GENERAL GEOTECHNICAL SUBSURFACE SOIL EVALUATION REPORT

FOR

EPWATER – BOONE INTERCEPTOR REPLACEMENT PHASE II PROJECT – ROUTE STUDY AND DESIGN

CQC PROJECT NO. AGCQC16-056

PREPARED FOR

BROWN AND CALDWELL
1200 GOLDEN KEY CIRCLE, SUITE 430
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July 17, 2020 (Final Issued Report Date: July 31, 2020)

Brown and Caldwell
1200 Golden Key Circle, Suite 430
El Paso, Texas 79925

Attn: Mr. Carlos Torres, P.E.
El Paso Office Lead Managing Engineer

Re: General Subsurface Soils Evaluation Report
EPWater – Boone Interceptor Replacement
Phase II Project – Route Study and Design
CQC Project No.: AGCQC16-056

Dear Mr. Torres:

In accordance with our scope of services under proposal PGCQC16-041 dated May 26, 2016, CQC Testing and Engineering, L.L.C. (CQC) is pleased to provide Brown and Caldwell (Client) with our general subsurface soils evaluation report for the above referenced project. This report presents the results of our subsurface exploration borings, boring logs, and guidance information with respect to the suitability of observed subsurface soils and general soil improvement guidelines. As requested by our Client, the results of our geotechnical subsurface soil evaluations for Phase I and II were combined into a single report. The geotechnical information presented within this report may be utilized for the design of the sewer interceptor relief route. At the time this report was submitted, specific detailed plans and specifications of the proposed design were not available for our consideration in the preparation of this report. Once the plans and specifications are available, this information should be provided to CQC to review and modify our recommendations within this report, as necessary.

Thank you for selecting our firm for geotechnical consulting services and we look forward to working with the owner and design team on the future development of this project. Please feel free to contact us if you have any questions regarding the contents of this report or if we may assist you with other services.

Respectfully Submitted,
CQC Testing and Engineering, L.L.C.
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Section 1.0 – General Project Information

This general soils evaluation report has been prepared for the use of Brown and Caldwell (Client) for the El Paso Water – Boone Interceptor Replacement Phase II Project – Route Study and Design. Based on general information and aerial schematic pipeline route plans provided by our Client, we understand that the proposed Phase I project consisted of evaluating different possible routes for the installation of relief sewer system for the El Paso Water. We understand that our Client requested this evaluation to review the potential subsurface soil conditions that may be encountered in the general area of the pipeline routes included in the relief route study. The project design approach was to perform an initial pipeline route study, followed by the design of the pipeline once the route was selected.

We understand that our Client chose Route 5 and the Offload Option 5 for the Boone Street Sewer Project. In general, the project is planned to start at the intersection of N. Boone Street and E. Yandell Drive and continue south to the existing Haskell R. Street Wastewater Treatment Plant in central El Paso, El Paso County, Texas. It is our understanding that the anticipated pipeline diameters shall be 24 and 36 inches.

We understand that the anticipated pipe invert elevations shall range between 10 to 24 feet below the existing ground and/or pavement surface elevations. In addition, we understand that trenchless and open trench pipeline installation techniques are anticipated to be used along the proposed route. The pipeline is anticipated to have up to six (6) trenchless crossings extending across Interstate 10 Highway, Washington Park, Union Pacific Railroad Line, Alameda Avenue, Paisano Drive and Delta Drive. It is our understanding that the pipeline may also traverse areas where an unregulated landfill or debris exists buried below the street elevations. This portion of the pipeline is anticipated to be in the area south of Paisano Drive and extend into the Haskell R. Street Wastewater Treatment Plant.

Our requested scope of services shall be to generally evaluate the subsurface soil conditions along the proposed pipeline alignment routes, collect subsurface soil information, conduct Standard Penetration Tests (SPTs), develop information with respect to the suitability of the on-site soils, classification, bearing resistance, trench safety considerations and potential construction use for pipeline backfilling. As requested by our Client, our general subsurface soils evaluation was performed in two phases during the preliminary route study phase and design phase.

The following sections of this report present our field evaluation methods, site soil-related considerations, site preparation, and design guidelines for pipeline installation. Please note that the entire report should be read for a thorough understanding of our evaluation, findings and guideline

recommendations. CQC Testing and Engineering, LLC (CQC) should be contacted through a written statement if our stated understanding of the project and proposed civil site work is not correct and/or if the owner changes the sewer route for this project. Site and pipeline route changes may result in our information and recommendations within this report to be invalid without further review and evaluation by CQC.

1.1 – Existing Site Conditions

Our exploration soil borings were performed along the proposed Route 5 and Offload Option 5 pipeline alignment, on the berm of the center and southwest perimeter of the ponding areas at N. Boone Street and E. Yandell Drive, the berm of the canal at River Avenue and Latta Street, and on the edge of the existing pavement of the streets and right of way. The dwellings adjacent to the proposed pipeline route consist primarily of ponding areas, a canal, parks, schools, commercial facilities and residential areas.

CQC was not provided any historical survey plans, historical topographic surveys, historical photographs, historical grading plans, environmental reports or construction reports for review from our Client or design representatives. Therefore, CQC has no knowledge if previous site excavations or fill were appropriately backfilled with suitable soils and tested for compaction verification.

1.2 – Seismic Considerations

Based on our review of the current International Building Code and Site Classification for Seismic Design Definitions in conjunction with our review of the geologic conditions in the area, it is our professional opinion that a Site Class D may be used for this site. Please note that a geologic atlas of the area was used to supplement our analysis since our borings were performed to maximum depth of 35 feet below the existing ground surface elevation and the building code considers the average soil properties in the top 100 feet of the subject site. In the event that the owner and/or design representative is interested in determining the building code Site Class with a higher degree of accuracy, additional tests beyond our original requested scope of work shall be required.

Based on a Soil Site Class D, seismic ground motion values were determined based on a general site latitude coordinate of 31.76701º and longitude coordinate of -106.44398º and are defined in the table below. The site coordinate was estimated from the approximate center area of the site. The seismic coefficients were generated through the USGS Earthquake Hazards Program OSHPD Seismic Design

website. The values should be verified by the project structural engineer prior to use in structural analysis, as applicable. CQC should be informed if the reported values vary significantly.

Table 1 – Seismic Ground Motion Values

Period (Seconds)	Spectral Accelerations (g)	Site Coefficient, F_a	Site Coefficient, F_v
0.2 (S_s)	0.339	1.535	-
1.0 (S_1)	0.171	-	2.385

Section 2.0 – General Subsurface Exploration Evaluation Methods and Testing

As requested by our Client, the subsurface soils for the Route Study Phase I along the proposed sewer pipeline alignment route were evaluated by completing a total of seven (7) vertical subsurface exploration borings to depths ranging from 25 to 35 feet and for the Design Phase II along the selected sewer line Route 5 and Offload Option 5 alignments were evaluated by performing a total of thirty-four (34) borings to depths ranging from 20 to 40 feet, each below existing ground and pavement surface elevation at the time of our drilling activities.

The exploration borings were drilled with a rotary drilling rig and hollow stem auger drilling techniques. The approximate locations are shown in the "Geotechnical General Subsurface Exploration Boring Location Aerial Plan" presented in Appendix A, Sheets A1-1 and A2-1. The soil borings were logged during our drilling operations by a trained member of our staff. Our boring logs are presented in Appendix A, Sheets A1-2 through A1-8 for Phase I and Sheets A2-2 through A2-35 for Phase II.

During our drilling operations Standard Penetration Tests (SPT's) were performed in general conformance with ASTM D 1586. Soil samples were collected within a split-spoon sampler and auger grab samples at discrete depth intervals and were containerized and transported to our laboratory for further observation and engineering soil classification testing on selected samples. Our soil classification tests (i.e., moisture contents, sieve analysis, Atterberg Limit Tests, moisture-density relationship tests, and hydrometer analysis tests) were performed in accordance with accepted ASTM test procedures D 2216, D 1140, D 6913, D 4318, D 1557, and D 7928, respectively. In general, the results of our tests and estimated "N-Values" are presented in our soil boring logs and Summary of Laboratory Engineering Soil Classification Test Results in Appendix A, Sheets A1-23 through A1-26 and Sheets A2-70 through A2-80. At the completion of our drilling activities, the borings were backfilled with auger cuttings and firmly compacted at the ground surface and covered with a lean concrete mixture to the asphalt and/or concrete surface elevation.

The following table summarizes the completion depth of our borings, type of samples, number of soil samples collected, and observed groundwater depths at the time of our drilling operations for Phase I and Phase II.

Table 2 – Summary of Subsurface Soil Boring Site Evaluation for Phase I and Phase II

Summary of Field Investigation				
Borehole No.	**Approximate Termination Depth (ft.)**	**No. Split-Spoon Samples**	**No. Grab Samples**	**Observed Groundwater/ Water Seepage Depth (ft.)**
Phase I				
B-1	35	14	---	25
B-2	35	13	1	25
B-3	35	14	---	NE
B-4	35	14	---	NE
B-5	35	13	1	NE
B-6	35	13	1	NE
B-7	25	10	---	NE
Phase II				
2B-1	25	8	---	NE
2B-2	25	8	---	NE
2B-3	35½	15	---	22½
2B-4	35½	15	---	22½
2B-5	20	7	---	NE
2B-6	20	7	---	NE
2B-7	20	7	---	NE
2B-8	20	7	---	NE
2B-9	25	8	---	NE
2B-10	25	6	2	NE
2B-11	35	9	1	NE
2B-12	35	10	---	NE
2B-13	35	10	---	NE
2B-14	40	11	---	NE
2B-15	25	8	---	NE
2B-16	25	8	---	NE
2B-17	20	7	---	NE
2B-18	25	8	---	NE
2B-19	20	7	---	NE
2B-20	25	8	---	NE

2B-21	20	6	1	NE
2B-22	35	9	1	NE
2B-23	20	7	---	NE
2B-24	25	8	---	NE
2B-25	20	7	---	NE
2B-26	20	7	---	NE
2B-27	20	7	---	NE
2B-28	20	7	---	NE
2B-29	30	9	---	NE
2B-30	30	9	---	NE
2B-31	20	7	---	NE
2B-32	20	7	---	NE
2B-33	25	8	---	NE
2B-34	35	10	---	NE

NE- Not encountered immediately at the time of our drilling activities.

Contractors interested in bidding the project shall perform their own tests to verify the types of materials or review historical plans of the area to evaluate the excavation requirements prior to bidding the project. The owner shall not incur additional costs for additional excavations or removal of encountered variable unclassified soils, buried materials or utilities, as applicable. . The purpose of our soil borings was not to encounter unforeseen conditions such as buried slabs, unclassified buried debris, landfill materials, hazardous materials, structures and soil cement backfill materials above existing utility lines. If our Client and/or Owner are concerned with these potential conditions, other relatively non-destructive methods such as Ground Penetrating Radar (G.P.R.) may be performed as an additional service, if requested by the Owner. It is highly recommended that consideration be given to the inclusion of an additional unit bid item for the removal of soil cement stabilized materials (i.e., two sack soil cement backfill), which may be encountered below or above repair areas and/or utility improvement trenches or other unclassified buried materials within the project area.

Please note that the collected soil samples from our soils evaluation shall be stored for a period of up to 60 days after the submittal of this report, if a longer period of storage is required by our Client, CQC should be informed in writing.

2.1 - Laboratory Engineering Soil Classification Testing

In the laboratory, selected soil samples were evaluated and visually classified by our geotechnical engineering staff in general accordance with the Unified Soil Classification System (USCS). The geotechnical engineering properties of selected soil samples were evaluated by the following tests:

Table 3 – Summary of Performed Engineering Soil Classification Tests for Phase I and Phase II

Type of Test	Total Number Conducted for Phase I	Total Number Conducted for Phase II
Moisture Content Tests	42	152
Atterberg Limit Tests	22	121
Soil Particle Size Analysis Tests	22	121
Soil-Moisture Density Relationship Tests	6	12
Soil Hydrometer Tests	4	7
Soil pH Tests	---	12
Soil Resistivity Tests	---	12

Selected soil particle size analysis test results are reported in Appendix A, Sheets A1-9 through A1-22 for Phase I and Sheets A2-36 through A2-69 for Phase II. Soil Hydrometer test results are reported in Appendix A, Sheets A1-33 through A1-36 for Phase I and Sheets A2-105 through A2-111 for Phase II. A summary of our laboratory engineering soil classification test results is reported in Appendix A, Sheets A1-23 through A1-26 for Phase I and Sheets A2-70 through A2-80 for Phase II for ease of reference.

2.2 – Soil Moisture-Density Relationship Test Results

At the time of our drilling activities, a total of eighteen (18) bulk subgrade soil samples were obtained from the borings for soil moisture-density relationship testing. The samples were collected from approximate depths ranging from 5 to 8 and 10 to 15 feet below the existing ground and pavement surface elevations. The results of our soil moisture-density relationship tests (i.e., proctors) conducted on the collected soil samples are presented in Appendix A, Sheets A1-27 through A1-32 for Phase I and Sheets A2-81 through A2-92 for Phase II. The proctors were prepared in accordance with compaction test procedure ASTM D 1557, Methods “A” and “B”. The optimum dry density and moisture content values are presented in the table below.

Table 4 – Summary of Soil Moisture-Density Relationship Test Results for Phase I and Phase II

Borehole No.	Sample Depth (ft)	Soil Classification	Opt. Dry Density (pcf)	Opt. Moisture (%)
Phase I				
B-1	10 – 15	Fine To Coarse Grained Silty Sand (SM)	129.7	7.4
B-2	10 – 15	Fine to Coarse Grained, Poorly Graded Sand with silt (SP-SM)	103.7	13.9
B-3	5 – 10	Sandy, Brown Clay (CL)	119.0	12.1
B-4	5 – 10	Sandy Brown Clay (CL)	117.9	11.9
B-5	10 – 15	Sandy Brown Clay (CL)	118.1	12.5
B-6	5 – 10	Fine To Medium Grained Silty Sand (SM)	117.4	12.1
Phase II				
2B-1	10 – 15	Fine to Coarse Grained Silty Sand (SM)	124.5	7.9
2B-2	10 – 15	Fine to Coarse Grained Silty Sand (SM)	122.8	8.0
2B-4	10 – 15	Fine to Coarse Grained Poorly Graded Sand with silt (SP-SM)	102.2	13.1
2B-9	10 – 15	Fine to Coarse Grained Clayey Sand (SC)	126.3	8.5
2B-11	10 – 15	Fine to Coarse Grained Poorly Graded Sand with silt (SP-SM)	102.3	13.4
2B-12	10 – 15	Sandy Dark Brown Clay (CL)	107.0	14.5
2-B13	10 – 15	Fine to Coarse Grained Silty Sand (SM)	113.3	11.2
2B-15	10 – 15	Fine to Coarse Grained Silty Sand (SM)	108.0	12.5
2B-20	10 – 15	Sandy Dark Brown Sand (ML)	113.9	11.6
2-B24	10 – 15	Fine to Coarse Grained Silty Sand (SM)	107.3	11.9
2B-27	10 – 15	Fine to Coarse Grained Silty Sand (SM)	112.9	10.5
2B-32	10 – 15	Fine to Coarse Grained Silty Sand (SM)	100.9	11.8

2.3 –pH Test Results

Corrosion is the disintegration of a material due to chemical reactions with its surroundings. Any contact between the soil material and any concrete structures, steel piles, or metal appurtenances could result in corrosive reactions. In order to evaluate the potential corrosivity of the subsurface soils, pH tests are typically performed on soil samples. Selected soil samples from our soil borings were tested in the

laboratory for pH content in accordance with TEX-128 E. The results of these tests are presented in the table below.

Table 5 – Summary of Soil pH Test Results for Phase II

Borehole No.	Sample Depth (ft)	pH
2B-1	10 - 15	9.4
2B-3	10 - 15	9.7
2B-4	10 - 15	9.6
2B-9	10 - 15	9.8
2B-11	10 - 15	9.6
2B-12	10 - 15	9.1
2B-13	10 - 15	9.4
2B-15	10 - 15	9.8
2B-20	10 - 15	8.7
2B-24	10 - 15	9.1
2B-27	10 - 15	8.5
2B-32	10 - 15	9.6

Soils with a pH ranging from 5 to 9 are generally not considered to affect corrosion rates. However, soils with a pH of 4 or less represent a serious corrosion risk to common construction materials. Based on our test results, the soils are outside the range of serious corrosion risk values.

2.4 - Laboratory Soil Resistivity Test Results

The subsurface soils at selected depths from the exploration borings were also analyzed by performing laboratory soil resistivity tests using the soil box method per TxDOT Designation: Tex-129-E. This test is conducted by using a portable resistivity meter and a small acrylic box with inside dimensions of 8½ in. x 1½ in. x 1¼ in. The resistivity values obtained represent the resistivity of the tested soil samples. The test consists of adding moisture to the soil in the box until the lowest resistance reading before an increase is noted. This reading is used to calculate the resistivity of the soil using the soil box factor. In general, tests were performed on samples collected at approximate depths ranging from 5 to 10 feet below existing grade from borings 2B-1, 2B-3, 2B-4, 2B-9, 2B-11, 2B-12, 2B-13, 2B-15, 2B-20, 2B-24, 2B-27 and 2B-32. The results of the resistivity measurements are presented in the table below.

Table 6 – Summary of Soil Resistivity Test Results for Phase II

Borehole No.	Soil Sample Test Depth (ft)	Min. Laboratory Resistivity Measurement (Ohm-cm)	Max. Laboratory Soil Resistivity Measurement (Ohm-cm)
2B-1	10 - 15	540	1,800
2B-3	10 - 15	360	1,485
2B-4	10 - 15	540	1,395
2B-9	10 - 15	158	585
2B-11	10 - 15	450	4,050
2B-12	10 - 15	266	3,555
2B-13	10 - 15	1,800	4,950
2B-15	10 - 15	720	1,710
2B-20	10 - 15	495	1,620
2B-24	10 - 15	1,575	1,800
2B-27	10 - 15	810	2,835
2B-32	10 - 15	1,305	4,050

Based on these results that aid in better defining the corrosion properties of subsurface soils, the tested subsurface soils may be considered corrosive at a very moist to saturated state at deeper strata particularly for steel casings (See Table 8). The results of the resistivity tests along with a graphical plot are presented in Appendix A, Sheets A2-93 through A2-104, for ease of reference.

Based on our soil resistivity tests, we recommend that in order to mitigate potential steel corrosion, Type II Portland cement should be utilized in concrete mix designs for this project, as applicable.

Table 7– Corrosivity Ratings Based on Soil Resistivity

Soil Resistivity (ohm-cm)	Corrosivity Rating
> 20,000	Non-Corrosive
10,000 to 20,000	Mildly Corrosive
5,000 to 10,000	Moderately Corrosive
3,000 to 5,000	Corrosive
1,000 to 3,000	Highly Corrosive
< 1,000	Extremely Corrosive

2.5 – Existing Pavement Removal and Recycling

Based on our pavement cores within the project site, the asphaltic-concrete thickness ranged from about 2 to 5 inches, the base course material thickness ranged from approximately 4 to 9 inches and the concrete pavement/sidewalk thickness ranged from about 4 to 9 inches. The presented boring logs in Appendix A indicate the specific encountered pavement section thicknesses at each location.

Section 3.0 – Subsurface Soil Classification and Strength Considerations

In general, on our soil classifications and laboratory tests, the subsurface soils encountered in our exploration borings may be described by three (3) generalized soil stratums. The logged depth of the soil formation types is approximately delineated in our boring logs. The pipe embedment and backfill recommendations in Section 7.0 and Section 10.0 of this report should be reviewed and considered in the design and development of specifications for this pipeline project. Our soil borings are presented in Appendix A of this report. Due to the geologic location of the site, it is possible for variations in the types and depths of the soil formations to occur over relatively short distances, this is specifically true of the potential geologic conditions that may be encountered along the pipeline route, since the route extends from the upper to lower Rio Grande flood plain. Encountered water seepage and/or perched water estimated depth elevations are reported on the soil boring logs. The reported ground elevations within our borings were estimated with a hand held GPS unit and shall not be considered for construction staking or earthwork excavation estimates. The elevations were considered to develop soil boring surface diagrams for selected borings. The approximate locations are shown in the "Subsurface Profile Diagram Boring Location Aerial Plan" presented in Appendix D, Sheets D1 and D2. Surface profile diagrams are presented in Appendix D, Sheets D3 through D14 for our Client's reference.

Stratum I consists of fine to coarse grained, brown to dark brown clayey sands, brown silty sands, and light brown to multicolored sands with varying amounts of silt. Based on our SPT data, these sands were encountered at a loose to very dense relative density with SPT N-values ranging from 3 to 68 blows per foot of penetration. Our soil laboratory tests indicate that tested soils exhibited moisture contents ranging from 7 to 17 percent. Atterberg Limit tests indicated liquid limits ranging from 27 to 42 and plasticity indices ranging from 10 to 26, and non-plastic. Our sieve analysis tests indicated that these soils contain fines ranging from 1 to 41 percent. These soils may be classified as SC, SM, SP and SP-SM in general accordance with the USCS. These soils may be susceptible to soil sloughing during excavations.

Stratum II moderate to high plasticity brown to dark brown, sandy clay with varying amounts of silt. Based on our SPT data, these clays were encountered at a soft to very stiff consistency with SPT N-values ranging from 4 to 15 blows per foot of penetration. Our soil laboratory tests indicate that these soils exhibit moisture contents ranging from 15 to 27 percent. Atterberg Limit tests indicated liquid limits ranging from 21 to 50 and plasticity indices ranging from 5 to 38. Our sieve analysis tests indicated that these soils contain fines ranging from 56 to 95 percent. These soils may be classified as CL, CL-ML, and CH in general accordance with the USCS. These soils are not considered suitable for use as Select Fill material. Heavily saturated clay soils were encountered in the borings completed around and near the Boone Pond. Especially, in borings 2B-3 and 2B-4 where one of the trenchless crossings shall be specified. These clays are considered Class IV soil materials.

Stratum III brown sandy silt. Based on our SPT data, these silts were encountered at a medium stiff to very stiff consistency with SPT N-values ranging from 4 to 18 blows per foot of penetration. Our soil laboratory test indicates that these soils exhibit a moisture content ranging from 11 to 37 percent. Atterberg Limit tests indicated a liquid limit of 65 and a plasticity index of 44, and non-plastic. Our sieve analysis test indicated that these soils contain fines ranging from 52 to 84 percent. These soils may be classified as ML and MH in general accordance with the USCS. These soils are not considered suitable for use as Select Fill material. These silt soil materials are considered Class IV soil materials.

Encountered soil zones in a loose condition shall be susceptible to sloughing and elastic settlement when excavated and saturated with moisture.

It is anticipated that clay layers may be encountered during excavation of the pipe trenches. In the event that clay layers are encountered at the elevation of the pipe or manholes, these soils shall be over-excavated and removed in their entirety and replaced with approved Select Fill and/or Class III backfill soils.

In general, it is anticipated that the encountered subsurface silty sands and poorly graded sands may be classified as Class III backfill soil materials based on our current test results.

Confirmation soil classification testing (i.e. soil particle size analysis, plasticity index and soil-moisture density relationship testing) shall be performed at the time of construction. The encountered

subsurface soil formations with N-values greater than 25 as indicated in the soil boring logs are anticipated to require relatively heavy equipment to perform excavations.

During our drilling activities, dark stained soils were encountered in several of our borings below existing pavement surface elevation. The depths of the stained soils are presented in the table below.

Table 8 – Summary of Borings with Dark Stained Soils for Phase II

Borehole No.	Depths in Feet
2B-26	5 – 7½
2B-27	5 – 7½
2B-28	2½ – 5
2B-29	2½ – 5
2B-30	2½ – 5
2B-31	2½ – 7½
2B-34	2½ – 9

The stained soils were primarily encountered within the parking lot at the corner of Shelter Place and Orchard Avenue to the intersection of Shelter Place and Delta Drive and continued on Delta Drive to the Haskell Waste Water Treatment Plant. Additional borings and specific chemical testing of soils was performed as a supplemental environmental study to this report which delineate the extent of the stained soils throughout these areas and address specific recommendations to be considered during construction stages. This supplemental report was prepared by ESSCO Environmental, Inc. and provided as a separate document dated May 2020.

It should be anticipated that unclassified landfill material may be encountered within the areas where stained soils were encountered. These materials shall require complete removal and replacement with approved Select Fill soils along the new pipeline trenches. Removed materials shall be appropriately disposed in accordance with developed remediation plan prepared for this project.

3.1 - Groundwater Depth Considerations

At the time of our drilling operations suspected perched water and/or water seepage was observed in our soil borings below the ground and pavement elevations at the time of our drilling activities. The results of these tests are presented in the table below.

Table 9 – Approximate Water Seepage Depth

Borehole No.	At Time of Drilling (ft)	At End of Drilling (ft)
B-1	25	29
B-2	25	15
2B-3	22½	-- [a]
2B-4	22½	-- [a]

Note (a): Not observed at the time of completion of the borehole. In general, review monitoring well data for approximate current water seepage depth levels in Table 10.

The encountered perched water conditions shall also vary with seasonal irrigation periods and during periods of significant precipitation. The perched water is anticipated to be associated with lateral water seepage from the Boone Pond to some degree. As a result, it is highly recommended that the contractor verify the ground water or water seepage depths along the specified wastewater pipeline routes prior to construction of this project. Piezometer (monitor well) soil borings were installed near the location of borings B-1, B-2, 2B-3 and 2B-4 to evaluate potential perched water zone depths over a period of several months from 2016 to 2020. The approximate location of the wells is indicated in Sheets A1-1 and A2-1.

Table 10 – Water Seepage Depth for Phase I and Phase II

Monitor Well No.	Monitor Well Depth (ft)	Measured Groundwater Depth (ft)								
		12/7/16	12/29/16	4/24/17	6/1/17	9/29/17	10/11/17	12/6/17	9/13/19	7/15/20
MW-1	35	---	6	6	11	8	---	6	5	8
MW-2	35	10	---	15	14	7	---	7	5	8
MW-3	35	---	---	---	---	---	12½	11	8½	6½

The variation of water seepage/groundwater depth in the installed piezometers is due to the proximity of large stormwater collection ponds in the vicinity of the project areas and the presence of non-permeable strata. The depth recorded in our exploratory borings is typically measured on the disturbed soil strata generated by the drilling and sampling activities. It is recommended that pipelines be installed in accordance with the El Paso Water standards for utility lines underground water or submerged conditions within areas where apparent water seepage was reported. We anticipate that the pipes will

be backfilled with Class II soil materials and wrapped with geotextile fabric or approved equivalent methods.

In the event that dewatering is specified and required, the dewatering system should be designed by a licensed professional engineer or professional geologist who is familiar with the hydrogeologic conditions of the area. The dewatering system should be carefully designed to ensure that "piping" or "boiling" (i.e., quick-sand condition) does not occur at the bottom of the excavation trenches. In addition, groundwater or perched water draw down rates and reestablishment rates should be carefully considered by the dewatering system designer and dewatering contractor and potential impact to surrounding structures. The designer should also consider if there is a need to re-inject removed subsurface water during dewatering operations. As a means to monitor potential ground movements, an array of settlement monitoring devices may be placed within a circular varying radial distance of the construction site to monitor potential ground movements. Piezometer wells may also be installed to monitor groundwater or water seepage levels and flow direction. It may be necessary for the general contractor to establish a contingency plan for potential observed movements within nearby adjacent structures and/or issued claims.

It is possible to encounter perched water zones where relatively high permeability soils overlay low permeability soils. Capillary moisture may also be observed above the reported groundwater or perched water depths. This may be associated with the capillary rise of moisture through the soils above the observed water seepage depths. In the event that perched water is encountered at shallower depths during construction at this site, the water seepage should be appropriately removed. If an "artesian" condition is encountered it may be bridged with suitable Controlled Low Strength Materials (CLSM) or approved gravel rock. The proposed CLSM or gravel rock should be approved by the engineer of record through a submittal process. Workers shall be prohibited from working in excavations where water has accumulated or is accumulating.

The following are some general minimum requirements that should be included and considered in the preparation of a dewatering plan for this project, but not limited to these sole requirements.

- The general contractor shall design, provide, and operate dewatering system to include sufficient trenches, sumps, pumps, hose, piping, well points, deep wells, and similar facilities, necessary to depress and maintain groundwater level 2 feet below the base of each excavation during all stages of construction operations for new pipeline and related appurtenances or as required by the general contractors retained design professional.
- Design and operate dewatering system to avoid settlement and damage to existing structures and underground facilities.

- Groundwater table shall be lowered in advance of excavation for a sufficient period of time to allow dewatering of fine grain soils.
- Maintain groundwater level at excavations two (2) feet below lowest subgrade excavation until the structure or underground facility, as applicable, has sufficient strength and weight to withstand horizontal and vertical soil and water pressures from natural groundwater.
- Operate dewatering system, continuously, 24 hours per day, seven days per week. Provide standby pumping facilities and personnel to main the continued effectiveness of the system. Do not discontinue dewatering operations without first obtaining the general contractors engineer's acceptance for such discontinuation.
- If, in the engineers opinion, the water levels are not being lowered or maintained as required, provide additional or alternate temporary dewatering devices as necessary, at no additional cost to owner.
- Where portions of dewatering system are located in the area of permanent construction, submit to and obtain general contractors design engineer's acceptance of details of proposed methods of constructing the work at such location. Control of ground water shall continue until the permanent construction provides sufficient dead load to withstand hydrostatic uplift of the normal groundwater, until concrete or applicable structures have attained sufficient strength to withstand earth and hydrostatic loads.
- Perform pumping of water from excavations in a manner that prevents carrying away of unsolidified concrete materials, and that avoids damaging the subgrade.
- Before discontinuing dewatering operations or permanently allowing the gradual rise of groundwater levels, prepare computations to demonstrate that structures affected by the water level rise are protected by fill or other means to sustain uplift.
- The general contractor's dewatering system shall discharge to suitable locations acceptable to owner or EPCWID or owners of other properties potentially affected by water discharge, including owners adjacent to and downstream of dewatering system discharge. Operation of the dewatering system and disposal of water shall be in accordance with Laws and Regulations. The need for reinjection of water shall also be considered in the design of the dewatering plan.
- Convey water from excavations in closed conduits. Do not use trench excavations as temporary drainage ditches.
- Dispose of water removed from excavations in a manner that does not endanger health and safety, property, the work, and other portions of the project at all times.

Our scope of work did not include the development of a dewatering plan or review of prepared submittals by the general contractor. CQC and our Client shall not be liable for observed structural distress of adjacent structures within private properties along or within the project limits. It is the general contractor's responsibility to consider these potential conditions in the preparation of a dewatering plan and the establishment of a contingency to address noted structural distress and/or issued claims.

3.2 - Soil Related Movement Consideration

The results of our moisture content and plasticity index tests were used to evaluate the Potential Vertical Rise (PVR) of the encountered and tested clays soils in accordance with a published empirical method. This method is used to estimate the potential vertical movements of cohesive soils based on the plasticity index (PI) of the soil, such as the encountered medium to high plasticity clays. The procedure allows the reduction of the initial estimated PVR for the existing soil conditions and/or dry soil profile through surcharge addition (i.e., fill soil pressure or load pressures) and replacement of the cohesive materials with non-plastic soils.

Based on our soil exploration results and soil classification tests, the potential soil related ground movements for the encountered soils in our borings were estimated. Our estimates were based on the Texas Department of Transportation, Method for Determining the Potential Vertical Rise (PVR) Tex-124-E procedures. Based on the encountered soil moisture conditions, a surcharge pressure of at least 1 psi and a maximum active soil zone of 15 feet; the following PVR values where estimated for each boring.

Table 11 – Estimated PVR Values

Borehole No. [1]	Estimated PVR Value (in.)
B-1	< ¼
B-2	½
B-32B-	1 ¾
B-4	< ¼
B-5	Negligible
B-6	< ¼
B-7	< ¼
2B-1	Negligible
2B-2	< ¼
2B-3	< ¼
2B-4	1
2B-4	¼
2B-5	3
2B-6	½
2B-7	3
2B-8	¼
2B-9	¼
2B-10	¼
2B-11	< ¼

2B-12	¼
2B-13	¼
2B-14, 15, 16, 17	< ¼
2B-18	¼
2B-19	½
2B-20	¼
2B-21	¼
2B-22, 23, 24, 25	< ¼
2B-26	½
2B-27, 28, 29	< ¼
2B-30	Negligible
2B-31	Negligible
2B-32	< ¼
2B-33	< ¼
2B-34	< ¼

[1] Borehole approximate locations are shown in Boring Location Aerial Plans in Appendix A

It shall be considered that subgrade soils that exhibit PVR values above ¾ inches shall require treatment and/or removal to achieve compaction and reduce PVR movements to less than 1 inch.

The effects of expansive soils may be further evaluated based on the Liquidity Index (LI) of the soil. The LI is defined as the numerical difference between the soil's water content and plastic limit divided by the plasticity index. A soil's calculated liquidity index is an indication of its swell state based upon its measured moisture content and its affinity to draw moisture. In general, a higher LI indicates higher swell states and an LI at or near zero indicates the soil sample is in a relatively low state of swell. Based on our Atterberg Limit test results, the liquidity indices ranged from -0.63 to 0.89 for the encountered clayey soils in our borings.

CQC should be informed immediately if deep stratums of clays are encountered during pipeline excavations so that on-site observations of the encountered conditions may be performed. It may be necessary to perform additional soil plasticity and moisture content tests on the encountered clay soil formations and provide additional soil over-excavation and replacement recommendations. Pipeline excavations trenches shall not be backfilled with clays and/or Class IV soil materials unless approved by the design engineer and owner.

According to the results, the subsurface soils within the project limits exhibit a relatively low to moderate potential for swelling. Typically, soil related movements impact lightly loaded slab structures. The estimated PVR movements should be considered in the design of flat site work (i.e., sidewalks,

ramps, slabs and pavements), which shall be primarily influenced by the estimated potential vertical movement. The dead weight and live loads imposed on load bearing foundation elements are anticipated to be greater than the potential uplift swelling pressure of the clay formations.

3.3 - Subsurface Soil Considerations and Preparation

The following report section presents specific conditions that we have noted during our evaluation and should be considered by our Client and design team with respect to earthwork estimates and operations.

Special Considerations

- Site work and backfilling should be performed in accordance with the following sections of this report or as required by the project specifications and plans, whichever is more stringent.

- When placing backfill within utility line trenches or during the installation of the new pipelines, backfill materials should be appropriately placed and compacted to mitigate potential settlements caused by uncontrolled backfill during construction. The contractor should adequately over-excavate areas and backfill pipeline trenches with approved Select backfill soils, or as required by the project plans and specifications. Select Fill material specifications are presented in Section 10.0 of this report.

- Bidding general contractors shall be responsible for conducting their own tests to verify the actual depths of the soil types within the project limits to perform earthwork. The owner shall not incur additional costs for variations in the soil formations within the project limits and/or additional excavation requirements by the contractor. The boring logs and data in this report are intended for engineering design purposes. Bidding contractors may consider the information presented in this report at their own risk. If deemed necessary, bidding contractors shall collect additional subsurface materials information for use and/or interpretation for earthwork or demolition estimates that comply with the project specifications and plans to complete the specified work prior to bidding.

- The indicated suitability of the on-site soils and use as suitable Select Fill in Sections 3.0 and 10.0 of this report should be considered by the design team and bidding general contractor.

- In the event that utility installations are performed at this site, the pipes shall be inspected for leaks to mitigate potential loss of pipe support and impacts to adjacent structures or supporting foundation systems from lateral water seepage. Water leaks may also hydro-compact loose soil zones, which may result in distress cracks in slabs and structural elements over time, where applicable.

- Based on our experience with similar soils in the area, the contractor should consider that it is possible for sloughing (i.e., erosion) of the sandy soils to occur during excavations for this project. Sloughing of granular soils may hinder the installation of form work and cause excavations to be wider than expected. Proper moisture conditioning and compaction of these soils may mitigate potential soil sloughing. We anticipate that clay layers or lenses may be encountered during excavation activities at the location of the bottom of pipe and manholes. In the event that the clay layers or lenses are encountered, these soils shall be over-excavated and removed completely

within the excavated trench to about 2 feet below the bottom of the pipe and structures, and replaced with approved Select Fill and/or Class III backfill soils.

- Based on our soil borings and soil classification tests, the soils encountered at this site should be considered Type "C" soils under current Occupational Safety and Health Administration (OSHA) regulations (Standard – 29 CFR-Part 1926.650, Subpart P- Excavations) pertaining to excavations. In excavations penetrating these soils, the non-permanent sloping and benching schemes specified for Type "C" soils under the OSHA regulations require that the excavation sidewalls be sloped no steeper than 1½:1 (horizontal: vertical). Trenches or excavations 4 feet and deeper shall require the development of a trench safety plan to protect employees and the general public. Please note that it is the contractor's responsibility to assign a "competent" person to perform daily inspections and required documentation in accordance with OSHA regulations. In addition, OSHA limits excavations to 20 feet when excavations utilize soil benching and sloping methods and braced/shored trench box (i.e., rated) shielded systems designed by a licensed professional engineer. Trench excavations utilizing sheet piling systems or un-braced temporary shielded systems per OSHA regulations shall be designed by a licensed professional engineer for any excavation depth in consideration to protect the health and safety of all workers and the public.

- Based on our observations of the proposed pipeline alignment locations and access considerations, we anticipate that the contractor may be required to use rated braced trench box systems to install the sewer pipeline. As a result, the contractor shall be responsible for preparing a trench safety plan prior to construction with applicable manufacturer's trench box system specifications for submittal to the engineer for compliance with the project specifications. The trench safety plan shall be performed by a licensed professional engineer. In the event that braced sheet piling is utilized, the sheet piling design and specified depths shall be determined by a licensed professional engineer and submitted to the engineer for review and documentation for any depth in consideration. This report provides general trench safety considerations for the project under report Section 6.0.

Site Preparation

- The existing soils at this site that will support compacted Select Backfill materials and the new sewer pipeline should be cleared of all vegetation, organic matter, topsoil, construction/pavement debris and/or any foreign matter. The cleared subgrade should be thoroughly compacted in order to densify any weak and compressible zones. The finished subgrade should be compacted to a minimum of 95 percent of maximum dry density per ASTM D-1557 and maintained within ±3 percent of optimum moisture and/or as required by the project specifications, whichever is more stringent. Weak or compressible soil zones identified during fill operations should be reprocessed or over-excavated, removed and replaced with specified compacted "Select Fill" and/or Class III backfill soils to a minimum depth of 8 inches below subgrade or as required to appropriately bridge over these soils, whichever is deeper for specified new flatwork structures, concrete curbs, utility lines, concrete structure and pavements. Subgrade preparation operations should be observed by a representative of CQC.

- Approved suitable fill or backfill materials should be appropriately tested at standard frequencies as recommended in this report and/or as required by the project specifications or on-site inspectors, whichever is more stringent.

3.4 - Drainage Considerations

Drainage is an important key to the successful performance of any excavation and soil supported structure. Positive surface drainage should be established prior to and be maintained during and after construction to prevent water from ponding within or adjacent to the pipeline trenches. It is also possible for sinkholes to be created if pipeline trenches are left open during periods of significant rainfall events especially in sites that have significant vertical changes in elevation.

Section 4.0 – Soil Bearing Capacity and Design Considerations

4.1 – Pipeline Design Considerations

Based on our current understanding that the invert depths of the pipeline, casings, manholes and diversion structures shall range from approximately 10 to 27 feet, the subsurface soils appear to be primarily in a relatively very loose to dense state at these invert depths. It is our understating that new diversion structures shall be constructed at E. Yandell Drive and N. Boone Street, Storm Water Pond Access Road next to N. Boone Street and the 72-inch manholes shall be installed at E. Yandell Drive and N. Boone Street and Durazno Street and N. Stephens Street. Based on our SPT data, the following table presents general allowable soil bearing capacities that may be considered. This information shall be further verified at the time of construction with field tests such as Dynamic Cone Penetrometer (DCP) tests performed in accordance with ASTM D6951M-18, as deemed necessary by the design engineer and/or on-site inspectors.

Table 12 – Allowable Soil Bearing Capacity

Borehole No. [1]	Estimated Allowable Bearing Capacity (lb/ft^2)
B-4, B-5, B-6, 2B-2, 2B-4, 2B-10, 2B-11, 2B-12, 2B-13, 2B-14, 2B-15, 2B-17, 2B-19	*1,000*
B-2, B-7, 2B-1, 2B-3, 2B-5, 2B-6, 2B-9, 2B-18, 2B-20, 2B-22, 2B-23, 2B-24, 2B-27, 2B-28, 2B-29, 2B-33, 2B-34	*1,500*
B-7, B-8, 2B-16, 2B-21, 2B-25, 2B-26, 2B-30, 2B-31, 2B-32	*2,000*
B-1, B-3	*2,500*

The recommendations in the following sections of this report should also be considered in the design of the sewer line, associated structures, pipeline embedment and backfilling.

During our drilling activities we encountered dark stained and apparently contaminated soils in borings 2B-26, 2B-27, 2B-28, 2B-29, 2B-20, 2B-31, and 2B-34 to depths ranging from 5 to 7½ feet, 2½ to 5 feet, 2½ to 7½ feet, and 2½ to 9 feet, below existing pavement surface elevation. As previously indicated, the stained soils were primarily encountered in the parking lot at the corner of Shelter Place and Orchard Avenue to the intersection of Shelter Place and Delta Drive and continues on Delta Drive to the Haskell Waste Water Treatment Plant. These soils shall be removed in their entirety and replaced with approved Select Fill material to a depth of 12 inches below stained soil. Additional considerations for removal and proper disposal of stained materials are addressed in the supplemental environmental report prepared by ESSCO Environmental, Inc.

4.2 - Earth and Vehicle Loads

The pipe analysis and design should consider the vehicular traffic loads, earth backfill loads, pipe laying methods, bending stresses, potential for settlement, and estimated pipe deflections. The following soil related design parameters may be considered in the pipe design analysis. CQC should be contacted if additional soil related information is required to supplement pipeline design and analysis.

- **Soil Related Design Parameters**

  -$\gamma_s \geq 125$ pcf (Estimated Soil Total unit weight)

  -Category 1 - Sandy & Gravel Profile

  - E'= 1,000 – 1,500 psi (Presumptive Allowable Modulus of Soil Reaction for Sandy Gravels and Clean Sand Backfill Bedding Soils)

4.3 – Thrust Blocks

We anticipate that thrust blocks shall be specified at curves and turns of the proposed pipeline, a passive earth resistance of 200 lb/ft^3 may be used for design purposes. Thrust blocks should bear solidly against undisturbed trench walls in all directions.

4.4 – Manhole and Pipeline Design Flotation Considerations

Manhole structures should be designed to resist buoyant forces when high groundwater table or where similar conditions are anticipated. A manhole structure has the potential to "float" or move in an upward direction if the buoyant force is greater than the weight of the structure plus the friction between the structure and the surrounding soil. Therefore, in order for the manhole structure to be stable, its weight and the friction or total sliding resistance have to resist the buoyant force.

The following equation can be used to estimate the manhole's floating potential:

$$B \leq W + R_{sliding}$$

Where: B is the buoyant force (lbs)
W is the weight of the manhole assembly (lbs)
$R_{sliding}$ is the total sliding resistance (lbs)

$$B = \gamma_w (\pi * D^2/4)(H_2)$$

Where: γ_w is the unit weight of water (pcf)
D is the diameter of the manhole (ft)
H_2 is the height from the bottom of the manhole to the top of water level (ft)

$$R_{sliding} = (P_{dry} + P_{sub}) (f)(\pi)(D)$$

Where: P_{dry} is the soil force acting on the manhole from the ground surface to the water table (lbs/ft)
P_{sub} is the effective force of the soil acting on the manhole below the water table (lbs/ft)
f is the friction factor (dimensionless), this case may range from 0.35 to 0.45
D is the diameter of the manhole (ft)

$$P_{dry} = (\gamma_s * H_1 * K_a)(H_1/2)$$
$$P_{sub} = (H_2)(\gamma_s * H_1 * K_a) + (1/2)(\gamma_{sub})(H_2)(K_a)$$

Where: γ_s is the unit weight of dry soil (pcf), this case may range from 115 to 135 pcf
K_a is the active lateral earth pressure coefficient (dimensionless), this case may range from 0.20 to 0.36 pcf
γ_{sub} is the effective unit weight of soil submerged (pcf), this case may range from 55 to 90 pcf
H_1 is the height of the manhole from the top of water level to the ground level (ft)
H_2 is the height from the bottom of the manhole to the top of water level (ft)

The American Concrete Pipe Association Design Data No. 41 publication may also be reviewed to further understand the theory, considerations, and sample calculations of manhole flotation resistance design.

