ST. TAMMANY PARISH

MICHAEL B. COOPER
PARISH PRESIDENT

August 16, 2024

Please find the following addendum to the below-mentioned BID.

Addendum No.:1

Bid#: 24-31-2

Project Name: West St. Tammany Regional Sewer Treatment Facility

Bid Due Date: August 21, 2024

RECEIPT OF THIS ADDENDUM SHALL BE ACKNOWLEDGED BY INSERTING ITS NUMBER IN THE SPACE PROVIDED ON THE PROPOSAL.

GENERAL INFORMATION:

1. A Non-Mandatory pre-bid meeting was held on July 31, 2024. A copy of the sign-in sheet is attached.
2. A Non-Mandatory site visit at the project site is scheduled for August 20 at 10:00AM.
3. Specification Section 03 – Summary of Work: remove this section in its entirety and replace with the revised section included herein. **BID MUST BE SUBMITTED ON THE REVISED SECTION 04 OR YOU WILL BE DEEMED NON-RESPONSIVE.**
4. Specification Section 04 – Louisiana Uniform Public Work Bid Form: remove this section in its entirety and replace with the revised section included herein.
5. Specification Section -02140 – Dewatering: this section is hereby added to the Bid Proposal documents.
6. Specification Section 02200 – Earthwork: remove this section in its entirety and replace with the revised section included herein.
7. Specification Section 02800 – Sewers and Appurtenances: remove this section in its entirety and replace with the revised section included herein.
8. Specification Section 03300 – Cast-in-Place Concrete: remove this section and replace with the revised section included herein.
9. Specification Section 11151 – Self Priming Centrifugal Pumps: remove this section in its entirety and replace with the revised section included herein.
10. A request for prior approval was submitted for an alternate generator vendor. There was insufficient information provided to adequately determine “or equal” status of the alternate product. Therefore, the alternate vendor is NOT pre-approved. This does not

mean the alternate products will not be approved for use on this project. Products submitted for approval during construction that meet the specifications will be considered at that time.

11. A request for prior approval was submitted for alternate bar screens and screw compactors. There was insufficient information provided to adequately determine "or equal" status of the alternate products. Therefore, the alternate vendor is NOT pre-approved. This does not mean the alternate products will not be approved for use on this project. Products submitted for approval during construction that meet the specifications will be considered at that time.
12. A request for prior approval was submitted for an alternate coating system. The request was submitted after the 7 working day deadline for prior approvals. Therefore, the alternate system is NOT pre-approved. However, products submitted for approval during construction that meet the specifications will be considered at that time.

QUESTIONS & ANSWERS:

QUESTION 1: Can the Geotech report be provided for bidding purposes?

ANSWER 1: A copy of the Geotech report is attached.

QUESTION 2: The specs state that the Parish will select a testing lab but the testing lab will be paid for by the Contractor. Can you please let us know what testing lab will be selected so we can request quotes from them?

ANSWER 2: The Contractor shall pay for testing and can choose any testing laboratory on the Parish Pre-Qualified vendor list for testing labs. A copy of the list is attached.

QUESTION 3: Can you please provide additional details of the existing sewer lift station that is called out to be demolished?

ANSWER 3: The existing lift station is a 200-gallon fiberglass duplex package station with solvent weld PVC piping. The wet well is 48" diameter and 67" deep.

QUESTION 4: Is sheeting, shoring, and bracing intended to be considered temporary and to be removed upon completion of the work? Question is in reference to Section 02160 Part 3 Note D.

ANSWER 4: The intent is for the sheeting, shoring, and bracing to be temporary and for it to be removed upon completion of the work. However, Part 3, paragraph D of Section 02160 still applies.

QUESTION 5: Would precast concrete be an approved equal in lieu of Cast-In-Place for both sewer and drainage structures?

ANSWER 5: Precast concrete structures may be considered for use (during the submittal phase of construction) provided Contractor submits a complete set of detailed plans of the proposed structures stamped by a professional engineer licensed in Louisiana and the design is acceptable to the Owner.

QUESTION 6. Is the owner or contractor intended to pay for testing for this project?

ANSWER 6. All testing shall be paid by the contractor.

ATTACHMENTS:

1. **Revised Specification Section 03 – Summary of Work**
2. **Revised Specification Section 04 –Uniform Public Work Bid Form**
3. **Specification Section 02140 – Dewatering**
4. **Revised Specification Section 02200 – Earthwork**
5. **Revised Specification Section 02800 – Sewers and Appurtenances**
6. **Revised Specification Section 03300 – Cast-in-Place Concrete**
7. **Revised Specification Section 11151 – Self-Priming Centrifugal Pumps**
8. **Geotechnical Report**
9. **Pre-Bid Meeting sign-in sheet**
10. **St. Tammany Parish Pre-Qualified testing lab vendor list**

End of Addendum #1

Section 03 - REVISED

Summary of Work

I. Work to Include:

The work of this contract comprises the construction and installation of a new influent pump station for the existing West St. Tammany Wastewater Treatment Plant, including, but not limited to, wet well, pumps, electrical panels, pump building, open channel with bar screen, and a generator sized to run not only the pump station, but also the treatment plant in the event of power outage.

II. Location of Work:

On LA-1085 in St. Tammany Parish, just west of LA-1077. Across LA-1085 from Diversified Blvd.

III. Documents: Bid Documents dated June, 2024, and entitled:

West St. Tammany Regional Sewer Treatment Facility
Bid No. 24-31-2

IV. OTHER REQUIREMENTS (as applicable)

The Contractor shall perform all his work in a way that minimizes interferences with the Department of Utility's (DU) operation of the facility and the public. All schedules and methods or work are subject to approval by the Engineer.

It will be assumed that all prospective bidders have inspected the site(s) and have anticipated themselves with the local conditions.

Because the location of the job site is on the grounds of the West St. Tammany Wastewater Treatment Plant, it is imperative that the Contractor schedule and conduct his work in such a manner so as not to interfere in any way with the operation of the facility. Trucking through the facility, delivery and storing materials and equipment, and parking shall be done with the approval of the Engineer. The Contactor's personnel will be allowed to enter the facility and park private vehicles on the site; however, he will be allowed to bring equipment and company vehicles only into the facility as necessary in the execution of this Contract but may be required to remove them if their presence interferes with the operations of the Department of Utilities, all at the discretion of the Engineer.

The locations of all utilities shown on the plans are approximate. Contractor shall field verify all utilities and their tie-in prior to any work commences.

When not otherwise specified herein, all work and materials shall conform to the requirements of the Louisiana Department of Transportation and Development hereafter called LDOTD (2016 Edition of Louisiana Standard Specifications for Roads and Bridges).

This project is federally grant funded and therefore requires the Contractor to have a Unique Entity Identification number (UEI). The Contractor should

submit with their response their UEI number. If the Contractor does not have a UEI already, then they must register at the below link before an award can be made.

https://sam.gov/content/entity-registration

Table 3.1

Liquidated Damages	
Original Contract Amount	**Daily Charge**
Dollars	Dollars
0 - 250,000	500
250,000 – 1 Million	1,000
> 1 Million – 5 Million	1,500
> 5 Million – 10 Million	2,000
> 10 Million	3,000

Parish reserves the right to increase the Daily charge rate due to additional provisions required in order to complete the project as described in the specifications

V. SPECIAL PROVISIONS

- BIDDERS TO EXAMINE LOCATION AND PLANS
  - Each Bidder shall make a personal examination of the location of the proposed work and of the surrounding area. He/she shall thoroughly acquaint themselves with the details of the work to be done and all the conditions and obstacles likely to be encountered, including soil conditions, in the performance and completion of work. Bidders shall inform themselves as to the facilities for the transportation, handling, and storage of equipment and materials.
  - Each bidder shall carefully study the plans, specifications and other contract documents and thoroughly satisfy themselves as to the conditions under which the work is to be done, and as to the character, qualities and quantities of work to be performed, and materials to be furnished, and be prepared to execute a finished job in every particular.

- LONG LEAD ITEMS
  Due to long delivery of certain items specified in this contract work, it is strongly recommended that the Contractor to order those long delivery items as soon as NTP has been issued. Contract substantial completion date shall not be extended due to contractor's negligence in ordering material and/or equipment in timely manner.

- SITE CONDITION
  - The location of the work of this contract is on the grounds of West St. Tammany Wastewater Treatment Plant. The Contractor shall perform all his work in a way that minimizes interferences with the Parish's Department of Utility's (DU) operation of the facility and the public. All schedules and methods of work are subject to approval by the Engineer. It will be assumed that all prospective bidders have inspected the site(s) and have acquainted themselves with the local conditions.

- Because of the location of the job site on the grounds of the West St. Tammany Wastewater Treatment Plant, it is imperative that the Contractor schedule and conduct his work in such a manner so as not to interfere in any way with the operation of the facility. Trucking through the facility, delivering and storing materials and equipment, shall be done with the approval of the engineer. The Contractor's personnel will be required to park private vehicles off-site. However, he will be allowed to bring equipment and company vehicles only into the facility as necessary in the execution of this contract but may be required to remove them if their presence interferes with the operations of the Department of Utilities, all at the discretion of the Engineer.
- All work of this contract MUST be coordinated with the Department of Utilities (DU) through the Engineer, with proper advanced notice.
- The existing wastewater treatment plant MUST remain operational throughout the length of this contract. Any outage of this facility and/or other damages due to the contractor's negligence shall be repaired immediately by the Contractor at no additional cost to the contract. Contractor shall inform the DU at least 72 hours in advance for any coordination required for tie-in the existing facility to the new facility, weather permitting. No work shall begin without express written approval of the DU. Waste water spillage, if any, shall be remediated immediately to the satisfaction of DU at no additional cost to the contract.

- UTILITY LOCATION
  - The locations of all utilities shown on the plans are approximate. Contractor shall field verify all utilities and their tie-in prior to any work commences.
  - Any damages to any utility line due to lack of the contractor's field verification shall be repaired immediately to the satisfaction of the Engineer, all at no cost to the contract.

- CONNECTIONS TO EXISTING FACILITIES
  - The location and condition of each tie-in is approximate. It is the contractor's responsibility to field verify the location and the conditions of each tie-in prior to ordering any materials and inform the Engineer of the findings.
  - Additionally, once the tie-ins are exposed, the contractor MUST notify the DU to operate and exercise the isolation valves at either end to see if they are operable and lines are flushed and cleaned (**ALL existing valves shall be operated by operations personnel of DU <u>only</u>**). In the event that the existing valves are not operable as determined by the Engineer, new valves may be installed at the discretion of DU through the Engineer.

- NOISE and SOUND CONCERNS AND LIMITATIONS
  Contractor's attention shall be given specifically to St. Tammany Parish Ordinance, Article IV – Noise and Sound, which in part states that the sound measured by a performer taken at least 25 feet from the source of the noise cannot exceed 70 decibels between Noon and 9 p.m. Between 9 p.m. and Noon, the sound measurement taken at least 25 feet from the source of the noise cannot exceed 55 decibels.

- NIGHT, WEEKEND OR HOLIDAY WORK
  Normal work hours are 7:00 a.m. to 6:00 p.m. Monday through Friday. Hours requested outside normal work hours must be requested in writing at least 72 hours in advance. Contractor shall be required to pay resident inspection fees for work outside normal working hours. Night, weekend or holiday work requiring the presence of an Engineer or inspector will be permitted only in cases of emergency, and then only to such an extent as is absolutely necessary and with the written permission of the DU through the Engineer. In the event such work becomes necessary, no extra payment will be made therefore.

- JOB SITE DRAWINGS AND SPECIFICATIONS
  - A complete and current set of contract drawings and specifications (including any addenda) shall be maintained on the job site by the Contractor.

- One copy of all approved shop drawings, equipment or material drawings, etc. shall be maintained on the job site by the Contractor.

- CONFLICT BETWEEN DRAWINGS AND SPECIFICATIONS
  - In case of the conflict between the drawings and the specifications, the Engineer shall be the sole authority in determining which of the two shall take precedence in the Contract Documents. Such conflict shall not be a basis for an extra expense to the Parish.
  - The Contractor is hereby cautioned to base his/her price and work upon the more costly item in event of conflict as no claim for extra expense will be entertained on this basis.

- AS-BUILT DRAWINGS
  - The Contractor shall furnish one (1) neat and legibly marked blue line set of contract drawings to depict actual "as-built" conditions.
  - The "as-built" drawings shall show all construction, elevation, equipment, mechanical and electrical systems and connections as installed or built.
  - The work under this contract will not be considered "complete" until "as-built" drawings, prepared to the satisfaction of the Engineer, are received.
  - There will be no direct payment for furnishing the "as-built" drawings specified above.
  - Provide copies of operation and maintenance manuals for all equipment. Manuals shall include spare parts lists recommended by the manufacturer.

- EMERGENCY TELEPHONE
  The Contractor shall, before contract work begins, furnish to the Engineer Telephone Numbers at which company officers and/or responsible persons can be contacted at night, weekends and holidays in case of emergencies.

- BUILDING AND SITE WORK PERMITS
  - Contractor shall be required to apply for, meet all requirements and obtain all required permits.
  - St. Tammany Parish Permit information is as follows:
    - Two (2) permits are required, one sitework permit, and one building permit. The Department of Utilities will prepare the permit application, and the Contractor will submit the permit application to the Parish. All fees shall be paid by the Contractor.
    - Contractor must register with St. Tammany Parish.
    - Traffic and Drainage Impact Fees shall not apply.
    - Permit fee schedule is available at: http://www.stpgov.org/departments/permits-and-inspections
    - Other fees and costs shall be paid by Contractor
  - LDH authorization has been obtained by Owner.
  - St. Tammany Parish Dept. of Environmental Services Letter of No Objection will be obtained by Owner. (Includes Engineering and Planning Dept. reviews)

Section 04 - REVISED

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: St. Tammany Parish Government
21454 Koop Dr., Suite 2F
Mandeville, La 70471
(Owner to provide name and address of owner)

BID FOR:
West St. Tammany Regional Sewer Treatment Facility
Bid No. 24-31-2
(*Owner to provide name of project and other identifying information.)*

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by:
Kyle Associates, L.L.C. and dated: June 2024
(Owner to provide name of entity preparing bidding documents.)

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____ .

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____Dollars ($ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____Dollars ($ _____)

Alternate No. 2 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____Dollars ($ _____)

Alternate No. 3 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____Dollars ($_____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

_____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM PUBLIC WORK BID FORM:

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

**** A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid for the public work as prescribed by LA R.S. 38:2212(B)(5).

