ADDENDUM NO. 1

Project: 2019 South Side Wastewater Treatment Plant Primary Clarifier Equipment Placement

Owner: City of Kingsville

Engineer: Rutilio P. Mora, Jr., P.E.

Addendum No. 1 **Specifications Section:** N/A **Issue Date:** 05/01/19

Acknowledge receipt of this Addendum in the BID PROPOSAL submitted for this Project. Failure to acknowledge receipt of this Addendum in the BID PROPOSAL may render the BID as non-responsive and serve as the basis for rejecting the BID.

Make the additions, modifications or deletions to the BID PROPOSAL described in this Addendum.

Approved by: Rutilio P. Mora, Jr., P.E.

Rutilio P. Mora Jr. 5/01/2019

Name Date

Addendum Items:

1. Project Completion Date revised from 180 to 270 consecutive calendar days. Revised documents include: Bid Proposal, Standard form of Agreement between City and Contractor, and General Conditions (Item 39)-Contract Period.
2. Revised Technical Specifications on section 464321 – Circular secondary Clarifier Equipment Pier Supported – Center Feed
3. Revised Bid Proposal posted on May 1,2019.
4. Addition of geotechnical report dated September 13, 2011.
5. Revised Clarifier Detail No. 2 on Sheet C5.

STATE OF TEXAS
RUTILIO P. MORA, JR.
111588
LICENSED
PROFESSIONAL ENGINEER

Revised on
May 1, 2019

BID PROPOSAL

Proposal of_____

_____

a *_____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of Texas to **City of Kingsville, Texas** (hereinafter called "OWNER.)"

BIDDER hereby proposes for Bid 19-07 to perform all WORK for the construction of the **"2019 South Side Wastewater Treatment Plant Primary Clarifier Equipment Replacement"** in accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

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

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within **270** consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of **$ 200.00** for each consecutive calendar day thereafter as provided in the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

_____

_____

_____

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

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following amount:

Revised on
May 1, 2019

BID SCHEDULE

ITEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL PRICE
BASE BID – PRIMARY CLARIFIER EQUIPMENT REPLACEMENT					
B-1)	1	LS	**REMOVE/REPLACE EXISTING 1.0 MGD CLARIFIER EQUIPMENT WITH HOT DIP GALVANIZED FINISH, AND ALL ITEMS NOT MENTION BUT NECESSARY TO COMPLETE IN PLACE** per plans and specifications, necessary to complete in place.	_____	_____

ITEM	QUANTITY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL PRICE
ALTERNATIVE No. 1– PRIMARY CLARIFIER EQUIPMENT REPLACEMENT					
A-1)	1	LS	**REMOVE/REPLACE EXISTING 1.0 MGD CLARIFIER EQUIPMENT IN LIEU OR GALVANIZED FINISH, IT SHALL BE 316 STAINLESS STEEL MATERIAL, AND ALL ITEMS NOT MENTION BUT NECESSARY TO COMPLETE IN PLACE** per plans and specifications, necessary to complete in place.	_____	_____

Revised on
May 1, 2019

TOTAL BASE BID $_____

TOTAL ALTERNATIVE No. 1 $_____

Respectfully submitted:

_____	_____
Signature	Address
_____	_____
Title	Date
_____	_____
License number (if applicable)	Date

STANDARD FORM OF AGREEMENT
BETWEEN CITY AND CONTRACTOR
ON THE BASIS OF A STIPULATED PRICE

THIS AGREEMENT is dated as of the _____ day of _____ in the year _____ by and between the **City of Kingsville, 400 W. King Avenue, Kingsville, Texas 78363** (hereinafter called CITY) and _____ (hereinafter called CONTRACTOR).

CITY and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1. WORK:

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

"City of Kingsville – BID 19-07 "2019 South Side Wastewater Treatment Plant Primary Clarifier Equipment Replacement"

Article 2. ENGINEER:

The Project has been designed by:

City of Kingsville - Engineering Department
400 W. King Avenue
Kingsville, Texas 78363
(361) 595-8007

Who is hereinafter called ENGINEER and who is to act as CITY'S representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

Article 3. CONTRACT TIME

3.1 The Work will be completed and ready for final payment in accordance with the General Conditions within **270** calendar days from the date when the Contract Time commences to run.

3.2 Liquidated Damages. CITY and CONTRACTOR recognize that time is of the essence of this Agreement and that CITY will suffer financial loss if the Work is not completed within the time specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with the General Conditions.

They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by CITY if the Work is not completed on time. Accordingly, instead of requiring any such proof, CITY and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay CITY two hundred & 00/100 dollars ($200.00) for each calendar day that expires after the time specified in Article 3.1 of this Agreement for Substantial Completion until the Work is substantially complete. After Substantial Completion if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by CITY, CONTRACTOR shall pay CITY two hundred dollars ($200.00) for each calendar day that expires after the time specified in Article 3.1 of this Agreement for completion and readiness for final payment.

Article 4. CONTRACT PRICE:

4.1 CITY shall pay CONTRACTOR for completion of Work in accordance with the Contract Documents in current funds as follows: Per Contractors Proposal dated _____in the total base bid or total alternative No. 1 A-1 in the amount of _____, as attached and a part of this contract document.

Article 5. PAYMENT PROCEDURES:

CONTRACTOR shall submit Applications for Payment in accordance with the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

Article 6. INTEREST:

All moneys not paid when due as provided in the General Conditions shall bear interest at the maximum rate allowed by law at the place of the Project.

Article 7. CONTRACTORS REPRESENTATIONS:

In order to induce CITY to enter into this Agreement CONTRACTOR makes the following representations:

7.1 CONTRACTOR has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

7.2 CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies which pertain to the subsurface or physical conditions at or contiguous to the site or otherwise may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance of furnishing of the Work at the Contract Price, within the Contract Time and in accordance with other terms and conditions of the Contract Documents, including specifically the provisions of the General Conditions; and no additional examinations, investigation, explorations, tests reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.

7.3 CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the Work at the Contract Price, within the Contract Time, and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of the General and Special Conditions.

7.4 CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

7.5 CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

Article 8. CONTRACT DOCUMENTS:

The Contract Documents which comprise the entire agreement between CITY and CONTRACTOR concerning the Work consists of the following:

8.1 A bound set of executed documents and specifications titled:

CONTRACT DOCUMENTS
&
TECHNICAL SPECIFICATIONS
FOR

BID -19-07
"2019 South Side Wastewater Treatment Plant Primary Clarifier Equipment Replacement"
FOR
CITY OF KINGSVILLE, TEXAS

City Manager
Jesus A Garza

Mayor
Sam Fugate

Commissioner(s)
Alfonso R Garcia
Noel Pena
Arturo Pecos
Edna Lopez

APRIL 2019

Prepared by:

Engineering Department
400 W. King Avenue
Kingsville, Texas 78363
(361) 595-8007

together with all of the items or sections listed in the Table of Contacts thereof.

8.2 A Notice of Award consisting of one page.

8.3 A Notice to Proceed with Construction consisting of one page which shall be executed at a later date.

8.4 A set of drawings consisting of FIVE (5) sheets titled:

Description
1. COVER SHEET
2. OVERALL LAYOUT PLAN AND NOTES
3. CLARIFIER PLANVIEW
4. CLARIFIER ELEVATION
5. CLARIFIER DETAILS

8.5 Addenda, if any, and Invitation to Bid, Instructions to Bidders, Signed Bid, General Conditions, Special Conditions and Technical Specifications.

There are no Contract Documents other than those listed above in this Article 8. The Contract Documents may only be amended, modified or supplemented as provided in the General Conditions.

Article 9. MISCELLANEOUS

9.1 Terms used in this Agreement which are defined in the General Conditions will have the meanings indicated in the General Conditions.

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

9.3 CITY and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

Article 10. OTHER PROVISIONS

10.1 The successful bidder who is awarded this bid will be required to complete and return a Conflict of Interest Disclosure Form and a Form 1295 – Certificate of Interested Parties

10.2 This contract gives no rights or benefits to anyone other than the CITY and CONTRACTOR.

10.3 CONTRACTOR agrees to abide by all local, state, and federal nondiscrimination and fair wages, and all other laws applicable to this contract.

10.4 CONFLICT OF INTEREST – Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that any vendor of person considering doing business with a local government entity must disclose in the Questionnaire Form CIQ, the vendor of person's affiliation or business relationship that might cause a conflict with a local governmental entity. This questionnaire must be filed, by law, with the City Secretary of the City of Kingsville not later than the 7th business day after the date the person becomes aware of the facts that require the statement be filed. See section 176.006, Local Government Code. A person commits an offense if the person violates Section 176.006, Local Government Code. An offence under this section is a Class C misdemeanor. For more information or

to obtain the Questionnaire CIQ go to Texas Ethics Commission web page at www.ethcis.state.tx.us/forms/CIQ.pdf.