The following general equation may be considered to estimate the buoyant force of a submerged pipe:

$$B_{Pipe} = (\pi * (OD)^2 * 62.4) /4$$

Where: OD is the outside diameter of the pipe (ft)

In order to improve the overall stability (i.e., vertical and horizontal deflection) of the pipe the specification of concrete collars at pipe joints at specific design points along the unsupported span of pipe should be considered. The specification of piers such as helical piers may also be consider to resist buoyant forces, as applicable.

Section 5.0 – Below Grade Lateral Earth Pressures

The proposed below grade structures and pipelines related to this project will be subjected to vertical and lateral earth pressures depending upon the type of backfill soil. The table below presents at-rest (K_o) pressure coefficients for select backfill soils. The K_o pressures are recommended for cases where the structures will experience little yield. Select backfill soils should meet the requirements of Select Fill or as required by the project specifications, whichever is more stringent.

We understand that a box structure shall be specified near boring 2B-1, soils at this location may be described as fine to coarse grained, silty, brown, loose sands with SPT's ranging from 1 to 6 blows per foot of penetration. These soils may be considered to have an angle of internal friction of 28 to 34 degrees. Lateral earth pressure will be the same regardless of width.

Table 13 – Earth Pressure Coefficients

Earth Pressure Coefficients				
Soil Type	Presumptive Soil Angle of Internal Friction (degrees)	Estimated Total Soil Unit Weight (pcf)	Lateral Earth Pressure Coefficient	Equivalent Fluid Weight Ranges (pcf)
			At-Rest (K_o)	At-Rest
Crushed Stone Base Course (Structural Fill)	Ø=46	148	0.28	42
Select Fill Soils (PI<12)	Ø=32	138	0.47	65
Silty, Clayey or Poorly Graded Sands	Ø=28	120	0.53	64

The lateral pressure with depth may be estimated with the following equation;

$$P_s = K_o\gamma_s(H-H_w) + K_o(\gamma_s-\gamma_w)H_w + \gamma_w H_w + q\,K_o$$

Where;
P = lateral earth pressure at calculated depth, psf
K_o = At-rest lateral earth pressure coefficient (typically used for long-term cases)
γ_s = Total wet unit weight of soil, pcf
H = Depth of structure from ground surface to calculated depth, ft
H_w = Positive vertical downward depth of water from reported highest depth.
Note when calculation depth is above reported water depth, then H_w term in equation is considered zero
γ_w = Unit weight of water, pcf
q = surcharge pressure, psf (typical only considered to 20 feet)
light loads (i.e., pedestrians and soil stockpiles) – 50 psf,
moderate (i.e., light equipment) – 150 psf,

heavy (i.e., heavy duty equipment) – 250 psf or more

Section 6.0 – General Trench Safety Considerations

The following report sections present general trench safety and trenchless horizontal boring excavation considerations.

6.1 – Trench Safety Considerations

Trench excavations of more than 4 feet in depth and extending to a maximum depth of 20 feet may be supported with shielded systems in accordance with OSHA regulations. Shielded systems, such as trench boxes, should not be subjected to loads exceeding those which the system was designed to withstand. Shields may be stacked, provided that they are installed in a manner to resist lateral displacements or other hazardous movements of the shield in the event of sudden changes in lateral loads, such as sidewall collapse, or impact from excavation equipment or any other potential force. Braced Trench Box Systems may also be utilized for excavations extending from 20 to 25 feet, provided that they are designed and rated for the specific excavation depths and soil materials.

Employees shall not be allowed in shielded trenches when shields are being installed, removed, or moved vertically or horizontally. Employees should not be permitted in trenches that show possible loss of soil from behind or below the bottom of the shield. Hard hats and warning vests or other highly visible Personal Protection Equipment (PPE) should be worn by all employees.

Surface encumbrances, such as boulders and vegetation, located so as to create a hazard to employees involved in excavation work or in the vicinity thereof at any time during operations, shall be removed, properly supported or made safe before excavation begins. Existing underground utility lines shall be located prior to performing excavations and protected during excavation construction. Excavations should not undermine existing structures and should be at least 10 feet from the toe of any structure.

When mobile equipment is operated adjacent to an excavation, a warning system should be utilized such as barricades, hand or mechanical signals, or stop logs.

Properly designed means of access and egress from excavations should be provided for employees. Structural members used as ramps and/or runways over excavations 6 feet or more in depth should be equipped with guardrails and should be uniform in thickness and supported properly to prevent displacements. Stairways, ladders, ramps, or other safe means of egress shall be located in trench

excavations that are 4 feet in depth or more in depth so as to require no more than 25 feet of lateral travel for employees.

A "competent person" shall inspect and document the excavation conditions trench systems and equipment daily and notify the contractor's superintendent of any conditions which may adversely affect the reliability and safety of the excavation. The excavations shall also be inspected after each rainstorm or when any changes in conditions occur that can increase the possibility of a cave-in or slide. If evidence of possible cave-ins or slides is apparent, all work in the excavation shall cease until the necessary precautions for sloping or bracing have been taken to safeguard the employees and trench. Any loose soil shall be scaled from the slope and removed from the excavation to protect workers against falling soil.

The atmosphere within a trench deeper than 4 feet shall be tested when there is a possibility of oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or build-up of hazardous gases. Ventilation should be provided to prevent flammable gas build-up to 20 percent of lower explosive limit of the gas. In addition, testing should be conducted as often as necessary to ensure that the atmosphere remains safe. Emergency rescue procedures and equipment should be readily available at all times, especially where hazardous atmospheric conditions could exist or develop during work in an excavation. Employees entering deep confined excavations should wear a safety harness with a lifeline securely attached to the harness.

A health and safety plan and emergency rescue plan should be established and maintained by the general contractor at all times during the project. In the event of an injury or emergency situation, it is imperative to follow all guidelines as detailed in the most recent OSHA Standards for the Construction Industry Manual, including completion of all necessary forms, accident procedures, and report documentation. After rescue operations are implemented the accident area should be closed off and made safe until an OSHA inspector visits the site and documents conditions after immediate notification. Emergency contact information should be posted on the site at all times during excavation activities.

Excavations of earth material to a level not greater than 2 feet below the bottom of a shield may be permitted, provided that the soil sidewalls are stable. Shields should extend to a minimum of 18 inches above the top of the vertical side or crest of the excavation.

The trench box system should be used in accordance with the Manufacturer's recommendations in accordance with the requirements of a trench safety plan and current OSHA regulations. Excavation safety systems for trenches shall be designed by a licensed professional engineer for all anticipated depths for this project.

In trench areas where landfill and deleterious materials are encountered, these materials shall be completely removed and replaced with approved Select Fill soils. We recommend to segregate and store these materials in areas with natural ventilation for proper disposal. We also recommend to keep ignition sources at least 25 feet away from temporary storage areas designated for proper disposal. Removed materials shall be appropriately disposed in accordance with the developed remediation plan prepared for this project.

Ensure that a competent person inspects the new pipeline trenches. A competent person shall be able to recognize existing and predictable hazardous conditions due to the encountered landfill and deleterious materials. All personnel shall wear proper PPE with gloves, face shield and goggles as minimum during the handling process in these areas.

It shall be the contractor's responsibility to document and record all daily excavation activities in accordance with OSHA regulations. CQC and our Client shall have no liability for the selected means and methods utilized by the contractor to perform excavations.

6.2 - Trenchless Pipeline Crossing Considerations

It is recommended that specified trenchless crossings for this project consist of limited personnel non-entry required methods such as Horizontal Boring, Pipe Jacking and Microtunneling trenchless excavation methods with casing. Pipe casing shall be maintained at least three (3) pipe diameters beyond the entry and exit pits or as required to maintain excavations stable and protect the new utility line.

If horizontal boring is selected, all underground utilities shall be located within 10 feet of the proposed drill path. Entry and exit elevation difference in excess of 50 feet shall be avoided. It is recommended to use drilling mud (fluid bentonite) in order to reduce drilling torque due to the encountered soil conditions, as required. Drilling mud shall also aid to maintain and support the borehole earthen walls. The specification of soil stabilization or strengthening methods such as pressure grouting may also be considered along specific areas of the pipeline route. Grouting would be performed prior to tunneling to strengthen loose soil zones. The encountered saturated clay soil conditions within the areas surrounding the Boone Pond should also be considered in the design and construction of trenchless crossings.

Pipe Jacking method should consider the use of guided casing to allow the installation of the new utility line. In jacking applications, the pipe stiffness should be considered according to the jacking compressive load and installation conditions including the jacking head proposed to be used. The jacking contractor should take precaution in applying no more than the allowable safe jacking load for the pipe.

The SPT data presented within this report may be reviewed as a guide and with caution by the pipe manufacturer in order to determine the relative stiffness of the subsurface soil formations. It shall be the pipe manufacturer's responsibility to collect additional subsurface soils information in order to specify the appropriate pipe to be utilized for jack boring methods for this project including but limited to material type, wall thickness, and welding details.

Where pipe casing will be left in place, the annular space between the pipe and casing should be filled to mitigate the potential settlement of the trench as required by the engineer or manufacturer. It is recommended that the selected contractor provide a jacking plan and profile drawing details and should include the planned method to monitor ground surface movements before, during and after construction. This may be accomplished by installing settlement monitoring points and/or devices in combination with pre-construction and post construction video recording methods. Surface movements shall be maintained below a ¼ inch. The contractor should provide, along with the specified submittal requirements, a detailed description of similar projects with references on which the proposed tunneling system had been successfully used by the contractor. The potential of a "blow-out" condition and impact to bore pits should also be considered for bores crossing below active channels, drainage canals, waterways and pit flooding events after significant rainfall events. In addition, the contractor should provide pipe calculations prior to ordering pipe casing and a summary of the backfilling method to be used to the engineer of record through a submittal process.

The following is a general list of items that shall be submitted by the general contractor and tunneling subcontractor, as applicable for the proposed trenchless excavation method.

- Manufacturer's data sheet and specifications describing in detail the trenchless method to be used.
- Detailed description of similar projects with references on which the proposed system had been successfully used by contractor/subcontractor or operator.
- Description of method to remove and dispose of spoil.
- Maximum anticipated jacking loads and supporting calculations, as applicable.
- Description of methods to control and dispose of ground water or water seepage spoil, temporary shoring, and other materials encountered in the maintenance and construction of pits and shafts.
- Shaft dimensions, locations, surface construction, profile, depth, method of excavation, shoring, bracing, and thrust block design, as required.

- Pipe design data and specifications.
- A description of the grade and alignment control system.
- Intermediate jacking station locations and design, as applicable.
- Description of lubrication and/or grouting system.
- Layout plans and description of operational sequence.
- A detailed plan for monitoring ground surface movement (settlement/vertical movement) due to trenchless operations. The plan shall address the method and frequency of survey measurement. At minimum, the plans shall measure the ground movement of all structures, roadways, and any other areas of concern. A description of how settlements will be monitored and excessive settlements will be avoided and contingency plan should also be required to establish how the contractor will mitigate any excessive settlements. A pre-construction survey shall be required and conducted by the contractor, accompanied by the engineer and owner representative(s), to document pre-construction conditions.
- Contingency plans for approval for the following potential conditions: damage to pipeline structural integrity and repair, loss and return to line and grade, and loss of ground.
- Procedures to meet all applicable OSHA requirements. These procedures shall be submitted for a record purpose only and will not be subject to approval by the engineer. At a minimum, the contractor shall provide the following:
  1) Protection against soil instability and groundwater/water seepage inflow.
  2) Safety for shaft access and exit, including ladders, stairs, walkways, and hoists.
  3) Protection against hydraulic and mechanical equipment operations, and for lifting and hoisting equipment and material.
  4) Ventilation and lighting.
  5) Monitoring for hazardous gases.
  6) Protection against flooding and means for emergency evacuation.
  7) Protection of shaft, including traffic barriers, accidental or unauthorized entry, and falling objects.
  8) Emergency protection equipment.
  9) Safety supervising responsibilities.
  10) Annular space grouting plans, if required by contract documents.

6.3 – Soil Stabilization Considerations

In the event that soil stabilization is required during the course of construction due to the presence of liquefaction or pumping of loose fine grained silty sands, poorly graded sands or saturated clays, we recommend that the owner consider adding unit price bid items for soil grouting stabilization, coarse gravel stabilization, the placement of a geogrid mat (i.e. Tensar Tri-AX (TX-5)), "EMC Squared" concentrated liquid stabilization, cement treatment of subgrade soils or similar approved product and placed per manufacturer requirements as approved by the engineer. Report section 8.7 presents recommendations for soil treatment with cement.

Soil treatment is used to improve soils that are otherwise unsuitable for use in subgrades or subbase layers. This includes decreasing the plasticity and volume change characteristics, decreasing potential subgrade pumping, increasing the bearing strength, or providing a stable working platform on which pavement layers may be constructed. The encountered silty subgrade sands at this site are non-plastic and can be difficult to work with, particularly if the subsurface soils are relatively wet and exposed to periods of inclement weather.

As appropriate, pumping subgrade soils may be stabilized with coarse gravel. Coarse gravel rock may be worked into the subgrade soils in order to stabilize and bridge over the very moist to wet subgrade soils. The gravel rock should be clean, uniformly angular, stable crushed limestone with a diameter between 1-1/2 to 8 inches or a size No. 1 or 2 rocks per ASTM C33 or as approved by the design engineer. The rock bed should be a minimum of 4 to 12 inches thick or as required to bridge over the subgrade soils and allow the placement of the first lift of Select Fill subbase or flexible base course material.

In addition, it is recommended that the selected contractor provide qualifications and similar project experience with respect to soil treatment and/or stabilization methods. The approved soil grout treatment test results would be provided to the owner's QA lab for field verification testing and quality control of density, moisture and compressive strength.

Section 7.0 – Pipeline Embedment and Backfill Considerations

As indicated above, the following recommendations should be considered in the design of the pipeline embedment and backfilling specifications.

7.1 – Pipeline Soil Support below Embedment Zone

Based on information provided by our Client, we understand that pipeline invert depths shall range from approximately 10 to 27 feet below the specified finished grade elevations. Based on our observations and soil classification tests, the proposed new pipeline embedment zone may be supported by prepared and compacted suitable approved Class II or III soil material. As previously stated, it should be anticipated that the import of approved backfill soils and/or blending of on-site soils shall be required to meet the specified requirements. The supporting subgrade soils at the cut excavation that shall support embedment backfill material and the pipe should be stripped of all vegetation, organic matter, clay soil lumps, topsoil, construction/pavement debris and/or any foreign matter. The exposed subgrade should be scarified just prior to embedment material placement to a minimum depth of 8 inches and recompacted to a minimum of 95 percent of maximum dry density as determined by ASTM D-1557. The moisture content of the subgrade should be maintained within ±3 percent of the optimum moisture content until permanently covered.

In general, embedment soil materials and pipes should not be directly supported by soils classified as CH, CL, MH, ML, OH, OL and PT under the USCS in all cases. These soils are considered Class IV soil materials. In areas where Class IV materials are encountered these soils shall be over-excavated and removed to at least 12 inches below the bottom of the specified pipe invert. These soils shall be replaced with approved Select Fill and/or Class III backfill soil materials.

7.2 – Pipeline Embedment Zone (Pipe Zone) Backfill

The pipe embedment zone or pipe zone materials that shall be in contact with the new pipe should meet the requirements of a Class III soil material or as recommended by the pipe manufacturer. The backfilled soil materials should be placed in loose lifts not to exceed 8 inches and compacted as required by the pipe manufacturer. We recommend that backfill not be compacted to less than 90 percent of maximum dry density as determined by ASTM D-1557. The moisture content of the backfill should be maintained at ±2 percent of the optimum moisture content until permanently covered.

Please note that the pipe zone is typically defined as the area extending from the bottom of the trench to 12 inches above the top of the pipe and extending to the undisturbed trench walls on both sides of the pipe.

7.3 – Trench Backfill Materials (Above the Pipe Zone)

The backfill soil materials above the embedment zone or pipe zone should be placed in maximum 8-inch uniform thickness loose lifts and should meet the requirements of a Class III soil material in accordance with Section 10.0 of this report and/or the project plans and specifications, whichever is more stringent. The backfill materials should be moisture conditioned to ±3 percent of optimum moisture content and compacted to a minimum of 90 percent of maximum density as determined by ASTM D 1557 laboratory compaction procedures. The trench backfill materials should be placed to 36 inches below the specified finished pavement section and/or ground subgrade elevation. The suitable fill materials below 36 inches of the finished grade elevations should achieve a minimum compaction of 95 percent as per ASTM D 1557 or as required by the project specifications.

7.4 – Diversion and Manhole Structures Considerations

Based on the understanding of the project, we anticipate that sewer improvements shall include the installation of diversion structures, box structures and manholes. We recommend that these concrete structures be supported by a minimum of 24 inches of compacted Structural Fill material, TXDOT Standard Specification 2014-Item 247, Type A, Grade 3. The Structural Fill should extend a minimum of 24 inches beyond the edges of the base. A modulus of subgrade reaction of 250 psi/in for prepared and compacted Structural Fill may be used for design purposes. The Structural Fill shall be placed in loose lifts not to exceed 8 inches to allow proper consolidation of the backfill material and should be compacted to at least 95 percent of the maximum dry density as per ASTM D 1557. The moisture content of the fill should be maintained within ± 2 percent of optimum moisture content. The suitable subgrade soils that shall support the Structural Fill should be scarified to a depth of 12 inches and re-compacted to at least 95 percent of maximum dry density per ASTM D 1557. The moisture content of the subgrade soils shall be maintained within ±3 percent of optimum moisture content. Cohesive subgrade soils (i.e., soils with a PI greater than 18) encountered at the depth below the Structural Fill shall be removed and replaced with approved Select Fill material to a minimum depth of 12 inches. In the event that cohesive subgrade soils are encountered below the over-excavated soils, these soils shall be compacted to at least 90 percent of maximum dry density per ASTM D 1557 with a water content within 0 to 3 percentage points of optimum. The use of rock material may also be required to stabilize the subgrade soils prior to the placement of structural fill that shall support specified structures.

We anticipate that water seepage shall generally be below the specified bearing depth of these structures, with the exception where apparent variable water seepage was reported. The lateral extent

of water seepage is not known. In areas where water seepage is not expected, conservative analysis may consider that ½ the structure is submerged as a worst-case analysis. We recommend that the plan general notes indicate that dewatering may be required to install structures in the event that water seepage is encountered at the time of construction.

Section 8.0 – Pavement Replacement and Site Work Improvement Considerations

Based on our general observations of the existing pavement conditions, soil exploration boring soil samples and laboratory engineering soil classification test results, the following sections present our flexible and rigid pavement recommendations for several intersections and improvement area with full and half-roadway replacement. As requested by our Client, specific pavement recommendations have been provided for new pavement structures within or adjacent to specific City of El Paso and TXDOT right-of-ways (i.e. intersections and parking lots). Material specifications have also been provided based on the typical requirements by the City of El Paso and TXDOT.

This section also provides a general pavement section along pipeline trench routes outside of street intersection areas where the entire width and half street width shall be reconstructed.

8.1 – Existing Pavement Removal and Recycling

In the event that the Contractor may consider utilizing the reclaimed base materials as sub-base materials within the new pavement section, the recycled base should meet the recommended requirements in Sections 8.4 of this report. The reuse of recycled base materials shall be approved by the engineer of record prior to reuse.

8.2 – Pavement Replacement Design Parameters and Considerations

Our pavement evaluation was performed in accordance with AASHTO and TXDOT design procedures based on the traffic loadings gathered from current City of El Paso traffic loads database. A minimum California Bearing Ratio value of 5 was considered in our pavement section evaluation.

We anticipate that a routine asphaltic-concrete pavement maintenance program and asphalt pavement rehabilitation shall be required after about 5 to 8 years and at years 12 to 15 to obtain the 20-year pavement service life. Our pavement recommendations also assume that positive surface drainage will be provided and that construction materials testing and monitoring will be provided during construction. The following tables present our pavement section recommendations and list the minimum pavement thicknesses and material specifications for the proposed pavement replacement areas.

Table 14 – Boone Street & Yandell Drive Intersection (City of El Paso) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 2,608,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**4**	96 to 98% Min., 2950 (Marshall Value)
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20 gal/yd^2	**-**	-
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**8**	100% Min., D-1557
Scarified, Moisture Conditioned and Compacted Subgrade Soils [3]	**10**	95% Min., D-1557

Table 15 – Boone Street & Yandell Drive to IH10 Section (City of El Paso) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 85,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**2**	96 to 98% Min., 2950 (Marshall Value)
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20 gal/yd^2	**-**	-
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**6**	100% Min., D-1557
Scarified, Moisture Conditioned and Compacted Subgrade Soils [3]	**8**	95% Min., D-1557

Table 16 – Boone Street from UPRR crossing to Washington Park Section (City of El Paso) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 269,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**2 ½**	96 to 98% Min., 2950 (Marshall Value)
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20 gal/yd^2	**-**	-
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**8**	100% Min., D-1557

Scarified and Cement Treated Existing Subgrade Soil Material [See Section 8.7]	**6 to 8**	95% Min., D-558

Table 17 – Boone Street and Alameda Avenue Intersection (TXDOT) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 2,700,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM/TXDOT Methods
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 341 - Type C with Superpave Gyratory Compactor – 50 gyrations	**4**	91.5% - 96.2 (Max Specific Gravity)-
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted).	**-**	Application rate at 0.15 to 0.20 gal/yd^2
Flexible Base Material TXDOT Item 247 Type A Grade 1-2	**8**	100% TEX-113E
Scarified and cement treated existing subgrade soil material per TXDOT Item 132 Density Control Requirements.	**10**	95% TEX-120-E

Table 18 – Washington Park Parking Lot (City of El Paso) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 112,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**2**	96 to 98% Min., 2950 (Marshall Value)
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20 gal/yd^2	**-**	-
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**6**	100% Min., D-1557
Scarified and Cement Treated Existing Subgrade Soil Material [See Section 8.7]	**6 to 8**	95% Min., D-558

Table 19 – Dunne Avenue from Washington Park to Tobin Place (City of El Paso) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 112,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**2**	96 to 98% Min., 2950 (Marshall Value)
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20	**-**	-

gal/yd^2		
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**6**	100% Min., D-1557
Scarified and Cement Treated Existing Subgrade Soil Material [See Section 8.7]	**6 to 8**	95% Min., D-558

Table 20 – Tobin Place from Dunne Avenue to Paisano Drive Section (City of El Paso) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 269,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**2 ½**	96 to 98% Min., 2950 (Marshall Value)
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20 gal/yd^2	**-**	-
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**8**	100% Min., D-1557
Scarified and Cement Treated Existing Subgrade Soil Material [See Section 8.7]	**6 to 8**	95% Min., D-558

Table 21 – Tobin Place and Paisano Drive Intersection (TXDOT) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 2,700,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM/TXDOT Methods
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 341 - Type C with Superpave Gyratory Compactor – 50 gyrations	**4**	91.5% - 96.2 (Max Specific Gravity)-
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted).	**-**	Application rate at 0.15 to 0.20 gal/yd^2
Flexible Base Material TXDOT Item 247 Type A Grade 1-2	**8**	100% TEX-113E
Scarified and cement treated existing subgrade soil material per TXDOT Item 132 Density Control Requirements.	**10**	95% TEX-120-E

Table 22 – Tobin Place from Paisano Drive to Orchard Street (City of El Paso) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 269,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**2 ½**	96 to 98% Min., 2950 (Marshall Value)

Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20 gal/yd^2	**-**	-
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**8**	100% Min., D-1557
Scarified and Cement Treated Existing Subgrade Soil Material [See Section 8.7]	**6 to 8**	95% Min., D-558

Table 23 – Orchard Street Intersection (City of El Paso)- Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 269,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**2 ½**	96 to 98% Min., 2950 (Marshall Value)
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20 gal/yd^2	**-**	-
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**8**	100% Min., D-1557
Scarified and Cement Treated Existing Subgrade Soil Material [See Section 8.7]	**6 to 8**	95% Min., D-558

Table 24 – Parks Facility Parking Lot (City of El Paso) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 269,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**2 ½**	96 to 98% Min., 2950 (Marshall Value)
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20 gal/yd^2	**-**	-
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**8**	100% Min., D-1557
Scarified and Cement Treated Existing Subgrade Soil Material [See Section 8.7]	**6 to 8**	95% Min., D-558

Table 25 - Delta Drive from Shelter Place to Haskell Plant Entrance Section (City of El Paso) - Asphaltic-Concrete Pavement Structure
Estimated ESAL's – 430,000

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**3**	96 to 98% Min., 2950

		(Marshall Value)
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20 gal/yd^2	**-**	-
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**8**	100% Min., D-1557
Scarified and Cement Treated Existing Subgrade Soil Material [See Section 8.7]	**6 to 8**	95% Min., D-558

Table 26 – Haskell Plant Access Roadway Section (City of El Paso) - Asphaltic-Concrete Pavement Structure

Material Section Type	Minimum Thickness (in.)	Specified Compaction, %, ASTM
Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 340, Type C[1]	**3**	96 to 98% Min., 2950 (Marshall Value)
Prime Coat TXDOT Item 310 – CSS-1H (Residual Asphalt Non-Diluted). Application rate at 0.15 to 0.20 gal/yd^2	**-**	-
Flexible Base Course Material TXDOT Item 247, Type A Grade 1-2 Material [2]	**8**	100% Min., D-1557
Scarified, Moisture Conditioned and Compacted Subgrade Soils [3]	**8**	95% Min., D-1557

[1] See Section 8.6 for AC material specifications.

[2] See Section 8.5 for Flexible Base Course specifications.

[3] Subgrade soils shall be compacted to 95 percent of maximum dry density determined by ASTM D 1557. The moisture content of the subgrade soils should be maintained within the range of ±3 percent of optimum moisture content. See Section 8.7 for Subgrade Cement Treatment specifications.

A general pavement section along pipeline trench routes outside of street intersection areas and within City of El Paso right-of-way where the pavement shall only be repaired along the trench cut shall consider that new Asphaltic-Concrete (AC) material shall conform to a TXDOT - Item 340, Type C material with a minimum of 1,500 pounds of Marshall Stability (75 blows, ASTM D 1559), a flow between 0.08 inches and 0.16 inches, air voids between 3 to 5 percent, and should be placed at a target of 98 percent of laboratory Marshall value. The asphalt content for the mix should be determined based on the Marshall Mix Design method. The bitumen material should be a performance grade material such as a PG70-22. We recommend that the specified replacement pavement section consist of at least 3 inches of Type C - AC material underlie by a minimum of 12 inches of approved CLSM (soil cement backfill). The CLSM may consist of a soil-cement stabilized backfill material. The CLSM should exhibit a minimum compressive strength of 150 psi at 7 days. The CLSM should be allowed to cure appropriately and

equipment should not be allowed on the CLSM if the material exhibits a permanent deformation greater than ¼ inch. The proposed CLSM should be submitted to the engineer of record for review and approval through a submittal process. The proposed CLSM submittal should also contain compressive strength data for review and consideration by the engineer of record.

In general, the subgrade soils that shall support the replacement pavement section should be moisture conditioned to ±3 percent of optimum moisture content and compacted to a minimum of 95 percent of maximum density as determined by ASTM D 1557 laboratory compaction procedures.

In the event that the subgrade soils will not be treated, the existing subgrade soils within the project limits that shall support compacted approved base course material shall be cleared of all vegetation, organic matter, topsoil, construction debris and/or any foreign matter. The cleared subgrade soils shall be scarified to a minimum depth of 8 inches and re-compacted to 95 percent of maximum dry density determined in accordance with ASTM D 1557 and maintained within ±3 percent of optimum moisture content until permanently covered. Cohesive clayey sandy subgrade soils (i.e., soils with a PI greater than 18) should be compacted to a least 90 percent of maximum dry density per ASTM D 1557 with a water content within 0 to +3 percentage points of optimum. Weak or compressible soil zones identified during compaction operations should be removed and replaced with properly compacted suitable Select Fill to a minimum depth of 8 inches or as required to appropriately bridge over these soils, whichever is deeper.

8.3 – Proposed Rigid Concrete Pavement Structure

In the event that a rigid pavement is required to be specified within some areas of the pipeline route, the following section presents a rigid pavement for the consideration of the design team. The specification of a rigid concrete pavement is highly recommended where heavy trucks (i.e., large trucks, construction equipment, trailers and semi-trucks, etc.) shall ingress and egress or where a high volume of traffic is expected, especially in narrow and circular configured paths that are relatively difficult to access with paving equipment. The following table presents our rigid pavement section recommendations and lists the minimum thicknesses and specifications.

Table 27 – Rigid Pavement Recommendations – Driveway Areas

Material Section Type	Minimum Thickness (in.)
Jointed Reinforced Portland Cement Concrete Pavement	8
Crushed Stone Base Course, TXDOT-Item 247, Type A Grade 1-2[1]	5

Scarified and Compacted Suitable Subgrade Soils[2]	8

[1] Base course should be placed in loose lifts not exceeding 8 inches in thickness and compacted to a minimum of 100 percent of the maximum dry density and at a moisture content within ± 2 percentage points of the optimum moisture content as determined by ASTM D 1557.

[2] The base course should be supported by prepared and compacted suitable native soils that meet the requirements of Select Fill materials as specified in this report and should be placed at 95 percent of maximum dry density and at ±3 percent of optimum moisture content as determined by ASTM D 1557. Imported fill should meet and be placed in accordance with the Select Fill section of this report. In the event that clayey subgrade soils are encountered, subgrade soils shall be treated with cement as indicated in report Section 8.7.

In general concrete pavement should have a minimum 28-day compressive strength of 4,000 psi, minimum flexural strength of 680 psi and meet the requirements of the 2014-TXDOT Standard Specification, Item 360 and 421 Class P concrete mix design. The concrete should have a maximum slump of 4½ inches ± 1 and should be consolidated with mechanical vibrators as required. A liquid membrane-forming curing compound should be applied as soon as practical after broom finishing the concrete surface. The curing compound will reduce the loss of water from the concrete. The reduction in the rapid loss of water will reduce shrinkage cracking of the concrete.

Reinforcing within the slab is recommended to consist of rebar. The concrete reinforcing should be placed approximately ½ the slab thickness below the surface of the slab, but not less than 2 inches. The reinforcing should not extend across expansion joints.

Joints in concrete pavements aid in construction phasing and control the location and magnitude of cracks. Joints should be carefully designed and constructed to ensure a good performing pavement system, which will keep stresses within safe limits and control the formation of irregular cracks. All control joints should be formed or sawed to a depth of at least ¼ the thickness of the concrete slab and should have a minimum width of ⅛ inch and a maximum width of ¼ inches. Sawing of control joints should begin as soon as the concrete will not ravel and within 8 hours of placement. Sawcut joints should be cleaned with a high-pressure air jet and sealed with an approved elastomeric sealant. Appropriate backer rods or backer materials should be used in each specified expansion joint next to rigid structures and meet the requirements of the sealant manufacturer.

Isolation joints should be provided only where pavement abuts fixed objects, such as the drop inlets, buildings and light pole standards, etc. Expansion joint spacing is not to exceed a maximum of 60 feet and no expansion or construction joints should be located in a swale or drainage collection location.

If possible, the pavement should develop a minimum slope of ¾ percent to provide surface drainage. Reinforced concrete pavement should cure a minimum of 3 days before allowing automobile

and truck traffic to load the pavement. Concrete pavements should be constructed in accordance with the current TXDOT Standard Specification 2014.

In general, the subgrade soils that shall support the base course material should be cleared of all vegetation, organic matter, and/or any foreign matter. The subgrade soils should be moisture conditioned to ±3 percent of optimum moisture content and compacted to a minimum of 95 percent of maximum density as determined by ASTM D-1557 laboratory compaction procedures.

8.4 – Recycled Flexible Base Coarse Material

If approved by the design engineer and owner, recycled base material shall be granular, free of clay lumps, deleterious materials, cobbles or boulders over 3 inches and crushed asphalt particles no greater than 1-3/4 inches in nominal size. Recycled base materials that shall be utilized should not contain more than 20% of asphaltic-concrete particles and should not be greater than 3-inches, unless approved by the owner and engineer. The recycled base soil materials should also meet the gradation requirements tabulated below.

Sieve Size (square opening)	% Passing by Weight
1 -3/4-inch	100
No. 4	60 Max.
No. 40	50 Max.
No. 200	18 Max.

The recycled base should have a liquid limit less than 40, a plasticity index no greater than 12, and should also exhibit an optimum dry density of at least 130 pcf when determined in accordance with ASTM D1557. The recycled base material aggregates should also be tested in accordance with ASTM C-131-"Laboratory Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine" and should exhibit a maximum percent loss of 40. Recycled base soil materials should be classified as SC, SC-SM, GP, GP-GM, GP-GC, GC, and GC-GM in accordance with the USCS or similar AASHTO classifications.

It is not recommended that the recycled base materials be blended with approved new imported base materials unless authorized by the owner and design engineer of record.

8.5 – New Imported Flexible Base Coarse Material

The new imported flexible base course should be crushed stone base conforming to TXDOT Standard Specifications, Item 247, Type A, Grade 1 -2 . Base course should be placed in loose lifts not exceeding 8-inches in thickness and compacted to a minimum of 100 percent of the maximum dry density at a moisture content within ± 2 percent of the optimum moisture content as determined by ASTM Methods or TEX-113E within TXDOT right-of-way.

8.6 – Asphaltic-Concrete Paving Materials

The hot-mix asphaltic concrete (HMAC) should be designed in conformance with the gradation requirements of a surface course, Type C as specified in accordance with Item 340 of the above referenced TXDOT Standard. The hot-mix asphalt concrete (HMAC) surface course should have a minimum of 1500 pounds of Marshall Stability (75 blows, ASTM D 1559-89), a flow between 0.08 inches and 0.16 inches, air voids between 3 to 5 percent, and should be placed at a target of 96 to 98 percent of the laboratory Marshall value. The asphalt content for the mix should be determined based on the Marshall Mix Design method. The bitumen binder grade should consist of a PG70-22 material or as established by the approved mix design for the seasonal temperature cycles and/or gradients of the El Paso County region.

In areas within TXDOT jurisdiction, the hot-mix asphaltic concrete (HMAC) should be in conformance with the gradation requirements of a surface course, Type C in accordance with Item 341 of the above referenced TXDOT Standard. The asphaltic-concrete mix design should meet the quality control field production and laboratory testing requirements of Item 341 and applicable material quality tolerances. The bitumen binder grade should consist of a PG70-22 material or as established by the approved mix design for the seasonal temperature cycles and/or gradients of the El Paso County region. The contractor shall design the mixture using a Superpave Gyratory Compactor (SGC) of 50 gyrations determined by TEX 241-F. The proposed HMAC mix should be submitted through a submittal process for the engineer's review.

8.7 –Subgrade Stabilization Considerations

In general, soil-cement treatment is used to improve soils that are otherwise unsuitable for use as subgrade or subbase layers. This includes decreasing the plasticity and volume change characteristics, decreasing potential subgrade pumping, increasing the bearing strength, or providing a

stable working platform on which pavement layers may be constructed. Subgrade soils that exhibit pumping and/or soft spots shall be stabilized with cement treatment. The process of adding cement for treating subgrade soils shall include scarifying the subgrade to a depth of at least 6 to 8 inches followed by the application of cement. Portland cement shall be added at a rate of about 6 percent (by weight or as needed to produce the desire stability) to treat the subgrade soil. The mixture shall the be moisture conditioned by adding water to the mixture (not to exceed the optimum moisture content of the soil cement mixture as determined by ASTM D 558) before compacting the mixture to a minimum dry density of 95 percent of the maximum dry density as determined by ASTM D 558 and then curing. Traffic (construction or otherwise) shall not be allowed onto the treated subgrade for a minimum of 24 hours or as required to allow proper curing time. In addition, the Contractor must keep the cement treated subgrade moist during the curing period. As such, the Contractor shall have sufficient means to obtain, store and apply water throughout the curing period. Consult with the project geotechnical engineer for additional requirements and recommendations on cement treatment of subgrade soils prior to construction.

As appropriate, pumping subgrade soils may also be stabilized with approved coarse gravel and/or with the placement of an approved geogrid.

8.8 – Prime Coat Placement

In general, the asphaltic-concrete material shall not be placed until the base course material or CLSM surface has been completely covered with a prime coat. The prime coat shall meet the requirements of TXDOT Standard Specification 2014, CSS-1H or SS-1H. The area shall be cleaned of any trash and/or foreign debris prior to placing the prime coat. The prime coat shall be applied in a uniform manner at a rate between 0.1 to 0.3 gal/sy. The prime coat shall be allowed to dry completely before placing the specified asphaltic-concrete paving material.

8.9 - TXDOT Density Control Fill Materials

Embankment Fill within TXDOT right-of-way shall meet the current TXDOT-Item 132, Type A material requirements. Type A materials shall consist of granular sands, sandy gravels or gavel with sand that contain less than 50 percent of particles passing the No. 200 sieve as classified under the Unified Soil Classification System (USCS) and ASTM D2487 or AASHTO M-145. Soils classified in accordance with the USCS as clay, silt and organic peat are considered Type B embankment materials as described under TXDOT Item 132.

Approved Embankment Fill Type A soil materials may consist of existing on-site soils or imported soils free of clay lumps, clay balls, deleterious materials, vegetation, organic material, cobbles or boulders over 3 inches in nominal size. The Embankment Fill Type A soil materials shall exhibit a liquid limit less than 40, a plasticity index no greater than 15 and exhibit a bar linear shrinkage of at least 2 percent. The Embankment Fill shall also exhibit an optimum dry density of at least 120 pcf with a tolerance of -5 pcf and meet the requirements of a Triaxial Class 4 or better per TXDOT test method TEX-117-E.

The Engineer will use Tex-114-E to determine the maximum dry density (Da) and optimum moisture content (Wopt). Meet the requirements for field density and moisture content in the Table, unless otherwise shown on the plans.

Description	Density	Moisture Content
	Tex-115-E	
PI ≤ 15	≥ 98% Da	
15 < PI ≤ 35	≥ 98% Da and ≤ 102% Da	≥ Wopt.
PI > 35	≥ 95% Da and ≤ 100% Da	≥ Wopt.

Each layer is subject to testing by the Inspector, Engineer for density and moisture content. During compaction, the moisture content of the soil should not exceed the value shown on the moisture-density curve, above optimum, required to achieve:

- 98% dry density for soils with a PI greater than 15 but less than or equal to 35 or
- 95% dry density for soils with PI greater than 35.

When required, remove small areas of the layer to allow for density tests. Replace the removed material and recompact at no additional expense to the Department. Proof-roll in accordance with Item 216, “Proof Rolling,” when shown on the plans or as directed. Correct soft spots as directed.

- Subgrade compaction will be in accordance with Section 132.3.4.2. “Density Control” and subsidiary to this Item.
- For Type A embankment, plasticity index less than/equal to 15 in accordance with TEX106E sampled every 10,000 yd^3 or as directed by the Engineer or for each different material or notable change in material.

- For Type A embankment, plasticity index greater than 15 in accordance with TEX106E sampled every 5,000 yd^3 or as directed by the Engineer or for each different material or notable change in material.
- For Type A embankment, gradation in accordance with TEX110E each 10,000 yd^3 or as directed by the Engineer.
- In-place density in accordance with TEX115E each 5,000 yd^3 of Fill or minimum of 1 per lift.
- In-place density in accordance with TEX115E each 6,000 L.F. of Cut or as directed by the Engineer.
- Embankment material must be consistent and homogeneous, free from vegetation or other objectionable matter, reasonably free from lumps of earth and suitable for forming a stable embankment.
- Quality assurance testing shall be performed by TXDOT's laboratory in accordance with the Guide Schedule of Sampling and Testing. However, TXDOT reserves the right to perform additional tests to further evaluate construction materials as required.
- Contractor shall perform Quality Control tests as required by TXDOT construction standards and in accordance with the approved QC plan submitted by the contractor at the beginning of the project.

8.10 – Concrete Curbs

We recommend that a minimum of 12 inches of compacted suitable Select Fill soils be placed below the curb structures. This compacted Select Fill material support will bridge and mitigate potential moisture changes of the subgrade, which may cause increased vertical soil movements The suitable Select Fill soils should be compacted to a minimum of 95 percent of maximum dry density determined in accordance with ASTM D 1557. The moisture content of these soils should be maintained at ±3 percent of optimum moisture content until covered.

The existing subgrade soils within the project limits that shall support compacted suitable Select Fill below curb structures should be cleared of all vegetation, organic matter, topsoil, construction debris and/or any foreign matter. The cleared subgrade soils should be scarified to a minimum depth of 8 inches and re-compacted to 95 percent of maximum dry density determined in accordance with ASTM D 1557 and maintained within ±3 percent of optimum moisture content until permanently covered. Weak or compressible soil zones identified during compaction operations should be removed and replaced with

properly compacted suitable Select Fill to a minimum depth of 8 inches or as required to appropriately bridge over these soils, whichever is deeper.

The contractor should also control or appropriately moisture condition the subgrade soils during earthwork operations to mitigate potential subgrade pumping.

8.11 – General Flat Work / Sidewalks Considerations

Where ground-supported flat site work such as sidewalks, walkways, ramps, etc. abut rigid buildings or isolated/suspended structures, differential movements should be anticipated. We recommend that a minimum of 12 inches of compacted Select Fill be placed below specified flatwork structures and sidewalks for this project. The suitable Select Fill should be compacted to a minimum of 95 percent of maximum dry density determined in accordance with ASTM D 1557. The moisture content of these soils should be maintained at ±3 percent of optimum moisture content until covered.

Site work grading should be designed in a manner that will provide positive surface drainage and prevent water from ponding adjacent to flat work and sidewalks Areas where storm water will naturally be allowed to "sheet flow" should be appropriately sealed and protected to prevent erosion of the supporting soils.

Section 9.0 – Additional Evaluation Considerations

In excavations adjacent to existing structures and residential properties, precautions should be taken not to undermine or damage existing structures, footings, and/or utility lines. Precautions should be taken to prevent distresses to nearby existing structures.

As typically expected with construction activities and relatively large excavation projects, a degree of vibratory impacts should be expected. Our scope of work did not include an assessment of the condition of private structures or facilities adjacent to the pipeline limits nor opinions or statements of potential impacts. In accordance with the typical provisions of construction contracts the general contractor shall be responsible for monitoring of existing structures. As required, the general contractor shall develop a vibration and ground settlement monitoring plan before, during the course of construction and after all construction activities have been completed at the project site. The plan may include the set-up of an array of monitoring points near the pipeline and at radial distances from construction activities to monitor potential ground movements. It may be necessary for the contractor to retain the services of a licensed professional engineer or geologist to develop a monitoring plan and provide site monitoring services as needed. It may be necessary for the contractor to establish a contingency plan for potential

observed movements of adjacent structures. The development of a settlement monitoring program was beyond our scope of work; however, we may meet with our Client and owner to further discuss this issue, as required. The US Bureau of Mines, FHWA – "Geotechnical Instrumentation for Monitoring Field Performance" manual and ASCE publications may be referenced to establish a monitoring plan and set maximum vibration peak particle velocity (i.e., typically less than 0.2 in/sec.) and frequency thresholds to ensure that vibrations are maintained below these limits during construction.

Section 10.0 – Project Specification Information

10.1 – Fill Materials

A. - Select Fill should consist of granular clayey, silty sands or sandy clayey, silty gravel mixtures, free of clay lumps, deleterious materials, organic material, vegetation, roots, cobbles or boulders over 3 inches in nominal size. The Select Fill should have a liquid limit less than 35 and a plasticity index of 12 or less. The Select Fill shall also exhibit an optimum dry density of at least 115 pcf determined in accordance with ASTM D-1557. Select Fill soils should also meet the gradation requirements below.