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA R.S. 38:2218(A) attached to and made a part of this bid.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM - REVISED

TO: St. Tammany Parish Government
21454 Koop Drive, Suite 2F
Mandeville, LA 70471

(Owner to provide name and address of owner)

BID FOR: West St. Tammany Regional Sewer Treatment Facility

Bid No. 24-31-2

(Owner to provide name of project and other indentifying information)

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	X Base Bid or Alt.#__ MOBILIZATION			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
1	1	LUMP SUM		

DESCRIPTION:	X Base Bid or Alt.#__ SITE WORK			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
2	1	LUMP SUM		

DESCRIPTION:	X Base Bid or Alt.#__ STRUCTURAL WORK - WET WELL			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
3	1	LUMP SUM		

DESCRIPTION:	X Base Bid or Alt.#__ STRUCTURAL WORK - BUILDING			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
4	1	LUMP SUM		

DESCRIPTION:	X Base Bid or Alt.#__ MECHANICAL WORK - PUMPS & PIPING			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
5	1	LUMP SUM		

DESCRIPTION:	X Base Bid or Alt.#__ MECHANICAL WORK - SCREENS			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
6	1	LUMP SUM		

DESCRIPTION:	X Base Bid or Alt.#__ ELECTRICAL WORK - POWER SUPPLY & LIGHTING			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
7	1	LUMP SUM		

Wording for "DESCRIPTION" is to be provided by the Owner.
All quantities are estimated. The Contractor will be paid based upon actual quantities as verified by the Owner.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM - REVISED

TO: St. Tammany Parish Government
21454 Koop Drive, Suite 2F
Mandeville, LA 70471

(Owner to provide name and address of owner)

BID FOR: West St. Tammany Regional Sewer Treatment Facility
Bid No. 24-31-2

(Owner to provide name of project and other indentifying information)

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	X Base Bid or Alt.#__ ELECTRICAL WORK - GENERATOR			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
8	1	LUMP SUM		

DESCRIPTION:	X Base Bid or Alt.#__ ELECTRICAL WORK - CONTROLS			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
9	1	LUMP SUM		

DESCRIPTION:	X Base Bid or Alt.#__ TEMPORARY SIGNS AND BARRICADES			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION (Quantity times Unit Price)
10	1	LUMP SUM		

Wording for "DESCRIPTION" is to be provided by the Owner.
All quantities are estimated. The Contractor will be paid based upon actual quantities as verified by the Owner.

SECTION 02140

DEWATERING

PART 1 -- GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall dewater trench and structure excavations, in accordance with the Contract Documents. The Contractor shall secure all necessary permits to complete the requirements of this Section of the Specifications.

B. When the Contractor encounters wastewater in trench or structure excavations, the wastewater shall be disposed of in a wastewater treatment structure as approved by the ENGINEER.

1.02 Contractor SUBMITTALS

A. Prior to commencement of excavation, the Contractor shall submit a detailed plan and operation schedule for dewatering of excavations. The Contractor may be required to demonstrate the system proposed and to verify that adequate equipment, personnel, and materials are provided to dewater the excavations at all locations and times. The Contractor's dewatering plan is subject to review by the ENGINEER.

1.03 QUALITY CONTROL

A. It shall be the sole responsibility of the Contractor to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.

B. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the Contractor.

C. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement which may develop. The responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the Contractor. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor.

PART 2 -- PRODUCTS

2.01 EQUIPMENT

A. Dewatering, where required, may include the use of well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, and other means. Standby pumping equipment shall be maintained on the Site.

PART 3 -- EXECUTION

3.01 GENERAL REQUIREMENTS

A. The Contractor shall provide all equipment necessary for dewatering. It shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failure.

B. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements.

C. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.

D. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

E. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with drain rock.

F. The Contractor shall maintain the water level below the bottom of excavation in all work areas where groundwater occurs during excavation construction, backfilling, and up to acceptance.

G. Flotation shall be prevented by the Contractor by maintaining a positive and continuous removal of water. The Contractor shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.

H. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sand packed and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the Contractor shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

I. The Contractor shall dispose of water from the WORK in a suitable manner without damage to adjacent property. Contractor shall be responsible for obtaining any permits that may be necessary to dispose of water. No water shall be drained into work built or under construction without prior consent of the ENGINEER. Water shall be filtered using an approved method to remove sand and fine-sized soil particles before disposal into any drainage system.

J. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

K. Dewatering of trenches and other excavations shall be considered as incidental to the construction of the WORK.

- END OF SECTION –

SECTION 02200

EARTHWORK

PART 1 – GENERAL

1.01 SCOPE

A. This Section includes earthwork and related operations, including, but not limited to, clearing and grubbing the construction site, dewatering, excavating all classes of material encountered, pumping, draining and handling of water encountered in the excavations, handling, storage, transportation and disposal of all excavated and unsuitable material, construction of fills and embankments, backfilling around structures and pipe, backfilling all trenches and pits, compacting, preparation of subgrades, surfacing and grading, and any other similar, incidental, or appurtenant earthwork operation which may be necessary to properly complete the work.

B. The Contactor shall provide all services, labor, materials and equipment required for all earthwork and related operations necessary or convenient to the Contractor for furnishing complete work as shown on the Drawings or specified in these Contract Documents.

1.02 GENERAL

A. The elevations shown on the Drawings as existing are taken from the best existing data and are intended to give reasonably accurate information about the existing elevations. They are not precise and the Contractor shall become satisfied as to the exact quantities of excavation and fill required.

B. Earthwork operations shall be performed in a safe and proper manner with appropriate precautions being taken against all hazards.

C. All excavated and filled areas for structures, trenches, fills, topsoil areas, embankments and channels shall be maintained by the Contractor in good condition at all times until final acceptance by the Owner. All damage caused by erosion or other construction operations shall be repaired by the Contractor using material of the same type as the damaged material.

D. Earthwork within the rights-of-way of State, Parish, and City agencies shall be done in accordance with requirements and provisions of the permits issued by those agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these Specifications.

E. The Contractor shall control grading in a manner to prevent surface water from running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm water can be uninterrupted in existing gutters, other surface drains or temporary drains. Free access must be provided to all fire hydrants, water gates and meters.

F. Excavation works shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition or condition thereof.

G. Tests for compaction and density shall be conducted by an independent testing laboratory selected from the Owner’s pre-qualified vendors list. Costs of compaction tests performed by an independent testing laboratory shall be paid for directly by the Contractor. The Contractor shall make all necessary excavations and shall supply any samples of materials necessary for conducting compaction and density tests. The cost of all retests made necessary by the failure of materials to conform to the requirements of these Contract Documents shall be paid by the Contractor.

H. The Contractor shall comply with local regulations and with the provisions of the “Manual of Accident Prevention in Construction” of the Associated General Contractors of American Inc., Occupational Safety and Health Act, and all other applicable safety regulations.

I. It is understood and agreed that the Contractor has made a thorough investigation of the surface and subsurface conditions of the site and any special construction problems which might arise as a result of nearby watercourses and floodplains, particularly in areas where construction activities may encounter water-bearing sands and gravels or limestone solution channels. The Contractor shall be responsible for providing all services, labor, equipment and materials necessary or convenient to the Contractor for completing the work within the time specified in these Contract Documents.

PART 2 – PRODUCTS

2.01 MATERIALS AND CONSTRUCTION

A. Earthwork Materials

1. Fill Material, General

a. Approval Required: All fill material shall be subject to the approval of the Engineer.

b. Notification: For approval of imported fill material, notify the Engineer at least one week in advance of intention to import material, designate the proposed borrow area and permit the Engineer to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

2. On-site Fill Material: All on-site fill material shall be soil exclusive of organic matter, frozen lumps or other deleterious substances. On-site fill material shall contain no rocks or lumps over 3-inches maximum in dimension.

3. Imported Fill Materials: All imported fill material shall meet the requirements of on-site fill material.

4. Sand Cushions and Sand Fill: Sand cushions and sand fill shall consist of a sand-gravel fill of such gradation that 100 percent will pass a 3/8-inch sieve and not more than 10 percent by weight is lost by washing.

5. Coarse Aggregate: Coarse aggregate shall conform to the Louisiana Department of Transportation Standard Specifications for Roads and Bridges, Section 1003.02(b).

6. Fine Aggregate: All fine aggregate shall conform to the Louisiana Department of Transportation Standard Specifications for Roads and Bridges, Section 1003.02(a).

7. Pea Gravel: Pea gravel shall be clean, naturally rounded aggregate, 1/8 to 3/4-inch in diameter per ASTM C 33.

8. Top Soil: Dark organic weed free loam, free of muck.

B. Geotextile Fabric

1. Nonwoven: Composed of at least 85% by weight of polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

a. Grab Tensile Strength: 110 lb; ASTM D 4632.

b. Tear Strength: 40 lb.; ASTM D 4533.

c. Puncture Resistance: 50 lb.; ASTM D 4833.

d. Water Flow Rate: 150 gpm per sq. ft.; ASTM D 4491.

e. Apparent Opening Size: No. 50; ASTM D 4751.

2. Woven: Composed of at least 85% by weight of polyolefins, polyesters, or polyamides and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:

a. Grab Tensile Strength: 200 lb; ASTM D 4632.

b. Tear Strength: 75 lb; ASTM D 4533.

c. Puncture Resistance: 90 lb; ASTM D 4833.

d. Water Flow Rate: 4 gpm per sq. ft.; ASTM D 4491.

e. Apparent Opening Size: No. 30; ASTM D 4751.

C. Other Materials: All other materials not specifically described but required for proper completion of the work of this Section shall be as selected by the Contractor subject to the approval of the Engineer.

PART 3 – EXECUTION

3.01 GENERAL

A. Topsoil

1. Remove all topsoil to a depth at which subsoil is encountered, from all areas under structures, pavements, and from all areas which are to be cut to lower grades or filled.

2. With the Engineer's approval, topsoil to be used for finish grading may be stored on the site.

3. Other topsoil may be used for fill in non-critical areas with approval of the Engineer.

4. Properly dispose of all excess topsoil off site.

B. Obstructions

1. Remove and dispose of all trees, stumps, roots, boulders, sidewalks, driveways, pavement, pipes and the like, as required for the performance of the work.

2. Exercise care in excavating around catch basins, inlets and manholes so as not to disturb or damage these structures.

3. Avoid removing or loosening castings or pushing dirt into catch basins, inlets, and manholes.

4. Damaged or displaced structures or casting shall be repaired, replaced and dirt entering the structures during the performance of the work shall be removed at no additional cost to the Owner.

C. Utilities to be Abandoned

1. When pipes, conduits, sewers or other structures are removed from the trench leaving dead ends in the ground, such ends shall be fully plugged or sealed with brick and non-shrink grout.

2. Abandoned structures such as manholes or chambers shall be entirely removed unless otherwise specified or indicated on the Drawings.

3. All materials from abandoned utilities which can be readily salvaged shall be removed from the excavation and stored on the site at a location as directed by the Owner.

4. All salvageable materials will remain the property of the Owner unless otherwise indicated by the Owner.

D. Extra Earth Excavation: In case soft or excessively wet material which, in the opinion of the Engineer, is not suitable, is encountered below the final subgrade elevation of an excavation or underneath a structure, the Engineer may order the removal of this material and its replacement with crushed stone or other suitable material in order to make a suitable foundation for the construction of the structure.

E. Cutting Paved Surfaces and Similar Improvements

1. Remove existing pavement as necessary for installing pipe utilities and appurtenances or as otherwise shown on the Drawings.

2. Before removing any pavement, mark the pavement neatly, paralleling pipe lines and existing street lines. Space the marks at least the width of the trench.

3. Break pavement along the marks by scoring with a rotary saw and breaking below the score by the use of jack hammers or other suitable tools.

4. Do not pull pavement with machines until completely broken and separated from pavement to remain.

5. Do not disturb or damage the adjacent pavement. If the adjacent pavement is disturbed or damaged, remove and replace the damaged pavement. No additional payment will be made for removing and replacing damaged adjacent pavement.

6. Remove and replace sidewalks disturbed by construction for their full width and to the nearest undisturbed joint.

7. The Contractor may tunnel under curbs that are encountered. Remove and replace any curb disturbed by construction to the nearest undisturbed joint.

3.02 EXCAVATION

A. Method

1. All excavation shall be open cut from the surface except as indicated on the Drawings.

2. All excavations for pipe appurtenances and structures shall be made in such manner and to such depth and width as will give ample room for building the structures and for bracing, sheeting and supporting the sides of the excavation, for pumping and draining groundwater and wastewater which may be encountered, and for the removal from the excavation of all materials excavated.

3. Take special care so that soil below the bottom of the structure to be built is left undisturbed.

B. Grades

1. Excavate to grades indicated on the Drawings

2. Where excavation grades are not indicated on the Drawings, excavate as required to accommodate installation.

C. Disposal of Excavated Material

1. Remove and properly dispose of all excavated material not needed to complete filling, backfilling and grading.

2. Dispose of excavated material off site at locations secured by the Contractor and in accordance with all requirements of federal, state, county and municipal regulations. No debris of any kind shall be deposited in any stream or body of water, or on any street or alley. No debris shall be deposited on any private property except by written consent of the property owner. In no case shall any material be left on the Project, shoved onto abutting private properties, or be buried in embankments or trenches on the Project.

3.03 EXCAVATING FOR STRUCTURES

A. Earth Excavation

1. Earth excavation shall include all substances to be excavated other than rock. Earth excavation for structures shall be to limits not less than two feet outside wall lines, to allow for formwork and inspection, and further as necessary to permit the trades to install their work. All materials loosened or disturbed by excavation shall be removed from surfaces to receive concrete or crushed stone.

2. No separate payment will be made for earth excavation. The cost of such work and all costs incidental thereto shall be included in the price bid for the item to which the work pertains.

B. Excavation for Foundations: Footings and slabs on grades shall rest on undisturbed earth, rock or compacted materials to insure proper bearing.

1. Unsuitable Foundation Material

a. Any material in the opinion of the Engineer which is unsuitable for foundation shall be removed and replaced with compacted crushed stone, or with compacted fill material as directed by the Engineer. Crushed stone shall meet the requirements of the Louisiana Department of Transportation Specification 1003.03(b).

b. No determination of unsuitability will be made until all requirements for dewatering are satisfactorily met.

2. Unauthorized Excavation

a. Care shall be taken that excavation does not extend below bottom levels of footings or slabs on earth or rock. Should the excavation, through carelessness or neglect, be carried below such levels, the Contractor shall fill in the resulting excess excavation with concrete under footings and compacted crushed stone or other approved material under slabs. Crushed stone or gravel shall meet the Louisiana Department of Transportation Specification 1003.03(b). Should excavation be carried beyond outside lines of footings, such excess excavation shall be filled with concrete, or formwork shall be provided, as directed by the Engineer.

b. Additional costs of corrective work, made necessary by unauthorized excavation of earth or rock, shall be borne by the Contractor.