Additionally, Pursuant to House Bill 1295 passed by the 84th Texas Legislature (Section 2252.908, Texas Government Code, as amended) and formal rules released by the Texas Ethics Commission (TEC), all contracts with private business entities requiring approval by the Kingsville City Commission must be accompanied by a completed, executed, and notarized Certificate of Interested Parties, Form 1295, Form 1295 must be completed in accordance with TEC Rules (https://www.ethics.state.tx.us/rules/adopted_Nov_2015.html#Ch46) and Section 2252.908 of the Texas Government Code, as amended (http://www.statutes.legis.state.tx.us/Docs/GV/htm/GV.2252.htm#2252.908).

Vendor must complete HB 1295 Form before the award is official and a Notice to Proceed is given.

IF YOU HAVE ANY QUESTIONS ABOUT COMPLIANCE, PLEASE CONSULT YOUR LEGAL COUNSEL. COMPLIANCE IS THE INDIVIDUAL RESPONSIBILITY OF EACH PERSON OR AGEENT OF A PERSON WHO IS SUBJECT TO THE FILING REQUIREMENT. AN OFFENSE UNDER CHAPTER 176 IS A CLASS C MISDEMEANOR.

10.5 NOT BOYCOT ISRAEL - The successful respondent must agree that it does not boycott Israel at the time the contract is executed and that it will not boycott Israel during the term of the contract.

10.6 JURISDICTION - Contract(s) executed as part of this solicitation shall be subject to and governed under the laws of the State of Texas. Any and all obligations and payment are due and performable and payable in Kleberg County, Texas.

10.7 VENUE – the parties agree that venue for purposes of any and all lawsuits, cause of action, arbitration, and/or any other dispute(s) shall be in Kleberg county, Texas.

IN WITNESS WHEREOF, CITY and CONTRACTOR have signed this Agreement in five counterparts. Two counterparts each have been delivered to CITY and CONTRACTOR and one counterpart to ENGINEER. All portions of the Contract Documents have been signed or identified by CITY and CONTRACTOR or by ENGINEER on their behalf.

This Agreement will be effective on _____, 20____

CITY:
City of Kingsville, Texas

By:_____
Jesus A. Garza, City Manager

Attest: _____

CONTRACTOR:
_____

By:_____

Attest: _____

Address for giving notices:

City of Kingsville
400 W. King Avenue
Kingsville, Texas, 78363

Address for giving notices:

GENERAL CONDITIONS

item exceeds $10,000 or the value of the quantity acquired by the preceding fiscal year exceeded $10,000 as long as such procurement is economically feasible.

36. [For Contracts > $100K] Overtime Requirements

No Contractor or subcontractor contracting for any part of the Contract work which may require or involve the employment of laborers or mechanics, including watchmen and guards, shall require or permit any laborer or mechanic in any workweek in which he is employed on such work to work in excess of 40 hours in such work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of 40 hours in such work week, as the case may be.

37. [For Contracts > $150K] Clean Air Act and the Federal Water Pollution Control Act

The Contractor or subcontractor shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401–7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251–1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

38. Contract Documents and Drawings

The City will furnish the Contractor without charge **5** copies of the Contract Documents, including Technical Specifications and Drawings. Additional copies requested by the Contractor will be furnished at cost.

39. Contract Period

The work to be performed under this contract shall commence within the time stipulated by the City in the Notice to Proceed, and shall be fully completed within **270** calendar days thereafter.

40. Liquidated Damages

Since the actual damages for any delay in completion of the work under this contract are impossible to determine, the Contractor and his Sureties shall be liable for and shall pay to the City the sum of Two-Hundred Dollars ($200) as fixed, agreed and liquidated damages for each calendar day of delay from the above stipulated time for completion.

Section 464321
CIRCULAR SECONDARY CLARIFIER EQUIPMENT
PIER SUPPORTED - CENTER FEED

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The contractor shall furnish and install one (1) secondary circular clarifier mechanism, 70'-0" diameter x 14'-0" SWD, in the existing 1 MGD package plant basins in accordance with the details shown on the drawings and as specified herein.

B. The equipment furnished for the clarifier mechanism shall include but not be limited to: center drive assembly, center drive platform to bolt onto the existing two (2) access bridges, center support column with inlet openings and concentric RAS pipe, draw band coupling(band sleeve coupling), center sludge sight well collection box with control valves, influent well, center cage(drive cage), sludge collection arms with rake blades and PVC sludge collection piping, dual skimmer assembly scum skimming and single trough equipment, effluent troughs, knee brace supports, air main support, drop box, dual effluent weir plates, and scum baffle and supports , controls and anchor bolts with assembly fasteners.

C. The equipment shall be designed to effectively settle mixed liquor suspended solids and rapidly remove the settled solids from the basin floor through the sludge collection piping. Visual observation of the sludge removal shall be at the clarifier's center work platform. The clarified effluent shall be collected uniformly by the peripheral launder and the collected sludge shall be discharged to the sludge collection box and funneled to the sludge withdrawal pipe as shown on the contract drawings. Surface scum shall be collected by the scum skimming equipment and discharged through the scum withdrawal pipe.

D. The clarifier equipment meeting these specifications shall be the Model HVS as manufactured by AMWELL, A Division of McNish Corporation only or an engineer pre-approved equal. Formal request for equipment substitutions shall be submitted a minimum of 10 days before the bid date and shall include at a minimum a job specific shop drawing of the proposed equipment along with 10 contacts and telephone numbers of existing installations of this type in the last 5 years. The engineer shall show those pre-approved to bid via addendum prior to the bid date.

E. Per Alternative No. 1 A-1, please note in this specification where indicated the items shall be manufactured out of 316 stainless steel.

1.2 MANUFACTURERS SERVICE

A. Manufacturer shall provide two (2) trips for and four (4) days on site for the

clarifier to check the final installation, performance acceptance test and instruct owner in the operation and lubrication of the equipment.

B. The installing contractor shall provide a professional surveyor to take measurements and elevations of the existing tank and clarifier mechanism as required for confirmation of tank dimensions and equipment location/elevation/detail. The installing contractor shall drain and clean the tank. The cost of this survey shall be included in the bid by the installing contractor. (See general notes on C2/8 & 9).

1.3 SUBMITTALS / MANUALS

A. Shop drawings shall be submitted in accordance with the General Conditions of these specifications.

B. (4) Operation and maintenance manuals shall be submitted to the City.

PART 2 - PRODUCTS

2.1 CLARIFIER DESIGN CRITERIA

A. Clarifier mechanisms shall be designed to satisfactorily handle the following flows **per basin:**

	Minimum	Average	Maximum	Peak
Influent	0.5 MGD	0.7 MGD	4.0 MGD	1.5 MGD
Sludge Return (RAS)	695 GPM		868 GPM	

2.2 DRIVE MECHANISM

A. Gear Design - The continuous output torque rating and the allowable stress values used in the design of the intermediate worm gear reduction unit and the final gear reduction unit shall be in **strict** conformance with the latest revision of the following standards:

Worm & Worm Gearing: ANSI/AGMA 6034-B92, "Practice for Enclosed Cylindrical Worm gear Speed Reducers and Gear motors."

Spur and Pinion Gearing: ANSI/AGMA 2001-C95, "Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth."

The continuous output torque rating of the spur and pinion gearing shall be based on the smaller of the rating values determined from the above ANSI/AGMA standard and a design life of 20 years. The drive shall be designed and rated to develop the following minimum torque values:

Operating Condition	Torque (Foot-Pounds)
Continuous	10,000
Alarm	10,000
Motor Cut-Off	12,000
Shear Pin	15,000
Peak	20,000

The equipment manufacturer shall submit calculations to the ENGINEER for approval substantiating the continuous output torque rating and design life. Calculations shall include the spur gear, pinion, worm gear set, and all bearings used in the intermediate worm gear reduction unit and the final gear reduction unit.

The spur gear and pinion calculations shall clearly specify the values used for the following design parameters for surface durability and strength ratings:

Number of Pinions	Pinion Pitch Diameter
Actual Face Width	Tooth Diametrical Pitch
Tooth Geometry Factors (I and J Factors)	Hardness Ratio Factor
Load Distribution Factor	Elastic Coefficient
Aspect Ratio	Life Factor
Allowable Contact Stress	Application Factor
Allowable Bending Stress	Rim Thickness Factor

Load distribution factors (Cm and Km) used in the calculations shall not exceed 1.28. For parameters which are material dependent, such as allowable contact stress, the calculations shall include a full description of the materials, quality grade, and heat treatment used. Momentary peak torque calculations shall use a maximum of 75% of yield strength.

