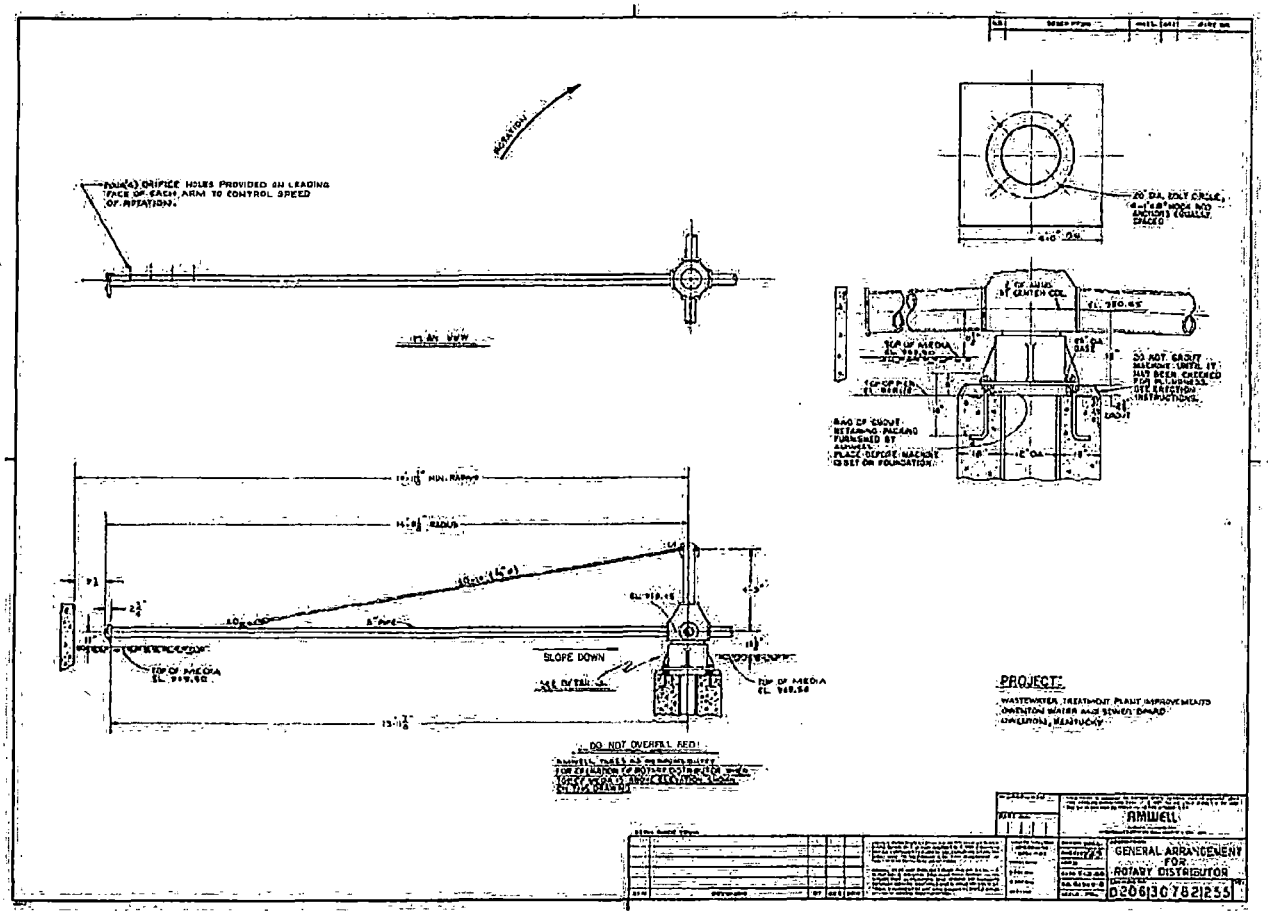


NO	DESCRIPTION	MATL	QTY	PART NO.
1A	BASE	CL FF	1	01133
1B	PIPE PLUG	STL	1	
1D	ALEMITE FITTING		2	
1E	CAP SCREW	ZPS	1	
1F	SOCKET HEAD SCREWS	ZPS	4	
1J	PIPE PLUG	STL	3	
2A	MANIFOLD	CL FF	1	10246
2B	CAP SCREWS	ZPS	8	
2C	CAP SCREWS	ZPS	4	
2D	CAP SCREWS	ZPS	12	
2E	PIPE PLUG	STL	1	
2F	CAP SCREWS	ZPS	4	
2G	WASHERS	ZPS	4	
2H	WASHERS	LEAD	4	
2J	H.H. COVER	CL FF	1	10261
2L	"O" RING	SYN RUBBER	1	
6A	BEARING CAP	CL FF	1	10264
6B	ALEMITE FITTING		1	
6C	CAP SCREWS	ZPS	3	
6A	SUPPORT	STL	1	10255
5B	CAP SCREWS	ZPS	8	
6A	GREASE SEAL		1	
7A	BEARING	CL FF	1	10251
8A	GREASE SEAL		1	
10A	SEAL & BRG SLEEVE	CL FF	1	10252
12A	BALL BEARING		1	
14A	REVOLVING BAUM	STL	1	10267
15A	BOLTS- NUTS	ZPS	12	
16A	GREASE BAFFLE RING	BRASS	1	10253
17A	PIPE COUPLING	BRASS	1	
18A	PIPE CLAMP	BRASS	1	
18B	ALLEN HEAD SCREWS	ZPS	2	
19A	PIPE	BRASS	1	
19D	PIPE NIPPLE	BRASS	1	
20A	STREET ELBOW	BRASS	1	
20B	ELBOW	BRASS		

AMWELL

8 RH DISTRIBUTOR
CENTER COLUMN
FOUR ARM MACHINE

D706 | 10267 | 76


ROTATION
FOUR(4) ORIFICE HOLES PROVIDED ON LEADING FACE OF EACH ARM TO CONTROL SPEED OF ROTATION.
SLOPE DOWN
DO NOT OVERFILL PED!
PROJECT:
AMWELL
GENERAL ARRANGEMENT FOR ROTARY DISTRIBUTOR
D206130782255

AURORA, ILLINOIS, USA (ORIGINALLY AMERICAN WELL WORKS — EST. 1868)	INSTRUCTION/SERVICE MANUAL	SHEET NO. PAGE 1 OF 4
PRODUCT CODE (5) ROTARY DISTRIBUTORS		ISSUED 4/6/87
SUBJECT 8" RH DISASSEMBLY AND ASSEMBLY PROCEDURE		SUPERSEDES NONE

DAMAGED EQUIPMENT

All material has been thoroughly checked and inspected before shipment from the factory. Please notify us immediately if any parts are found broken or damaged during shipment. This will enable us to assist you in placing the proper claims against the freight company. Please store carefully as AMWELL cannot be responsible for material deterioration or breakage due to exposure and improper storage.

If there are any questions on this procedure, please do not hesitate to contact us at:

AMWELL
1740 MOLITOR ROAD
AURORA, ILLINOIS 60505

PHONE: (312) 898-6900

NOTES: 1. For internal parts refer to Drawing A706-10267-176.

2. Normally you do not need to remove the C.I. base (1A) or support (5A) unless these items are damaged.

DISASSEMBLY PROCEDURE

1. Remove Arms.

   a. Block-up arms on filter bed and loosen truss and sway braces.
   b. Remove truss and sway rods.
   c. Remove capscrews (2B) (arms to manifold).

2. Lift Procedure

   Option 1. If you use a "Cherry Picker", you can lift the entire column and manifold off at this time, but you will have to raise the unit twice as high as it is standing now (approximately 16'). Hook on to the upper ears (where truss rods attach). Lift slowly and twist the lower bottom while lifting. UPPER BEARING CAP (4A), REVOLVING DRUM (14A), MANIFOLD (2A) and SEAL & BEARING SLEEVE (10A) will come up. Lift up over the support (5A). You can now lay the unit down to work on it.

E

AURORA, ILLINOIS, USA (ORIGINALLY AMERICAN WELL WORKS — EST. 1868)	MANUAL	PAGE 2 OF 4
PRODUCT CODE (5) ROTARY DISTRIBUTORS		ISSUED 4/6/87
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2. Lift Procedure (Continued)

Option 2. If you use a "Tri-Pod" first remove the upper bolts on the BEARING CAP (15A). Unit will drop 1/4" - 1/8". Remove UPPER BEARING (12A) and use set screws (4C) to disengage BEARING from CAP. Remove upper BEARING and CAP. Now remove bolts (2C) from MANIFOLD. Insert hooks on upper ears of REVOLVING DRUM (14A) and lift over support (5A). Now insert eye-bolts into MANIFOLD and lift over SUPPORT using a twisting motion (SEAL & BEARING SLEEVE will also be coming off with MANIFOLD). You can now lay this on the filter bed and remove the SEAL and BEARING SLEEVE capscrews (2D).

3. Grease Seal and Bearing Removal.

a. Looking down into the base, on the upper lip, there should be four (4) small steel SOCKET HEAD capscrews (1F). Remove and keep these. These hold the seal down and keeps the seal in place.
b. Pry out UPPER GREASE SEAL (8A), lift up and over SUPPORT.
c. Insert eye bolts (3/8" diameter) on top of cast iron BEARING (7A). Remove CAPSCREW (1E), this bolt holds BEARING (7A) in place. Twist BEARING out and over SUPPORT.
d. Pry out GREASE SEAL (6A) (same as item b).
e. Insert eye bolts (3/8" diameter) on top of cast bronze GREASE BAFELE RING (16A) lift up and over.

4. Clean and Inspect

a. Clean and inspect cast iron BASE and SUPPORT for any unknown cracks. Stuff rags around bottom of opening inlet so when you clean off old grease, rust, etc., it does not fall into the sewage and come up and through the distributor and clog the orifice later.

REASSEMBLY PROCEDURE

1. Cast Bronze Grease Baffle Ring (16A)

a. Lower over support and into base (wide flange down), this will be a tight fit. Tap with hammer and a piece of hardwood to seat firmly in place.

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REASSEMBLY PROCEDURE (Continued)

2. Install New Lower Grease Seal (6A) Into Base.

   a. The upper and lower seals are different sizes. The smaller seal is the lower seal. This seal should be installed with lip facing down.
   b. The seals should be pushed down by using a hammer and a piece of hardwood. Caution should be taken so as not to damage the seal.
   c. The seal should be pushed down until seated.

3. Installing the Babbitted Bearing (7A) Into Base.

   a. The bearing can be installed using the same method used for the lower seal. Make sure the cut-out portion of the outer rings of the bearing align with the hole for the capscrew (1E) in the base.
   b. Using eye bolts in the tapped holes provided, lower the bearing down into base until seated on the lower seal.
   c. Reinstall cap screw (1E) into base.

4. Installing Upper Grease Seal (8A) Into Base.

   a. The same method may be used to install the upper grease seal as was used to install the lower grease seal. Make sure the grease seal lip is facing down.
   b. After seating the upper grease seal down on the bearing, reinstall the socket head cap screws (1F).

5. Installing Seal and Bearing Sleeve (10A)

   a. Place seal and bearing sleeve on the bottom of the manifold. Insert cap screws (2D) and tighten until the seal and bearing sleeve is seated.

6. Installing Manifold (2A) (See option 1 or 2 on Disassembly)

   a. Bolt manifold to revolving drum.
   b. Coat seal and bearing sleeve with oil.
   c. Lift manifold and drum assemblies over support (5A) and set gently into seals and bearing and letting assembly bottom out.

PRODUCT CODE	(5) ROTARY DISTRIBUTOR	ISSUED 4/6/87
SUBJECT	8" DISASSEMBLY AND ASSEMBLY PROCEDURE	SUPERSEDES NONE

REASSEMBLY PROCEDURE (Continued)

7. Installing Bearing Assembly (12A) (See option 1 or 2)

   a. Clean all dirt, grit and old grease from bearing housing.
   b. Gently tap outer race of bearing into housing using a piece of wood or soft metal being careful to install squarely to prevent damage to bearing.
   c. Clean all dirt, grit, and old grease from bearing seat of bearing cap (4A).
   d. Remove set screw (4C).
   e. Gently press inner bearing race onto bearing cap making sure bearing is set squarely on shoulder of cap.
   f. Pack both halves of bearing with grease. Mount cap and bearing assembly into bearing on support. There should be approximately 1/4" gap between cap (4A) and revolving drum (14A).

8. Attach Revolving Drum Assembly (14A) (See option 1 or 2)

   a. Line up mounting holes in cap with holes in revolving drum. Insert cap screws (15A) and using nuts draw up revolving drum assembly until tight. Insert set screws (4C) and tighten.

9. Lubricate Center Column

   a. See drawing C706-04868-463.

10. Test distributor for freedom of operation by pushing by hand through a couple of revolutions. The unit should turn freely.

11. Reinstall Arms.

    The pipe arms of the machine slope downward from the center of the machine to the ends of the arms approximately 1/2". Starting with one (1) arm, measure the distance between the arm and a point of reference. Bring each of the other arms into the same position adjusting it to the same measurement. The process is repeated until the measurement is the same for each arm to within 1/8" and preferably closer. Exercise due care in keeping the underside of the arms straight by adjustment of the various diagonal trusses along the arm.

12. Machine should now be ready for operation.

APPENDIX

GEOTECHNOLOGY INC
FROM THE GROUND UP

GEOTECHNICAL EXPLORATION
OWENTON WWTP LAGOON IMPROVEMENTS
OWENTON, KENTUCKY

Prepared for:

KENTUCKY AMERICAN WATER
LEXINGTON, KENTUCKY

Prepared by:

GEOTECHNOLOGY, INC.
ERLANGER, KENTUCKY

Date:

DECEMBER 14, 2017

Geotechnology Project No.:

J031017.01

SAFETY
QUALITY
INTEGRITY
PARTNERSHIP
OPPORTUNITY
RESPONSIVENESS

GEOTECHNOLOGY INC
FROM THE GROUND UP

December 14, 2017

Mr. Cole Mitcham, PE
Kentucky American Water
2300 Richmond Road
Lexington, Kentucky 40502

Re: Geotechnical Exploration
Owenton WWTP Lagoon Improvements
Owenton, Kentucky
Geotechnology Project No. J031017.01

Dear Mr. Mitcham:

Presented in this report are the results of our geotechnical exploration completed for the Owenton Wastewater Treatment Plant Lagoon Improvements. Our services were performed in general accordance with our Proposal P031017.01, which was dated October 31, 2017. Our services were authorized via the Kentucky American Water Purchase Order No. 5000089084, which was dated November 1, 2017.

We appreciate the opportunity to provide the geotechnical services for this project. If you have any questions regarding this report, or if we may be of any additional service to you, please do not hesitate to contact us.

Respectfully submitted,
GEOTECHNOLOGY, INC.

Todd M. Starkey, EI
Project Engineer

Joseph D. Hauber, PE
Senior Project Manager

STATE OF KENTUCKY
Joseph D. Hauber
27774
LICENSED PROFESSIONAL ENGINEER
12/14/2017

TMS/JDH:tms/jdh/tmk

Copies submitted: Kentucky American Water (email)
GRW, Inc. (email)
Chapman Technical Group (email)

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FROM THE GROUND UP

GEOTECHNICAL EXPLORATION
OWENTON WWTP LAGOON IMPROVEMENTS
OWENTON, KENTUCKY
December 14, 2017 | Geotechnology Project No. J031017.01

1.0 INTRODUCTION

Geotechnology, Inc. (Geotechnology) prepared this geotechnical exploration report for Kentucky American Water (KAW) for the Owenton Wastewater Treatment Plant (WWTP) Lagoon Improvements project that will be located in Owenton, Kentucky.

