Geotechnical Engineering Study

Miranda 18-inch Wastewater Relief Line
El Paso, El Paso County, Texas
LOI File No. 20-312

Prepared for:
H2O Terra
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February 4, 2021

ENGINEERS

File No. LOI20-312
February 4, 2021

Mr. Steven T. Morgan, P.E.
H2O Terra
2020 E. Mills Ave.
El Paso, Texas 79901

Re: Geotechnical Engineering Report
Miranda 18-inch Wastewater Relief Line
El Paso, El Paso County, Texas

Dear Mr. Morgan:

We thank you for the opportunity to present the enclosed geotechnical engineering report for the above referenced project. This engineering report was prepared in accordance with the scope of services as presented in our proposal No. LOIP18-081, dated March 20, 2018, and authorized on November 20, 2020. The information we are presenting herein describes the procedures utilized for field and laboratory investigation, along with the results of our study.

It was a pleasure to work with you on this phase of your project, and we look forward to assist you further during the subsequent construction activities. If you have any questions regarding the information we present herein, please call us.

Respectfully submitted,
LOI ENGINEERS

Diana S. Guerrero, E.I.T.
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STATE OF TEXAS
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Principal Engineer 2/4/2021

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ENGINEERS

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1.0 INTRODUCTION

We have completed the geotechnical engineering study for the proposed Miranda 18" Wastewater Relief Line project, which will be constructed in west El Paso, Texas. We were authorized to conduct this study by Mr. Steven T. Morgan, P.E., representing H2O Terra (Client) on November 30, 2020.

2.0 PROJECT DESCRIPTION AND OBJECTIVE

The project consists of the design and construction of the replacement and upgrade of about 5,600 linear feet of the existing Miranda Wastewater 18" System, in El Paso, Texas. The sewer alignment will start near the intersection of N. Mesa Street and Conley Road, then to Mace Street, Graphite Drive, and then across IH-10, proceeding along N. Desert Boulevard, in west El Paso, El Paso County, Texas.

We conducted our study in general accordance with the "Recommended Practice for the Design of Foundations" manual published by the American Society of Civil Engineers.

3.0 FIELD AND LABORATORY INVESTIGATION

3.1 Field Exploration

In our field exploration phase, we drilled six (6) soil borings to depths ranging from 16½ feet to 41½ feet below ground surface at representative locations within the proposed sewer line alignment. It is important to note that a seventh soil boring remains to be drilled. Once access to the site is granted, LOI will complete the drilling program. The soil test results and geotechnical recommendations associated with the remaining soil boring will be submitted under separate cover. We drilled and sampled the soil borings in general accordance with ASTM D-6151 and D-1586 procedures with a truck-mounted CME-75 drill rig. We located the borings in the field using property corners and street references included in the project plans provided by Client.

The soil boring locations are shown in the Boring Plan included in the Appendix A of this report in Sheet A-1. We also prepared a log of each soil boring to delineate the soil strata studied at the site. The soil boring logs (B-1 (to be drilled at a later time) through B-7) are included in the Appendix A of this report as Sheets A-2 through A-8. A key to the soil terminology used in the logs is included in the Appendix B of this report as Sheets B-1 and B-2.

We conducted Standard Penetration Tests (SPT) at each representative soil strata in the soil borings to determine the relative density or consistency of the resident soils. The SPT is a widely recognized procedure that provides a numerical value of the soil strata being tested, indicating the number of blows that it takes for a standard 140-pound weight hammer with a standard 30-inch free fall drop to penetrate 12 inches into the soil. The SPT values for the soil strata in the soil borings are included in the soil boring logs.

As part of our field exploration, we collected representative soil samples from the soil borings at regular depth intervals using a standard 2-inch diameter split spoon sampler. We identified and labeled the samples according to boring number and depth, visually classified them according to ASTM D-2488, and placed them in moisture-proof containers for transportation to the laboratory for further evaluation and testing.

Unless we receive prompt notification from Client, we will store the samples collected from the field investigation in our laboratory for a period of 90 days from the date of this report, after which time we will discard the samples.

3.2 Geotechnical Laboratory Testing

In the laboratory, we determined the moisture content, particle size analysis, percent passing the No. 200 sieve, and Atterberg Limits of selected samples. We conducted these tests to determine the physical and engineering properties of representative soils at the site. These tests also allowed us to properly classify the resident soils in accordance with the Unified Soil Classification System (USCS). The results of our tests are included in the soil boring logs, adjacent to the depth at which the sample was recovered.

Type of Test	Number of Tests
Moisture Content (ASTM D-2216)	25
Grain Size Distribution Analysis (ASTM D-422)	13
Percent Passing No. 200 Sieve (ASTM D-6913)	25
Atterberg Limits (ASTM D-4318)	2
Moisture-Density Relationship Curve (ASTM D-1557)	2

3.3 Corrosivity

During our field exploration, we collected representative composite soil samples from the borings at an interval depth of 6 inches to 24 inches to determine some of their corrosivity properties. We identified and labeled the samples according to sampling point and depth, visually classified them according to ASTM D-2488, and placed them in moisture-proof containers and ice for transportation to the laboratory for further evaluation and testing. The test results are presented in the table below.

Parameter	Units	Soil Boring & Depth							
		B-2 2¼'-4'	B-4 7½-9'	B-4 10-11½'	B-5 21-21½'	B-6 10-11½'	B-6 15-16½'	B-6 21-21½'	B-7 5-6½'
Corrosivity	mm /yr	M	M	M	M	M	M	M	M
pH	s.u.	9.02	10.1	9.81	9.78	9.74	8.63	9.28	9.69
Chloride	mg/ Kg	24.1	10.4	12.2	12.4	40	328	14.8	18.8
Sulfate	mg/ Kg	97.8	55.2	130	50.5	45	127	11.6	26.6
Sulfide	mg/ Kg	<671	799	<671	<671	<671	<672	999	<670
M - Moderate									

4.0 GENERAL SITE CONDITIONS

4.1 Site Geology

The project sites of soil borings B-2 through B-4 are located above the Rio Grande flood plain. According to the Soil Conservation Service of El Paso County, the soils in this area

correspond to the Harkey-Glendale association, which is described as nearly level soils that have loamy very fine sand to silty clay loam underlying material.

The project sites of soil borings B-5 through B-7 are located mainly on and near foot slopes of the Franklin Mountains. According to the Soil Conservation Service of El Paso County, the soils in this area correspond to the Delnorte-Canutillo association, which is described as nearly level to steep soils that are shallow or very shallow over caliche or that are deep and gravely throughout.

4.2 Site Topography and Site Conditions

The site topography and conditions at each boring location are shown below:

Boring Number	Site Topography and Conditions
1	N/A
2 (Conley Road)	The site was relatively level and topped with a hot-mix asphaltic concrete (flexible pavement).
3 (near Crossroads Valley Apartments along McClintock Drive)	The site exhibited undulating topography.
4 (Mace Street)	The site was relatively level and topped with a hot-mix asphaltic concrete (flexible pavement).
5 (Graphite Drive)	The site was relatively level and topped with a hot-mix asphaltic concrete (flexible pavement).
6 (TXDOT ROW near N. Desert Blvd.)	The site exhibited undulating topography.
7 (TXDOT ROW near N. Desert Blvd.)	The site exhibited undulating topography.

4.3 Site Vegetation

At the time of our field phase, the sites near soil borings B-3, B-6 and B-7, exhibited sparse native vegetation consisting of weeds, shrubs, and perennial grasses. Soil borings B-2, B-4 and B-5 were drilled within streets or sites relatively free of vegetation.

4.4 Soil Stratigraphy

The soils we encountered in the borings can be divided into three (3) generalized soil strata as follows:

Soil Boring B-2

Stratum A, consisting of brown and light brown fine grained silty sands, intermixed with gravel and occasional small cobbles, was encountered from beneath the asphalt and base course layer, and extended to a depth of 10 feet below ground surface (bgs) and again underlying the Stratum B soils from a depth of 20 feet BGS and extended to the total explored depth of 31½ feet BGS in soil boring B-2. These soils were encountered at a very loose to medium dense relative density, with SPT values results ranging from 2 to 26 blows per foot of penetration. These soils were encountered at a dry to saturated condition, with tested moisture content values ranging from 5 to 35 percent, and percent finer than the No. 200 sieve test results ranging from 2 to 21 percent. Soils in this stratum can be classified as SM, SP, or a combination of these, in accordance with the USCS.

Stratum B, consisting of gray and light brown sandy gravels, occasionally intermixed with silt, was encountered interbedded in the Stratum A soils in soil boring B-2. These soils were encountered at medium dense relative density, with SPT values ranging from 18 to over 22 blows per foot of penetration. These soils were encountered at a dry condition, with a tested moisture content value of 2 percent, and a percent finer than the No. 200 sieve test result of 5 percent. Soils in this stratum can be classified as GM, GW, or a combination of these, in accordance with the USCS.

Soil Boring B-3

Stratum A, consisting of brown fine grained silty sands, intermixed with gravel and occasional small cobbles, was encountered from ground surface elevation, and extended to a depth of 15 feet BGS in soil boring B-3. These soils were encountered at a dense to very dense relative density, with SPT values results ranging from 28 to over 50 blows per foot of penetration. These soils were encountered at a dry condition, with

tested moisture content value of 1 percent, and percent finer than the No. 200 sieve test results ranging from 6 to 10 percent. Soils in this stratum can be classified as SM, SP, or a combination of these, in accordance with the USCS.

Stratum B, consisting of brown sandy gravels, occasionally intermixed with silt, was encountered underlying the Stratum A soils in soil boring B-3. These soils were encountered at a very dense relative density, with a SPT value of over 50 blows per foot of penetration. These soils were encountered at a dry condition, with a tested moisture content value of 2 percent, and a percent finer than the No. 200 sieve test result of 6 percent. Soils in this stratum can be classified as GM, GP, or a combination of these, in accordance with the USCS.

Soil Boring B-4

Stratum A, consisting of brown and light brown fine grained silty sands, intermixed with gravel and occasional small cobbles, was encountered from beneath the asphalt and base course layer, and extended to the total explored depth of 16½ feet BGS in soil boring B-4. These soils were encountered at a loose to medium dense relative density, with SPT values results ranging from 8 to 27 blows per foot of penetration. These soils were encountered at a dry to moist condition, with tested moisture content values ranging from 6 to 8 percent, and percent finer than the No. 200 sieve test results ranging from 6 to 8 percent. Soils in this stratum can be classified as SM, SP, or a combination of these, in accordance with the USCS.

Soil Boring B-5

Stratum A, consisting of brown and light brown fine grained silty sands, intermixed with gravel and occasional small cobbles, was encountered from beneath the asphalt and base course layer, and extended to the total explored depth of 22 feet BGS in soil boring B-5. These soils were encountered at a dense to very dense relative density, with SPT values results ranging from 39 to over 50 blows per foot of penetration. These soils were encountered at a dry to moist condition, with tested moisture content values ranging

from 2 to 5 percent, and percent finer than the No. 200 sieve test results ranging from 4 to 14 percent. Soils in this stratum can be classified as SM, SP, SW, or a combination of these, in accordance with the USCS.

Soil Boring B-6

Stratum A, consisting of brown and light brown fine grained silty sands, intermixed with gravel and occasional small cobbles, was encountered from ground surface elevation, and extended to a depth of 20 feet BGS and again underlying the Stratum C soils and extended to the total explored depth of 41½ feet BGS in soil boring B-6. These soils were encountered at a medium dense to very dense relative density, with SPT values results ranging from 24 to over 50 blows per foot of penetration. These soils were encountered at a dry to moist condition, with tested moisture content values ranging from 1 to 9percent, and percent finer than the No. 200 sieve test results ranging from 7 to 22 percent. Soils in this stratum can be classified as SM, SP, or a combination of these, in accordance with the USCS.

Stratum C, consisting of brown sandy fat clays, was encountered interbedded in the Stratum A soils, from a depth of 20 feet to 25 feet BGS, in soil boring B-6. These soils were encountered at a very stiff consistency, with an SPT value of 24 blows per foot of penetration. These soils were encountered at a very moist condition, with a tested moisture content value of 25 percent, and a percent finer than the No. 200 sieve test result of 64 percent. Soils in this stratum can be classified as CH in accordance with the USCS.

Soil Boring B-7

Stratum A, consisting of brown and light brown fine grained silty sands, intermixed with gravel and occasional small cobbles, was encountered from ground surface elevation, and extended to a depth of 7½ feet BGS ad again underlying the Stratum B soils from a depth of 15 feet BGS and extended to the total explored depth of 16½ feet BGS in soil boring B-7. These soils were encountered at a dense to very dense relative density, with

SPT values results ranging from 32 to over 50 blows per foot of penetration. These soils were encountered at a dry to moist condition, with tested moisture content values ranging from 1 to 6 percent, and percent finer than the No. 200 sieve test results ranging from 11 to 38 percent. Soils in this stratum can be classified as SM, SP, SC, or a combination of these, in accordance with the USCS.

Stratum B, consisting of gray and light brown sandy gravels, occasionally intermixed with silt, was encountered interbedded the Stratum A soils from a depth of 7½ feet to 15 feet BGS in soil boring B-7. These soils were encountered at a very dense relative density, with SPT values ranging of over 50 blows per foot of penetration. These soils were encountered at a dry condition, with a tested moisture content value of 1 percent, and a percent finer than the No. 200 sieve test result of 7 percent. Soils in this stratum can be classified as GM, GP, or a combination of these, in accordance with the USCS.