B. Primary Gear Reduction Unit - The primary gear reduction unit shall consist of a totally enclosed, horizontal type gear motor or gear reducer with C-face mounted drive motor, mounted on top of the intermediate worm gear housing. The primary gear reducer shall be a heavy-duty parallel shaft helical type, conforming to ANSI/AGMA 6019-B89, and shall have a service factor of 1.15.
All gearbox bearings shall be of the anti-friction type and running in oil in a cast iron housing. The totally enclosed primary reduction unit shall operate on 3 phase, 60 hertz, 230/460-volt power source, and shall be at least 1/2 HP. The motor shall conform to NEMA specifications for AC motors and be designed for continuous operating condition.

C. Chain Drive - Power transmission between the primary gear reduction unit and the intermediate worm gear reduction unit shall be through a ½" pitch 40L steel

roller chain and steel sprocket assembly. The chain drive shall be enclosed with a stainless-steel chain guard meeting OSHA requirement. The shear pin overload shall be easily accessible by removal of the chain guard.

D. Intermediate Worm Gear Reduction Unit - The intermediate worm gear reduction unit shall consist of a worm gear driven by an integral straddle mounted worm and shaft, supported by heavy duty anti-friction bearings running in an oil bath, and housing. All bearings shall have a minimum L10 life of 20 years, based on the continuous torque rating. The integral worm and shaft shall be single piece and made from AISI 8620H alloy steel carburized, hardened and ground and shall have a case hardness of 55-60 RC. The worm gear shall be centrifugally cast, conforming to ASTM B271 and ANSI/AGMA 2004-B89, high strength, and manganese bronze.

The worm gear shall have a minimum 200 Brinell hardness and shall have a minimum pitch diameter of 12.79 inches and have a minimum face width of 2.25 inches.

The worm gear shall be keyed to the pinion shaft. The intermediate worm gear housing shall be ASTM A48 Class 40 cast iron complete with seals, oil fill, and oil level sight gauge and drain plugs. The intermediate worm gear housing shall have full 360° contact and support from the final gear housing.

E. Final Gear Reduction Unit - The final gear reduction unit shall consist of a pinion, internal split spur gear, anti-friction ball bearing assembly, and housing.

The pinion shall be AISI 4150 minimum grade 2 steel, heat treated to a minimum 321 BHN hardness, have a minimum 6.00-inch pitch diameter and a have a minimum 2.56-inch face width.

The pinion shall be one solid piece, extending from the worm gear to the spur gear, straddle mounted between anti-friction ball bearings to maintain accurate pinion to spur gear alignment and contact. All bearings shall have a minimum L10 life of 20 years based on the continuous torque. The pinion shall be manufactured to have a minimum AGMA quality class 8, in conformance with ANSI/AGMA 2000-A88.

The internal spur gear shall be ductile iron normalized, quenched & tempered, conforming to grade 120-90-02, with micro-structure of fine tempered pearlite, conforming to ASTM A536, manufactured to have a minimum base hardness of 270 BHN and have a minimum AGMA quality Class 6, in conformance with ANSI/AGMA 2000-A88. The spur gear shall have a minimum 42-inch pitch diameter and have a minimum 2.56-inch face width. The internal spur gear shall be of split construction to provide for replacement of balls and race liners without removing the drive unit or other parts of the clarifier mechanism. Internal spur gears that are not split are not considered acceptable for this application.

The internal spur gear shall be mounted on a large, full complement anti-friction ball bearing assembly designed to support the entire rotating clarifier mechanism. The ball bearing assembly shall consist of a minimum 97- 1-1/2" diameter AISI E52100 GRADE 50 chrome alloy steel bearing balls running in an oil bath protected from contamination by a dust shield. Nylon spacer balls are not acceptable to handle the clarifier thrust and radial loads.

The minimum ball race diameter shall be 46 inches, to assure stability. The race liner inserts shall be heat treated to a hardness of no greater than 39-43 RC to avoid fatigue cracking. The race liners and bearing balls shall be designed for a minimum L10 life of 20 years. Bearing life calculations shall include all combined horizontal and vertical loads on the bearing assembly. Four-point angular contact bearings are not considered acceptable for this application.

The ball bearing assembly shall be mounted in an ASTM A48 Class 40 cast iron housing. Fabricated steel housings are not acceptable for this application. The housing shall be cast as a single piece to provide a leak proof enclosure. Seals or gaskets located below the oil level will not be acceptable. The base of the housing shall be mounted on the top flange of the stationary center column and designed to support the internal spur gear, the rotating clarifier mechanism and the access bridge.

The housing shall be complete with seals, oil level sight gages, oil fill, and valved oil and condensation drains. A positive means of removing condensation and contaminant from the lower pinion bearing pocket must be provided.

Lubrication of the gear teeth shall be accomplished by means of an oil dam and the meshing action of the pinion and the internal gear teeth which shall force lubricant up the face of the teeth. Designs shall not require auxiliary oil pumps or circulating systems for lubrication.

F. Overload protection shall consist of two (2) NEMA 4 limit switches located on the worm gear housing and operated by a spring-loaded actuator and aluminum pivot arm from the worm shaft. One (1) limit switch (N.O. contact is for alarm torque and one (1) limit switch (N.C. contact) is for cut-out torque. An aluminum pointer with aluminum graduated scale marked in 0, 25, 50, 75 and 100 percentages is provided for indicating load on drive at all times. Switches shall be easily accessible for routine monthly checking. A shear pin overload device shall also be included.

2.3 ACCESS BRIDGE, HANDRAILING AND TOE PLATE

A. The existing HDG steel access bridge, HDG grating and handrail shall be reused.

B. A new drive service platform, approximately 8'-0" long x 8'-0" wide fabricated

from HDG steel shall be provided to bolt into place to the existing two (2) bridge sections to replace the existing service platform. The new platform shall have removable sections to provide access to the drive mechanism and the sludge control valves.

C. The new drive platform shall be designed to support, in addition to the dead load, a live load of at a minimum 50 pounds per square foot without deflection in excess of 1/360 of the span.

D. The existing handrail system shall be reworked and attached to the new drive service platform as required.

2.4 CENTER COLUMN

A. A minimum 24-inch diameter x 1/4-inch wall thickness HDG steel stationary center column shall be provided which shall serve as the influent pipe. One end shall have a support flange for bolting to the foundation with a minimum of eight (8) - 1-inch diameter anchor bolts as shown on the plans. A similar flange shall be provided at the top of the column for supporting and securing the center drive assembly.

B. Two (2) sets of ports shall be provided at the upper end of the center column. One set of ports shall convey the fresh sludge from the sludge collection box to the central discharge pipe. The other set of ports shall diffuse the flow and reduce the inlet velocity as it enters the influent well at a maximum of 1.0 FPS.

C. Inside the support column there shall be a 12-inch diameter sludge discharge HDG Steel pipe. The sludge discharge pipe shall extend from the bottom of the sludge collection drum to 1 foot above the bottom flange of the stationary influent column as shown on the drawings. The sludge discharge pipe shall connect to the cast-in-place sludge discharge pipe by way of a stainless-steel band coupling provided by the clarifier equipment manufacturer.

D. Per Alternative No. 1 A-1, this center column shall be manufactured out of 316 stainless steel.

2.5 DRIVE CAGE AND TRUSS ARMS

A. A minimum 4'-0" square HDG steel drive cage shall be furnished, connected to and rotated by the central driving mechanism. The skimmer assembly and sludge collector arms shall be fastened to and rotate with the drive cage, which shall be made up of structural steel members having a minimum thickness of 1/4", using all welded construction.

B. The collector mechanism shall be furnished with two (2) fabricated structural HDG steel arms all welded truss construction conforming to the slope of the tank floor. The arms shall be rigidly connected to the collector mechanism drive cage. Each arm shall be furnished with ¼" HDG steel flights complete with adjustable spring brass squeegee blades and PVC sludge piping. The flights shall be arranged to provide scraping of the floor twice per revolution.

C. Each rake arm shall be equipped with three (3) 4-inch PVC schedule 40 sludge withdrawal pipes located along the arms as detailed by the clarifier manufacturer. The pipe sizing shall accommodate the maximum sludge return flow rate. The withdrawal pipes shall be secured to the rake arms with stainless steel clamps and shall pass along the arms and vertically upward to the rotating sludge collection box.

D. Per Alternative No. 1 A-1, this drive cage, truss arms and flights shall be manufactured out of 316 stainless steel.

2.6 SLUDGE COLLECTION BOX AND SLUDGE CONTROL VALVES

A. A ¼" thick HDG steel rotating sludge collection box shall be provided inside the feed well to collect and convey freshly returned sludge to the return sludge pipe located within the center support column. A neoprene seal shall be provided between the rotating sludge collection box and the center column.

B. The sludge collection box shall contain a sludge control valve for each sludge draw-off pipe. A durable label shall be provided on the sludge collection box to indicate the location, along the rake arm, of each sludge withdrawal pipe and respective control valve.