The purposes of the geotechnical exploration were: to evaluate the general subsurface profile at the site and the engineering properties of the soils and bedrock; and to develop recommendations for the geotechnical aspects of the design and construction of the project, as defined in our proposal. Our scope of services included a site reconnaissance, geotechnical borings, laboratory testing, engineering analyses, and preparation of this report.

2.0 PROJECT INFORMATION

The following project information was derived from:

- The Site Plan Grading and Drainage (Site Plan), titled "Owenton WWTP Lagoon Improvements", which was prepared by GRW, Inc. (GRW), dated July 2017, and received electronically on October 25, 2017; and

- Correspondence with KAW, GRW, and Chapman Technical Group.

We understand that this project will include the construction of a temporary 300,000-gallon treatment tank and a temporary 500,000-gallon wet weather storage tank on the ridge north of the existing lagoon, and the grading of a bench immediately west of the lagoon for staging of sludge dredging equipment. Grading for the tanks will include cuts and fills 3 feet deep or less. Grading for the staging area will involve cuts up to 11 feet deep and fills up to 5 feet deep. Based on the referenced plan, a 3 horizontal to 1 vertical (3H:1V) cut slope that is approximately 25 feet in height (measured toe to crest) will be excavated to the east of the existing access road for the proposed bench. Temporary piping for the facilities will be surface-supported, and were not addressed by this exploration.

3.0 SITE CONDITIONS

The existing site consists of a sewage lagoon with a slope to the west of the lagoon and a ridgetop north of the lagoon. The ground surface on the slope to the west of the lagoon varies from about

El. 983[1] to El. 950 with a slope geometry on the order of about 4H:1V. The ground surface on the ridge and slope to the east of the ridge varies from about El. 971 to El. 935 with a slope geometry on the order of about 6H:1V, except near the toe of the slope where a cut has been made for the existing access road. This cut slope is approximately 3H:1V.

4.0 SUBSURFACE EXPLORATION

The subsurface exploration consisted of six borings numbered B-1 through B-6. The boring locations were selected by us and were staked in the field by a GRW survey crew relative to their survey control and benchmark elevation. The locations of the borings are shown on our Boring Plan, which is included in Appendix B.

The borings were drilled on November 10, 2017 with an ATV drill rig advancing hollow-stem augers. Sampling of the overburden soils and bedrock was accomplished ahead of the augers at the depths indicated on the boring logs with 2-inch-outside-diameter (O.D.) split-spoons in general accordance with the procedures outlined by ASTM D1586. Standard Penetration Tests (SPTs) were performed to obtain the standard penetration resistance or N-value[2] of the sampled material.

As each boring was advanced, the Drilling Foreman kept a field log of the subsurface profile noting the soil and bedrock types and stratifications, groundwater, SPT results, and other pertinent data. Observations for groundwater were made in the borings during drilling and at the completion of drilling.

Representative portions of the split-spoon samples were placed in glass jars with lids to preserve the in-situ moisture contents of the samples. The glass jars were labeled in the field for identification when returned to our laboratory.

5.0 LABORATORY REVIEW AND TESTING

Upon completion of the fieldwork, the samples recovered from the borings were transported to our Soil Mechanics Laboratory, where they were visually reviewed and classified by the Project Geotechnical Engineer.

Laboratory testing was performed on selected soil samples to estimate engineering and index properties. Laboratory testing of the selected soil samples included moisture content and Atterberg limits. The results of these tests are summarized in the Tabulation of Laboratory Tests in Appendix D.

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[1] The elevations in this report are referenced to North American Vertical Datum of 1988 (NAVD 88) in units of feet, unless noted otherwise.

[2] The standard penetration resistance, or N-value, is defined as the number of blows required to drive the split-spoon sampler 12 inches with a 140-pound hammer falling 30 inches. Since the split spoon sampler is driven 18 inches or until refusal, the blows for the first 6 inches are for seating the sampler, and the number of blows for the final 12 inches is the N-value. Additionally, "refusal" of the split-spoon sampler occurs when the sampler is driven less than 6 inches with 50 blows of the hammer.

The boring logs, which are included in Appendix C, were prepared by the Project Geotechnical Engineer on the basis of the field logs, the visual classification of the soil and bedrock samples in the laboratory, and the laboratory test results. Soil and Rock Classification Sheets are also included in Appendix C, which describe the terms and symbols used on the boring logs. The dashed lines on the boring logs indicate an approximate change in strata as estimated between samples, whereas a solid line indicates that the change in strata occurred within a sample where a more precise measurement could be made. Furthermore, the transition between strata can be abrupt or gradual.

6.0 SUBSURFACE CONDITIONS

6.1 Stratification

Generally, the ground surface was underlain by undocumented clayey fill, native residual clay, and interbedded limestone and shale bedrock. More specific descriptions of the subsurface strata are provided below and on the boring logs located in Appendix C.

6.1.1 Fill

Existing, undocumented fill was encountered beneath the ground surface in Borings B-4 and B-6. The fill in these borings was 2 and 7 feet thick, respectively, and was generally described as mixed brown to dark brown, moist, medium stiff to very stiff, lean and fat clay with limestone, shale, sand, and asphalt. The N-values for the fill ranged from 4 to 12 blows per foot (bpf). Moisture content testing on three samples of the fill resulted in values of 20.8, 25.5, and 25.9 percent.

6.1.2 Residuum

Residual soils (or residuum) are soils that have formed by the in-situ weathering of the underlying bedrock into a soil. Occasionally, layers of the bedrock (i.e., shale or limestone layers) may be encountered within the residual soils. Residual soils were encountered beneath the ground surface or fill at depths of 0 to 7 feet in each of the borings. The residuum in these borings was generally described as brown, trace gray, moist, stiff to very stiff, fat and lean clay with bedding planes, oxide stains, sand, and limestone. Locally, soft to medium stiff residual soils were encountered at the ground surface in Boring B-2 and B-5. The N-values for the residuum ranged from 5 to 30 bpf, and locally split-spoon refusal was encountered within the residual soils on limestone layers or floaters. Moisture content testing on eight samples of the residuum resulted in values ranging from 21.2 to 28.0 percent. Atterberg limits testing on two samples of the residual soils are summarized in Table 1. The residual soil samples tested were classified as CH (high plasticity, or "fat", clay) soils.

Table 1. Summary of Atterberg limits test results of the residuum.

Boring No.	Sample No.	Depth (ft.)		Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
		From	To			
B-1	2	2.5	4.0	79	34	45
B-3	2	2.5	4.0	58	24	34

6.1.3 Bedrock

The overburden soils at the site are underlain by bedrock consisting of interbedded limestone and shale layers. Bedrock was encountered at depths of 7 to 14.5 feet below the ground surface in each of the borings, with the exception of Boring B-4.

According to the 1975 United States Geological Survey (USGS) Geologic Map of the Owenton Quadrangle, Owen and Grant Counties, Kentucky, the bedrock underlying the overburden soils belongs to the Calloway Creek Limestone Formation.

The referenced USGS map describes the Calloway Creek Limestone bedrock formation as follows: the formation is made up of interbedded limestone and minor shale; the limestone comprises approximately 75 to 85 percent of the formation; the limestone is medium-gray, largely coarse-grained, poorly sorted, fossil-fragmental, and occurs in beds up to 18 inches thick; and the shale is medium-gray, calcareous, and occurs as partings and thin discontinuous beds.

Bedrock in the area is typically categorized as highly weathered, weathered, or unweathered, based on the degree of weathering of the shale component. The highly weathered zone is typically the uppermost zone, wherein the shale is brown to olive brown in color and has almost weathered to a clay. In the intermediate weathered zone, the shale is typically olive brown with occasional gray and is stronger than the shale in the highly weathered zone. In the unweathered parent zone, the shale is gray and is stronger than the shale in the weathered zones. Each zone is interbedded with limestone. It is common for one or both of the weathered bedrock zones to be absent due to differential weathering, erosion, or prior excavation. The Rock Classification Sheet, which is included in Appendix C, describes the varying degrees of weathering along with the rock strength descriptions that are used on the appended boring logs.

Regarding the limestone, these layers are predominantly unweathered, and their strengths are estimated to range from medium strong to very strong (i.e., uniaxial compressive strengths ranging from 4,000 psi to upwards of 30,000 psi). Occasionally, layers are encountered within the bedrock profile where groundwater seepage is concentrated and weathering of the limestone layers is more advanced.

Interbedded limestone and highly weathered shale bedrock was encountered in Boring B-3 at a depth of 7 feet from the ground surface, and the thickness was 5 feet. The strength of the highly weathered shale was described as extremely weak.

Interbedded limestone and unweathered shale bedrock was encountered in each of the borings, with the exception of Boring B-4. The depth to the top of the unweathered bedrock, where encountered, ranged from 9.5 to 14.5 feet from the ground surface. The strength of the unweathered shale was described as extremely weak to very weak.

6.2 Groundwater Conditions

As mentioned in Section 4.0, groundwater observations were made in the borings during drilling and at the completion of drilling. The boreholes were backfilled after drilling, so long-term water readings were not observed on this project. The borings were noted to be "dry" during our field exploration.

Based on our local experience, groundwater seepage is anticipated along the fill/native soil interface, along the overburden soil/bedrock interface, along limestone layers within the bedrock, and in saturated zones of fill or native soils that are within perched groundwater zones. Locally concentrated flow may occur due to saturated layers of fill or native soils or along fractures in the bedrock. Additionally, groundwater levels and seepage amounts are expected to vary with time, location, season of the year, and amounts of precipitation.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our engineering reconnaissance of the site, the borings, visual examination of the recovered samples, the laboratory test results, our understanding of the proposed project, our engineering analyses, and our experience as Consulting Soil and Foundation Engineers in Kentucky, we have reached the conclusions and make the recommendations of this report.

7.1 Excavation Support

Excavation support should be the responsibility of the Contractor. Excavation support should be designed and implemented such that excavations are adequately ventilated and braced, shored, and/or sloped in order to protect and ensure the safety of workers within and near the excavations and to protect adjacent ground, slopes, structures, and infrastructure. Occupation Safety and Health Administration (OSHA), federal, state, and local safety regulations should be satisfied. The analyses, discussions, conclusions, and recommendations throughout this report are not to be interpreted as pre-engineering compliance with any safety regulation.

7.2 Site Preparation and Earthwork

As stated in Section 2.0, earthwork for the temporary tanks will involve cuts and fills up to 3 feet thick, and the grading for the staging area to the west of the lagoon will involve cuts up to 11 feet deep and fills up to 5 feet thick.

The initial preparation of the site for grading should include the removal of vegetation and heavy root systems from the proposed cut, fill, and structure areas. The vegetation and heavy root systems should be disposed of off site in accordance with applicable regulations.

Experience indicates that the overburden soils and the highly weathered and weathered zones of the bedrock can be excavated with conventional earthwork equipment (dozers, hoes, loaders,

etc.), although ripping is necessary to loosen the bedrock so that it can be picked up. Excavations that extend into the limestone and unweathered gray shale bedrock become more difficult with depth, and more ripping may be required to loosen the bedrock along with hoe-ramming.

After the above operations and making the required excavations in the cut areas, the exposed subgrade, including that for the tanks, should be thoroughly proofrolled using a heavily loaded piece of equipment under the review of the Project Geotechnical Engineer, or a representative thereof. Soft or yielding soils observed during the proofrolling should be undercut to stiff non-yielding cohesive soils or bedrock. Additionally, fill soils encountered in the area of the proposed temporary storage tanks should be undercut to stiff native soils. The undercuts should be backfilled with new compacted fill satisfying the material and compaction requirements presented in this section. The undercut soils may be reused provided that they conform to the recommendations contained in this report regarding acceptable fill materials. We recommend that the Contract Documents include a bid item for the recommended undercutting, as deemed necessary, and the replacement with new compacted and tested fill on a "per cubic yard of in-place compacted fill" basis.

Fill materials should consist of approved on-site, non-organic, clayey soils, bedrock, or approved borrow material that are relatively free of topsoil, vegetation, trash, construction or demolition debris, frozen materials, particles over 6 inches in maximum dimension, or other deleterious materials.

The limestone and shale bedrock may be incorporated into the fill provided that the shale is pulverized to a soil-like consistency and moisture-conditioned, and provided that the limestone is broken up and dispersed so as not to cause nesting or retard compaction. The maximum dimension of the broken-up limestone floaters in the fills should be limited to 30 inches with a maximum thickness of 6 inches; thicker layers or larger pieces of limestone, if not capable of being broken up, should be wasted off site. Additionally, limestone floaters should be restricted from the fill within 12 inches of subgrade elevation of the proposed temporary storage tanks.

The fill should be placed in shallow level lifts (or layers), 6 to 8 inches in loose thickness. Each lift should be moisture-conditioned to within the acceptable moisture content range provided in Table 2, and compacted with a sheepsfoot roller or self-propelled compactor to at least the minimum percent compaction indicated in the same table. Moisture-conditioning may include: aeration and drying of wetter soils; wetting drier soils; and/or thoroughly mixing wetter and drier soils into a uniform mixture.

Granular backfill that exhibits a well-defined moisture-density relationship should be compacted and moisture-conditioned per the requirements presented in Table 2; otherwise, the granular material should be compacted to at least the minimum relative densities indicated in Table 3. Granular backfill should be placed in 6- to 8-inch thick lifts with each lift compacted to at least the specified degree of compaction. The backfill should not be flushed in an attempt to obtain compaction.

Table 2. Percent compaction and moisture-conditioning requirements for fill and backfill.

Area	Minimum Percent Compaction[a,b]	Acceptable Moisture Content Range[c]
Structural[d]	98% of SPMDD	-2% to +3% of OMC
Non-structural	95% of SPMDD	±3% of OMC

[a] SPMDD = standard Proctor maximum dry density determined from ASTM D698.
[b] For granular soils that do not exhibit a well-defined moisture-density relationship, refer to Table 3 for minimum relative density requirements.
[c] OMC = optimum moisture content determined from ASTM D698.
[d] Structural fill and backfill for foundations are defined as fill and backfill located within the zones of influence of structures. The zone of influence of a structure is defined as the area below the footprint of the structure and 2H:1V outward and downward projections from the bearing elevation of the structure.

Table 3. Relative density compaction requirements for granular fill and backfill.

Area	Minimum Relative Density[a,b]
Structural[c]	80%
Non-structural	75%

[a] Relative density evaluated on the basis of the maximum and minimum index densities determined from ASTM D4253 and D4254, respectively.
[b] For granular soils that exhibit a well-defined moisture-density relationship, refer to Table 2 on page 7 for minimum percent compaction and moisture-conditioning requirements.
[c] Structural fill and backfill for foundations are defined as fill and backfill located within the zones of influence of structures. The zone of influence of a structure is defined as the area below the footprint of the structure and 2H:1V outward and downward projections from the bearing elevation of the structure.

Where fill is placed on sloping terrain that is steeper than 6H:1V, the fill should be placed on continuous horizontal benches up the sloping terrain with the initial bench having a minimum width of 15 feet and all subsequent benches being at least 5 feet wide. The initial 15-foot wide bench should be located at the toe of the proposed fill. The benching operations should remove surficial medium stiff or softer soils and expose stiff soils or undisturbed, intact bedrock on the surfaces of the benches. The benches should not be made until the fill is ready to be placed. If groundwater seepage is noted on the benches, the Project Geotechnical Engineer should be contacted for underdrainage recommendations before the soils are replaced and compacted.