C. Unsuitable Bearing

1. If suitable bearings for foundations are not encountered at the elevations indicated on the Drawings, immediately notify the Engineer.

2. Do not proceed further until instructions are received and necessary measurements made for purposes of establishing additional volume of excavation.

3.04 FILL

A. Controlled Fill

1. The fill for structures, and slabs on grade shall be controlled fill.

2. After the existing ground or excavated area has been proof rolled and examined by the Engineer, all holes and other irregularities shall be filled and compacted before the main fill is placed.

3. The fill shall be placed in even layers not exceeding 10-inches in depth and shall be thoroughly compacted as herein specified.

4. If an analysis of the soil being placed shows a marked difference from one location to another, the fill being placed shall not be made up of a mixture of these materials.

5. Each different type of material shall be handled continuously so that field control of moisture and density may be based upon a known type of material.

6. No fill shall be placed following a heavy rain without first making certain on isolated test areas that compaction can be obtained without damage to the already compacted fill.

B. Placement

1. Prior to placement of any material in embankments, the area within the embankment limits shall be stripped of topsoil and all unsuitable materials removed as described under Article 3.02. The area shall then be scarified to a depth of at least 6-inches.

2. Fill materials shall be placed in continuous approximately horizontal layers extending the full width of the embankment cross-section and the full dimension of the excavation where practical and having a net compacted thickness of not over 6-inches.

3. Fill materials shall be placed at optimum moisture content within practicable limits (not less than one percent below optimum). Optimum moisture shall be maintained by sprinkling the layers as placed or by allowing materials to dry before placement.

C. Compaction

1. Fill materials shall be compacted to dry densities as determined by the Standard Proctor Compaction Test performed in accordance with ASTM D 698.

2. Fill materials supporting structures and backfill around structures shall be compacted to 95 percent of the maximum dry density. The top 12-inches of fill material supporting roadways, parking areas, sidewalks, structures, and buildings shall be compacted to 98 percent of the maximum dry density. Fill placed for general site grading shall be compacted to 90 percent of the maximum dry density.

3. Compaction of embankments shall be by sheepsfoot rollers with staggered, uniformly spaced knobs and suitable cleaning devices. The projected area of each knob and the number of spacing of the knobs shall be such that the total weight of the roller and ballast when disturbed over the area of one row of knobs shall be 250 psi. Placement and compaction of materials shall extend beyond the final contours sufficiently to insure compaction of the material at the resulting final surface. Final contours shall then be achieved by a tracked bulldozer shaping the face of the embankment.

4. Compaction of backfill around structures shall be accomplished by heavy power tamping equipment.

5. If tests indicate that density of fill is less than that specified, the area shall be recompacted or undercut, filled, and compacted until specified density is achieved.

D. Final Grading: Upon completion of construction operations, the area shall be graded to finish contour elevations and grades shown on the Drawings. Graded areas shall be made to blend into conformation with remaining ground surfaces. All surfaces shall be left smooth and free to drain.

E. Excess Material

1. Any excess earth excavation and unsuitable materials shall be placed on the site as directed by the Engineer. Surfaces and slopes of waste fills shall be left smooth and free to drain.

2. No separate payment will be made for backfilling. The cost of all such work and all costs incidental thereto shall be included in the price bid for the item to which the work pertains.

F. Moisture

1. All fill shall be compacted with the moisture content as established by the 98 percent intercept on the moisture density curves or the moisture content at the shrinkage limit, whichever is less.

2. If fill material is too wet, provide and operate approved means to assist the drying of the fill until suitable for compaction. If fill material is too dry, provide and operate approved means to add moisture to the fill layers.

3.05 BACKFILLING

A. Backfill carefully to restore the ground surface to its original condition. Dispose of surplus material.

B. Compact backfill underlying roadways, parking areas, sidewalks, structures, and buildings to 95 percent of the maximum dry density.

C. Backfill for Pipe

1. Initial: Place initial backfill material carefully around the pipe above bedding in uniform 6-inch layers to a depth of at least 18-inches above the pipe bell. Compact each layer thoroughly with suitable hand tools. Do not disturb or damage the pipe. Backfill on both sides of the pipe simultaneously to prevent side pressures. Initial backfill material is earth material excavated from the trench which is clean and free of rock, organics, and other unsuitable material. If materials excavated from the trench are not suitable for use as initial backfill material, obtain suitable materials elsewhere.

2. Final: After initial backfill material has been placed and compacted, backfill with general excavated material. Place backfill material in uniform layers and thoroughly compact with heavy power tamping tools of the “Wacker” type.

3. Settlement: If trenches settle, re-fill and grade the surface to conform to the adjacent surfaces.

4. Additional Material

    a. Where final grades above the pre-existing grades are required to maintain minimum cover, additional fill material will be shown on the Drawings.

    b. Utilize excess material excavated from the trench if the material is suitable. No additional payment will be made for additional material when excavated materials are used.

    c. If excess excavated materials are not suitable, or if the quantity available is not sufficient, provide suitable additional fill material. Payment for additional material imported to the job site will be made for the quantity of materials provided at the unit price bid.

D. Backfilling Around Structures

1. General

    a. Remove debris from excavations before backfilling.

    b. Do not backfill against foundation walls until so directed by the Engineer, nor until all indicated perimeter insulation and/or waterproofing is in place.

    c. Protect such insulation and/or waterproofing during filling operations.

    d. Wherever possible, backfilling shall be simultaneous on both sides of walls to equalize lateral pressures.

    e. Do not backfill against walls until all permanent construction is in place to furnish lateral support on both top and bottom of wall.

    f. Backfilling against walls is to take place after all the concrete in the affected members has attained the specified strengths.

2. Materials: Backfill material placed against structures built or encountered during the work of this Section shall be suitable fill material. No broken concrete, bricks or similar materials will be permitted as backfill.

3.06 GRADING

A. General: Perform all rough and finish grading required to attain the elevations indicated on the Drawings. Perform finish grading to an accuracy of 0.10 foot.

B. Compact backfill underlying structures to 95 percent of the maximum dry density. The top 12-inches of backfill shall be compacted to 98 percent of the maximum dry density.

C. Backfilling Around Structures

1. General

    a. Remove debris from excavations before backfilling.

    b. Do not backfill against foundation walls until so directed by the Engineer, nor until all indicated perimeter insulation and/or waterproofing is in place.

    c. Protect such insulation and/or waterproofing during filling operations.

d. Wherever possible, backfilling shall be simultaneous on both sides if walls to equalize lateral pressures.

e. Backfilling against walls shall take place after all the concrete in the affected members has attained the specified strengths.

2. Materials: Backfill material placed against structures built or encountered during the work of this Section shall be suitable fill material. No broken concrete, bricks or similar materials will be permitted as backfill.

D. Treatment After Completion of Grading

1. After grading is completed, permit no further excavation, filling or grading, except with the approval of the Engineer.

2. Use all means necessary to prevent the erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3.07 SURFACE WATER CONTROL

A. Regulations and Permits: Obtain all necessary soil erosion control permits and all pertinent rules, laws, and regulations of all applicable federal, state, county and municipal regulatory agencies.

B. Unfavorable Weather

1. Do not place, spread or roll any fill material during unfavorable weather conditions.

2. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.

C. Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collected in depressions.

D. Pumping and Drainage

1. Provide, maintain and use at all times during construction adequate means and devices to promptly remove and dispose of all water from every source entering the excavations or other parts of the work.

2. Dewater by means which will insure dry excavations, preserve final lines and grades, do not disturb or displace adjacent soil.

3. All pumping and drainage shall be done with no damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians, vehicular traffic or the work of other contractors, and in accordance with all pertinent laws, ordinances and regulations.

4. Do not overload or obstruct existing drainage facilities.

3.08 SETTLEMENT

A. The Contractor shall be responsible for all settlement of backfill, fills and embankments which may occur within one year after final acceptance of the Work by the Owner.

B. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after receipt of written notice from the Engineer or Owner.

3.09 CLEANING

Upon completion of the work of this Section, remove all rubbish, trash and debris resulting from construction operations. Remove surplus equipment and tools. Leave the site in a neat and orderly condition acceptable to the Engineer.

END OF SECTION 02200

SECTION 02800

SEWERS AND APPURTENANCES

PART 1 - GENERAL

1.01. WORK INCLUDED

A. This section covers the construction of the buried piping, lift station piping, and appurtenances.

B. Included in this section are force mains, access hatches, and lift station piping. Sheeting, shoring and bracing of excavations is covered in Section 02160 – Sheeting, Shoring, and Bracing. Valves, couplings, and adapters are covered in Section 15100 – Valves and Appurtenances.

C. The Contractor shall furnish all materials, equipment, transportation, tools and labor necessary and complete the system in substantial conformance with the lines, grades, and locations shown on the Drawings.

1.02. REFERENCED SPECIFICATIONS

A. Those parts of the referenced specifications which are applicable hereto shall be considered as if written herein in full.

B. ASTM: American Society of Testing Materials.

C. AWWA: American Water Works Association.

D. ASA: American Standards Association.

PART 2 - PRODUCTS

2.01. FOUNDATION, EMBEDMENT, & BACKFILL

A. Embedment Material shall be a non-plastic, granular, siliceous material with 100% passing the ½ inch sieve, 75 – 100% passing the No. 10 sieve and 0 to 10% passing the No. 200 sieve, free of trash, roots and weeds and other deleterious materials.

B. Backfill material shall be as indicated on the Drawings.

2.02. FORCE MAIN AND LIFT STATION PIPING

A. Below Grade Piping

1. Below grade force main shall be PVC.

a. PVC pipe sizes 4”-12” shall conform with ANSI/AWWA C900 with a dimension ratio (DR) of 18 and rated working pressure of 150 psi. Fittings shall be ductile iron mechanical joint. Megalug Series 2000 PV Mechanical Joint Restraint shall be used at ductile iron fittings to PVC pipe joints. EBAA Series 1500 joint restraint shall be used at PVC to PVC joints. Where additional joints require restraint, the length of restrained joint pipe shall be as indicated on the drawings. Mechanical Joint fittings shall meet the requirements of ANSI A21.11 except as amended by ANSI A-21.51.

b. PVC pipe sizes >12” shall conform with ANSI/AWWA C900 with a dimension ratio (DR) of 21 and rated working pressure of 200 psi. Fittings shall be ductile iron mechanical joint. Megalug Series 2000 PV Mechanical Joint Restraint shall be used at ductile iron fittings to PVC pipe joints. EBAA Series 1500 joint restraint shall be used at PVC to

PVC joints. Where additional joints require restraint, the length of restrained joint pipe shall be as indicated on the drawings. Mechanical Joint fittings shall meet the requirements of ANSI A21.11 except as amended by ANSI A-21.51.

B. Lift Station Piping

1. All rigid station piping located within the wet well, within the valve box, between the wet well and valve box, for the first 5 feet outside the wet well and valve box, and located above grade shall be ductile iron flanged piping. Ductile iron flanged pipe shall be in accordance with ANSI/AWWA C115/A21.15, Class 53. Nuts and bolts shall be 304 stainless steel. Anti-seize compound shall be applied to all threads. Flange gaskets shall be full face type SBR per AWWA C111. Thickness shall be 1/8-inch unless indicated otherwise.

C. Ductile Iron Piping Lining Requirements

1. Discharge/Station Piping shall be cement lined at the factory in accordance with AWWA C104 and epoxy lined at the factory in accordance AWWA C116.

D. Ductile Iron Piping Coating Requirements

1. For buried service applications, the Contractor shall use bituminous coating in accordance with AWWA C151 and C110.

2. For above grade applications, the Contractor shall use primer and final coating in accordance with Section 09960 – Coatings.

PART 3 - EXECUTION

3.01. EXCAVATION

A. Excavations shall be open cuts with vertical sides. Excavated material shall be placed so as not to interfere with public movement or to endanger the trench.

B. No greater length of trench shall be opened in advance of the installed pipe or structure, nor left unfilled to the rear for more than 40 feet, or to such other shorter length as the Engineer shall direct. All open trenches shall be barricaded, fenced, and lighted during non-working hours or when operations are temporarily suspended.

C. If unauthorized excavation is made below the grade required by the plans, the Contractor shall backfill to required grade with embedment material at the Contractor’s expense.

D. Excavation includes removal of stumps, roots and logs encountered within the trench, and to a depth of 12" below the bottom of the trench. Excavation below grade to remove an obstruction encountered in the trench section and which may extend below grade and the foundation materials used to fill the undercut shall be paid under the Allowance Item in accordance with Section 01025.

E. The trench width shall be at the dimensions shown on the Drawings.

F. Base slabs for wet wells and manholes shall be constructed on dry, compacted excavation bottoms.

3.02. SHEETING & BRACING FOR PIPELINES

A. Protection of the excavation against caving or settling of the banks shall be the sole responsibility of the Contractor. He shall protect the sides of his excavation by sheeting and bracing as may be necessary to support the trench walls and any adjacent structures and sheeting and shoring

shall be such as the nature of the ground and related construction and material storage may dictate.

B. The sheeting and bracing, where indicated on the drawings, is for the purpose of controlling the loading on the pipe only. The Contractor by his operations, the proximity of his equipment to the trench and the weight of this equipment, the location of backfill and construction material relative to the trench, etc. will increase or decrease the possibility of trench wall collapse and is solely responsible for installing the sheeting and bracing necessary to prevent this collapse.

C. All sheeting and bracing left in the trench shall be cut off a minimum of 3 feet below existing ground surface.

D. For sheeting and bracing of excavations for structures, see Section 02160 – Sheeting, Shoring, and Bracing.

3.03. FOUNDATION

A. The foundation shown on the drawings is a minimum design section; the use of additional material will be at the Contractor's expense.

3.04. BACKFILLING

A. Backfilling of piping trenches shall begin as soon as the joints have been made properly and the location of fittings properly recorded.

B. Embedment material shall be placed in the trench on top of the foundation on both sides and over the pipe in accordance with the Drawings.

C. Granular material or select excavated material, as noted on the Drawings, shall be placed over the embedment material in layers not to exceed 12" and each layer tamped and compacted prior to the placement of the next layer.

D. The requirement for embedment and backfilling varies with the relative location of the pipe line to the pavement as shown on the Drawings.

3.05. INSTALLATION OF PIPELINES

A. Contractor, prior to laying pipe, shall verify the location and elevation of tie-ins. Unless indicated otherwise, all pipes shall be installed with 3’-0” minimum cover.