C. The control valve shall be a concentric tube type valve to allow visual observation of relative flow from each valve and to allow for easy sampling of the return sludge from each valve. The tube shall be PVC and shall be provided with an aluminum handle for adjustment with an appropriate tool to turn the valve from the operating platform.

D. Per Alternative No. 1 A-1, this sludge collection box shall be manufactured out of 316 stainless steel.

2.7 INFLUENT FEEDWELL

A. The influent feed well shall be fabricated out of 3/16" HDG steel plate. The well shall measure a minimum of 16'-0" in diameter and 8'-0" in depth. The top of the well shall be approximately 6" above the surface of the water.

B. Sufficient reinforcing rim angles shall be provided as required. The well shall be supported by structure attached to the drive cage.

C. Scum ports with adjustable baffles shall be provided as required to allow scum to escape out of the influent well.

D. Per Alternative No. 1 A-1, this influent well shall be manufactured out of 316 stainless steel.

2.8 SURFACE SKIMMER, SCUM TROUGH AND SKIMMER BLADE RAMP

A. A full radius skimming assembly shall be furnished for each clarifier. Each skimmer assembly shall consist of two (2) rotating skimming arms with scum blade and one (1) fixed scum trough.

B. The rotating scum deflector shall have an L-shaped scum blade supported from structural braces extended from the truss arm and influent well. The deflector shall extend tangentially from the influent well to the scum baffle.

C. A pivoting wiper assembly shall be mounted on the outer end of the deflector blade to form a pocket for trapping the scum. There shall be two pivot joints to ensure continual contact and proper alignment between wiper blade, scum baffle and beach as the blade travels up the beach and over the scum trough.

D. The wiper blade shall have a wearing strip on its outer end which contacts the effluent scum baffle and a neoprene strip on its lower and inner edge. The scum shall be trapped as the wiper blade meets the skimmer blade ramp and is raised up the beach to be dumped into the scum trough. Skimmers which rely on support from the scum baffle will not be acceptable.

E. The scum trough and beach plate shall be of welded construction, 1/4" thick HDG steel plate, and shall have a minimum width of 4'-0" and a minimum overall length along the scum baffle of 5'-3". The scum trough shall consist of beach plate, submerged shelf, baffle, hopper, flushing valve and discharge pipe. The trough and beach plate shall be adequately supported from the tank wall.

F. The scum hopper shall be a minimum 12" wide and shall extend the full width of the trough. A flushing device shall be provided on the scum trough. The flushing device shall consist of a counterweighted flapper valve actuated by the skimmer arm. The valve shall be designed to provide flushing water of 10 to 20 gallons per skimmer pass. The actuator arm shall be counterweighted with steel plates to ensure positive valve closure. Valve seat shall be 1/4" thick resilient neoprene.

G. A standard diameter flange connection for the scum discharge pipe shall be furnished. Scum piping beyond the scum trough flange shall be as shown on the drawings.

H. Per Alternative No. 1 A-1, these surface skimmer arms and scum trough/hopper shall be manufactured out of 316 stainless steel.

2.9 EFFLUENT WEIRS, SCUM BAFFLE, EFFLUENT TROUGHS AND SUPPORTS

A. Effluent weir plates shall consist of 9-inch-deep x 1/4-inch-thick HDG steel sections with 2-1/2"-inch deep 90° v-notches at 6 inch intervals. Weirs shall be attached to both sides of the effluent trough. The weir sections shall be fastened to the effluent trough wall using 316 stainless steel bolts, hex nuts and 5-inch diameter washers, allowing for vertical adjustment.

B. The scum baffle plates shall consist of 12-inch-deep x ¼ inch thick HDG steel sections supported from the effluent trough by HDG steel angle brackets secured with 316 stainless steel bolts and hex nuts, allowing for vertical and radial adjustment.

C. The effluent troughs shall be fabricated from ¼" thick HDG steel and shall measure 16-3/4" wide x 13" deep and be supported off of the wall approximately 45" at midpoint of the trough with knee braces and designed for the effluent troughs being full of water and the tank empty and the tank full of water and the effluent troughs empty.

D. A drop box shall be fabricated from ¼" thick HDG steel and shall be provided to match up to the existing tank wall penetrations and/or configuration.

E. Per Alternative No. 1 A-1, these effluent weirs, scum baffles, troughs, drop boxes and supports shall be manufactured out of 316 stainless steel.

2.11 SPARE PARTS

A. The clarifier manufacturer shall furnish as a minimum the following spare parts per clarifier.

   A. One (1) set of neoprene skimmer wipers for each skimmer assembly.
   B. Twelve (12) shear pins.

2.12 ANCHOR BOLTS / FIELD BOLTS

A. All equipment anchor bolts and assembly bolts shall be 316 stainless steel, furnished by the equipment manufacturer, and of ample size and strength for the

purpose intended. All anchor bolts shall be set by the Contractor in accordance with the equipment manufacturer's instructions.

2.13 SHOP PAINTING AND FIELD COATINGS

A. All submerged and non-submerged un-galvanized steel work to be sandblasted per Spec. No. SSPC-SP6 and to receive one (1) shop coat, 2.0 mils dry film thickness per coat of Tnemec epoxy primer or approved equal. The spur gear drive assembly shall be factory finish painted with the manufacturer's standard paint system.

B. Stainless steel shall be passivated per ASTM 380 using a citrus based cleaner.

C. The installing contractor shall touch up and/or any paint that is damaged during installation.

2.14 ACCEPTANCE TEST

A. After installation, the sludge collector mechanism shall be field torque tested in the presence of the Engineer to confirm and verify the structural and mechanical compliance to the torque requirements specified by loading the collector mechanism with 120% and 140% of rated continuous torque specified. Also, this field test shall substantiate operation of warning and drive shutdown circuitry.

C. All labor, materials and test apparatus necessary for conducting the above tests shall be furnished by the Contractor at no additional cost to the Owner.

2.15 CONTROL PANEL

A. A control panel (460V/3 Phase service) shall be provided with the new clarifier by the equipment manufacturer and shall be wired in place and tested by the installing contractor. All new wire, conduit, supports, and all other required materials and shall be provided by the installing contractor.

B. The control panel shall contain the following components:

- 316 NEMA 4X STAINLESS STEEL ENCLOSURE
- U/L LABEL
- 14ga. CONTROL WIRE
- MOTOR CIRCUIT PROTECTOR(S)
- PHASE FAILURE RELAY
- NEMA SIZE 1 MOTOR STARTER(S)
- OVERLOAD RESET PUSH BUTTON(S)
- TRANSFORMER CIRCUIT BREAKER
- CONTROL TRANSFORMER(S)

- POWER ON PILOT LIGHT(S) PUSH-TO-TEST (2)
- HAND-OFF-AUTO SELECTOR SWITCH(ES)
- RUN PILOT LIGHT(S) PUSH-TO-TEST TYPE
- AUX. RUN CONTACT(S)
- SET(S) OVERLOAD AUX. CONTACTS
- HIGH TORQUE ALARM PILOT LIGHT PUSH TO TEST TYPE
- SET(S) AUX. CONTACTS
- TORQUE SHUTDOWN ALARM PILOT LIGHT PUSH TO TEST
- SET(S) AUX. CONTACTS
- MANUAL RESET PUSH BUTTON(S)
- 120VAC FLASHING ALARM LIGHT
- ALARM HORN WITH SILENCE PUSH BUTTON
- ALARM HORN OFF-ON SELECTOR SWITCH(ES)

PART 3 – EXECUTION

3.1 INSTALLATION

A. The collector mechanism shall be erected and installed in strict conformance with the approved shop drawings and Manufacturer's installation instructions.

3.2 START-UP & COMMISSIONING

A. Provide Manufacturer service technician for start-up, field testing, operator training and final adjustment.

B. Field testing, start-up, and operator training: minimum of two (2) trips totaling four (4) full days on-site.

C. A written report covering the technician's findings and installation approval shall be submitted to the Engineer/Owner covering all inspections and outlining in detail any deficiencies noted.

3.3 MAINTENANCE

A. The equipment supplier shall furnish four (4) copies of operation and maintenance manuals which will be retained at the installation site to assist plant operators. The manual shall include the supplier's erection and assembly recommendations and a complete list of recommended spare parts.

END OF SECTION

- GEOTECHNICAL ENGINEERING
- CONSTRUCTION MATERIALS ENGINEERING & TESTING
- SOILS • ASPHALT • CONCRETE

September 13, 2011

LNV Engineering, Inc.
801 Navigation Blvd., Suite 300
Corpus Christi, Texas 78408

Attention: Juan A. Pimentel, P.E.