We recommend that the permanent cut and fill slopes for this project be designed not steeper than 3H:1V. Gentler slopes should be used whenever possible for ease of maintenance. Additionally, we recommend that the fill slopes be slightly overbuilt and then trimmed back to the design slope to achieve a well-compacted surface. Silt and/or sand soils should also be excluded from the surficial 5 feet of the fill slopes, as these materials are more susceptible to erosion.

It is our opinion that, based on the engineering properties associated with highly plastic, or "fat", clay soils, slopes steeper than 3H:1V will have factors of safety lower than typically targeted in the geotechnical engineering discipline and will be more susceptible to slope failure.

Topsoil should be track-compacted on the proposed cut and fill slopes. We recommend that a maximum of 6 inches of topsoil be placed on the slopes. It should be noted that bedrock exposures at proposed grades may not consistently hold the topsoil layer, and small pop-outs may occur, especially at points of seepage.

Groundwater is not expected to have a significant adverse effect on the proposed earthwork construction; however, the Contractor should be prepared to remove seepage that accumulates on fill surfaces or at subgrade levels. Additionally, if seepage is observed during the construction of the cut or fill slopes, we recommend that we be contacted to review the effects of the seepage on the long-term stability of the slopes.

Maintaining the moisture content of bearing and subgrade soils within the acceptable range provided in Table 2 is important during and after construction for the proposed structures. The clayey bearing and subgrade soils should not be allowed to become excessively wet or dried during or after construction, and measures should be taken to prevent water from ponding on these soils and to prevent these soils from desiccating during dry weather.

Positive drainage should be established around the proposed structures to promote the rapid drainage of surface water away from these structures and to prevent the ponding of water adjacent to these structures. Finish grading in grass and landscaped areas should be sloped down and away from the structures at 10 percent for at least 10 feet, and then at a gradient of at least 2 percent beyond the initial 10 feet from the structures.

We recommend that the earthwork operations be carried out during the drier season of the year and that a sufficient gradient be maintained at the ground surface to prevent ponding of surface water. In our experience, the weather conditions are historically more favorable for earthwork during the months of May through October in the area of the project site. Regardless of the time of year, concrete or fill should not be placed over frozen or saturated soils, and frozen or saturated soils should not be used as compacted fill or backfill.

Best management practices (BMPs) should be implemented to reduce the effects of erosion and the siltation of adjacent properties. Upon completion of earthwork, disturbed areas should be stabilized. It is also recommended that riprap and/or suitable armoring be used at the outlets of storm sewers and headwalls to reduce flow velocities and protect against erosion.

7.3 Foundation Design and Construction

Based on drawings prepared by CST Storage, which are dated June and July 2012 and received on October 25, 2017 from GRW, we understand that the proposed tank structure with consist of panels forming the sides of the tanks that are supported on a ring of shallow, pedestal foundations, bearing in new compacted and tested fill, stiff to very stiff native soils, or undisturbed, intact

bedrock. The floor of the tank will consist of a liner stretched across a structural sand base that will be approximately 5 inches thick. In our opinion, the new compacted and tested fill or stiff to very stiff native soils are suitable for a maximum allowable bearing pressure of 3,000 pounds per square foot (psf), full dead and full live load. The undisturbed, intact bedrock is suitable for a maximum allowable bearing pressure of 6,000 pounds per square foot (psf), full dead and full live load.

Based on the anticipated fill thicknesses and the maximum allowable bearing pressure, we anticipate maximum total settlement on the order of 1 inch or less and differential settlements on the order of 0.5 inches or less. These settlements do not account for potential shrinkage or swelling of the subgrade soils due to moisture fluctuations.

We understand that the temporary storage tanks will only be used for a few months in the late spring to early fall months and that the foundations will bear above the frost line, which is 24 inches below the lowest adjacent exterior/unheated grade. It should be noted that foundations bearing above the frost are more susceptible to moisture fluctuations of the subgrade soils, and therefore have a potential for settlement and heave resulting from shrinkage and swelling associated with moisture fluctuations. Furthermore, fat clay soils, which were encountered on the site, are particularly susceptible to shrinkage and swelling (settlement and heave) due to moisture fluctuations; however, we understand that the temporary tanks will only be in place for a few months and that the Client is aware of the risks of bearing above the frost line.

To mitigate the risks of shrinkage and swelling, care should be taken during construction and usage of the tanks to not allow the subgrade to become desiccated or saturated. We recommend that the subgrade soils be compacted and moisture-conditioned per the recommendations for "structural fill" presented in Table 2, immediately prior to placement of the sand layer and pedestals. Additionally, caution should be exercised so that the proposed sand base layer does not become saturated during or after construction. Consideration should also be given to constructing a 2-foot-tall by 5-foot-wide triangular clayey berm against the tank walls to mitigate potential desiccation and shrinkage of the clayey subgrade soils.

The tank bearing elevations should not be located higher than a relationship of 2H:1V above proposed adjacent foundations or the inverts of nearby existing or proposed utilities that parallel or nearly parallel the foundations, without a site-specific evaluation of the conditions by the Project Geotechnical Engineer.

Water should not be allowed to pond on top of either bearing soils or bedrock within the tank footprints, or around the tanks, in order to mitigate potential softening or swelling of the bearing materials.

We recommend that the tank subgrade be reviewed by the Project Geotechnical Engineer, or a representative thereof, prior to placing the sand base layer and pedestals in order to confirm that the bearing materials and surfaces are consistent with the design recommendations of this report.

8.0 RECOMMENDED ADDITIONAL SERVICES

The conclusions and recommendations given in this report are based on: Geotechnology's understanding of the proposed design and construction, as outlined in this report; site observations; interpretation of the exploration data; and our experience. Since the intent of the design recommendations is best understood by Geotechnology, we recommend that Geotechnology be included in the final design and construction process, and be retained to review the project plans and specifications to confirm that the recommendations given in this report have been correctly implemented. We recommend that Geotechnology be retained to participate in prebid and preconstruction conferences to reduce the risk of misinterpretation of the conclusions and recommendations in this report relative to the proposed construction of the subject project.

Since actual subsurface conditions between boring locations may vary from those encountered in the borings, our design recommendations are subject to adjustment in the field based on the subsurface conditions encountered during construction. Therefore, we recommend that Geotechnology be retained to provide construction observation services as a continuation of the design process to confirm the recommendations in this report and to revise them accordingly to accommodate differing subsurface conditions. Construction observation is intended to enhance compliance with project plans and specifications. It is not insurance, nor does it constitute a warranty or guarantee of any type. Regardless of construction observation, contractors, suppliers, and others are solely responsible for the quality of their work and for adhering to plans and specifications.

9.0 LIMITATIONS

This report has been prepared on behalf of, and for the exclusive use of, the client for specific application to the named project as described herein. If this report is provided to other parties, it should be provided in its entirety with all supplementary information. In addition, the client should make it clear that the information is provided for factual data only, and not as a warranty of subsurface conditions presented in this report.

Geotechnology has attempted to conduct the services reported herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions. The recommendations and conclusions contained in this report are professional opinions. The report is not a bidding document and should not be used for that purpose.

Our scope for this phase of the project did not include any environmental assessment or investigation for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Our scope did not include an assessment of the effects of flooding and erosion of the lagoon or creeks adjacent to or on the project site.

The analyses, conclusions, and recommendations contained in this report are based on the data obtained from the subsurface exploration. The field exploration methods used indicate subsurface

conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Consequently, subsurface conditions may vary gradually, abruptly, and/or nonlinearly between sample locations and/or intervals.

The conclusions or recommendations presented in this report should not be used without Geotechnology's review and assessment if the nature, design, or location of the facilities is changed, if there is a substantial lapse in time between the submittal of this report and the start of work at the site, or if there is a substantial interruption or delay during work at the site. If changes are contemplated or delays occur, Geotechnology must be allowed to review them to assess their impact on the findings, conclusions, and/or design recommendations given in this report. Geotechnology will not be responsible for any claims, damages, or liability associated with any other party's interpretations of the subsurface data or with reuse of the subsurface data or engineering analyses in this report.

The recommendations included in this report have been based in part on assumptions about variations in site stratigraphy that may be evaluated further during earthwork and foundation construction. Geotechnology should be retained to perform construction observation and continue its geotechnical engineering service using observational methods. Geotechnology cannot assume liability for the adequacy of its recommendations when they are used in the field without Geotechnology being retained to observe construction.

A copy of "Important Information about This Geotechnical-Engineering Report" that is published by the Geotechnical Business Council (GBC) of the Geoprofessional Business Association (GBA) is included in Appendix A for your review. The publication discusses some other limitations, as well as ways to manage risk associated with subsurface conditions.

APPENDIX A – IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by:* the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

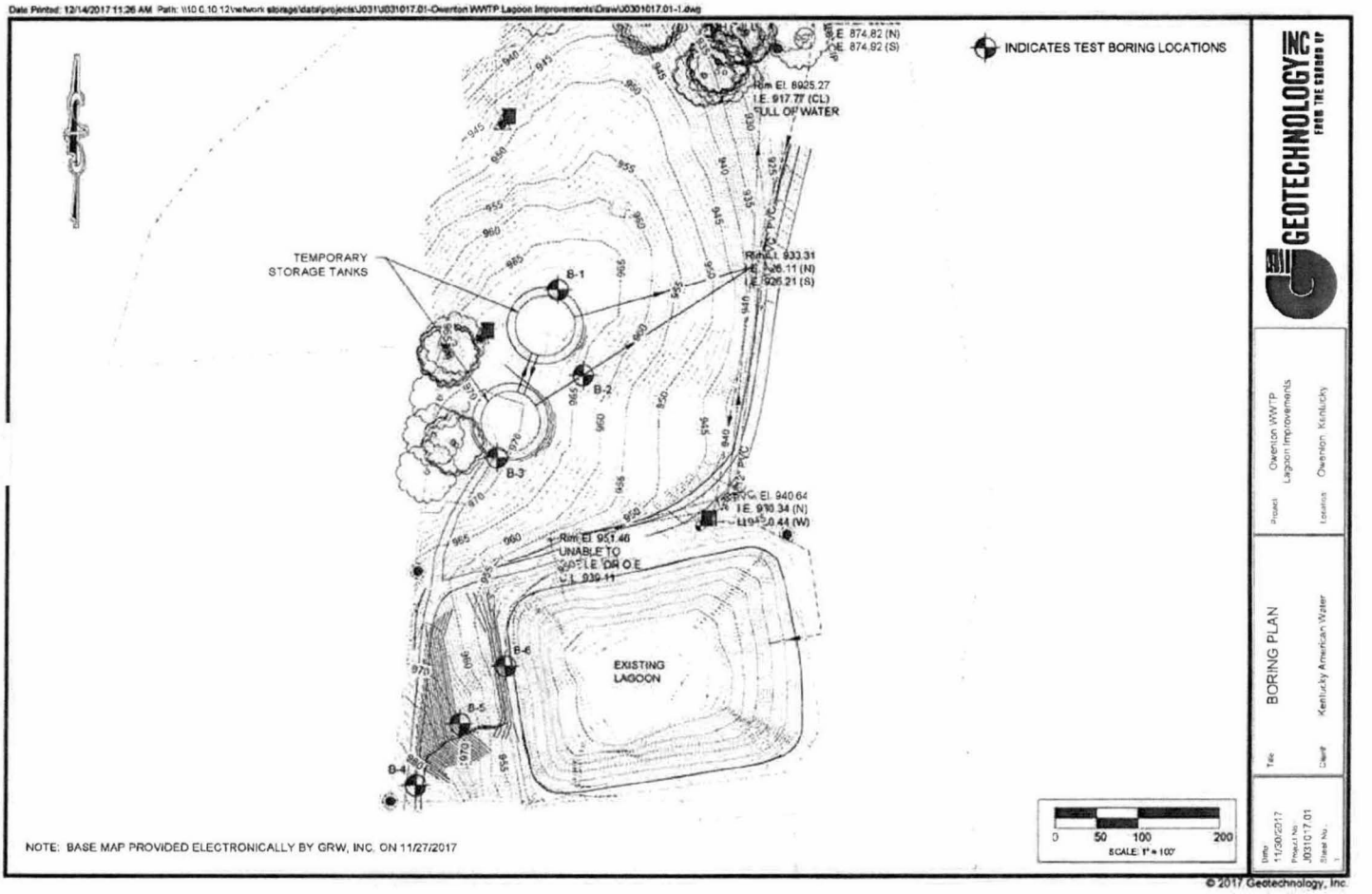
Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX B – PLAN

Boring Plan, Sheet No. 1


Date Printed: 12/14/2017 11:26 AM Path: \\10.0.10.12\network storage\data\projects\J031\J031017.01-Owenton WWTP Lagoon Improvements\Draw\J0301017.01-1.dwg
INDICATES TEST BORING LOCATIONS
TEMPORARY STORAGE TANKS
B-1
B-2
B-3
B-4
B-5
B-6
EXISTING LAGOON
Rim El. 8925.27
I.E. 917.77 (CL)
FULL OF WATER
Rim El. 933.31
I.E. 926.11 (N)
I.E. 926.21 (S)
Rim El. 951.46
UNABLE TO
I.E. 939.11
I.E. 874.82 (N)
I.E. 874.92 (S)
0 50 100 200
SCALE: 1" = 100'
NOTE: BASE MAP PROVIDED ELECTRONICALLY BY GRW, INC. ON 11/27/2017
GEOTECHNOLOGY INC
FROM THE GROUND UP
Project Owenton WWTP Lagoon Improvements
Location Owenton, Kentucky
Title BORING PLAN
Client Kentucky American Water
Date 11/30/2017
Project No. J031017.01
Sheet No. 1
© 2017 Geotechnology, Inc.

APPENDIX C – BORING INFORMATION

Boring Logs

Soil Classification Sheet

Rock Classification Sheet

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Kentucky American Water
PROJECT: Owenton WWTP Lagoon Improvements
Owenton, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-1
PROJECT #: J031017.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
968.3	Ground Surface	0.0	0						
	Brown moist stiff to very stiff LEAN CLAY, trace oxide stains.			I	1	DS	3-5-6	18	100
966.3		2.0							
	Brown, trace gray very stiff FAT CLAY (CH).			I	2	DS	7-8-6	18	100
			5	I	3	DS	7-7-7	18	100
961.3		7.0							
	Brown, trace gray moist very stiff FAT CLAY with oxide stains.			I	4	DS	7-11-11	12	67
958.8		9.5							
	Brown moist very stiff FAT CLAY with bedding planes, trace limestone fragments/floaters, trace oxide stains.		10	I	5	DS	5-11-15	18	100
				L	6	DS	50/2"	0	0
953.8		14.5							
	Interbedded gray medium strong to very strong LIMESTONE and gray moist extremely weak to very weak unweathered SHALE (bedrock).		15	I	7	DS	17-50/3"	4	44
952.5		15.8							
	Split spoon refusal and bottom of test boring at 15.8 feet.		20						
			25						
			30						

Datum: NAVD 88
Surface Elevation: 968.3 ft.
Date Started: 11/10/2017
Date Completed: 11/10/2017

Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.

Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25

Drill Rig: CME 550 BD-1
Foreman: K. Florer
Engineer: Todd M. Starkey

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Dry
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Kentucky American Water
PROJECT: Owenton WWTP Lagoon Improvements
Owenton, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-2
PROJECT #: J031017.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
964.5	Ground Surface	0.0	0						
	Dark brown moist to very moist soft to medium stiff LEAN CLAY with organics.			I	1	DS	7-6-5	6	33
962.5		2.0							
	Brown moist stiff to very stiff FAT CLAY with oxide stains, trace bedding planes.			I	2	DS	4-4-4	18	100
960.0		4.5							
	Brown, trace gray moist stiff FAT CLAY with bedding planes, trace limestone fragments/floaters, trace oxide stains.		5	I	3	DS	5-6-7	10	56
				I	4	DS	2-2-9	18	100
955.0		9.5							
	Interbedded gray medium strong to very strong LIMESTONE and gray moist extremely weak to very weak unweathered SHALE (bedrock).		10	I	5	DS	50/2"	2	100
				I	6	DS	50/4"	2	50
949.2		15.3	15	I	7	DS	50/4"	1	25
	Split spoon refusal and bottom of test boring at 15.3 feet.								
			20						
			25						
			30						

Datum: NAVD 88
Surface Elevation: 964.5 ft.
Date Started: 11/10/2017
Date Completed: 11/10/2017

Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.

Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25

Drill Rig: CME 550 BD-1
Foreman: K. Florer
Engineer: Todd M. Starkey

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Dry
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Kentucky American Water
PROJECT: Owenton WWTP Lagoon Improvements
Owenton, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1.

BORING #: B-3
PROJECT #: J031017.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
971.0	Ground Surface	0.0	0						
	Brown, trace gray moist stiff to very stiff FAT CLAY, trace hairlike roots, trace oxide stains (CH).			I	1	DS	2-3-3	18	100
				I	2	DS	5-9-7	18	100
966.5		4.5	5						
	Brown moist very stiff FAT CLAY with oxide stains and bedding planes.			I	3	DS	8-8-13	18	100
964.0		7.0							
	Interbedded gray medium strong to very strong LIMESTONE and brown to olive brown moist extremely weak highly weathered SHALE (bedrock).			I	4	DS	26-50/2"	4	50
			10	I	5	DS	50/5"	2	40
959.0		12.0							
957.8	Interbedded gray medium strong to very strong LIMESTONE and gray moist extremely weak to very weak unweathered SHALE (bedrock).	13.2		I	6	DS	34-50/2"	4	50
	Split spoon refusal and bottom of test boring at 13.2 feet.		15						
			20						
			25						
			30						

Datum: NAVD 88
Surface Elevation: 971.0 ft.
Date Started: 11/10/2017
Date Completed: 11/10/2017

Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.

Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25

Drill Rig: CME 550 BD-1
Foreman: K. Florer
Engineer: Todd M. Starkey

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Dry
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Kentucky American Water
PROJECT: Owenton WWTP Lagoon Improvements
Owenton, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-4
PROJECT #: J031017.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
981.9	Ground Surface	0.0	0						
	Dark brown moist stiff FILL, lean clay, trace sand, trace asphalt.			I	1	DS	3-5-5	18	100
979.9		2.0							
	Brown, trace gray moist stiff LEAN CLAY, trace sand, trace oxide stains.			I	2	DS	4-2-4	18	100
977.4		4.5	5						
	Brown moist very stiff FAT CLAY with heavy oxide stains and concretions.			I	3	DS	4-7-9	18	100
				I	4	DS	3-5-7	18	100
972.4		9.5	10						
	Brown to olive brown, trace gray moist very stiff FAT CLAY with bedding planes, trace oxide stains.			I	5	DS	5-8-10	18	100
				I	6	DS	4-5-6	18	100
			15						
965.4		16.5		I	7	DS	4-8-7	18	100
	Bottom of test boring at 16.5 feet.		20						
			25						
			30						

Datum: NAVD 88
Surface Elevation: 981.9 ft.
Date Started: 11/10/2017
Date Completed: 11/10/2017

Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.

Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25

Drill Rig: CME 550 BD-1
Foreman: K. Florer
Engineer: Todd M. Starkey

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Dry
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Kentucky American Water
PROJECT: Owenton WWTP Lagoon Improvements
Owenton, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-5
PROJECT #: J031017.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
969.6	Ground Surface	0.0	0						
967.6	Brown very moist soft to medium stiff LEAN CLAY, trace organics, trace oxide concretions.	2.0		I	1	DS	2-2-3	18	100
965.1	Brown moist very stiff FAT CLAY, trace oxide stains.	4.5		I	2	DS	3-4-5	18	100
	Brown, trace gray moist very stiff FAT CLAY with bedding planes and oxide stains.		5	I	3	DS	4-6-7	18	100
				I	4	DS	4-5-6	18	100
			10	I	5	DS	4-4-6	18	100
				I	6	DS	4-3-3	18	100
955.1		14.5							
954.4	Interbedded gray medium strong to very strong LIMESTONE and gray moist extremely weak to very weak unweathered SHALE (bedrock).	15.2	15	I	7	DS	50/2"	1	50
	Split spoon refusal and bottom of test boring at 15.2 feet.		20						
			25						
			30						

Datum: NAVD 88
Surface Elevation: 969.6 ft.
Date Started: 11/10/2017
Date Completed: 11/10/2017

Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.

Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25

Drill Rig: CME 550 BD-1
Foreman: K. Florer
Engineer: Todd M. Starkey

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D = Disintegrated
I = Intact
U = Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Dry
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

LOG OF TEST BORING

CLIENT: Kentucky American Water
PROJECT: Owenton WWTP Lagoon Improvements
Owenton, Kentucky
LOCATION OF BORING: As shown on Boring Plan, Sheet No. 1

BORING #: B-6
PROJECT #: J031017.01
PAGE #: 1 of 1

ELEV.	COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS DESCRIPTION	Strata Depth (feet)	Depth Scale (feet)	Sample Condition	Sample Number	Sample Type	SPT* Blows/6" / Rock Core RQD (%)	Recovery (in.)	Recovery (%)
952.1	Ground Surface	0.0	0						
	Mixed brown, trace gray moist stiff FILL, lean clay, trace limestone fragments.			I	1	DS	2-7-5	18	100
950.1		2.0							
	Dark brown moist medium stiff FILL, lean clay.			I	2	DS	3-1-3	12	67
947.6		4.5							
	Brown, trace gray moist stiff to very stiff FILL, fat clay with shale and limestone fragments.		5	I	3	DS	3-4-6	18	100
945.1		7.0							
	Brown, trace gray moist stiff to very stiff FAT CLAY with bedding planes, trace to little limestone floaters/layers.			I	4	DS	3-12-18	18	100
			10	L	5	DS	50/1"	0	0
940.1		12.0							
	Interbedded gray medium strong to very strong LIMESTONE and gray moist extremely weak to very weak unweathered SHALE (bedrock).			I	6	DS	16-50/1"	2	29
936.3		15.8	15	I	7	DS	50/3"	3	100
	Split spoon refusal and bottom of test boring at 15.8 feet.		20						
			25						
			30						

Datum: NAVD 88
Surface Elevation: 952.1 ft.
Date Started: 11/10/2017
Date Completed: 11/10/2017
Hammer Weight: 140 lb.
Hammer Drop: 30 in.
Pipe Size: 2 in. O.D.
Hole Diameter: 8 in.
Rock Core Diameter: --
Boring Method: HSA-3.25
Drill Rig: CME 550 BD-1
Foreman: K. Florer
Engineer: Todd M. Starkey

BORING METHOD
HSA = Hollow Stem Augers
CFA = Continuous Flight Augers
DC = Driving Casing
MD = Mud Drilling

SAMPLE TYPE
PC = Pavement Core
CA = Continuous Flight Auger
DS = Driven Split Spoon
PT = Pressed Shelby Tube
RC = Rock Core

SAMPLE CONDITIONS
D= Disintegrated
I = Intact
U= Undisturbed
L = Lost

GROUNDWATER DEPTH
First Noted: None
At Completion: Dry
After: --
Backfilled: Immediately

* SPT = Standard Penetration Test - Driving 2" O.D. Sampler 18" with 140-Pound Hammer Falling 30"; Count Made at 6" Intervals

GEOTECHNOLOGY INC
FROM THE GROUND UP

SOIL CLASSIFICATION SHEET

NON COHESIVE SOILS
(Silt, Sand, Gravel and Combinations)

Density

Very Loose	- 5 blows/ft. or less
Loose	- 6 to 10 blows/ft.
Medium Dense	- 11 to 30 blows/ft.
Dense	- 31 to 50 blows/ft.
Very Dense	- 51 blows/ft. or more

Relative Properties

Descriptive Term	Percent
Trace	1 – 10
Little	11 – 20
Some	21 – 35
And	36 – 50

Particle Size Identification

Boulders	- 8 inch diameter or more	
Cobbles	- 3 to 8 inch diameter	
Gravel	- Coarse	- 3/4 to 3 inches
	- Fine	- 3/16 to 3/4 inches
Sand	- Coarse	- 2mm to 5mm (dia. of pencil lead)
	- Medium	- 0.45mm to 2mm (dia. of broom straw)
	- Fine	- 0.075mm to 0.45mm (dia. of human hair)
Silt		- 0.005mm to 0.075mm (Cannot see particles)

COHESIVE SOILS
(Clay, Silt and Combinations)

Consistency	Field Identification	Unconfined Compressive Strength (tons/sq. ft.)
Very Soft	Easily penetrated several inches by fist	Less than 0.25
Soft	Easily penetrated several inches by thumb	0.25 – 0.5
Medium Stiff	Can be penetrated several inches by thumb with moderate effort	0.5 – 1.0
Stiff	Readily indented by thumb but penetrated only with great effort	1.0 – 2.0
Very Stiff	Readily indented by thumbnail	2.0 – 4.0
Hard	Indented with difficulty by thumbnail	Over 4.0

Classification on logs are made by visual inspection.

Standard Penetration Test – Driving a 2.0" O.D., 1 3/8" I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6 inches of penetration on the drill log (Example – 6/8/9). The standard penetration test results can be obtained by adding the last two figures (i.e. 8+9=17 blows/ft.). Refusal is defined as greater than 50 blows for 6 inches or less penetration.

Strata Changes – In the column "Soil Descriptions" on the drill log, the horizontal lines represent strata changes. A solid line (————) represents an actually observed change; a dashed line (— — — —) represents an estimated change.

Groundwater observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

GEOTECHNOLOGY INC
FROM THE GROUND UP

ROCK CLASSIFICATION SHEET

ROCK WEATHERING

Descriptions	Field Identification
Unweathered	No visible sign of rock material weathering, perhaps slight discoloration on major discontinuity surfaces.
Weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker externally than it its fresh condition.
Highly Weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones.
Residual Soil	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact with bedding planes visible, and the soil has not been significantly transported.

ROCK STRENGTH

Descriptions	Field Identification	Uniaxial Compressive Strength (psi)
Extremely Weak	Indented by thumbnail	40-150
Very Weak	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife.	150-700
Weak	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer.	700-4,000
Medium Strong	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with a single blow of a geological hammer.	4,000-7,000
Strong	Specimen requires more than one blow of a geological hammer to fracture.	7,000-15,000
Very Strong	Specimen requires many blows with a geological hammer to fracture.	15,000-36,000
Extremely Strong	Specimen can only be chipped with geological hammer.	>36,000

BEDDING

Descriptive Term	Bed Thickness
Massive	> 4 ft.
Thick	2 to 4 ft.
Medium	2 in. to 2 ft.
Thin	< 2 in.

APPENDIX D – LABORATORY TEST DATA

Tabulation of Laboratory Tests

GEOTECHNOLOGY INC
FROM THE GROUND UP

OWENTON WWTP LAGOON IMPROVEMENTS
OWENTON, KENTUCKY
PROJECT NO. J031017.01

TABULATION OF LABORATORY TESTS

Boring No.	Sample No.	Depth (ft.)		Moisture Content (%)	Atterberg Limits (%)			USCS Classification
		From	To		LL	PL	PI	
B-1	2	2.5	4.0	25.5	79	34	45	CH
B-3	1	0.0	1.5	28.0				
B-3	2	2.5	4.0	22.2	58	24	34	CH
B-3	3	5.0	6.5	21.2				
B-5	1	0.0	1.5	21.5				
B-5	2	2.5	4.0	27.0				
B-5	3	5.0	6.5	24.2				
B-5	4	7.5	9.0	28.0				
B-6	1	0.0	1.5	20.8				
B-6	2	2.5	4.0	25.5				
B-6	3	5.0	6.5	25.9				
B-6	4	7.5	9.0	24.5				

H&A RESOURCE MANAGEMENT
103 Fieldview Dr.
Versailles, KY 40383
Phone 859-873-3331
Fax 859-873-4611

May 14, 2018

Mr. Cole Mitcham, PE
Kentucky American Water
2300 Richmond Road
Lexington, KY 40502

Re: Revised Lagoon Clean-out/Dewatering Proposal

Dear Mr. Mitcham:

Enclosed please find our revised proposal. The revision is to the pricing section only for an adjustment to account for the new landfill disposal site. Should you have any questions, please do not hesitate to contact me.

Sincerely,

G. Todd Stephens
President

enclosure

PROPOSAL FOR LAGOON CLEANOUT, DEWATERING, AND TRANSPORTATION

Kentucky-American Water Company
Owenton Wastewater Treatment Plant
Owenton, Kentucky

INTRODUCTION

H&A Resource Management (H&A) is proud to present a proposal to Kentucky-American Water Company (KAWC) for the dredging/removal, dewatering and disposal of solids from the KAWC wastewater treatment plant lagoon in Owenton, Kentucky. The lagoon has been evaluated to have some potential structural issues and needs the liner replaced. Solids remaining in the lagoon must be removed to allow for extraction of the liner and the necessary repairs to be made. The lagoon will be bypassed during the project. The bypassing operation will be performed by KAWC.

H&A proposes to remove the accumulated solids from the lagoon with a dredge as well as pumping methods, dewater them with a mobile belt press and transport the material to the landfill.

SCOPE OF WORK

H&A proposes to initially use a dredge to remove solids from the lagoon. Dredging has been selected as the most feasible method of removal since it will allow for the lagoon to remain in service as long as possible. Once the dredge has removed all the solids possible, the lagoon will have to be taken out of service so the remaining material can be pumped out and prepared for removal of the liner.

The dredge that is proposed is an unmanned unit and is smaller than a typical manned machine. This unit is capable of dredging to a depth of 12 feet. Therefore, the water level in the lagoon will have to be lowered periodically during the project to allow for access to the solids. Dredging has the capability to remove solids down to approximately 6-12 inches. Once it is determined that the dredge has removed all the solids possible, the lagoon would then have to be bypassed and the level pumped down. H&A will then place a submersible pump into the lagoon to remove as much

of the remaining solids as possible. Due to the anticipated flat (non-designed slope) bottom of the lagoon, typical unevenness of the bottom and lapping of the liner, there will be solids remaining. The removal of these remaining solids is not in the scope of this proposal.

The dredge will be delivered on a gooseneck trailer and will be offloaded with a truck crane into the lagoon. The dredge operates on a cabling system, which is set up on four corners of the lagoon. This allows for the dredge to be moved as it makes passes across the lagoon and also allows for the forward and reverse traversing necessary to auger/pump the solids. The electrical source for the dredge can either be a 480 Volt III Phase 60 amp electrical disconnect located close to the pond (within 50 feet of the waters edge) or a generator. Set up of the dredge will normally take one full day.

Material from the dredge is first pumped through floating pipe that follows the dredge across the lagoon. Once material reaches the bank, the piping will run to a temporary storage tank (sealed rolloff container, tanker trailer, or frac tank) for storage of the solids prior to belt pressing. This arrangement is necessary to regulate the flow and consistency of material that feeds the belt filter press.

After dredging is completed, KAWC will have to lower the remaining volume of water from the lagoon and begin the bypassing operation. Removal of the remaining solids from the lagoon will require H&A personnel to place a submersible hydraulic pump in the lagoon. Solids that will not flow to the pump will be flushed with water from a hose by H&A. H&A personnel may have to enter the lagoon to facilitate this process. All personnel will be equipped with a harness and rope for safety purposes. Because of the potential instability of the lagoon floor, personnel will avoid any areas that are believed suspect. Washing of material in these areas will be performed from the top of the lagoon as best as possible. A significant amount of the remaining solids are believed to be able to be removed with this method. The solids that will remain will be the responsibility of others.