B. Lay pipe to line and grades with bell upgrade. Force mains and waterlines shall be laid to avoid the gravity sewer system and gravity drainage. Unless indicated otherwise, pressure lines shall be installed to be under or over the gravity pipe with both pipes maintaining a minimum 3’-0” of cover and one foot (minimum) separation between the two pipes.

C. Each pipe length shall be clean and laid to form a close joint.

D. All material excavated and all construction material shall be placed so as to interfere as little as possible with public travel.

E. Give free access to fire engines, fire hydrants, water valves, fire alarm boxes, mail boxes and driveways.

F. Protect all poles, posts, gallery supports, signs, etc.

G. Should the location or position of any gas or water pipe, telephone conduit, sewer connection, etc. be such that it is in direct conflict with the work being constructed, then the conflict shall be

remedied as follows:

1. For private utilities such as telephone or power lines and poles, the Contractor shall request in writing to the proper utility company that the conflicting item be removed.

2. For public utilities, the Contractor shall notify the utility as soon as the conflict is discovered to request assistance.

3. The Contractor, at the Contractor's expense, shall repair all surface and subsurface structures damaged by the Contractor's actions that cross or are in the trench in such a location as not to directly conflict with the sewer.

4. When a utility, such as a gas pipe line, is shown on the Drawings in proximity to the pipeline to be installed, the Contractor shall carefully find the exact location of this utility and protect it before beginning work on the pipeline.

3.06. CARE & RESTORATION OF STREETS, DRIVEWAYS, ETC.

A. All streets, driveways, parking areas, and sidewalks damaged by the Contractor shall be repaired at the Contractor's expense.

1. If not shown otherwise on the Drawings, concrete for repairs shall contain 6-1/2 sacks of cement per cubic yard, a water reducing admixture and have a maximum slump of 4".

2. If not shown otherwise on the Drawings, repairs of concrete shall be to the nearest joint, or, if approved by the Engineer to a saw cut joint.

3. Repairs shall be of the thickness of the concrete being repaired but not less than 4" for sidewalks, 6" for driveways and 8" for streets, unless otherwise shown on the Drawings.

B. Excavations through yards and grassy areas shall be sodded in accordance with the Specifications.

3.07. TESTING AND ACCEPTANCE

A. See Section 02660 – Testing of Pipelines.

B. All tie-ins to existing water or sewer lines shall be tested prior to back-filling.

END OF SECTION 02800

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1: GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to place all cast-in-place concrete, reinforcing steel, forms, waterstops, and miscellaneous related items including sleeves, anchor bolts, inserts and embedded items specified under other Sections.

B. All cast-in-place concrete work shall be performed in accordance with ACI 318 except as hereinafter specified.

1.02 REFERENCE SPECIFICATIONS

A. American Concrete Institute (ACI)

1. ACI 301 Specifications for Structural Concrete for Buildings.

2. ACI 304 Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.

3. ACI 305 Hot Weather Concreting.

4. ACI 306 Cold Weather Concreting.

5. ACI 308 Standard Practice for Curing Concrete.

6. ACI 309 Standard Practice for Consolidation of Concrete.

7. ACI 318 Building Code Requirements for Reinforced Concrete.

8. ACI 347 Recommended Practice for Concrete Formwork.

9. ACI 350 Concrete Sanitary Engineering Structures.

B. American Society for Testing and Materials (ASTM)

1. ASTM C33 Specification for Concrete Aggregates.

2. ASTM C94 Specification for Ready-mix Concrete.

3. ASTM C150 Specification for Portland Cement.

4. ASTM C260 Specification for Air-Entraining Admixtures for Concrete.

5. ASTM C494 Specification for Chemical Admixtures for Concrete.

C. National Ready-Mixed Concrete Association

Truck Mixer and Agitator Standards

D. U.S. Army Corps of Engineers

CRD-C572 Polyvinyl Chloride Waterstops

1.03 SUBMITTALS

A. Submit to the Engineer for review in accordance with Section 01300 complete shop drawings, working drawings and product data showing placement of forms, form joints, locations of form ties in exposed exterior concrete, rustications, major inserts, and block outs.

B. Submit to the Engineer for review in accordance with Section 01300 the proposed methods of concrete placement, curing, and protection.

C. Submit to the Engineer for review in accordance with Section 01300 the proposed concrete mixes designed within the limits of these specifications, listing the brand and type of cement, source and results of tests of aggregates and admixtures, at least 45 days prior to the beginning of placing concrete.

D. Deliver to the Engineer concrete mix tickets as hereinafter specified.

1.04 QUALITY ASSURANCE

A. The actual acceptance of aggregates and development of mix proportions to produce concrete conforming to the specific requirements shall be determined prior to the placement of any concrete, by means of laboratory tests made with the constituents to be used on the work.

B. The limiting strengths, water-cement ratios and cement factors as shown on Table A shall apply. Maximum water-cement (#/#) for water retaining structures shall be 0.45.

TABLE A

Minimum Comp. Str. psi at 28 days	Maximum Net Water Content gals/100 lbs*	Minimum Cement Factor 100 lbs/cu. yd.**
4000	5.4	5.64
6000	4.5	6.58

* Maximum; decrease if possible. This represents total water in mix at time of mixing, including free water on aggregates, and water in admixture solution.

** Minimum; increase as necessary to meet other requirements. These cement factors apply to "controlled" concrete subject to specific inspection.

C. When high-early-strength Portland cement is permitted, the same strength requirements shall apply except that the indicated strengths shall be attained at seven (7) days instead of twenty-eight (28) days.

D. If, during the progress of the work, it is impossible to secure concrete of the required workability and strength with the materials being furnished, the Engineer may order such changes in proportions or materials, or both, as may be necessary to secure the desired properties. All changes so ordered shall be made at the Contractor's expense.

E. If, during the progress of the work, the Contractor desires to use materials other than those originally approved, or if the materials from the sources originally approved change in characteristics, the Contractor shall, at his own expense, have made new acceptance tests of aggregates and establishment of new basic mixtures and submit them to the Engineer for approval.

F. Under special circumstances, the Engineer may allow minor deviations from the material requirements specified, provided the resulting concrete quality is not adversely affected or provided a suitable adjustment in cement content is made to compensate for such deviations

without cost to the Owner.

G. Consistency of the concrete as measured by the ASTM Designation C143 shall be as shown in Table B.

TABLE B

	Slump (inches)	
Portion of Structure	Max.	Min.
Pavement and slabs at grade	4	2
Slabs below grade	4	2

H. Concrete shall be of such consistency and mix composition that it can be readily worked into the corners and angles of the forms and around the reinforcement, inserts, and wall castings without permitting materials to segregate or free water to collect on the surface, due consideration being given to the methods of placing and compacting.

I. No excessively wet concrete will be permitted, and if at any time concrete of such consistency beyond the limits of Table B is delivered to the job, the Engineer may direct the Contractor to reject same. No additional water shall be added by drivers of transit-mix trucks except that established for the design. Failure to comply with this requirement shall be justification for rejecting the concrete.

J. The concrete supplier shall submit a certified copy of the mill test certificate showing that the Portland cement used in the batching of all concrete delivered to the project is in conformance with the requirements of these specifications. The mill test certificate shall show point of origin of the Portland cement, type, and shall state that the material is in conformance with these specifications and standard mill practice established by the Portland Cement Association. A mill test certificate shall be supplied for each lot of cement that is used in the manufacture of concrete for this project. Cements not included on the LADOTD approved products list will not be acceptable.

1.05 ACCEPTANCE TESTS

A. Conformity of aggregates to these Specifications, and the actual proportions of cement, aggregates, and water necessary to produce concrete conforming to the requirements set forth in Table A, shall be determined by tests made with representative samples of the materials to be used on the work. Tests will be made by an accredited testing laboratory from the Owner's pre-qualified vendors list in accordance with Section 01410.

B. Cement may be subject to testing to determine that it conforms to the requirements of this Specification. Methods of testing shall conform to the appropriate specification, but the place, time, frequency, and method of sampling will be determined by the Engineer in accordance with the particular need.

C. Samples of fine and coarse aggregates shall be delivered to the laboratory for examination and testing at least three (3) weeks before the Contractor proposes to use them in the work.

D. Water content of the concrete shall be based on a curve showing the relation between water content and seven (7) and twenty-eight (28) day compressive strengths of concrete made using the proposed materials. The curves shall be determined by four (4) or more points, each representing an average value of at least three (3) test specimens at each age, and shall have a range of values sufficient to yield the desired data, including all the compressive strengths called for on the Drawings, without extrapolation. The water content of the concrete to be used, as determined from the curve, shall correspond to the test strengths of the laboratory trial mixtures as shown on Table C.

TABLE C

Design Strength	Minimum Lab Strength 7 Day	28 Days
4000	3500	4600
6000	4000	6000

E. In no case, however, shall the resulting mix conflict with the limiting values for maximum water-cement ratios and minimum cement contents as specified in Table A.

PART 2: PRODUCTS

2.01 MATERIALS

A. Concrete shall be of Portland cement, fine aggregate, coarse aggregate, water and admixtures as specified and shall be ready-mixed, or transit-mixed concrete produced by a plant acceptable to the Engineers. All constituents, including admixture, shall be batched at the central batch plant in accordance with ASTM C-94. Materials shall conform to these Specifications and any State or local specification requirements. Mixtures containing fly ash shall not be acceptable.

B. Cement:

1. Cement for all cast in place concrete shall be a domestic Portland cement (ASTM C150, Type I) or high early strength Portland cement (ASTM C150, Type III) free from injurious water soluble salts or alkalis.

2. High early strength cement may only be used with written approval of the Engineer.

3. Air entraining cements shall not be used.

4. Cement brands shall be subject to approval of the Engineer.

5. Fly ash and slag cements shall not be used.

C. Aggregates:

1. Fine aggregate shall consist of washed inert sand conforming to the requirements of ASTM C33, and the following detailed requirements:

Fineness Modulus	2.30-3.10
Organics	Organic Plate 2, per ASTM 40
Silt	2.0% maximum
Mortar	95% minimum as per ASTM C87 Section10
Soundness	8% maximum loss, using magnesium sulfate, subjected to 5 cycles

2. Coarse aggregate shall consist of well-graded crushed rock or washed gravel conforming to the requirements of ASTM C33 and the following detailed requirements:

Organics	Organic Plate 1, per ASTM C40
Silt	1.0% maximum
Soundness	8% maximum loss, using magnesium sulfate, subjected to 5 cycles

3. The following designated sizes* of aggregate shall be the maximum employed in concrete:

2-inch for plain concrete
1-inch for reinforced sections 10-in and over in thickness
3/4-inch for reinforced sections less than 10-in thickness

D. Water:

1. Water shall be clean and free from injurious amounts of oils, acid, alkali, organic matter, or other deleterious substances.

2. When subjected to the mortar strength test described in ASTM C87, the twenty-eight (28) day strength of mortar specimens made with the water under examination and normal Portland cement shall be at least one hundred percent (100%) of the strength of similar specimens made with distilled water.

3. Potable tap water will normally fulfill the above requirements.

E. Admixtures:

1. A water reducing agent such as Pozzolith, WRDA or equal may be used in all concrete. The admixture shall conform to ASTM C494. Proportioning and mixing shall be as recommended by the manufacturer.

2. Admixtures causing accelerated setting of cement in concrete shall not be used.

3. Air Entrainment admixtures shall not be used.

4. Anti-microbial/Waterproofing admixtures: Incorporate Xypex Bio-San C500, or equal admixture into the concrete to be used in the wet well and influent screen channels at a rate of 1% by weight of cementitious material, and in accordance with manufacturer's instructions.

F. Grout:

1. Grout for setting bearing plates for structural steel, machinery, and other equipment shall be mixed as recommended by the manufacturer to give the necessary consistency for placing and to give a minimum compressive strength of 3,000 lbs. per square inch in three (3) days, and 6,800 lbs. per square inch in twenty-eight (28) days.

2. Non-shrink grout shall be Masterflow 713 as manufactured by the Master Builders Company, Euco N-S by Euclid Chemical Co., Five Star Grout by U.S. Grout Corp., or equal.

G. Reinforcing Steel:

1. Epoxy-coated reinforcing bars shall be ASTM A 615, Grade 60 ASTM A 706, deformed bars, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length. Steel reinforcement shall be fabricated according to CRSI's "Manual of Standard Practice.

2. Bar supports, including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place, shall be manufactured from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

PART 3: EXECUTION

3.01 MEASURING MATERIALS

A. Materials shall be measured by weighing except as otherwise specified or where other methods are specifically authorized by the Engineer. The apparatus provided for weighing the aggregates and cement shall be suitably designed and constructed for this purpose. Scales shall have been certified by the local Sealer of Weights and Measures within one (1) year of use. Each size of aggregate and the cement shall be weighed separately. The accuracy of all weighing devices shall be such that successive quantities can be measured to within one percent of the desired amount. Cement in standard packages (sacks) need not be weighed, but bulk cement and fractional packages shall be weighed.

B. Water shall be measured by volume or by weight. The water-measuring device shall be capable of control to ½-percent accuracy. All measuring devices shall be subject to approval. Admixtures shall be dispensed either manually with use of calibrated containers or measuring tanks, or by means of an approved automatic dispenser designed by the manufacturer of the specific admixture.

3.02 MIXING

A. Concrete shall be ready-mixed, or transit-mixed, as produced by equipment acceptable to the Engineer. No hand-mixing will be permitted. Adding water in controlled amounts during the mixing cycle shall be done only with the express approval of, and under the direction of, the Engineer.

B. Ready-mix or transit-mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities for the respective conditions as stated on the name plate. Discharge at the site shall be within 1½ hours and within one (1) hour when ambient temperature is above 85°F after cement was first introduced into the mix. Central mixed concrete shall be plant-mixed a minimum of 1½ minutes per batch and then shall be truck-mixed or agitated a minimum of eight (8) minutes. Agitation shall begin immediately after the pre-mixed concrete is placed in the truck and shall continue without interruption until discharge. Transit-mixed concrete shall be mixed at mixing speed for at least ten (10) minutes immediately after charging the truck, followed by agitation without interruption until discharged.

C. All central plant and rolling stock equipment and methods shall conform to ACI 304, ASTM C94, and the latest Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers' Bureau of the National Ready-Mixed Concrete Association.

D. The retempering of concrete or mortar which has partially hardened, that is, mixing with or without additional cement, aggregate, or water, will not be permitted.

E. Attention is called to the importance of dispatching trucks from the batching plant so that they shall arrive at the site of the work just before the concrete is required, thus avoiding excessive mixing of concrete while waiting or delays in placing successive layers of concrete in the forms.

F. Deliver to the Engineer at the time of each truckload transported to the site a mix ticket, showing at least the following: concrete plant identification, date, quantity of ingredients (including water) added at the batch plant, time of charge, and truck number.