Due to the relatively small diameter of the drilling and sampling tools utilized in our drilling program, we could not establish the maximum size of cobbles in Stratum B. However, based on the degree of difficulty in our drilling program at the site, we anticipate that the size of cobbles will exceed 6 inches in diameter. During our drilling operations, auger refusal occurred at depths as shallow as 22 feet. Based on the natural stratigraphy in the vicinity of the project site, large boulders and rock formations may be encountered at depths of about 30 feet in certain locations. However, due to our drilling methodology and localized sampling, we could not verify the type, the presence or the extent of these possible formations.

4.5 Groundwater

Groundwater was encountered in Borings B-2 (along Conley Road) and B-4 (along Mace Street) during the time of our field exploration which took place on December 11, 2020 and December 16, 2020, respectively. The groundwater table at the site (Conley Road and Mace Street) was encountered at a depths ranging from 10 feet to 15 feet below the ground surface.

It is our opinion that the depth to groundwater at the site may vary considerably after periods of significant rainfall or during irrigation seasons. Fluctuations in groundwater may also occur as a function of temperature, groundwater withdrawal and future construction activities that may alter the surface drainage and sub-drainage characteristics of this site.

Furthermore, implementation of dewatering program will be necessary at or near borings B-2 and B-4.

5.0 ENGINEERING EVALUATION

5.1 Site Preparation

The asphalt paving throughout the alignment (where applicable) should be removed and disposed of off-site as per City of El Paso regulations. Based on the SPTs performed at the site, the majority of soils in the upper 10 feet below ground surface, were encountered at a very loose to very dense relative density. Furthermore, soils at their present condition may provide adequate support for the proposed sewer line and manholes when properly processed as indicated in the Section 5.6 of this report.

5.2 Foundation Recommendations

The Stratum A and Stratum B soils may be used as support directly beneath the planned proposed sewer line and manhole structures. Based on invert elevations ranging from 7 to 16 feet below ground surface, these soils should be overexcavated and replaced with select fill as indicated in the following table.

Boring Number	Type of Foundation	Allow. Soil Bearing Capacity (lb/ft^2)	Minimum Bearing Depth (in.)	Minimum Select Fill Below Bottom of Footing Elevation (in.)
B-1	To be determined at a later time			
B-2 (Sta. 2+38.00 to Sta. 14+50.00)	Individual Spread	1,900	30	12
B-3 (Sta. 14+50.00 to Sta. 25+57.08)	Individual Spread	2,250	36	12

Boring Number	Type of Foundation	Allow. Soil Bearing Capacity (lb/ft²)	Minimum Bearing Depth (in.)	Minimum Select Fill Below Bottom of Footing Elevation (in.)
B-4 (Sta. 25+57.08 to Sta. 38+90.01)	Individual Spread	2,100	36	12
B-5 (Sta. 38+90.01 to Sta. 48+40.38)	Individual Spread	2,250	36	12
B-6 (Sta. 48+40.38 to Sta. 55+00)	Individual Spread	2,300	48	12
B-7 (Sta. 55+00 to Sta. 57+17.00)	Individual Spread	2,300	30	12

The horizontal limits of any excavation associated with a structural element shall extend 12 inches beyond the footing line.

5.3 Trench Guidelines

We recommend adequate protection on the faces of the excavations to prevent hazards from falling material. Adequate sloping on the faces of the excavations should also be implemented to avoid possible soil sloughing.

The Occupational Safety and Health Administration (OSHA) classifies soils for the purpose of defining stable slopes to be used in trenching applications.

The soils found during our field exploration, are considered Type C materials. For temporary slopes in soil trenching for this project, Type C soils can have a maximum slope of 1½:1 (H:V).

The pipeline installation contractor/subcontractor may be required to utilize shielded trench systems during the construction phase whenever excavations deeper than 5 feet are required taking into consideration site constraints such as vehicular traffic, existing underground lines (fuel, natural gas, telecommunication, and water), overhead lines, and existing structures.

We should note that the information included in this report is for design of sewer pipeline facilities and lift station structures only, and is not intended to provide a trench safety plan. The contractor should develop a trench safety plan in accordance with the

requirements of OSHA and specifications in the project plans. If trench shields will be used, these should be selected appropriately to retain the lateral loads from the native coarse grained soils.

5.4 Lateral Earth Pressures

Above Water Table

We recommend the following values to be used in earth pressure computations, considering the Rankine method for lateral earth pressure computation having cohesionless or granular native materials as follows:

$$\Phi = 34°$$
$$\gamma_w = 135 \text{ lb/ft}^3$$

Additionally, the equivalent fluid density, considering the equivalent fluid method with the appropriate k value, may be computed as follows:

$$G_h = k^* \gamma_w$$

For concrete or masonry walls, the wall-soil interface friction angle may be computed as follows:

$$\Phi_w = 0.67\Phi$$

Coefficients of active and passive earth pressure are given below, along with the coefficient for the possible at-rest condition:

$$k_a = 0.28$$
$$k_p = 3.54$$
$$k_o = 0.44$$

Below Water Table

We recommend the following values to be used in earth pressure computations, considering the Rankine method for lateral earth pressure computation having cohesionless or granular native materials as follows:

$$\Phi = 32°$$

$$\gamma_w = 134 \text{ lb/ft}^3$$

Additionally, the equivalent fluid density, considering the equivalent fluid method with the appropriate k value, may be computed as follows:

$$G_h = k^* \gamma_w$$

For concrete or masonry walls, the wall-soil interface friction angle may be computed as follows:

$$\Phi_w = 0.67\Phi$$

Coefficients of active and passive earth pressure are given below, along with the coefficient for the possible at-rest condition:

$$k_o = 0.31$$

$$k_p = 3.25$$

$$k_o = 0.47$$

5.5 Seismic Considerations

The site classification for the insitu soil was determined to be Class D, stiff soil. USGS Seismic maps reveal that the site has a peak ground acceleration of 0.12g for a 2 percent probability of exceedance in 50 years, with a soil dampening value of 5 percent (USGS 2002).

Parameter	Value
S_S	0.304g
S_1	0.094g
F_a	1.557
F_v	2.4

5.6 Select Fill

Select fill material used for site grading should be granular, cohesionless, and free of deleterious material and particles over 4 inches in greatest dimension. Soils proposed for use as fill materials should be classified in accordance with ASTM D-2487. The following soils classified in accordance with the Unified Soil Classification System (USCS) can be considered satisfactory for use as select fill.

> GM, GC, GW-GM, GW-GC, GP, GP-GM and GP-GC, SM, SC, SW-SM, SW-SC, SP-SM, SW-SC and SC-SM.

The following USCS-classified soils are not considered satisfactory for use as select fill.

> CH, CL, MH, ML, OH, OL and PT, or soils that exceed a liquid limit of 40 and a plasticity index of 15.

The Stratum A and Stratum B soils in our borings are suitable for use as select fill, provided they meet the above criteria for acceptable fill materials. The Stratum C soils in our borings are NOT suitable for use as select fill.

Select fill should be placed in uniform layers not exceeding 8 inches in compacted thickness, moisture-conditioned to add the amount of moisture required for optimum compaction and compacted to a minimum of 95 percent of maximum density in accordance with ASTM D-1557 (modified Proctor) procedures. The moisture content should be at plus or minus 3 percent of optimum moisture content in accordance with ASTM D-1557.

This compaction requirement also applies to the subgrade soils that will receive select fill. However, if the subgrade soils consist of cohesive soils such as CL or CH, or if the plasticity index exceeds 18, the subgrade soils should be compacted to a minimum of 90 percent of the above standard.

Compaction of the fill material and subgrade soils should be conducted with approved types of pneumatic, power or tamping equipment. Determination of density in the field should be conducted in accordance with ASTM D-2922 or D-1556.

5.7 Pipe Bedding and Trench Backfill

Pipe bedding and backfill material should be placed in uniform layers not exceeding 8 inches in compacted thickness, moisture-conditioned to add the amount of moisture required for optimum compaction and compacted to a minimum of 95 percent of maximum density in accordance with ASTM D-1557 (modified Proctor) procedures. Soil moisture should be at plus or minus 3 percentage points of optimum in accordance with the above standard. Refer to Appendix C for El Paso Water Standard Details for bedding and backfill of pressure pipe and gravity pipe in dry and wet conditions. Use the following soil types for the standard details in Appendix C.

Soil Class	Soil Type ASTM D 2487	Soil Description
Class I	None	Manufactured aggregates, angular, crushed rock, crushed gravel with maximum particle size of 1½ inches per ASTM D-2321
Class II	GW, GP, SW, SP	Coarse grained sands and gravels per ASTM D 2487 with maximum particle size of 1½ inches per ASTM D-2322
Class III	GM, GC, SM, SC	Coarse grained sands with fines per ASTM D 2487 with maximum particle size of 1½ inches per ASTM D-2323

Material fill below the pipe should be placed in uniform layers not exceeding 8 inches in compacted thickness, moisture-conditioned to add the amount of moisture required for optimum compaction and compacted to a minimum of 95 percent of maximum density in accordance with ASTM D-1557 (modified Proctor) procedures. The moisture content

should be at plus or minus 3 percent of optimum moisture content in accordance with ASTM D-1557.

Material fill should be placed in uniform layers not exceeding 8 inches in compacted thickness, moisture-conditioned to add the amount of moisture required for optimum compaction and compacted to a minimum of 90 percent of maximum density in accordance with ASTM D-1557 (modified Proctor) procedures. The moisture content should be at plus or minus 3 percent of optimum moisture content in accordance with ASTM D-1557. Material fill shall be placed no less than 12" in compacted with all around.

Material fill above the pipe should be placed in uniform layers not exceeding 8 inches in compacted thickness, moisture-conditioned to add the amount of moisture required for optimum compaction and compacted to a minimum of 95 percent of maximum density in accordance with ASTM D-1557 (modified Proctor) procedures. The moisture content should be at plus or minus 3 percent of optimum moisture content in accordance with ASTM D-1557. Minimum cover shall be 5-ft from top of pipe to finished grade.

The foundation system designed and constructed in accordance with the above recommendations should experience a total settlement of less than one inch.

We have also classified the soils in Stratum B as Class II and III in accordance with ASTM D2321, which allows the determination of a stable subsurface environment for underground pipe installation.

5.8 Groundwater Control

As previously indicated, we encountered groundwater in two soil borings drilled during our investigation at depths of about 10 feet to 15 feet below ground surface. Hence, the contractor shall implement an appropriately designed dewatering program that will take the various groundwater conditions, soil lithology, existing structures, existing water wells, determination of the depth which the water table should be lowered for construction

purposes, and determine and monitor water table elevations prior to and during construction, respectively.

Groundwater control and appropriate dewatering methods are discussed in Section 5.9 in this report.

5.9 Dewatering Approach

The contractor shall submit a dewatering plan for approval by the engineer at least three weeks prior to commencing dewatering operations. Appropriate dewatering methods or a water control system shall not affect existing structures and shall not cause any type of structural movement of existing structures during and long after the construction period.

Furthermore, the dewatering plan shall provide the steps to gradually decommission the dewatering system, mainly because an abrupt change in water table elevation may cause undesired soil behavior and or structural distress to existing buildings and/or foundations. In addition, the contractor shall periodically check the performance of the dewatering system.

We recommend that, prior to commencing dewatering operations the contractor develop a baseline of the condition of the existing structures that are located near the proposed sewer alignment. This will help benchmark if existing buildings already have experienced distress, particularly because the buildings are constructed on top of expansive clays and shallow water table elevations.

5.10 Considerations

The contractor is responsible for the design, installation and operation of the dewatering and groundwater control systems required for the construction of the Miranda 18-inch Wastewater Relief Line project.

Because there will be construction of subsurface structures (e.g., pipe lines and manholes), at near or below the water table, dewatering and groundwater control procedures will be required to maintain competency of existing foundations and structures.

5.11 Construction Dewatering

Proper control of groundwater can greatly facilitate construction of subsurface structures founded in, or underlain by, pervious soil strata below the water table by:

- Intercepting seepage that would otherwise emerge from the slopes or bottom of an excavation.
- Increasing the stability of excavated slopes and preventing the loss of material from the slopes or bottom of the excavation.
- Reducing lateral loads on cofferdams.
- Eliminating the need for, or reducing, air pressure in tunneling.
- Improving the excavation and backfill characteristics of sandy soils.

It is very important to underscore that uncontrolled or improperly controlled groundwater can, by hydrostatic pressure and seepage, cause piping, heaving, or reduce the stability of excavation slopes or foundation soils so as to make them unsuitable for supporting the structures or safe for workers to be at or near excavations. Hence, subsurface construction shall not be attempted or permitted without appropriate control of the groundwater and (subsurface) hydrostatic pressure.

We recommend that the design drawings include a statement and/or provisions that indicate that deep dewatering will be necessary, they should be explicitly required by

the specifications as they greatly exceed normal requirements and would not otherwise be anticipated by contractors.

5.12 Flexible Pavement Recommendations

We understand that milling and overlaying may take place from the centerline of the street to the face of the curb or face of the gutter beyond the trench limits of the areas affected by installation of the sewer line. The pavement sections of the affected areas shall be replaced to match the existing pavement sections.