SUBJECT: **SUBSURFACE INVESTIGATION, LABORATORY TESTING PROGRAM AND FOUNDATION EVALUATION FOR THE PROPOSED NEW CLARIFIER**
Kingsville South Wastewater Treatment Plant
F.M. 1717
Kingsville, Texas
RETL Project Number: G211220

Dear Mr. Pimentel:

In accordance with our agreement, we have conducted a subsurface investigation and foundation evaluation for the above referenced project. The results of this investigation, together with our recommendations, are to be found in the accompanying report, two copies of which are being transmitted herewith.

Often, because of design and construction details that occur on a project, questions arise concerning soil conditions. Rock Engineering and Testing Laboratory, Inc. (RETL) would be pleased to continue its role as the Geotechnical Engineer during project implementation.

RETL also has great interest in providing materials testing and observation services during the construction phase of this project. If you will advise us of a convenient time to discuss these engineering services, we are pleased to meet with you at that time.

Sincerely,

Kyle D. Hammock, P.E.
Vice President

SUBSURFACE INVESTIGATION, LABORATORY TESTING PROGRAM,
AND FOUNDATION EVALUATION
FOR THE
PROPOSED NEW CLARIFIER
KINGSVILLE SOUTH WASTEWATER TREATMENT PLANT
F.M. 1717
KINGSVILLE, TEXAS

RETL JOB NUMBER: G211220

PREPARED FOR:

LNV ENGINEERING, INC.
800 NAVIGATION BLVD., SUITE 300
CORPUS CHRISTI, TEXAS 78408

SEPTEMBER 13, 2011

PREPARED BY:

ROCK ENGINEERING AND TESTING LABORATORY, INC.
6817 LEOPARD STREET
CORPUS CHRISTI, TEXAS 78409
PHONE: (361) 883-4555; FAX: (361) 883-4711

TEXAS BOARD OF PROFESSIONAL ENGINEERS FIRM
REGISTRATION #2101

Kyle D. Hammock, P.E.
Vice President

TABLE OF CONTENTS

INTRODUCTION

This report presents the results of a subsurface investigation, laboratory testing program and foundation evaluation for the proposed New Clarifier to be constructed at the Kingsville South Wastewater Treatment plant located on F.M. 1717 in Kingsville, Texas. This study was conducted for the LNV Engineering, Inc.

Authorization

The work for this project was performed in accordance with RETL Proposal No. P080411A (Revision #1) dated August 5, 2011. The proposal contained a scope of work, fee and limitations. The scope of work was approved by Juan A. Pimentel, P.E. of LNV Engineering, Inc.

Purpose and Scope

The purpose of this exploration was to evaluate the soil and groundwater conditions at the site and to recommend a type and depth of foundation system suitable for the proposed project.

The scope of the exploration and analysis included the subsurface exploration, field and laboratory testing, engineering analysis and evaluation of the subsurface soils, foundation recommendations and preparation of this report.

The scope of services did not include an environmental assessment. Any statements in this report, or on the boring log, regarding odors, colors, unusual or suspicious items or conditions are strictly for the information of the client.

General

The exploration and analysis of the subsurface conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the foundation design. The recommendations submitted for the proposed project are based on the available soil information and the preliminary design details provided by Juan A. Pimentel, P.E. of LNV Engineering, Inc. If the designer requires additional soil parameters to complete the design of the proposed foundation and the requested information can be determined from the data obtained within the agreed scope of work provided in the proposal, then RETL will provide this information as a supplement to this report.

The Geotechnical Engineer states that the findings, recommendations, specifications or professional advice contained herein have been presented after being prepared in a manner consistent with that level of care and skill ordinarily exercised by reputable members of the Geotechnical Engineer's profession practicing contemporaneously under similar conditions in the locality of the project. RETL operates in general accordance with, "*Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction*, (ASTM D3740)." No other representations are expressed or implied, and no warranty or guarantee is included or intended.

This report has been prepared for the exclusive use of the LNV Engineering, Inc. for the specific purpose of the proposed New Clarifier to be constructed at the Kingsville South Wastewater Treatment Plant located on F.M. 1717 in Kingsville, Texas.

FIELD EXPLORATION

Scope

The field exploration, to evaluate the engineering characteristics of the foundation bearing materials, included reconnaissance of the project site, performing the test boring operations and obtaining disturbed split spoon and relatively undisturbed Shelby tube soil samples. During the sample recovery operations, the soils encountered were classified and recorded on the boring log in accordance with, "*Standard Guide for Field Logging of Subsurface Exploration of Soil and Rock*, (ASTM D5434)."

Two borings were performed for the purpose of providing foundation recommendations for the proposed project. Juan A. Pimentel, P.E. of LNV Engineering, Inc. determined the number and depth of the borings. RETL determined the boring locations in the field and a sub-consultant to RETL performed the boring operations. The boring location GPS coordinates are included in the following table:

Boring Number	GPS Coordinates
B-1	N 27° 28.162' W 97° 50.173'
B-2	N 27° 28.164' W 97° 50.154'

Upon completion of the drilling operations and obtaining the groundwater observations, the drill holes were backfilled with excavated soil and the site cleaned as required. A Boring Location Plan, which is a reproduction of an aerial drawing of the site, is provided in the Appendix of this report.

Drilling and Sampling Procedures

The test borings were performed using a drilling rig equipped with a rotary head turning hollow stem augers to advance the boreholes. Disturbed soil samples were obtained employing split-barrel sampling procedures in general accordance with the procedures for, "*Penetration Test and Split-Barrel Sampling of Soils,* (ASTM D1586)." Undisturbed soil samples were obtained using thin-wall tube sampling procedures in accordance with the procedures for "*Thin Walled Tube Sampling of Soils*" (ASTM D1587). The samples obtained by this procedure were extruded by a hydraulic ram and classified in the field.

All of the samples were placed in plastic bags, marked according to boring number, depth and any other pertinent field data, stored in special containers and delivered to the laboratory for testing.

Field Tests and Observations

Penetration Tests - During the sampling procedures, standard penetration tests (SPT) were performed to obtain the standard penetration value of the soil at selected intervals. 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 1-foot into the soil. 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 successive 6-inch penetrations. The "N" value is obtained by adding the second and third 6-inch increment number of blows. The results of standard penetration tests indicate the relative density of cohesionless soils and comparative consistency of cohesive soils, thereby providing a basis for estimating the relative strength and compressibility of the soil profile components.

Water Level Observations - Water level observations were obtained during the test boring operations. Water level observations are noted on the boring logs provided in the Appendix. In relatively pervious soils, such as sandy soils, the indicated depths are usually reliable groundwater levels. In relatively impervious soils, a suitable estimate of the groundwater depth may not be possible, even after several days of observation. Seasonal variations, temperature, land-use, proximity to a creek, river or lake and recent rainfall conditions may influence the depth to the groundwater. The amount of water in an open borehole largely depends on the permeability of the soils encountered at the boring location.

Ground Surface Elevations - The ground surface elevations were not provided at the boring locations. Therefore, all depths referred to in this report are from the actual ground surface elevations at the boring locations during the time of our field investigation.

LABORATORY TESTING PROGRAM

In addition to the field investigation, a laboratory-testing program was conducted to determine pertinent engineering characteristics of the subsurface materials necessary in analyzing the behavior of the foundation system for the proposed project.

The laboratory-testing program included supplementary visual classification (ASTM D2487) and water content tests (ASTM D2216) on all samples. In addition, selected samples were subjected to dry unit weight determinations (ASTM D2937), Atterberg limits tests (ASTM D4318) and percent material finer than the #200 sieve (ASTM D1140). Estimated soil strengths were obtained using a hand penetrometer.

All phases of the laboratory-testing program were conducted in general accordance with applicable ASTM Specifications. The results of these tests are to be found on the accompanying boring logs provided in the Appendix.

SUBSURFACE CONDITIONS

General

The types of foundation bearing materials encountered in the test borings have been visually classified and are described in detail on the boring logs. The standard penetration tests, strength tests, water level observations and other laboratory tests performed are presented on the boring logs in numerical form. Representative samples of the soils were placed in polyethylene bags and are now stored in the laboratory for further analysis, if desired. Unless notified to the contrary, all samples will be disposed of three months after issuance of this report.

The stratification of the soil, as shown on the boring logs, represents the soil conditions at the actual boring locations. Variations may occur between or beyond the actual boring locations. Lines of demarcation represent the approximate boundary between different soil types, but the transition may be gradual, or not clearly defined.

It should be noted that, whereas the test borings were drilled and sampled by experienced drillers, it is sometimes difficult to record changes in stratification within narrow limits. In the absence of foreign substances, it is also difficult to distinguish between discolored soils and clean soil fill.