3.03 INSPECTION AND CONTROL

A. The preparation of forms, placing of reinforcing steel, conduits, pipes, and sleeves, batching, mixing, transportation, placing, curing, and testing of concrete shall be at all times under the inspection of the Engineer.

B. The Contractor shall engage the services of an accredited testing laboratory in accordance with Section 01300 to review the basic mixtures of concrete as required by the specifications,

to test field control cylinder specimens, and to conduct other tests as specified herein or as deemed required by the Engineer to ensure the quality of concrete as specified. All tests shall be performed in accordance with the applicable ASTM standard methods.

3.04 FIELD TESTS

A. Sets of four (4) field control cylinder specimens shall be taken for every one-hundred (100) cubic yards of concrete placed. During cold weather concreting, one additional test cylinder shall be taken and cured on the job site under the same conditions as the concrete it represents. Not less than one set of specimens shall be taken on any one day when concrete is being placed. At least one slump test shall be performed for each set of test cylinders taken and for each concrete mixer truck load delivery. All specimens shall be taken in conformance with ASTM C31. When average ultimate twenty-eight (28) day strength of control cylinders in any set falls below the required ultimate strength or below proportional minimum seven (7) day strengths where proper relation between seven (7) and twenty-eight (28) day strengths have been established by tests, proportions, water content, or temperature conditions shall be changed to secure the required strength.

B. The Contractor shall cooperate in the making of such tests to the extent of allowing free access to the work for the selection of samples, providing heated (when required) moist storage facilities for specimens, affording protection to the specimens against injury or loss through his operations, and furnishing material and labor required for the purpose of taking concrete cylinder samples, curing boxes, and shipping boxes.

3.05 CONCRETE APPEARANCE

A. Concrete for every part of the work shall be of homogeneous structure which, when hardened, will have the required strength, durability and appearance.

B. Formwork, mixtures and concrete placement workmanship shall be such that concrete surfaces, when exposed, will require only minimal finishing with no excess honeycombing, voids or irregular color lines.

3.06 FORMS

A. Forms shall be used for all concrete masonry, including footings. Forms shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, appearance, and to the elevations indicated on the Drawings.

B. Forms for all exposed exterior and interior concrete walls shall be plywood with "A" veneer exterior on casting side. Rustications shall be at the location and to the details shown on the Drawings. Moldings for chamfers and rustications shall be milled and planed smooth.

C. Forms shall be made of wood, metal, or other approved material. Wood forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots; where used for exposed surfaces, boards shall be dressed and matched. Plywood shall be sanded smooth and fitted with tight joints between panels. Metal forms shall be of an approved type for the class of work involved and of the thickness and design required for rigid construction.

D. Edges of all form panels in contact with concrete shall be flush within 1/32-inch and forms for plane surfaces shall be such that the concrete will be plane within 1/16-inch in four feet (4'). Forms shall be tight to prevent the passage of mortar and water and grout.

E. Forms for walls shall have removable panels at the bottom for cleaning, inspection, and scrubbing-in of bonding paste. Forms for walls of considerable height shall be arranged with

tremies and hoppers for placing concrete in a manner that will prevent segregation and accumulation of hardened concrete on the forms or reinforcements above the fresh concrete.

F. Molding or bevels shall be placed to produce a 3/4-inch chamfer on all exposed projecting corners, unless otherwise shown on the Drawings. Similar chamfer strips shall be provided at horizontal and vertical extremities of all wall placements to produce "clean" separation between successive placements as called for on the Plans.

G. Forms shall be sufficiently rigid to withstand vibration, to prevent displacement or sagging between supports, and constructed so the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.

H. Forms, including new pre-oiled forms, shall be oiled before reinforcement is placed, with an approved nonstaining oil or liquid form coating having a non-paraffin base.

I. Before form material is reused, all surfaces in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn, all protrusions smoothed and in the case of wood forms pre-oiled.

J. Form ties encased in concrete shall be designed so that after removal of the projecting part, no metal shall be within 1½-inch of the face of the concrete. That part of the tie to be removed shall be at least one-inch (1") diameter, or be provided with a wood, metal, or plastic cone at least one-inch (1") in diameter and one-inch (1") long. Form ties in concrete exposed to view shall be the cone-washer type equal to the Richmond "Tyscru". Through bolts or common wire shall not be used for form ties. Ties for water-holding structures shall have an integral waterstop that is tightly fitted to the tie at minor point.

3.07 PLACING AND COMPACTING

A. Unless otherwise permitted, the work begun on any day shall be completed in daylight of the same day.

B. Concrete is not to be placed until reinforcing steel, pipes, conduits, sleeves, hangers, anchors, and other work required to be built into concrete have been inspected and approved by the Engineer. Remove water and foreign matter from forms and excavation. Place no concrete on frozen soil, and provide adequate protection against frost action during freezing weather. All soil bottom for slabs and footings shall be approved by the Engineer before placing concrete.

C. Transport concrete from mixer to place of final deposit as rapidly as practicable by methods which prevent separation of ingredients and displacement of reinforcement, and which avoid rehandling. Partially hardened concrete is not to be used.

D. "Cold joints" are to be avoided, but if they occur, are to be treated as bonded construction joints.

E. At construction joints the surfaces of the concrete already placed, including vertical and inclined surfaces, shall be thoroughly cleaned of foreign materials and laitance, and weak concrete and roughened with suitable tools to expose a fresh face. At least two hours before and again shortly before the new concrete is deposited, the joints shall be saturated with water. After glistening water disappears, the joints shall be given a thorough coating of neat cement slurry mixed to the consistency of very heavy paste. The surfaces shall receive a coating at least 1/8-inch thick, well scrubbed-in by means of stiff bristle brushes whenever possible. New concrete shall be deposited before the neat cement dries.

F. Deposit concrete to maintain, until the completion of the unit, a horizontal plastic surface. Vertical lifts shall not exceed twenty-four inches (24") and preferably eighteen-inches (18").

G. Chutes for conveying concrete shall be of U-shaped design and sized to insure a continuous flow of concrete. Flat (coal) chutes shall not be employed. Chutes shall be metal or metal-lined and each section shall have approximately the same slope. The slope shall not be less than 25 nor more than 45° from the horizontal, and shall be such as to prevent the segregation of the ingredients. The discharge end of the chute shall be provided with a baffle plate or spout to prevent segregation. If the discharge end of the chute is more than five feet (5') above the surface of the concrete in the forms, a spout shall be used, and the lower end maintained as near the surface of deposit as practicable. When the operation is intermittent, the chute shall discharge into a hopper. Chutes shall be thoroughly cleaned before and after each run, and the debris and any water shall be discharged outside the forms. Concrete shall not be allowed to flow horizontally over distances exceeding five feet (5').

H. The pumping of concrete is an acceptable method. The proposed equipment and concrete mix shall be submitted to the Engineer for review prior to usage. The Contractor shall submit his entire plan of operation from time of discharge of concrete from the mixer to final placement in the forms, and the steps to be taken to prevent the formation of cold joints in case the transporting of concrete by chute, conveyor, or pumps is disrupted.

1. Aluminum alloy pipelines shall not be used for delivery of concrete.

2. The trial mixes intended for pumping shall be prepared and tested in laboratory in accordance with all applicable ASTM Standards, and comply to all above mentioned requirements.

3. The selected trial mixes shall be tested for pumpability. The pumpability test(s) involves a duplication of anticipated job conditions from beginning to end. The batching and truck mixing shall be the same as will be used, the same pump and operator shall be present and the pipe and/or hose layouts shall reflect the maximum height and distance contemplated.

4. If a go-devil device pushed by water is used to clean out the pipe, additional measures to prevent water spillage into the placement area shall be taken.

5. Sampling as indicated by the Engineer at both the truck discharge and points of final placement shall be employed to determine if any changes in the slump, air content and other significant mix characteristic occur. However, only the quality of the concrete at the placement end of the line will be considered.

6. No water will be permitted to be added in order to increase workability.

7. Pumps shall be operated and maintained so that a continuous stream of concrete is delivered into the forms without air pockets, segregation, or change in slump. When pumping is completed, concrete to be used remaining in the pipeline shall be ejected without contamination of concrete or segregation of ingredients. After each operation, equipment shall be thoroughly cleaned, and the flushing water shall be wasted outside the forms. Standby equipment shall be provided to assure continuity of operation when clogging or breakdown occur.

I. In thin sections of considerable height, concrete shall be placed using suitable hoppers, spouts with restricted outlets, or otherwise, as required or approved.

J. Concrete during and immediately after depositing shall be thoroughly compacted by means of suitable tools. Internal type mechanical vibrators shall be employed to produce required quality of finish. Vibration shall be done by experienced operators under close supervision and shall be carried on long enough to produce homogeneity and optimum consolidation without permitting segregation of the solid constituents or "pumping" or migration of air. All vibrators shall be supplemented by proper wooden spade puddling adjacent to forms to remove included bubbles and honeycomb. This is essential for the top lifts of walls. All vibrators shall travel at

least 10,000 rpm and be of adequate capacity. At least one vibrator shall be used for every ten (10) cubic yards of concrete placed per hour. In addition, one spare vibrator in operating condition shall be on the site.

K. Concrete slabs on the ground shall be well-tamped into place and foundation material shall be wet, tamped, and rolled until thoroughly compacted prior to placing concrete.

L. Concrete shall be deposited continuously in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. If a section cannot be placed continuously, construction joints may be located at points as provided for in the Drawings or approved by the Engineer.

3.08 CURING AND PROTECTION

A. Protect all concrete work against injury from the elements and defacements of any nature during construction operations. Special curing procedures shall be implemented as described herein to minimize the cracking of concrete in water retaining structures.

B. Concrete placed at air temperature below 40°F shall have a minimum temperature of 60°F. When the air temperature is below 40°F or near 40°F and falling, the water and aggregates shall be heated before mixing. Accelerating chemicals shall not be used to prevent freezing. All concrete shall be so protected that the temperature at the surface will not fall below 50°F for at least seven (7) days after placing. The Contractor shall submit for approval by the Engineer the methods he proposes to use against low temperatures. No salt, manure, or other chemicals shall be used for protection.

C. All concrete, particularly exposed surfaces, shall be treated immediately after concreting or cement finishing is completed to provide continuous moist curing above 50°F for at least seven (7) days, regardless of the ambient air temperature. Walls and vertical surfaces may be covered with continuously saturated burlap, or other approved means; horizontal surfaces, slabs, etc. shall be pounded to a depth of ½-inch or kept continuously wet by use of sprinklers.

1. Slabs of water retaining structures shall be wet cured continuously with approved means for a minimum of fourteen (14) days if Type I cement is used, or for three (3) days if Type III cement is used.

2. Walls of water retaining structures shall have all their exposed surfaces covered from direct sunlight and forms left in place for a minimum of three (3) days. Curing shall commence within four (4) hours after concrete placement.

3. A LDOTD approved white pigmented curing compound shall be applied to all street pavement slabs. Application of the curing compound shall be in strict accordance with the manufacturer's recommendation including application rates.

D. In cold weather supplementary continuous warm curing (above 50°F) shall provide a total of 350-day degrees (i.e., five (5) days, 70°F, etc.) of heat.

E. In hot weather, concrete when deposited shall have a placing temperature which will not cause difficulty from loss of slump, flash set or formation of cold joints. In no case shall the temperature of concrete being placed exceed 90°F.

F. Finished surface and slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

3.09 REMOVAL OF FORMS

A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has cured as specified above in Subparagraph 3.08C and the concrete has

attained a strength of at least thirty percent (30%) of the ultimate strength prescribed by the design, and not before reaching the following number of day-degrees (whichever is the longer):

Forms for	Day-degree*
Beams and slabs	500
Walls and vertical surfaces (non-water retaining)	100
Walls and vertical surfaces (water retaining)	150

* Day-degree: Total number of days times average daily air temperature at surface of concrete. For example, five (5) days at a daily weighted average temperature of 60°F equal 300 day-degrees. (Days with temperatures below 50°F not to be included).

B. Shores shall not be removed until the concrete has attained at least 75% of the specified strength and also sufficient strength to support safely its own weight and the construction live loads upon it, but concrete shall be minimum age of fourteen (14) days before such removal.

3.10 FAILURE TO MEET REQUIREMENTS

A. Should the strengths shown by the test specimens made and tested in accordance with the above provisions fall below the values given in Table A, the Engineer shall have the right to require changes in proportions as outlined above to apply to the remainder of the work. Furthermore, the Engineer shall have the right to require additional curing on those portions of the structure represented by the test specimens which failed, the cost of such additional curing to be at the Contractor's expense. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer shall have the right to require strengthening or replacement of those portions of the structure which fail to develop the required strength. The cost of all such core borings and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be entirely at the expense of the Contractor. In such cases of failure to meet strength requirements the Contractor and Engineer shall confer to determine what adjustment, if any, can be made in conformity with Sections 16 and 17 of ASTM C94.

B. When the tests on control specimens of concrete fall below the required strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in accordance with ASTM C42 and C39. In case of failure of the latter, the Engineer, in addition to other recourses, may require, at the Contractor's expense, load tests on any one of the slabs, beams, piles, caps, and columns in which such concrete was used. Test need not be made until concrete has aged sixty (60) days.

C. Slabs or beams, under load test, shall be loaded with their own weights plus a super-imposed load of two (2) times design live load. The load shall be applied uniformly over portion being tested in approved manner, and left in position for 24 hours. The structure shall be considered satisfactory if deflection "D" in feet, at the end of a 24-hour period, does not exceed value:

D equals 0.001(L x L)/t

in which "L" is span in feet, "t" is depth of slab or beam in inches.

D. If deflection exceeds "D" in the above formula, the concrete shall be considered faulty unless within 24 hours after removal of the load, slab or beam under test recovers at least seventy-five percent (75%) of observed deflection.

3.11 PATCHING AND REPAIRS

A. It is the intent of these Specification to require that forms, mixture of concrete and workmanship shall be such that concrete surfaces, when exposed, will require minimal finishing as specified in Paragraph 3.05 above.

B. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties (except where ties are left in place during sandblasting) shall be filled, and surface defects which do not impair structural strength shall be repaired. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to approval of the Engineer.

C. Immediately after removal of forms remove plugs and break off metal ties as required by Paragraph 3.06. Holes are then to be promptly filled upon stripping as follows: Moisten the hole with water, followed by a 1/16-inch brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1-1.5 mixture of cement and concrete sand mixed slightly damp to the touch (just short of "balling"). Hammer the grout into the hole until dense, and an excess of paste appears on the surface in the form of a spider web. Trowel smooth with heavy pressure. Avoid burnishing.