We recommend that the replacement flexible pavement consists of the following minimum thickness:

Pavement Component	Minimum Thickness (in.)
Hot-Mix Asphaltic Concrete	4
Crushed Stone Base Course	8
Compacted Subgrade	12

As a minimum, the HMAC material should conform to Type C for an HMAC thickness less than 2 inches and Type B for an HMAC thickness greater than or equal to 2 inches, in accordance with the City of El Paso standards. The HMAC mix should have a minimum 1,500 pounds of Marshall Stability when compacted at 75 blows in accordance with ASTM D-1559, and should have a flow between 8 and 16. The HMAC course should be placed at a target density of at least 98 percent.

The Crushed Stone Base Course (CSBC) should be Item 247, Type A, Grade 3 in accordance with the Texas Department of Transportation (TXDOT) Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges. CSBC materials should be placed in loose lifts not exceeding 6 inches in compacted thickness, and compacted to a minimum 95 percent of maximum dry density and a moisture content within plus or minus 2 percent, in accordance with ASTM D-1557.

5.13 Existing Flexible Pavement Condition

During our subsurface exploration and field activities, we observed multiple signs of pavement distress throughout the project site. We noted reflective and alligator-type cracking along Conley Road, Mace Street and Graphite Drive.

The above described signs of distress are normally associated with a reduction in the pavement support, which may be attributed to water infiltration, poor drainage and exceedance of traffic volumes over the street's life cycle.

5.14 New Construction near Existing Structures and Utilities

Contractor shall exercise extreme care during footing excavation and site preparation near the existing structures to avoid encroaching into the existing foundation systems, hence preventing adversely affecting or undermining the performance and structural integrity of the existing structures, utility lines, and associated appurtenances. We also recommend that before any excavation or earthwork takes place, all underground utilities be located to prevent damages to the existing infrastructure. We also recommend that any underground utilities that may encroach the proposed foundations system be decommissioned, removed and/or relocated, and the voids need to be filled with select fill as recommended in Section 5.6 of this report.

We recommend that ten (10) days prior to commencing any excavation near the existing building, the contractor shall submit a plan describing how they will protect the existing structures during construction activities. Protective measures may include, but may not be limited to temporary shoring and/or phased excavation.

6.0 ADDITIONAL CONSIDERATIONS

6.1 Construction Monitoring

We recommend that Client retain LOI ENGINEERS during the construction phase of this project to verify the findings of our study, and to provide supplemental data to this study in the event that site conditions vary from those described in this report.

The geotechnical engineer should also conduct testing of fill materials used for earthwork operations at the following frequencies:

- At least one (1) moisture-density relationship (ASTM D-1557) and soil classification tests (ASTM D-6913 and ASTM D-4318) for each type of material encountered, or imported material to be used.
- A minimum of one (1) nuclear density test per lift (8-inch compacted) at 150-linear foot intervals for pipe bedding and backfill operations, or a total of three (3) tests per lift, whichever is greater, according to ASTM D-6938 or D-1556.
- A minimum of one (1) nuclear density test per lift (8-inch compacted) at 150-linear foot intervals for base course materials, or a total of three (3) tests per lift, whichever is greater.
- One nuclear density test at each manhole footing

Sampling and testing for quality assurance of concrete materials should be performed at the following frequencies:

- At least one (1) set of four specimens should be collected for every 50 cubic yards of concrete placed, or fraction thereof. Concrete field testing shall include temperature, slump, and air content (if applicable).

Sampling and testing for quality assurance of asphalt materials should be performed at the following frequencies:

- A minimum of one (1) nuclear density test per lift at 200-linear foot intervals for HMAC materials, or a total of three (3) tests per lift, whichever is greater.

6.2 Limitations

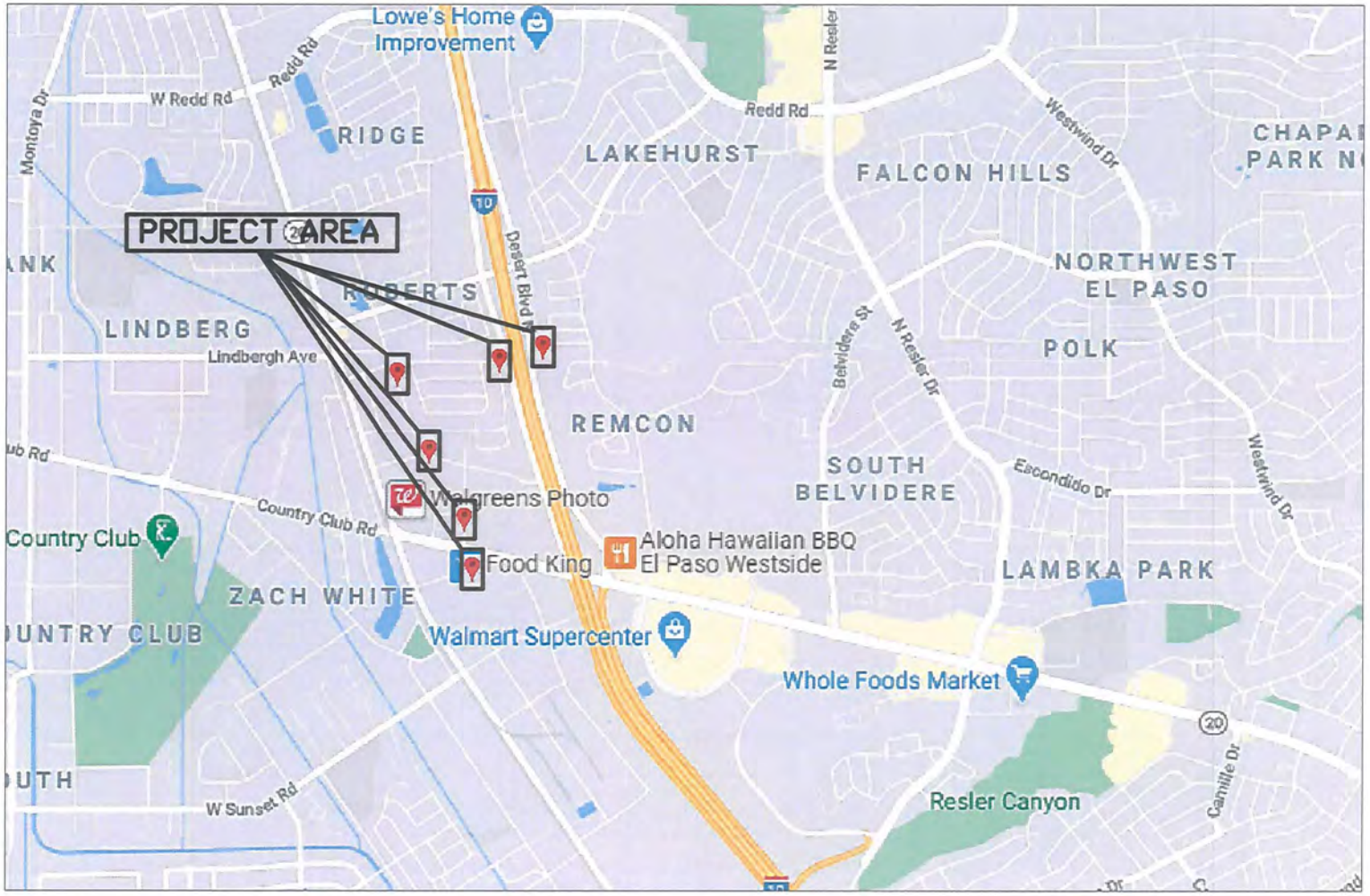
We have performed our professional services and have obtained the data presented in this report in accordance with generally accepted geotechnical engineering principles and practices. The information in this report is based on the data obtained from six (6) representative test borings and laboratory testing conducted on representative samples, and on our knowledge of the project conditions at the time of our subsurface soil study.

The data in this report reflects subsurface soil conditions only at the specific sampling location, time of sampling, and to the depths indicated in our report. This report is not intended to identify or address any potential environmental concerns associated with the project site.

We recommend that Client notify LOI ENGINEERS of any changes to the project conditions considered in this report, so that we may provide pertinent modifications to our recommendations if deemed necessary. Additionally, once construction commences, we should be notified of any unusual site conditions that appear to vary from those reported herein, so that we may conduct further investigations and prepare supplemental recommendations if deemed necessary.

We conducted this investigation for the purpose of defining the subsurface soil conditions for the Miranda 18" Wastewater Relief Line, in El Paso, Texas. Use of this information for projects other than the one described herein will not be adequate.

APPENDIX A



LEGEND	GEOTECHNICAL CONSULTANT	PROJECT CONSULTANT	DRAWING TITLE: GENERAL LOCATION MAP
APPROXIMATE PROJECT LOCATION	LOI ENGINEERS 915-781-1532 2101 E. MISSOURI AVE SUITE B EL PASO, TEXAS 79903	H20 TERRA 2020 E. MILLS AVE. EL PASO, TEXAS 79901	PROJECT NAME: MIRANDA 18-INCH WASTEWATER RELIEF LINE EL PASO, EL PASO COUNTY, TEXAS

DRAWN BY	REVIEWED BY	APPROVED BY	SCALE
F.R.	D.G.	B.O.	N.T.S.
PROJECT No.	FILE NAME	DATE	SHEET No.
LOI20-312	SITE PLAN	12/24/20	A-1.1

LEGEND	GEOTECHNICAL CONSULTANT	PROJECT CONSULTANT	DRAWING TITLE: BORING LOCATION PLAN
B-1 APPROXIMATE BORING LOCATION AND NUMBER	LOI ENGINEERS 915-781-1532 2101 E. MISSOURI AVE SUITE B EL PASO, TEXAS 79903	H20 TERRA 2020 E. MILLS AVE. EL PASO, TEXAS 79901	PROJECT NAME: MIRANDA 18-INCH WASTEWATER RELIEF LINE EL PASO, EL PASO COUNTY, TEXAS

DRAWN BY	REVIEWED BY	APPROVED BY	SCALE
F.R.	D.G.	B.O.	N.T.S.
PROJECT No.	**FILE NAME**	**DATE**	**SHEET No.**
LOI20-312	SITE PLAN	12/24/20	A-1.2

LEGEND	GEOTECHNICAL CONSULTANT	PROJECT CONSULTANT	DRAWING TITLE: BORING LOCATION PLAN
B-1 APPROXIMATE BORING LOCATION AND NUMBER	LOI ENGINEERS 915-781-1532 2101 E. MISSOURI AVE SUITE B EL PASO, TEXAS 79903	H20 TERRA 2020 E. MILLS AVE. EL PASO, TEXAS 79901	PROJECT NAME: MIRANDA 18-INCH WASTEWATER RELIEF LINE EL PASO, EL PASO COUNTY, TEXAS

DRAWN BY	REVIEWED BY	APPROVED BY	SCALE
F.R.	D.G.	B.O.	N.T.S.
PROJECT No. LOI20-312	FILE NAME SITE PLAN	DATE 12/24/20	SHEET No. A-1.3

LEGEND	GEOTECHNICAL CONSULTANT	PROJECT CONSULTANT	DRAWING TITLE: BORING LOCATION PLAN
B-1 APPROXIMATE BORING LOCATION AND NUMBER	LOI ENGINEERS 915-781-1532 2101 E. MISSOURI AVE SUITE B EL PASO, TEXAS 79903	H20 TERRA 2020 E. MILLS AVE. EL PASO, TEXAS 79901	PROJECT NAME: MIRANDA 18-INCH WASTEWATER RELIEF LINE EL PASO, EL PASO COUNTY, TEXAS

DRAWN BY	REVIEWED BY	APPROVED BY	SCALE
F.R.	D.G.	B.O.	N.T.S.
PROJECT No.	**FILE NAME**	**DATE**	**SHEET No.**
LOI20-312	SITE PLAN	12/24/20	A-1.4

LEGEND	GEOTECHNICAL CONSULTANT	PROJECT CONSULTANT	DRAWING TITLE: BORING LOCATION PLAN
B-1 APPROXIMATE BORING LOCATION AND NUMBER	LOI ENGINEERS 915-781-1532 2101 E. MISSOURI AVE SUITE B EL PASO, TEXAS 79903	H20 TERRA 2020 E. MILLS AVE. EL PASO, TEXAS 79901	PROJECT NAME: MIRANDA 18-INCH WASTEWATER RELIEF LINE EL PASO, EL PASO COUNTY, TEXAS

DRAWN BY	REVIEWED BY	APPROVED BY	SCALE
F.R.	D.G.	B.O.	N.T.S.
PROJECT No.	**FILE NAME**	**DATE**	**SHEET No.**
LOI20-312	SITE PLAN	12/24/20	A-1.5

LOG OF TEST BORING No. B-1

Project name: Miranda 18" Wasterwater Relief Line
File No.: LOI20-312
Date drilled: TO BE DRILLED AT A LATER DATE
Boring Location: See Sheet A-1
Elevation (ft.): N/A North: N/A West: N/A

Elevation and Depth (Ft.)	Samples	Soil symbols	Soil Description	USCS symbol	Moisture content,%	Minus #200 sieve, %	Liquid limit	Plastic limit	Plasticity index	SPT N-Value: Blows per foot (N)	SPT N-Value: CURVE (10 30 50)

Groundwater Table Data

Depth	Date	Time
N/A	N/A	N/A

Sample Type
- Auger cutting
- 2" O.D. split spoon
- 3" O.D. split tube
- Thin-walled Shelby tube