Soil Conditions

The soil conditions encountered at the boring locations have been summarized and are provided in the following table:

D	DESCRIPTION	C	ϕ	C'	ϕ'	K_a	K_p	γ_e
0-8	Lean **CLAY**	1250	0	520	25	0.41	2.46	120
8-13	Clayey **SAND**	1250	0	520	25	0.41	2.46	55
13-33	Lean/Fat **CLAY**	2000	0	520	27	0.38	2.66	60
33-50	Lean **CLAY**	2500	0	520	27	0.38	2.66	60

Where: D =Depth in Feet
C= Undrained Shear Strength (psf)
ϕ = Undrained Angle of Internal Friction (degrees)
C'= Drained Shear Strength (psf)
ϕ'= Drained Angle of Internal Friction (degrees)
K_a= Active Earth Pressure Coefficient
K_p= Passive Earth Pressure Coefficient
γ_e= Effective Unit Weight (pcf)

The soil parameters provided in the table above may be used for the design of a braced excavation. The trench protection should be designed to provide the most conservative design.

It should be noted that the values provided in the table above are based on the soil strengths and soil densities encountered in the field. Empirical formulas were used to correlate undrained shear strengths to drained shear strengths and the corresponding angle of internal friction for clay soils.

The active and passive earth pressure coefficients for the clay soils encountered were calculated using the drained angle of internal friction as recommended in "***FOUNDATION ANALYSIS AND DESIGN***", written by Mr. Joseph Bowles where he states, "Drained soil parameters for stiff clays and ϕ-C soils in general may be appropriate for lateral pressures behind braced walls where the excavation is open for a considerable length of time".

Detailed descriptions of the soils encountered at the boring locations are provided on the boring logs provided in the Appendix.

Groundwater Observations

Groundwater (GW) observations and the depths the borings caved are provided in the following table:

BORING NO.	DURING DRILLING	UPON COMPLETION	AFTER 24 HOURS
B-1	10.5'	11' and caved at 15'	8.5' and caved at 11'
B-1	10.5'	11' and caved at 14'	9.5' and caved at 10'

Based on observations made in the field and moisture contents obtained in the laboratory, it appears that groundwater at the boring locations will be encountered near the 10 to 11-foot depth, however, an excavation deeper than approximately 8-feet will likely begin to collect groundwater over an extended period of time. It should be noted that water levels in open boreholes may require several hours to several days to stabilize depending on the permeability of the soils and that groundwater levels at this site may be affected recent rainfall, drought or temperature.

OSHA Soil Type Classification

The table below provides a summary of the OSHA Soil Type Classification for the soils encountered at this site based on the soils encountered at the boring location:

D	DESCRIPTION	OSHA SOIL TYPE CLASSIFICATION
0-8	Lean **CLAY**	Type B
8-13	Clayey **SAND**	Type C
13-50	Lean/Fat **CLAY**	Type C

It should be noted that the contractor's "responsible person" shall make the final determination of the OSHA Soil Type during excavation of the soils at the jobsite.

The maximum allowable slopes during construction for soil OSHA soil types are provided in the following table:

GUIDELINES FOR MAXIMUM ALLOWABLE SLOPES	
Soil or Rock Type	**Max. Allow. Slopes for Excavations < Than 20' Deep**
Stable Rock	Vertical
Type A	¾: Horizontal : 1 Vertical
Type B	1 Horizontal : 1 Vertical
Type C	1 ½ Horizontal : 1 Vertical

Guidelines for maximum allowable slopes were obtained from OSHA documents, but do not take into account any recent revisions or the stability of long term unprotected slopes. Long term unprotected slopes will likely require much flatter slopes. The guidelines presented herein for slopes does not imply RETL is taking responsibility for construction site safety, this responsibility falls entirely upon the contractor and his responsible person. RETL is assuming that the contractor will comply with all rules, ordinances and other requirements to comply with safe construction practices.

FOUNDATION DISCUSSION AND RECOMMENDATIONS

Project Description

Based on information provided to RETL, the project will include the construction of a reinforced concrete clarifier structure approximately 110-feet in diameter with a wall height of approximately 20-feet. The bottom of the clarifier will likely be cone shaped and will be approximately 10-feet below existing site grades. A concrete mat/slab with a perimeter turned down edge or grade beam footing is typically used to support clarifier structures.

Clarifier Foundation

The clarifier may utilize a mat/slab type foundation at this site. The net allowable unit soil pressure for design of the clarifier foundation may be taken as **2,500 psf**. The net allowable unit soil bearing pressure provided is applicable between depths of 2 and 13-feet and utilizes a factor of safety of 3.0. It should be noted that dewatering will likely be required for any excavation deeper than about 8-feet.

Excavation equipment may disturb the bearing soils and loose pockets can occur at the bearing level that was not disclosed by the borings. For this reason, it is recommended that the bottom of the clarifier excavation be compacted prior structural fill or concrete placement. The upper 6-inches of exposed subgrade should be compacted to achieve a density of no less that 95-percent of the maximum dry density as determined by the standard Proctor (ASTM D698) and the moisture content should be maintained within –1 to +3% of the optimum moisture content.

In order to minimize the effects of slight differential movements that may occur due to variations in the character of the supporting soils, it is recommended that the clarifier foundation be suitably reinforced to make it as rigid as possible. In addition, piping and other utilities connected to the clarifier should take into account that settlement on the order of 1-inch may occur during the hydro testing due to elastic consolidation of the clay foundation soils.

If the foundation bearing level will be open for a long period of time, a lean concrete seal slab should be placed to protect the exposed bearing soils from adverse climatic conditions.

CONSTRUCTION CONSIDERATIONS

Site Drainage

A majority of foundation related problems in the project area are attributable, at least in part, to poor drainage. Poor drainage, and the resulting ponded water, can result in a non-uniform moisture regime within the foundation limits and beyond, resulting in differential movements within the structure. We recommend that an effective site drainage plan be devised by others prior to commencement of construction to provide positive drainage away from the foundation perimeters and off the site, both during, and after construction.

Select Fill

Select fill material used at this site should have a maximum liquid limit of 40 percent and a plasticity index (PI) of 7 to 18. The select fill should be placed in no greater than 8-inch thick loose lifts and compacted to a minimum density of 95-percent of the standard Proctor (ASTM D698) maximum dry density and at or above the optimum moisture content.

Structural Fill

Structural fill material used at this site should consist of crushed limestone base meeting the requirements of TxDOT Item 247, Type A, Grade 2 or better. The structural fill should be placed in no greater than 8-inch thick loose lifts and compacted to a minimum density of 95-percent of the modified Proctor (ASTM D1557) maximum dry density and within 2 % of the optimum moisture content.

Earthwork and Foundation Acceptance

Exposure to the environment may weaken the soils at the foundation bearing level if the excavation remains open for long periods of time. Therefore, it is recommended that the foundation excavation be extended to final grade and that the foundation be constructed as soon as possible to minimize potential damage to the bearing soils. The foundation bearing level should be free of loose soil, ponded water or debris and should be observed prior to concreting by the Geotechnical Engineer, or his designated representative.

Foundation concrete should not be placed on soils that have been disturbed by rainfall or seepage. If the bearing soils are softened by surface water intrusion, or by desiccation, the unsuitable soils must be removed from the foundation excavation and be replaced with properly compacted select fill prior to placement of concrete.

The Geotechnical Engineer, or his designated representative, should monitor subgrade preparation and placement of select fill. As a guideline, a minimum of one, in-place density test should be performed on the subgrade soils and each subsequent lift of fill for each 2,000 square feet of slab area, or a minimum of three in-place density tests per testing interval, whichever is greater. Any areas not meeting the required compaction should be recompacted and retested until compliance is met.

Excavations

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. **All excavations should comply with applicable local, state and federal safety regulations including the current OSHA Excavation and Trench Safety Standards.** We are providing this information solely as a service to our client. Under no circumstances should the information provided herein be interpreted to mean that RETL is assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

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. Specifically, the current OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926 should be followed. 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's "competent person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. For excavations, including a trench, extending to a depth of more than 20-feet, it will be necessary to have the side slopes designed by a professional engineer licensed in the State of Texas.

The contractor's "competent person" should establish a minimum lateral distance from the crest of the slope for all vehicles and spoil piles. Likewise, the contractor's "responsible person" should establish protective measures for exposed slope faces.

Dewatering Construction Considerations

An excavation to a depth of 8-feet or deeper at this site, to construct the bottom portion of the clarifier or to install piping, will likely encounter groundwater. Therefore, dewatering will be required to construct the proposed clarifier. It should be noted that the depth to the groundwater is subject to change due to climatic conditions, and therefore, it should be made the responsibility of the contractor to verify the depth to groundwater. South Texas is currently experiencing a drought and groundwater levels closer to the surface should be expected during periods of rain.

The following discussion is general information that may be useful where dewatering operations are required.