Table 28 – Select Fill Gradation Requirements

Sieve Size (square opening)	% Passing by Weight
3-inch	100
3/4-inch	75 – 100
No. 4	45 – 100
No. 200	5 – 45%

Select Fill soils should classify as SP-SM, SM, SC, SC-SM, GM, GC, GC-GM, GP-GM, and GP-GC in accordance with the Unified Soil Classification System (USCS).

B. – Structural Fill shall consist of a crushed stone base (CSB) coarse material conforming to requirements of a to 2014-TXDOT Item 247 – Flexible Base, Type A, Grade 3 soil material. The flexible base material should meet the gradation requirements below, exhibit a liquid limit less than 35 and plasticity index of 12 or less. The flexible base material should also exhibit a maximum dry density of at least 140 pcf determined in accordance with ASTM D 1557. It is not recommended that recycled concrete base material be considered as a substitute for the requirement above, unless approved by the project engineer and owner.

Table 29 – Structural Fill - Base Course Material Gradation Requirements

Sieve Size (square opening)	% Passing by Weight
2½ -inch	100
1¾ -inch	90 – 100
No. 4	25 – 55
No. 40	15 – 50

C. - Native Fill Soils (Existing On-Site Soils) shall consist of clayey, silty, poorly graded sands, free of clay lumps, deleterious materials, vegetation, organic material, roots, cobbles or boulders over 3 inches in nominal size. The Native Fill soils shall have a liquid limit less than 35 and a plasticity index of 12 or less. Suitable Native Fill soils should meet the gradation requirements below. Native Fill soils are not considered specified Select Fill, Structural Fill, Class I through III soils unless they strictly meet the requirements specified above and/or are approved by the engineer of record.

Table 30 – Native Fill Soil Gradation Requirements

Sieve Size (square opening)	% Passing by Weight
3-inch	100
3/4-inch	70 – 100
No. 4	45 – 100
No. 200	3 – 45

Native Fill soils classified in the following list according to the USCS may be considered satisfactory for use Native Fill soils: SM, SW, SC, SP-SM, SP-SC, SC-SM, GW, GP, GM, GC, GP-GM and GP-GC, provided that these soils also meet the requirements above.

It is recommended that on-site soils classified as SP be blended with low-plasticity clayey sands or as appropriate to mitigate potential soil sloughing during excavations in these types of soils and to create a relatively stable blended soil material that exhibits adequate bearing capacity. The blended soils should meet the requirements of Select Fill or Class III backfill soils described above.

Soils classified as CH, CL, MH, ML, OH, OL and PT or a combination of these under the USCS classification and soils that exhibit a plasticity index greater than 12 are not considered suitable for use as Native Fill, Select Fill, Structural Fill and Class I through III soil materials. These soils are considered Class IV backfill soil materials.

D. - Utility Line Backfill Soil Classifications The following soil backfill classifications are typically designated for utility plumbing pipe backfill materials. **It is not recommended that slag be utilized for**

the backfill material unless approved by the engineer of record. Class I, Class II, Class III, Class IV and Class IV materials may be defined as follows:

- **CLASS I** material may be manufactured angular, well-graded, crushed stone per ASTM D-2321 with a maximum particle size of 1½ inches. The following materials shall be acceptable under this class designation: ASTM D-448 – Stone Sizes 4, 46, 5, 56, 57, and 6. Pea Gravel and other uniformly graded material are not acceptable under this class. A gradation of Class I material shall be submitted by the Contractor to the Engineer for approval prior to use.
- **CLASS II** material may be coarse sands and gravels per ASTM D-2487 with maximum particle size of 1½ inches, including variously graded sands and gravels, containing less than 12 percent fines (material passing the #200 sieve) generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class. (i.e., typically required within pipe zone). Proposed Class II material shall be submitted by the Contractor to the Engineer for evaluation and approval prior to use.
- **CLASS III** material may be fine sands, clayey sand mixtures, clayey gravel and sand mixtures, suitable clean native sands and gravels. Class III materials shall also be free of clay lumps, deleterious materials, cobbles or boulders over 3-inches in nominal size. Class III materials should have a liquid limit less than 35 and a plasticity index less than or equal to 12 and exhibit an optimum dry density of at least 115 pcf. Soils classified in the following list according to the USCS and ASTM may be considered satisfactory for use as Class III backfill soil materials above the pipe zone as approved by the project engineer of record: SM, SW, SC, SP-SM, SP-SC, SC-SM, GW, GP, GM, GC, GP-GM and GP-GC. Proposed Class III material shall be submitted by the Contractor to the Engineer for evaluation and approval prior to use.
- **CLASS IV and V** material may be classified as CH, CL, MH, ML, OH, OL and PT under the USCS. These soils shall not be used as backfill materials, unless approved by the engineer of record.

10.2 - Construction Materials Testing

We recommend that construction materials inspection and testing of site work, fill placement, footing excavations, concrete placement, and all other applicable materials and structures be performed by CQC. The specification testing program should include the following testing frequencies as a minimum or as required by the project specifications and plans, whichever is more stringent:

1. At least one (1) Moisture-Density Relationship test (Proctor) for each type of in-situ soil and/or imported material to be used, according to ASTM D 1557. Additional soil samples for testing shall be requested by the General Contractor during the course of earthwork operations to ensure that the fill materials are maintained consistently within the specified requirements.

2. At least one (1) Soil Classification (Sieve Analysis and Atterberg Limits Test) for each type of in-situ soil and/or imported material to be used, according to ASTM D 6913 and D 4318. Additional soil samples for testing shall be requested by the General Contractor during the course of earthwork operations to ensure that the fill materials are maintained consistently within the specified requirements.

3. A minimum of two (2) nuclear density tests per 8-inch lift per 125 linear feet spacing of pipeline bedding and backfill operations in paved areas. A minimum of one (1) nuclear density test for each 300 linear feet of prepared trench per 8-inch lift for pipeline bedding and backfill operations in nonstructural areas. A minimum of two (2) nuclear density tests per 8-inch lift per demolition site. A minimum of one (1) nuclear density test per 8-inch lift beneath sidewalks, driveways and curb & gutter as required by the City of El Paso. A minimum of two (2) nuclear density test per 8-inch lift beneath junction box and manhole structures as required by the City of El Paso. Backfill around structures shall be tested at least every 8 inches until reaching the top finished grade elevation. All nuclear density tests shall conform to ASTM D 6938 or D 1556.

4. Sampling and testing for quality assurance of placed **concrete** materials should be performed for the project. Concrete field testing shall include testing for temperature, slump and air content (if required). The design strength of the concrete mix shall be evaluated by collecting cylindrical concrete compression test specimens for lab curing and testing in accordance with applicable ASTM procedures. At least one set of four (4) 6-inch x 12-inch or five (5) 4-inch x 8-inch concrete cylinders should be collected for every 50 cubic yards or less of poured concrete or as directed by the project engineer. The concrete specimens should be tested at 7 days (2 cylinders) and 28 days (3 cylinders) for verification of the specified design strength or as directed by the project plans and specifications. The ACI guidelines for hot weather and cold weather concreting should be followed to mitigate the potential poor performance of the concrete materials during significant periods of high (above 95° F) and low (below 35° F) temperatures.

5. Sampling and testing for quality assurance of placed **flowable fill** materials should be performed for the project. The design strength of the flowable fill shall be evaluated by collecting prisms specimens for lab curing and testing in accordance with applicable ASTM procedures. At least one set of four (4) flowable fill cylinders should be collected for every 50 cubic yards or less or poured flowable fill or as directed by the project engineer. The flowable fill samples should be tested at 7 days (2 samples) and 28 days (2 samples) for verification of the specified design strength or as directed by the project plans and specifications.

6. The Hot-Mixed Asphaltic-Concrete (**HMAC**) paving materials should be tested during construction production for mix design verification. The plant produced HMAC should be sampled for each day's production or every 20 tons of material produced and tested for compliance with the approved Marshall Mix Design and to determine the laboratory density of the material. The placed HMAC mat should be tested by conducting a minimum of three field density test every 150 lf or as directed by the project engineer.

Section 11.0 – Soils Evaluation Report Considerations and Limitations

The analysis and recommendations in this report are based on the data obtained from forty-one (41) vertical subsurface exploration soil borings performed at the approximate locations indicated on the attached Geotechnical General Subsurface Exploration Boring Location Aerial Plan, Sheets A1-1 and A2-1. This report may not reflect all the variations that may occur between the soil borings. The nature and extent of the variations may not become evident until during the course of construction. If variations appear during construction, CQC should be contacted immediately, it may be necessary for a reevaluation of our recommendations provided within this report to be made after performing on-site observations during the construction period and noting the characteristics of any variations. No other information relevant to the project site history or known conditions of concern were discussed or disclosed to CQC by our Client or design representatives.

The scope of our soil evaluation did not include surveying services, ground water study, delineation of buried structures and/or unclassified materials, sinkhole study, landslide study, soil slope stability analysis, preparation of engineering plans, specifications, cost estimates, an environmental assessment of the property's air, soil, water, site fault delineation and evaluation, preparation of a dewatering plan, trench safety and/or shoring plan, delineation of subsurface flowing water or rock conditions either on or adjacent to the project site limits, therefore no opinions and/or conclusions are presented in this report. Our geotechnical scope of work for this site did not include an environmental assessment or chemical testing and analysis of the subsurface soils. This specifically true for the apparently stained and contaminated soils encountered along the area of Shelter Street. It should also be considered that it is possible to encounter buried debris within the area of the Haskell Waste Water Treatment Plant.

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APPENDIX A

construction quality control
testing and engineering

Geotechnical General Subsurface Exploration
Boring Location Aerial Plan

General Subsurface Soils Evaluation
EPW-Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

Client: Brown & Caldwell	
Project No. AGCQC16-056	
Scale: NTS	Check by: JR
Date: 11/17/17	Sheet A1-1

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

BORING NUMBER B-1

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Study Phase I
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 12/29/17 **COMPLETED** 12/29/17
GROUND ELEVATION 3710 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING 25.0 ft / Elev 3685.0 ft
LOGGED BY DN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1
AFTER DRILLING 29.0 ft / Elev 3681.0 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0	SS 1		SAND, Fine to Coarse Grained, Clayey, Dark Brown, Dense, Moist.	5-15-17 (32)					
	SS 2		- Very dense at 2-1/2 feet.	18-18-50 (68)	95	29	7	12	SC
5	SS 3		SAND, Fine to Coarse Grained, Silty, Brown, Medium Dense, Moist.	13-12-10 (22)					
	SS 4			8-13-12 (25)			9		
10	SS 5		- Loose at 10 feet. - These sands shall be susceptible to soil sloughing.	5-3-5 (8)	99	32	10	NP	SM
	SS 6		- Concrete debris encountered at 12-1/2 feet.	7-6-4 (10)					
15	SS 7		CLAY, Sandy, Brown, Stiff, Slightly Moist.	8-7-7 (14)	100	56	15	16	CL
	SS 8		SAND, Fine to Coarse Grained, Silty, Brown, Loose, Moist. - These sands shall be susceptible to soil sloughing and elastic settlement.	4-5-4 (9)					
20	SS 9		- Medium dense at 20 feet.	5-7-5 (12)			11		
	SS 10		SAND, Fine to Coarse Grained, Clayey, Brown, Medium Dense, Moist to Wet.	8-9-12 (21)					
25	SS 11		▽ - Apparent perched water encountered at 25 feet. CLAY, Silty, Brown, Stiff, Wet.	5-5-9 (14)	100	60	23	5	CL-ML
	SS 12		SAND, Fine to Coarse Grained, Silty, Brown, Loose, Moist. ▽ - These sands shall be susceptible to soil sloughing.	4-5-4 (9)					
30	SS 13			3-4-5 (9)					
35	SS 14		CLAY, Brown, Very Stiff, Very Moist.	3-9-11 (20)					
			NOTE: SS - Split Spoon Sample Bottom of hole at 35.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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BORING NUMBER B-2

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Study Phase I
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 12/7/16 **COMPLETED** 12/7/16
GROUND ELEVATION 3695 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING 25.0 ft / Elev 3670.0 ft
LOGGED BY DN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING 15.0 ft / Elev 3680.0 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic Concrete Pavement - Approx. 3 in. thick						
	GB 1		Apparent Base Course Mat. - Approx. 10 in. thick SAND, Fine to Coarse Grained, Clayey, Brown, Moist.						
	SS 2		- Medium dense at 2-1/2 feet.	9-11-6 (17)	94	41	19	26	SC
5	SS 3		SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Loose, Moist. - These sands shall be susceptible to soil sloughing.	4-4-6 (10)					
	SS 4		- Medium dense at 7-1/2 feet.	5-9-9 (18)	100	1	5	NP	SP
10	SS 5			3-8-12 (20)					
	SS 6		- Loose at 12-1/2 feet. - These sands shall be susceptible to soil sloughing.	4-4-5 (9)			5		
15	SS 7		- Medium dense at 15 feet.	4-6-9 (15)					
	SS 8			8-11-10 (21)			5		
20	SS 9			4-7-13 (20)					
	SS 10			5-9-13 (22)			5		
25	SS 11		- Apparent perched water encountered at 25 feet.	12-12-10 (22)					
	SS 12		CLAY, Brown, Medium Stiff, Moist.	2-3-3 (6)					
30	SS 13			4-3-5 (8)	100	78	29	14	CL
	SS 14		- Stiff at 33-1/2 feet.	2-5-4 (9)					
35			Final depth of clay layer nor verified. NOTE: SS - Split Spoon Sample Bottom of hole at 35.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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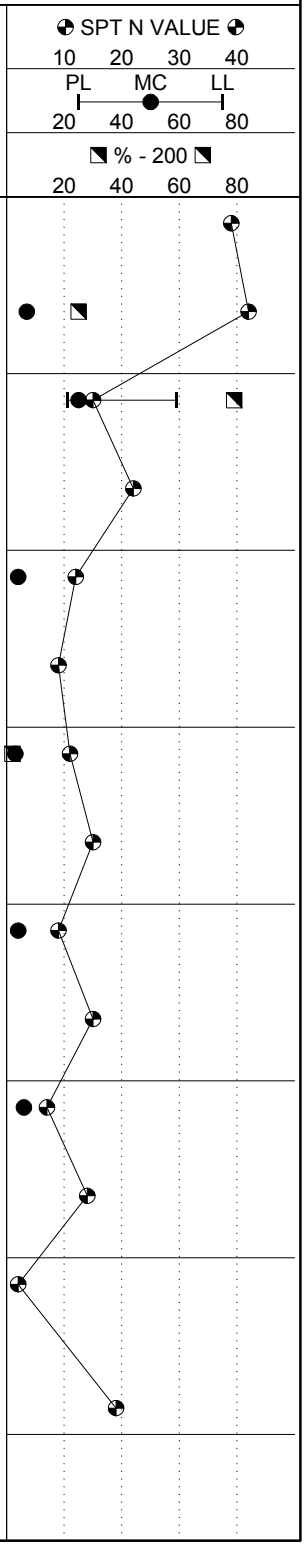
BORING NUMBER B-3

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Study Phase I
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 12/8/16 **COMPLETED** 12/8/16
GROUND ELEVATION 3735 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY DN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A3
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0	SS 1	SAND, Fine to Coarse Grained, Silty, Brown, Dense, Moist.	25-21-18 (39)					
	SS 2		11-21-21 (42)	99	25	7	NP	SM
5	SS 3	CLAY, Brown, Very Stiff, Very Moist.	4-6-9 (15)	100	79	25	38	CH
	SS 4	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Medium Dense, Moist.	3-10-12 (22)					
10	SS 5		5-7-5 (12)			4		
	SS 6	- Loose to medium dense below 12-1/2 feet. - These sands shall be susceptible to soil sloughing.	3-4-5 (9)					
15	SS 7		3-3-8 (11)	94	2	3	NP	SP
	SS 8		6-6-9 (15)					
20	SS 9		7-6-3 (9)			4		
	SS 10		6-7-8 (15)					
25	SS 11		4-3-4 (7)			6		
	SS 12		3-8-6 (14)					
30	SS 13		3-1-1 (2)					
	SS 14		6-8-11 (19)					
35		NOTE: SS - Split Spoon Sample Bottom of hole at 35.0 feet.						



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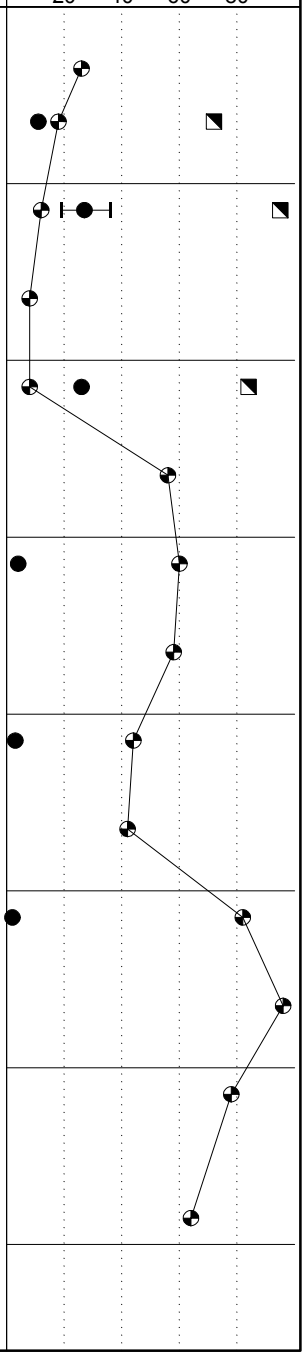
BORING NUMBER B-4

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Study Phase I
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 12/7/16 **COMPLETED** 12/7/16
GROUND ELEVATION 3716 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY DN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A4
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic Concrete Pavement - Approx. 3 in. thick						
		Apparent Base Course Mat. - Approx. 9 in. thick						
	SS 1	CLAY, Brown, Stiff, Moist.	6-5-8 (13)					
	SS 2	SILT, Sandy, Brown, Stiff, Moist.	4-4-5 (9)	100	72	11	NP	ML
5	SS 3	CLAY, Brown, Medium Stiff, Moist.	7-3-3 (6)	100	95	27	17	CL
	SS 4	SILT, Sandy, Brown, Medium Stiff, Moist.	3-2-2 (4)					
10	SS 5	- Very moist at 10 feet.	3-2-2 (4)	94	84	26	NP	ML
	SS 6	SAND, Fine to Coarse Grained, Silty, Brown, Medium Dense, Moist.	3-11-17 (28)					
15	SS 7		10-15-15 (30)			4		
	SS 8		6-12-17 (29)					
20	SS 9		5-10-12 (22)			3		
	SS 10		6-11-10 (21)					
25	SS 11	- Dense with some gravel below 25 feet.	6-18-23 (41)			2		
	SS 12		9-24-24 (48)					
30	SS 13		17-18-21 (39)					
	SS 14		9-16-16 (32)					
35		NOTE: SS - Split Spoon Sample						
		Bottom of hole at 35.0 feet.						



CQC Testing and Engineering LLC-TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

BORING NUMBER B-5

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Study Phase I
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 12/2/16 **COMPLETED** 12/2/16
GROUND ELEVATION 3709 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY DN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A5
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic Concrete Pavement - Approx. 4 in. thick						
		Apparent Base Course Mat. - Approx. 16-1/2 in. thick						
	GB 1	SAND, Fine to Coarse Grained, Clayey, Dark Brown to Black, Loose, Very Moist.		77	28	10	10	SC
	SS 2	- These sands shall be susceptible to soil sloughing.	2-1-2 (3)					
5	SS 3	CLAY, Brown, Soft, Very Moist. - Susceptible to consolidation settlement.	1-2-2 (4)	100	92	27	14	CL
	SS 4		3-3-5 (8)					
10	SS 5		3-4-5 (9)					
	SS 6	SAND, Fine to Coarse Grained, Silty, Brown, Medium Dense, Moist.	3-5-8 (13)	100	36	14	NP	SM
15	SS 7	- Dense at 15 feet.	7-13-17 (30)					
	SS 8	- Medium dense at 17-1/2 feet.	9-11-14 (25)			5		
20	SS 9		4-5-10 (15)					
	SS 10		5-8-12 (20)			8		
25	SS 11	- Dense at 25 feet.	7-16-23 (39)					
	SS 12	- Medium dense at 27-1/2 feet.	5-12-16 (28)			4		
30	SS 13		4-9-14 (23)					
	SS 14	- Very dense at 33-1/2 feet.	14-27-36 (63)					
35		NOTE: SS - Split Spoon Sample						
		Bottom of hole at 35.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

>>

THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS.GPJ CQC2014.GDT

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
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BORING NUMBER B-6

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Study Phase I
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 12/2/16 **COMPLETED** 12/2/16
GROUND ELEVATION 3699 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY DN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A6
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic Concrete Pavement - Approx. 3 in. thick						
		Apparent Base Course Mat. - Approx. 9 in. thick						
	GB 1	SILT, Sandy, Brown, Medium Stiff, Moist.						
	SS 2		3-3-5 (8)	100	61	13	NP	ML
5	SS 3	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Loose, Moist with silt. - These sands shall be susceptible to soil sloughing and elastic settlement.	3-5-5 (10)					
	SS 4		2-3-6 (9)	100	6	4	NP	SP-SM
10	SS 5	- Medium dense at 10 feet.	3-4-7 (11)					
	SS 6	- Loose and very moist below 12-1/2 feet.	2-4-3 (7)			17		
15	SS 7		4-5-1 (6)					
	SS 8		2-3-5 (8)			10		
20	SS 9		2-2-3 (5)					
	SS 10	SILT, Sandy, Brown, Stiff, Very Moist.	2-4-6 (10)	100	52	37	44	MH
25	SS 11	- Medium dense at 25 feet.	6-7-7 (14)					
	SS 12	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Medium Dense, Very Moist.	6-5-13 (18)			24		
30	SS 13		4-10-10 (20)					
35	SS 14		4-7-11 (18)					
		NOTE: SS - Split Spoon Sample						
		Bottom of hole at 35.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
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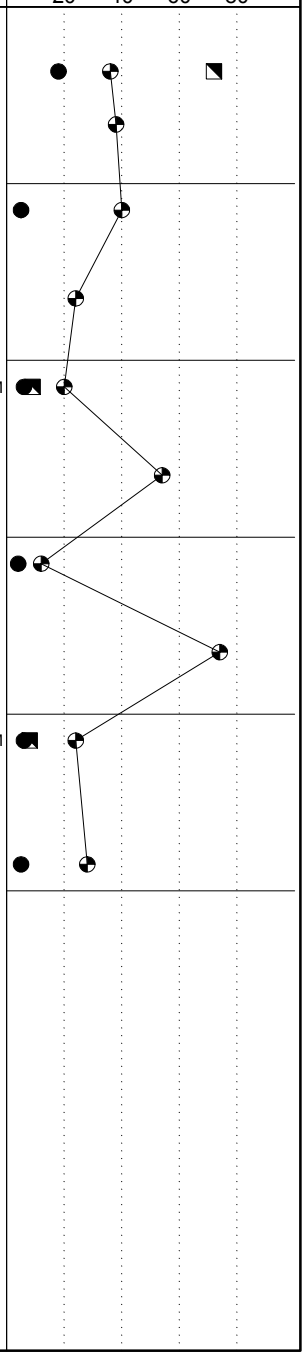
BORING NUMBER B-7

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Study Phase I
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 12/8/16 **COMPLETED** 12/8/16
GROUND ELEVATION 3698 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY DN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A7
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic Concrete Pavement - Approx. 2 in. thick						
			Apparent Base Course Mat. - Approx. 11 in. thick						
	SS 1		SILT, Sandy, Brown, Very Stiff, Very Moist.	5-8-10 (18)	100	72	18	NP	ML
	SS 2		SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Medium Dense, Moist with silt.	4-7-12 (19)					
5	SS 3			7-9-11 (20)			5		
	SS 4			3-6-6 (12)					
10	SS 5		- Loose at 10 feet. - These sands shall be susceptible to soil sloughing.	3-3-7 (10)	100	9	6	NP	SP-SM
	SS 6		- Medium dense at 12-1/2 feet.	9-14-13 (27)					
15	SS 7		- Loose at 15 feet. - These sands shall be susceptible to soil sloughing.	12-4-2 (6)			4		
	SS 8		- Dense at 17-1/2 feet.	13-18-19 (37)					
20	SS 9		- Medium dense below 20 feet.	4-5-7 (12)	94	8	6	NP	SP-SM
25	SS 10			7-7-7 (14)			5		
			NOTE: SS - Split Spoon Sample Bottom of hole at 25.0 feet.						



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/29/2016 **SAMPLE NO.:** S-2

BORING NO.: B-1 **SAMPLE DEPTH:** 2½' - 4'

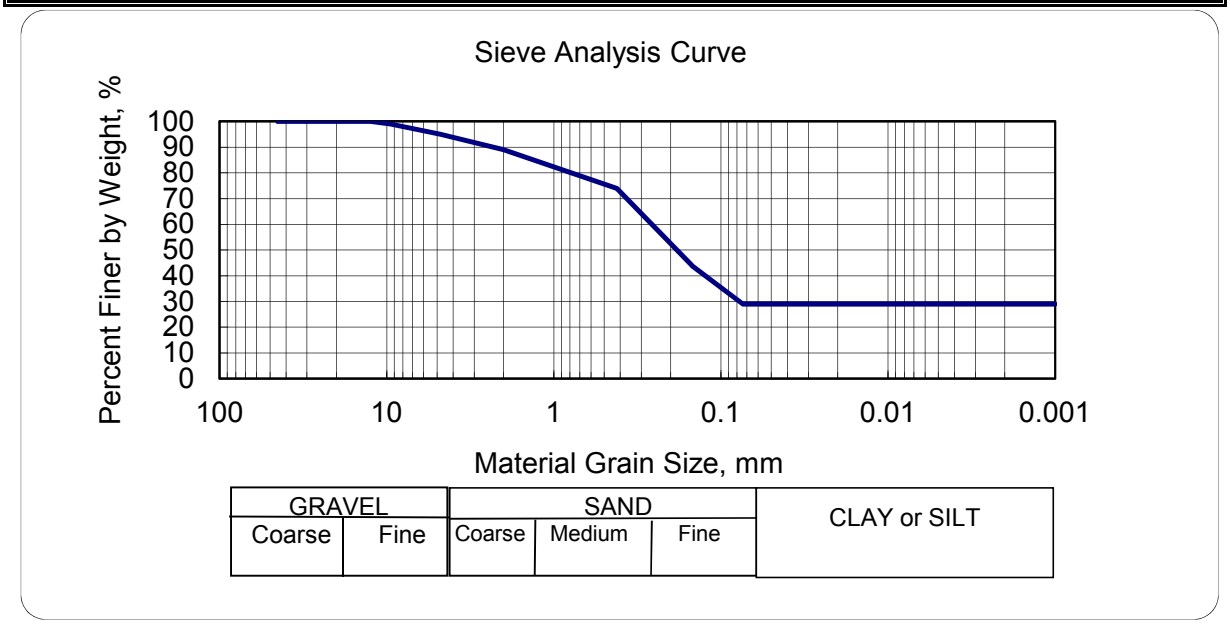
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Clayey, Dark Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	1	99
No. 4	5	95
No. 10	11	89
No. 40	26	74
No. 100	56	44
No. 200	71	29
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/29/2016 **SAMPLE NO.:** S-7

BORING NO.: B-1 **SAMPLE DEPTH:** 15' - 16½'

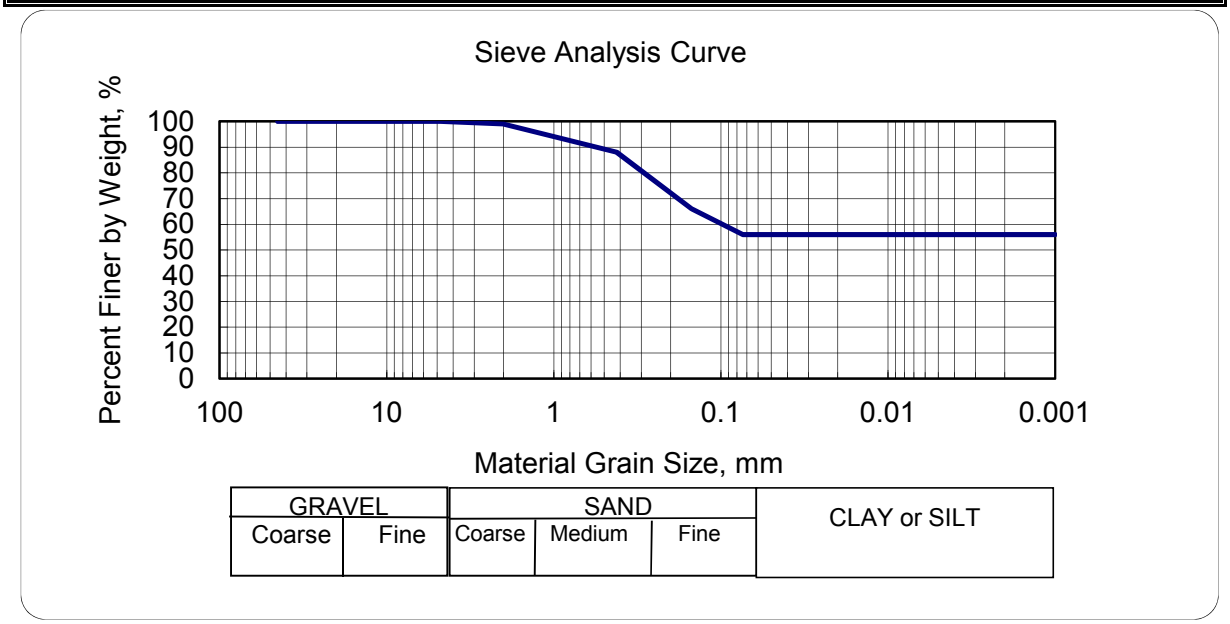
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / CLAY, Sandy, Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	1	99
No. 40	12	88
No. 100	34	66
No. 200	44	56
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/7/2016 **SAMPLE NO.:** S-2

BORING NO.: B-2 **SAMPLE DEPTH:** 2½' - 4'

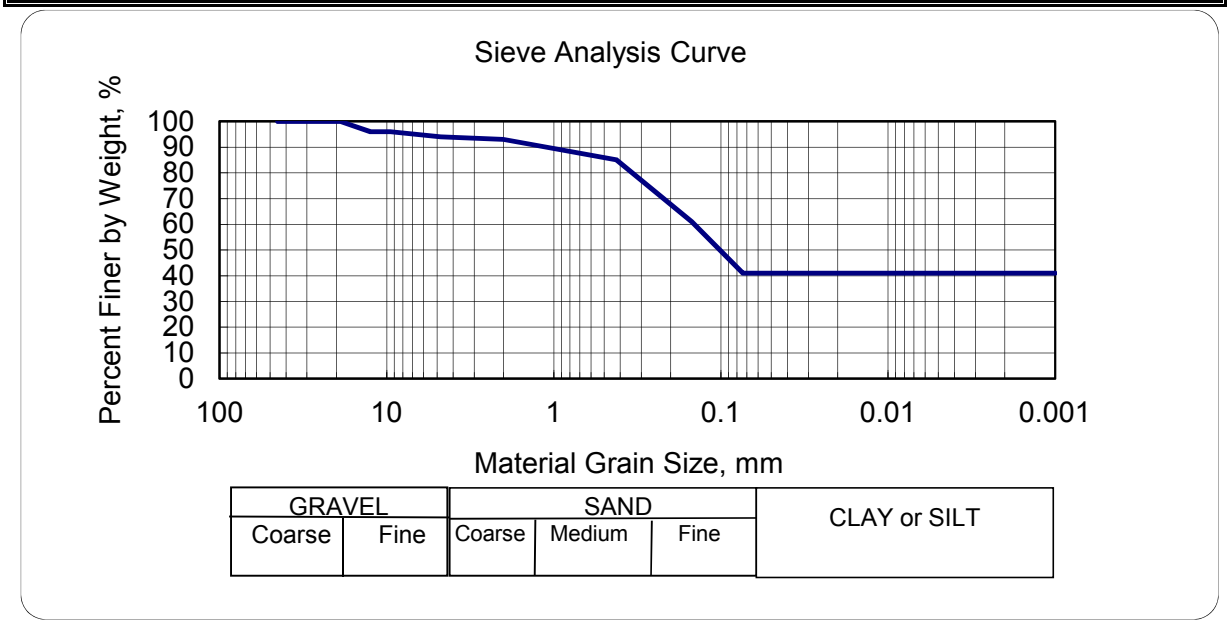
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Clayey, Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	4	96
3/8 inch	4	96
No. 4	6	94
No. 10	7	93
No. 40	15	85
No. 100	39	61
No. 200	59	41
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/7/2016 **SAMPLE NO.:** S-4

BORING NO.: B-2 **SAMPLE DEPTH:** 7½' - 9'

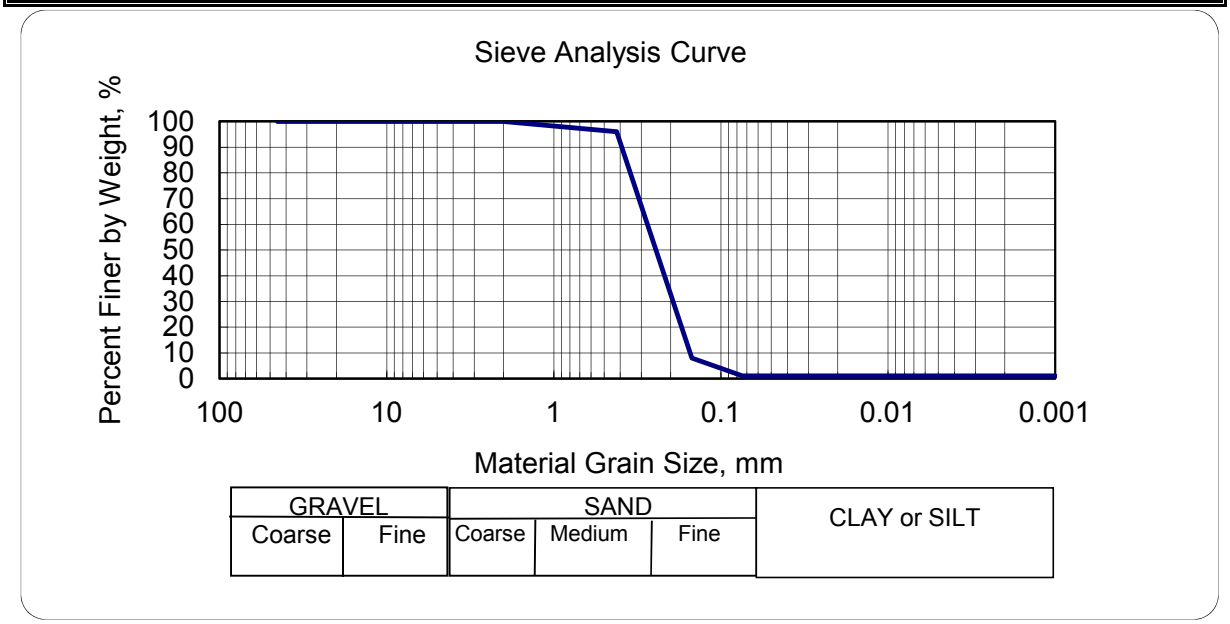
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	4	96
No. 100	92	8
No. 200	99	1
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/8/2016 **SAMPLE NO.:** S-2

BORING NO.: B-3 **SAMPLE DEPTH:** 2½' - 4'

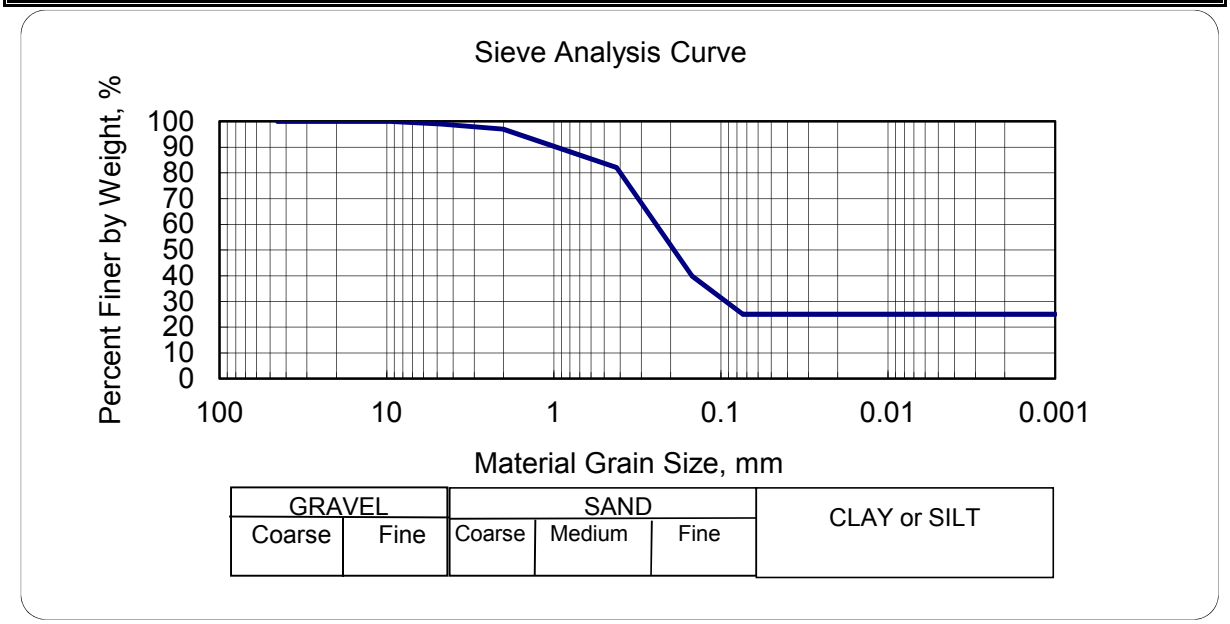
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	1	99
No. 10	3	97
No. 40	18	82
No. 100	60	40
No. 200	75	25
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/8/2016 **SAMPLE NO.:** S-7

BORING NO.: B-3 **SAMPLE DEPTH:** 15' - 16½'

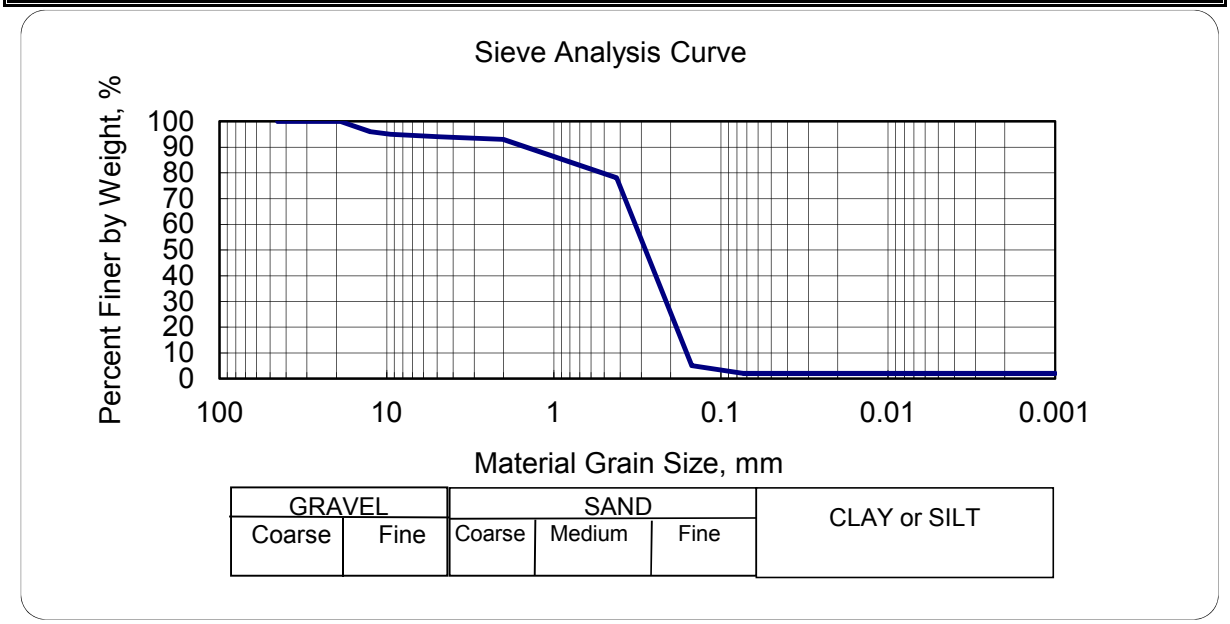
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	4	96
3/8 inch	5	95
No. 4	6	94
No. 10	7	93
No. 40	22	78
No. 100	95	5
No. 200	98	2
0.005 mm	-	-
0.001 mm	-	-



construction quality control
testing and engineering

Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/7/2016 **SAMPLE NO.:** S-3

BORING NO.: B-4 **SAMPLE DEPTH:** 5' - 6½'

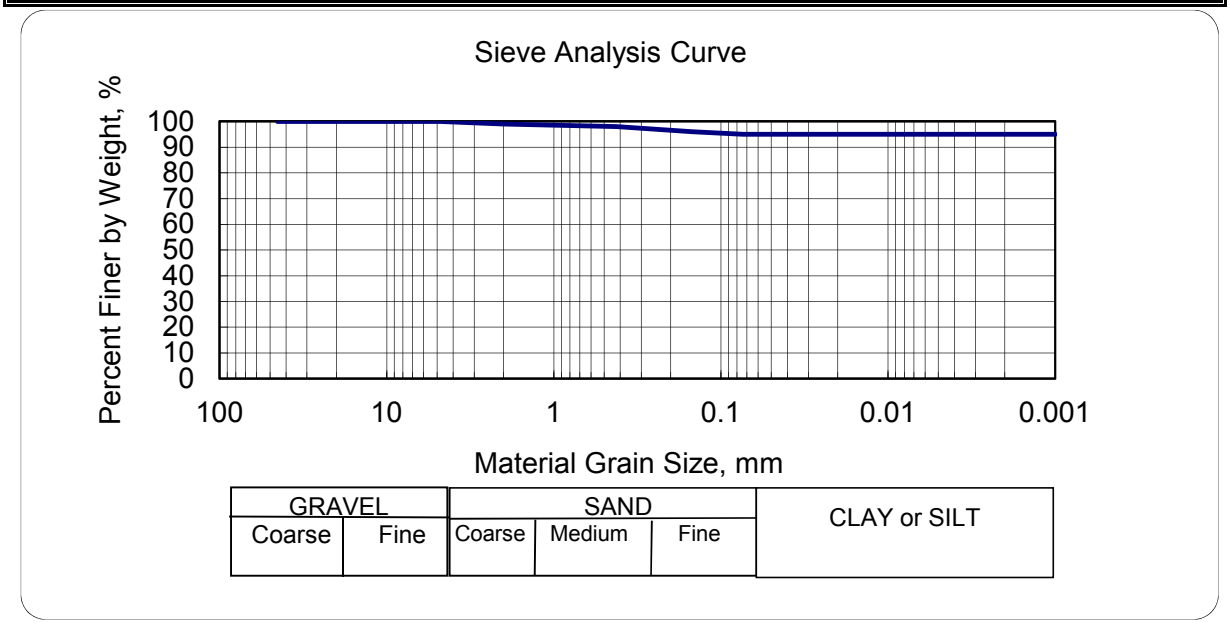
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / CLAY, Brown, Medium Stiff

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	1	99
No. 40	2	98
No. 100	4	96
No. 200	5	95
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/7/2016 **SAMPLE NO.:** S-5

BORING NO.: B-4 **SAMPLE DEPTH:** 10' - 11½'