Rig type: CME-75
Boring type: HSA
Drilled by: JR
Logger:
Sheet No.: A-2

LOG OF TEST BORING No. B-2

Project name: Miranda 18" Wasterwater Relief Line
File No.: LOI20-312
Date drilled: 12/11/2020
Boring Location: See Sheet A-1
Elevation (ft.): N/A North: N/A West: N/A

LOI ENGINEERS

Elevation and Depth (Ft.)	Samples	Soil symbols	Soil Description	USCS symbol	Moisture content,%	Minus #200 sieve, %	Liquid limit	Plastic limit	Plasticity index	SPT N-Value: Blows per foot (N)	SPT N-Value CURVE
0			ASPHALT ABOUT 1.5 INCHES BASE COURSE ABOUT 8 INCHES THICK								
			SAND, fine grained, silty, brown, medium dense, dry to moist		5	17				23	
			-loose at 2.5 feet							6	
5			-very loose at 5 feet	SM	6	21				4	
			-medium dense at 7.5 feet							26	
10			GRAVEL, well-graded with silt, gray/multi-color, medium dense, dry		2	5				22	
15				GW-GM						18	
20			SAND, fine grained, poorly-graded, brown, very loose, moist with gravel	SP	12	2				2	
25			SAND, fine grained, poorly-graded with silt, brown, very loose, very moist	SP-SM	21	6				2	
30											

SPT N-Value CURVE: 10, 30, 50

Groundwater Table Data

Depth	Date	Time
10 feet	12/11/	12:52 PM

Sample Type
- Auger cutting
- 2" O.D. split spoon
- 3" O.D. split tube
- Thin-walled Shelby tube

Rig type: CME-75
Boring type: HSA
Drilled by: EAH
Logger: FR
Sheet No.: **A-3**

LOG OF TEST BORING No. B-2

Project name: Miranda 18" Wasterwater Relief Line
File No.: LOI20-312
Date drilled: 12/11/2020
Boring Location: See Sheet A-1
Elevation (ft.): N/A North: N/A West: N/A

Elevation and Depth (Ft.)	Samples	Soil symbols	Soil Description	USCS symbol	Moisture content,%	Minus #200 sieve, %	Liquid limit	Plastic limit	Plasticity index	SPT N-Value: Blows per foot (N)	SPT N-Value: CURVE (10 30 50)
			SAND, fine grained, silty, brown, very loose, saturated	SM	35	17				2	
			Termination depth at 31.5 feet								
35											
40											
45											
50											
55											
60											

Groundwater Table Data

Depth	Date	Time
10 feet	12/11/	12:52 PM

Sample Type
- Auger cutting
- 2" O.D. split spoon
- 3" O.D. split tube
- Thin-walled Shelby tube

Rig type: CME-75
Boring type: HSA
Drilled by: EAH
Logger: FR
Sheet No.: **A-4**

LOG OF TEST BORING No. B-3

Project name: Miranda 18" Wasterwater Relief Line
File No.: LOI20-312
Date drilled: 12/16/2020
Boring Location: See Sheet A-1
Elevation (ft.): N/A North: N/A West: N/A

Elevation and Depth (Ft.)	Samples	Soil symbols	Soil Description	USCS symbol	Moisture content, %	Minus #200 sieve, %	Liquid limit	Plastic limit	Plasticity index	SPT N-Value: Blows per foot (N)	SPT N-Value CURVE
0			SAND, fine grained, poorly-graded with silt, brown, dense, dry with gravel		1	10				32	
										37	
5			-medium dense at 5 feet							28	
			-very dense at 7.5 feet	SP-SM	1	6				50+	50+
10										50+	50+
15			GRAVEL, poorly-graded with silt, brown, very dense, dry	GP-GM	2	6				50+	50+
			Termination depth at 16.5 feet								
20											
25											
30											

SPT N-Value CURVE: 10 30 50

Groundwater Table Data

Depth	Date	Time
N/A	N/A	N/A

Sample Type
- Auger cutting
- 2" O.D. split spoon
- 3" O.D. split tube
- Thin-walled Shelby tube

Rig type: CME-75
Boring type: HSA
Drilled by: EAH
Logger: FR
Sheet No.: **A-5**

LOG OF TEST BORING No. B-4

Project name: Miranda 18" Wasterwater Relief Line
File No.: LOI20-312
Date drilled: 12/16/2020
Boring Location: See Sheet A-1
Elevation (ft.): N/A North: N/A West: N/A

LOI ENGINEERS

Elevation and Depth (Ft.)	Samples	Soil symbols	Soil Description	USCS symbol	Moisture content,%	Minus #200 sieve, %	Liquid limit	Plastic limit	Plasticity index	SPT N-Value: Blows per foot (N)	SPT N-Value: CURVE (10 30 50)
0			ASPHALT ABOUT 3 INCHES THICK BASE ABOUT 8 INCHES THICK								
			SAND, fine grained, poorly-graded with silt, brown, medium dense, dry to moist with gravel	SP-SM	6	11				23	
										15	
5			SAND, fine grained, silty, brown, medium dense, dry to moist	SM	8	20				26	
										11	
10			-loose at 10 feet		6	21				8	
15			-medium dense at 15 feet							27	
			Termination depth at 16.5 feet								
20											
25											
30											

Groundwater Table Data

Depth	Date	Time
15 feet	12/16/	9:00 am

Sample Type
- Auger cutting
- 2" O.D. split spoon
- 3" O.D. split tube
- Thin-walled Shelby tube

Rig type: CME-75
Boring type: HSA
Drilled by: EAH
Logger: FR
Sheet No.: **A-6**

LOG OF TEST BORING No. B-5

Project name: Miranda 18" Wasterwater Relief Line
File No.: LOI20-312
Date drilled: 12/11/2020
Boring Location: See Sheet A-1
Elevation (ft.): N/A North: N/A West: N/A

LOI ENGINEERS

Elevation and Depth (Ft.)	Samples	Soil symbols	Soil Description	USCS symbol	Moisture content,%	Minus #200 sieve, %	Liquid limit	Plastic limit	Plasticity index	SPT N-Value: Blows per foot (N)	SPT N-Value CURVE (10 30 50)
0			ASPHALT AT 3 INCHES BASE AT 8 INCHES								
			SAND, fine grained, silty, brown, medium dense, dry to moist with gravel	SM	5	14	NV	NV	NP	45	
			SAND, fine grained, poorly-graded with silt, brown, dense, dry to moist with gravel	SP-SM	5	11				39	
5										46	
			SAND, fine grained, well-graded with silt, brown, very dense, dry with gravel	SW-SM	2	10				50+	50+
10										50+	50+
15										50+	50+
20			SAND, fine grained, well-graded, brown, dense, dry with gravel AUGER REFUSAL AT 22 FEET	SW	3	4				47	
			Termination depth at 22 feet								
25											
30											

Groundwater Table Data

Depth	Date	Time
N/A	N/A	N/A

Sample Type
- Auger cutting
- 2" O.D. split spoon
- 3" O.D. split tube
- Thin-walled Shelby tube

Rig type: CME-75
Boring type: HSA/SSA
Drilled by: EAH
Logger: FR
Sheet No.: **A-7**

LOG OF TEST BORING No. B-6

Project name: Miranda 18" Wasterwater Relief Line
File No.: LOI20-312
Date drilled: 12/17/2020
Boring Location: See Sheet A-1
Elevation (ft.): N/A North: N/A West: N/A

Elevation and Depth (Ft.)	Samples	Soil symbols	Soil Description	USCS symbol	Moisture content,%	Minus #200 sieve, %	Liquid limit	Plastic limit	Plasticity index	SPT N-Value: Blows per foot (N)	SPT N-Value CURVE (10 30 50)
0			SAND, fine grained, poorly-graded with silt, brown, dense, dry with gravel							39	
			-medium dense at 2.5 feet		1	7				28	
5			-very dense at 5 feet							50+	50+
				SP-SM	2	9				50+	50+
10										50+	50+
15			SAND, fine grained, silty, brown, medium dense, dry to moist	SM	9	22				24	
20			CLAY, sandy fat, brown, very stiff, very moist	CH	25	64	76	25	51	24	
25			SAND, fine grained, silty, brown, dense, dry							32	
30											

Groundwater Table Data

Depth	Date	Time
N/A	N/A	N/A

Sample Type
- Auger cutting
- 2" O.D. split spoon
- 3" O.D. split tube
- Thin-walled Shelby tube

Rig type: CME-75
Boring type: HSA
Drilled by: EAH
Logger: FR
Sheet No.: **A-8**

LOG OF TEST BORING No. B-6

Project name: Miranda 18" Wasterwater Relief Line
File No.: LOI20-312
Date drilled: 12/17/2020
Boring Location: See Sheet A-1
Elevation (ft.): N/A North: N/A West: N/A

Elevation and Depth (Ft.)	Samples	Soil symbols	Soil Description	USCS symbol	Moisture content, %	Minus #200 sieve, %	Liquid limit	Plastic limit	Plasticity index	SPT N-Value: Blows per foot (N)	SPT N-Value CURVE (10 30 50)
			-medium dense at 30 feet							28	
				SM							
35			-dense at 35 feet							34	
40					8	14				32	
			Termination depth at 41.5 feet								
45											
50											
55											
60											

Groundwater Table Data

Depth	Date	Time
N/A	N/A	N/A

Sample Type
- Auger cutting
- 2" O.D. split spoon
- 3" O.D. split tube
- Thin-walled Shelby tube

Rig type: CME-75
Boring type: HSA
Drilled by: EAH
Logger: FR
Sheet No.: **A-9**

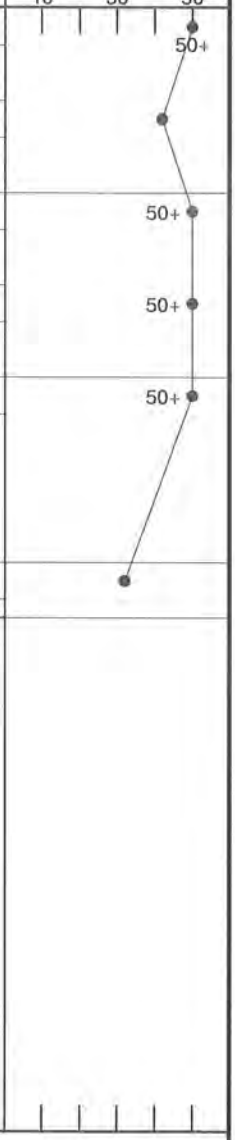
LOG OF TEST BORING No. B-7

Project name: Miranda 18" Wasterwater Relief Line
File No.: LOI20-312
Date drilled: 12/17/2020
Boring Location: See Sheet A-1
Elevation (ft.): N/A North: N/A West: N/A

LOI ENGINEERS

Elevation and Depth (Ft.)	Samples	Soil symbols	Soil Description	USCS symbol	Moisture content,%	Minus #200 sieve, %	Liquid limit	Plastic limit	Plasticity index	Blows per foot (N)
0			SAND, fine grained, poorly-graded with silt, brown, very dense, dry with gravel	SP-SM	1	11				50+
			SAND, fine grained, clayey, brown, dense, dry		2	38				42
5			-very dense at 5 feet	SC						50+
			GRAVEL, poorly-graded with silt, brown, very dense, dry		1	7				50+
10				GP-GM						50+
15			SAND, fine grained, silty, brown, dense, dry to moist	SM	6	16				32
			Termination depth at 16.5 feet							
20										
25										
30										

SPT N-Value CURVE



Groundwater Table Data

Depth	Date	Time
N/A	N/A	N/A

Sample Type
- Auger cutting
- 2" O.D. split spoon
- 3" O.D. split tube
- Thin-walled Shelby tube

Rig type: CME-75
Boring type: HSA
Drilled by: EAH
Logger: FR
Sheet No.: **A-10**

SUMMARY OF RESULTS

Project: Miranda 18" Wastewater Relief Line El Paso, El Paso County, Texas

LOI Proj # LOI20-312

Date: 12/18/2020

Boring No.	Depth (ft.)	% Moisture Content	% Material passing # 4	% Material passing # 40	% Material minus # 200	LL	PL	PI	Soil Classification
2	0-1½	5			17				Silty sand (SM)
2	5-6½	6			21				Silty sand (SM)
2	10-11½	2	46	21	5				Well-graded gravel with silt (GW-GM)
2	20-21½	12			2				Poorly-graded sand with gravel (SP)
2	25-26½	21			6				Poorly-graded sand with silt and gravel (SP-SM)
2	30-31½	35			17				Silty sand (SM)
3	0-1½	1	58	37	10				Poorly-graded sand with silt and gravel (SP-SM)
3	7½-9	1	54	10	6				Poorly-graded sand with silt and gravel (SP-SM)
3	15-16½	2	48	30	6				Poorly-graded gravel with silt (GP-GM)
4	0-1½	6	61	45	11				Poorly-graded sand with silt and gravel (SP-SM)
4	5-6½	8			20				Silty sand (SM)
4	10-11½	6			21				Silty sand (SM)
5	0-1½	5	53	36	14	NV	NV	NP	Silty sand (SM)
5	2½-4	5			11				Poorly-graded sand with silt and gravel (SP-SM)
5	7½-9	2	54	26	10				Well-graded sand with silt and gravel (SW-SM)
5	20-21½	3	70	15	4				Well-graded sand with gravel (SW)
6	2½-4	1	51	29	7				Poorly-graded sand with silt and gravel (SP-SM)
6	7½-9	2	57	29	9				Poorly-graded sand with silt and gravel (SP-SM)
6	15-16½	9			22				Silty sand (SM)
6	20-21½	25			64	76	25	51	Sandy fat clay (CH)
6	40-41½	8			14				Silty sand (SM)
7	0-1½	1	62	38	11				Silty sand (SM)
7	2½-4	2	73	54	38				Clayey sand (SC)
7	7½-9	1	36	20	7				Poorly-graded gravel with silt (GP-GM)
7	15-16½	6			16				Silty sand (SM)

REPORT OF MOISTURE-DENSITY RELATIONSHIP, SIEVE ANALYSIS, AND PLASTICITY INDEX

ASTM D-2487, C-136, D-4318, D-1557

Project Name: Miranda 18" Wastewater Relief Line
El Paso, El Paso County, Texas

Project Number: LOI20-312

Client: H2O Terra
2020 E. Mills Ave.
El Paso, Texas 79901

Sample date: 12/16/20

Sample Location: Existing material; Sample collected at soil boring B-3; 0' to 3' in depth.