The aerators, cables or any other obstructions in the lagoon will have to be removed or relocated in order to facilitate removal of the solids. KAWC or their contractor will be responsible for moving these items.

H&A proposes to set up a mobile belt filter press trailer and sealed roll-off container beside the lower end of the lagoon at the first turn in the road towards the wastewater plant. Currently, the area is not large enough to set up this equipment. KAWC will be responsible for preparing the area for placement of the belt press and roll-off container. Water for the dewatering operations, and flushing solids from the lagoon, will be supplied by KAWC. It is our understanding that a water line, that does not currently exist, will be installed for this purpose. Electric to operate the belt press and dredge also does not currently exist at the lagoon. Installation of a temporary service would be worthy of investigation by KAWC as a cost saving measure. Otherwise, H&A will provide a generator for the power source.

Trucks will be loaded directly from the conveyor on the belt press. Loaded trucks are proposed to be taken directly to the Rumpke Landfill in Butler, KY. Trucks will be continuously loaded throughout the day. After the last load of the day has been taken to the landfill, another truck (night load) will be filled to be taken to the landfill the next morning while another truck is being filled.

PERMITTING

To dispose of the material at a landfill, a waste profile will have to be submitted to the selected facility for approval. H&A can assist KAWC in obtaining this approval. A representative sample of the solids will be collected and analyzed as instructed by the landfill. The results of this sample, as well as a waste profile form, will be submitted to the landfill to obtain approval for disposal. No other permitting is believed necessary for this project or will be the responsibility of H&A under the terms of this agreement.

H&A will likely acquire approvals from two landfills. Due to the daily restrictions many landfills have placed on volume, a second landfill will most likely be necessary to manage the volume generated.

TIMING

H&A would anticipate the project to take from 8 to 10 weeks to complete, depending on volume, as outlined in this proposal. The dredging operation will allow the lagoon to remain in service for the first several weeks. Should KAWC desire a shorter completion period, additional equipment

will be necessary and an adjustment to the scope and pricing of this proposal will be required. Commencement of the project will be as negotiated between H&A and KAWC. Regardless, every effort will be made to meet the needs of KAWC.

KAWC'S RESPONSIBILITIES

Under this contract, KAWC will be responsible the following items:

- Provide accessibility to the facility at all times during the project. H&A anticipates operating a minimum of 10 hours per day.
- Provide for the cost of any sampling and analysis that may be required by the landfill or regulatory agency.
- Provide H&A with a 480 volt 3-phase 60-80 amp electrical disconnect for the belt press and the dredge. H&A can provide a generator if necessary at an additional cost
- Provide access to a clean water source capable of providing a minimum of 80 gpm at 30 psi at no charge to H&A to operate the belt press. An additional volume of water will be necessary for flushing solids to the pump. Typically a two in water supply line will supply the volume necessary.
- Provide accessibility of the press to allow for the loading of trucks at all times.
- Allow for filtrate that is produced from the dewatering operation to be discharged to sewer system. The discharge point should be able to handle a minimum of 200 gpm. Maximum filtrate discharge is not anticipated to exceed 350 gpm.
- Remove or reposition the aerators or other obstruction in the lagoon to allow for dredging.
- Provide the necessary arrangements to bypass the lagoon during the cleaning project.

VOLUMES

Based on information provided by GRW Engineers, it was estimated that approximately 15,747 cubic yards of solids are in the lagoon. This would equate to approximately 3.1 million gallons in place. KAWC has estimated there to be approximately 2,500 wet tons of dewatered material

generated from the cleanout. We understand these are estimates only. Tonnage removed will be determined via weigh tickets from the landfill.

TERM

The prices quoted are for a one-time dewatering/cleanout event to take place in the spring or summer of 2018.

SUBCONTRACTORS

H&A may utilize subcontractors for any part of the project as described. Regardless, H&A will have personnel onsite during the project and will be responsible for all aspects of the operation.

INSURANCE

H&A will maintain insurance on all equipment and personnel associated with the project. Any subcontractors will be required to carry liability insurance on all equipment and personnel while on the job site. H&A maintains insurance coverage as follows:

Auto/Equipment	$1,000,000
General, Pollution, & Professional Liability	$2,000,000
Workers Compensation	Statutory Limit

PRICE

The following prices are quoted for this project:

Mobilization/Set Up (Dredge, Trucks & Belt Press)	**$5,750.00 lump sum**
Dredging/Dewatering/Transportation	**$113.00 per wet ton**

Other Costs if necessary

Generator	**$650.00 per week + fuel**
Downtime (after 2 hours)	**up to $250.00/hr**
Temporarily pull off project and leave equipment	**up to $1,000/day**

Prices quoted are based on the following conditions as well as those outlined it the KAWC's Responsibilities section of this proposal:

1. Prices quoted are good for a period of thirty (30) days from the date on this document.
2. Invoicing will be based on the weigh tickets from the landfill.

The downtime and pull off project charges listed above are for incidents that are not the fault of H&A. This does not include shut downs due to inclement weather or other "Acts of God". The actual amount charged will depend on the exact circumstances of the shut down.

H&A will submit an invoice to KAWC at the end of each month, or the end of the dewatering event, whichever is first. Payment in full shall be received no later than thirty (30) days after receipt of the invoice. If not paid in full by the due date, H&A may charge up to the legal amount allowed for finance charges.

REFERENCES/EXPERIENCE

H&A would be pleased to provide the KAWC with a list of references and experience upon request.

SIGNATURES

H&A Resource Management	Kentucky American Water Company
[signature]	[signature]
Signature of Authorized Representative	Signature of Authorized Representative
G. TODD STEPHENS, PRESIDENT	BRENT O'NEILL, DIRECTOR OF ENGINEERING
Print Name and Title	Print Name and Title
5/14/2018	5/14/18
Date	Date

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 05/15/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	Slade & Collins Insurance Agency 3320 Clays Mill Road Suite 109 Lexington, KY 40503
CONTACT NAME:	Tina Woofter
PHONE (A/C, No, Ext):	859-219-1121
FAX (A/C, No):	
E-MAIL ADDRESS:	Tina@sladeandCollins.com
INSURED	H&A Residuals & Biosolids Management, LLC DBA H&A Resource Management 103 Fieldview Drive Versailles, KY 40383

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A: KY Asociated General Contractors	56789
INSURER B: Auto Owners Insurance	
INSURER C:	
INSURER D:	
INSURER E:	
INSURER F:	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$
	CLAIMS-MADE / OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$
	POLICY / PRO-JECT / LOC						PRODUCTS - COMP/OP AGG	$
	OTHER:							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
	UMBRELLA LIAB / OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB / CLAIMS-MADE						AGGREGATE	$
	DED / RETENTION $							$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N: Y If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		22236	01/01/2018	01/01/2019	✓ PER STATUTE / OTH-ER	
							E.L. EACH ACCIDENT	$ 4,000,000
							E.L. DISEASE - EA EMPLOYEE	$ 4,000,000
							E.L. DISEASE - POLICY LIMIT	$ 4,000,000
B	Leased / Rented Equipment			52834934	08/14/2017	8/14/2018		$150,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

Evidence of Coverage

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 5/15/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Al Torstrick Insurance Agency Inc 343 Waller Avenue Lexington KY 40504	CONTACT NAME: Stephanie Casey PHONE (A/C, No, Ext): (859) 233-1461 FAX (A/C, No): (859) 281-9450 E-MAIL ADDRESS: scasey@altorstrick.com
INSURED H & A Resource Management, LLC 103 Fieldview Drive Versailles KY 40383	INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A: Rockhill Insurance Company INSURER B: State Auto Property & Casualty — 25127 INSURER C: INSURER D: INSURER E: INSURER F:

COVERAGES **CERTIFICATE NUMBER:2017-2018** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR X Pollution Included X Professional Included GEN'L AGGREGATE LIMIT APPLIES PER: X POLICY PRO-JECT LOC OTHER:			ENVP004320-05	8/14/2017	8/14/2018	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG Pollution Liability	$ 2,000,000 $ 50,000 $ 5,000 $ 2,000,000 $ 2,000,000 $ 2,000,000 $ 2,000,000
B	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS X HIRED AUTOS X NON-OWNED AUTOS			BAP2359126	8/14/2017	8/14/2018	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) UnderInsured motorist	$ 1,000,000 $ $ $ $ 1,000,000
A	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED X RETENTION $ 10,000			ENVE0143242-02	08/14/2017	08/14/2018	EACH OCCURRENCE AGGREGATE	$ 4,000,000 $ 4,000,000 $
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N N/A If yes, describe under DESCRIPTION OF OPERATIONS below						PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ $ $

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

Insured's Copy

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Stephanie Casey/SMC Stephanie Casey

KENTUCKY
AMERICAN WATER

2300 Richmond Road
Lexington, KY 40502
Cole.Mitcham@Amwater.com

P 859.335-3415
F 859.268.6738

May 4, 2018

Matt Williams
WesTech Engineering, Inc.
3665 S. West Temple
Salt Lake City, UT 84115

RE: Owenton, KY WWTP

Dear Mr. Williams,

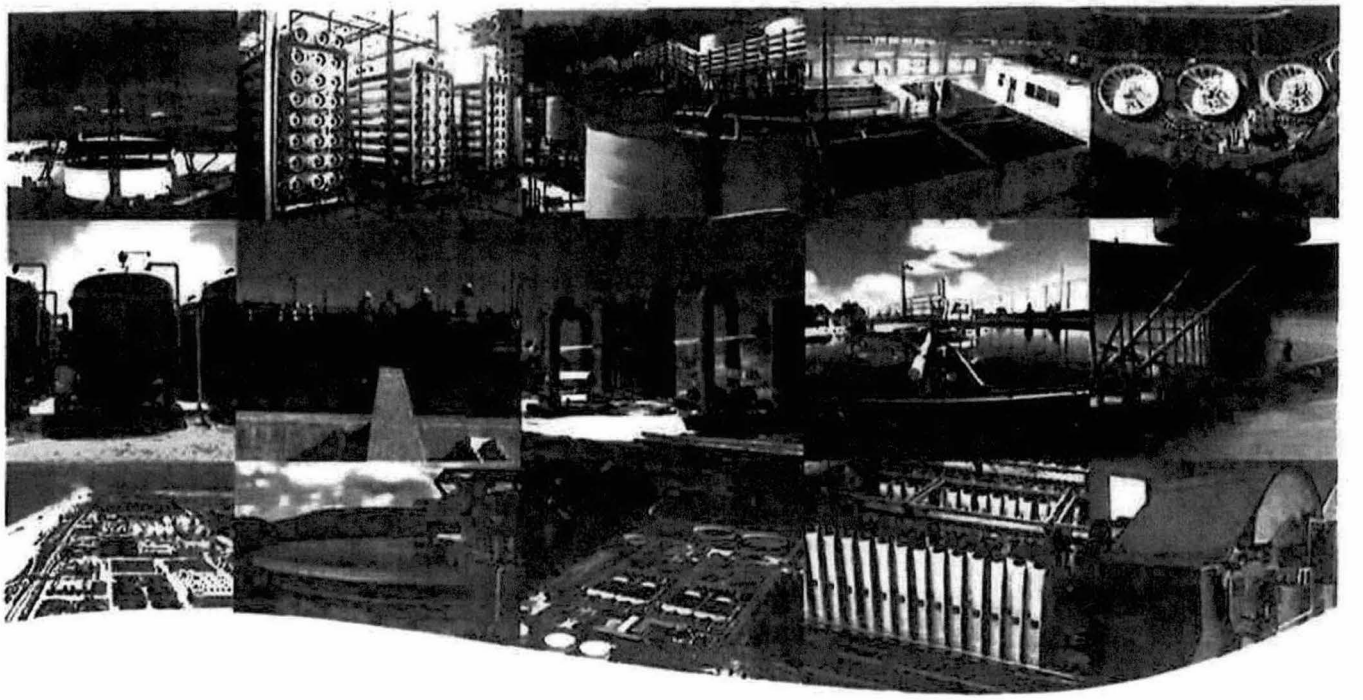
Attached is the executed proposal. We estimate that we will need the mobile equipment for approximately four (4) months starting on the estimated delivery date of July 30, 2018. Below is the estimated total cost based on your proposal broken-down by your pricing schedule:

- Mobile Equipment (6 x Activated Sludge Tanks) @ $1,150/day - **$138,000.00**
- Optional Item A – Field Services (Field Service Technician for start-up and training) @ $1,200/day for 5 days - **$6,000.00**
- Freight to and from the site (Mobile Equipment) - **$48,000.00**
- Contingency - **$8,000.00**
- **Total - $200,000.00**

Sincerely,

Cole Mitcham, PE
Senior Project Engineer

Cc: Katie Avera, Eco-Tech, Inc.



Owenton WWTP

Kentucky

Engineer
GRW

Furnished by
Steve Goldsmith
sgoldsmith@westech-inc.com

Represented by
Katie Avera
Eco-Tech, Inc.
London, Kentucky
(606) 682-0887
kavera@eco-tech.net

Regional Sales Manager
Matt Williams
mwilliams@westech-inc.com

WesTech Opportunity Number: 1860218
Thursday, May 03, 2018

Table of Contents

Technical Proposal

Design Criteria	
Parameter	**Value**
Hydraulic Design Flow	1,500,000 GPD
Loading Rate Designed for Average Flow of	**300,000 GPD**
Inlet TSS	200 mg/L
Inlet cBOD	200 mg/L
Max Outlet TSS (After Clarifier)	30 mg/L
Effluent DO	7 mg/L **with Adder – 1**
Effluent cBOD	20 mg/L
Effluent NH_3 as N	4 mg/L
Effluent Phosphorus	No Required

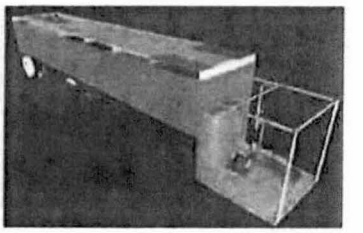
WesTech is excited to introduce our new mobile fleet of equipment for various industrial and municipal applications. The proposed plants will be much more **streamlined and mobile**, require much **less installation construction** than a permanent plant, all while treating the flow specified in this proposal at the Owenton WWTP. Available equipment includes:

Equipment Supply

Mobile Activated Sludge System

The (6) six Mobile Activated Sludge Systems are equipped with a blower and pipe fittings for easy installation.

- The tanks will provide ample time to reduce BOD.
- Current system will only remove ammonia and does not lower total nitrogen
- **Pumps are required if the topography doesn't allow for gravity feeding to pump flow from aeration basin to aeration basin. A price can be provided upon request.**
- System will be set up to run in series.



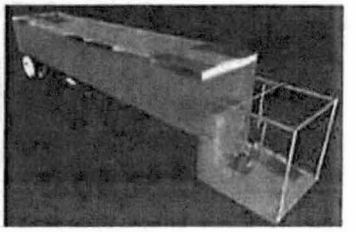
Secondary Clarification

WesTech Assumes secondary clarification will be provided by the site's existing 2 x 29' diameter clarifiers.

Our calculations show that at MAX flow the clarifiers are sized aggressively (we would recommend a slightly larger system of around 2 x 33' diameter clarifiers). It is suggested that Adder 3 be utilized, which will add a polymer feed system. At average flow polymer addition shouldn't be needed with a properly operated system.