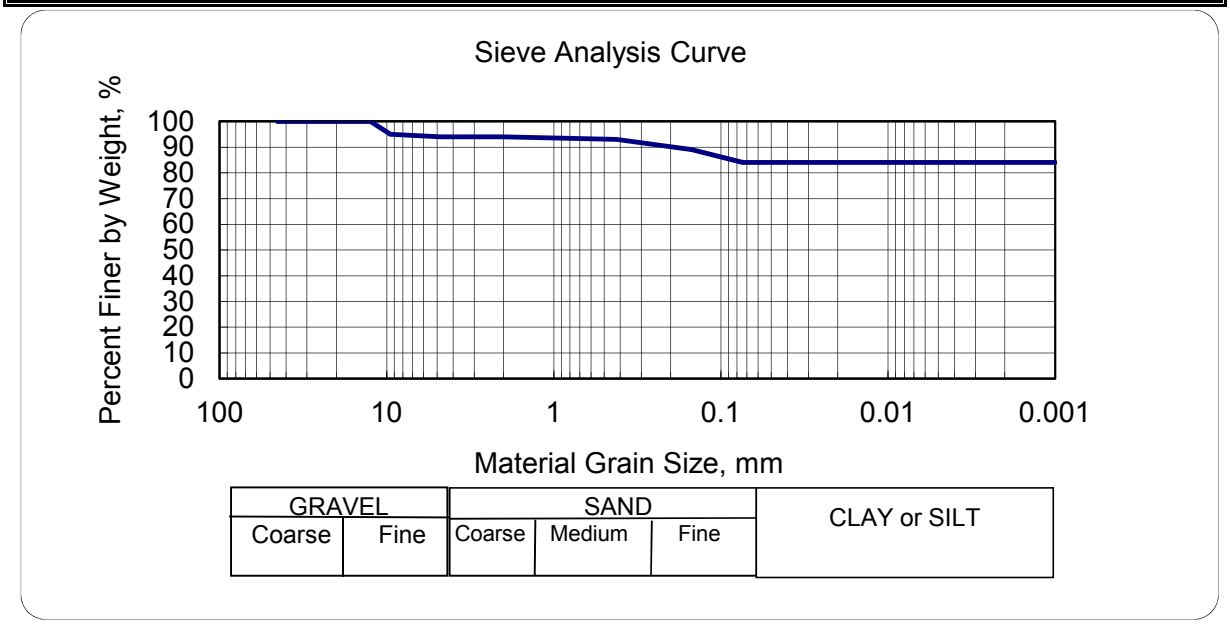
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / CLAY, Brown, Medium Stiff

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	5	95
No. 4	6	94
No. 10	6	94
No. 40	7	93
No. 100	11	89
No. 200	16	84
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/2/2016 **SAMPLE NO.:** S-1

BORING NO.: B-5 **SAMPLE DEPTH:** 0' - 1½'

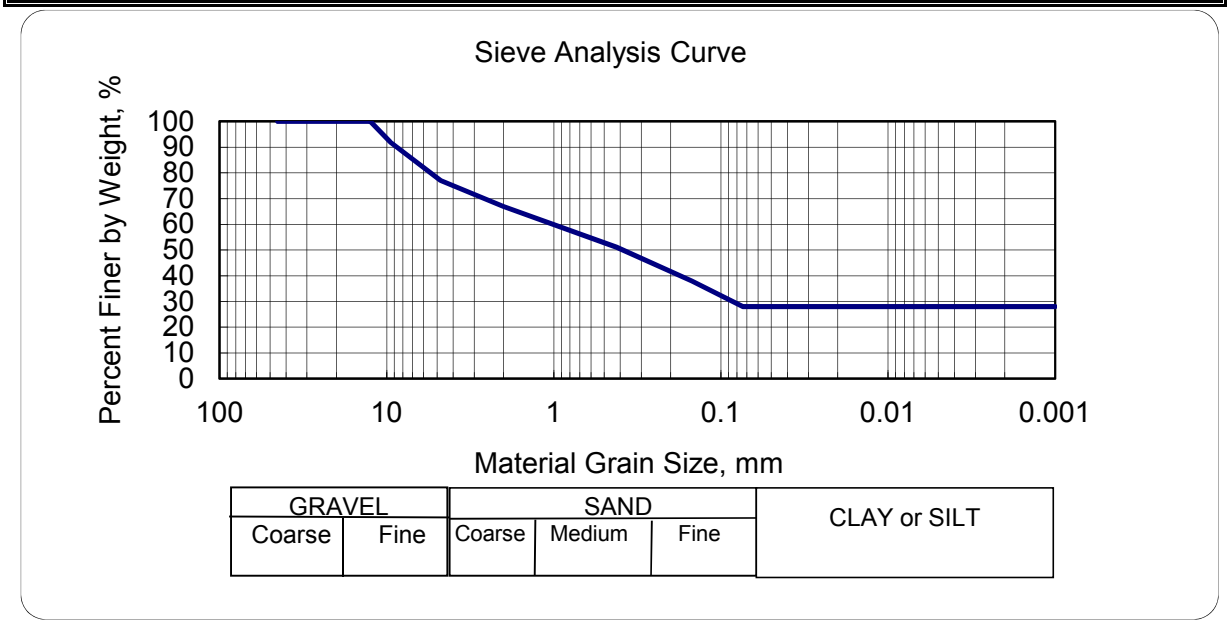
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Clayey, Dark Brown to Black

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	8	92
No. 4	23	77
No. 10	33	67
No. 40	49	51
No. 100	62	38
No. 200	72	28
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/2/2016 **SAMPLE NO.:** S-3

BORING NO.: B-5 **SAMPLE DEPTH:** 5' - 6½'

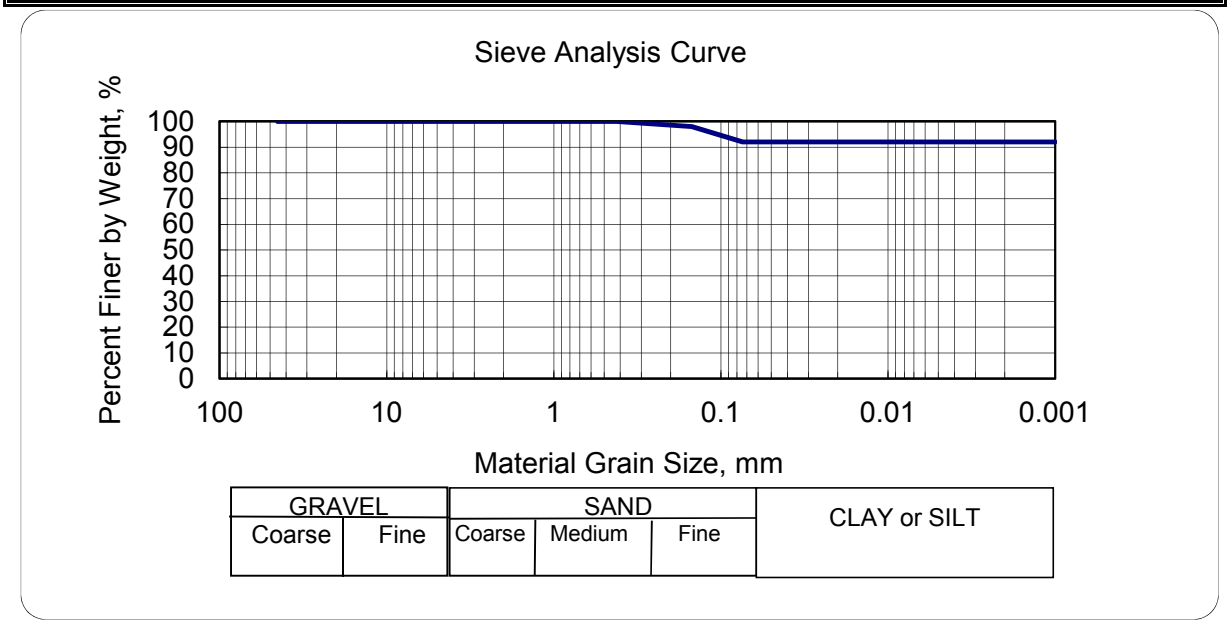
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / CLAY, Brown, Soft

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	0	100
No. 100	2	98
No. 200	8	92
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/2/2016 **SAMPLE NO.:** S-4

BORING NO.: B-6 **SAMPLE DEPTH:** 7½' - 9'

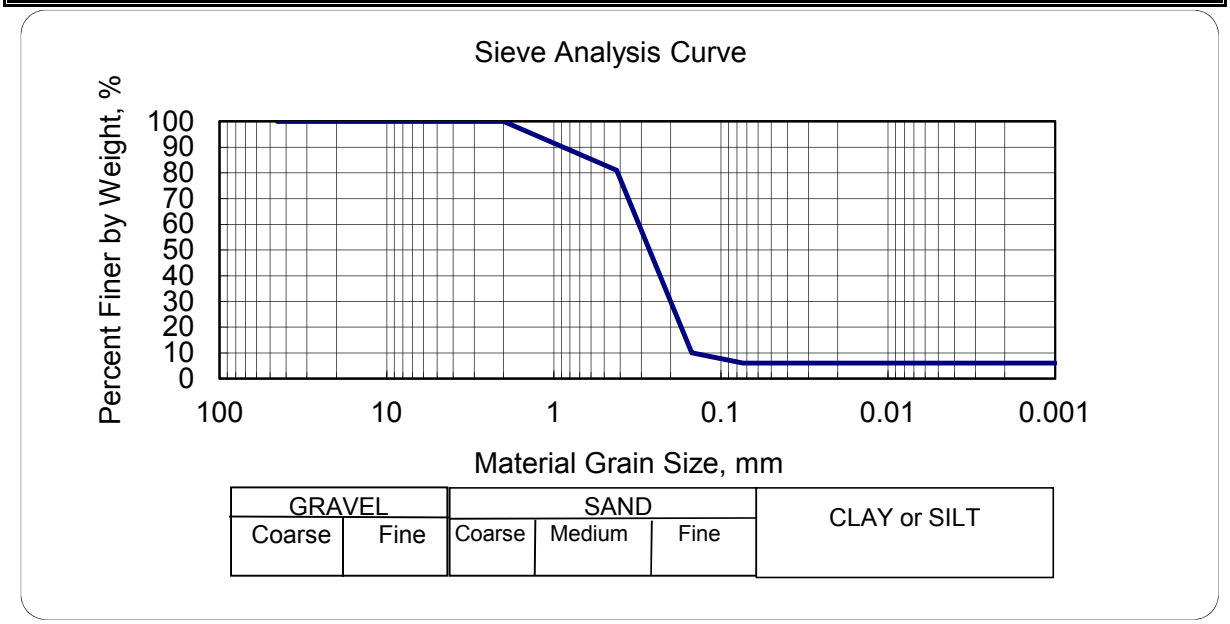
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	19	81
No. 100	90	10
No. 200	94	6
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/2/2016 **SAMPLE NO.:** S-10

BORING NO.: B-6 **SAMPLE DEPTH:** 22½' - 24'

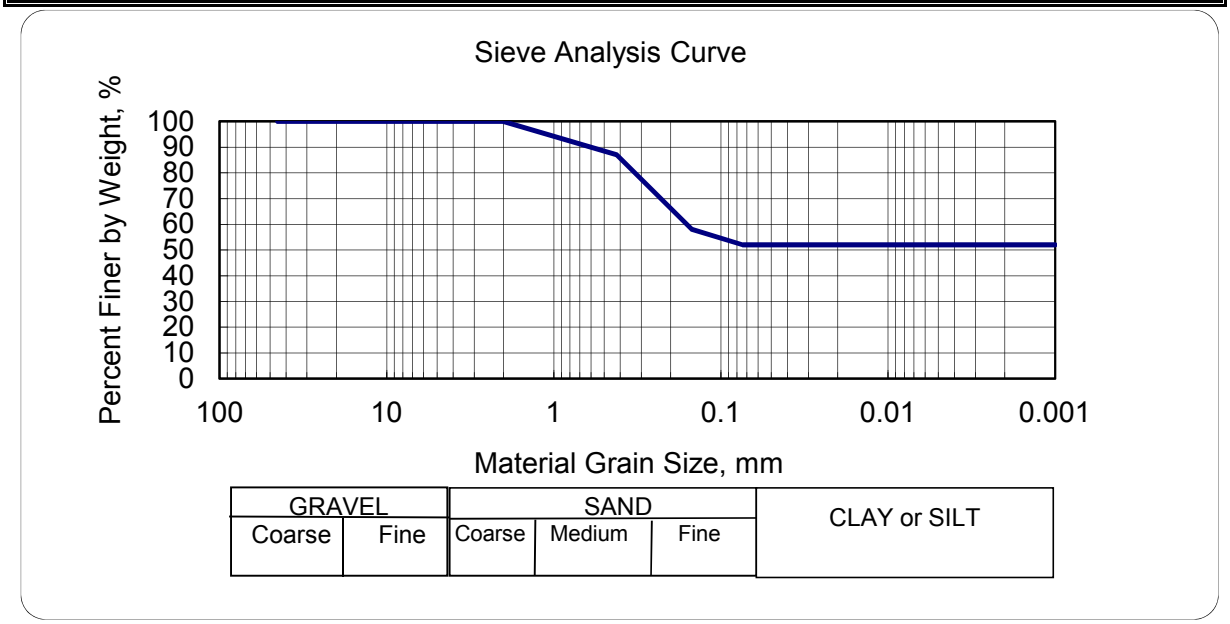
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SILT, Sandy, Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	13	87
No. 100	42	58
No. 200	48	52
0.005 mm	-	-
0.001 mm	-	-



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Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/2/2016 **SAMPLE NO.:** S-5

BORING NO.: B-6 **SAMPLE DEPTH:** 10' - 11½'

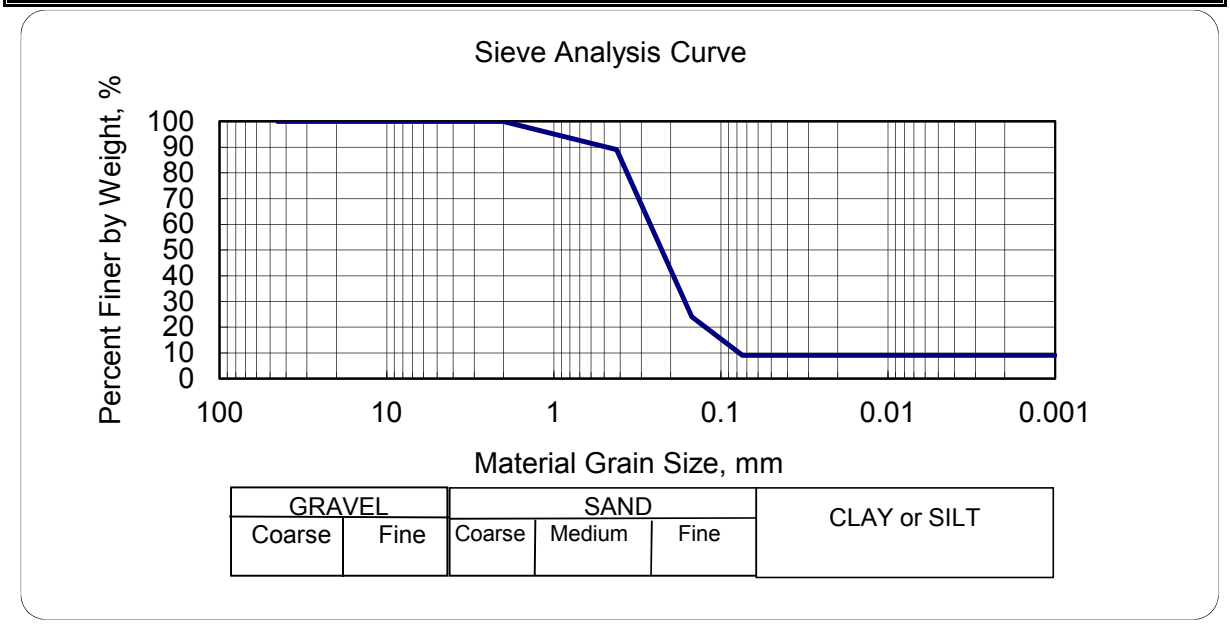
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	11	89
No. 100	76	24
No. 200	91	9
0.005 mm	-	-
0.001 mm	-	-



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Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 12/2/2016 **SAMPLE NO.:** S-9

BORING NO.: B-6 **SAMPLE DEPTH:** 20' - 21½'

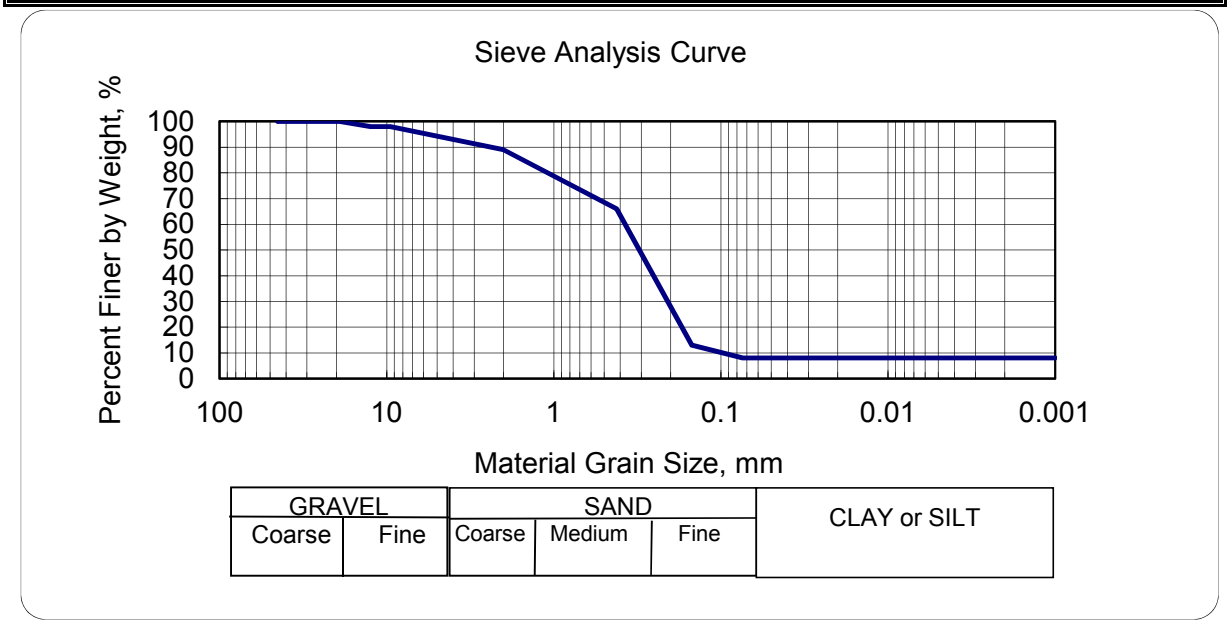
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	2	98
3/8 inch	2	98
No. 4	6	94
No. 10	11	89
No. 40	34	66
No. 100	87	13
No. 200	92	8
0.005 mm	-	-
0.001 mm	-	-



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Forensic Analysis /Testing

SUMMARY OF LABORATORY ENGINEERING SOIL CLASSIFICATION TEST RESULTS

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW – Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

DATE: 2/24/17

PROJECT NO.: AGCQC16-056

CLIENT: Brown and Caldwell

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
B-1	1	SS	0' – 1 ½'	32							
	2	SS	2 ½' – 4'	68	7	27	15	12	95	29	SC
	3	SS	5' – 6 ½'	22							
	4	SS	7 ½' – 9'	25	9						
	5	SS	10' – 11 ½'	8	10	-	-	NP	99	32	SM
	6	SS	12 ½' – 14'	10							
	7	SS	15' - 16 ½'	14	15	31	15	16	100	56	CL
	8	SS	17 ½' – 19'	9							
	9	SS	20' – 21 ½'	12	11						
	10	SS	22 ½' – 24'	21							
	11	SS	25' – 26 ½'	14	23	21	16	5	100	60	CL-ML
	12	SS	27 ½' – 29'	9							
	13	SS	30' – 31 ½'	9							
	14	SS	33 ½' – 35'	20							
B-2	1	SS	0' – 1 ½'	GB							
	2	SS	2 ½' – 4'	17	19	42	16	26	94	41	SC
	3	SS	5' – 6 ½'	10							
	4	SS	7 ½' – 9'	18	5	-	-	NP	100	1	SP
	5	SS	10' – 11 ½'	20							
	6	SS	12 ½' – 14'	9	5						

Note: SS – Split-Spoon Sample, GB – Grab Sample, NP – Non-plastic by test

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
B-2	7	SS	15' - 16 ½'	15							
	8	SS	17 ½' – 19'	21	5						
	9	SS	20' – 21 ½'	20							
	10	SS	22 ½' – 24'	22	5						
	11	SS	25' – 26 ½'	22							
	12	SS	27 ½' – 29'	6							
	13	SS	30' – 31 ½'	8	29	30	16	14	100	78	CL
	14	SS	33 ½' – 35'	9							
B-3	1	SS	0' – 1 ½'	39							
	2	SS	2 ½' – 4'	42	7	-	-	NP	99	25	SM
	3	SS	5' – 6 ½'	15	25	59	21	38	100	79	CH
	4	SS	7 ½' – 9'	22							
	5	SS	10' – 11 ½'	12	4						
	6	SS	12 ½' – 14'	9							
	7	SS	15' - 16 ½'	11	3	-	-	NP	94	2	SP
	8	SS	17 ½' – 19'	15							
	9	SS	20' – 21 ½'	9	4						
	10	SS	22 ½' – 24'	15							
	11	SS	25' – 26 ½'	7	6						
	12	SS	27 ½' – 29'	14							
	13	SS	30' – 31 ½'	2							
	14	SS	33 ½' – 35'	19							
B-4	1	SS	0' – 1 ½'	13							
	2	SS	2 ½' – 4'	9	11	-	-	NP	100	72	ML
	3	SS	5' – 6 ½'	6	27	36	19	17	100	95	CL
	4	SS	7 ½' – 9'	4							
	5	SS	10' – 11 ½'	4	26	-	-	NP	94	84	ML
	6	SS	12 ½' – 14'	28							
	7	SS	15' - 16 ½'	30	4						

Note: SS – Split-Spoon Sample, GB – Grab Sample, NP – Non-plastic by test

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
B-4	8	SS	17 ½' – 19'	29							
	9	SS	20' – 21 ½'	22	3						
	10	SS	22 ½' – 24'	21							
	11	SS	25' – 26 ½'	41	2						
	12	SS	27 ½' – 29'	48							
	13	SS	30' – 31 ½'	39							
	14	SS	33 ½' – 35'	32							
B-5	1	SS	0' – 1 ½'	GB	10	28	18	10	77	28	SC
	2	SS	2 ½' – 4'	3							
	3	SS	5' – 6 ½'	4	27	36	22	14	100	92	CL
	4	SS	7 ½' – 9'	8							
	5	SS	10' – 11 ½'	9							
	6	SS	12 ½' – 14'	13	14	-	-	NP	100	36	SM
	7	SS	15' - 16 ½'	30							
	8	SS	17 ½' – 19'	25	5						
	9	SS	20' – 21 ½'	15							
	10	SS	22 ½' – 24'	20	8						
	11	SS	25' – 26 ½'	39							
	12	SS	27 ½' – 29'	28	4						
	13	SS	30' – 31 ½'	23							
	14	SS	33 ½' – 35'	63							
B-6	1	SS	0' – 1 ½'	GB							
	2	SS	2 ½' – 4'	8	13	-	-	NP	100	61	ML
	3	SS	5' – 6 ½'	10							
	4	SS	7 ½' – 9'	9	4	-	-	NP	100	6	SP-SM
	5	SS	10' – 11 ½'	11							
	6	SS	12 ½' – 14'	7	17						
	7	SS	15' - 16 ½'	6							

Note: SS – Split-Spoon Sample, GB – Grab Sample, NP – Non-plastic by test

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
B-6	8	SS	17 ½' – 19'	8	10						
	9	SS	20' – 21 ½'	5							
	10	SS	22 ½' – 24'	10	37	65	21	44	100	52	MH
	11	SS	25' – 26 ½'	14							
	12	SS	27 ½' – 29'	18	24						
	13	SS	30' – 31 ½'	20							
	14	SS	33 ½' – 35'	18							
B-7	1	SS	0' – 1 ½'	18	18	-	-	NP	100	72	ML
	2	SS	2 ½' – 4'	19							
	3	SS	5' – 6 ½'	20	5						
	4	SS	7 ½' – 9'	12							
	5	SS	10' – 11 ½'	10	6	-	-	NP	100	9	SP-SM
	6	SS	12 ½' – 14'	27							
	7	SS	15' - 16 ½'	6	4						
	8	SS	17 ½' – 19'	37							
	9	SS	20' – 21 ½'	12	6	-	-	NP	94	8	SP-SM
	10	SS	23½' – 25'	14	5						

Note: SS – Split-Spoon Sample, GB – Grab Sample, NP – Non-plastic by test

Construction Materials Testing
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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 1 **SAMPLED BY:** DN

SOIL SAMPLE LOCATION: B-1 **SAMPLE DATE:** 12/29/2016

SOIL SAMPLE APPROX. DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown

SAMPLE TEST RESULTS

Sieve Analysis Test

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	3	97
1/2"	5	95
3/8"	5	95
No. 4	9	91
No. 10	13	87
No. 40	39	61
No. 100	72	28
No. 200	82	18

NS- Not Specified

Atterberg Limits Test

Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

NP-Non Plastic
NS - Not Specified

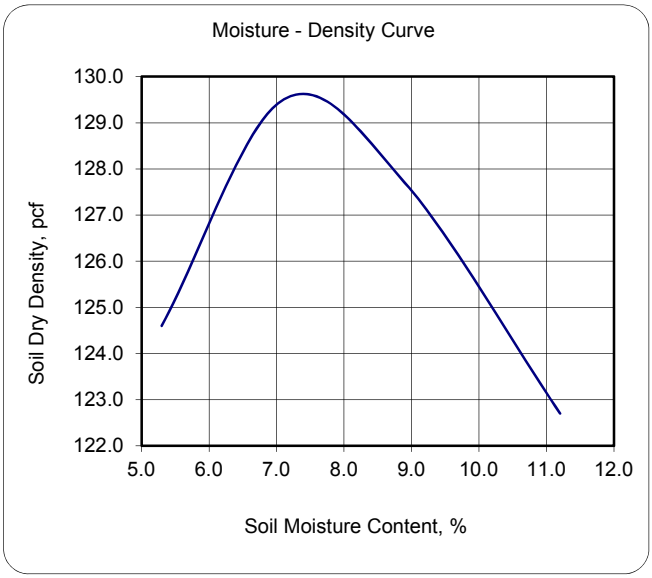
Soil Classification: **SM**
Test Method: ASTM D 2487

Moisture-Density Relationship Test

Test Method: ASTM D 1557, Method "B"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	5.3	124.6
2	7.1	129.5
3	8.9	127.7
4	11.2	122.7

Maximum Dry Density, pcf: **129.7**
Optimum Moisture Content, %: **7.4**



Construction Materials Testing
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Environmental Site Assessments
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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 2 **SAMPLED BY:** DN

SOIL SAMPLE LOCATION: B-2 **SAMPLE DATE:** 12/7/2016

SOIL SAMPLE APPROX. DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Brown with silt

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	0	100
No. 4	1	99
No. 10	1	99
No. 40	6	94
No. 100	81	19
No. 200	92	8

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

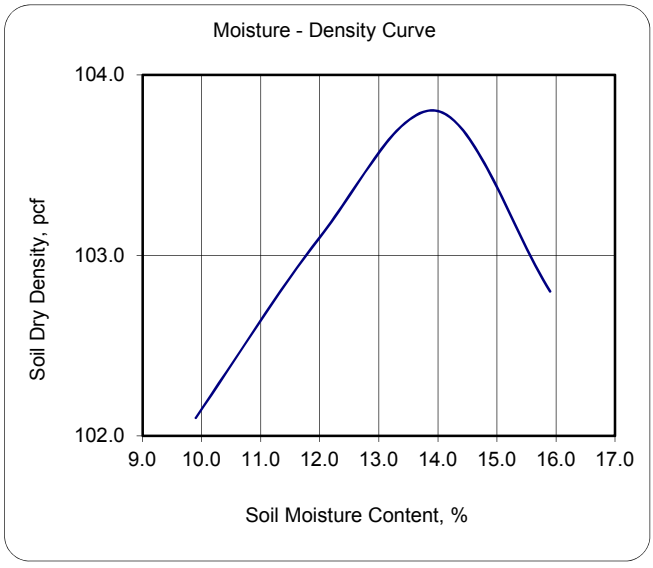
NP-Non Plastic
NS - Not Specified

Soil Classification: **SP-SM**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	9.9	102.1
2	12.0	103.1
3	14.0	103.8
4	15.9	102.8

Maximum Dry Density, pcf: **103.7**
Optimum Moisture Content, %: **13.9**



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 3 **SAMPLED BY:** DN

SOIL SAMPLE LOCATION: B-3 **SAMPLE DATE:** 12/8/2016

SOIL SAMPLE APPROX. DEPTH: 5' - 8'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / CLAY, Sandy, Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	0	100
No. 4	1	99
No. 10	3	97
No. 40	8	92
No. 100	21	79
No. 200	27	73

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	36
PL	12
PI	24

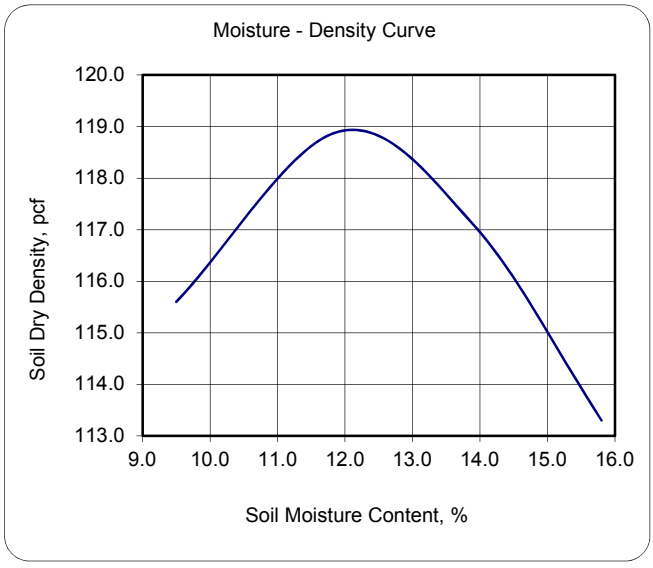
NP-Non Plastic
NS - Not Specified

Soil Classification: **CL**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	9.5	115.6
2	11.9	118.9
3	13.9	117.1
4	15.8	113.3

Maximum Dry Density, pcf: **119.0**
Optimum Moisture Content, %: **12.1**



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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 4 **SAMPLED BY:** DN

SOIL SAMPLE LOCATION: B-4 **SAMPLE DATE:** 12/7/2016

SOIL SAMPLE APPROX. DEPTH: 5' - 8'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / CLAY, Sandy, Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	0	100
No. 4	0	100
No. 10	1	99
No. 40	3	97
No. 100	10	90
No. 200	30	70

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	28
PL	18
PI	10

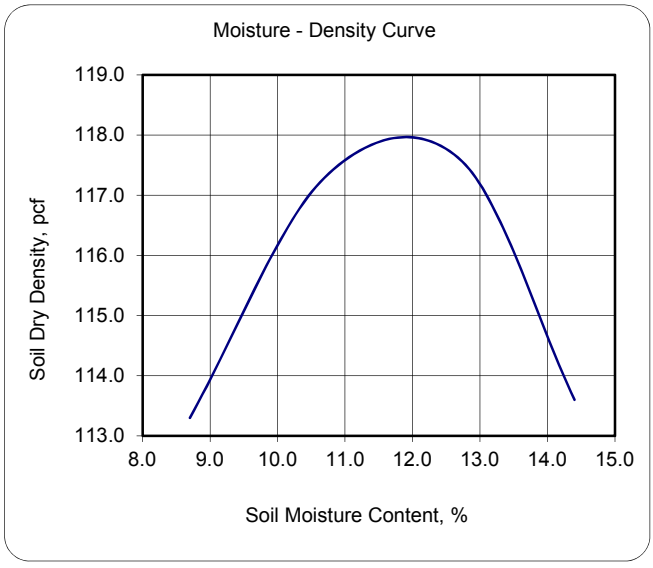
NP-Non Plastic
NS - Not Specified

Soil Classification: **CL**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	8.7	113.3
2	10.7	117.3
3	12.7	117.6
4	14.4	113.6

Maximum Dry Density, pcf: **117.9**
Optimum Moisture Content, %: **11.9**



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Forensic Analysis/Testing

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 5 **SAMPLED BY:** DN

SOIL SAMPLE LOCATION: B-5 **SAMPLE DATE:** 12/2/2016

SOIL SAMPLE APPROX. DEPTH: 10' - 13'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / CLAY, Sandy, Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	0	100
No. 4	2	98
No. 10	3	97
No. 40	5	95
No. 100	7	93
No. 200	18	82

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	35
PL	20
PI	15

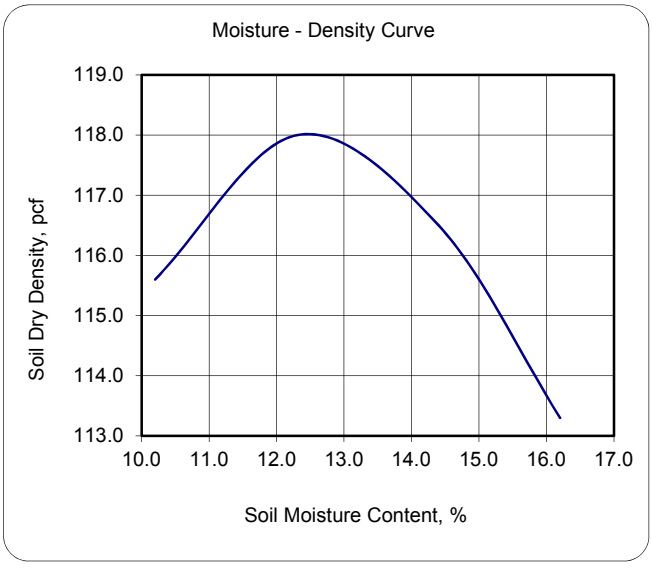
NP-Non Plastic
NS - Not Specified

Soil Classification: **CL**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	10.2	115.6
2	12.3	118.0
3	14.4	116.5
4	16.2	113.3

Maximum Dry Density, pcf: **118.1**
Optimum Moisture Content, %: **12.5**



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Environmental Site Assessments
Forensic Analysis/Testing

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 2/24/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 6 **SAMPLED BY:** DN

SOIL SAMPLE LOCATION: B-6 **SAMPLE DATE:** 12/2/2016

SOIL SAMPLE APPROX. DEPTH: 5' - 10'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Medium Grained, Silty, Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	0	100
No. 4	0	100
No. 10	1	99
No. 40	6	94
No. 100	59	41
No. 200	74	26

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

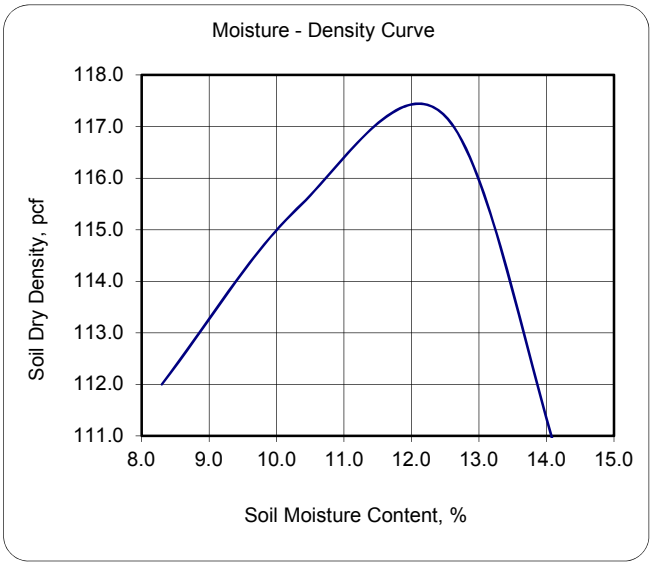
NP-Non Plastic
NS - Not Specified

Soil Classification: **SM**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	8.3	112.0
2	10.3	115.4
3	12.5	117.2
4	14.3	110.0

Maximum Dry Density, pcf: **117.4**
Optimum Moisture Content, %: **12.1**

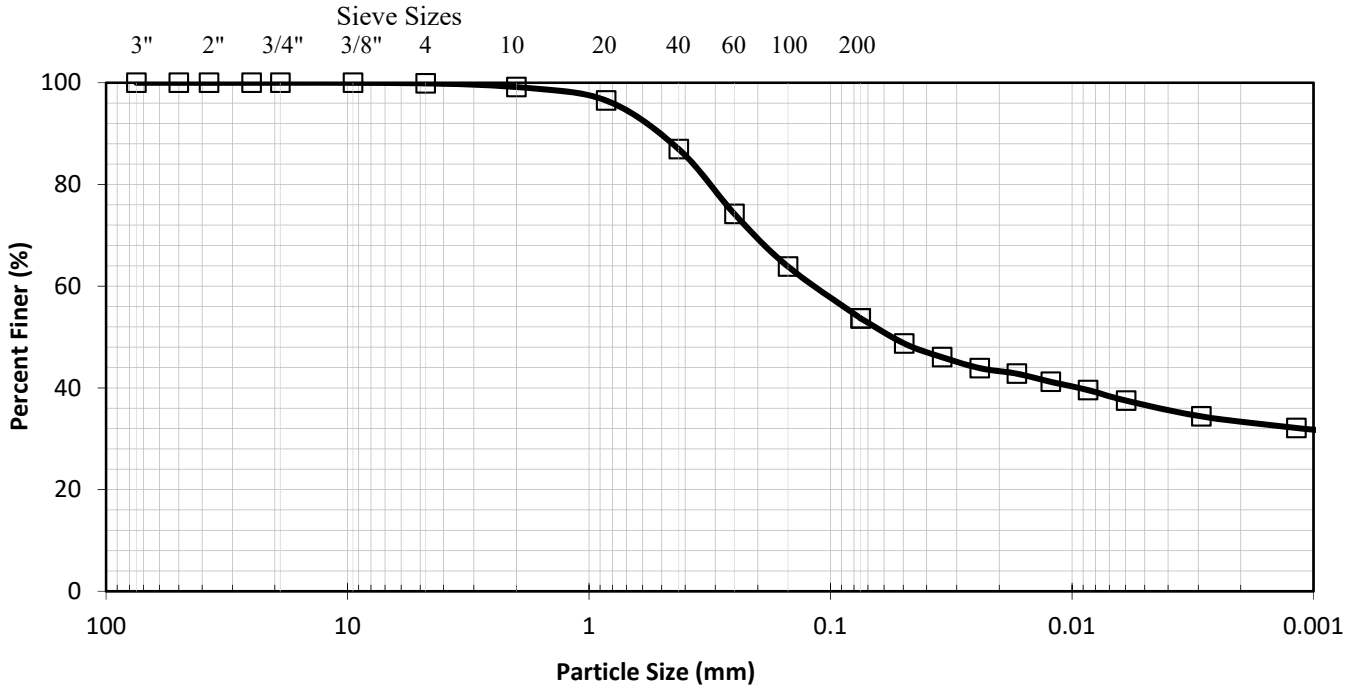


RRC Power & Energy, LLC
3801 Doris Lane
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing & Engineering
Project: EPW Boone Street Sewer Interceptor (AGCQC16-056)
Sample: 16-056, B-1, 161/2

RRC Project No.: LT1612056
Test Methods: ASTM D6913, D7928
Test Date: 1/23/2017



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.9
No. 10 (2.0 mm)	99.1
No. 20 (850 µm)	96.5
No. 40 (450 µm)	86.9
No. 60 (250 µm)	74.2
No. 100 (150 µm)	63.8
No. 200 (75 µm)	53.7

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0495 mm	48.7
0.0345 mm	46.0
0.0241 mm	43.9
0.0169 mm	42.8
0.0123 mm	41.2
0.0086 mm	39.6
0.0060 mm	37.5
0.0029 mm	34.4
0.0012 mm	32.1
0.0009 mm	31.5

*S.G. assumed to be 2.67, sample was prepared moist.

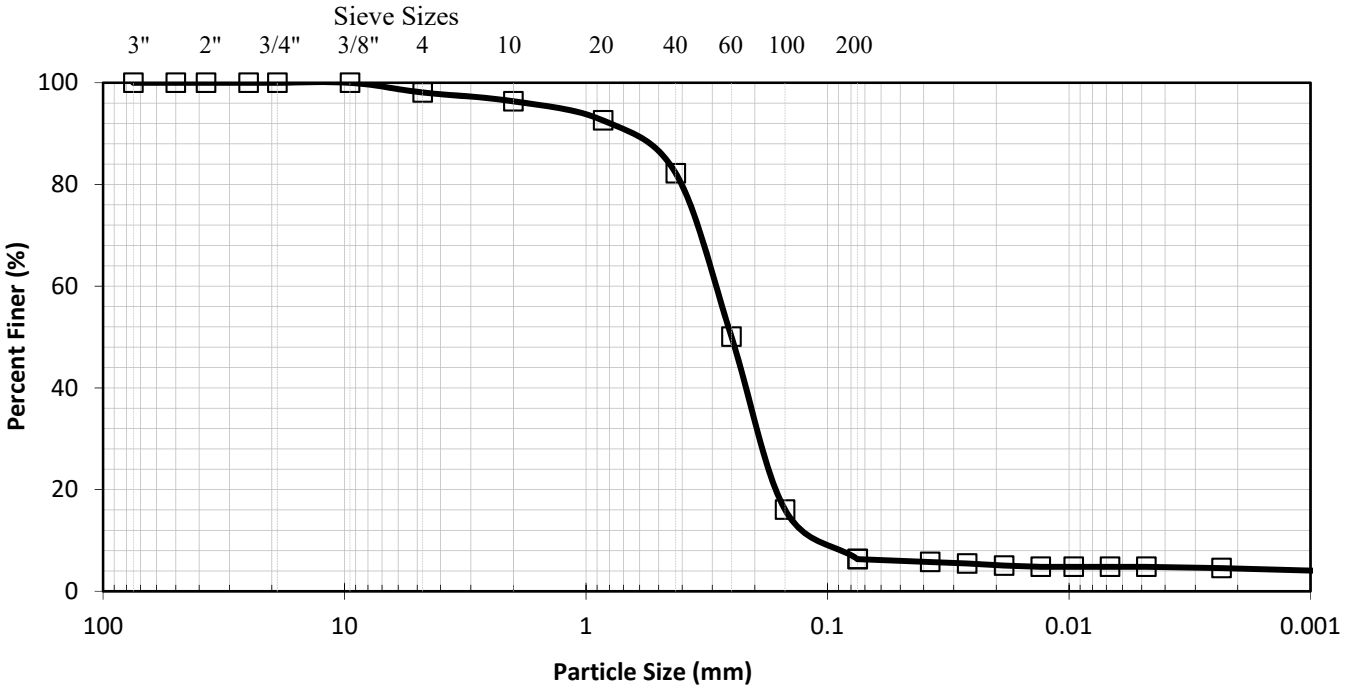
Bushi Ren, 1/26/17
Quality Review/Date
Tested by: T.D.

RRC Power & Energy, LLC
3801 Doris Lane
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing & Engineering
Project: EPW Boone Street Sewer Interceptor (AGCQC16-056)
Sample: B-2, 16-1/2

RRC Project No.: LT1612056
Test Methods: ASTM D6913, D7928
Test Date: 12/27/2016



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	98.1
No. 10 (2.0 mm)	96.4
No. 20 (850 µm)	92.6
No. 40 (450 µm)	82.2
No. 60 (250 µm)	50.1
No. 100 (150 µm)	16.1
No. 200 (75 µm)	6.3

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0376 mm	5.8
0.0264 mm	5.5
0.0186 mm	5.1
0.0131 mm	4.8
0.0096 mm	4.8
0.0068 mm	4.8
0.0048 mm	4.8
0.0023 mm	4.6
0.0010 mm	4.1
0.0007 mm	3.8

*S.G. assumed to be 2.67, sample was prepared moist.