For construction of shallow excavations, open drainage or interceptor ditches can be expedient and relatively inexpensive method for lowering the groundwater table a slight distance. The interceptor ditch has to penetrate deeper than the elevation of the work area. Water collecting in such ditches normally has to be pumped out of the ditch for disposal. Since gravity flow is relied upon to bring the water to the ditch, the continued inflow is dependent on the water level in the ditch being kept low. With this method, it is common to construct small pits in the ditch, termed sump pits, for locating the necessary pumps (sump pumps).

The drawing down of the water table can also be accomplished by constructing a series of sump pits, or, if greater depth is required, some type of drainage wells around the construction area and pumping the water from these pits or wells.

For dewatering to intermediate depths (to about 20-feet but more if sufficient area is available for installing the necessary equipment) well-point systems are normally used. To dewater an area, a series of well points is installed around the perimeter of the area. The groundwater level within the perimeter will be lowered when the well-point system is put in operation. The spacing of the well points varies according to the soil type and depth of dewatering. Spacing conventionally varies between 3 and 10-feet.

With the type of pumping equipment conventionally used for well points, the depth of dewatering that can usually be achieved by a single line of well points located around the perimeter of an excavation is about 18 to 20-feet. This is due to the limit on the practical lifting, or suction, capacity of the pumping equipment. Lowering the water table through a greater distance may require the use of a two (or more) stage (multistage) installation. Where a two-stage installation is required, the well points for the first stage of drawdown are located near the extreme perimeter limits of the area that can be excavated, and are put into operation. Well points for the second stage are subsequently located within the area that has been excavated, near to the bottom elevation that has been dewatered by the first stage. The second stage well points then lower the water table to the additional depth necessary to complete the excavation in dry conditions.

Subsurface water that flows in an upward direction into an excavation area that is being dewatered imparts a seepage force that tends to loosen the soil, reducing the soil strength. The change in strength should be considered in designing excavation bracing and foundations. Where excavations are to extend more than a few feet below groundwater level, open ditches or pits may not be practical, and more advanced methods may be required.

Other methods of dewatering are available and may be more cost effective than those mentioned above. Additional information concerning dewatering may be obtained from a contractor whose specialty is dewatering.

GENERAL COMMENTS

If significant changes are made in the character or location of the proposed project, a consultation should be arranged to review any changes with respect to the prevailing soil conditions. At that time, it may be necessary to submit supplementary recommendations.

It is recommended that the services of RETL be engaged to test and evaluate the soils in the foundation excavation prior to concreting in order to verify that the bearing soils are consistent with those encountered in the borings. RETL cannot accept any responsibility for any conditions that deviate from those described in this report, nor for the performance of the foundation if not engaged to also provide construction observation and testing for this project. If it is required for RETL to accept any liability, then RETL must agree with the plans and perform such observation during construction as we recommend.

All sheeting, shoring and bracing of trenches, pits and excavations should be made the responsibility of the contractor and should comply with all current and applicable local, state and federal safety codes, regulations and practices, including the Occupational Safety and Health Administration.

APPENDIX

BORING LOCATION PLAN

NO SCALE

September 14, 2011
LNV Engineering, Inc.
RETL Job No.: G211220

PROPOSED CLARIFIER
Kingsville South WWTP - F.M. 1717
Kingsville, Texas

ROCK ENGINEERING AND TESTING LABORATORY, INC.
18847 REDLAND ROAD; SUITE 202
SAN ANTONIO, TEXAS 78259
(210) 495-8000

LOG OF BORING B-1

Rock Engineering & Testing Laboratory Inc.
4910 Neptune
Corpus Christi, TX 78405
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: LNV Engineering, Inc.
PROJECT: Kingsville WWTP Clarifier
LOCATION: Kingsville WWTP; FM 1717-Kingsville, TX
NUMBER: G211220

DATE(S) DRILLED: 08/19/11 - 08/19/11

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at 10.5' during drilling. GW measured at 11' and boring caved at 15' upon completion of drilling.
24 Hour: GW at 8.5' and caved at 11'

SURFACE ELEVATION: N/A

SOIL SYMBOL	DEPTH (FT)	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	ATTERBERG LIMITS PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
		SH S-1		P= 4.5+	12							**SANDY LEAN CLAY**, dark brown, slightly moist, very stiff.
	5	SH S-2		P= 4.5+	8	31	17	14			61	Same as above, with calcareous material, dry. (CL)
		SH S-3		P= 3.0	14							Same as above, brown, slightly moist.
		SH S-4		P= 2.0	19	32	21	11			42	**CLAYEY SAND**, with clay seams, light brown, moist, stiff. (SC)
	10	SS S-5		N= 12	19							Same as above.
		SS S-6		N= 14	19	34	23	11			68	**SANDY LEAN CLAY**, light brown, moist, stiff. (CL)
	15											
		SS S-7		N= 20	22							Same as above, very moist, very stiff.
	20											
		SS S-8		N= 22	25						47	**CLAYEY SAND**, light brown, very moist, medium dense.
	25											
		SS S-9		N= 15	40							**SILTY SAND**, light brown, wet, medium dense.
	30											
		SS S-10		N= 13	33						13	**SANDY LEAN CLAY**, grayish brown, very moist, stiff.
	35											
		SS S-11		N= 19	30							Same as above, very stiff.
	40											
		SS S-12		N= 14	32						81	**LEAN CLAY**, with sand, light grayish brown, very moist, stiff.
	45											
		SS S-13		N= 13	31							Same as above.
	50											Boring terminated at a depth of 50-feet.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - POCKET TORVANE SHEAR STRENGTH

REMARKS:
Boring location determined by RETL. Boring operations performed by a drilling subcontractor to RETL.
GPS Coordinates: N 27° 28.162' W 97° 50.173'

LOG_OF_BORING G211220 KINGSVILLE WWTP.GPJ ROCK_ETL.GDT 9/14/11

LOG OF BORING B-2

Rock Engineering & Testing Laboratory Inc.
4910 Neptune
Corpus Christi, TX 78405
Telephone: 361-883-4555
Fax: 361-883-4711

CLIENT: LNV Engineering, Inc.
PROJECT: Kingsville WWTP Clarifier
LOCATION: Kingsville WWTP; FM 1717-Kingsville, TX
NUMBER: G211220

DATE(S) DRILLED: 08/19/11 - 08/19/11

DRILLING METHOD(S):
Hollow Stem Auger

GROUNDWATER INFORMATION:
Groundwater (GW) was encountered at 10.5' during drilling. GW measured at 11' and boring caved at 14' upon completion of drilling.
24 Hour: GW at 9.5' and caved at 10'

SURFACE ELEVATION: N/A

SOIL SYMBOL	DEPTH (FT)	SAMPLE NUMBER	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: TONS/SQ FT PERCENT RECOVERY/ ROCK QUALITY DESIGNATION	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
		SS S-1		N= 8	15						71	**LEAN CLAY**, with sand, light brown, moist, stiff.
		SS S-2		N= 11	14							Same as above, with calcareous material.
	5	SS S-3		N= 7	19	30	17	13			82	Same as above, very moist, firm. (CL)
		SS S-4		N= 5	17							**CLAYEY SAND**, light brown, moist, loose.
	10	SS S-5		N= 10	18	38	20	18			46	Same as above, light grayish brown, very moist, medium dense. (SC)
		SS S-6		N= 9	30							**SANDY LEAN CLAY**, light grayish brown, very moist, stiff.
	15											
		SS S-7		N= 13	22	48	23	25			57	Same as above, with calcareous material, light brown, moist. (CL)
	20											
		SS S-8		N= 15	29							Same as above, very moist.
	25											
		SS S-9		N= 20	27	64	33	31			60	**SANDY FAT CLAY**, light grayish brown, moist, very stiff. (CH)
	30											
		SS S-10		N= 11	33							**SANDY LEAN CLAY**, grayish brown, very moist, stiff.
	35											
		SS S-11		N= 16	30						70	Same as above, very stiff.
	40											
		SS S-12		N= 15	19							Same as above, light brown, moist, stiff.
	45											
		SS S-13		N= 20	28						78	**LEAN CLAY**, with sand, grayish brown, very moist, very stiff.
	50											Boring terminated at a depth of 50-feet.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - POCKET TORVANE SHEAR STRENGTH

REMARKS:
Boring location determined by RETL. Boring operations performed by a drilling subcontractor to RETL.
GPS Coordinates: N 27° 28.164' W 97° 50.154'

Engineering & Testing
Laboratory, Inc.