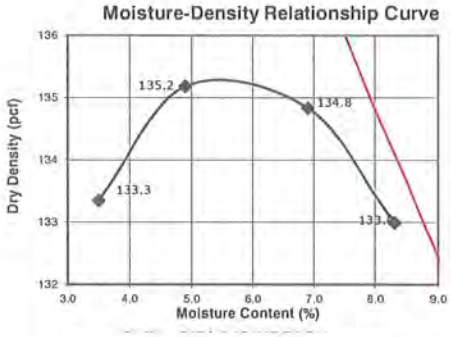
Sampler: EH

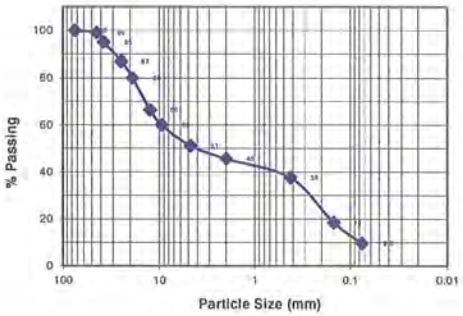
Soil Classification: Poorly graded gravel with silt and sand (GP-GM)

Sample Number: 121620-B3

Method Used: C
Preparation: Dry
Rammer: Mechanical
Specific Gravity: 2.59 (estimated)
As Received Water Content: 1 %

Corrected Maximum Dry Unit Weight: 135.3 pcf
Corrected Optimum Water Content: 5.5 %





Sieve Analysis

Sieve Opening Size		Retained (%)		Passing (%)	
Std.	mm	Actual	Specs.	Actual	Specs.
3"	75.00	0	-	100	-
1-3/4"	44.50	1	-	99	-
1-1/2"	37.50	5	-	95	-
1"	25.00	13	-	87	-
3/4"	19.00	20	-	80	-
1/2"	12.50	34	-	66	-
3/8"	9.50	40	-	60	-
#4	4.75	49	-	51	-
#10	2.00	54	-	46	-
#40	0.425	62	-	38	-
#100	0.150	82	-	18	-
#200	0.075	90.4	-	9.6	-

Gradation Parameters			
D_{10}=	0.08	C_c=	0.13
D_{30}=	0.32	C_u=	121.16
D_{60}=	9.50	-	-

Plasticity Index

Process: Air-dry

Actual	**LL=**	NV	**PL=**	NV	**PI=**	NP
Typical	**LL=**		**PL=**		**PI=**	

Sheet A-12

REPORT OF BULK SPECIFIC GRAVITY VALUE, AND MARSHALL FLOW AND STABILITY OF CORED SPECIMENS

ASTM D-2726, D-6927

Project Name: Miranda 18" Wastewater Relief Line
El Paso, El Paso County, Texas

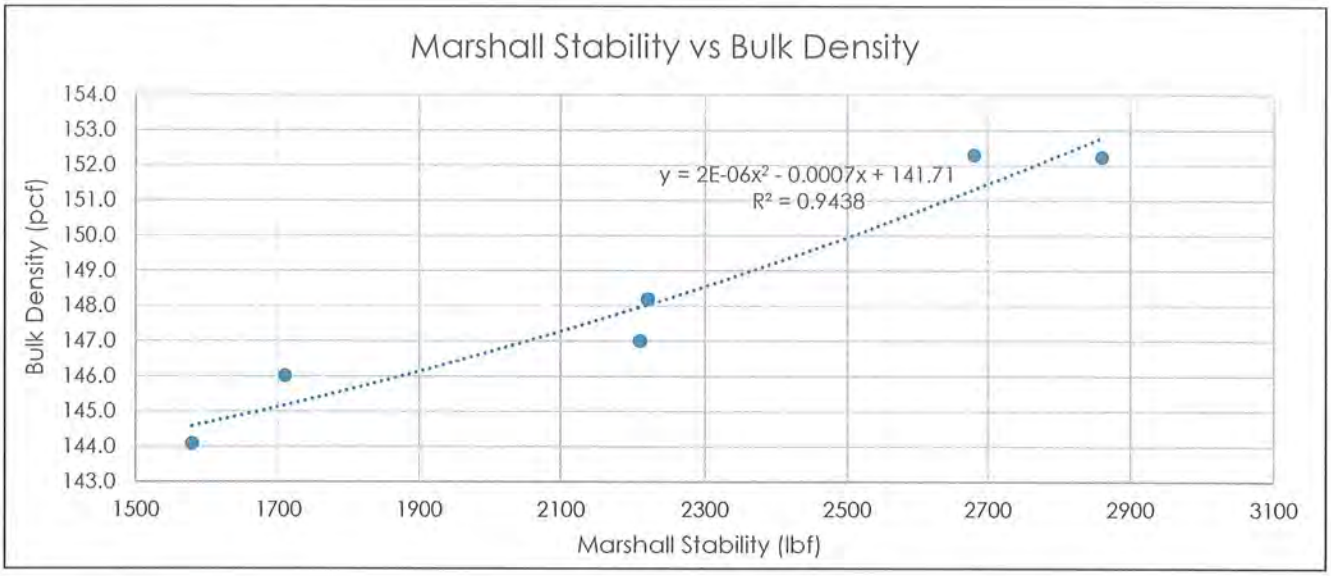
Project Number: LOI20-312

Client: H2O Terra
2020 E. Mills Ave.
El Paso, Texas 79901

Sample Date: 12/16/20

Technician: EH

Core Location	Average Cored Thinkness (in.)	Bulk Specific Gravity	Unit weight (lb/ft^3)	Marshall Flow (0.01 in.)	Marshall Stability (lbf.)
Soil Boring B-2, Sample A	1.63	2.381	148.2	15	2220
Soil Boring B-2, Sample B	1.62	2.362	147.0	14	2210
Soil Boring B-4, Sample A	2.13	2.447	152.3	16	2680
Soil Boring B-4, Sample B	2.11	2.446	152.2	15	2860
Soil Boring B-5, Sample A	3.02	2.315	144.1	21	1580
Soil Boring B-5, Sample B	3.05	2.346	146.0	23	1710

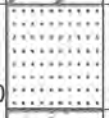
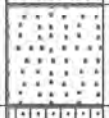
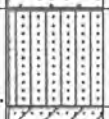


Sheet A-13

APPENDIX B

SOIL SYMBOLS

Identification of the major soil divisions used to distinguish the change of a different stratum. For their combinations and a more detailed description, see UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487-00)

MAJOR SOIL DIVISIONS			SOIL SYMBOL	USCS SYMBOL	TYPICAL NAME
Coarse-Grained Soils (< 50% pass No. 200 sieve)	GRAVELS (<50% pass No. 4 sieve)	Clean Gravels (< 5% pass No. 200 sieve)		**GW**	Well-Graded Gravels
				**GP**	Poorly-Graded Gravels
		Gravels with fines (> 12% pass No. 200 sieve)		**GM**	Silty Gravels
				**GC**	Clayey Gravels
	SANDS (> 50% pass No. 4 sieve)	Clean Sands (< 5% pass No. 200 sieve)		**SW**	Well-Graded Sands
				**SP**	Poorly-Graded Sands
		Sands with fines (> 12% pass No. 200 sieve)		**SM**	Silty Sands
				**SC**	Clayey Sands
Fine-Grained Soils (> 50% pass No. 200 sieve)	SILTS	Silts of Low Plasticity (*LL < 50)		**ML**	Inorganic Silts (slightly plastic)
		Silts of High Plasticity (*LL > 50)		**MH**	Inorganic Silts (elastic)
	CLAYS	Clays of Low Plasticity (*LL < 50)		**CL**	Inorganic Clays (lean clays)
		Clays of High Plasticity (*LL > 50)		**CH**	Inorganic Clays (Fat clays)

*Liquid Limit of the soil
NV: No value obtained; NP: Non-plastic

SOIL TERMINOLOGY

COARSE GRAINED SOILS: More than 50 percent retained on No. 200 sieve. Includes fine, medium, or coarse grained (depending on grain size) gravel and sand, and silty and/or clayey gravel and sand. Density is described according to relative density measured in the laboratory, or sampler resistance in the field as follows:

Penetration Resistance* (Blows per Foot)	Descriptive Term	Relative Density** (Percent)
0 – 4	Very Loose	0 - 15
5 - 10	Loose	15 – 35
11 - 30	Medium Dense	35 – 65
31 - 50	Dense	65 - 85
More than 50	Very Dense	85 - 100

* From Standard Penetration Test with 140-pound hammer, 30 inch drop.
** From relative density tests on undisturbed sand sample.

FINE GRAINED SOILS: More than 50 percent passing through the No. 200 sieve. Includes organic and inorganic silt and clay, gravelly and/or sandy silt and clay, silty clay, and clayey silt. Consistency is described according to shear strength, from unconfined compression tests in the laboratory, penetrometer tests in the field or laboratory, or sampler resistance in the field as follows:

Compressive Strength* (Tons per Square Foot)	Descriptive Term	Penetration Resistance** (Blows per Foot)
Less than 0.25	Very Soft	Less than 2
0.25 - 0.50	Soft	3 - 4
0.50 - 1.00	Firm	5 - 8
1.00 - 2.00	Stiff	9 - 15
2.00 - 4.00	Very Stiff	16 - 50
4.00 and higher	Hard	50 and higher

* From unconfined compression strength test.
** From Standard Penetration Test with 140-pound hammer, 30 inch drop.

Slickensided: With inclined planes of weakness of slick and glassy appearance.
Fissured: With shrinkage cracks that are frequently filled with fine sand.
Laminated: With thin layers of varying colors and texture.
Interbedded: With alternate layers of different soil types.
Calcareous: With noticeable quantities of calcium carbonate.
Sensitive: Applies to cohesive soils that are subject to loss of strength when remolded.
Well graded: With wide range in grain sizes and good distribution of intermediate particle sizes.
Poorly graded: With one predominant grain size, or a poor distribution with intermediate sizes missing.

ENGINEERS

APPENDIX C

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Analytical Report 682366

for

LOI Engineers

Project Manager: Diana Guerrero

Miranda Wastewater Line

LOI20-312

12.30.2020

Collected By: Client

200 East Sunset Rd, Suite E, El Paso, TX 79922

Xenco-Houston (EPA Lab Code: TX00122):
Texas (T104704215-20-38), Arizona (AZ0765), Florida (E871002-33), Louisiana (03054)
Oklahoma (2020-014), North Carolina (681), Arkansas (20-035-0)

Xenco-Dallas (EPA Lab Code: TX01468):
Texas (T104704295-20-26), Arizona (AZ0809)

Xenco-El Paso (EPA Lab Code: TX00127): Texas (T104704221-20-18)
Xenco-Lubbock (EPA Lab Code: TX00139): Texas (T104704219-20-23)
Xenco-Midland (EPA Lab Code: TX00158): Texas (T104704400-19-21)
Xenco-Carlsbad (LELAP): Louisiana (05092)
Xenco-San Antonio (EPA Lab Code: TNI02385): Texas (T104704534-20-8)
Xenco-Tampa: Florida (E87429), North Carolina (483)

12.30.2020

Project Manager: **Diana Guerrero**
LOI Engineers
2101 E. Missouri Ave.
El Paso, TX 79903

Reference: Eurofins Xenco, LLC Report No(s): **682366**
Miranda Wastewater Line
Project Address: Conley St., Mace Graphite

Diana Guerrero:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the Eurofins Xenco, LLC Report Number(s) 682366. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by Eurofins Xenco, LLC. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 682366 will be filed for 45 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting Eurofins Xenco, LLC to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Holly Taylor

Holly Taylor
Project Manager

A Small Business and Minority Company

Houston - Dallas - Midland - Tampa - Phoenix - Lubbock - San Antonio - El Paso - Atlanta - New Mexico

Sample Cross Reference 682366

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
B2 2 1/2-4'	S	12.11.2020 08:00	N/A	682366-001
B4 7 1/2-9'	S	12.16.2020 09:00	N/A	682366-002
B4 10-11 1/2'	S	12.16.2020 09:30	N/A	682366-003
B6 10-11 1/2'	S	12.17.2020 13:00	N/A	682366-004
B5 20-21 1/2'	S	12.11.2020 13:15	N/A	682366-005
B6 15-16 1/2'	S	12.17.2020 13:30	N/A	682366-006
B6 20-21 1/2	S	12.17.2020 14:00	N/A	682366-007
B7 5-6 1/2	S	12.17.2020 16:00	N/A	682366-008

CASE NARRATIVE SUMMARY

eurofins | Environment Testing Xenco

Client Name: ***LOI Engineers***

Project Name: ***Miranda Wastewater Line***

Project ID:	*LOI20-312*	*Report Date:*	*12.30.2020*
Work Order Number:	*682366*	*Date Received:*	*12.23.2020*

This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory.