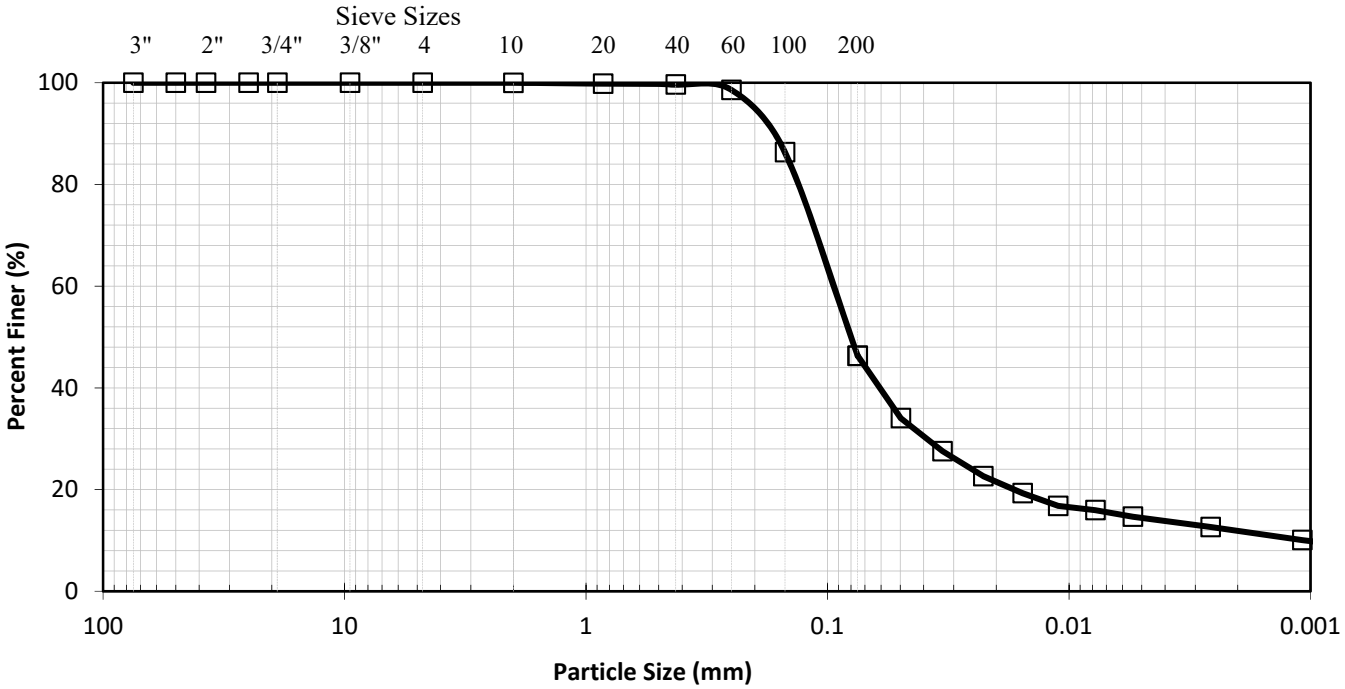
Bushi Ren, 12/28/16
Quality Review/Date
Tested by: T.D.

RRC Power & Energy, LLC
3801 Doris Lane
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing & Engineering
Project: EPW Boone Street Sewer Interceptor (AGCQC16-056)
Sample: B-4, 11-1/2

RRC Project No.: LT1612056
Test Methods: ASTM D6913, D7928
Test Date: 12/27/2016



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	100.0
No. 10 (2.0 mm)	100.0
No. 20 (850 µm)	99.8
No. 40 (450 µm)	99.7
No. 60 (250 µm)	98.6
No. 100 (150 µm)	86.3
No. 200 (75 µm)	46.3

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0497 mm	34.0
0.0334 mm	27.6
0.0227 mm	22.6
0.0156 mm	19.3
0.0111 mm	16.8
0.0078 mm	16.0
0.0054 mm	14.7
0.0026 mm	12.6
0.0011 mm	10.1
0.0007 mm	9.0

*S.G. assumed to be 2.67, sample was prepared moist.

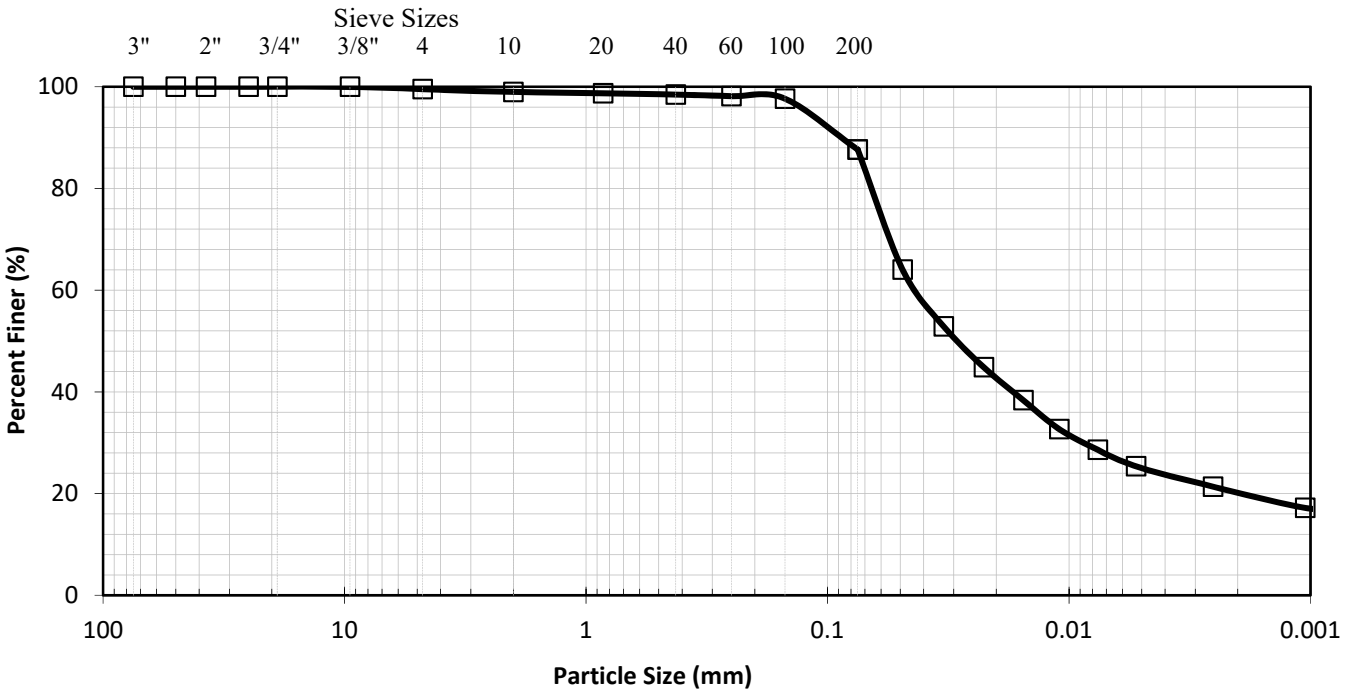
Bushi Ren, 12/28/16
Quality Review/Date
Tested by: T.D.

RRC Power & Energy, LLC
3801 Doris Lane
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing & Engineering
Project: EPW Boone Street Sewer Interceptor (AGCQC16-056)
Sample: B-5, 6-1/2

RRC Project No.: LT1612056
Test Methods: ASTM D6913, D7928
Test Date: 12/27/2016



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.5
No. 10 (2.0 mm)	99.0
No. 20 (850 µm)	98.7
No. 40 (450 µm)	98.5
No. 60 (250 µm)	98.1
No. 100 (150 µm)	97.7
No. 200 (75 µm)	87.6

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0489 mm	64.0
0.0330 mm	52.9
0.0225 mm	44.9
0.0155 mm	38.4
0.0110 mm	32.7
0.0076 mm	28.6
0.0053 mm	25.4
0.0025 mm	21.4
0.0011 mm	17.2
0.0007 mm	16.9

*S.G. assumed to be 2.67, sample was prepared moist.

Bushi Ren, 12/28/16
Quality Review/Date
Tested by: T.D.

STATE OF TEXAS WELL REPORT for Tracking #445442

Owner:	**EPWU**	Owner Well #:	**MW-1**
Address:	**1154 Hawkins Blvd El Paso, TX 79925**	Grid #:	**49-13-8**
Well Location:	**Boone St & Yandell St (Ponding Area Berm) El Paso, Texas, TX**	Latitude:	**31° 46' 46.63" N**
		Longitude:	**106° 26' 32.64" W**
	Off Boone St and Yandell St (in the Ponding area berm)	Elevation:	**3728 ft. above sea level**
Well County:	**El Paso**		
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Start Date: **3/14/2017** Drilling End Date: **3/14/2017**

	Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
Borehole:	**8**	**0**	**35**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Screened**

	Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
Annular Seal Data:	**2**	**14**	**Grout**
	14	**18**	**Bentonite**

Seal Method: **Slurry**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Slab Installed** **Surface Completion by Driller**

Water Level: **25 ft.** below land surface on **2017-03-14** Measurement Method: **Weighted Line**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	No Data

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **Terracon Consultants**

7002 Commerce
El Paso, TX 79915

Driller Name: **Manuel Duenez** License Number: **2914**

Apprentice Name: **Derek Duenez**

Comments: **No Data**

Report Amended on 3/27/2017 by Request #21054

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	5	Sand, Fine Sand, Clayey,Dark Brown, Dense, Moist
5	15	Sand, Fine Sand, Silty, Brown, Med Dense, Moist
15	18	Clay, Sandy, Brown, Stiff, Moist
18	23	Sand, Fine, Silty, Brown, Loose, Moist
23	26	Sand, Fine, Clayey, Brown, Med Dense, Moist to Wet
26	28	Clay, Silty, Brown, Stiff, Wet
28	34	Sand, Fine, Silty,Brown, Loose, Moist
34	35	Clay,Brown,Stiff,Moist

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	Riser	New Plastic (PVC)	40	0	20
2	Screen	New Plastic (PVC)	40 0.010	20	35

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

STATE OF TEXAS WELL REPORT for Tracking #445447

Owner:	**EPWU**	Owner Well #:	**MW-2**
Address:	**1154 Hawkins Blvd El Paso, TX 79925**	Grid #:	**49-13-8**
Well Location:	**Marr St and Gateway Blvd East El Paso, Texas, TX**	Latitude:	**31° 46' 36.84" N**
		Longitude:	**106° 26' 20.4" W**
	Marr St and Gateway Blvd East	Elevation:	**3688 ft. above sea level**
Well County:	**El Paso**		
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Start Date: **3/14/2017** Drilling End Date: **3/14/2017**

	Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
Borehole:	**8**	**0**	**35**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Screened**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
2	**14**	**Grout**
14	**18**	**Bentonite**

Seal Method: **Slurry**

Sealed By: **Driller**

Distance to Property Line (ft.): **No Data**

Distance to Septic Field or other concentrated contamination (ft.): **No Data**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Slab Installed** **Surface Completion by Driller**

Water Level: **25 ft.** below land surface on **2017-03-14** Measurement Method: **Weighted Line**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

Water Quality:

Strata Depth (ft.)	Water Type
No Data	No Data

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **Terracon Consultants**

7002 Commerce
El Paso, TX 79915

Driller Name: **Manuel Duenez** License Number: **2914**

Apprentice Name: **Derek Duenez**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	5	Sand, Fine Sand, Clayey,Dark Brown, Dense, Moist
5	28	Sand, Fine Sand, Poorly Graded, Brown, Loose to Med Dense, Moist
28	35	Clay, Brown, Med Stiff, Moist

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	Riser	New Plastic (PVC)	40	0	20
2	Screen	New Plastic (PVC)	40 0.010	20	35

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

construction quality control
testing and engineering

Geotechnical General Exploration Boring Location Aerial Plan

General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Phase I and Design Phase II Project
Various Streets in El Paso
El Paso, El Paso County, Texas

Client: Brown & Caldwell	
CQC Project No. AGCQC16-056	
Scale: NTS	Check by: JR
Date: 11/17/17	Sheet A1-2

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

BORING NUMBER 2B-1

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/9/17 **COMPLETED** 10/9/17
GROUND ELEVATION 3733 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic Concrete Pavement - Approx. 4 in. thick						
			Apparent Base Course Mat. - Approx. 9 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Clayey, Tannish to Brown, Dense, Moist.	8-13-17 (30)	93	26	12	10	SC
	SS 2		SAND, Fine to Coarse Grained, Silty, Brown, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-3-3 (6)					
5	SS 3			3-2-2 (4)	94	21	7	NP	SM
	SS 4		- Very loose below 7-1/2 feet.	1					
10	SS 5			1-1-1 (2)	98	20	5	NP	SM
15	SS 6		- Loose below 15 feet.	4-3-3 (6)					
20	SS 7			3-3-3 (6)	100	36	7	NP	SM
25	SS 8			4-3-3 (6)					
			NOTE: SS - Split Spoon Sample Bottom of hole at 25.0 feet.						

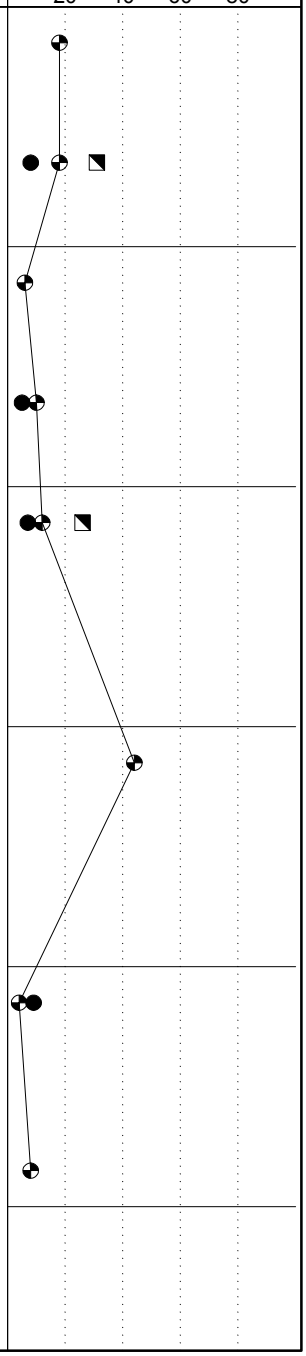
SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

BORING NUMBER 2B-2

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/11/17 **COMPLETED** 9/11/17
GROUND ELEVATION 3721 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0	SS 1		SAND, Fine to Coarse Grained, Silty, Light Brown to Brown, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	4-4-5 (9)					
	SS 2			5-5-4 (9)	97	31	8	NP	SM
5	SS 3		- Very loose below 5 feet.	1-1-2 (3)					
	SS 4		- Loose below 7-1/2 feet.	3-2-3 (5)			5		
10	SS 5			4-3-3 (6)	99	26	7	NP	SM
15	SS 6		- Medium dense below 15 feet.	10-14-8 (22)					
20	SS 7		- Very loose below 20 feet.	1-1-1 (2)			9		
	SS 8		- Loose below 23-1/2 feet.	2-3-1 (4)					
25			NOTE: SS - Split Spoon Sample Bottom of hole at 25.0 feet.						



CQC Testing and Engineering LLC-TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

BORING NUMBER 2B-3

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 11/3/17 **COMPLETED** 11/3/17
GROUND ELEVATION 3718 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING 22.5 ft / Elev 3695.5 ft
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A3
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Concrete Sidewalk - Approx. 4 in. thick						
	SS 1	SAND, Fine to Coarse Grained, Silty, Brown, Medium Dense, Moist.	5-8-3 (11)					
	SS 2	- Loose below 2-1/2 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-3-3 (6)	100	29	8	NP	SM
5	SS 3	- with a clay lense at 5 feet.	3-3-5 (8)					
	SS 4		3-4-6 (10)	100	21	7	NP	SM
10	SS 5		2-4-5 (9)					
	SS 6	- Medium dense below 12-1/2 feet.	3-4-7 (11)	99	29	8	NP	SM
15	SS 7		2-6-5 (11)					
	SS 8		4-8-6 (14)	88	13	4	NP	SM
20	SS 9		2-3-5 (8)					
	SS 10	▽ - Encountered perched water at approximately 22-1/2 feet in depth.	3-8-6 (14)	100	39	22	NP	SM
25	SS 11	CLAY, Sandy, Brown, Medium Stiff, Very Moist.	2-4-4 (8)	99	53	17	14	CL
	SS 12	- Very stiff at 27-1/2 feet	7-7-15 (22)					
30	SS 13	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Medium Dense, Moist with silt.	4-9-5 (14)	96	12	19	NP	SP-SM
	SS 14	CLAY, Sandy, Brown, Stiff, Moist.	4-6-7 (13)					
35	SS 15	- Very stiff below 34 feet. NOTE: SS - Split Spoon Sample	4-8-8 (16)					
		Bottom of hole at 35.5 feet.						

SPT N VALUE: 10 20 30 40
PL MC LL: 20 40 60 80
% - 200: 20 40 60 80

THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

BORING NUMBER 2B-4

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/11/17 **COMPLETED** 10/11/17
GROUND ELEVATION 3719 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING 22.5 ft / Elev 3696.5 ft
LOGGED BY JA **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A4
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0	SS 1	Topsoil and vegetation material layer-Appr 2 in. thick/ CLAY, Sandy, Brown, Medium Stiff, Moist.	2-3-3 (6)					
	SS 2		3-3-4 (7)	100	79	24	31	CH
5	SS 3		2-3-5 (8)	100	89	27	31	CH
	SS 4	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Medium Dense, Moist with silt.	4-5-7 (12)					
10	SS 5		6-8-8 (16)	96	4	4	NP	SP
	SS 6		5-6-7 (13)					
15	SS 7		4-5-7 (12)			5		
	SS 8		4-4-7 (11)					
20	SS 9		6-8-10 (18)	96	7	5	NP	SP-SM
	SS 10	▽ - Encountered perched water at an approximate depth of 22-1/2 feet.	5-5-6 (11)					
25	SS 11	- Loose at 25 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-2-2 (4)					
	SS 12	CLAY, Brown, Soft, Very Moist.	2-1-2 (3)	100	99	45	71	CH
30	SS 13		1-1-1 (2)					
	SS 14	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Loose, Slightly Moist. - Medium dense below 33-1/2 feet.	4-4-4 (8)					
35	SS 15		3-6-9 (15)					
		NOTE: SS - Split Spoon Sample						
		Bottom of hole at 35.5 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

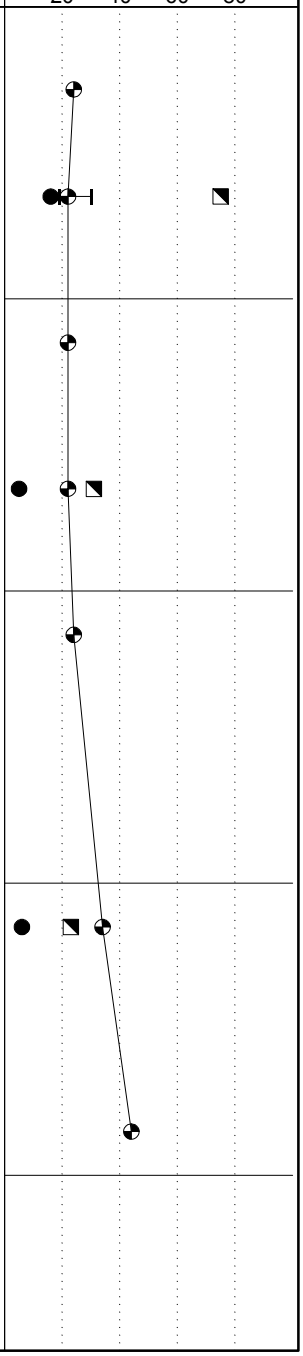
CQC Testing and Engineering LLC-TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

BORING NUMBER 2B-5

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/7/17 **COMPLETED** 10/7/17
GROUND ELEVATION 3709 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A5
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic Concrete Pavement - Approx. 4 in. thick						
			Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Clayey, Brown, Medium Dense, Moist.	7-7-5 (12)					
	SS 2		CLAY, Sandy, Brown, Stiff, Moist.	2-5-6 (11)	97	75	16	11	CL
5	SS 3			4-6-5 (11)					
	SS 4		SILT, Sandy Brown, Stiff, Slightly Moist.	3-6-5 (11)	100	31	5	NP	ML
10	SS 5		SAND, Fine to Coarse Grained, Silty, Brown to Multicolored, Medium Dense, Moist.	3-6-6 (12)					
15	SS 6			4-7-10 (17)	100	23	6	NP	SM
	SS 7			5-8-14 (22)					
20			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
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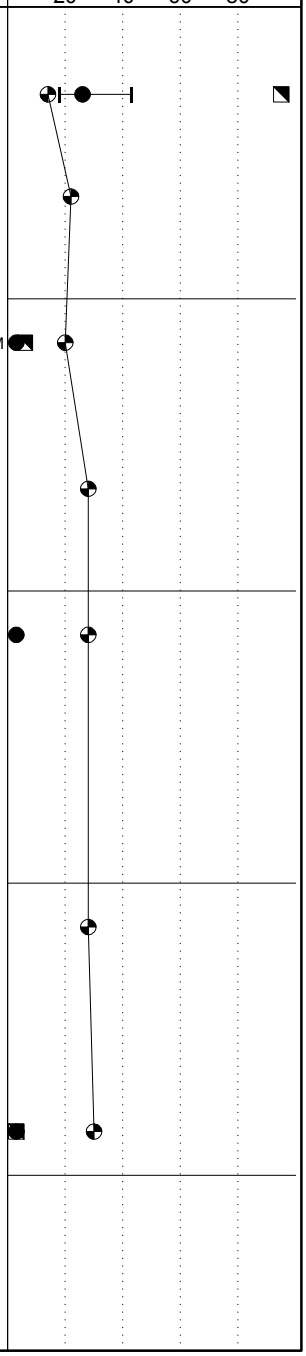
BORING NUMBER 2B-6

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/7/17 **COMPLETED** 10/7/17
GROUND ELEVATION 3712 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A6
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic Concrete Pavement - Approx. 5 in. thick						
			Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1		CLAY, Brown to Dark Brown, Medium Stiff, Slightly Moist.	4-4-3 (7)	100	95	26	25	CL
	SS 2		- Stiff below 2-1/2 feet.	4-4-7 (11)					
5	SS 3		SAND, Fine to Coarse Grained, Porly Graded, Brown to Multicolored, Loose, Moist with silt and a clay layer. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	4-5-5 (10)	100	6	3	NP	SP-SM
	SS 4		- Medium dense below 7-1/2 feet.	4-7-7 (14)					
10	SS 5			2-6-8 (14)			3		
15	SS 6			3-7-7 (14)					
	SS 7			3-6-9 (15)	100	3	3	NP	SP
20			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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BORING NUMBER 2B-7

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/7/17 **COMPLETED** 10/7/17
GROUND ELEVATION 3714 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A7
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic Concrete Pavement - Approx. 4 in. thick						
			Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1		CLAY, Dark Brown, Stiff, Moist with sand.	3-5-5 (10)					
	SS 2			7-8-7 (15)	100	93	24	30	CH
5	SS 3			3-5-7 (12)					
	SS 4			3-5-5 (10)	100	100	31	49	CH
10	SS 5		- Medium stiff below 10 feet.	2-3-3 (6)					
15	SS 6		SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Loose, Moist with silt. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	4-6-4 (10)	100	5	5	NP	SP-SM
	SS 7		- Medium dense below 18-1/2 feet.	5-7-8 (15)					
20			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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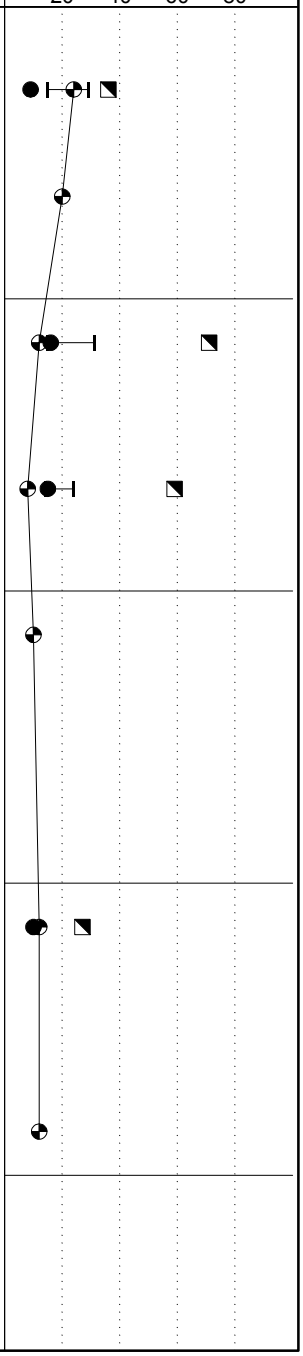
BORING NUMBER 2B-8

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/7/17 **COMPLETED** 10/7/17
GROUND ELEVATION 3714 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic Concrete Pavement - Approx. 4 in. thick Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Clayey, Brown to Dark Brown, Medium Dense, Moist with calcareous material.	7-7-5 (12)	85	36	9	14	SC
	SS 2			3-5-5 (10)					
5									
	SS 3		CLAY, Sandy, Brown, Stiff, Slightly Moist.	2-3-3 (6)	100	71	16	16	CL
	SS 4			3-2-2 (4)	99	59	15	10	CL
10									
	SS 5		SAND, Fine to Coarse Grained, Clayey, Brown, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-2-3 (5)					
15									
	SS 6		SAND, Fine to Coarse Grained, Silty, Brown to Multicolored, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-3-3 (6)	100	27	10	NP	SM
	SS 7			3-3-3 (6)					
20			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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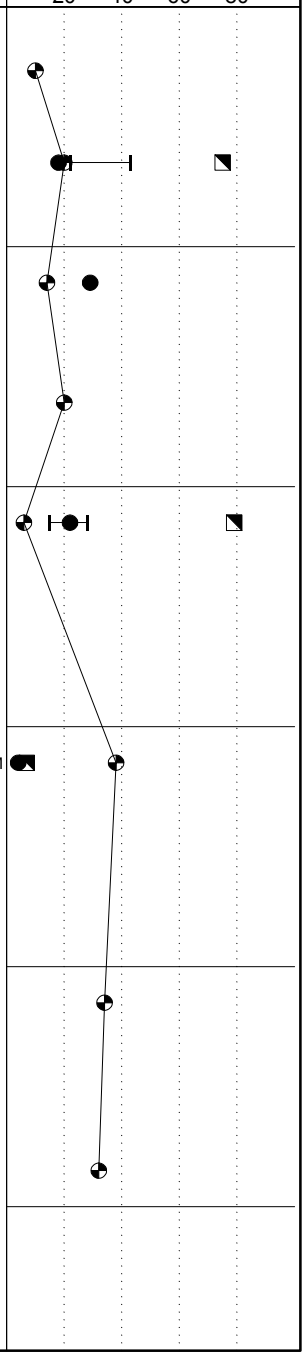
BORING NUMBER 2B-9

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/7/17 **COMPLETED** 10/7/17
GROUND ELEVATION 3715 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic Concrete Pavement - Approx. 3 in. thick						
		Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1	CLAY, Sandy, Brown, Medium Stiff, Slightly Moist with calcareous material.	7-3-2 (5)					
	SS 2	- Stiff below 2-1/2 feet.	3-5-5 (10)	99	75	18	21	CL
5	SS 3	- Medium stiff below 5 feet.	2-3-4 (7)			29		
	SS 4	- Stiff below 7-1/2 feet.	4-6-4 (10)					
10	SS 5	- Soft below 10 feet.	1-1-2 (3)	100	79	22	13	CL
15	SS 6	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Medium Dense, Moist with silt.	3-8-11 (19)	94	7	4	NP	SP-SM
20	SS 7		4-8-9 (17)					
25	SS 8		5-8-8 (16)					
		NOTE: SS - Split Spoon Sample						
		Bottom of hole at 25.0 feet.						



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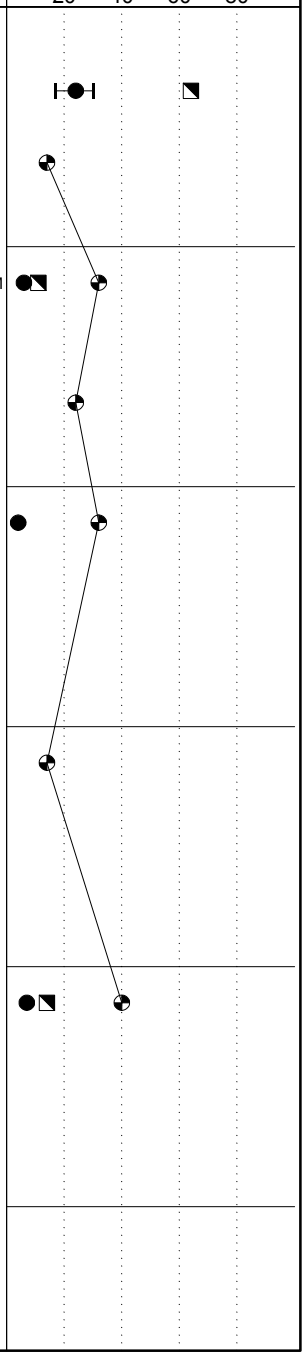
BORING NUMBER 2B-10

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/28/17 **COMPLETED** 9/28/17
GROUND ELEVATION 3705 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY DN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Concrete Pavement - Approx. 9 in. thick						
		Apparent Flowable Fill Mat. - Approx. 6 in thick						
	GB 1	CLAY, Sandy, Brown, Moist.		97	64	24	13	CL
	SS 2	SAND, Fine to Coarse Grained, Poorly Graded, Grayish- Brown, Loose, Moist with silt. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	3-2-5 (7)					
5	SS 3	- Medium dense below 5 feet.	5-7-9 (16)	100	11	6	NP	SP-SM
	SS 4		5-5-7 (12)					
10	SS 5		3-9-7 (16)			4		
15	SS 6	- Loose below 15 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-3-4 (7)					
20	SS 7	- Medium dense below 20 feet.	7-9-11 (20)	100	14	7	NP	SM
25	SS 8							

NOTE: SS - Split Spoon Sample
GB - Grab Sample

Bottom of hole at 25.0 feet.



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

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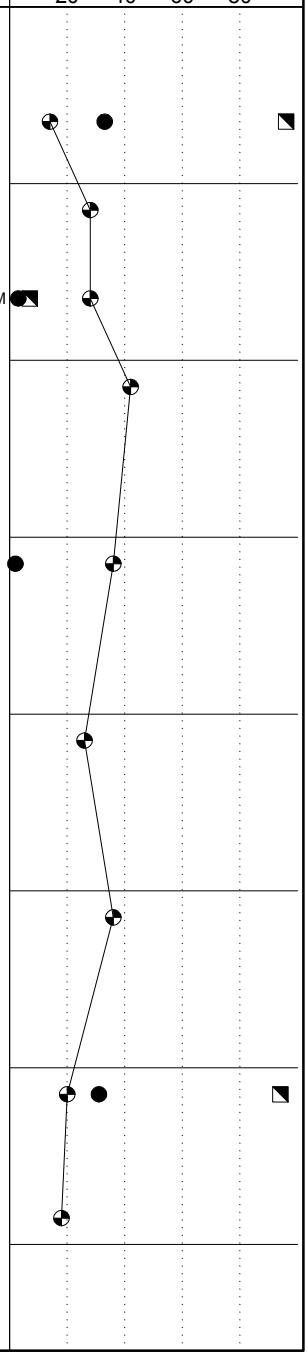
BORING NUMBER 2B-11

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/28/17 **COMPLETED** 9/28/17
GROUND ELEVATION 3707 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY DN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0	GB 1	Concrete Pavement - Approx. 9 in. thick CLAY, Dark Brown, Moist.						
	SS 2	SILT, Sandy, Light Brown, Medium Stiff, Moist.	4-3-4 (7)	100	96	33	NP	ML
5	SS 3	SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Muticolored, Medium Dense, Moist with silt.	5-7-7 (14)					
	SS 4		5-7-7 (14)	100	7	3	NP	SP-SM
10	SS 5		4-10-11 (21)					
15	SS 6		4-8-10 (18)			2		
20	SS 7		6-7-6 (13)					
25	SS 8		7-9-9 (18)					
30	SS 9	CLAY, Dark Brown, Stiff, Slightly Moist with sand.	5-5-5 (10)	100	94	31		
35	SS 10		7-5-4 (9)					

NOTE: SS - Split Spoon Sample
GB - Grab Sample
Bottom of hole at 35.0 feet.

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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BORING NUMBER 2B-12

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/20/17 **COMPLETED** 9/20/17
GROUND ELEVATION 3708 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic-Concrete Pavement - Approx. 3 in. thick						
		Apparent Base Course mat. - Approx. 4 in. thick						
	SS 1	SAND, Fine to Coarse Grained, Clayey, Dark Brown, Loose, Moist.	3-5-5 (10)					
	SS 2	- Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-1-1 (2)	95	73	11	13	SC
5		- Very loose below 2-1/2 feet.						
	SS 3	CLAY, Sandy, Dark Brown, Soft, Slightly Moist.	2-2-2 (4)					
	SS 4		1-2-2 (4)	99	77	33	22	CL
10								
	SS 5		4-2-1 (3)					
15								
	SS 6	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Medium Dense, Moist.	5-6-7 (13)	99	17	7	NP	SM
20								
	SS 7		5-11-14 (25)					
25								
	SS 8	CLAY, Sandy, Dark Brown, Stiff, Slighlty Moist.	3-4-7 (11)	99	81	27	14	CL
30								
	SS 9		2-5-8 (13)					
	SS 10		7-7-8 (15)					
35		NOTE: SS - Split Spoon Sample						
		Bottom of hole at 35.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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BORING NUMBER 2B-13

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/20/17 **COMPLETED** 9/20/17
GROUND ELEVATION 3709 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic-Concrete Pavement - Approx. 5 in. thick						
	SS 1	Apparent Base Course Mat. - Approx. 4 in. thick CLAY, Sandy, Light Brown to Brown, Medium Stiff, Slightly Moist.	2-4-4 (8)	98	84	17	8	CL
	SS 2	- Soft below 2-1/2 feet.	2-2-1 (3)					
5								
	SS 3	SILT, Sandy, Brown, Stiff, Slightly Moist.	2-4-4 (8)	100	72	13	NP	ML
	SS 4		2-3-3 (6)					
10								
	SS 5	SAND, Fine to Coarse Grained, Silty, Brown, Medium Dense, Moist.	1-1-2 (3)	100	34	10	NP	SM
15								
	SS 6	- Medium dense below 15 feet.	2-5-13 (18)					
20								
	SS 7		6-4-9 (13)			13		
25								
	SS 8		5-5-11 (16)	100	26	9	NP	SM
30								
	SS 9		6-5-11 (16)					
	SS 10	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Mlticolored, Medium Dense, Moist.	3-8-14 (22)			4		
35		NOTE: SS - Split Spoon Sample Bottom of hole at 35.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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BORING NUMBER 2B-14

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/9/17 **COMPLETED** 10/9/17
GROUND ELEVATION 3708 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic Concrete Pavement - Approx. 3 in. thick						
	SS 1	Apparent Base Course Mat. - Approx. 5 in. thick SAND, Fine to Coarse Grained, Silty, Brown, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-3-3 (6)					
5	SS 2		3-5-4 (9)	95	35	8	NP	SM
	SS 3	- Medium dense below 5 feet.	4-6-8 (14)	95	30	7	NP	SM
10	SS 4	- Loose below 7-1/2 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	3-4-5 (9)	93	26	8	NP	SM
	SS 5		3-3-3 (6)					
15	SS 6		1-2-3 (5)			6		
20	SS 7	- Very loose at 20 feet.	1-1-1 (2)					
25	SS 8	- Loose below 25 feet.	1-1-3 (4)	98	16	6	NP	SM
30	SS 9		2-2-3 (5)					
35	SS 10	- Medium dense with a clay layer below 35 feet.	2-13-12 (25)	87	34	16	NP	SM
40	SS 11	- Dense below 38-1/2 feet.	5-11-19 (30)					
		NOTE: SS - Split Spoon Sample Bottom of hole at 40.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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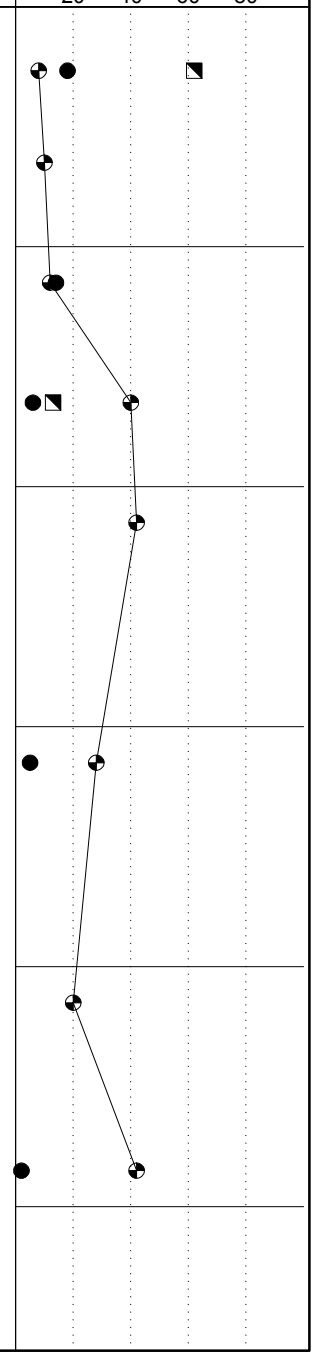
BORING NUMBER 2B-15

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/8/17 **COMPLETED** 9/8/17
GROUND ELEVATION 3706 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic-Concrete Pavement - Approx. 3 in. thick						
		Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1	SILT, Sandy, Light Brown to Brown, Soft, Moist.	3-2-2 (4)	100	62	18	NP	ML
	SS 2		3-3-2 (5)					
5	SS 3		2-3-3 (6)			14		
	SS 4	SAND, Fine to Coarse Grained, Silty, Light Brown to Brown, Medium Dense, Moist.	4-7-13 (20)	100	13	6	NP	SM
10	SS 5		6-10-11 (21)					
15	SS 6		5-7-7 (14)			5		
20	SS 7	- with a clay layer at 20 feet.	3-3-7 (10)					
25	SS 8		9-11-10 (21)			2		
		NOTE: SS - Split Spoon Sample						
		Bottom of hole at 25.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
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Ph: (915) 771-7766
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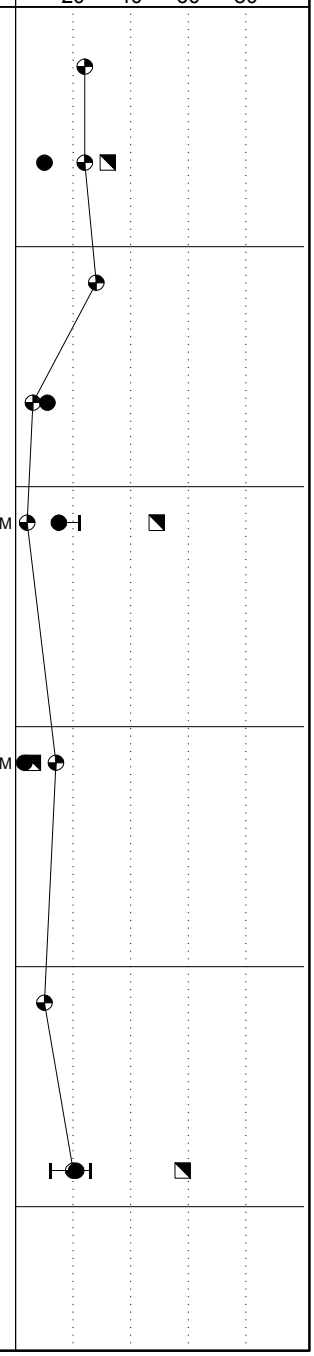
BORING NUMBER 2B-16

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/11/17 **COMPLETED** 9/11/17
GROUND ELEVATION 3707 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 2 in. thick						
	SS 1		Apparent Base Course Mat. - Approx. 4 in. thick SAND, Fine to Coarse Grained, Silty, Light Brown to Brown, Medium Dense, Moist.	15-5-7 (12)					
	SS 2			5-5-7 (12)	97	32	10	NP	SM
5	SS 3			4-6-8 (14)					
	SS 4		- Very loose below 7-1/2 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-2-1 (3)			11		
10	SS 5		- with some clay at 10 feet.	1-1-1 (2)	98	49	15	7	SC-SM
15	SS 6		SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Loose, Moist with silt. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	1-3-4 (7)	94	6	3	NP	SP-SM
20	SS 7			1-2-3 (5)					
25	SS 8		CLAY, Sandy, Dark Brown, Stiff, Slightly Moist.	4-5-5 (10)	99	58	21	14	CL
			NOTE: SS - Split Spoon Sample Bottom of hole at 25.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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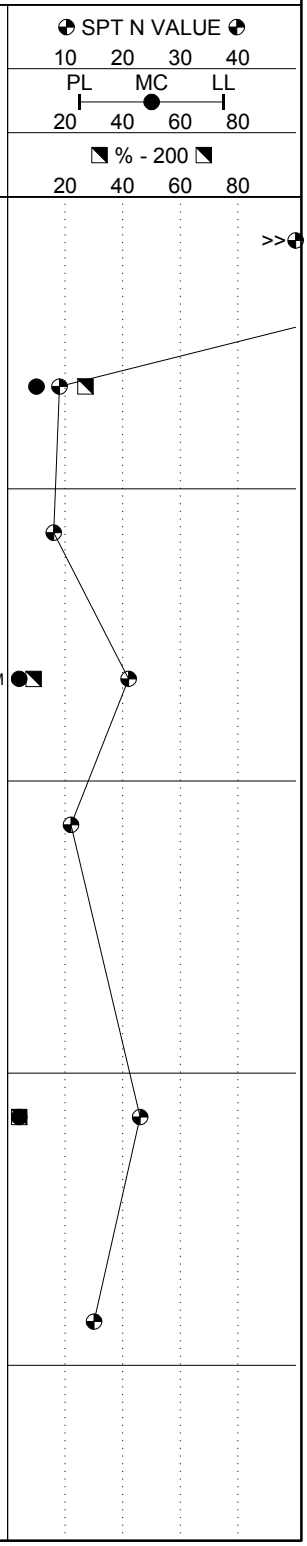
BORING NUMBER 2B-17

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/8/17 **COMPLETED** 9/8/17
GROUND ELEVATION 3707 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 3 in. thick						
	SS 1		Apparent Base Course Mat. - Approx. 4 in. thick SAND, Fine to Coarse Grained, Silty, Light Brown to Multicolored, Very Dense, Moist.	50/4"					
	SS 2		- Loose below 2-1/2 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	10-4-5 (9)	92	27	10	NP	SM
5	SS 3		SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Loose, Slightly Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	4-3-5 (8)					
	SS 4		- Medium dense with silt at 7-1/2 feet.	8-10-11 (21)	100	9	4	NP	SP-SM
10	SS 5			4-6-5 (11)					
15	SS 6			8-10-13 (23)	99	4	4	NP	SP
	SS 7		- with a clay layer at 19-1/2 feet.	3-5-10 (15)					
20			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						



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BORING NUMBER 2B-18

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/11/17 **COMPLETED** 9/11/17
GROUND ELEVATION 3705 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0	SS 1		Topsoil and vegetation material layer-Appr 2 in. thick CLAY, Dark Brown, Medium Stiff, Slightly Moist with sand.	1-2-3 (5)	100	92	34	19	CL
	SS 2		- Soft below 2-1/2 feet.	3-2-2 (4)	100	84	27	10	CL
5	SS 3		SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Brown, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	4-4-5 (9)					
	SS 4		- Medium dense below 7-1/2 feet.	2-4-7 (11)	100	3	4	NP	SP
10	SS 5			5-7-8 (15)					
15	SS 6			7-9-10 (19)			3		
20	SS 7			6-7-10 (17)					
25	SS 8			5-6-6 (12)	91	1	7	NP	SP
			NOTE: SS - Split Spoon Sample Bottom of hole at 25.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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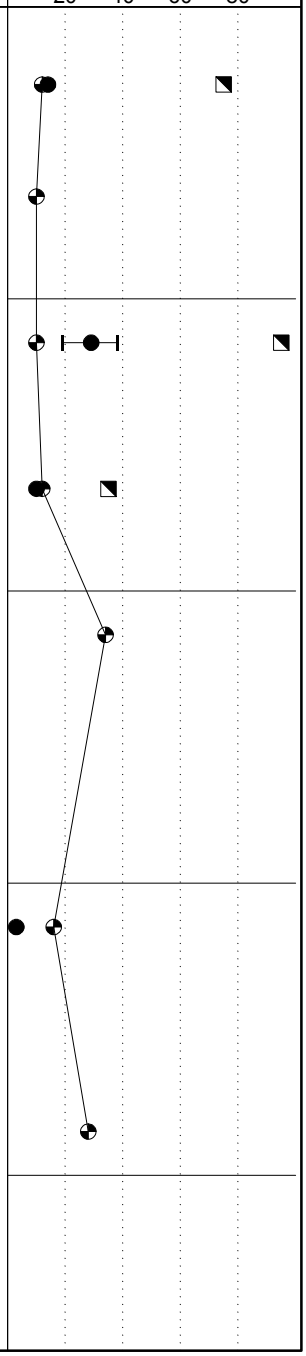
BORING NUMBER 2B-19

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/11/17 **COMPLETED** 10/11/17
GROUND ELEVATION 3707 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY JA **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic Concrete Pavement - Approx. 3 in. thick						
			Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1		SILT, Sandy, Brown, Medium Stiff, Moist.	5-3-3 (6)	100	75	14	NP	ML
	SS 2		CLAY, Brown, Medium Stiff, Moist.	3-2-3 (5)					
5	SS 3			3-2-3 (5)	100	95	29	19	CL
	SS 4		SAND, Fine to Coarse Grained, Silty, Brown to Multicolored, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-2-4 (6)	100	35	10	NP	SM
10	SS 5		- Medium dense belwo 10 feet.	10-8-9 (17)					
15	SS 6		- Loose below 15 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	3-3-5 (8)			3		
	SS 7		- Medium dense below 18-1/2 feet.	3-7-7 (14)					
20			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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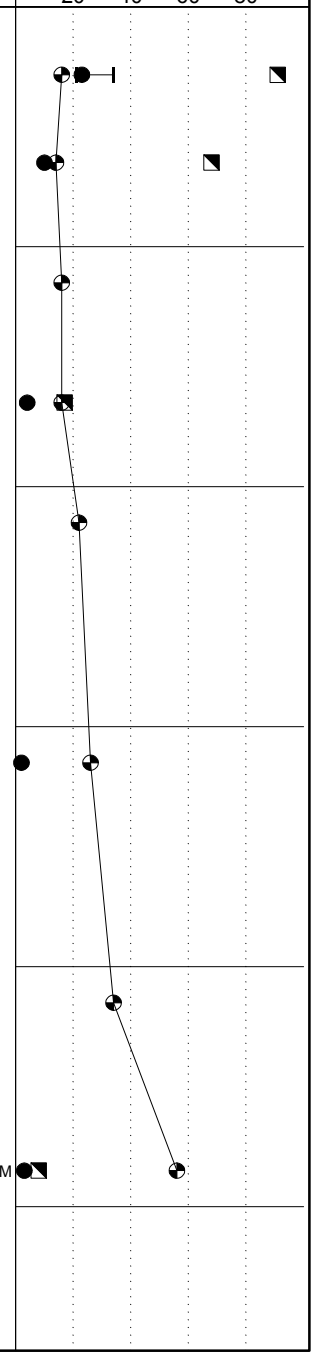
BORING NUMBER 2B-20

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/1/17 **COMPLETED** 9/1/17
GROUND ELEVATION 3704 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic-Concrete Pavement - Approx. 4 in. thick						
		Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1	CLAY, Dark Brown, Medium Stiff, Slightly Moist with sand.	6-5-3 (8)	100	91	23	13	CL
	SS 2	SILT, Sandy, Light Brown, Medium Stiff, Moist.	3-3-4 (7)	99	68	10	NP	ML
5	SS 3		3-4-4 (8)					
	SS 4	SAND, Fine to Coarse Grained, Silty, Light Brown to Multicolored, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-3-5 (8)	100	17	4	NP	SM
10	SS 5	SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Medium Dense, Moist with silt.	3-5-6 (11)					
15	SS 6		5-6-7 (13)			2		
20	SS 7		8-10-7 (17)					
25	SS 8		9-12-16 (28)	100	8	3	NP	SP-SM
		NOTE: SS - Split Spoon Sample						
		Bottom of hole at 25.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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BORING NUMBER 2B-21

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/27/17 **COMPLETED** 9/27/17
GROUND ELEVATION 3708 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY JA **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0	GB 1	Asphaltic-Concrete Pavement - Approx. 2 in. thick Apparent Base Course Mat. - Approx. 4 in. thick CLAY, Sandy, Dark Brown, Slightly Moist.		99	65	14	11	CL
	SS 2	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Loose, Moist with silt. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	6-5-5 (10)					
5	SS 3		3-5-5 (10)	100	6	3	NP	SP-SM
	SS 4	- Medium dense below 7-1/2 feet.	4-5-7 (12)					
10	SS 5		4-5-6 (11)	100	7	3	NP	SP-SM
15	SS 6	- Loose below 15 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	3-4-6 (10)					
20	SS 7		3-9-11 (20)			3		

NOTE: SS - Split Spoon Sample
GB - Grab Sample

Bottom of hole at 20.0 feet.