Adder 1 Mobile Aeration Tank

The Mobile Aeration Tank are equipped with blowers and pipe fittings for easy installation.



- The tank will include a blower system to add 7 mg/L of oxygen into the water.
- Treated water is collected via weirs or orifices located along the long side of the tank. Discharge of the clarified water will be collected in a manifold and sent to the outfall system via gravity.

Adder 2 Polymer Pump Skid for Existing Secondary Clarifiers

As required, this system could dose polymer to the 2 existing secondary clarifiers. Piping is required to split flow from this pump.

Optional Item A – Field Services

Site Supervision (Additional)
Services of a WesTech Engineering, Inc. Field Service Representative are available for supervision of Owenton WWTP installation, startup, troubleshooting, equipment tuning, and post startup service as required. These services are provided on a per diem or contract basis.

RATES:	North America
Field Service Technician	$1,200.00 per day
Sr. or Process Engineer	$1,450.00 per day

All rates are quoted straight time and portal-to-portal.
Within the 50 United States and Territories, straight time rates are for eight-hour days. Straight time is defined as time worked on a regular schedule of eight (8) hours per day (minimum) between Monday through Friday on an agreed upon schedule between 7:00am and 9:00pm.

Report preparation time will be billed at $100.00 per hour when Process Startup or Equipment/Process Evaluation has been purchased. Trip preparation time including project familiarization, calculations, reports, etc., will also be billed at $100.00 per hour.

Overtime is defined as time worked in excess of eight (8) hours per day or worked outside the hours as specified above. Overtime will be charged at 1.5 times straight time rates.

Holiday work and travel during holidays will be charged at double the straight time rates. Holidays are defined as any day observed by WesTech Engineering, Inc. as a holiday, Saturday, and Sunday.

Travel time, other than Holiday travel, is charged at the daily straight time rate.

Expenses:
Living, airfare, and travel expenses will be charged at actual cost plus 10% for both domestic and international travel. Items over $25.00 will include attached receipts.

Hotel accommodations will be recommended by the customer and agreed upon by WesTech Engineering, Inc. Should the customer not designate accommodations, WesTech Engineering Inc. will provide mid-level accommodations depending on the area. Rental vehicles will be a minimum of "mid-size" status.

Authorization:
The authorization of WesTech Engineering, Inc. to provide service is limited to the amount of the purchase order as issued by the customer. The customer will be informed when allocated monies have expired and will be provided an estimate for remaining services, if any. Additional services can be performed with verbal authorization.

Invoicing/Payment:
Invoices will be rendered on a post job, bi-monthly, or otherwise agreed upon basis. Payment terms are net fifteen (15) days from the date of invoice.

Responsibility:
The Field Service Representative shall act in an advisory and consulting capacity to interpret drawings and/or other printed material and recommend sequence of work in construction, installation, startup, troubleshooting, and repair services.

Unless specified in writing to the contrary, the customer or his designate shall supply all labor, materials, tools, equipment, and facilities necessary for the execution of work.

The Field Service Representative may at *prior* request by the customer provide a daily log of activities.

General:
The customer shall be solely responsible for complying with all applicable local, state, and federal codes and standards.

Any charges incurred by WesTech as a result of a customer's request to cancel or change a service trip will be added to the invoice.

For air travel, two weeks advance notice is required.

Rates are subject to change at any time.

WesTech supervisors will require site specific training from Owenton WWTP, according to the project schedule.

Optional Item B – Field Operations and Maintenance

Certified WesTech Field Operators
Field Operations and Maintenance of all WesTech supplied equipment is available for an additional cost.

Operations can be purchased at Monthly rates and will cover all tasks listed in Typical Maintenance Required shown above in this proposal, including operations and any parts supplied by WesTech on a **24/7 operational basis. Minimum 5-day purchase.**

Operations pricing is shown for Monthly lump sum, 12 hour shifts **with operators alternating schedules to stay within a 40-hour work week.**

Rate includes any consumables, such as testing apparatus, gloves, glasses, and other cleaning equipment. Also includes any rentals of lifts, scaffolding or pump trucks for normal operations. Upset conditions outside of design parameters may require additional personnel and equipment, billed to Owenton WWTP separately from this service agreement unless supplied by Owenton WWTP and its contractors (labor, equipment, etc.).

Operators are safety trained for municipal plant work, with all current Substance, OSHA and industry standard safety programs. Site Specific training will be completed prior to any work on the site.

Invoicing/Payment:
Invoices will be rendered on a post job, bi-monthly, or otherwise agreed upon basis. Payment terms are net fifteen (15) days from the date of invoice.

Expenses:
Living, airfare, and travel expenses will be charged at actual cost plus 10% for both domestic and international travel. Items over $25.00 will include attached receipts.

Hotel accommodations will be recommended by the customer and agreed upon by WesTech Engineering, Inc. Should the customer not designate accommodations, WesTech Engineering Inc. will provide mid-level accommodations depending on the area. Rental vehicles will be a minimum of "mid-size" status.

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Any charges incurred by WesTech as a result of a customer's request to cancel or change a service trip will be added to the invoice.

For air travel, two weeks advance notice is required.

Rates are subject to change at any time.
WesTech supervisors will require site specific training from Owenton WWTP, according to the project schedule.

Lease Terms and Pricing

2 Month Lease Terms

- Minimum lease terms of **2 months**. Lease term begins when major equipment arrives on site.
- Field Services in Item A will be billed when contracted services are complete, prior to the 20th day of the month in which the service is completed.
- Operations (if purchased) will be billed at beginning of the month of operation
- Rental price does not include heated tenting or freeze protection. WesTech recommends the project be scheduled for months with temperatures above freezing

2 Month Rental Fees & Pricing

Equipment	Equipment Quantity	Daily Rental Fee	Lump Sum Price
Mobile Equipment	6 x Activated Sludge Tanks	$1,150	-
Adder 1 - Mobile Aeration Tank	1	$150	
Adder 2 – Polymer Pump Skid	1	$250	
Optional Item A – Field Services	-	-	Varies*
Optional Item B – Operations (24/7)	-	$2,000 + expenses	Varies†

*See Optional Item A for Field Services (additional) cost estimations
†See Optional Item B for Operations (additional) cost estimations

- All taxes are not included
- Interconnecting Piping, mobilization, and demobilization not included
- Freight not included. Estimated freight shown below: (Will be billed at cost)
  - Freight to site for the Mobile Equipment - $24,000 (+4,000 for Adder 1)
  - Freight from site for the Mobile Equipment - $24,000 (+4,000 for Adder 1)

Not Currently in WesTech's Scope of Work

- Installation and all interconnecting piping and wiring
- Removal of all interconnecting piping and wiring
- Onsite operations (can be provided, see Optional Item B)
- Site civil design and construction
- Backwash, potable water, and sludge sump with transfer pumps (if required) by site elevation
- Permanent power to plant
- Permitting
- Disposal of hazardous materials
- Relocation of equipment, underground/overhead obstructions
- Removal and replacement of unsuitable soils
- Off-site disposal of excavated and demolished materials
- Ownership of non-WesTech supplied equipment LOTO (Lock Out Tag Out of Owenton WWTP equipment is the responsibility of Owenton WWTP and its contractors)
- Temporary stormwater pollution prevention provisions including erosion control
- Permanent stormwater features (stormwater collection boxes, piping, culverts, detention basins)
- Fencing and Security services
- Groundwater pumping and handling
- Concrete equipment pads, footings, foundations, etc.
- Asphalt roadways
- 480V service extension from transformer
- Site lighting
- Jersey barriers
- Full site containment
- On-site safety personnel
- Construction trailer
- Temporary facilities (power, potable water, port-a-johns)
- Field measurements and construction staking
- Offloading and setting equipment
- Shimming and leveling equipment
- Generator feeder connection
- Water for Hydro testing of piping prior to use
- Performance testing and plant certification
- Site Specific O&M manuals
- Heat trace & insulation
- Chemical and generator secondary containment

Commercial Firm Pricing

Proposal Name: Owenton WWTP
Proposal Number: 1860218
Thursday, May 03, 2018

1. Bidder's Contact Information

Company Name	WesTech Engineering, Inc.
Contact Name	Matt Williams
Phone	801.265.1000
Email	mwilliams@westech-inc.com
Address: Number/Street	3665 S West Temple
Address: City, State, Zip	Salt Lake City, UT 84115

2. Schedule

See Attached Schedule

Terms & Conditions

Terms and Conditions appearing in any order based on this proposal which are inconsistent herewith shall not be binding on WesTech Engineering Inc. The sale and purchase of equipment described herein shall be governed exclusively by the foregoing proposal and the following provisions:

1. SPECIFICATIONS: WesTech Engineering Inc. is furnishing its standard equipment as outlined in the proposal and as will be covered by final approved drawings. The equipment may not be in strict compliance with the Engineer's/Owner's plans, specifications, or addenda as there may be deviations. The equipment will, however, meet the general intention of the mechanical specifications of these documents.

2. ITEMS INCLUDED: This proposal includes only the equipment specified herein and does not include erection, installation, accessories, nor associated materials such as controls, piping, etc., unless specifically listed.

3. PARTIES TO CONTRACT: WesTech Engineering Inc. is not a party to or bound by the terms of any contract between WesTech Engineering Inc.'s customer and any other party. WesTech Engineering Inc.'s undertakings are limited to those defined in the contract between WesTech Engineering Inc. and its direct customers.

4. PRICE AND DELIVERY: All selling prices quoted are subject to change without notice after 30 days from the date of this proposal unless specified otherwise. Unless otherwise stated, all prices are F.O.B. WesTech Engineering Inc. or its supplier's shipping points. All claims for damage, delay or shortage arising from such equipment shall be made by Purchaser directly against the carrier. When shipments are quoted F.O.B. job site or other designation, Purchaser shall inspect the equipment shipped, notifying WesTech Engineering Inc. of any damage or shortage within forty-eight hours of receipt, and failure to so notify WesTech Engineering Inc. shall constitute acceptance by Purchaser, relieving WesTech Engineering Inc. of any liability for shipping damages or shortages.

5. PAYMENTS: All invoices are net 30 days. Delinquencies are subject to a 1.5 percent service charge per month or the maximum permitted by law, whichever is less on all past due accounts. Pro rata payments are due as shipments are made. If shipments are delayed by the Purchaser, invoices shall be sent on the date when WesTech Engineering Inc. is prepared to make shipment and payment shall become due under standard invoicing terms. If the work to be performed hereunder is delayed by the Purchaser, payments shall be based on the purchase price and percentage of completion. Products held for the Purchaser shall be at the risk and expense of the Purchaser. Unless specifically stated otherwise, prices quoted are for equipment only. These terms are independent of and not contingent upon the time and manner in which the Purchaser receives payment from the owner.

6. PAYMENT TERMS: Credit is subject to acceptance by WesTech Engineering Inc.'s Credit Department. If the financial condition of the Purchaser at any time is such as to give WesTech Engineering Inc., in its judgment, doubt concerning the Purchaser's ability to pay, WesTech Engineering Inc. may require full or partial payment in advance or may suspend any further deliveries or continuance of the work to be performed by the WesTech Engineering Inc. until such payment has been received.

7. ESCALATION: If shipment is, for any reason, deferred by the Purchaser beyond the normal shipment date, or if material price increases are greater than 5% from proposal date to material procurement date, stated prices set forth herein are subject to escalation. The escalation shall be based upon increases in labor and material and other costs to WesTech Engineering Inc. that occur in the time period between quotation and shipment by WesTech Engineering Inc. Purchaser agrees to this potential escalation regardless of contradicting terms in the contract, except when an agreed upon escalation adder is included in the price.

(a) The total quoted revised price is based upon changes in the indices published by the United States Department of Labor, Bureau of Labor Statistics. Labor will be related to the Average Hourly Earnings Indices found in the Employment and Earnings publication. Material will be related to the Metal and Metal Products Indices published in Wholesale Prices and Prices Indices.

(b) Price revision for items furnished to, and not manufactured by WesTech Engineering Inc., which exceed the above escalation calculation, will be passed along by WesTech Engineering Inc. to Purchaser based upon the actual increase in price to WesTech Engineering Inc. for the period from the date of quotation to the date of shipment by WesTech Engineering Inc. Any item that is so revised will be excluded from the index escalation calculations set forth in subparagraph (a) above.

8. APPROVAL: If approval of equipment submittals by Purchaser or others is required, a condition precedent to WesTech Engineering Inc. supplying any equipment shall be such complete approval.

9. INSTALLATION SUPERVISION: Prices quoted for equipment do not include installation supervision. WesTech Engineering Inc. recommends and will, upon request, make available, at WesTech Engineering Inc.'s then current rate, an experienced installation supervisor to act as the Purchaser's employee and agent to supervise installation of the equipment. Purchaser shall at its sole expense furnish all necessary labor equipment, and materials needed for installation.

Responsibility for proper operation of equipment, if not installed by WesTech Engineering Inc. or installed in accordance with WesTech Engineering Inc.'s instructions, and inspected and accepted in writing by WesTech Engineering Inc., rests entirely with Purchaser; and any work performed by WesTech Engineering Inc. personnel in making adjustment or changes must be paid for at WesTech Engineering Inc.'s then current per diem rates plus living and traveling expenses.

WesTech Engineering Inc. will supply the safety devices described in this proposal or shown in WesTech Engineering Inc.'s drawings furnished as part of this order but excepting these, WesTech Engineering Inc. shall not be required to supply or install any safety devices whether required by law or otherwise. The Purchaser hereby agrees to indemnify and hold harmless WesTech Engineering Inc. from any claims or losses arising due to alleged or actual insufficiency or inadequacy of the safety devices offered or supplied hereunder, whether specified by WesTech Engineering Inc. or Purchaser, and from any damage resulting from the use of the equipment supplied hereunder.

10. ACCEPTANCE OF PRODUCTS: Products will be deemed accepted without any claim by Purchaser unless written notice of non-acceptance is received by WesTech Engineering Inc. within 30 days of delivery if shipped F.O.B. point of shipment, or 48 hours of delivery if shipped F.O.B. point of destination. Such written notice shall not be

considered received by WesTech Engineering Inc. unless it is accompanied by all freight bills for said shipment, with Purchaser's notations as to damages, shortages and conditions of equipment, containers, and seals. Non-accepted products are subject to the return policy stated below.

11. TAXES: Any federal, state, or local sales, use or other taxes applicable to this transaction, unless specifically included in the price, shall be for Purchaser's account.

12. TITLE: The equipment specified herein, and any replacements or substitutes therefore shall, regardless of the manner in which affixed to or used in connection with realty, remain the sole and personal property of WesTech Engineering Inc. until the full purchase price has been paid. Purchaser agrees to do all things necessary to protect and maintain WesTech Engineering Inc.'s title and interest in and to such equipment; and upon Purchaser's default, WesTech Engineering Inc. may retain as liquidated damages any and all partial payments made and shall be free to enter the premises where such equipment is located and remove the same as its property without prejudice to any further claims on account of damages or loss which WesTech Engineering Inc. may suffer from any cause.

13. INSURANCE: From date of shipment until the invoice is paid in full, Purchaser agrees to provide and maintain at its expense, but for WesTech Engineering Inc.'s benefit, adequate insurance including, but not limited to, builders risk insurance on the equipment against any loss of any nature whatsoever.

14. SHIPMENTS: Any shipment of delivery dates recited represent WesTech Engineering Inc.'s best estimate but no liability, direct or indirect, is assumed by WesTech Engineering Inc. for failure to ship or deliver on such dates.