When patching or repairing exposed surfaces the same source of cement and sand as used in the parent concrete shall be employed. Adjust color, if necessary, by addition of proper amounts of white cement.

D. Rub lightly with a fine Carborundum stone at an age of one (1) to five (5) days if necessary to bring the surface down with the parent concrete. Exercise care to avoid damaging or staining the virgin skin of the surrounding parent concrete. Wash thoroughly to remove all rubbed matter.

E. Defective concrete and honeycombed areas shall be chipped down reasonably square and at least one-inch (1") deep to sound concrete by means of hand chisels or pneumatic chipping hammers. Irregular voids or surface stones need not be removed if they are sound, free of laitance, and firmly embedded in the parent concrete, subject to Engineer's final inspection. If honeycomb exists around reinforcement, chip to provide a clear space at least 3/8-inch wide all around the steel. For areas less than 1½-inch deep, the patch may be made in the same manner as described above for filling form tie holes, care being exercised to use adequately dry (non-trowelable) mixtures and to avoid sagging. Thicker repairs will require build-up in successive 1½-inch layers on successive days, each layer being applied (with slurry, etc.) as described above. The Contractor shall use non-shrink, non-metallic grout for these repairs.

3.12 INSTALLATION SCHEDULE

A. Concrete for structures shall have minimum compressive strength at twenty-eight (28) days of 4000 psi unless otherwise shown on the Drawings.

3.13 FIELD CONTROL

A. The Contractor shall advise the Engineer of his readiness to proceed at least 24 hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing and the alignment and tightness of formwork. No placement shall be made without the prior approval of the Engineer.

B. The Engineer may have cores taken from any questionable area in the concrete work such as construction joints and other locations as required for determination of concrete quality. The results of tests on such cores shall be the basis for acceptance, rejection or determining the continuation of concrete work.

C. The Contractor shall cooperate in the obtaining of cores by allowing free access to the work and permitting the use of ladders, scaffolding and such incidental equipment as may be required. The Contractor shall repair all core holes to the satisfaction of the Engineer. The work of cutting and testing the cores will be at the expense of the Owner if cores test satisfactorily and will be at the expense of the Contractor if cores test unsatisfactorily.

3.14 MISCELLANEOUS WORK

A. All bolts, anchors, miscellaneous metals or other sleeves and steel work required to be set in the concrete forms for attachment of masonry, structural, and mechanical equipment shall be set or installed under this Section. The Contractor shall be fully responsible for the setting of such materials in the forms and shall correct all such not installed in a proper location or manner at his own expense.

B. Electric conduits shall be installed in the concrete as required by the Drawings and specified herein. Outlet boxes and fixtures shall be located in reference to the final floor, wall or ceiling finish and shall be as secured that they will not be displaced by concrete placing.

C. Pipes or conduits for embedment, other than those merely passing through shall not be larger in outside diameter than one-third (1/3) the thickness of the slab, wall, or beam in which they are embedded, unless indicated on the Drawings, nor shall they be spaced closer than three (3) diameters on center, nor so located as to unduly impair the strength of the construction. All conduits and fixtures shall be located as approved by the Engineer.

D. Concrete foundations, supports and bases for all equipment and machinery shall be built to the equipment manufacturer's requirements, as approved by the Engineer, with anchor bolts installed.

E. All motor control centers and power control centers shall be installed on four-inch (4") minimum depth concrete bases as specified above.

3.15 PLACING REINFORCING STEEL

A. The Contractor shall comply with CRSI's "Manual of Standard Practice" for placing reinforcement. There shall be no field bending or straightening of reinforcement partially embedded in concrete.

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SECTION 11151

SELF PRIMING CENTRIFUGAL PUMPS

PART 1 -- GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all materials, equipment, transportation, tools and labor necessary and complete the installation with all pump/motors, controls, piping, valves, wiring, etc. necessary for a complete and operating pumping system. The pump station shall be outfitted with four (4) horizontal self-priming solids handling centrifugal pumps. Equipment shall be new, suitable for intended usage, and installed in complete conformance with the manufacturer's instructions and these specifications.

1.2 SUBMITTALS

A. Copies of all materials required to establish compliance with the specifications shall be submitted in accordance with the provisions of the General Conditions. Submittal shall include at least the following:

B. Certified shop and erection drawings showing all important details of construction, dimensions, and anchor bolt locations.

C. Descriptive literature, bulletins, and/or catalogs of the equipment.

D. Data on characteristics and performance of the pump. Data shall include guaranteed performance curves, based on actual shop tests of duplicate units, which show that they meet the specified requirements for head, capacity, efficiency, allowable NPSH, allowable suction lift, and horsepower. Curves shall be submitted on separate 8 ½ by 11-inch sheets. Curves for multiple speed pumps shall be provided with curves plotted for each specified rpm.

E. The total weight of the equipment including the weight of the single largest items.

F. A complete total bill of materials for all equipment.

G. A list of the manufacturer's recommended spare parts with the manufacturer's current price for each item. Include gaskets, packing, and related items on the list. List bearings by the bearing manufacturer's number only.

1.3 OPERATING INSTRUCTIONS

A. Copies of an operating and maintenance manual for each pump shall be furnished to the Engineer as provided for in General Requirements. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, and other material required to instruct operating and maintenance personnel unfamiliar with such equipment.

B. A factory representative who has complete knowledge of proper operation and maintenance shall be provided for one (1) day to instruct representatives of the Owner and the Engineer on proper operation and maintenance of this equipment. This work may be conducted in conjunction with the inspection of the installation and test run. If there are difficulties in operation of the equipment due to the manufacturer's design of fabrications, additional service shall be provided at no cost to the Owner.

1.4 RELATED WORK SPECIFIED ELSEWHERE

A. Electrical Work and controls.

1.5 WARRANTY

A. Contractor shall warrant equipment and installation to be free from defects for a period of one (1) year from the date of acceptance, excepting only those items normally consumed in service.

B. Components which fail under this warranty shall be repaired or replaced without cost of labor or materials to the owner.

C. The pump manufacturer shall provide a minimum 4-year warranty on the self-priming pumps

PART 2 -- PRODUCTS

2.1 SELF-PRIMING PUMPS

A. Performance Criteria. Self-priming pumps must be designed to handle raw, unscreened, domestic sanitary sewage. Each pump shall be guaranteed to perform at the following conditions: 1) 2700 GPM @ 53 feet TDH at 1150 RPM, minimum hydraulic efficiency of 75%, 2) 2000 GPM @ 67 feet TDH at 1150 RPM, minimum hydraulic efficiency of 75%. The minimum shut off head for each pump shall be 96 feet. The motors shall be suitable for 3 phase, 60 hertz, 480 volt, 4 wire power supply. The motors shall be 50 horsepower. Pump performance shall be stable and free from cavitation and noise throughout the entire specified operating range.

B. Solids Handling Capability.

1. All internal passages, impeller vanes, and recirculation ports shall pass a 3” spherical solid. Smaller internal passages that create a maintenance nuisance or interfere with priming and pump performance shall not be permitted. Certified drawings showing size and location of the recirculation port(s) shall be submitted for approval.

C. Reprime Performance.

1. Consideration shall be given to the sanitary sewage service anticipated, in which debris is expected to lodge between the suction check valve and its seat, resulting in the loss of the pump suction leg, and siphoning of liquid from the pump casing to the approximate center line of the impeller. Such occurrence shall be considered normal, and the pump must be capable of automatic, unattended operation with an air release line installed.

2. During unattended operation, the pump shall retain adequate liquid in the casing to ensure automatic repriming while operating at its rated speed in a completely open system. The need for a suction check valve or external priming device shall not be required.

3. Pump must reprime the vertical distance shown on the plans at the specified speed and impeller diameter. Reprime lift is defined as the static height of the pump suction above the liquid, while operating with only one-half of the liquid remaining in the pump casing. The pump must reprime and deliver full capacity within five minutes after the pump is energized in the reprime condition. Reprime performance must be confirmed with the following test set-up:

D. A check valve to be installed downstream from the pump discharge flange. The check valve size shall be equal (or greater than) the pump discharge diameter.

E. A length of air release pipe shall be installed between pump and the discharge check valve. This line shall be fitted with a Gorman-Rupp Model GRP33-07 (or equal) air release valve and be vented to the wet well as indicated on the Drawings.

F. The pump suction check valve shall be removed. No restrictions in the pump or suction piping will prevent the siphon drop of the suction leg. Suction pipe configuration for reprime test shall incorporate a 2 feet minimum horizontal run, a 90° elbow and vertical run at the specified lift. Pipe size shall be equal to the pump suction diameter.

G. Impeller clearances shall be set as recommended in the pump service manual.

H. Repeatability of performance shall be demonstrated by testing five consecutive reprime cycles. Full pump capacity (flow) shall be achieved within five minutes during each cycle.

I. Liquid to be used for reprime test shall be water.

J. Upon request from the Engineer, certified reprime performance test results, prepared by the manufacturer, and certified by a registered professional engineer, shall be submitted for approval prior to shipment.

K. Manufacturer

1. Gorman-Rupp model T10A-B-2, All Prime model XS-10, or equal

2.2 Pump Design.

A. Pumps shall be horizontal, self-priming centrifugal type, designed specifically for handling raw, unscreened, domestic sanitary sewage. Pump solids handling capability and performance criteria shall be in accordance with requirements listed herein.

B. Materials and Construction Features.

1. Pump casing: Casing shall be cast iron Class 30 with integral volute scroll. Casing shall incorporate following features:

2. Mounting feet sized to prevent tipping or binding when pump is completely disassembled for maintenance.

3. Fill port cover plate, 3 1/2" diameter, shall be opened after loosening a hand nut/clamp bar assembly. In consideration for safety, hand nut threads must provide slow release of pressure, and the clamp bar shall be retained by detente lugs. A Teflon gasket shall prevent adhesion of the fill port cover to the casing.

4. Casing drain plug shall be at least 1 1/4" NPT to insure complete and rapid draining.

C. Liquid volume and recirculation port design shall be consistent with performance criteria listed herein.

D. Cover plate:Cover plate shall be cast iron Class 30. Design must incorporate following maintenance features:

E. Retained by hand nuts for complete access to pump interior. Cover plate removal must provide ample clearance for removal of stoppages, and allow service the impeller, seal, wear plate or check valve without removing suction or discharge piping.

F. A replaceable wear plate secured to the cover plate by weld studs and nuts shall be AISI 1018 HRS.

G. In consideration for safety, a pressure relief valve shall be supplied in the cover plate. Relief valve shall open at 75-200 PSI.

H. O-ring of Buna-N material shall seal cover plate to pump casing.

I. Rotating Assembly: A rotating assembly, which includes impeller, shaft, mechanical shaft seal, lip seals, bearings, seal plate and bearing housing, must be removable as a single unit without disturbing the pump casing or piping. Design shall incorporate following features:

J. Seal plate and bearing housing shall be cast iron Class 30. Separate oil filled cavities, vented to atmosphere, shall be provided for shaft seal and bearings. Cavities must be cooled by the liquid pumped and lip seals will prevent leakage of oil. The bearing cavity to have an oil level sight gauge and fill plug check valve. The check valve shall vent the cavity but prevent introduction of moist air to the bearings.

K. Impeller shall be ductile iron, two-vane, semi-open, non-clog, with integral pump out vanes on the back shroud. Impeller shall thread onto the pump shaft and be secured with a lock screw and conical washer.

L. Shaft shall be AISI 17-4 PH stainless steel.

M. Bearings shall be anti-friction ball or tapered roller type of proper size and design to withstand all radial and thrust loads expected during normal operation. Bearings shall be oil lubricated from a dedicated reservoir. Pump designs which use the same oil to lubricate the bearings and shaft seal shall not be used.

N. Shaft seal shall be oil lubricated mechanical type. The stationary and rotating seal faces shall be tungsten titanium carbide alloy. Each mating surface shall be lapped to three light band flatness, as measured by an optical flat under monochromatic light. The stationary seal seat shall be double floating by virtue of a dual O-ring design; an external O-ring secures the stationary seat to the seal plate, and an internal O-ring holds the faces in alignment during periods of mechanical or hydraulic shock (loads which cause shaft deflection, vibration, and axial/radial movement). Elastomers shall be viton. Cage and spring to be AISI 316 stainless steel. Seal shall be oil lubricated from a dedicated reservoir. The same oil shall not lubricate both shaft seal and shaft bearings. Seal shall be warranted in accordance with requirements listed herein.

O. Adjustment of the impeller face clearance (distance between impeller and wear plate) shall be accomplished by external means. Stainless steel adjusting shims shall be used to move the entire rotating assembly as a unit when adjusting the working clearances. Clearance adjustment which requires movement of the shaft only, thereby adversely affecting seal working length or impeller back clearance, shall not be used.

P. Suction check valve shall be molded Neoprene with integral steel and nylon reinforcement. A blow-out center shall protect pump casing from hydraulic shock or excessive pressure. Removal or installation of the check valve must be accomplished through the cover plate opening, without disturbing the suction piping. Sole function of check valve shall be to save energy by eliminating need to reprime after each pumping cycle. Pumps requiring a suction check valve to assist reprime shall not be used.

Q. Spool flanges shall be one-piece cast iron, Class 30 fitted to suction and/or discharge ports. Each spool shall have one 1-1/4" NPT and one 1/4" NPT tapped hole with pipe plugs for mounting gauges or other equipment.

R. A cast iron flare fitting shall be used at the end of the suction line in the wet well.

S. Anchor Bolts: Anchor bolts shall be Type 304 Stainless Steel.

2.3 CONTROLS

A. Controls shall be as specified in Division 16 – Electrical.

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Installation of pumping equipment shall be in strict accordance with the manufacturer's instructions and recommendation in the locations shown on the drawings.

3.2 TESTING AND ACCEPTANCE

A. Factory Tests: Each pump being furnished under these specifications shall be factory tested. Certified copies of the Hydrostatic Test Report shall be supplied prior to conducting a pump performance test.

B. Installation & Field Acceptance Tests: The pumps and motors shall be installed in accordance with the instructions of the manufacturer and as indicated on the Drawings. In addition, the pumps and motors shall be installed under the supervision of a factory representative of the manufacturer supplying the equipment.

C. The Contractor shall submit certification by the equipment manufacturer that their equipment has been satisfactorily installed and ready for operation and that the operating personnel have been adequately instructed in the operation, lubrication, and maintenance of their equipment.

D. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer=s recommendations. Furnish all anchor bolts, temporary lifting equipment, power, water, labor and all other incidentals required for the proper installation of the pumps.