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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BORING NUMBER 2B-22

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/27/17 **COMPLETED** 9/27/17
GROUND ELEVATION 3707 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY JA **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0	GB 1	Asphaltic-Concrete Pavement - Approx. 2 in. thick Apparent Base Course Mat. - Approx. 5 in. thick SAND, Fine to Coarse Grained, Clayey, Light Brown to Brown, Loose, Moist with gravel. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.		66	29	5	12	SC
	SS 2		4-3-4 (7)	94	72	17	8	CL
5	SS 3	CLAY, Sandy, Dark Brown, Medium Stiff, Slightly Moist.	4-4-4 (8)	100	31	9	NP	SM
	SS 4	SAND, Fine to Coarse Grained, Silty, Light Brown, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-2-5 (7)					
10	SS 5		2-2-3 (5)					
15	SS 6	SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Medium Dense, Moist with silt.	3-7-7 (14)	100	3	3	NP	SP
20	SS 7	- with a clay layer at 20 feet.	1-4-8 (12)					
25	SS 8		2-9-12 (21)					
30	SS 9	- with silt and some gravel below 30 feet.	2-14-17 (31)	78	7	3	NP	SP-SM
35	SS 10	- Loose below 33-1/2 feet.	2-5-5 (10)					
		NOTE: SS - Split Spoon Sample GB - Grab Sample Bottom of hole at 35.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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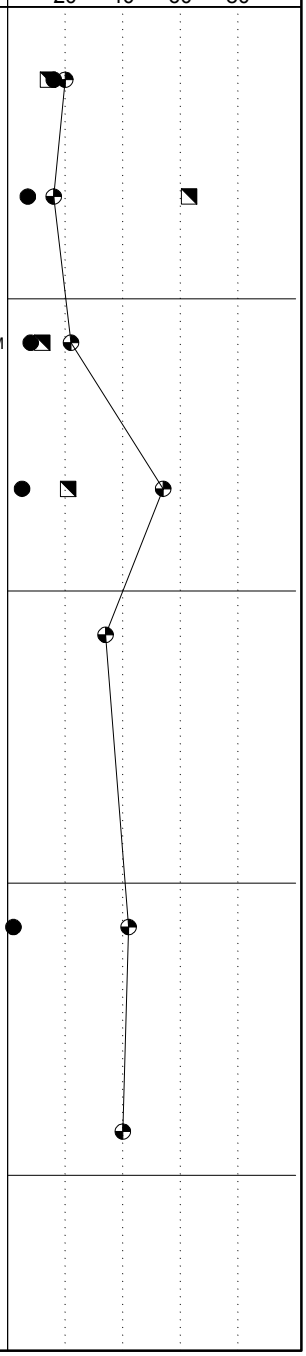
BORING NUMBER 2B-23

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/11/17 **COMPLETED** 9/11/17
GROUND ELEVATION 3705 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 2 in. thick						
			Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Silty, Light Brown to Brown, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	4-3-7 (10)	100	14	16	NP	SM
	SS 2		SILT, Sandy Light Brown, Medium Stiff, Moist.	5-4-4 (8)	98	63	7	NP	ML
5	SS 3		SAND, Fine to Coarse Grained, Poory Graded, Silty, Light Brown to Multicolored, Medium Dense, Moist.	3-5-6 (11)	100	12	8	NP	SP-SM
	SS 4			8-13-14 (27)	100	21	5	NP	SM
10	SS 5			6-8-9 (17)					
15	SS 6			8-7-14 (21)			2		
	SS 7			9-10-10 (20)					
20			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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BORING NUMBER 2B-24

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/1/17 **COMPLETED** 9/1/17
GROUND ELEVATION 3704 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 4 in. thick						
			Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Silty, Brown, Medium Dense, Moist.	8-7-6 (13)	87	49	12	NP	SM
	SS 2		- Loose below 2-1/2 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-2-2 (4)	93	31	11	NP	SM
5	SS 3			3-4-6 (10)					
	SS 4		- Medium dense with clay layer at 15 feet.	3-5-10 (15)			9		
10									
	SS 5		SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Medium Dense, Moist with silt.	6-5-10 (15)					
15	SS 6			4-5-9 (14)	94	11	7	NP	SP-SM
20	SS 7		- Dense below 20 feet.	12-19-25 (44)					
25	SS 8			14-19-12 (31)			2		
			NOTE: SS - Split Spoon Sample Bottom of hole at 25.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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BORING NUMBER 2B-25

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/1/17 **COMPLETED** 9/1/17
GROUND ELEVATION 3707 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic-Concrete Pavement - Approx. 3 in. thick						
		Apparent Base Course Mat. - Approx. 5 in. thick						
	SS 1	SAND, Fine to Coarse Grained, Clayey, Dark Brown, Medium Dense, Slightly Moist with some gravel.	16-10-4 (14)	74	38	9	11	SC
	SS 2	SAND, Fine to Coarse Grained, Silty, Light Brown to Multicolored, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	5-3-7 (10)					
5	SS 3		7-4-4 (8)			6		
	SS 4		2-2-2 (4)					
10	SS 5	- Medium dense below 10 feet.	6-7-11 (18)	100	15	5	NP	SM
15	SS 6	SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Dense, Moist with silt.	9-18-15 (33)					
	SS 7	- Medium dense below 18-1/2 feet.	10-9-6 (15)			4		
20		NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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BORING NUMBER 2B-26

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/1/17 **COMPLETED** 9/1/17
GROUND ELEVATION 3708 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 3 in. thick						
			Apparent Base Course Mat. - Approx. 6 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Clayey, Dark Brown, Medium Dense, Slightly Moist.	5-6-7 (13)	86	23	7	13	SC
	SS 2		SAND, Fine to Coarse Grained, Silty, Light Brown to Multicolored, Medium Dense, Moist.	1-7-7 (14)	99	48	12	NP	SM
5	SS 3		- Dark brown to black at 5 feet.	2					
	SS 4		- Loose below 7-1/2 feet.	3-5-5 (10)			9		
10	SS 5		SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Medium Dense, Moist with silt.	4-7-10 (17)					
15	SS 6			7-12-11 (23)	100	6	4	NP	SP-SM
	SS 7			6-7-9 (16)					
20			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

BORING NUMBER 2B-27

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/1/17 **COMPLETED** 9/1/17
GROUND ELEVATION 3708 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 4 in. thick						
			Apparent Base Course Mat. - Approx. 6 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	9-5-5 (10)					
	SS 2		SAND, Fine to Coarse Grained, Silty, Light Brown to Brown, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	3-2-2 (4)	97	36	10	NP	SM
5	SS 3			2-3-3 (6)					
	SS 4		- Medium dense below 7-1/2 feet.	4-5-8 (13)			6		
10	SS 5		SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Medium Dense, Moist.	8-6-6 (12)	100	10	4	NP	SP-SM
15	SS 6		- Dense below 15 feet.	7-13-17 (30)					
20	SS 7			9-17-17 (34)	100	4	4	NP	SP-SM
			NOTE: SS - Split Spoon Sample						
			Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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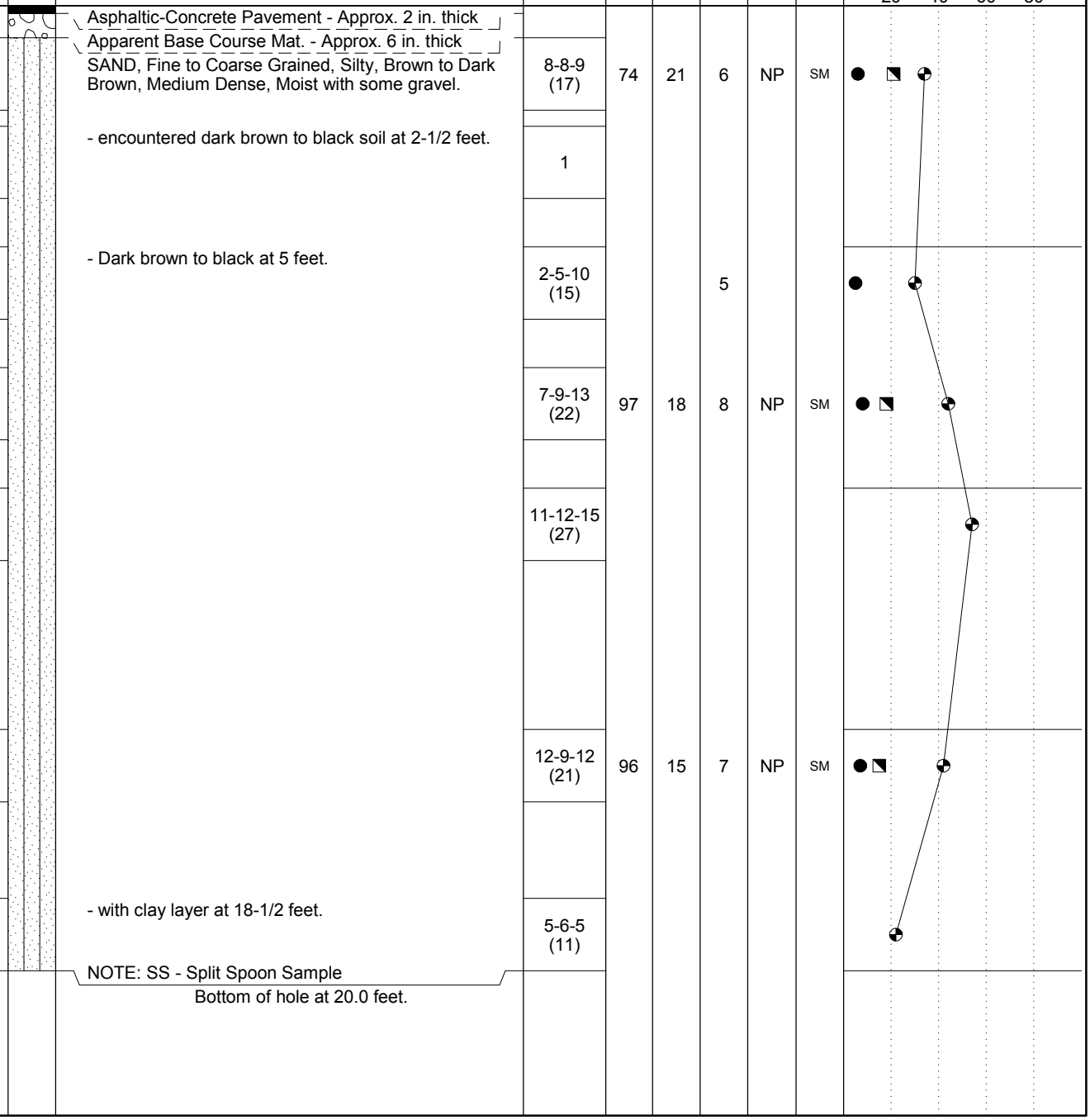
BORING NUMBER 2B-28

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/1/17 **COMPLETED** 9/1/17
GROUND ELEVATION 3708 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 2 in. thick						
			Apparent Base Course Mat. - Approx. 6 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Silty, Brown to Dark Brown, Medium Dense, Moist with some gravel.	8-8-9 (17)	74	21	6	NP	SM
	SS 2		- encountered dark brown to black soil at 2-1/2 feet.	1					
5	SS 3		- Dark brown to black at 5 feet.	2-5-10 (15)			5		
	SS 4			7-9-13 (22)	97	18	8	NP	SM
10	SS 5			11-12-15 (27)					
15	SS 6			12-9-12 (21)	96	15	7	NP	SM
	SS 7		- with clay layer at 18-1/2 feet.	5-6-5 (11)					
20			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
4606 Titanic Avenue
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Ph: (915) 771-7766
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BORING NUMBER 2B-29

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/8/17 **COMPLETED** 9/8/17
GROUND ELEVATION 3708 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 3 in. thick						
			Apparent Base Course Mat. - Approx. 4 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Clayey, Brown to Dark Brown, Loose, Moist with silt. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement. - Dark brown to black at 2-1/2 feet.	3-3-4 (7)	100	9	11	7	SC-SM
	SS 2			4-3-3 (6)					
5	SS 3		SAND, Fine to Coarse Grained, Silty, LIght Brown to Multicolored, Medium Dense, Moist.	4-8-8 (16)	92	45	4	NP	SM
	SS 4		SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Medium Dense, Moist with silt.	7-8-8 (16)					
10	SS 5			5-7-8 (15)					
15	SS 6			8-11-15 (26)	100	5	2	NP	SP-SM
20	SS 7		- with a clay layer at 20 feet.	10-9-5 (14)					
25	SS 8			13-11-11 (22)	100	4	3	NP	SP-SM
30	SS 9		- Loose below 28-1/2 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement. NOTE: SS - Split Spoon Sample	7-3-3 (6)					
			Bottom of hole at 30.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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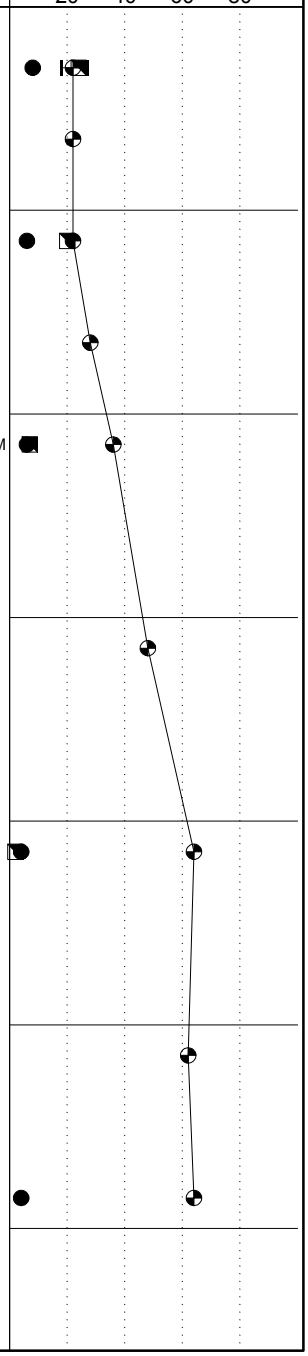
BORING NUMBER 2B-30

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/2/17 **COMPLETED** 10/2/17
GROUND ELEVATION 3706 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 4 in. thick						
			Apparent Base Course Mat. - Approx. 5 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Clayey, Brown, Medium Dense, Moist.	6-4-7 (11)	89	24	8	9	SC
	SS 2		- with dark brown to black soil at 2-1/2 feet.	4-4-7 (11)					
5	SS 3		SAND, Fine to Coarse Grained, Silty, Light Brown, Medium Dense, Moist.	6-5-6 (11)	92	20	6	NP	SM
	SS 4			2-5-9 (14)					
10	SS 5		SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Medium Dense, Moist with silt.	4-7-11 (18)	100	7	6	NP	SP-SM
15	SS 6			3-9-15 (24)					
20	SS 7		- Dense below 20 feet.	7-14-18 (32)	100	2	4	NP	SP
25	SS 8			8-15-16 (31)					
30	SS 9			8-16-16 (32)			4		
			NOTE: SS - Split Spoon Sample						
			Bottom of hole at 30.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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BORING NUMBER 2B-31

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/2/17 **COMPLETED** 10/2/17
GROUND ELEVATION 3708 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 4 in. thick						
			Apparent Base Course Mat. - Approx. 5 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Clayey, Brown, Medium Dense, Moist with some gravel.	7-7-7 (14)	76	25	7	11	SC
	SS 2		- Dark brown to black at 2-1/2 feet.	15-7-8 (15)					
5	SS 3		- with glass, trash, and rust at 5 feet.	2-1-2 (3)					
	SS 4		SILT, Sandy, Light Brown, Medium Stiff, Moist.	3-3-2 (5)	93	72	14	NP	ML
10	SS 5		SAND, Fine to Coarse Grained, Silty, Light Brown to Brown, Loose, Moist. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	3-3-2 (5)	99	26	8	NP	SM
15	SS 6			3-7-8 (15)					
	SS 7		- with a clay layer at 18-1/2 feet.	14-17-18 (35)			14		
20			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

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BORING NUMBER 2B-32

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/2/17 **COMPLETED** 10/2/17
GROUND ELEVATION 3709 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 4 in. thick						
			Apparent Base Course Mat. - Approx. 5 in. thick						
	SS 1		SAND, Fine to Coarse Grained, Clayey, Brown, Medium Dense, Moist with silt and some gravel.	5-9-7 (16)	73	19	6	7	SC-SM
	SS 2		SAND, Fine to Coarse Grained, Silty, Brown, Medium Dense, Moist.	5-11-11 (22)	100	29	7	NP	SM
5	SS 3			9-12-16 (28)	99	20	6	NP	SM
	SS 4			5-7-8 (15)					
10	SS 5		SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Loose, Moist with silt. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	3-3-5 (8)	99	12	7	NP	SP-SM
15	SS 6		- Medium dense below 15 feet.	5-9-9 (18)					
20	SS 7		- Very loose with a clay layer at 18-1/2 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	1-1-1 (2)			15		
			NOTE: SS - Split Spoon Sample Bottom of hole at 20.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80

CQC Testing and Engineering LLC-TBPE Firm No. F-10632
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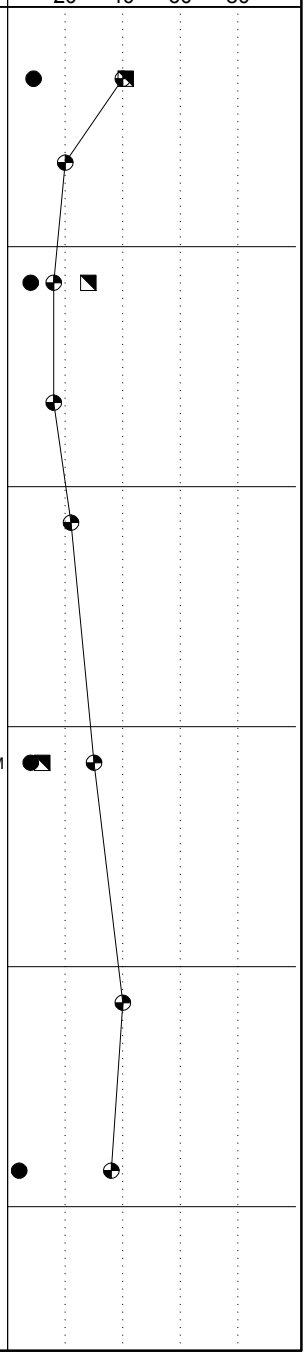
BORING NUMBER 2B-33

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 10/2/17 **COMPLETED** 10/2/17
GROUND ELEVATION 3706 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0		Asphaltic-Concrete Pavement - Approx. 4 in. thick						
		Apparent Base Course Mat. - Approx. 5 in. thick						
	SS 1	SAND, Fine to Coarse Grained, Silty, Dark Brown, Medium Dense, Moist.	5-9-11 (20)	90	41	9	NP	SM
	SS 2	- loose below 2-1/2 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-3-7 (10)					
5	SS 3		3-3-5 (8)	93	28	8	NP	SM
	SS 4		3-4-4 (8)					
10	SS 5	- Medium dense below 10 feet.	2-5-6 (11)					
15	SS 6	SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored, Medium Dense, Moist with silt.	3-6-9 (15)	100	12	8	NP	SP-SM
20	SS 7		5-7-13 (20)					
25	SS 8		5-8-10 (18)			4		
		NOTE: SS - Split Spoon Sample Bottom of hole at 25.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

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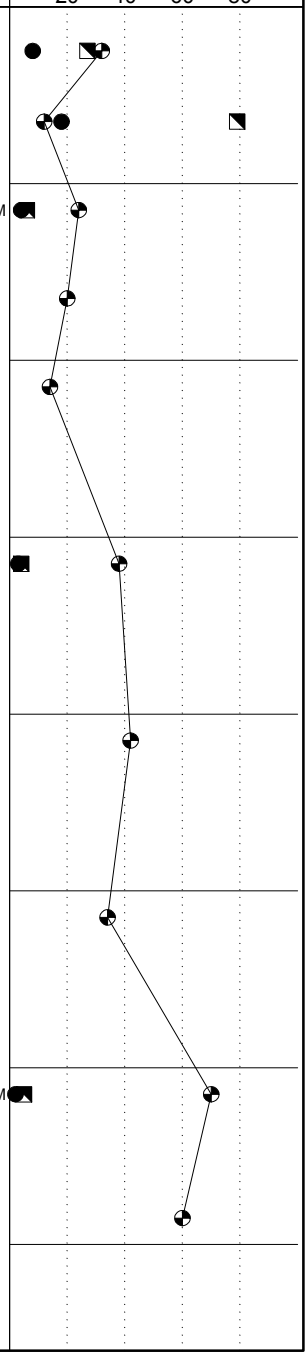
BORING NUMBER 2B-34

CLIENT Brown & Caldwell
PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II
PROJECT NUMBER AGCQC16-056
PROJECT LOCATION Various Locations
DATE STARTED 9/8/17 **COMPLETED** 9/8/17
GROUND ELEVATION 3707 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR T.D.
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/3-1/4" ID HSA
AT TIME OF DRILLING None Encountered
LOGGED BY MN **CHECKED BY** CS
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A2
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% -4	% -200	% Moisture Content	PI (LL-PL)	USCS
0			Asphaltic-Concrete Pavement - Approx. 2 in. thick						
	SS 1		Apparent Base Course Mat. - Approx. 4 in. thick SAND, Fine to Coarse Grained, Silty, Brown, Medium Dense, Moist.	4-9-7 (16)	89	27	8	NP	SM
	SS 2		SILT, Sandy, Medium Stiff, Dark Brown to Black, Moist.	4-3-3 (6)	91	79	18	NP	ML
5	SS 3		SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored, Medium Dense, Moist with silt.	2-5-7 (12)	99	6	4	NP	SP-SM
	SS 4		- Loose below 7-1/2 feet. - Encountered sandy soils that shall be susceptible to soil sloughing and elastic settlement.	2-4-6 (10)					
10	SS 5		- with a clay layer at 10 feet.	5-5-2 (7)					
15	SS 6		- Medium dense below 15 feet.	6-8-11 (19)	91	4	3	NP	SP
20	SS 7			5-9-12 (21)					
25	SS 8		- with a clay layer at 25 feet.	4-4-13 (17)					
30	SS 9		- Dense below 30 feet.	7-16-19 (35)	100	5	2	NP	SP-SM
35	SS 10			7-9-21 (30)					
			NOTE: SS - Split Spoon Sample Bottom of hole at 35.0 feet.						

SPT N VALUE
10 20 30 40
PL MC LL
20 40 60 80
% - 200
20 40 60 80



THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

CQC STANDARD LOG 16-056-LOGS PH II.GPJ CQC2014.GDT

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/9/2017 **SAMPLE NO.:** S-5

BORING NO.: 2B-1 **SAMPLE DEPTH:** 10' - 11½'

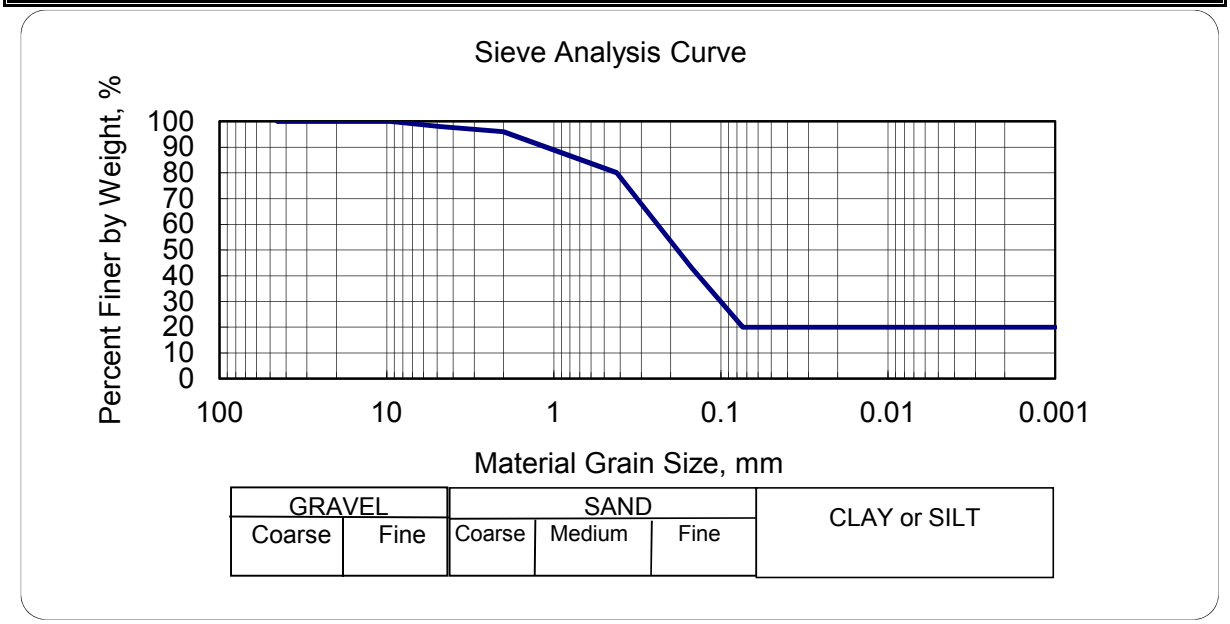
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	2	98
No. 10	4	96
No. 40	20	80
No. 100	57	43
No. 200	80	20
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/11/2017 **SAMPLE NO.:** S-5

BORING NO.: 2B-2 **SAMPLE DEPTH:** 10' - 11½'

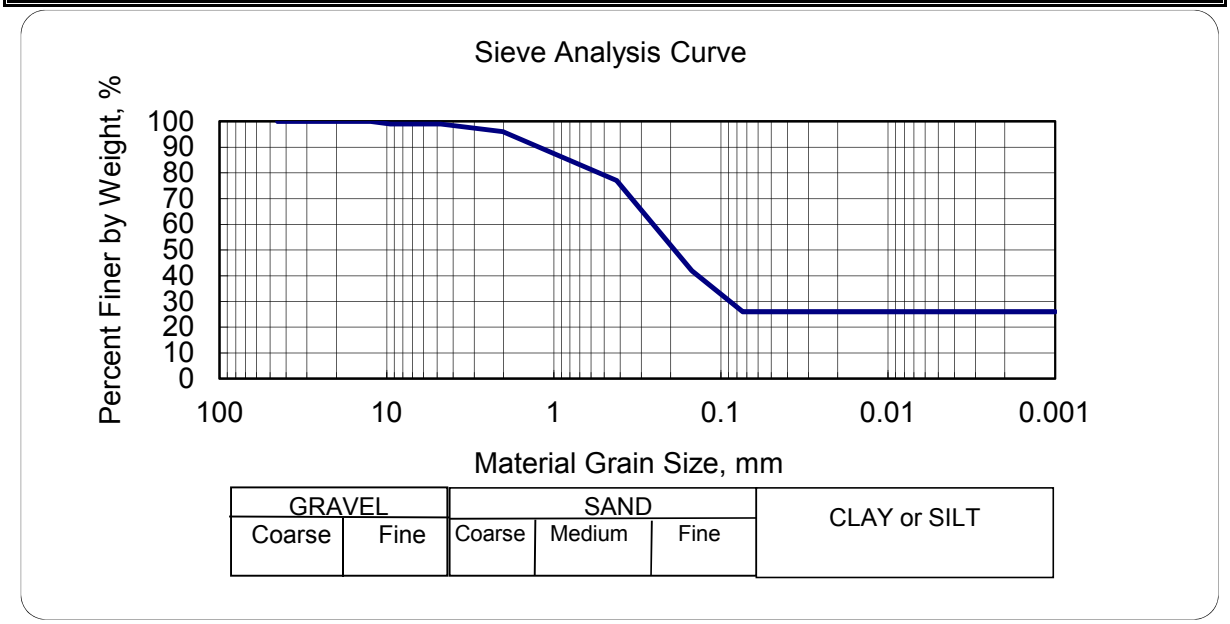
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Light Brown to Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	1	99
No. 4	1	99
No. 10	4	96
No. 40	23	77
No. 100	58	42
No. 200	74	26
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 11/3/2017 **SAMPLE NO.:** S-8

BORING NO.: 2B-3 **SAMPLE DEPTH:** 17½' - 19'

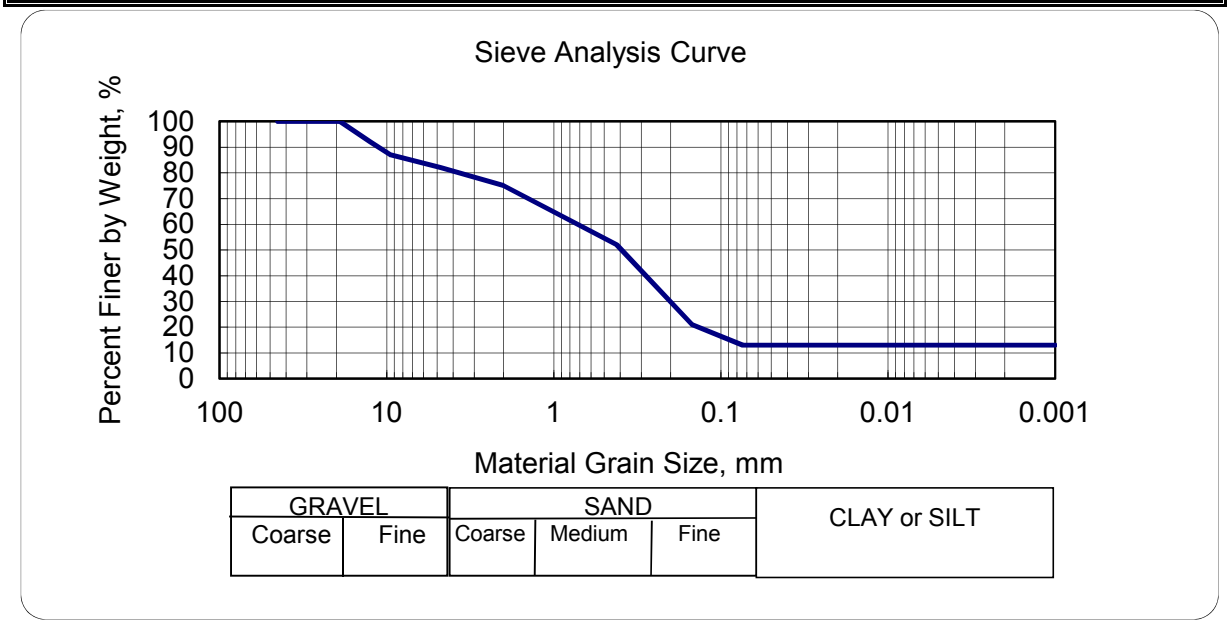
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	8	92
3/8 inch	13	87
No. 4	18	82
No. 10	25	75
No. 40	48	52
No. 100	79	21
No. 200	87	13
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/11/2017 **SAMPLE NO.:** S-9

BORING NO.: 2B-4 **SAMPLE DEPTH:** 20' - 21½'

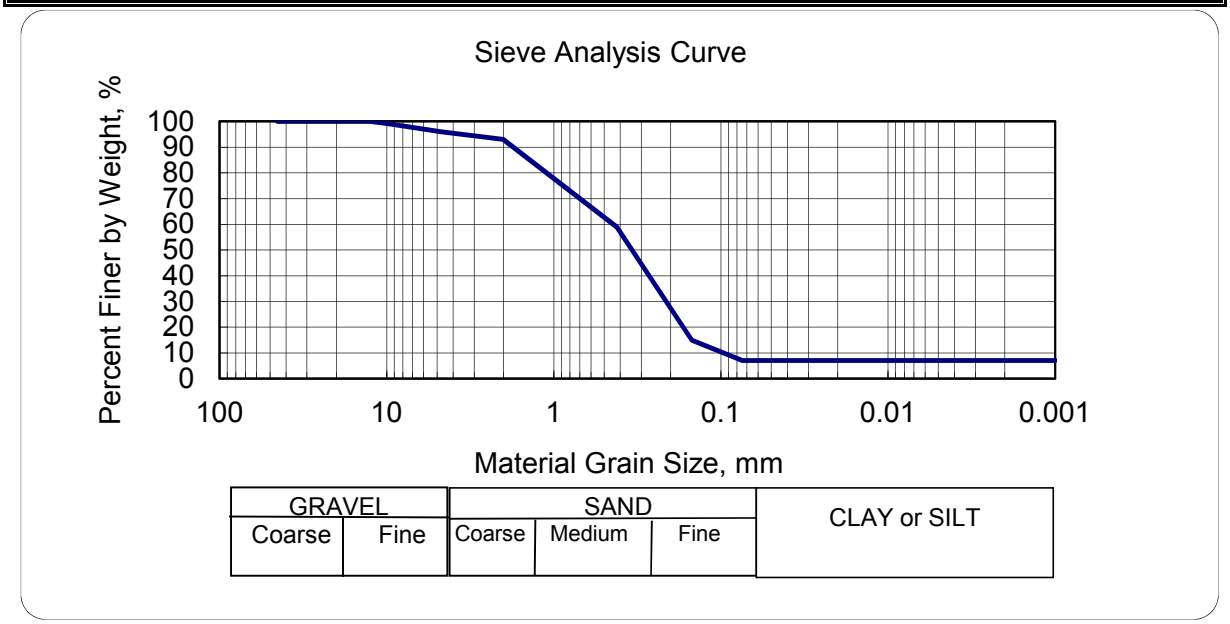
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	1	99
No. 4	4	96
No. 10	7	93
No. 40	41	59
No. 100	85	15
No. 200	93	7
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/7/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-5 **SAMPLE DEPTH:** 15' - 16½'

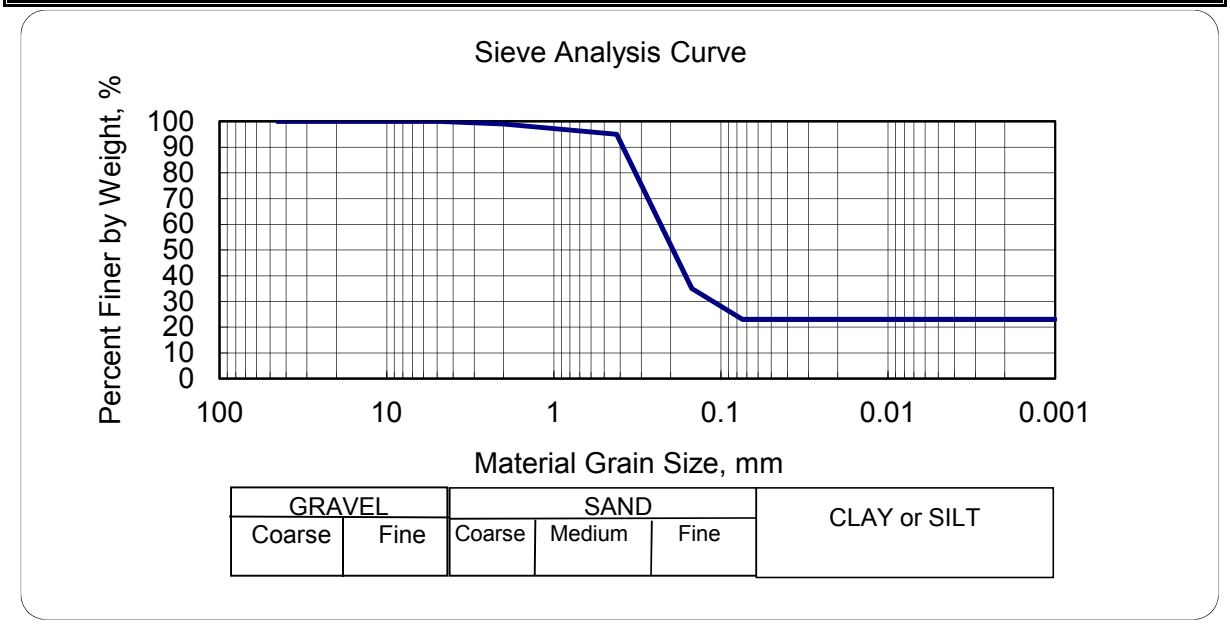
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Silty, Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	1	99
No. 40	5	95
No. 100	65	35
No. 200	77	23
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/7/2017 **SAMPLE NO.:** S-7

BORING NO.: 2B-6 **SAMPLE DEPTH:** 18½' - 20'

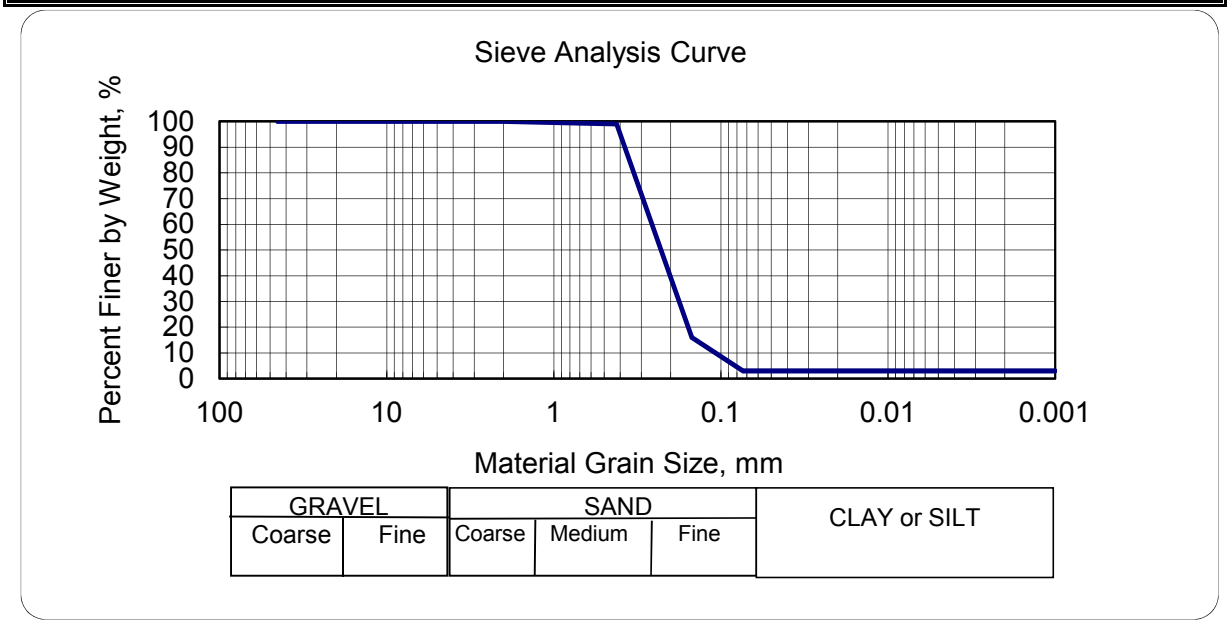
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	1	99
No. 100	84	16
No. 200	97	3
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/7/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-7 **SAMPLE DEPTH:** 15' - 16½'