WesTech Engineering Inc. shall have the right to make partial shipments; and invoices covering the same shall be due and payable by Purchaser in accordance with the payment terms thereof. If Purchaser defaults in any payment when due hereunder, WesTech Engineering Inc. may, without incurring any liability therefore to Purchaser or Purchaser's customers, declare all payments immediately due and payable with maximum legal interest thereon from due date of said payment, and at its option, stop all further work and shipments until all past due payments have been made, and/or require that any further deliveries be paid for prior to shipment.

If Purchaser requests postponements of shipments, the purchase price shall be due and payable upon notice from WesTech Engineering Inc. that the equipment is ready for shipment; and thereafter any storage or other charge WesTech Engineering Inc. incurs on account of the equipment shall be for the Purchaser's account.

If delivery is specified at a point other than WesTech Engineering Inc. or its supplier's shipping points, and delivery is postponed or prevented by strike, accident, embargo, or other cause beyond WesTech Engineering Inc.'s reasonable control and occurring at a location other than WesTech Engineering Inc. or its supplier's shipping points, WesTech Engineering Inc. assumes no liability in delivery delay. If Purchaser refuses such delivery, WesTech Engineering Inc. may store the equipment at Purchaser's expense. For all purposes of this agreement such tender of delivery or storage shall constitute delivery.

15. WARRANTY: WESTECH ENGINEERING INC. WARRANTS EQUIPMENT IT SUPPLIES ONLY IN ACCORDANCE WITH THE WARRANTY EXPRESSED IN THE ATTACHED COPY OF "WESTECH WARRANTY" AGAINST DEFECTS IN WORKMANSHIP AND MATERIALS WHICH IS MADE A PART HEREOF. SUCH WARRANTY IN LIEU OF ALL OTHER WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, WHETHER WRITTEN, ORAL, EXPRESSED, IMPLIED OR STATUTORY, WESTECH ENGINEERING INC. SHALL NOT BE LIABLE ANY CONTINGENT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES FOR ANY REASON WHATSOEVER.

16. PATENTS: WesTech Engineering Inc. agrees that it will, at its own expense, defend all suits or proceedings instituted against Purchaser and pay any award of damages assessed against it in such suits or proceedings, so far as the same are based on any claim that the said equipment or any part thereof constitutes an infringement of any apparatus patent of the United States issued at the date of this Agreement, provided WesTech Engineering Inc. is given prompt notice in writing of the institution or threatened institution of any suit or proceeding and is given full control of the defense, settlement, or compromise of any such action; and Purchaser agrees to give WesTech Engineering Inc. needed information, assistance, and authority to enable WesTech Engineering Inc. so to do. In the event said equipment is held or conceded to infringe such a patent, WesTech Engineering Inc. shall have the right at its sole option and expense to a) modify the equipment to be non-infringing, b) obtain for Purchaser the license to continue using said equipment, or c) accept return of the equipment and refund to the Purchaser the purchase price thereof less a reasonable charge for the use thereof. WesTech Engineering Inc. will reimburse Purchaser for actual out-of-pocket expenses, exclusive of legal fees, incurred in preparing such information and rendering such assistance at WesTech Engineering Inc.'s request. The foregoing states the entire liability of WesTech Engineering Inc., with respect to patent infringement; and except as otherwise agreed to in writing, WesTech Engineering Inc. assumes no responsibility for process patent infringement.

17. SURFACE PREPARATION AND PAINTING: If furnished, shop primer paint is intended to serve only as minimal protective finish. WesTech Engineering Inc. will not be responsible for the condition of primed or finish painted surfaces after equipment leaves its shops. Purchasers are invited to inspect paint in shops for proper preparation and application prior to shipment. WesTech Engineering Inc. assumes no responsibility for field surface preparation or touch-up of shipping damage to paint. Painting of fasteners and other touch-up to painted surfaces will be by Purchaser's painting contractor after mechanism installation.

Motors, gear motors, and other components not manufactured by WesTech Engineering Inc. will be painted with that manufacturer's standard paint system. It is WesTech Engineering Inc.'s intention to ship major steel components as soon as fabricated, often before drive, motors, and other manufactured components. Unless Purchaser can ensure that shop primed steel shall be field painted within thirty (30) days after arrival at the job site, WesTech Engineering Inc. encourages the Purchaser to order these components without primer.

WesTech Engineering Inc.'s prices are based on paints and surface preparations as outlined in the main body of this proposal. In the event that an alternate paint system is selected, WesTech Engineering Inc. requests that Purchaser's order advise of the paint selection. WesTech Engineering Inc. will then either adjust the price as may be necessary to comply or ship the material unpainted if compliance is not possible due to application problems or environmental controls.

18. CANCELLATION, SUSPENSION, OR DELAY: After acceptance by WesTech Engineering Inc., this proposal, or Purchaser's order based on this proposal, shall be a firm agreement and is not subject to cancellation, suspension, or delay except upon payment by Purchaser of appropriate charges which shall include all costs incurred by WesTech Engineering Inc. to date of cancellation, suspension, or delay plus a reasonable profit. Additionally, all charges related to storage and/or resumption of work, at WesTech Engineering Inc.'s plant or elsewhere, shall be for Purchaser's sole account; and all risks incidental to storage shall be assumed by Purchaser.

19. RETURN OF PRODUCTS: No products may be returned to WesTech Engineering Inc. without WesTech Engineering Inc.'s prior written permission. Said permission may be withheld by WesTech Engineering Inc. at its sole discretion.

20. BACKCHARGES: WesTech Engineering Inc. will not approve or accept backcharges for labor, materials, or other costs incurred by Purchaser or others in modification, adjustment, service, or repair of WesTech Engineering Inc.-furnished materials unless such back charge has been authorized in advance in writing by a WesTech Engineering Inc. employee, by a WesTech Engineering Inc. purchase order, or work requisition signed by WesTech Engineering Inc.

21. INDEMNIFICATION: Purchaser agrees to indemnify WesTech Engineering Inc. from all costs incurred, including but not limited to court costs and reasonable attorney fees, from enforcing any provisions of this contract, including but not limited to breach of contract or costs incurred in collecting monies owed on this contract.

22. ENTIRE AGREEMENT: This proposal expresses the entire agreement between the parties hereto superseding any prior understandings, and is not subject to modification except by a writing signed by an authorized officer of each party.

23. MOTORS AND MOTOR DRIVES: In order to avoid shipment delays of WesTech Engineering Inc. equipment, the motor drives may be sent directly to the job site for installation by the equipment installer. Minor fit-up may be required.

24. EXTENDED STORAGE: Extended storage instructions will be part of information provided to shipment. If equipment installation and start-up is delayed more than 30 days, the provisions of the storage instructions must be followed to keep WARRANTY in force.

25. LIABILITY: Professional liability insurance, including but not limited to, errors and omissions insurance, is not included. In any event, liability for errors and omissions shall be limited to the lesser of $100,000USD or the value of the particular piece of equipment (not the value of the entire order) supplied by WesTech Engineering Inc. against which a claim is sought.

26. ARBITRATION NEGOTIATION: Any controversy or claim arising out of or relating to the performance of any contract resulting from this proposal or contract issued, or the breach thereof, shall be settled by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) may be entered to any court having jurisdiction.

ACCEPTED BY PURCHASER

Customer Name: KENTUCKY-AMERICAN WATER Co.

Customer Address: 2300 RICHMOND RD.
LEXINGTON, KY 40502

Contact Name: COLE MITCHAM

Contact Phone: 859-335-3415

Contact Email: COLE.MITCHAM.AMWATER.COM

Signature: Cole Mitch

Printed Name: COLE MITCHAM

Title: SENIOR PROJECT ENGINEER

Date: 5/4/18

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 3/13/2017

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER The Buckner Company 6550 South Millrock Dr. Suite #300 Salt Lake City UT 84121-	CONTACT NAME: Donna Kane PHONE (A/C, No, Ext): 801-937-6740 FAX (A/C, No): 801-385-0808 E-MAIL ADDRESS: dkane@buckner.com
INSURED WesTech Engineering, Inc. 3665 S West Temple Salt Lake City UT 84115-	WESTENG-03

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A: Zurich American Insurance Company	16535
INSURER B: Travelers Property Casualty Company	25674
INSURER C:	
INSURER D:	
INSURER E:	
INSURER F:	

COVERAGES CERTIFICATE NUMBER: 728549632 REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR	Y	Y	GLO9809319	3/1/2017	3/1/2018	EACH OCCURRENCE	$1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$100,000
							MED EXP (Any one person)	$5,000
							PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [ ] LOC						GENERAL AGGREGATE	$2,000,000
	OTHER:						PRODUCTS - COMP/OP AGG	$2,000,000
								$
A	AUTOMOBILE LIABILITY	Y	Y	BAP9809320	3/1/2017	3/1/2018	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	ALL OWNED AUTOS / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS / X NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	$
	X Comp $1000 / X Coll $1000							$
B	X UMBRELLA LIAB / X OCCUR	Y	Y	ZUP10T3186316NF	3/1/2017	3/1/2018	EACH OCCURRENCE	$10,000,000
	EXCESS LIAB / CLAIMS-MADE						AGGREGATE	$10,000,000
	DED [X] RETENTION $ 10,000							$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N		Y	WC9809318	3/1/2017	3/1/2018	X PER STATUTE / OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? [N] (Mandatory in NH)	N/A					E.L. EACH ACCIDENT	$1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$1,000,000
							E.L. DISEASE - POLICY LIMIT	$1,000,000
B	Property of Others Coverage Leased/Rented Equip coverage Installation Floater Coverage			QT6303E973782TIL	3/1/2017	3/1/2018	1,000,000 $500,000 1,000,000	$5,000 ded $1,000 ded $1,000 ded

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

WesTech Customer

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Randy L Emery

KAW COPY

PIPELINE BID DOCUMENTS AND SPECIFICATIONS

BASE BID UNIT COST BASIS

Prepared By:

AMERICAN WATER WORKS SERVICE COMPANY, INC.
SYSTEM ENGINEERING
1025 LAUREL OAK ROAD
VOORHEES, NEW JERSEY 08043

December, 1990

Revised By:

KENTUCKY AMERICAN WATER

August, 1991
August, 1994
October, 1994

Re: I12-330002-01 – Owenton WWTP Lagoon Improvements Project

P.O. 5000108464
Created 7-5-18

↑ Once contract has been executed, copy needs to be attached to PO in SAP.
DT

AGREEMENT

THIS AGREEMENT is dated as of the_____ day of_____ in the year 20_____ by and between KENTUCKY AMERICAN WATER (hereinafter called OWNER) and TODD JOHNSON CONTRACTING, INC. (hereinafter called CONTRACTOR).

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

Article 1. WORK

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

Article 2. ENGINEER

ENGINEER for the Project is KENTUCKY AMERICAN WATER and who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

Article 3. CONTRACT TIMES

3.1 The Work will be substantially completed within 45 calendar days from the date when the Contract times commences to run as provided in Paragraph 2.3 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 14.13 of the General Conditions within 60 calendar days from the date when the Contract Times commences to run.

3.2 Liquidated Damages: OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in Paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in providing in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time.

Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER _____dollars ($N/A) for each day that expires after the times specified in Paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the Contract Times or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER_____ dollars ($N/A) for each day that expires after the times specified in Paragraph 3.1 for completion and readiness for final payment.

Article 4. **CONTRACT PRICE**

4.1 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents in current funds as follows: (Bid Sheet is attached.)

Article 5. **PAYMENT PROCEDURES**

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER, as provided in the General Conditions.

5.1 Progress Payment. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER. At intervals of once a month, the CONTRACTOR shall submit an estimate of the value of the work completed to the first day of such month, and the value of materials and equipment suitably stored at the work site to be incorporated into the finished project. Upon approval by the ENGINEER, payment will be made for the net sum of eighty percent (80%) of such value less aggregate of previous payments. The net sum will be paid to the CONTRACTOR within thirty (30) days following receipt of the approved estimate.

When pipeline testing has been completed in accordance with the specifications to the satisfaction of the ENGINEER, payment of five percent (5%) of the value of completed work will be made to the CONTRACTOR. An additional payment of five percent (5%) of the value of completed work will be made to the CONTRACTOR upon completion of restoration work to the satisfaction of the ENGINEER. The net sums for testing and restorations will be paid to the CONTRACTOR within thirty (30) days following receipt of an approved estimate.

5.2 Final Payment. Upon final completion and acceptance of the Work in accordance with Paragraph 14.13 of the General Conditions, OWNER shall pay the remainder of the Contract Price and any retained funds, as recommended by ENGINEER as provided in said Paragraph 14.13.

Article 6. **CONTRACTOR'S REPRESENTATIONS**

In order to induce OWNER to enter into the Agreement, CONTRACTOR makes the following representations:

6.1 CONTRACTOR has familiarized itself with the nature and extent of the contract documents, contract times, work, site, locality, and all local conditions and laws and regulations that in any manner may affect cost, progress, performance or furnishing of the work.

6.2 CONTRACTOR has studied carefully all reports of explorations and tests of subsurface conditions and drawings of physical conditions which are identified in the Supplementary Conditions as provided in Paragraph 4.2 of the General Conditions, and accepts the limitations set forth in Article 4, Section 4.2 of the General Conditions.

6.3 CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies (in addition to or to supplement those referred to in Paragraph 6.2 above) which pertain to the subsurface or physical conditions at or contiguous to the site or otherwise which may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Paragraph 4.2 of the General Conditions; and

no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.

6.4 CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Paragraph 4.3 of the General Conditions.

6.5 CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

6.6 CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

Article 7. **CONTRACT DOCUMENTS**

The Contract Documents, which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work, consist of the following:

7.1 This Agreement (pages 1 to 5, inclusive)

7.2 Contractors Bid Sheet

7.3 Performance and other Bonds, identified as exhibits A, B and C and consisting of 7 pages (if applicable)

* 7.4 Notice of Award

* 7.5 General Conditions (Document Identification 12/90-PIPELINE, pages GC-0 to GC-29, inclusive)

* 7.6 Supplementary Conditions

* 7.7 Specifications Special Conditions

* 7.8 Specifications, Document Identification 12/90-Pipeline

7.9 Work Order Sketch

7.10 Addenda numbers ____ to ____, inclusive (if applicable)

7.11 The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: All Written Amendments and other documents amending, modifying, or supplementing the Contract Documents pursuant to paragraphs 3.5 and 3.6 of the General Conditions.

7.12 The documents listed in Paragraphs 7.2 et seq. above are attached to this Agreement (except as expressly noted otherwise above).

7.13 CONTRACTOR's Certificate of Insurance

7.14 Release of Liens

- As previously received by CONTRACTOR.

There are no Contract Documents other than those listed above in this Article 7. The Contract Documents may only be amended, modified or supplemented as provided in Paragraphs 3.4 and 3.5 of the General Conditions.

Article 8. MISCELLANEOUS

8.1 Terms used in this Agreement, which are defined in Article 1 of the General Conditions, will have the meaning indicated in the General Conditions.

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

8.3 OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

8.4 OWNER has amended its Standard Pipeline Documents to require a guaranty and warranty, and a correction of defective work, of two years instead of one year. Notwithstanding any provision in any other document, CONTRACTOR agrees that it will provide such guaranty and warranty and will correct defective work for a two-year period after substantial completion of any work performed under this Agreement.

Article 9. OTHER PROVISIONS

9.1 Government Regulations

The following clauses, where applicable, are incorporated in this Agreement by reference as is fully set out; the Equal Opportunity Clause prescribed in 41 CFR 60-1.40, the Affirmative Action Clause prescribed in 41 CFR 60-205.4, regarding veterans and veterans of the Vietnam Era, and the Affirmative Action Clause for handicapped Workers prescribed in 41 CFR 60-741.4.