Holly Taylor

Holly Taylor
Project Manager

Certificate of Analytical Results

682366

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Sample Id: **B2 2 1/2-4'** Matrix: Soil Sample Depth:

Lab Sample Id: 682366-001 Date Collected: 12.11.2020 08:00 Date Received: 12.23.2020 16:45

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JYM % Moist:

Seq Number: 3146182 Date Prep: 12.28.2020 16:55 Tech: JYM

Subcontractor: SUB: T104704215-20-38 Prep seq: 7717987

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**24.1**	9.96	0.353	mg/kg	12.28.2020 19:08		1
Sulfate	14808-79-8	**97.8**	9.96	1.99	mg/kg	12.28.2020 19:08		1

Analytical Method: Sulfide by SM4500-S-F Prep Method:

Analyst: ALZ % Moist:

Seq Number: 3146266 Date Prep: Tech: ALZ

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Sulfide, total	18496-25-8	<671	2000	671	mg/kg	12.29.2020 13:50	UK	100

Analytical Method: PH By SW9045D Prep Method:

Analyst: ANP % Moist:

Seq Number: 3146039 Date Prep: Tech: ANP

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
pH in Water	12408-02-5	**9.02**			SU	12.27.2020 17:41		
Soil pH meas. in water at	TEMP	**19.8**			Deg C	12.27.2020 17:41		1

Certificate of Analytical Results

682366

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Sample Id: **B4 7 1/2-9'** Matrix: Soil Sample Depth:

Lab Sample Id: 682366-002 Date Collected: 12.16.2020 09:00 Date Received: 12.23.2020 16:45

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JYM % Moist:

Seq Number: 3146182 Date Prep: 12.28.2020 16:55 Tech: JYM

Subcontractor: SUB: T104704215-20-38 Prep seq: 7717987

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**10.4**	10.1	0.357	mg/kg	12.28.2020 19:45		1
Sulfate	14808-79-8	**55.2**	10.1	2.02	mg/kg	12.28.2020 19:45		1

Analytical Method: Sulfide by SM4500-S-F Prep Method:

Analyst: ALZ % Moist:

Seq Number: 3146266 Date Prep: Tech: ALZ

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Sulfide, total	18496-25-8	**799**	2000	671	mg/kg	12.29.2020 13:50	JK	100

Analytical Method: PH By SW9045D Prep Method:

Analyst: ANP % Moist:

Seq Number: 3146039 Date Prep: Tech: ANP

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
pH in Water	12408-02-5	**10.1**			SU	12.27.2020 17:41		
Soil pH meas. in water at	TEMP	**19.8**			Deg C	12.27.2020 17:41		1

Certificate of Analytical Results

682366

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Sample Id: **B4 10-11 1/2'** Matrix: Soil Sample Depth:

Lab Sample Id: 682366-003 Date Collected: 12.16.2020 09:30 Date Received: 12.23.2020 16:45

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JYM % Moist:

Seq Number: 3146182 Date Prep: 12.28.2020 16:55 Tech: JYM

Subcontractor: SUB: T104704215-20-38 Prep seq: 7717987

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**12.2**	10.1	0.359	mg/kg	12.28.2020 19:57		1
Sulfate	14808-79-8	**130**	10.1	2.03	mg/kg	12.28.2020 19:57		1

Analytical Method: Sulfide by SM4500-S-F Prep Method:

Analyst: ALZ % Moist:

Seq Number: 3146266 Date Prep: Tech: ALZ

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Sulfide, total	18496-25-8	<671	2000	671	mg/kg	12.29.2020 13:50	UK	100

Analytical Method: PH By SW9045D Prep Method:

Analyst: ANP % Moist:

Seq Number: 3146039 Date Prep: Tech: ANP

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
pH in Water	12408-02-5	**9.81**			SU	12.27.2020 17:41		
Soil pH meas. in water at	TEMP	**19.9**			Deg C	12.27.2020 17:41		1

Certificate of Analytical Results

682366

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Sample Id: **B6 10-11 1/2'** Matrix: Soil Sample Depth:

Lab Sample Id: 682366-004 Date Collected: 12.17.2020 13:00 Date Received: 12.23.2020 16:45

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JYM % Moist:

Seq Number: 3146182 Date Prep: 12.28.2020 16:55 Tech: JYM

Subcontractor: SUB: T104704215-20-38 Prep seq: 7717987

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**40.0**	9.84	0.348	mg/kg	12.28.2020 20:34		1
Sulfate	14808-79-8	**45.0**	9.84	1.97	mg/kg	12.28.2020 20:34		1

Analytical Method: Sulfide by SM4500-S-F Prep Method:

Analyst: ALZ % Moist:

Seq Number: 3146266 Date Prep: Tech: ALZ

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Sulfide, total	18496-25-8	<671	2000	671	mg/kg	12.29.2020 13:50	UK	100

Analytical Method: PH By SW9045D Prep Method:

Analyst: ANP % Moist:

Seq Number: 3146039 Date Prep: Tech: ANP

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
pH in Water	12408-02-5	**9.74**			SU	12.27.2020 17:41		
Soil pH meas. in water at	TEMP	**19.8**			Deg C	12.27.2020 17:41		1

Certificate of Analytical Results

682366

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Sample Id: **B5 20-21 1/2'** Matrix: Soil Sample Depth:

Lab Sample Id: 682366-005 Date Collected: 12.11.2020 13:15 Date Received: 12.23.2020 16:45

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JYM % Moist:

Seq Number: 3146182 Date Prep: 12.28.2020 16:55 Tech: JYM

Subcontractor: SUB: T104704215-20-38 Prep seq: 7717987

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**12.4**	9.90	0.350	mg/kg	12.28.2020 20:46		1
Sulfate	14808-79-8	**50.5**	9.90	1.98	mg/kg	12.28.2020 20:46		1

Analytical Method: Sulfide by SM4500-S-F Prep Method:

Analyst: ALZ % Moist:

Seq Number: 3146266 Date Prep: Tech: ALZ

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Sulfide, total	18496-25-8	<671	2000	671	mg/kg	12.29.2020 13:50	UK	100

Analytical Method: PH By SW9045D Prep Method:

Analyst: ANP % Moist:

Seq Number: 3146039 Date Prep: Tech: ANP

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
pH in Water	12408-02-5	**9.78**			SU	12.27.2020 17:41		
Soil pH meas. in water at	TEMP	**19.8**			Deg C	12.27.2020 17:41		1

Certificate of Analytical Results

682366

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Sample Id: **B6 15-16 1/2'** Matrix: Soil Sample Depth:

Lab Sample Id: 682366-006 Date Collected: 12.17.2020 13:30 Date Received: 12.23.2020 16:45

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JYM % Moist:

Seq Number: 3146182 Date Prep: 12.28.2020 16:55 Tech: JYM

Subcontractor: SUB: T104704215-20-38 Prep seq: 7717987

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**328**	9.94	0.352	mg/kg	12.28.2020 20:58		1
Sulfate	14808-79-8	**127**	9.94	1.99	mg/kg	12.28.2020 20:58		1

Analytical Method: Sulfide by SM4500-S-F Prep Method:

Analyst: ALZ % Moist:

Seq Number: 3146266 Date Prep: Tech: ALZ

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Sulfide, total	18496-25-8	<672	2000	672	mg/kg	12.29.2020 13:50	UK	100

Analytical Method: PH By SW9045D Prep Method:

Analyst: ANP % Moist:

Seq Number: 3146039 Date Prep: Tech: ANP

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
pH in Water	12408-02-5	**8.63**			SU	12.27.2020 17:41		
Soil pH meas. in water at	TEMP	**20.0**			Deg C	12.27.2020 17:41		1

Certificate of Analytical Results

682366

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Sample Id: **B6 20-21 1/2** Matrix: Soil Sample Depth:

Lab Sample Id: 682366-007 Date Collected: 12.17.2020 14:00 Date Received: 12.23.2020 16:45

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JYM % Moist:

Seq Number: 3146182 Date Prep: 12.28.2020 16:55 Tech: JYM

Subcontractor: SUB: T104704215-20-38 Prep seq: 7717987

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**14.8**	9.98	0.353	mg/kg	12.28.2020 21:11		1
Sulfate	14808-79-8	**11.6**	9.98	2.00	mg/kg	12.28.2020 21:11		1

Analytical Method: Sulfide by SM4500-S-F Prep Method:

Analyst: ALZ % Moist:

Seq Number: 3146266 Date Prep: Tech: ALZ

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Sulfide, total	18496-25-8	**999**	2000	671	mg/kg	12.29.2020 13:50	JK	100

Analytical Method: PH By SW9045D Prep Method:

Analyst: ANP % Moist:

Seq Number: 3146039 Date Prep: Tech: ANP

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
pH in Water	12408-02-5	**9.28**			SU	12.27.2020 17:41		
Soil pH meas. in water at	TEMP	**20.0**			Deg C	12.27.2020 17:41		1

Certificate of Analytical Results

682366

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Sample Id: **B7 5-6 1/2** Matrix: Soil Sample Depth:

Lab Sample Id: 682366-008 Date Collected: 12.17.2020 16:00 Date Received: 12.23.2020 16:45

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JYM % Moist:

Seq Number: 3146182 Date Prep: 12.28.2020 16:55 Tech: JYM

Subcontractor: SUB: T104704215-20-38 Prep seq: 7717987

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**18.8**	10.0	0.355	mg/kg	12.28.2020 21:23		1
Sulfate	14808-79-8	**26.6**	10.0	2.01	mg/kg	12.28.2020 21:23		1

Analytical Method: Sulfide by SM4500-S-F Prep Method:

Analyst: ALZ % Moist:

Seq Number: 3146266 Date Prep: Tech: ALZ

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Sulfide, total	18496-25-8	<670	2000	670	mg/kg	12.29.2020 13:50	UK	100

Analytical Method: PH By SW9045D Prep Method:

Analyst: ANP % Moist:

Seq Number: 3146039 Date Prep: Tech: ANP

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
pH in Water	12408-02-5	**9.69**			SU	12.27.2020 17:41		
Soil pH meas. in water at	TEMP	**20.1**			Deg C	12.27.2020 17:41		1

Certificate of Analytical Results

682366

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Sample Id: **3146266-1-BLK** Matrix: Solid Sample Depth:

Lab Sample Id: 3146266-1-BLK Date Collected: Date Received:

Analytical Method: Sulfide by SM4500-S-F Prep Method:

Analyst: ALZ % Moist:

Seq Number: 3146266 Date Prep: Tech: ALZ

Subcontractor: SUB: T104704215-20-38 Prep seq:

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Sulfide, total	18496-25-8	<0.672	2.00	0.672	mg/kg	12.29.2020 13:50	U	1

Sample Id: **7717987-1-BLK** Matrix: Solid Sample Depth:

Lab Sample Id: 7717987-1-BLK Date Collected: Date Received:

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JYM % Moist:

Seq Number: 3146182 Date Prep: 12.28.2020 16:55 Tech: JYM

Subcontractor: SUB: T104704215-20-38 Prep seq: 7717987

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	<0.354	10.0	0.354	mg/kg	12.28.2020 18:07	U	1
Sulfate	14808-79-8	<2.00	10.0	2.00	mg/kg	12.28.2020 18:07	U	1

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CHRONOLOGY OF HOLDING TIMES

Analytical Method : Inorganic Anions by EPA 300/300.1
Work Order #: **682366**
Date Received: 12.23.2020

Client : LOI Engineers
Project ID: LOI20-312

Field Sample ID	Lab Sample ID	Date Collected	Date Extracted	Expiration Date Extraction	Date Analyzed	Expiration Date Analysis	Q
B2 2 1/2-4'	682366-001	12.11.2020	12.28.2020	01.08.2021	12.28.2020	01.25.2021	
B4 7 1/2-9'	682366-002	12.16.2020	12.28.2020	01.13.2021	12.28.2020	01.25.2021	
B4 10-11 1/2'	682366-003	12.16.2020	12.28.2020	01.13.2021	12.28.2020	01.25.2021	
B6 10-11 1/2'	682366-004	12.17.2020	12.28.2020	01.14.2021	12.28.2020	01.25.2021	
B5 20-21 1/2'	682366-005	12.11.2020	12.28.2020	01.08.2021	12.28.2020	01.25.2021	
B6 15-16 1/2'	682366-006	12.17.2020	12.28.2020	01.14.2021	12.28.2020	01.25.2021	
B6 20-21 1/2	682366-007	12.17.2020	12.28.2020	01.14.2021	12.28.2020	01.25.2021	
B7 5-6 1/2	682366-008	12.17.2020	12.28.2020	01.14.2021	12.28.2020	01.25.2021	

F = These samples were analyzed outside the recommended holding time.