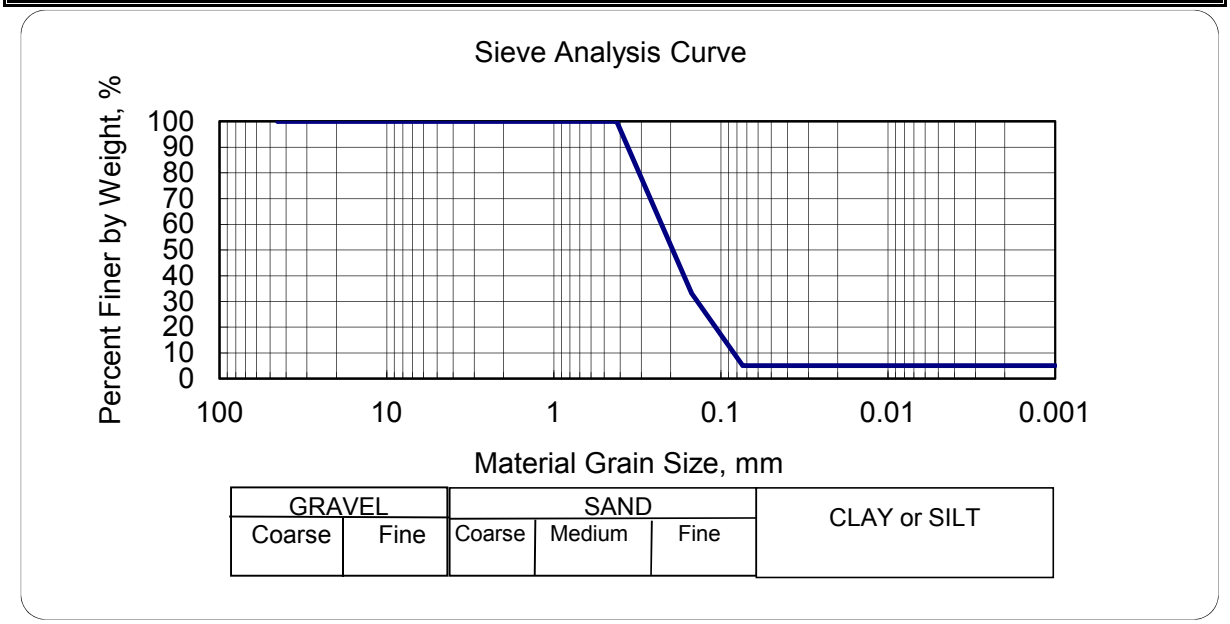
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	0	100
No. 100	67	33
No. 200	95	5
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/7/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-8 **SAMPLE DEPTH:** 15' - 16½'

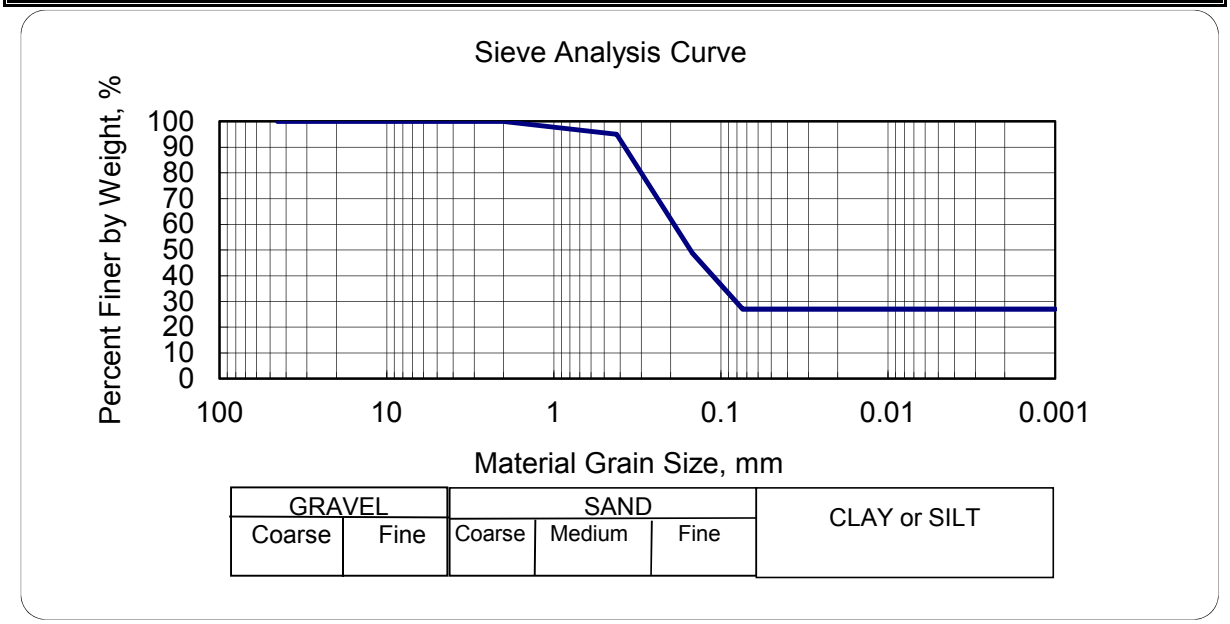
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Silty, Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	5	95
No. 100	51	49
No. 200	73	27
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/7/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-9 **SAMPLE DEPTH:** 15' - 16½'

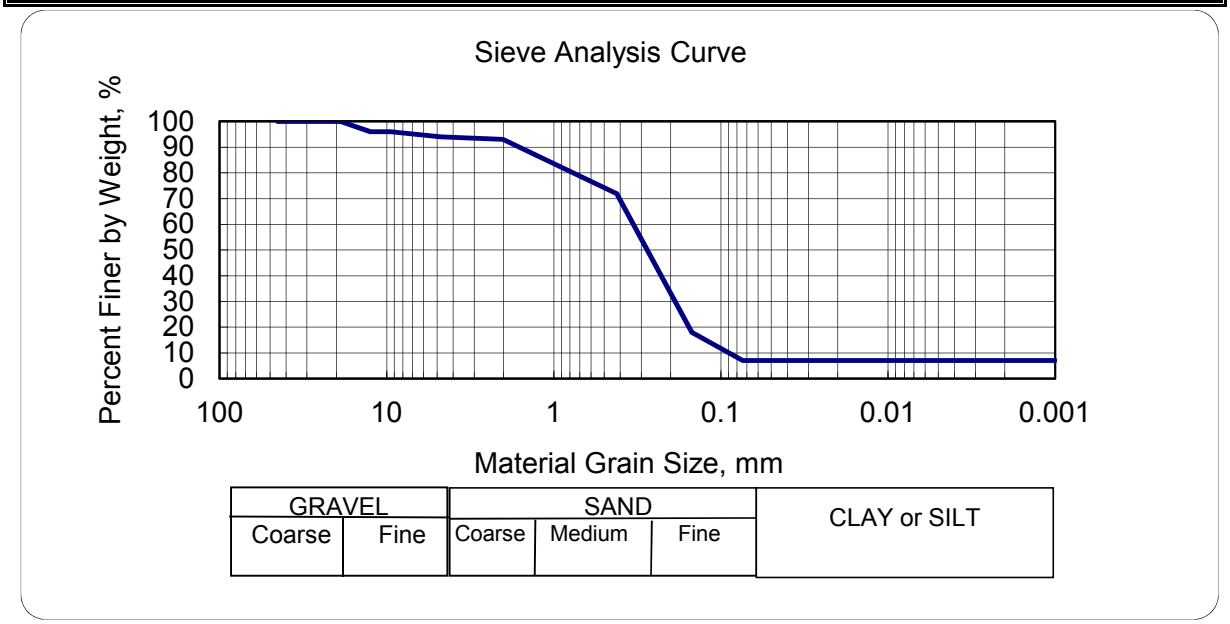
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	4	96
3/8 inch	4	96
No. 4	6	94
No. 10	7	93
No. 40	28	72
No. 100	82	18
No. 200	93	7
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/28/2017 **SAMPLE NO.:** S-7

BORING NO.: 2B-10 **SAMPLE DEPTH:** 20' - 21½'

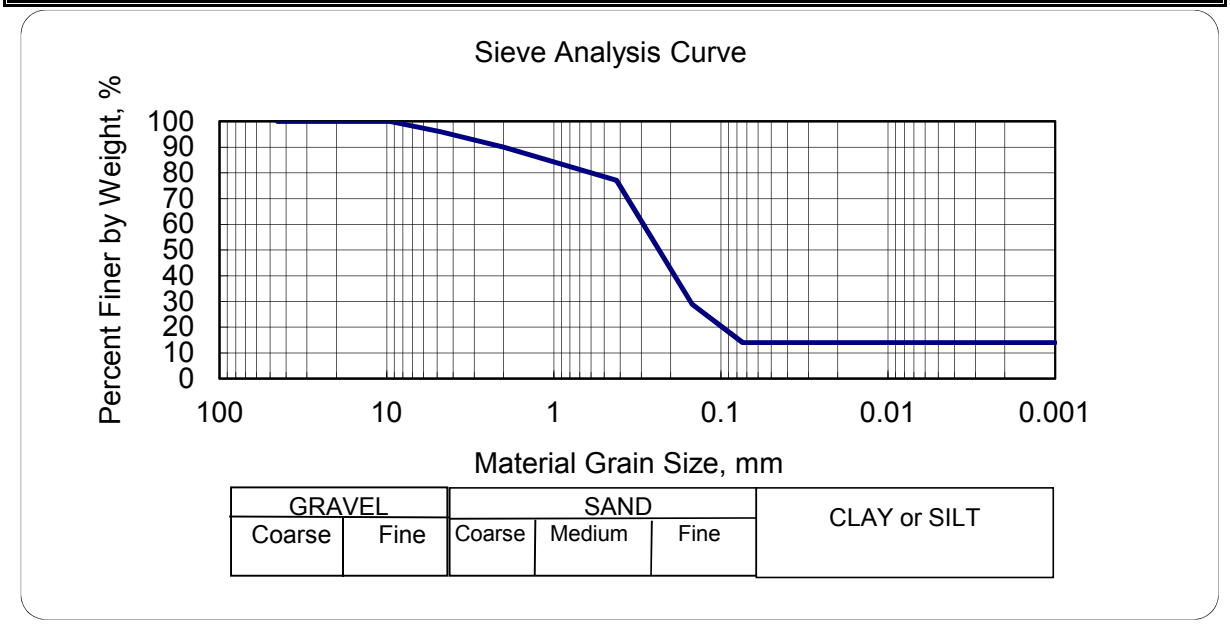
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	4	96
No. 10	10	90
No. 40	23	77
No. 100	71	29
No. 200	86	14
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/28/2017 **SAMPLE NO.:** S-4

BORING NO.: 2B-11 **SAMPLE DEPTH:** 7½' - 9'

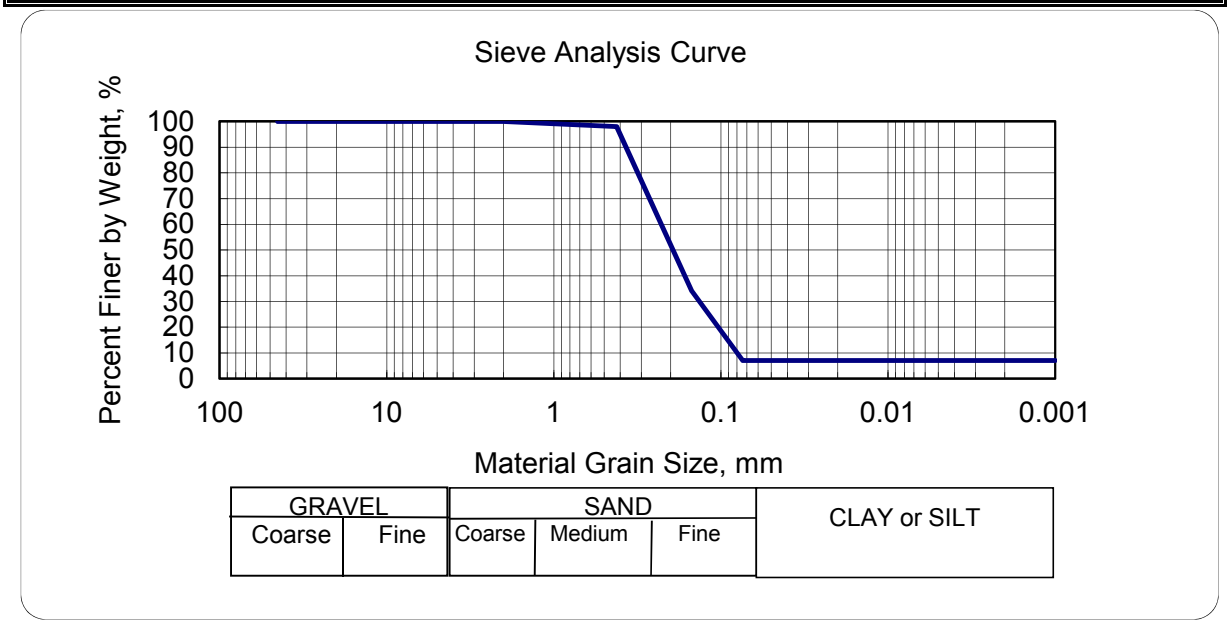
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	2	98
No. 100	66	34
No. 200	93	7
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/20/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-12 **SAMPLE DEPTH:** 15' - 16½'

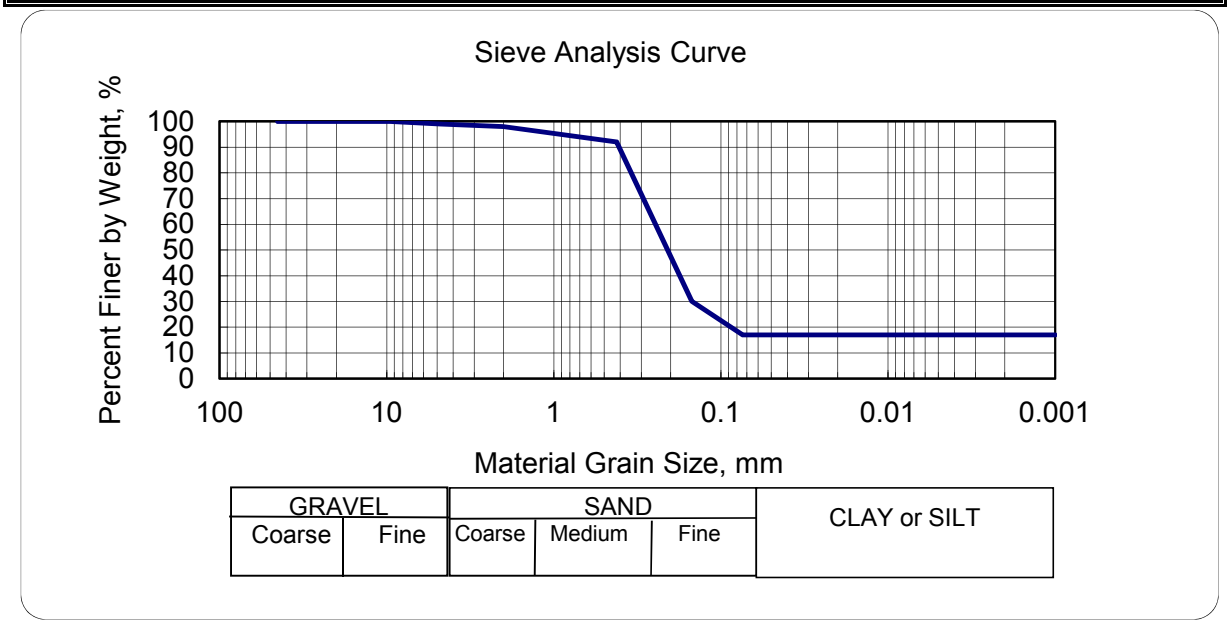
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	1	99
No. 10	2	98
No. 40	8	92
No. 100	70	30
No. 200	83	17
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/20/2017 **SAMPLE NO.:** S-5

BORING NO.: 2B-13 **SAMPLE DEPTH:** 10' - 11½'

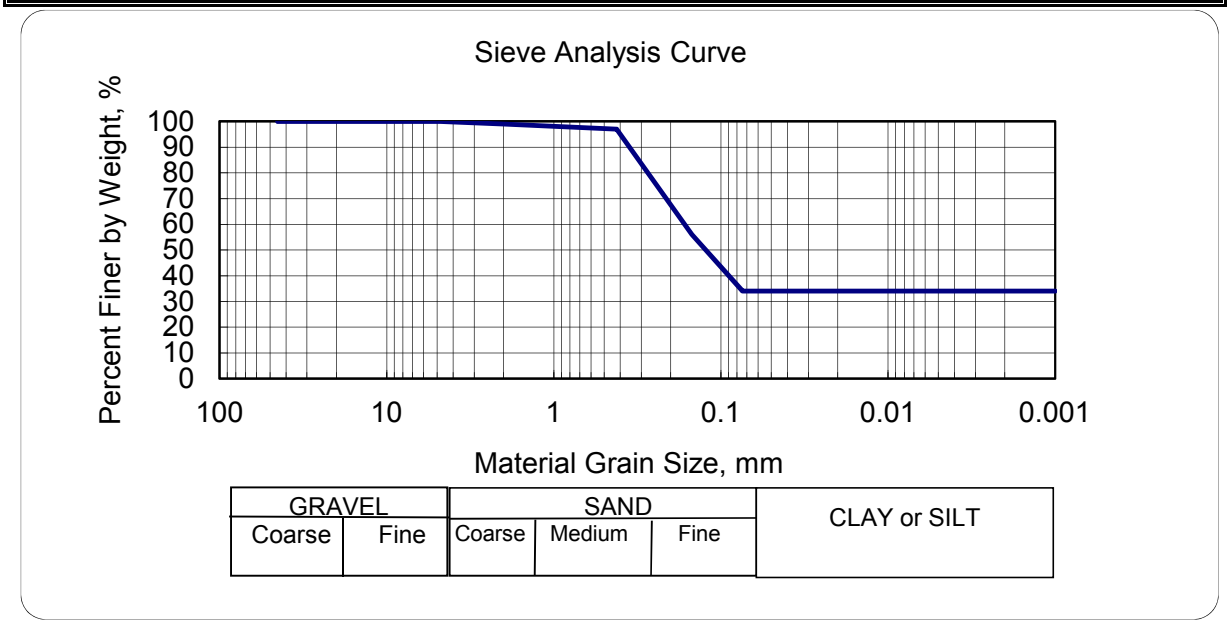
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown to Multicolored with interbedded clay layer

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	1	99
No. 40	3	97
No. 100	44	56
No. 200	66	34
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/9/2017 **SAMPLE NO.:** S-4

BORING NO.: 2B-14 **SAMPLE DEPTH:** 7½' - 9'

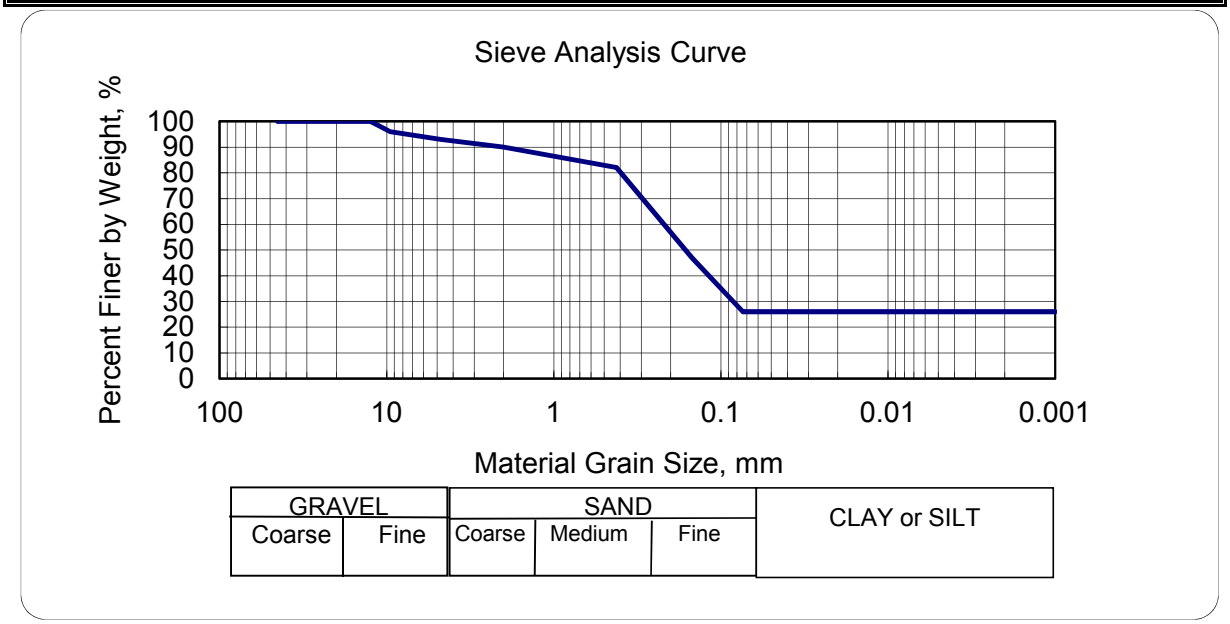
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	4	96
No. 4	7	93
No. 10	10	90
No. 40	18	82
No. 100	53	47
No. 200	74	26
0.005 mm	-	-
0.001 mm	-	-



construction quality control
testing and engineering

Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/8/2017 **SAMPLE NO.:** S-4

BORING NO.: 2B-15 **SAMPLE DEPTH:** 7½' - 9'

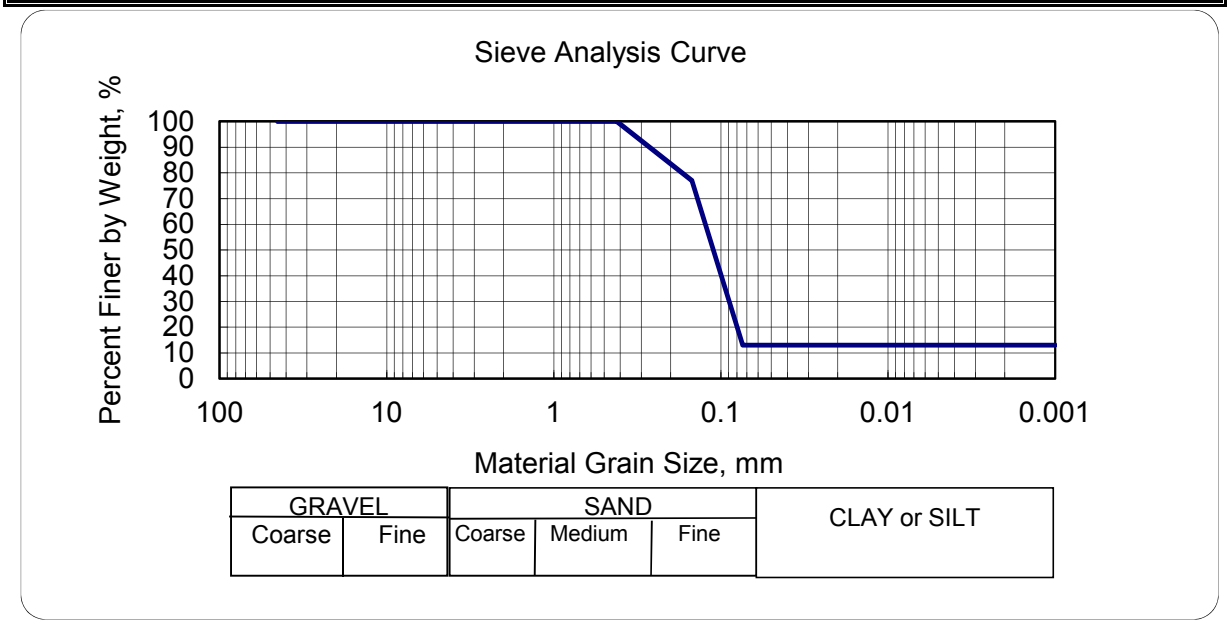
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Silty, Light Brown to Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	0	100
No. 100	23	77
No. 200	87	13
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/11/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-16 **SAMPLE DEPTH:** 15' - 16½'

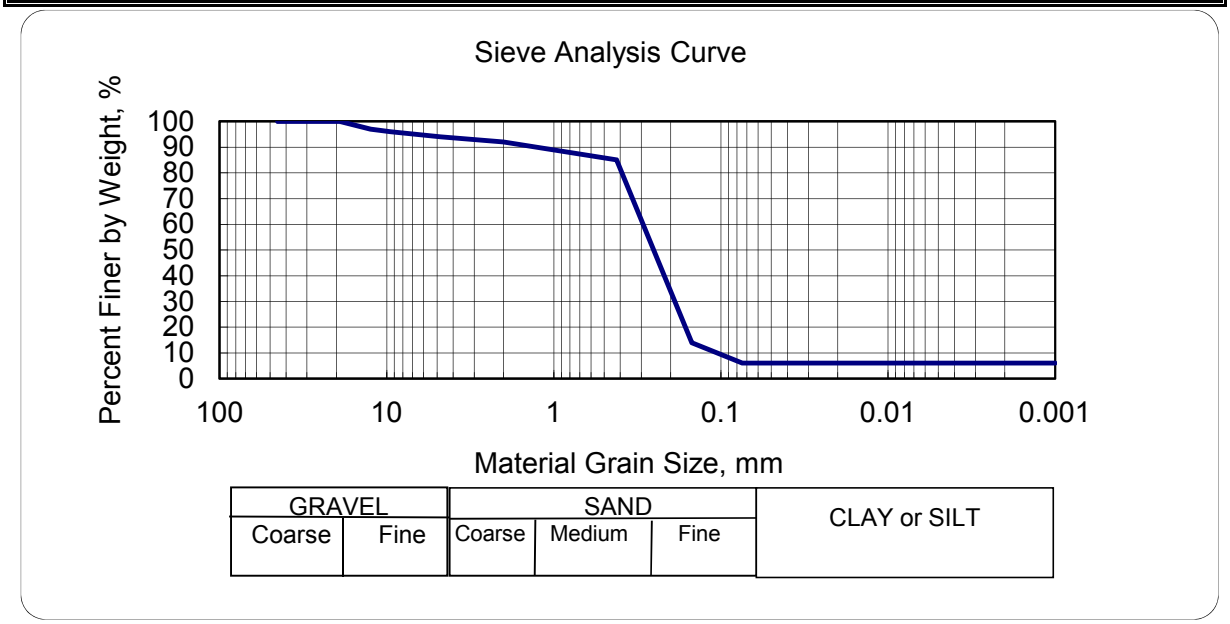
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	3	97
3/8 inch	4	96
No. 4	6	94
No. 10	8	92
No. 40	15	85
No. 100	86	14
No. 200	94	6
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/8/2017 **SAMPLE NO.:** S-4

BORING NO.: 2B-17 **SAMPLE DEPTH:** 7½' - 9'

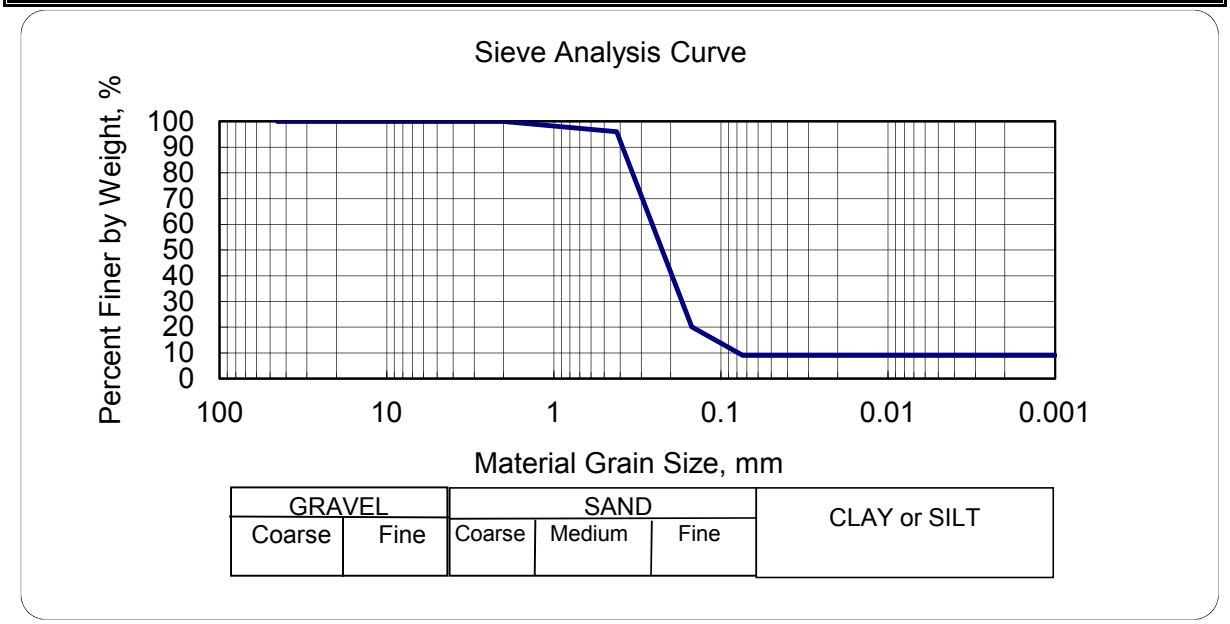
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	4	96
No. 100	80	20
No. 200	91	9
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/11/2017 **SAMPLE NO.:** S-8

BORING NO.: 2B-18 **SAMPLE DEPTH:** 23½' - 25'

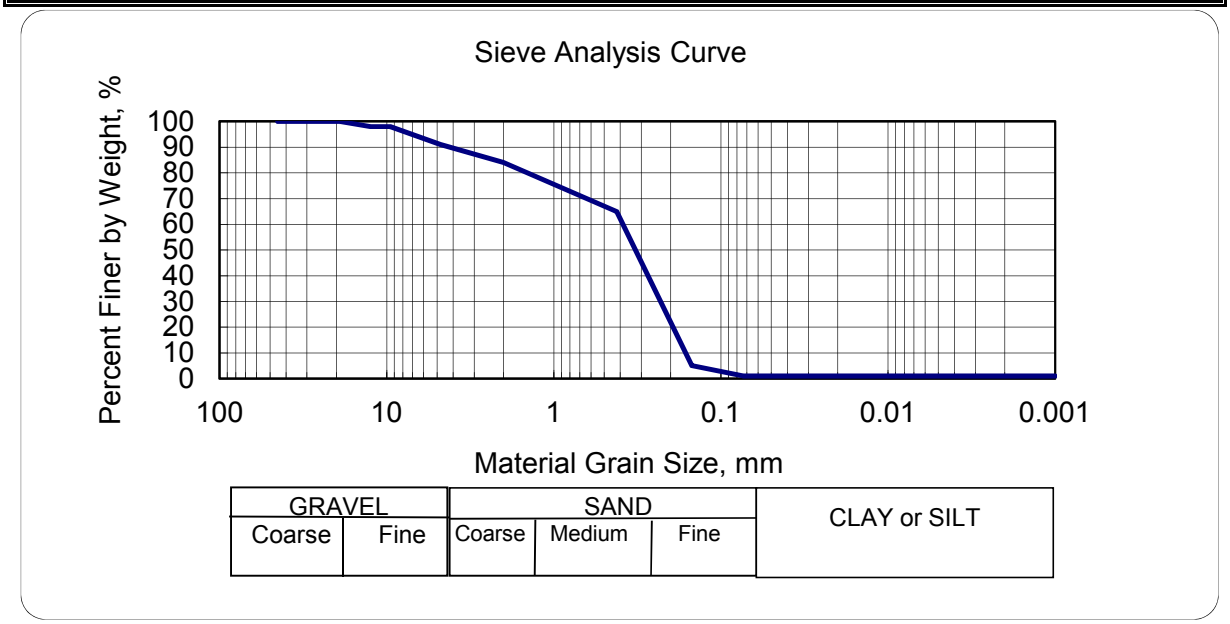
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	2	98
3/8 inch	2	98
No. 4	9	91
No. 10	16	84
No. 40	35	65
No. 100	95	5
No. 200	99	1
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/11/2017 **SAMPLE NO.:** S-4

BORING NO.: 2B-19 **SAMPLE DEPTH:** 7½' - 9'

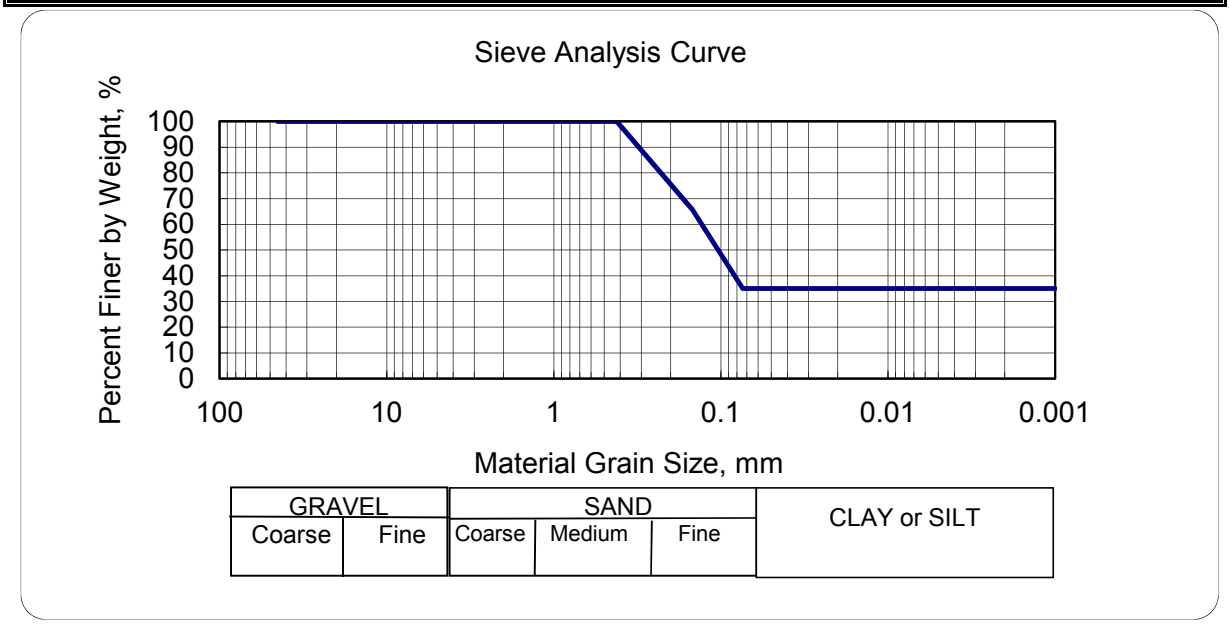
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Silty, Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	0	100
No. 100	34	66
No. 200	65	35
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/11/2017 **SAMPLE NO.:** S-8

BORING NO.: 2B-20 **SAMPLE DEPTH:** 7½' - 9'

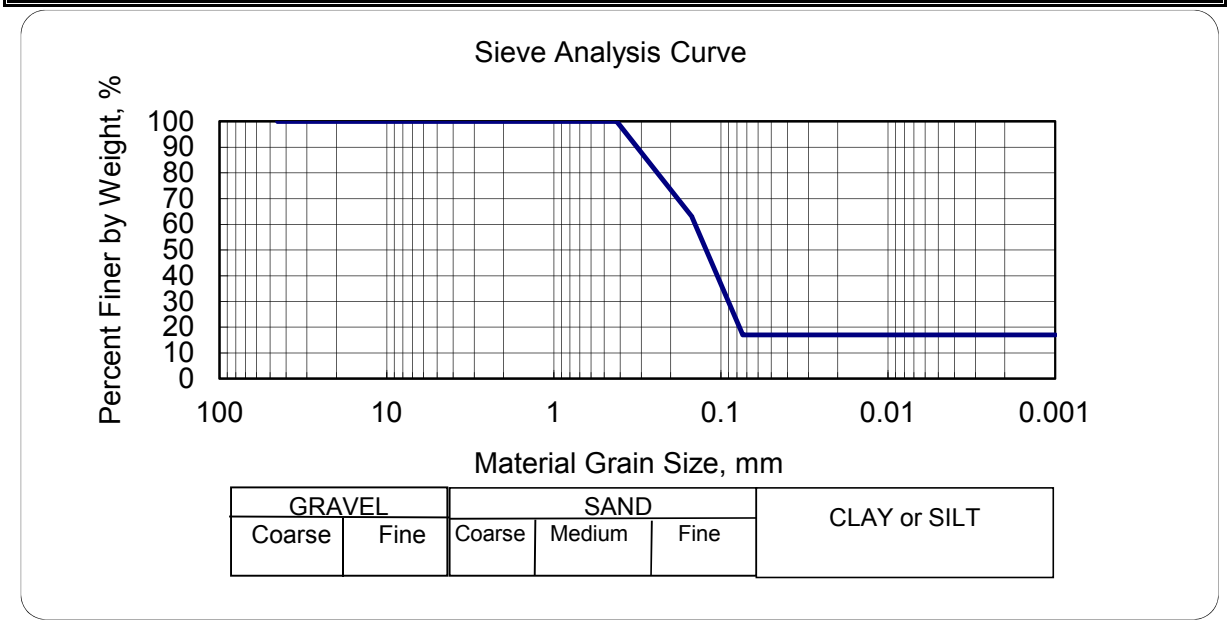
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Silty, Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	0	100
No. 100	37	63
No. 200	83	17
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/27/2017 **SAMPLE NO.:** S-5

BORING NO.: 2B-21 **SAMPLE DEPTH:** 10' - 11½'

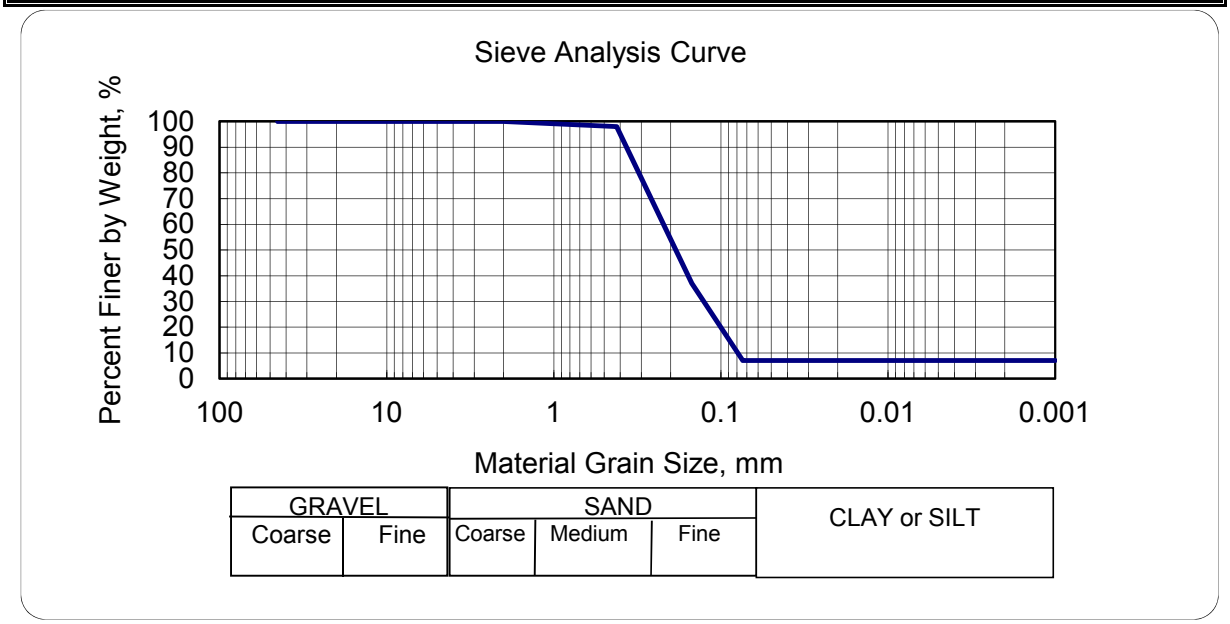
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	2	98
No. 100	63	37
No. 200	93	7
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/27/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-22 **SAMPLE DEPTH:** 15' - 16½'

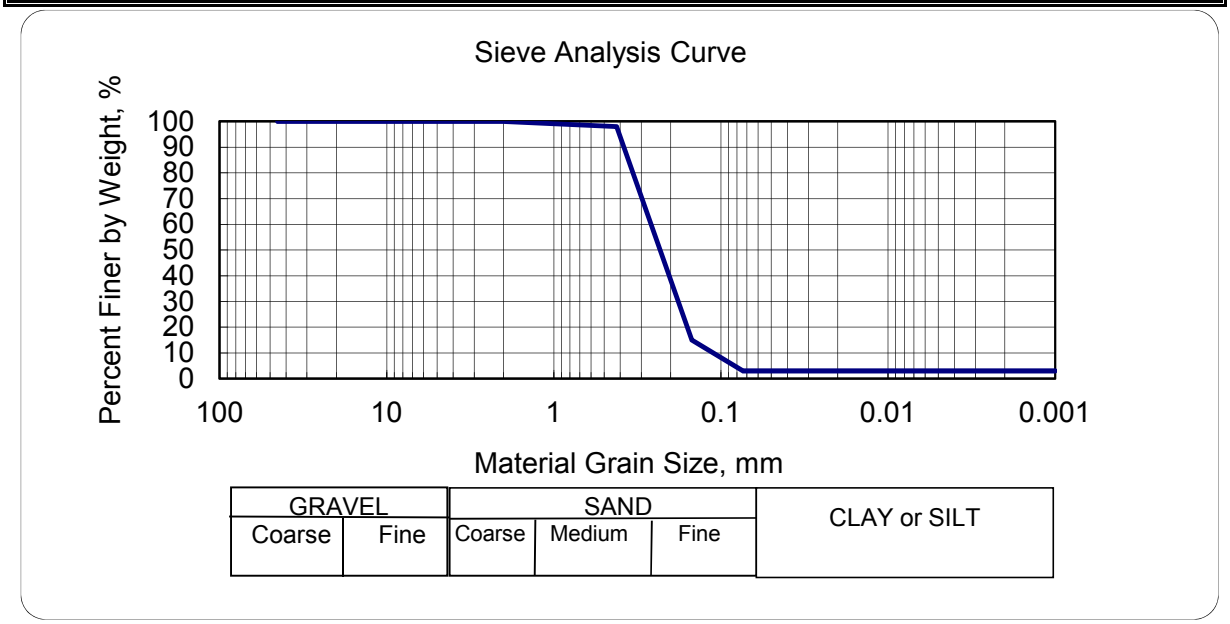
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	2	98
No. 100	85	15
No. 200	97	3
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/11/2017 **SAMPLE NO.:** S-1

BORING NO.: 2B-23 **SAMPLE DEPTH:** 0' - 1½'