E. Furnish the services of a factory representative who has complete knowledge and experience in the proper installation, operation, and maintenance of the pumping equipment, to inspect the final installation and supervise the field acceptance tests of the equipment. These services shall be provided for a minimum of one (1) day with additional time provided, if required by the Engineer, to correct problems or deficiencies. These services shall be combined with those provided under Paragraph 1.5, Operating Instructions.

F. Field testing shall be conducted after the installation of all equipment has been completed, and the equipment operated for a sufficient period to make all desirable corrections and adjustments. Each pumping unit and all associated equipment shall be given a field test to determine that operation is satisfactory and in compliance with the Specification.

END OF SECTION 11151

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STRATUM ENGINEERING, LLC
Geotechnical Engineering ◆ Testing and Inspection Services

January 19, 2016

Kyle Associates, LLC
638 Village Lane North
Mandeville, Louisiana 70471

Attn: Mr. Phil Nelson, P.E.

Re: Geotechnical Engineering Report
Proposed West St. Tammany Parish
Waste Water Treatment Plant Expansion
Covington, Louisiana
Project No. G15-108

Dear Phil:

Stratum Engineering, LLC (SE) is pleased to submit our Geotechnical Engineering Report for the above referenced project. This report includes the results of our field exploration and laboratory testing, and recommendations for foundation design as well as general site development.

We appreciate the opportunity to perform this geotechnical study and look forward to working with you during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please do not hesitate to call.

Respectfully submitted,
STRATUM ENGINEERING, LLC

William "Dean" McInnis, P.E.
Project Manager

Tony Y. Maroun, P.E.
Principal

STATE OF LOUISIANA
TONY Y. MAROUN
License No. 26198
PROFESSIONAL ENGINEER
CIVIL ENGINEERING
1/19/16

WDM/TYM:nsv

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PROJECT INFORMATION

Project Authorization

Stratum Engineering, LLC (SE) has completed a geotechnical exploration for the proposed expansion to the West St. Tammany Regional Waste Water Treatment Plant (WWTP) to be completed for Tammany Utilities in Covington, Louisiana. The exploration was accomplished in general accordance with SE Proposal No. G15-185, dated November 24, 2015.

Project Description

The project includes the installation of new waste water treatment units consisting of an above ground steel aeration/clarifier tank as well as a steel equalization (EQ) tank. Both tanks will be supported on reinforced concrete mats. The units will have plan areas of approximately 5,000 and 12,000 square feet. The aeration/clarifier tank and equalization tank will each be about 16 ½ feet high with empty weights of approximately 300 kips and 85 kips, respectively. Each tank will exert a slab load of about 1,400 pounds per square foot when filled to capacity.

The geotechnical recommendations presented in this report are based on the available project information, plant location, and the subsurface materials described in this report. If any of the noted information is incorrect, please inform SE in writing so that we may amend the recommendations presented in this report, if appropriate and if desired by the client. SE will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site to enable an evaluation of cost effective foundation systems for the proposed Waste Water Treatment Plant Expansion. Two (2) borings were drilled at the site to a depth of 30 feet below the existing ground surface. The borings were located in the field by a Stratum Engineering representative using normal taping from existing landmarks. The approximate locations of the borings are indicated on the boring location plan included in the Appendix.

Our scope of services included a reconnaissance of the project site, drilling the soil borings, select laboratory testing, and preparation of this geotechnical report. The report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents recommendations regarding the following:

- Foundation type, allowable bearing capacity, and an estimate of settlement;
- Seismic site classification;
- Site preparation, including subgrade preparation and fill compaction requirements;
- Factors influencing construction and performance of the proposed improvements.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The site encompasses about 1 acre of property currently occupied by an existing aeration/clarifier tank and associated pump house structure. The property is located off LA Highway 1085 just north of Interstate 12 in Covington, Louisiana. Detailed grading information was unavailable at the time of this report. However, based on conversations with Mr. Phil Nelson of Kyle Associates, we understand that the existing ground surface elevation at the tank locations ranges from +23 to +24 feet. Considering a slab finished floor elevation of +26 feet, 2 to 3 feet of fill may be required to achieve the design grades. Furthermore, we understand that about two (2) feet of fill was previously placed during the initial development of the site.

The site is bounded by a wooded area followed by commercial properties to the north, LA Highway 1085 to the south, Windward Drive to the east, and a wooded area followed by residential properties to the west.

Drilling, Sampling, and Laboratory Testing Procedures

The borings were drilled with an All Terrain Vehicle (ATV) mounted drill rig. Auger and wet rotary drilling techniques were used to advance the borings. Samples were generally obtained continuously from the ground surface to a depth of ten feet and at maximum five foot intervals thereafter. Drilling and sampling techniques were accomplished in general accordance with ASTM Standards.

Undisturbed samples of cohesive soils were generally obtained using thin-wall tube sampling procedures in general accordance with the procedures for "Thin-Walled Tube Geotechnical Sampling of Soils" (ASTM D1587). These samples were extruded in the field with a hydraulic ram and were wrapped in aluminum foil prior to placement in a plastic wrapping to preserve moisture. The samples were transported to the laboratory in containers to prevent disturbance.

For cohesionless soils and semi-cohesive soils, Standard Penetration Tests (SPT) were performed to obtain standard penetration values of the soil. The standard penetration value (N) is defined as the number of blows of a 140-pound hammer, falling 30 inches, required to advance the split-barrel sampler one (1) foot into the soil. Samples of granular soils were obtained utilizing a two (2) inch O.D. split-barrel sampler in general accordance with procedures for "Penetration Test and Split-Barrel Sampling of Soils" (ASTM D1586). To perform the test and obtain a sample, the sampler is lowered to the bottom of the previously cleaned drill hole and advanced by blows from the hammer. The number of blows is recorded for each of three (3) successive increments of six (6) inches penetration. The "N" value is obtained by adding the second and third incremental numbers. The results of the standard penetration test indicate the relative density of cohesionless soils and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components. The split spoon samples were identified according to the project number, boring number, and depth, and were also placed in polyethylene plastic wrapping to protect against moisture loss.

The laboratory testing program included supplementary visual classification and water content tests on all of the soil samples. In addition, selected samples were subjected to unconfined compression testing, percent passing the #200 sieve, and Atterberg Limits determination. Additional estimates of unconfined compressive strength were made using a hand penetrometer. The laboratory testing was performed in general accordance with ASTM Standard Procedures.

Subsurface Conditions

Based on the borings, about 24 inches of previously placed fill consisting of sand and limestone mixture was encountered at the surface of the site. The surficial material was underlain by firm to stiff reddish sandy lean clay to a depth of about 4 feet and was followed by stiff tannish gray lean clay to a depth of about 12 feet. The lean clay was underlain by firm to stiff tannish gray fat clay to a depth of 30 feet, the maximum depth explored.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the Appendix should be reviewed for specific information at the boring locations. These records include soil descriptions, stratification, penetration resistance, and locations of the samples and laboratory test data. The stratification shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected across the site. The stratification represents the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on the boring logs. The samples, which were not altered by laboratory testing, will be retained for 60 days from the date of this report and then will be discarded.

Groundwater Conditions

Groundwater was encountered at a depth between 9 ½ and 10 feet during the drilling operations. However, it should be noted that groundwater levels will fluctuate with seasonal variations in rainfall, extended periods of drought and surface runoff. Therefore, it is recommended that the actual groundwater levels at the site be determined by the contractor at the time of the construction activities.

IBC Site Classification

The International Building Code (IBC), 2012 edition, was reviewed to determine the site classification for seismic design. Based on the soils encountered in the boring and our experience in the general vicinity, the site can be classified as Site Class "D", as outlined in Section 1613.3.2 of the Building Code.

EVALUATION AND RECOMMENDATIONS

General

The type and depth of foundation suitable for a given structure primarily depends on several factors including the subsurface conditions, the function of the structure, the loads it may carry, the cost of the foundation and the criteria set by the Design Engineer with respect to vertical and differential movement which the structure can withstand without damage.

The results of this exploration indicate that the subsurface soils present at the site are fair in bearing quality and suitable to support the structure on a shallow foundation system. Details related to site preparation, foundation design, and construction considerations are presented in subsequent sections of this report.

Site Preparation

We understand that the area may have been filled some time ago and graded to achieve the current elevations. Since the tank sand pads and underlying sandy clay have been filled without any technical observation, it is recommended that 24 inches of the sandy fill be removed and stockpiled for re-use. The bottom 12 inches of the sandy clay fill should be proofrolled and field density tests conducted to verify the density of the in-situ fill.

The subgrade fill should be proofrolled with a tandem axle dump truck or a similar heavily loaded rubber tired vehicle weighing 20 tons. Soils, which are observed to rut or deflect excessively under the moving load, should be undercut and replaced with properly compacted structural fill. The proofrolling and undercutting activities should be witnessed by a representative of the Geotechnical Engineer and should be performed during a period of dry weather.

The remaining fill should be placed in a relatively uniform horizontal lift and should be adequately keyed into the previous lift. The structural fill may consist of sandy clay or clayey sand having a maximum liquid limit of 40 and a plasticity index of less than 18 percent. The structural fill should be compacted to at least 95 percent of the fill's maximum dry density as determined by ASTM D698 (Standard Proctor).

The structural fill should be placed in maximum lifts of eight (8) inches of loose material and should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Each lift of compacted structural fill should be tested by a representative of the Geotechnical Engineer prior to placement of subsequent lifts. In-place density measurements should be taken to assure that the above degree of compaction is achieved.

Mat Foundations

We understand that the proposed waste water treatment plant will be supported on a shallow mat type of foundation bearing at least two (2) feet below the finished grade in the naturally occurring stiff clay or on compacted structural fill. The foundation may be designed for a maximum allowable bearing pressure of 2,500 psf which includes a design factor of safety of three (3).

Estimates of Modulus of Subgrade Reaction (k) for mat foundations will depend on the type and strength of bearing soils, mat size, shape, bearing depth, and magnitude of sustained loads. Since limited information regarding the bearing depth was available at the time the report was prepared, estimates for the subgrade reaction modulus for the soils encountered in the upper 4 feet are tabulated below:

Modulus of Subgrade Reaction (k)		
Soil Type	**Depth (ft)**	**k (pci)**
Silty Clayey Sand with Limestone	0 to 2	250
Sandy Clay	2 to 4	125

The Modulus of Subgrade Reaction (k) can be better estimated by plate load tests conducted on the soils in question at the actual bearing depth.

The foundation excavations should be observed by a representative of SE prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the materials discussed in this report. Soft or loose soil zones encountered at the bottom of the footing excavations should be removed to the level of firm soils or adequately compacted fill as directed by the Geotechnical Engineer. Cavities formed as a result of excavation of soft or loose soil zones should be backfilled with compacted structural fill or crushed stone, as determined by the Geotechnical Engineer.

Footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond prior to or after concrete placement. The foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

Settlement

Differential settlements of mat foundations depend on the rigidity of the mat. Differential settlements for mats with a rigidity factor greater that 0.5 will be negligible. For mat foundations with rigidity factors less than 0.5, differential settlements will generally be on the order of 50 percent of the total settlement.

Analyses were made to estimate the settlement under a loaded area roughly about 130 feet by 130 feet. Based on a loading condition exerted by a uniform load of 1,400 psf, long term settlement at the center of the loaded area was estimated to be about one (1) to 1 ½ inches. Settlement at the edge and corner of the mat were estimated to be about ¾ inch and ½ inch, respectively.

CONSTRUCTION CONSIDERATIONS

It is recommended that SE be retained to provide observation and testing of construction activities involved in the foundations and related activities of this project. SE cannot accept any responsibility for any conditions which deviate from those described in this report, nor for the performance of the foundations, if not engaged to also provide construction observation and testing for this project.

Moisture Sensitive Soils/Weather Related Concerns

The upper soils encountered at this site are relatively sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, an increase in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

Drainage and Groundwater Concerns

Water should not be allowed to collect in the foundation excavations or on the prepared subgrade in the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water around the foundation elements.

Groundwater was encountered at a depth between 9 ½ and 10 feet during the drilling operations. However, it is possible that seasonal variations will cause fluctuations of the water table. Additionally, perched water may be encountered in discontinuous zones within the overburden soils. Any water accumulation should be removed from the excavations by pumping. If excessive and uncontrolled amounts of seepage occur, the Geotechnical Engineer should be consulted.

Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1928, Subpart P". This document was issued to better ensure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavation or footing excavation, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR, Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. SE does not assume responsibility for construction site safety or the contractor's or other parties' compliance with local, state, and federal safety or other regulations.

REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information obtained by SE and design details furnished by Kyle Associates, LLC. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, SE should be notified immediately to determine if changes in the foundation or pavement recommendations are required. If SE is not notified of such changes, SE will not be responsible for the impact of those changes on the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

The scope of services does not include an environmental or biological assessment of the site. Any statements in the report or supplementary documentation concerning odors or other suspicious observations are for information purposes only. If there are contamination or environmental concerns with the site, the owner should have further investigations conducted by others.

After the plans and specifications are more complete, the Geotechnical Engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated in to the design documents. At that time, it may be necessary to submit supplementary recommendations. If SE is not retained to perform these functions, SE will not be responsible for the impact of those conditions on the project. This report has been prepared for the exclusive use of Kyle Associates, LLC for the specific application to the proposed West St. Tammany Parish Waste Water Treatment Plant Expansion to be constructed in Covington, Louisiana.