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CHRONOLOGY OF HOLDING TIMES

Analytical Method : Sulfide by SM4500-S-F
Work Order #: **682366**
Date Received: 12.23.2020

Client : LOI Engineers
Project ID: LOI20-312

Field Sample ID	Lab Sample ID	Date Collected	Date Extracted	Expiration Date Extraction	Date Analyzed	Expiration Date Analysis	Q
B2 2 1/2-4'	682366-001	12.11.2020			12.29.2020	12.18.2020	F
B4 7 1/2-9'	682366-002	12.16.2020			12.29.2020	12.23.2020	F
B4 10-11 1/2'	682366-003	12.16.2020			12.29.2020	12.23.2020	F
B6 10-11 1/2'	682366-004	12.17.2020			12.29.2020	12.24.2020	F
B5 20-21 1/2'	682366-005	12.11.2020			12.29.2020	12.18.2020	F
B6 15-16 1/2'	682366-006	12.17.2020			12.29.2020	12.24.2020	F
B6 20-21 1/2	682366-007	12.17.2020			12.29.2020	12.24.2020	F
B7 5-6 1/2	682366-008	12.17.2020			12.29.2020	12.24.2020	F

F = These samples were analyzed outside the recommended holding time.

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the quantitation limit and above the detection limit.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

JN A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit. **ND** Not Detected.

RL Reporting Limit

MDL Method Detection Limit **SDL** Sample Detection Limit **LOD** Limit of Detection

PQL Practical Quantitation Limit **MQL** Method Quantitation Limit **LOQ** Limit of Quantitation

DL Method Detection Limit

NC Non-Calculable

SMP Client Sample **BLK** Method Blank

BKS/LCS Blank Spike/Laboratory Control Sample **BKSD/LCSD** Blank Spike Duplicate/Laboratory Control Sample Duplicate

MD/SD Method Duplicate/Sample Duplicate **MS** Matrix Spike **MSD:** Matrix Spike Duplicate

+ NELAC certification not offered for this compound.

* (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation

Analytical Method:	PH By SW9045D	Batch #:	3146039
Project Name:	Miranda Wastewater Line	Project ID:	LOI20-312
Client Name:	LOI Engineers	WO Number:	682366

Client Sample Id	Lab Sample Id	QC Types
B2 2 1/2-4'	682366-001	SMP
B4 10-11 1/2'	682366-003	SMP
B4 7 1/2-9'	682366-002	SMP
B5 20-21 1/2'	682366-005	SMP
B6 10-11 1/2'	682366-004	SMP
B6 15-16 1/2'	682366-006	SMP
B6 20-21 1/2	682366-007	SMP
B7 5-6 1/2	682366-008	SMP
	682366-008 D	MD
	682527-001 D	MD

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Analytical Log

Analytical Method:	Inorganic Anions by EPA 300/300.1	Batch #:	3146182
Project Name:	Miranda Wastewater Line	Project ID:	LOI20-312
Client Name:	LOI Engineers	WO Number:	682366

Client Sample Id	Lab Sample Id	QC Types
B2 2 1/2-4'	682366-001	SMP
B4 10-11 1/2'	682366-003	SMP
B4 7 1/2-9'	682366-002	SMP
B5 20-21 1/2'	682366-005	SMP
B6 10-11 1/2'	682366-004	SMP
B6 15-16 1/2'	682366-006	SMP
B6 20-21 1/2	682366-007	SMP
B7 5-6 1/2	682366-008	SMP
	682366-001 S	MS
	682366-001 SD	MSD
	682637-001 S	MS
	682637-001 SD	MSD
	7717987-1-BKS	BKS
	7717987-1-BLK	BLK
	7717987-1-BSD	BSD

eurofins | Environment Testing Xenco

Analytical Log

Analytical Method:	Sulfide by SM4500-S-F	Batch #:	3146266
Project Name:	Miranda Wastewater Line	Project ID:	LOI20-312
Client Name:	LOI Engineers	WO Number:	682366

Client Sample Id	Lab Sample Id	QC Types
B2 2 1/2-4'	682366-001	SMP
B4 10-11 1/2'	682366-003	SMP
B4 7 1/2-9'	682366-002	SMP
B5 20-21 1/2'	682366-005	SMP
B6 10-11 1/2'	682366-004	SMP
B6 15-16 1/2'	682366-006	SMP
B6 20-21 1/2	682366-007	SMP
B7 5-6 1/2	682366-008	SMP
	3146266-1-BKS	BKS
	3146266-1-BLK	BLK
	3146266-1-BSD	BSD
	682366-001 S	MS
	682366-001 SD	MSD

LOI Engineers

Miranda Wastewater Line

Analytical Method: Inorganic Anions by EPA 300/300.1 — Prep Method: E300P
Seq Number: 3146182 — Matrix: Solid — Date Prep: 12.28.2020
MB Sample Id: 7717987-1-BLK — LCS Sample Id: 7717987-1-BKS — LCSD Sample Id: 7717987-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<0.354	100	100	100	100	100	80-120	0	20	mg/kg	12.28.2020 18:19	
Sulfate	<2.00	100	99.0	99	98.9	99	80-120	0	20	mg/kg	12.28.2020 18:19	

Analytical Method: Inorganic Anions by EPA 300/300.1 — Prep Method: E300P
Seq Number: 3146182 — Matrix: Soil — Date Prep: 12.28.2020
Parent Sample Id: 682366-001 — MS Sample Id: 682366-001 S — MSD Sample Id: 682366-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	24.1	99.4	122	98	123	99	80-120	1	20	mg/kg	12.28.2020 19:20	
Sulfate	97.8	99.4	200	103	201	103	80-120	0	20	mg/kg	12.28.2020 19:20	

Analytical Method: Inorganic Anions by EPA 300/300.1 — Prep Method: E300P
Seq Number: 3146182 — Matrix: Soil — Date Prep: 12.28.2020
Parent Sample Id: 682637-001 — MS Sample Id: 682637-001 S — MSD Sample Id: 682637-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<0.353	99.8	103	103	103	103	80-120	0	20	mg/kg	12.28.2020 21:47	
Sulfate	10.4	99.8	109	99	110	100	80-120	1	20	mg/kg	12.28.2020 21:47	

Analytical Method: PH By SW9045D
Seq Number: 3146039 — Matrix: Soil
Parent Sample Id: 682366-008 — MD Sample Id: 682366-008 D

Parameter	Parent Result	MD Result	%RPD	RPD Limit	Units	Analysis Date	Flag
pH in Water	9.69	9.72	0	20	SU	12.27.2020 17:41	
Soil pH meas. in water at	20.1	20.0	0	25	Deg C	12.27.2020 17:41	

Analytical Method: PH By SW9045D
Seq Number: 3146039 — Matrix: Sludge
Parent Sample Id: 682527-001 — MD Sample Id: 682527-001 D

Parameter	Parent Result	MD Result	%RPD	RPD Limit	Units	Analysis Date	Flag
pH in Water	6.09	6.09	0	20	SU	12.27.2020 17:41	
Soil pH meas. in water at	19.7	19.8	1	25	Deg C	12.27.2020 17:41	

MS/MSD Percent Recovery — [D] = 100*(C-A) / B — LCS = Laboratory Control Sample — MS = Matrix Spike
Relative Percent Difference — RPD = 200* | (C-E) / (C+E) | — A = Parent Result — B = Spike Added
LCS/LCSD Recovery — [D] = 100 * (C) / [B] — C = MS/LCS Result — D = MSD/LCSD % Rec
Log Difference — Log Diff. = Log(Sample Duplicate) - Log(Original Sample) — E = MSD/LCSD Result

LOI Engineers

Miranda Wastewater Line

Analytical Method: **Sulfide by SM4500-S-F**
Seq Number: 3146266 Matrix: Solid
MB Sample Id: 3146266-1-BLK LCS Sample Id: 3146266-1-BKS LCSD Sample Id: 3146266-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Sulfide, total	<0.672	50.0	43.0	86	42.8	86	75-120	0	20	mg/kg	12.29.2020 13:50	

Analytical Method: **Sulfide by SM4500-S-F**
Seq Number: 3146266 Matrix: Soil
Parent Sample Id: 682366-001 MS Sample Id: 682366-001 S MSD Sample Id: 682366-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Sulfide, total	<671	49900	43500	87	43400	87	75-120	0	20	mg/kg	12.29.2020 13:50	

MS/MSD Percent Recovery [D] = 100*(C-A) / B
Relative Percent Difference RPD = 200* | (C-E) / (C+E) |
LCS/LCSD Recovery [D] = 100 * (C) / [B]
Log Difference Log Diff. = Log(Sample Duplicate) - Log(Original Sample)

LCS = Laboratory Control Sample
A = Parent Result
C = MS/LCS Result
E = MSD/LCSD Result

MS = Matrix Spike
B = Spike Added
D = MSD/LCSD % Rec

Attachment A Laboratory Data Package Cover Page

Project Name: **Miranda Wastewater Line** Laboratory Number: **682366**

This Data package consists of : Laboratory Batch No(s): **3146266, 3146039, 7717987**

This signature page, the laboratory review checklist, and the following reportable data:

[X] R1 Field chain-of-custody documentation;

[X] R2 Sample identification cross-reference;

[X] R3 Test reports (analytical data sheets) for each environmental sample that includes:
- a) Items consistent with NELAC 5
- b) dilution factors,
- c) preparation methods,
- d) cleanup methods, and
- e) if required for the project, tentatively identified compounds (TICs).

[X] R4 Surrogate Recovery data including:
- a) Calculated recovery (%R), and
- b) The laboratory's surrogate QC limits.

[X] R5 Test reports/summary forms for blank samples;

[X] R6 Test reports/summary forms for laboratory control samples (LCSs) including:
- a) LCS spiking amounts,
- b) Calculated %R for each analyte, and
- c) The laboratory's LCS QC limits.

[X] R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
- a) Samples associated with the MS/MSD clearly identified,
- b) MS/MSD spiking amounts,
- c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,
- d) Calculated %Rs and relative percent differences (RPDs) and
- e) The laboratory's MS/MSD QC limits

[X] R8 Laboratory anaytical duplicate (if applicable) recovery and precision:
- a) the amount of analyte measured in the duplicate,
- b) the calculated RPD, and
- c) the laboratory's QC limits for analytical duplicates.

[X] R9 List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix;

[X] R10 Other problems or anomalies.

[X] Exception Report for every "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies, observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC 25.6 and was last inspection by [ ] TCEQ or [ ] _____ on (enter date of last inspection). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The offical signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Holly Taylor	Holly Taylor	**Project Manager**	**12302020**
Name (Printed)	Signature	Official Title (printed)	Date

A1

Attachment A (cont'd) : Laboratory Review Checklist: Reportable Data

Laboratory Name:	EUROFINS XENCO, LLC	LRC Date :	12302020
Project Name:	Miranda Wastewater Line	Laboratory Job Number :	682366
Reviewer Name:	HTA	Batch Number(s) :	3146266, 3146039, 7717987

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	**Chain-of-Custody (COC)**					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
		Were all departures from standard conditions described in an exception report?			X		
R2	OI	**Sample and Quality Control (QC) Identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	**Test Reports**					
		Were all samples prepared and analyzed within holding times?	X				
		Other than those results <MQL, were all other raw values bracketed by calibration standards?	X				
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?	X				
		Were % moisture (or solids) reported for all soil and sediment samples?	X				
		Were bulk soil/solid samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
		If required for the project, were TICs reported?			X		
R4	O	**Surrogate Recovery Data**					
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
R5	OI	**Test Reports/Summary Forms for Blank Samples**					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency ?	X				
		Were method blanks taken through the entire analytical procedure, including preparation and, if applicable, cleanup procedures ?	X				
		Were Blank Concentrations <MQL?	X				
R6	OI	**Laboratory Control Samples (LCS):**					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within the QC limits?	X				
R7	OI	**Matrix Spike (MS) and Matrix Spike Duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
		Were MS/MSD RPDs within the laboratory QC limits?	X				
R8	OI	**Analytical Duplicate Data**					
		Were appropriate analytical duplicates analyzed for each matrix?	X				
		Were analytical duplicates analyzed at the appropriate frequency?	X				
		Were RPDs or relative standard deviations within the laboratory QC limits?	X				
R9	OI	**Method Quantitation Limits (MQLs)**					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	**Other Problems/Anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				

Attachment A (cont'd) : Laboratory Review Checklist: Reportable Data

Laboratory Name:	EUROFINS XENCO, LLC	LRC Date :	12302020
Project Name:	Miranda Wastewater Line	Laboratory Job Number :	682366
Reviewer Name:	HTA	Batch Number(s) :	3146266, 3146039, 7717987

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	**Initial Calibration (ICAL)**					
		Were response factors and/or relative response factors for each analyte within QC limits?	X				
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and the highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	**Initial and Continuing Calibration Verification (ICCV and CCV) and continuing calibration blank**					
		Was the CCV analyzed at the method-required frequency?	X				
		Were percent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB <MDL?			X		
S3	O	**Mass Spectral Tuning**					
		Was the appropriate compound for the method used for tuning?			X		
		Were ion abundance data within the method-required QC limits?			X		
S4	O	**Internal Standard (IS)**					
		Were IS area counts and retention times within the method-required QC limits?			X		
S5	OI	**Raw Data (NELAC 5.5.10)**					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?	X				
S6	O	**Dual Column Confirmation**					
		Did dual column confirmation results meet the method-required QC?			X		
S7	O	**Tentatively Identified Compounds (TICs)**					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	**Interference Check Sample (ICS) Results**					
		Were percent recoveries within method QC limits?			X		
S9	I	**Serial Dilutions, Post Digestions Spikes, and Method of Standard Additions**					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
S10	OI	**Method Detection Limit (MDL) Studies**					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	**Proficiency Test Reports**					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	**Standards Documentation**					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	**Compound/Analyte Identification Procedures**					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	**Demonstration of Analyst Competency (DOC)**					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	**Verification/Validation Documentation for Methods (NELAC Chapter 5)**					
		Are all methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	**Laboratory Standard Operating Procedures (SOPs)**					
		Are laboratory SOPs current and on file for each method performed?	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted to the TCEQ-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable).
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report Identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Attachment A (cont'd): Laboratory Review Checklist: Exception Reports

Laboratory Name:	EUROFINS XENCO, LLC	LRC Date:	12302020
Project Name:	Miranda Wastewater Line	Laboratory Job Number:	682366
Reviewer Name:	HTA	Batch Number(s):	3146266, 3146039, 7717987

ER# [1]	DESCRIPTION

1 ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No is checked on the LRC).