CONTRACTOR accepts this Agreement and will supply any information relating to federal or state laws, rules or regulations relating to the above.

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

This Agreement will be effective on _____, 20____.

OWNER:

KENTUCKY AMERICAN WATER

By: _____

Witness _____

Address for giving notices:
2300 Richmond Road
Lexington, Kentucky 40502

CONTRACTOR:

TODD JOHNSON CONTRACTING, INC.

By: _____

Witness _____

Address for giving notices:
497 Dillehay Street
Danville, Kentucky 40422

License No. _____
Agent for service of process:

_____
(If CONTRACTOR is a corporation, attached evidence of authority to sign.)

BID FORM

PROJECT DESCRIPTION — Owenton WWTP Lagoon Improvements Project
Kentucky American Water
Owenton, KY

PROJECT NUMBER — GRW Project No.: 4483

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Kentucky American Water
2300 Richmond Road
Lexington, KY 40502

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

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No.	Addendum, Date
1	5-30-18
2	6-1-18
3	6-6-18

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

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

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Bidding Documents, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Bidding Documents, especially with respect to Technical Data in such reports and drawings.

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

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

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

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

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

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

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

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

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

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract.

ARTICLE 5 – BASIS OF BID

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

A. Notes:

1. Bids shall include sales tax, where required, and all other applicable taxes and fees.

2. All specific cash allowances are included in the price(s) set forth and have been computed in accordance with Paragraph 13.02 of the General Conditions.

BASE BID CONTRACT PRICE:

One Million one hundred fifty three thousand six hundred forty three dollars and ninety two cents (Use Words)

($ 1,153,643.92) (Figures)

LUMP SUM DEDUCTION - Alternates as Selected By Owner:

_____ ($_____)
(Use Words) (Figures)
(Above Is To Be Filled In By Owner After Review of Bid Alternates)

TOTAL BID:

_____ ($_____)
(Use Words) (Figures)
(Above Is To Be Filled In By Owner)

Base Bid Items					
Item No.	Description	Unit	Estimated Quantity		
1.	12" HDPE Temporary Force Main (Above grade)	LF	300	79.94	23982.00
2.	12" HDPE Temporary Force Main (Below grade)	LF	20	280.67	5613.40
3.	12" HDPE Temporary Gravity Sewer	LF	300	68.82	20646.00
4.	12" DI Flange Connection Piping	LF	10	980.18	9801.80
5.	12" x 12" Wet Tap	EA	1	3076.41	3076.41
6.	12" DI Plug Valve	EA	1	3723.77	3723.77
7.	12" DI Gate Valve	EA	1	3076.41	3076.41
8.	12" Line Stop	EA	1	9717.42	9717.42
9.	10'-0" Precast Concrete Top Slab	EA	1	4853.00	4853.00
10.	Bypass Pumping	LS	1	23632.50	23632.50
11.	Liner Removal and Disposal	LS	1	118241.65	118241.65
12.	60 MIL HDPE Leak Location Liner System	SQ. YD.	10,680	49.09	524281.20
13.	Ventilation System Geocomposite	SQ. YD.	10,680	25.33	270524.40
14.	Floating Docks	LS	1	0.00	0.00
15.	Hydraulic Baffle	EA	1	5943.50	5943.50
16.	Installation of Mobile Treatment Units	LS	1	9821.00	9821.00
17.	Refurbishment of Existing Packed Tower Distributing Arm	LS	1	52788.73	52788.73
Add No.1 18.	*Installation of Submersible Pumps in Existing Influent Pump Station*	LS	1	10420.73	10420.73

ALTERNATIVE EQUIPMENT INFORMATION			
Equipment Item	**Base Bid Equipment Manufacturer**	**Alternate Bid Equipment Manufacturer**	**Lump Sum Deduction**
1. HDPE Lining Membrane Section 334725	GSE Environmental, LLC Extreme Plastics	a.	a.
		b.	b.
2. Geocomposite Filtration and Drainage Section 334726	GSE Environmental, LLC Extreme Plastics	a.	a.
		b.	b.
3. Dock Equipment Section 461100	American Muscle Docks and Fabrication Using	a.	a.
		b.	b.
4. Hydraulic Baffles Section 464200	Lemna Environmental Technologies, Inc. Using	a.	a.
		b.	b.

12" PVC Pipe CI Thornburg

B. Notes:

1. Where more than one Base Bid equipment manufacturer is listed above, the BIDDER has the option of including any of the listed manufacturers in the Base Bid. The BIDDER must indicate the Base Bid equipment included in the BID by circling the selected manufacturer at the time of the submission of the Bid. The design has been completed using the first listed Base Bid equipment manufacturer. Should the BIDDER list the second or third Base Bid equipment or the OWNER select other Alternate Bid equipment, the BIDDER, at no additional cost to the OWNER, shall make any changes to structure, piping controls, electrical, instrumentation, architectural, mechanical, etc. that may be necessary to accommodate this equipment.

2. Space is provided within the above list for BIDDERS to offer lump sum deductions for alternate equipment not listed under the Base Bid equipment manufacturer. BIDDERS are not required to offer deductive alternates. However, should the BIDDER choose to offer for consideration to the OWNER, any alternate manufacturers/products to those listed above, the BIDDER shall provide a detailed submittal of applicable items such as catalog cut sheets, pump curves, hydraulic calculations, specifications, wiring diagrams, P&ID's, technical literature, dimensional drawings, etc., or any other information requested by the OWNER. This submittal information shall be included with the BIDDER's bidding documents for proper evaluation by the OWNER. These submittal items shall be in addition to the submittal requirements listed in the respective technical specifications section of the equipment item or product hereinafter. Alternates will not be evaluated or pre-qualified prior to BID opening.

C. The best and lowest BIDDER will be determined based on the lowest Base Bid Contract Price. Bid Alternate equipment prices will **not** be used in determining the best and lowest BIDDER. After selection of the best and lowest BIDDER, the OWNER reserves the right to select any, all or none of the proposed alternates offered by the selected BIDDER.

Bonds required under Paragraph 6.01 of the General Conditions will be based on the Contract Price.

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete within 121 calendar days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 151 calendar days after the date when the Contract Times commence to run.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The following documents are submitted with and made a condition of this Bid:

A. Required Bid security;

B. List of Proposed Subcontractors;

C. List of Project References;

D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;

E. Required Bidder Qualification Statement with supporting data

ARTICLE 8 – DEFINED TERMS

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

Proposed Subcontractors:
HPT Company
DPS Equipment Services Inc
Extreme Plastics
Blue Tank + Pump Rental

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

Todd Johnson Contracting, Inc

By:
[Signature] Linda Johnson

[Printed name] Linda Johnson
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] Tom Johnson

[Printed name] Tom Johnson

Title: Secretary / Treasurer

Submittal Date: 6-8-18

Address for giving notices:

497 Dillehay Street
Danville, KY 40422

Telephone Number: 859-238-9489

Fax Number: 859-236-8977

Contact Name and e-mail address: Jeremy Johnson
jeremy@toddjohnsoncontracting.com
tom@toddjohnsoncontracting.com

Client#: 1420738 TODDJOHN2

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 2/23/2018

Page 1 of 1

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer any rights to the certificate holder in lieu of such endorsement(s).

PRODUCER USI Insurance Services LLC-CL 950 Breckenridge Lane Suite 50 Louisville, KY 40207	CONTACT NAME: Cindy Ballinger PHONE (A/C, No, Ext): 502-815-5200 FAX (A/C, No): E-MAIL ADDRESS: cindy.ballinger@usi.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : FCCI Insurance Company	10178
INSURER B : KY Associated General Contractors	A55002
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
Todd Johnson Contracting Inc
497 Dillehay Street
Danville, KY 40422

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR X PD Ded:1,000 GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [X] LOC OTHER:			CPP00255641	01/01/2018	01/01/2019	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$1,000,000 $100,000 $5,000 $1,000,000 $2,000,000 $2,000,000
A	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY X HIRED AUTOS ONLY X Drive Oth Car SCHEDULED AUTOS X NON-OWNED AUTOS ONLY			CA100009959	01/01/2018	01/01/2019	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$1,000,000 $ $ $
A	X UMBRELLA LIAB [X] OCCUR EXCESS LIAB CLAIMS-MADE DED [X] RETENTION $0			UMB0018043	01/01/2018	01/01/2019	EACH OCCURRENCE AGGREGATE	$9,000,000 $9,000,000
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N [N] N/A (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below			7040	01/01/2018	01/01/2019	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$4,000,000 $4,000,000 $4,000,000
A	L/R or Borrow EQ			CPP00255641	01/01/2018	01/01/2019	500,000/350,000	
A	Contractors EQ			CPP00255641	01/01/2018	01/01/2019	As Scheduled/$1,000 Ded	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
Kentucky American water Co is additional insured with respect to General Liability per written contract owneton water plant demolition and repurposing project.

CERTIFICATE HOLDER

Kentucky American Water Co.
2300 Richmond Road
Lexington, KY 40502

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

RELEASE OF LIENS
PRIME CONTRACTOR

WHEREAS, we, the undersigned, have installed or furnished labor, materials and/or equipment for the installation of 12-inch HDPE temporary force main (above and below grade), temporary gravity force sewer, flange connection piping, wet tap, plug and gate valves, line stop precast concrete top slab, bypass pumping, liner removal/disposal, leak location liner system, ventilation system, floating docks, hydraulic baffle, mobile treatment units, refurbish existing packed tower distributing arm and installation of submersible pumps in existing influent pump station, installed pursuant to a written agreement dated the _____ day of _____, _____ between Kentucky American Water, (hereinafter referred to as the WATER COMPANY) and TODD JOHNSON CONTRACTING, INC. (hereinafter referred to as the CONTRACTOR), which said facilities are owned by the WATER COMPANY and described and located as follows:

WBS Element No. I12-330002-01 – Owenton WWTP Lagoon Improvements Project
The installation of 12-inch HDPE temporary force main (above and below grade), temporary gravity force sewer, flange connection piping, wet tap, plug and gate valves, line stop precast concrete top slab, bypass pumping, liner removal/disposal, leak location liner system, ventilation system, floating docks, hydraulic baffle, mobile treatment units, refurbish existing packed tower distributing arm and installation of submersible pumps in existing influent pump station

WHEREAS, we, the undersigned, have agreed to release any and all claims and liens which we have, or might have, against the WATER COMPANY, or said facilities by reason of the labor, materials and equipment furnished by us in connection with said installation;

NOW THESE PRESENTS WITNESS that we, the undersigned, in consideration of the premises, and of the sum of One Dollar ($1.00) in hand paid by the said WATER COMPANY, at and before the sealing and delivery hereof, the receipt whereof we do hereby acknowledge, have remised, released and forever quitclaimed, and by these presents do remise, release and forever quitclaim, unto the said WATER COMPANY, its successors and assigns, any and all manner of liens, claims and demands whatsoever which we now have, or might or could have, on or against the said facilities, or the owner thereof, for work done, or for equipment or materials furnished in connection with the installation thereof. It is the intent of this release that the WATER COMPANY, its successors and assigns shall and may hold, have, use and enjoy the said facilities free and discharged from all liens and demands whatsoever which we now have, or might have or could have, against the same if these presents had not been made.

IN WITNESS WHEREOF, we have hereunto set our hand and seal the day written opposite our signature.

Company Name _____ (SEAL)

By _____

Title _____

Dated _____, 20 _____

Sworn to and subscribed before me, a Notary Public, this ____ day of _____, 20 ___.

_____ (SEAL)
Notary Public

I, _____, duly authorized representative of _____, designated as CONTRACTOR, do hereby state that the parties whose names are signed to the attached releases, pages 1 through ___, are all of the parties who have furnished labor, materials or equipment in connection with the construction of the facilities mentioned above, excepting only such materials as may have been furnished by the WATER COMPANY.

Dated _____, 20_____ _____
Representative's Signature

Sworn to and subscribed before me, a Notary Public, this ____ day of _____, 20 ___.

_____ (SEAL)
Notary Public

RELEASE OF LIENS

SUBCONTRACTORS AND MATERIAL SUPPLIERS

WHEREAS, we, the undersigned, have installed or furnished labor, materials and/or equipment for the installation of _____

_____

installed pursuant to a written agreement dated _____, 20___, between Kentucky American Water, (hereinafter referred to as the WATER COMPANY and _____ _____ (hereinafter referred to as the CONTRACTOR), which said facilities are owned by the WATER COMPANY and described and located as follows:

_____

_____

WHEREAS, we, the undersigned, have agreed to release any and all claims and liens which we have, or might have, against the WATER COMPANY, or said facilities by reason of the labor, materials and equipment furnished by us in connection with said installation;

NOW THESE PRESENTS WITNESS that we, the undersigned, in consideration of the premises, and of the sum of One Dollar ($1.00) in hand paid by the said WATER COMPANY, at and before the sealing and delivery hereof, the receipt whereof we do hereby acknowledge, have remised, released and forever quitclaimed, and by these presents do remise, release and forever quitclaim, unto the said WATER COMPANY, its successors and assigns, any and all manner of liens, claims and demands whatsoever which we now have, or might or could have, on or against the said facilities, or the owner thereof, for work done, or for equipment or materials furnished in connection with the installation thereof. It is the intent of this release that the WATER COMPANY, its successors and assigns shall and may hold, have, use and enjoy the said facilities free and discharged from all liens and demands whatsoever which we now have, or might have or could have against the same if these presents had not been made. And we do further certify and acknowledge, that we have received of and from the said CONTRACTOR, payment in full on account of labor done or materials or equipment furnished for or in connection with said facilities.

IN WITNESS WHEREOF, we have hereunto set our hand and seal the day written opposite our signature.

Company Name _____ (SEAL)

By _____

Title _____

Dated _____, 20 ____

Sworn to and subscribed before me, a Notary Public, this ____ day of _____, 20 ___.

_____ (SEAL)
Notary Public

Witness: **Brent E. O'Neill**

2. Refer to the Application, Item 14 at page 5.

   a. Provide a breakdown of the estimated construction costs by uniform system of accounts (USoA) account numbers.
   b. Provide the depreciation life that Kentucky-American will use for each USoA account identified in Item 2.a. Include documentation to support each depreciation life.

Response:

a. Following is the breakdown of the estimated construction costs by uniform system of accounts:

Utility Account	Utility Account Description	NARUC Account Group	Estimated Construction Cost
354400	Structure & Improvements - TDP	311	$1,425,000.00
371100	Pump Equipment - Electric	363A	$ 75,000.00

b. Based on the Depreciation Schedule as presented in Case No. 2014-0390, KAWC has anticipated that Utility Account 354400 – Structures & Improvements – TDP would have a useful life of 50 years and Utility Account 371100 – Pumping Equipment – Elect would have a useful life of 20 years.

Witness: **Brent E. O'Neill**

3. Refer to the Application, Item 8 at page 4. Expand on Kentucky-American's explanation of how Kentucky-American will finance the construction project.

Response:

KAWC does not finance any of its projects as stand-alone items. Rather, KAWC finances its entire capital program through short-term debt and available cash from operations with periodic issuances of long-term debt and equity infusions from American Water Capital Corporation ("AWCC") as needed to maintain an appropriate capital structure. The lagoon liner project at issue in this case will be financed in that same manner as part of KAWC's entire capital construction program. In addition to long-term financing, AWCC provides short-term funding to KAWC through its access to the commercial paper markets at the identical rates it receives. KAWC believes that its practice of utilizing short-term borrowing capacity and available cash with subsequent longer-term financing when necessary is the most reasonable low-cost financing option. The only historical exception to this financing practice was for the construction of Kentucky River Station II when specific tax-exempt debt was issued to finance the plant construction.