APPENDIX

STRATUM ENGINEERING, LLC

= BORING LOCATION

STRATUM ENGINEERING, LLC

BORING LOCATION PLAN

GEOTECHNICAL ENGINEERING SERVICES
PROPOSED WEST ST. TAMMANY PARISH
WASTE WATER TREATMENT PLANT EXPANSION
COVINGTON, LOUISIANA

STRATUM ENGINEERING, LLC

LOG OF BORING B-1

PROPOSED WEST ST. TAMMANY PARISH
WASTE WATER TREATMENT PLANT EXPASION
COVINGTON, LOUISIANA

TYPE OF BORING: WET ROTARY **LOCATION:** TREATMENT PLANT AREA **PROJECT NO.:** G15-108

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			Reddish tan Clayey Sand with limestone - Fill						13			
			Firm to stiff reddish Sandy Lean Clay		0.41	1.00		106	21	31	14	66
5			Stiff tannish gray Lean Clay with silt seams and sand lenses			1.50			20			
					1.45	1.50		110	21			
10			▽			1.50			23	41	25	
			Firm to stiff tannish gray Fat Clay		0.87	1.00		90	33			
15												
20						1.50			31			
			-becomes gray at 23'		0.93	1.00		82	41			
25												
30			-stiff to very stiff at 28'			2.00			36			
			Boring Terminated at 30 Feet									
35												
40												
45												
50												

DEPTH OF BORING: 30 Feet **GROUNDWATER:** Encountered at 9 ½ Feet During Drilling
DATE: 12/14/2015

STRATUM ENGINEERING, LLC

LOG OF BORING B-2

PROPOSED WEST ST. TAMMANY PARISH
WASTE WATER TREATMENT PLANT EXPASION
COVINGTON, LOUISIANA

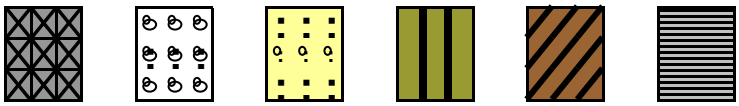
TYPE OF BORING: WET ROTARY **LOCATION:** TREATMENT PLANT AREA **PROJECT NO.:** G15-108

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			Reddish tan Poorly Graded Sand with limestone						6			
			Stiff gray Silty Sandy Clay	12					19			78
5			Stiff to very stiff tannish gray Lean Clay with sand			2.00			21			
					1.32	1.50		112	19	40	24	83
						1.50			23			
10			▽									
			-firm to stiff at 13'		0.93	1.00		106	25			
15												
			Stiff tannish gray Fat Clay			1.50			42			
20												
			-becomes gray at 23'		1.23	1.25		88	36			
25												
						1.50			33			
30												
			Boring Terminated at 30 Feet									
35												
40												
45												
50												

DEPTH OF BORING: 30 Feet **GROUNDWATER:** Encountered at 10 Feet During Drilling
DATE: 12/14/2015

KEY TO TERMS AND SYMBOLS USED ON LOGS

SOIL TYPE

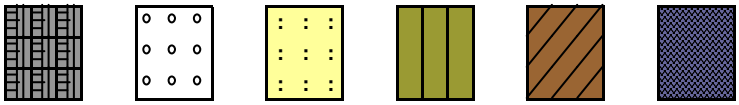


ROCK | GRAVEL | SAND | SILT | CLAY | PEAT

SAMPLER TYPE

NO SAMPLE | AUGER SAMPLE | SHELBY TUBE | SPLIT SPOON

MODIFIERS



STONE | GRAVELY | SANDY | SILTY | CLAYEY | FILL

NO RECOVERY | ROCK CORE | 2" SHELBY TUBE | TXDOT CONE

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		W/ APPRECIABLE FINES	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN 50% PASSING NO. 4 SIEVE	CLEAN SANDS LITTLE FINES	SW	WELL GRADED SAND, GRAVELY SAND (LITTLE FINES)
			SP	POORLY GRADED SANDS, GRAVELY SAND (L.FINES)
		SANDS WITH APPREA. FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS,SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS & VERY FINE SANDS,ROCK FLOUR SILTY OR CLAYEY FINE SANDS OR CLAYEY SILT W/ LOW PI
			CL	INORGANIC CLAY OF LOW TO MEDIUM PI LEAN CLAY GRAVELY CLAYS, SANDY CLAYS, SILTY CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PI
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY FAT CLAYS
			OH	ORGANIC CLAYS OF MED TO HIGH PI, ORGANIC SILT
HIGHLY ORGANIC SOIL			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS
UNCLASSIFIED FILL MATERIALS			ARTIFICIALLY DEPOSITED AND OTHER UNCLASSIFIED SOILS AND MAN-MADE SOIL MIXTURES	

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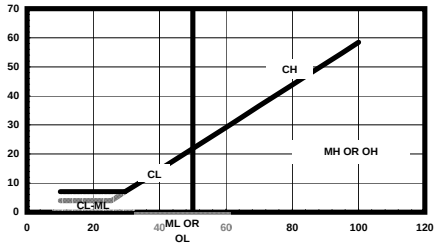
STIFF	0.5 TO 1.0
VERY STIFF	1.0 TO 2.0
HARD	> 2.0 OR 2.0+

RELATIVE DENSITY - GRANULAR SOILS

CONSISTENCY	N-VALUE (BLOWS/FOOT)
VERY LOOSE	0-4
LOOSE	4-9
MEDIUM DENSE	10-29
DENSE	30-49
VERY DENSE	> 50 OR 50+



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NOTE: PLOT INDICATES SHEAR STRENGTH AS OBTAINED BY ABOVE TESTS

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LEVEL GROUNDWATER ENCOUNTERED

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U.S. STANDARD SIEVE SIZE(S)

6"	3"	3/4"	4	10	40	200

BOUL--DERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		

152	76.2	19.1	4.76	2.0	0.42	0.075	0.002

GRAIN SIZE IN MM

STRATUM ENGINEERING, LLC
Geotechnical Engineering ◆ Testing and Inspection Services

April 26, 2016

Kyle Associates, LLC
638 Village Lane North
Mandeville, Louisiana 70471

Attn: Mr. Phil Nelson, P.E.

Re: Additional Geotechnical Recommendations
Proposed West St. Tammany Parish
Waste Water Treatment Plant Expansion
Covington, Louisiana
SE Project No. G15-108
Addendum No. 1

Dear Phil:

Stratum Engineering (SE) is pleased to submit supplemental foundation recommendations for the above referenced project. SE conducted an initial geotechnical investigation for the project and our recommendations were provided in SE Report No. G15-108, dated January 19, 2016. During the initial investigation, two (2) borings were advanced to a depth of 30 feet below the existing ground surface in the tank areas. The report provided shallow mat foundation recommendations for the proposed new 5,000 and 12,000 square foot waste water treatment plants. Subsequent to the initial investigation, a recent revision to the plans includes the addition of a pump station in the southwest corner of the property.

We understand that the new pump station will consist of a pre-cast concrete wet well with a footprint of approximately 200 square feet installed at a bottom depth of approximately 12 feet below the existing ground surface. Consequently, SE was requested to advance one (1) additional boring to a depth of 30 feet in the pump station area so that design recommendations could be provided for the structure. The approximate location of the boring is indicated on the boring location plan included with this letter. Based on the results of the exploration, the subsurface soil conditions are generally consistent with the material encountered during the initial investigation. The soil appears to be generally fair in bearing quality and suitable for support of the proposed lift station on a shallow foundation system. Details related to the lift station, foundation recommendations, as well as construction consideration are presented in subsequent sections of this letter.

Lift Station Wet Well

It is understood that a pre-cast concrete wet well with a plan area of about 200 square feet will be installed at a depth of approximately 12 feet below the existing ground surface. Based on the boring drilled in the wet well area, loose clayey sand was encountered to a depth of about two (2) feet. The clayey sand was underlain by firm to stiff silty sandy clay to a depth of about six (6) feet and was followed by firm to stiff lean clay to a depth of 12 feet. The lean clay was underlain by stiff to very stiff lean clay with sand to a depth of about 22 feet. The boring was terminated in stiff to very stiff lean clay at a depth of 30 feet, the maximum depth explored. The log included with this letter should be reviewed for specific information at the boring location.

Based on the field data and laboratory test results, the soils at the bottom of the wet well elevation are estimated to have an allowable bearing pressure of about 2,000 psf which includes a factor of safety of 3.0.

Since wet conditions may be encountered at the bottom of the excavation, the wet well should bear on a minimum of 18 inches of #57 limestone to distribute the load and minimize the initial subsidence. The wet well excavation should be side bedded and backfilled to the surface with granular fill. The granular fill may consist of sand or an equivalent granular fill approved by the Geotechnical Engineer. The sand should have less than ten (10) percent passing the #200 sieve and be placed in lifts not exceeding 12 inches and compacted to 95 percent of the maximum dry density, as determined by ASTM D698.

Groundwater was encountered at a depth of about 7 ½ feet during the drilling operations. Dewatering of the excavation area may be necessary to allow proper installation of the wet well. Based on the laboratory test results, a coefficient of permeability (K) for the lean clay encountered in the upper 12 feet of the boring was estimated to be on the order of 1×10^{-8} cm/sec. Dewatering is anticipated to be accomplished using a sump/pump system due to the low permeability of the clay. However, should dewatering be required, it is recommended that the groundwater be lowered about two (2) feet below the bottom of the excavation. This can be accomplished by well points or other means of forced withdrawal. Braced excavations may be necessary to maintain a safe access to the wet well area. The design of the dewatering system and bulkhead for the wet well braced excavation should be the responsibility of the contractor who should maintain both systems, as necessary, throughout the installation.

Although groundwater was encountered at a depth of 7 ½ at the time of the investigation it may be encountered at shallower depths during construction. Therefore, the design of the wet well should take into consideration any buoyant forces exerted on the structure.

The foundation excavation should be observed by a representative of Stratum Engineering prior to placement of the wet well to assess that the foundation materials are consistent with the materials discussed in this letter. Soft or loose soil zones encountered at the bottom of the excavation should be removed to the level of firm, suitable bearing soils or adequately compacted fill as directed by the Geotechnical Engineer.

The foundation excavation should be observed and the well installed as quickly as possible to avoid exposure of the excavation bottom to wetting and drying. Surface run-off water should be drained away from the excavation and not be allowed to pond. If it is required that the excavation be left open for more than one day, it should be protected to reduce changes in the moisture content of the bearing soils.

Bedding Material

The wet well and associated sanitary gravity sewer lines and force mains should be supported on aggregate bedding to distribute the load and minimize initial subsidence. The bedding material below the wet well slab should be at least 18 inches in thickness and should extend at least 2 feet below the edge of the structure. The bedding material below the pipes should be at least 6 inches in thickness and should extend one-half of the pipe diameters beyond the edge of either side of the pipe or a minimum of 12 inches, whichever is greater. The pipes should be side bedded to the mid-height of the pipe. The bedding material should consist of well-graded, free draining aggregate, meeting the requirements of #57 stone.

The trench excavation should be backfilled to the surface with granular fill (sand). The fill should be placed in lifts not exceeding 8 inches and compacted to 95 percent of the maximum dry density, as determined by ASTM D698.

Report Limitations

These additional recommendations have been provided for the exclusive use of Kyle Associates, LLC for the specific application to West St. Tammany Parish Waste Water Treatment Plant Expansion in Covington, Louisiana. Site preparation and other recommendations provided in the initial geotechnical report remain in effect. If you should have any questions, please do not hesitate to call.

Respectfully submitted,
STRATUM ENGINEERING, LLC

William "Dean" McInnis, P.E.
Project Manager

Tony Y. Maroun, P.E.
Principal

STATE OF LOUISIANA
TONY Y. MAROUN
License No. 26198
PROFESSIONAL ENGINEER
CIVIL ENGINEERING
4/26/16

WDM/TYM:nsv

APPENDIX

STRATUM ENGINEERING, LLC

STRATUM ENGINEERING, LLC

BORING LOCATION PLAN

GEOTECHNICAL ENGINEERING SERVICES
PROPOSED WEST ST. TAMMANY PARISH
WASTE WATER TREATMENT PLANT EXPANSION
COVINGTON, LOUISIANA

STRATUM ENGINEERING, LLC

LOG OF BORING B-3

PROPOSED WEST ST. TAMMANY PARISH
WASTE WATER TREATMENT PLANT EXPASION
COVINGTON, LOUISIANA

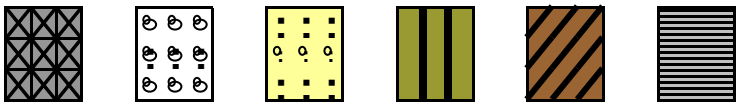
TYPE OF BORING: WET ROTARY **LOCATION:** WET WELL AREA **PROJECT NO.:** G15-108

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" Silty Sandy Topsoil with organics						17			
			Reddish tan Clayey Sand									
			Firm to stiff reddish tan Silty Sandy Clay		0.36	0.75		103	22	23	6	55
5			-becomes gray at 4'			1.75			20			
			Firm to stiff gray Lean Clay ▽		0.73	0.75		102	26			
10						1.50			23	37	20	
			Stiff to very stiff tannish gray Lean Clay with sand		1.60	2.00		104	22			
15												
20						2.25			22			
			Stiff to very stiff tannish gray Lean Clay		0.85	1.25		98	25			
25												
30						2.00			25			
			Boring Terminated at 30 Feet									
35												
40												
45												
50												

DEPTH OF BORING: 30 Feet **GROUNDWATER:** Encountered at 7 ½ Feet During Drilling
DATE: 4/13/2016

KEY TO TERMS AND SYMBOLS USED ON LOGS

SOIL TYPE

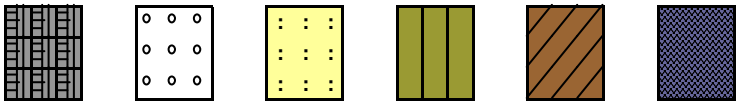


ROCK | GRAVEL | SAND | SILT | CLAY | PEAT

SAMPLER TYPE

NO SAMPLE | AUGER SAMPLE | SHELBY TUBE | SPLIT SPOON

MODIFIERS



STONE | GRAVELY | SANDY | SILTY | CLAYEY | FILL

NO RECOVERY | ROCK CORE | 2" SHELBY TUBE | TXDOT CONE

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
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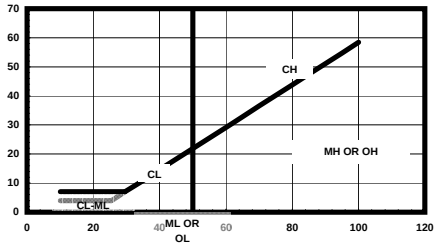

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GRAIN SIZE IN MM

St. Tammany Parish Government
Office Complex, 21454 Koop Dr.
Mandeville, LA 70471

Pre-Bid Sign-In Sheet

July 31, 2024; 2:00 PM

West St. Tammany Regional Sewer Treatment Facility; BID No.: 24-31-2

Page:

Name	Company	Email	Phone
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Melissa Falvey	Command Construction, LLC	Michelle@commandindustries.com	504-232-3518
Trent Greco	Cycle Construction	estimating@cycleconstruction.com	504-275-1344
Rachelforehand	STPGOV	rnforehand@stpgov.org	985 898 2520
Brandon Himel	RNGD Infrastructure LLC	bhimel@rngd.com	985-231-8898
Thelma Naquin	STPGOV - PROC	tnaquin@stpgov.org	
Kevin Drane	Kyle Associates	kdrane@kyleassociates.net	985-727-9377

Laboratory / Field Testing

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Elos	Lucas Watkins	607 W. Morris Avenue Hammond, LA 70403	985-662-5501	lwatkins@elosenv.com	N
Eustis Engineering	Gwendolyn Sanders	3011 28th St. Metairie, LA 70002	504-834-0157	gsanders@eustiseng.com	N
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Terracon	Zack "Lem" Dial	524 Elmwood Park Blvd Ste. 170 New Orleans, LA 70123	504-818-3638	Lem.Dial@terracon.com	N