4910 Neptune Street
Corpus Christi, Texas 78405
Office: (361) 883-4555 Fax: (361) 883-4711

KEY TO SOIL CLASSIFICATIONS AND SYMBOLS

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		Letter	Symbol: Hatching	Symbol: Color	NAME
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW		RED	Well – graded gravels or gravel – sand mixtures, little or no fines
		GP			Poorly-graded gravels or gravel – sand mixtures, little or no fines
		GM		YELLOW	Silty gravels, gravel – sand – silt mixtures
		GC			Clayey gravels, gravel - sand – clay mixtures
	SAND AND SANDY SOILS	SW		RED	Well - graded sands or gravelly sands, little or no fines
		SP			Poorly – graded sands or gravelly sands, little or no fines
		SM		YELLOW	Silty sands, sand – silt mixtures
		SC			Clayey sands, sand – clay mixtures
FINE GRAINED SOILS	SILTS AND CLAYS LL < 50	ML		GREEN	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with
		CL			Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL			Organic silts and organic silt-clays of low plasticity
	SILTS AND CLAYS LL > 50	MH		BLUE	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH			Inorganic clays of high plasticity, fat clays
		OH			Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		P '		ORANGE	Peat and other highly organic soils

TERMS CHARACTERIZING SOIL STRUCTURE

SLICKENSIDED – having inclined planes Of weakness that are slick and glossy in appearance

FISSURED – containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical

LAMINATED (VARVED) – composed of thin layers of varying color and texture, usually grading from sand or silt at the bottom to clay at the top.

CRUMBLY – cohesive soils which break into small blocks or crumbs on drying

CALCAREOUS – containing appreciable quantities of calcium carbonate, generally nodular.

WELL GRADED – having wide range in grain sizes and substantial amounts of all intermediate particle sizes.

POORLY GRADED - predominantly of one grain size (uniformly graded) or having a range of sizes with some intermediate size missing (gap or skip graded)

SYMBOLS FOR TEST DATA

M/C = 15 – Natural moisture content in percent.

γ = 95 – Dry unit weight in lbs/cu ft.

Qu = 1.23 – Unconfined compression strength in tons/ sq ft.

51 – 21 – 30 – Liquid limit, Plastic limit, and Plasticity index.

30% FINER – Percent finer than No. 200 mesh sieve

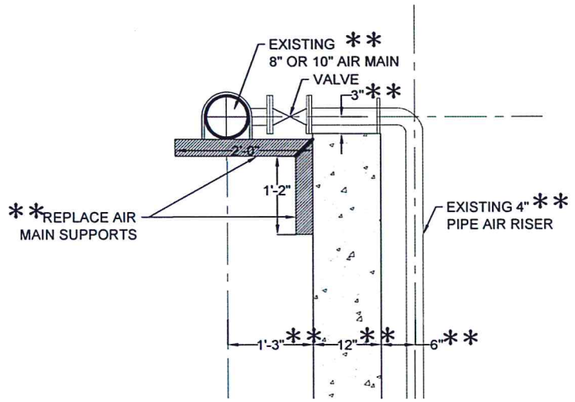
30 B/F – Blows per foot, standard penetration test.

▼ – Ground water table.

TERMS DESCRIBING CONSISTENCY OF SOIL (2)

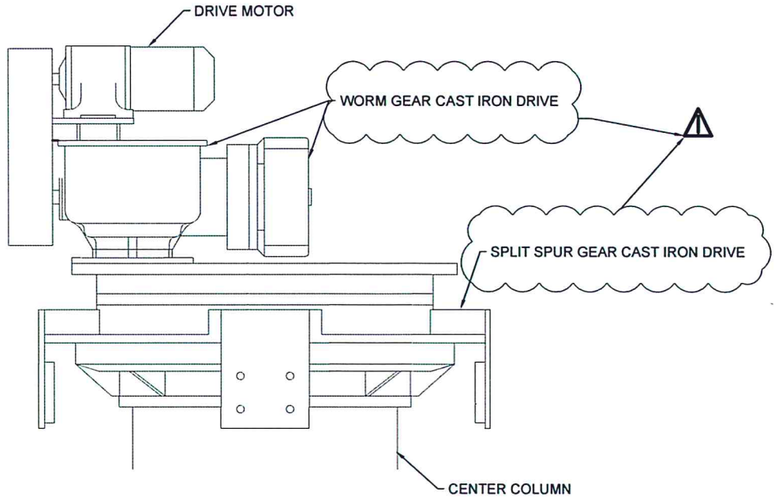
COARSE GRAINED SOILS		FINE GRAINED SOILS		
DESCRIPTIVE TERM	NO. BLOWS / FT. STANDARD PEN. TEST	DESCRIPTIVE TERM	NO. BLOWS / FT. STANDARD PEN. TEST	UNCONFINED COMPRESSION TONS PER SQ. FT.
Very loose	0 – 4	Very Soft	< 2	< 0.25
Loose	4 – 10	Soft	2 – 4	0.25 – 0.50
Firm (medium)	10 – 30	Plastic (med. Stiff)	4 – 8	0.50- 1.00
Dense	30 – 50	Stiff	8 – 15	1.0 – 2.00
Very Dense	over 50	Very Stiff	15 – 30	2.00 – 4.00
		Hard	over 30	over 4.00

Field classification for "Consistency" is determined with a 0.25" diameter penetrometer.



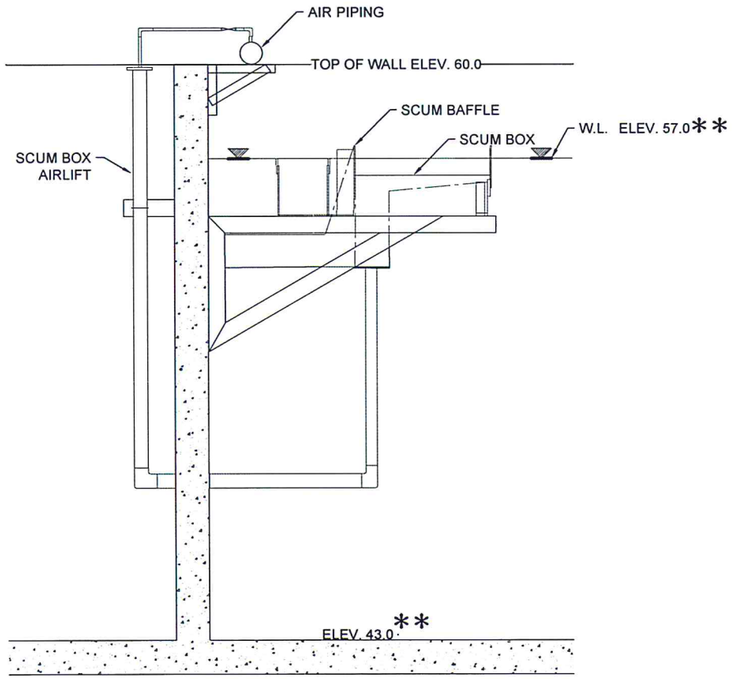
1 / C5 AIR MAIN SUPPORT

SCALE: 1" = 1'-0"



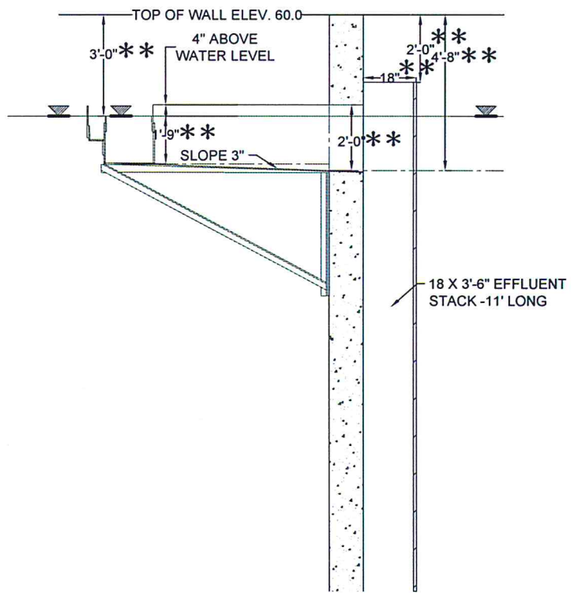
2 / C5 DRIVE ASSEMBLY

SCALE: 1'-1/2" = 1'-0"



3 / C5 SCUM BOX

SCALE: 1/2" = 1'-0"



4 / C5 EFFLUENT TROUGH

SCALE: 1/2" = 1'-0"

STATE OF TEXAS
RUTILIO P. MORA, JR.
111588
LICENSED
PROFESSIONAL ENGINEER

Rutilio P. Mora Jr.
4/30/2019

⚠ REVISED AS PER ADDENDUM No. 1

** THIS ELEVATION OR DIMENSION SHALL BE FIELD VERIFIED

CITY OF KINGSVILLE
ENGINEERING DEPARTMENT
400 W. Kinu Avenue
Kingsville, Texas 78363
Office 361.595.8007
Fax 361.595.8035

Drawn by: R. TOVAR
Date: 01/03/2019
Revised by: R. MORA
Job:
Scale: X

2019 SOUTH SIDE WASTEWATER
TREATMENT PLANT PRIMARY CLARIFIER
EQUIPMENT REPLACEMENT

CLARIFIER DETAILS