LOI Engineers, El Paso, TX

Miranda Wastewater Line

Analytical Method: **Inorganic Anions by EPA 300/300.1** Matrix: **Soil**

Prep Method: **E300P** Laboratory: **Xenco - Houston**

Parameter	SDL	MQL	Spike Amount	Actual Amount	Units
Chloride	0.354	10.0	5.00	1.59	mg/kg
Sulfate	2.00	10.0	5.00	5.72	mg/kg

Chain of Custody

XENCO LABORATORIES

Houston,TX (281) 240-4200 Dallas,TX (214) 902-0300 San Antonio,TX (210) 509-3334
Midland,TX (432) 704-5440 EL Paso,TX (915) 585-3443 Lubbock,TX (806) 794-1296 Crasbad, NM (432) 704-5440
Phoenix,AZ (480) 355-0900 Atlanta,GA (770) 449-8800 Tampa,FL (813) 620-2000 West Palm Beach, FL (561) 689-6701

Work Order No: 6823660

www.xenco.com Page _____ of _____

Project Manager:	Diana Guerrero	Bill to: (if different)	
Company Name:	LOI Engineers	Company Name:	
Address:	2101 E. Missouri Ste. B	Address:	
City, State ZIP:	79903 El Paso, TX	City, State ZIP:	
Phone:	915-630-4947	Email:	

Work Order Comments

Program: UST/PST ☐ PRP ☐ Brownfields ☐ RRC ☐ Superfund ☐
State of Project:
Reporting: Level II ☐ Level III ☐ PST/UST ☐ TRRP ☐ Level IV ☐
Deliverables: EDD ☐ ADaPT ☐ Other:

Project Name:	Miranda Wastewater Line	Turn Around	
Project Number:	L0120-312	Routine	☑
Project Location	Conley St. Mace, Graphite	Rush:	
Sampler's Name:	Fabian Rosas	Due Date:	
PO #:		Quote #:	

SAMPLE RECEIPT			
Temperature (°C):	21.4 / 20.20	Temp Blank:	Yes (No)
Received Intact:	(Yes) No	Wet Ice:	Yes (No)
Cooler Custody Seals:	Yes (No) N/A	Thermometer ID	IR-14
Sample Custody Seals:	Yes (No) N/A	Correction Factor:	-0.60
		Total Containers:	8

Lab ID	Sample Identification	Matrix	Date Sampled	Time Sampled	Depth	Number of Containers	Pres. Code	Sulfate	Sulfide	Chlorate	pH
	B2 2½'-4'		12/11/20	8:00Am	2½'-4'	1		✓	✓	✓	✓
	B4 7½-9'		12/16/20	9:00Am	7½'-9'	1		✓	✓	✓	✓
	B4 10'-11½'		12/16/20	9:30 Am	10'-11½'	1		✓	✓	✓	✓
	B6 10'-11½'		12/11/20	1:00pm	10'-11½	1		✓	✓	✓	✓
	B5 20-21½		12/11/20	1:15pm	20'-21½	1		✓	✓	✓	✓
	B6 15-16½		12/17/20	1:30 pm	15'-16½	1		✓	✓	✓	✓
	B6 20-21½		12/17/20	2:00pm	20-21½	1		✓	✓	✓	✓
	B7 5-6½		12/17/20	4:00pm	5'-6½'	1		✓	✓	✓	✓

ANALYSIS REQUEST

Preservative Codes

MeOH: Me
None: NO
HNO3: HN
H2S04: H2
HCL: HL
NaOH: Na
Zn Acetate+ NaOH: Zn

TAT starts the day recevied by the lab, if received by 4:00pm

Sample Comments

Total 200.7 / 6010 200.8 / 6020: 8RCRA 13PPM Texas 11 Al Sb As Ba Be B Cd Ca Cr Co Cu Fe Pb Mg Mn Mo Ni K Se Ag SiO2 Na Sr Tl Sn U V Zn

Circle Method(s) and Metal(s) to be analyzed TCLP / SPLP 6010: 8RCRA Sb As Ba Be Cd Cr Co Cu Pb Mn Mo Ni Se Ag Tl U 1631 / 245.1 / 7470 / 7471 : Hg

	Relinquished by: (Signature)	Received by: (Signature)	Date/Time		Relinquished by: (Signature)	Received by: (Signature)	Date/Time
1		Roxana Rodgz	12/22/20 @ 1645	2			
3	12/22/20 16:45			4			
5				6			

Revised Date 022619 Rev. 2019.1

Final 1.000

Inter-Office Shipment

IOS Number : 75492

Date/Time: 12.23.2020
Lab# From: **El Paso**
Lab# To: **Houston**
Created by: Niria Aparicio
Delivery Priority:
Air Bill No.: 126326152446
Please send report to: Holly Taylor
Address: 200 East Sunset Rd, Suite E, El Paso, TX 79922
E-Mail: holly.taylor@eurofinset.com

Sample Id	Matrix	Client Sample Id	Sample Collection	Method	Method Name	Lab Due	HT Due	PM	Analytes	Sign
682366-001	S	B2 2 1/2-4'	12.11.2020 08:00	E300	Inorganic Anions by EPA 300/300.1	01.01.2021	01.08.2021	HTA	CL SO4	
682366-001	S	B2 2 1/2-4'	12.11.2020 08:00	SW9045D	PH By SW9045D	01.01.2021	01.08.2021	HTA		
682366-001	S	B2 2 1/2-4'	12.11.2020 08:00	SM4500SF00	Sulfide by SM4500-S-F	01.01.2021	**12.18.2020 08:00**	HTA	S	
682366-002	S	B4 7 1/2-9'	12.16.2020 09:00	E300	Inorganic Anions by EPA 300/300.1	01.01.2021	01.13.2021	HTA	CL SO4	
682366-002	S	B4 7 1/2-9'	12.16.2020 09:00	SM4500SF00	Sulfide by SM4500-S-F	01.01.2021	**12.23.2020 09:00**	HTA	S	
682366-002	S	B4 7 1/2-9'	12.16.2020 09:00	SW9045D	PH By SW9045D	01.01.2021	01.13.2021	HTA		
682366-003	S	B4 10-11 1/2'	12.16.2020 09:30	SM4500SF00	Sulfide by SM4500-S-F	01.01.2021	**12.23.2020 09:30**	HTA	S	
682366-003	S	B4 10-11 1/2'	12.16.2020 09:30	E300	Inorganic Anions by EPA 300/300.1	01.01.2021	01.13.2021	HTA	CL SO4	
682366-003	S	B4 10-11 1/2'	12.16.2020 09:30	SW9045D	PH By SW9045D	01.01.2021	01.13.2021	HTA		
682366-004	S	B6 10-11 1/2'	12.17.2020 13:00	SM4500SF00	Sulfide by SM4500-S-F	01.01.2021	**12.24.2020 13:00**	HTA	S	
682366-004	S	B6 10-11 1/2'	12.17.2020 13:00	E300	Inorganic Anions by EPA 300/300.1	01.01.2021	01.14.2021	HTA	CL SO4	
682366-004	S	B6 10-11 1/2'	12.17.2020 13:00	SW9045D	PH By SW9045D	01.01.2021	01.14.2021	HTA		
682366-005	S	B5 20-21 1/2'	12.11.2020 13:15	SM4500SF00	Sulfide by SM4500-S-F	01.01.2021	**12.18.2020 13:15**	HTA	S	
682366-005	S	B5 20-21 1/2'	12.11.2020 13:15	E300	Inorganic Anions by EPA 300/300.1	01.01.2021	01.08.2021	HTA	CL SO4	
682366-005	S	B5 20-21 1/2'	12.11.2020 13:15	SW9045D	PH By SW9045D	01.01.2021	01.08.2021	HTA		
682366-006	S	B6 15-16 1/2'	12.17.2020 13:30	E300	Inorganic Anions by EPA 300/300.1	01.01.2021	01.14.2021	HTA	CL SO4	
682366-006	S	B6 15-16 1/2'	12.17.2020 13:30	SM4500SF00	Sulfide by SM4500-S-F	01.01.2021	**12.24.2020 13:30**	HTA	S	
682366-006	S	B6 15-16 1/2'	12.17.2020 13:30	SW9045D	PH By SW9045D	01.01.2021	01.14.2021	HTA		
682366-007	S	B6 20-21 1/2	12.17.2020 14:00	SW9045D	PH By SW9045D	01.01.2021	01.14.2021	HTA		
682366-007	S	B6 20-21 1/2	12.17.2020 14:00	SM4500SF00	Sulfide by SM4500-S-F	01.01.2021	**12.24.2020 14:00**	HTA	S	
682366-007	S	B6 20-21 1/2	12.17.2020 14:00	E300	Inorganic Anions by EPA 300/300.1	01.01.2021	01.14.2021	HTA	CL SO4	
682366-008	S	B7 5-6 1/2	12.17.2020 16:00	SM4500SF00	Sulfide by SM4500-S-F	01.01.2021	**12.24.2020 16:00**	HTA	S	
682366-008	S	B7 5-6 1/2	12.17.2020 16:00	SW9045D	PH By SW9045D	01.01.2021	01.14.2021	HTA		
682366-008	S	B7 5-6 1/2	12.17.2020 16:00	E300	Inorganic Anions by EPA 300/300.1	01.01.2021	01.14.2021	HTA	CL SO4	

Inter-Office Shipment

IOS Number : 75492

Date/Time:	12.23.2020	Created by:	Niria Aparicio
Lab# From:	**El Paso**	Delivery Priority:	
Lab# To:	**Houston**	Air Bill No.:	126326152446

Please send report to:	Holly Taylor
Address:	200 East Sunset Rd, Suite E, El Paso, TX 79922
E-Mail:	holly.taylor@eurofinset.com

Inter Office Shipment or Sample Comments:

Relinquished By: Niria Aparicio

Date Relinquished: 12.23.2020

Received By: Hypatia Keys

Date Received: 12.24.2020

Cooler Temperature: 2.7

eurofins | Environment Testing Xenco

Eurofins Xenco, LLC

Inter Office Report- Sample Receipt Checklist

Sent To: Houston

IOS #: 75492

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient
Temperature Measuring device used : hou-188

Sent By: Niria Aparicio **Date Sent:** 12.23.2020 01.46 PM

Received By: Hypatia Keys **Date Received:** 12.24.2020 10.30 AM

Sample Receipt Checklist		Comments
#1 *Temperature of cooler(s)?	2.7	
#2 *Shipping container in good condition?	Yes	
#3 *Samples received with appropriate temperature?	Yes	
#4 *Custody Seals intact on shipping container/ cooler?	Yes	
#5 *Custody Seals Signed and dated for Containers/coolers	Yes	
#6 *IOS present?	Yes	
#7 Any missing/extra samples?	No	
#8 IOS agrees with sample label(s)/matrix?	Yes	
#9 Sample matrix/ properties agree with IOS?	Yes	
#10 Samples in proper container/ bottle?	Yes	
#11 Samples properly preserved?	Yes	
#12 Sample container(s) intact?	Yes	
#13 Sufficient sample amount for indicated test(s)?	Yes	
#14 All samples received within hold time?	Yes	

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

NonConformance:

Corrective Action Taken:

Nonconformance Documentation

Contact: _____ **Contacted by :** _____ **Date:** _____

Checklist reviewed by: Hypatia Keys Date: 12.24.2020

Hypatia Keys

Eurofins Xenco, LLC

Prelogin/Nonconformance Report- Sample Log-In

Client: LOI Engineers

Date/ Time Received: 12.23.2020 04.45.00 PM

Work Order #: 682366

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : ir-4

Sample Receipt Checklist		Comments
#1 *Temperature of cooler(s)?	20.8	
#2 *Shipping container in good condition?	Yes	
#3 *Samples received on ice?	No	
#4 *Custody Seals intact on shipping container/ cooler?	N/A	
#5 Custody Seals intact on sample bottles?	N/A	
#6*Custody Seals Signed and dated?	N/A	
#7 *Chain of Custody present?	Yes	
#8 Any missing/extra samples?	No	
#9 Chain of Custody signed when relinquished/ received?	Yes	
#10 Chain of Custody agrees with sample labels/matrix?	Yes	
#11 Container label(s) legible and intact?	Yes	
#12 Samples in proper container/ bottle?	Yes	
#13 Samples properly preserved?	Yes	
#14 Sample container(s) intact?	Yes	
#15 Sufficient sample amount for indicated test(s)?	Yes	
#16 All samples received within hold time?	Yes	
#17 Subcontract of sample(s)?	Yes	Stafford
#18 Water VOC samples have zero headspace?	N/A	

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst: PH Device/Lot#:

Checklist completed by: Niria Aparicio Date: 12.23.2020

Checklist reviewed by: Holly Taylor Date: 12.24.2020