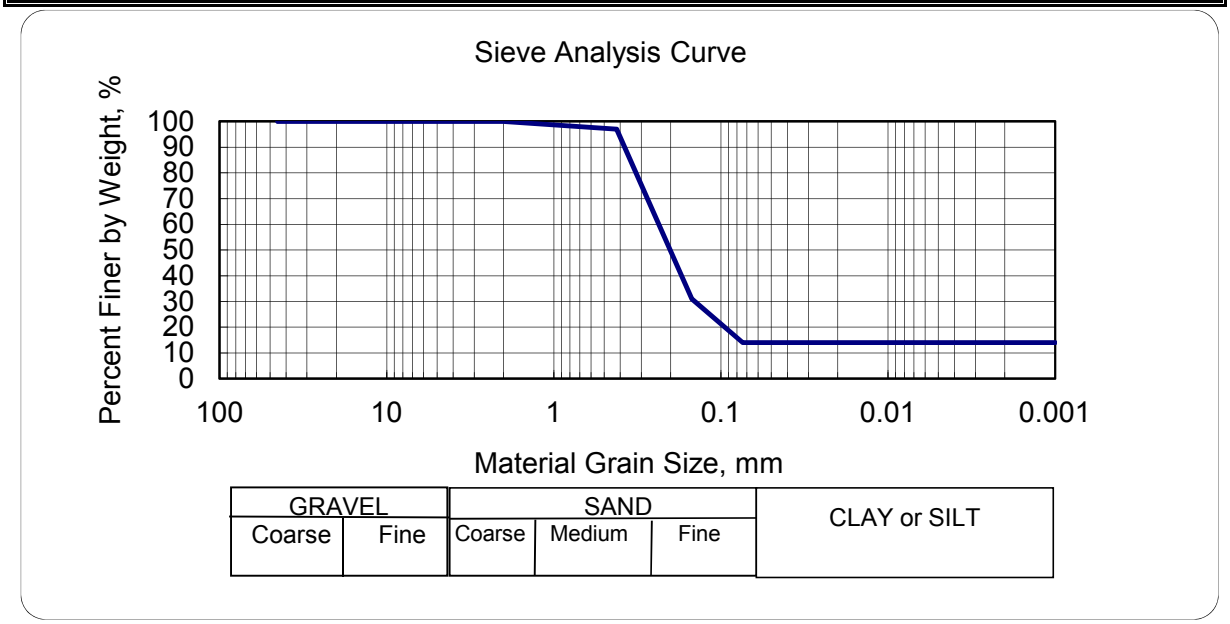
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Silty, Light Brown to Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	3	97
No. 100	69	31
No. 200	86	14
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/1/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-24 **SAMPLE DEPTH:** 15' - 16½'

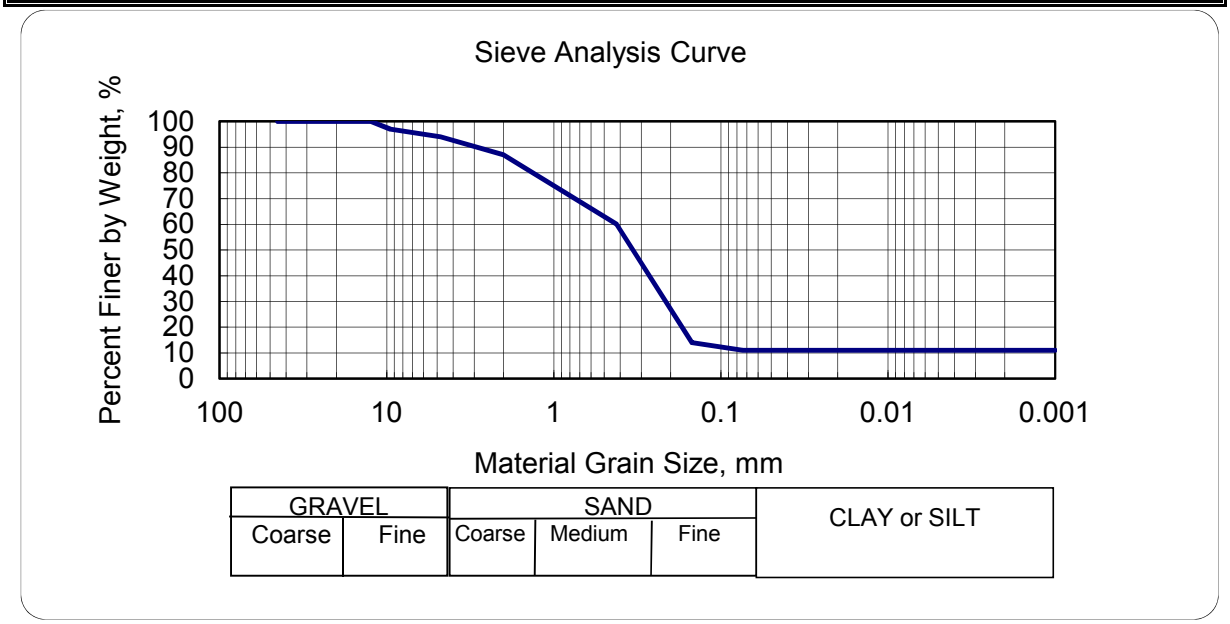
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	3	97
No. 4	6	94
No. 10	13	87
No. 40	40	60
No. 100	86	14
No. 200	89	11
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/1/2017 **SAMPLE NO.:** S-5

BORING NO.: 2B-25 **SAMPLE DEPTH:** 10' - 11½'

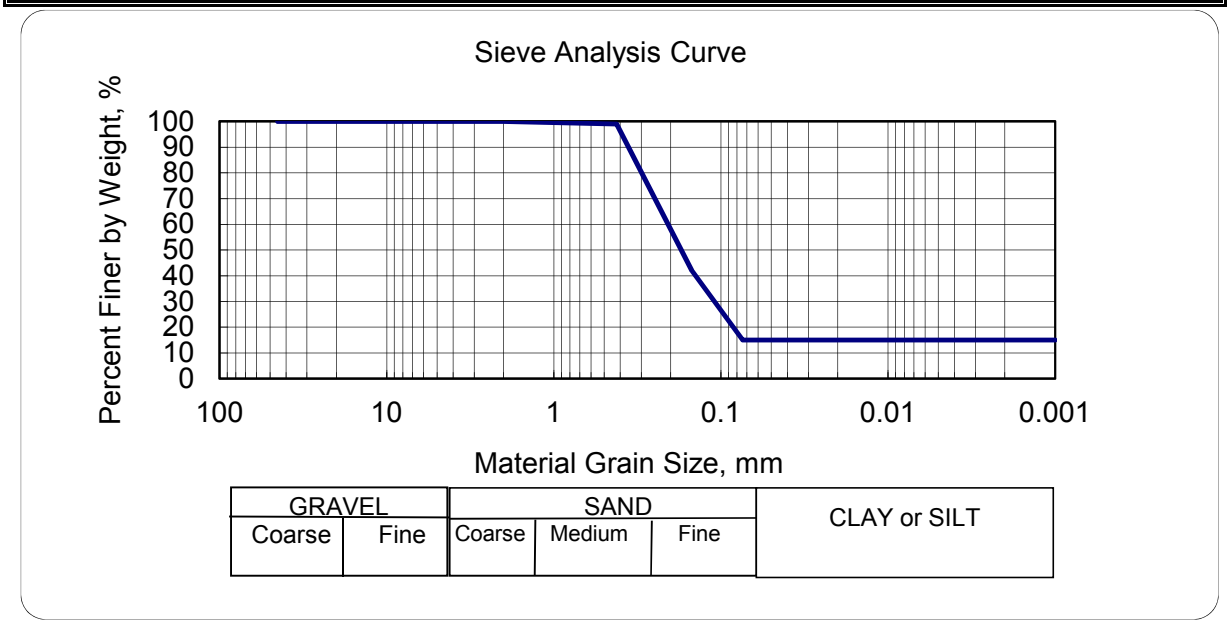
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Silty, Light Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	1	99
No. 100	58	42
No. 200	85	15
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/1/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-26 **SAMPLE DEPTH:** 15' - 16½'

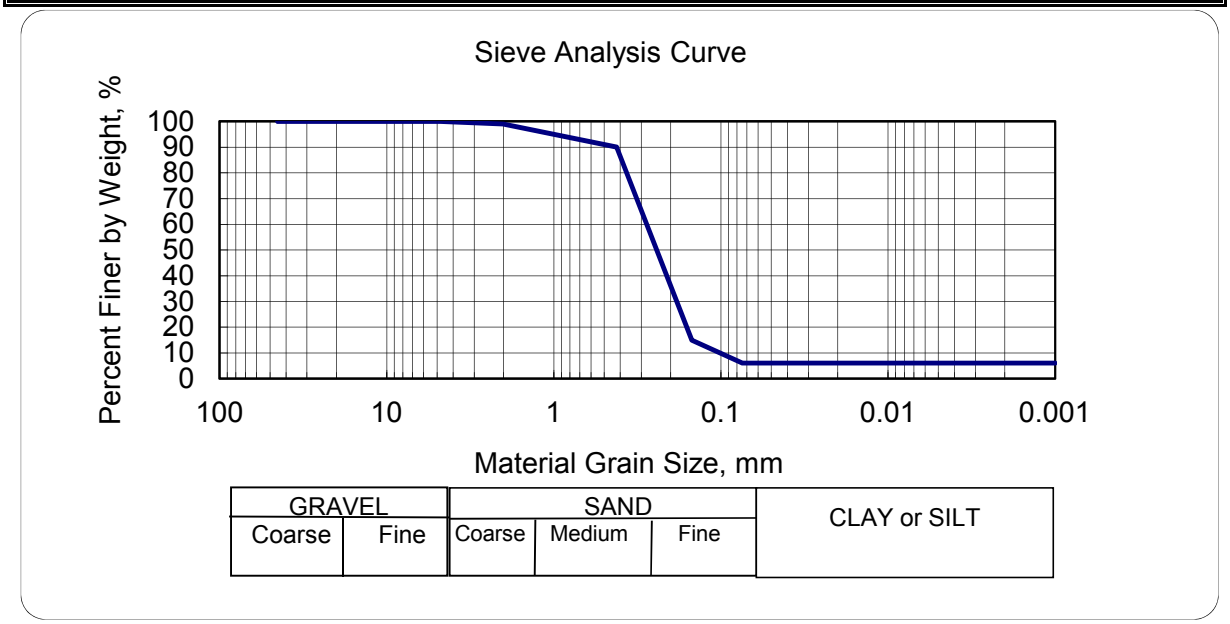
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Light Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	1	99
No. 40	10	90
No. 100	85	15
No. 200	94	6
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/1/2017 **SAMPLE NO.:** S-7

BORING NO.: 2B-27 **SAMPLE DEPTH:** 18½' - 20'

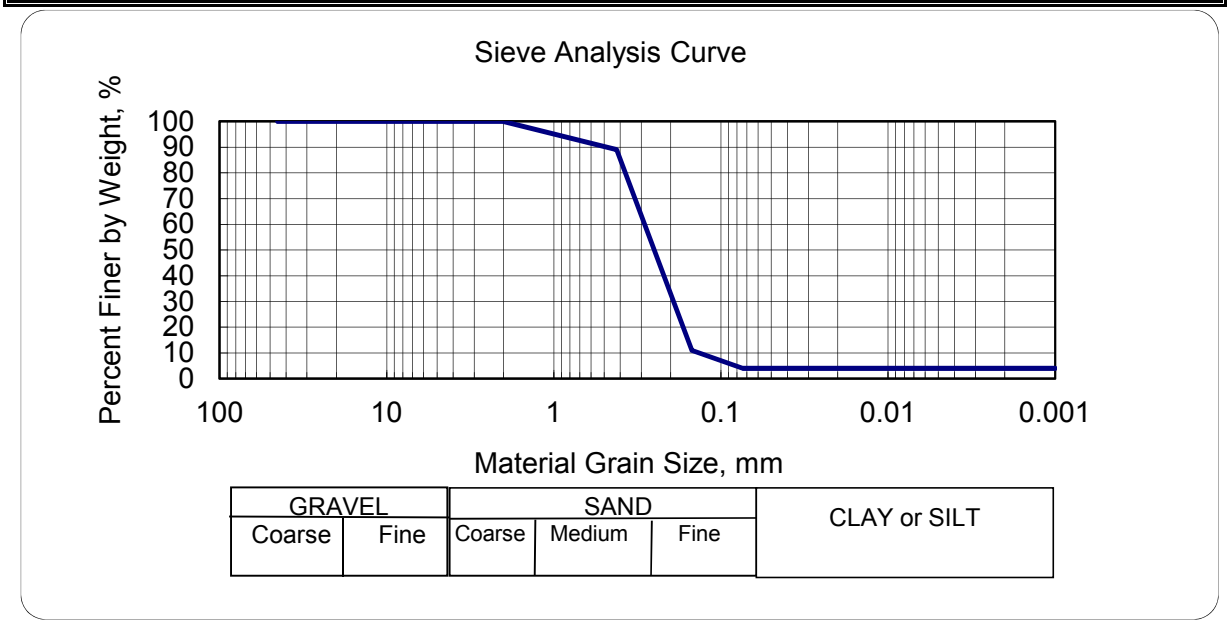
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	11	89
No. 100	89	11
No. 200	96	4
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/1/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-28 **SAMPLE DEPTH:** 15' - 16½'

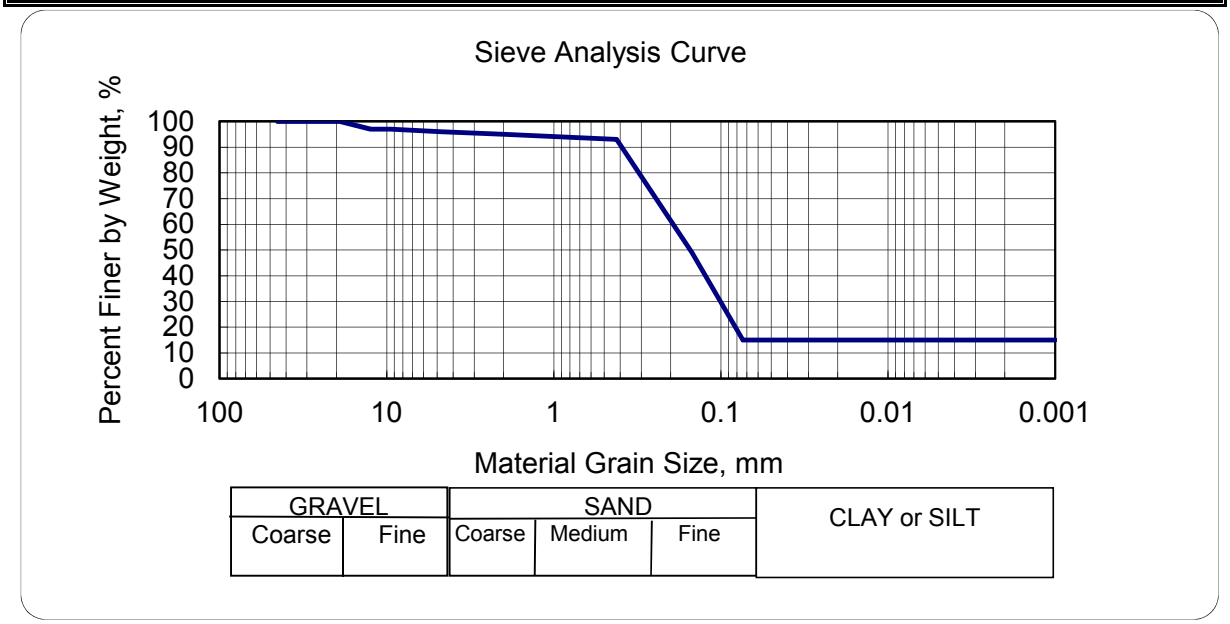
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Dark Brown to Black

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	3	97
3/8 inch	3	97
No. 4	4	96
No. 10	5	95
No. 40	7	93
No. 100	51	49
No. 200	85	15
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/8/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-29 **SAMPLE DEPTH:** 15' - 16½'

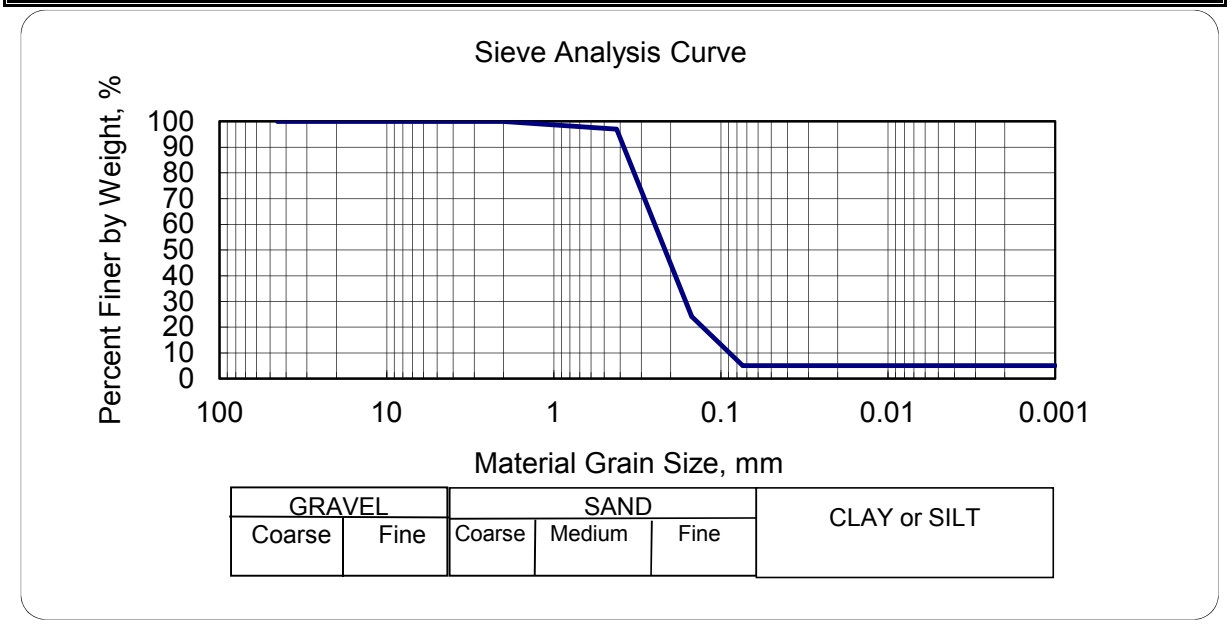
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Light Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	3	97
No. 100	76	24
No. 200	95	5
0.005 mm	-	-
0.001 mm	-	-



construction quality control
testing and engineering

Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/2/2017 **SAMPLE NO.:** S-7

BORING NO.: 2B-30 **SAMPLE DEPTH:** 20' - 21½'

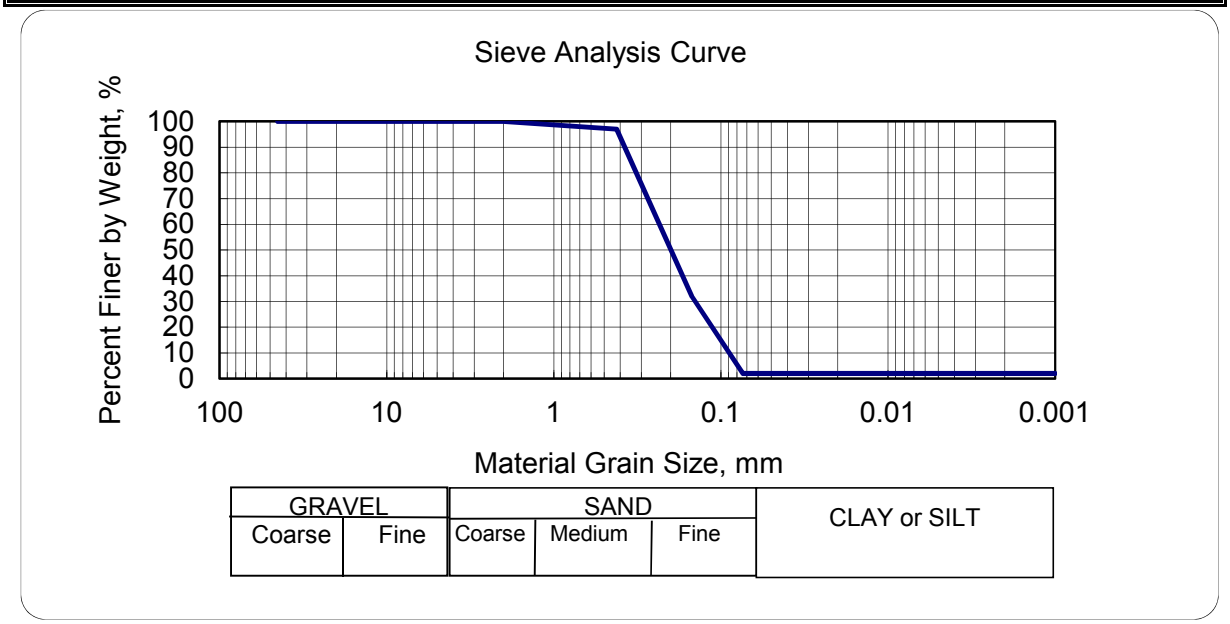
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Light Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	0	100
No. 40	3	97
No. 100	68	32
No. 200	98	2
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/2/2017 **SAMPLE NO.:** S-5

BORING NO.: 2B-31 **SAMPLE DEPTH:** 10' - 11½'

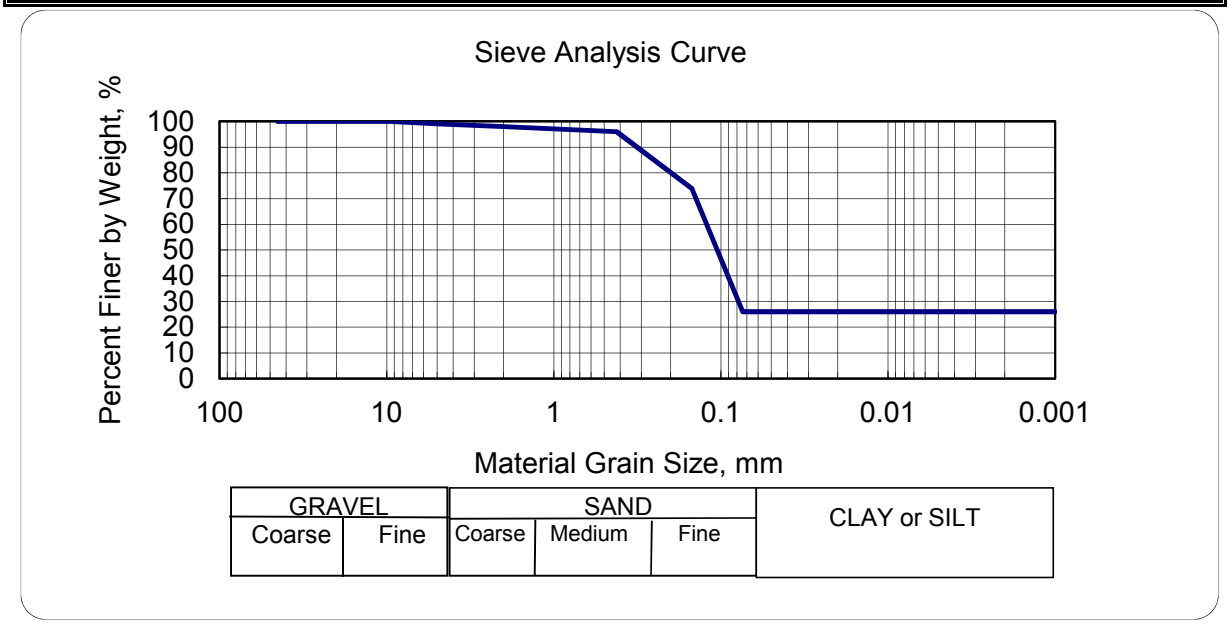
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Light Brown to Brown

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	1	99
No. 10	2	98
No. 40	4	96
No. 100	26	74
No. 200	74	26
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/2/2017 **SAMPLE NO.:** S-5

BORING NO.: 2B-32 **SAMPLE DEPTH:** 10' - 11½'

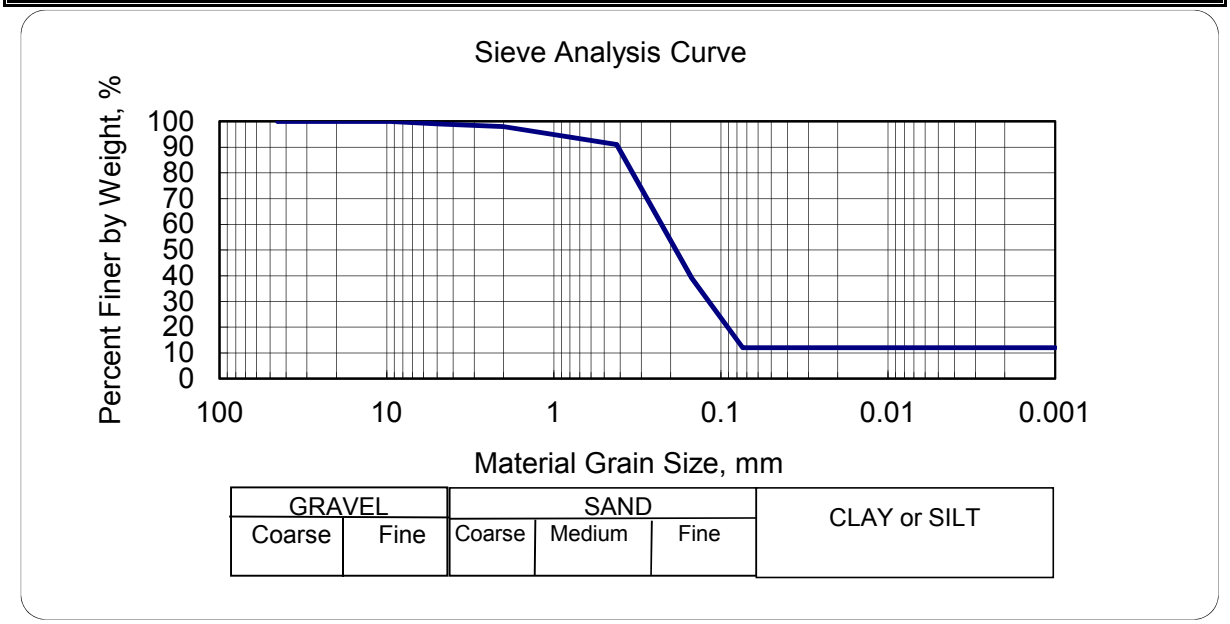
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	1	99
No. 10	2	98
No. 40	9	91
No. 100	61	39
No. 200	88	12
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 10/2/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-33 **SAMPLE DEPTH:** 15' - 16½'

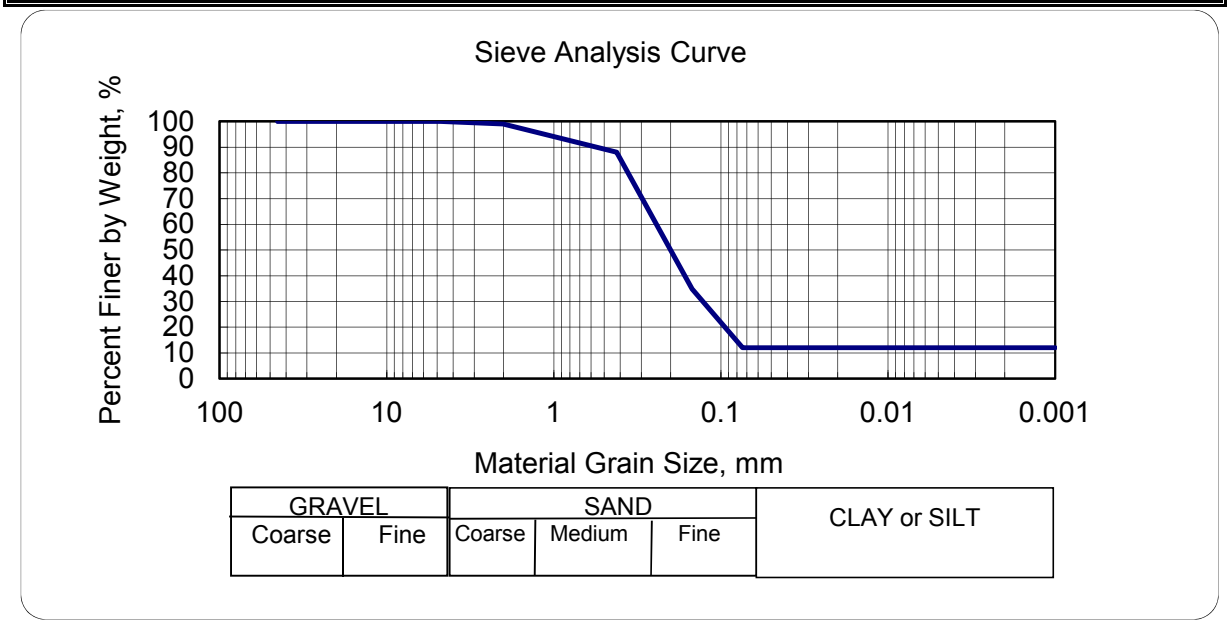
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Medium Grained, Poorly Graded, Light Brown to Multicolored with silt

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	0	100
3/8 inch	0	100
No. 4	0	100
No. 10	1	99
No. 40	12	88
No. 100	65	35
No. 200	88	12
0.005 mm	-	-
0.001 mm	-	-



SOIL SAMPLE PARTICLE SIZE ANALYSIS TEST REPORT

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

SAMPLE DATE: 9/8/2017 **SAMPLE NO.:** S-6

BORING NO.: 2B-34 **SAMPLE DEPTH:** 15' - 16½'

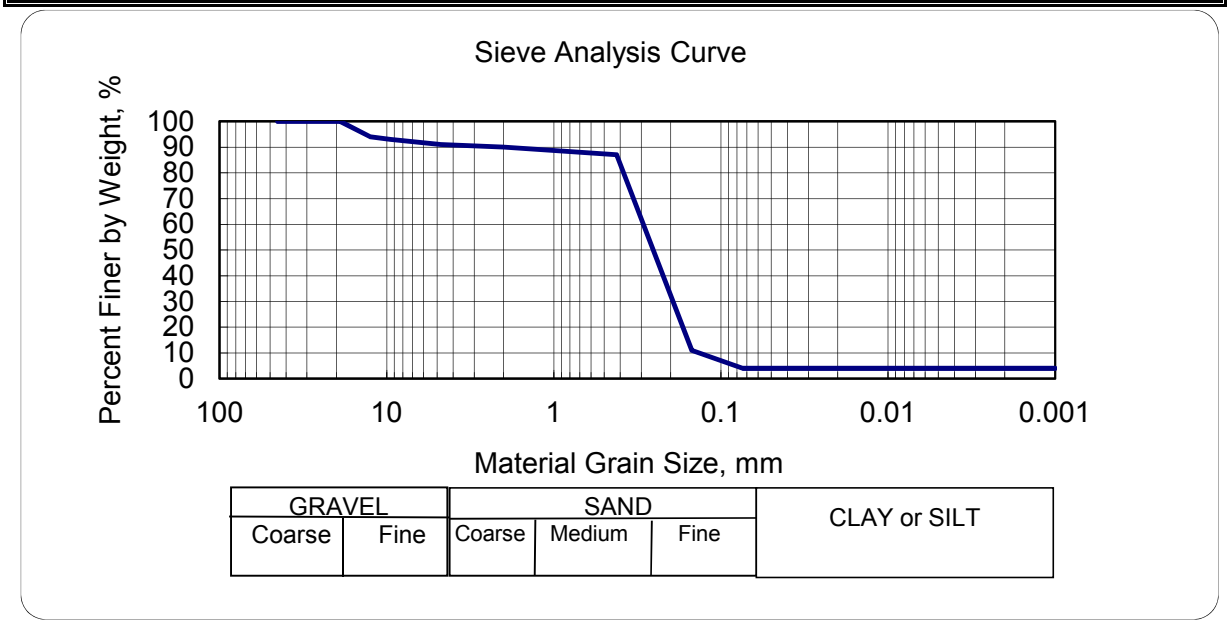
SOIL TYPE/DESCRIPTION: On-Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored

ANALYSIS TEST RESULTS

Sieve Analysis Test:

Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
1-3/4 inches	0	100
1-1/2 inches	0	100
1 inch	0	100
3/4 inch	0	100
1/2 inch	6	94
3/8 inch	7	93
No. 4	9	91
No. 10	10	90
No. 40	13	87
No. 100	89	11
No. 200	96	4
0.005 mm	-	-
0.001 mm	-	-



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis /Testing

SUMMARY OF LABORATORY ENGINEERING SOIL CLASSIFICATION TEST RESULTS

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW – Boone Street Sewer Interceptor Relief Route
Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

11/17/17

PROJECT NO.: AGCQC16-056

CLIENT: Brown and Caldwell

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-1	1	SS	0' – 1 ½'	30	12	30	20	10	93	26	SC
	2	SS	2 ½' – 4'	6							
	3	SS	5 – 6 ½'	4	7	-	-	NP	94	21	SM
	4	SS	7 ½' – 9'	1							
	5	SS	10' – 11 ½'	2	5	-	-	NP	98	20	SM
	6	SS	15' – 16 ½'	6							
	7	SS	20' – 21 ½'	6	7	-	-	NP	100	36	SM
	8	SS	23 ½' – 25	6							
2B-2	1	SS	0' – 1 ½'	9							
	2	SS	2 ½' – 4'	9	8	-	-	NP	97	31	SM
	3	SS	5 – 6 ½'	3							
	4	SS	7 ½' – 9'	5	5						
	5	SS	10' – 11 ½'	6	7	-	-	NP	99	26	SM
	6	SS	15' – 16 ½'	22							
	7	SS	20' – 21 ½'	2	9						
	8	SS	23 ½' – 25	4							
2B-3	1	SS	0' – 1 ½'	11							
	2	SS	2 ½' – 4'	6	8	-	-	-	100	29	SM
	3	SS	5 – 6 ½'	8							
	4	SS	7 ½' – 9'	10	7	-	-	-	100	21	SM
	5	SS	10' – 11 ½'	9							
	6	SS	12 ½' – 14'	11	8	-	-	-	99	29	SM

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-3	7	SS	15' – 16 ½'	11							
	8	SS	17 ½' – 19'	14	4	-	-	-	88	13	SM
	9	SS	20' – 21 ½'	8							
	10	SS	22 ½' – 24'	14	22	-	-	-	100	39	SM
	11	SS	25' – 26 ½'	8	17	27	13	14	99	53	CL
	12	SS	27 ½' – 29'	22							
	13	SS	30' – 31 ½'	14	19	-	-	-	96	12	SP-SM
	14	SS	32 ½' - 34	13							
	15	SS	34 - 35 ½'	16							
2B-4	1	SS	0' – 1 ½'	6							
	2	SS	2 ½' – 4'	7	24	50	19	31	100	79	CH
	3	SS	5' – 6 ½'	8	27	53	22	31	100	89	CH
	4	SS	7 ½' – 9'	12							
	5	SS	10' – 11 ½'	16	4	-	-	NP	96	4	SP
	6	SS	12 ½' - 14'	13							
	7	SS	15' – 16 ½'	12	5						
	8	SS	17 ½' – 19'	11							
	9	SS	20' – 21 ½'	18	5	-	-	NP	96	7	SP-SM
	10	SS	22 ½' – 24'	11							
	11	SS	25' – 26 ½'	4							
	12	SS	27 ½' – 29'	3	45	95	24	71	100	99	CH
	13	SS	30' – 31 ½'	2							
	14	SS	32 ½' – 34'	8							
	15	SS	34' – 35 ½'	15							
2B-5	1	SS	0' – 1 ½'	12							
	2	SS	2 ½' – 4'	11	16	30	19	11	97	75	CL
	3	SS	5' – 6 ½'	11							
	4	SS	7 ½' – 9'	11	5	-	-	NP	100	31	ML
	5	SS	10' – 11 ½'	12							
	6	SS	15' – 16 ½'	17	6	-	-	NP	100	23	SM
	7	SS	18 ½' – 20'	22							

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-6	1	SS	0' – 1 ½'	7	26	43	18	25	100	95	CL
	2	SS	2 ½' – 4'	11							
	3	SS	5' – 6 ½'	10	3	-	-	NP	100	6	SP-SM
	4	SS	7 ½' – 9'	14							
	5	SS	10' – 11 ½'	14	3						
	6	SS	15' – 16 ½'	14							
	7	SS	18 ½' – 20'	15	3	-	-	NP	100	3	SP
2B-7	1	SS	0' – 1 ½'	10							
	2	SS	2 ½' – 4'	15	24	52	22	30	100	93	CH
	3	SS	5' – 6 ½'	12							
	4	SS	7 ½' – 9'	10	31	79	30	49	100	100	CH
	5	SS	10' – 11 ½'	6							
	6	SS	15' – 16 ½'	10	5	-	-	NP	100	5	SP-SM
	7	SS	18 ½' – 20'	15							
2B-8	1	SS	0' – 1 ½'	12	9	29	15	14	85	36	SC
	2	SS	2 ½' – 4'	10							
	3	SS	5' – 6 ½'	6	16	31	15	16	100	71	CL
	4	SS	7 ½' – 9'	4	15	24	14	10	99	59	CL
	5	SS	10' – 11 ½'	5							
	6	SS	15' – 16 ½'	6	10	-	-	NP	100	27	SM
	7	SS	18 ½' – 20'	6							
2B-9	1	SS	0' – 1 ½'	5							
	2	SS	2 ½' – 4'	10	18	43	22	21	99	75	CL
	3	SS	5' – 6 ½'	7	29						
	4	SS	7 ½' – 9'	10							
	5	SS	10' – 11 ½'	3	22	28	15	13	100	79	CL
	6	SS	15' – 16 ½'	19	4	-	-	NP	94	7	SP-SM
	7	SS	20' – 21 ½'	17							
	8	SS	23 ½' – 25'	16							

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-10	1	GB	0' – 1'		24	30	17	13	97	64	CL
	2	SS	2 ½' – 4'	7							
	3	SS	5' – 6 ½'	16	6	-	-	NP	100	11	SP-SM
	4	SS	7 ½' – 9'	12							
	5	SS	10' – 11 ½'	16	4						
	6	SS	15' – 16 ½'	7							
	7	SS	20' – 21 ½'	20	7	-	-	NP	100	14	SM
	8	GB	23 ½' – 25'								
2B-11	1	GB	0' – 1'								
	2	SS	2 ½' – 4'	7	33	-	-	NP	100	96	ML
	3	SS	5' – 6 ½'	14							
	4	SS	7 ½' – 9'	14	3	-	-	NP	100	7	SP-SM
	5	SS	10' – 11 ½'	21							
	6	SS	15' – 16 ½'	18	2						
	7	SS	20' – 21 ½'	13							
	8	SS	25' – 26 ½'	18							
	9	SS	30' – 31 ½'	10	31				100	94	
	10	SS	33 ½' – 35'	9							
2B-12	1	SS	0' – 1 ½'	10							
	2	SS	2 ½' – 4'	2	11	27	14	13	95	73	SC
	3	SS	5' – 6 ½'	4							
	4	SS	7 ½' – 9'	4	33	38	16	22	99	77	CL
	5	SS	10' – 11 ½'	3							
	6	SS	15' – 16 ½'	13	7	-	-	NP	99	17	SM
	7	SS	20' – 21 ½'	25							
	8	SS	25' – 26 ½'	11	27	27	13	14	99	81	CL
	9	SS	30' – 31 ½'	13							
	10	SS	33 ½' – 35'	15							

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-13	1	SS	0' – 1 ½'	8	17	30	22	8	98	84	CL
	2	SS	2 ½' – 4'	3							
	3	SS	5' – 6 ½'	8	13	-	-	NP	100	72	ML
	4	SS	7 ½' – 9'	6							
	5	SS	10' – 11 ½'	3	10	-	-	NP	100	34	SM
	6	SS	15' – 16 ½'	18							
	7	SS	20' – 21 ½'	13	13						
	8	SS	25' – 26 ½'	16	9	-	-	NP	100	26	SM
	9	SS	30' – 31 ½'	16							
	10	SS	33 ½ ' – 35'	22	4						
2B-14	1	SS	0' – 1 ½'	6							
	2	SS	2 ½' – 4'	9	8	-	-	NP	95	35	SM
	3	SS	5' – 6 ½'	14	7	-	-	NP	95	30	SM
	4	SS	7 ½' – 9'	9	8	-	-	NP	93	26	SM
	5	SS	10' – 11 ½'	6							
	6	SS	15' – 16 ½'	5	6						
	7	SS	20' – 21 ½'	2							
	8	SS	25' – 26 ½'	4	6	-	-	NP	98	16	SM
	9	SS	30' – 31 ½'	5							
	10	SS	35' – 36 ½'	25	16	-	-	NP	87	34	SM
	11	SS	38 ½' – 40'	30							
2B-15	1	SS	0' – 1 ½'	4	18	-	-	NP	100	62	ML
	2	SS	2 ½' – 4'	5							
	3	SS	5' – 6 ½'	6	14						
	4	SS	7 ½' – 9'	20	6	-	-	NP	100	13	SM
	5	SS	10' – 11 ½'	21							
	6	SS	15' – 16 ½'	14	5						
	7	SS	20' – 21 ½'	10							
	8	SS	23 ½' – 25'	21	2						

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-16	1	SS	0' – 1 ½'	12							
	2	SS	2 ½' – 4'	12	10	-	-	NP	97	32	SM
	3	SS	5' – 6 ½'	14							
	4	SS	7 ½' – 9'	3	11						
	5	SS	10' – 11 ½'	2	15	22	15	7	98	49	SC-SM
	6	SS	15' – 16 ½'	7	3	-	-	NP	94	6	SP-SM
	7	SS	20' – 21 ½'	5							
	8	SS	23 ½' – 25'	10	21	26	12	14	99	58	CL
2B-17	1	SS	0' – 1 ½'	50/4"							
	2	SS	2 ½' – 4'	9	10	-	-	NP	92	27	SM
	3	SS	5' – 6 ½'	8							
	4	SS	7 ½' – 9'	21	4	-	-	NP	100	9	SP-SM
	5	SS	10' – 11 ½'	11							
	6	SS	15' – 16 ½'	23	4	-	-	NP	99	4	SP
	7	SS	18 ½' – 20'	15							
2B-18	1	SS	0' – 1 ½'	5	34	36	17	19	100	92	CL
	2	SS	2 ½' – 4'	4	27	29	19	10	100	84	CL
	3	SS	5' – 6 ½'	9							
	4	SS	7 ½' – 9'	11	4	-	-	NP	100	3	SP
	5	SS	10' – 11 ½'	15							
	6	SS	15' – 16 ½'	19	3						
	7	SS	20' – 21 ½'	17							
	8	SS	23 ½' – 25'	12	7	-	-	NP	91	1	SP
2B-19	1	SS	0' – 1 ½'	6	14	-	-	NP	100	75	ML
	2	SS	2 ½' – 4'	5							
	3	SS	5' – 6 ½'	5	29	38	19	19	100	95	CL
	4	SS	7 ½' – 9'	6	10	-	-	NP	100	35	SM
	5	SS	10' – 11 ½'	17							
	6	SS	15' – 16 ½'	8	3						
	7	SS	18 ½' – 20'	14							

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-20	1	SS	0' – 1 ½'	8	23	34	21	13	100	91	CL
	2	SS	2 ½' – 4'	7	10	-	-	NP	99	68	ML
	3	SS	5' – 6 ½'	8							
	4	SS	7 ½' – 9'	8	4	-	-	NP	100	17	SM
	5	SS	10' – 11 ½'	11							
	6	SS	15' – 16 ½'	13	2						
	7	SS	20' – 21 ½'	17							
	8	SS	23 ½' – 25'	28	3	-	-	NP	100	8	SP-SM
2B-21	1	GB	0' – 1'		14	28	17	11	99	65	CL
	2	SS	2 ½' – 4'	10							
	3	SS	5' – 6 ½'	10	3	-	-	NP	100	6	SP-SM
	4	SS	7 ½' – 9'	12							
	5	SS	10' – 11 ½'	11	3	-	-	NP	100	7	SP-SM
	6	SS	15' – 16 ½'	10							
	7	SS	18 ½' – 20'	20	3						
2B-22	1	GB	0' – 1'		5	26	14	12	66	29	SC
	2	SS	2 ½' – 4'	7	17	25	17	8	94	72	CL
	3	SS	5' – 6 ½'	8	9	-	-	NP	100	31	SM
	4	SS	7 ½' – 9'	7							
	5	SS	10' – 11 ½'	5							
	6	SS	15' – 16 ½'	14	3	-	-	NP	100	3	SP
	7	SS	20' – 21 ½'	12							
	8	SS	25' – 26 ½'	21							
	9	SS	30' – 31 ½'	31	3	-	-	NP	78	7	SP-SM
	10	SS	33 ½' – 35'	10							

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-23	1	SS	0' – 1 ½'	10	16	-	-	NP	100	14	SM
	2	SS	2 ½' – 4'	8	7	-	-	NP	98	63	ML
	3	SS	5' – 6 ½'	11	8	-	-	NP	100	12	SP-SM
	4	SS	7 ½' – 9'	27	5	-	-	NP	100	21	SM
	5	SS	10' – 11 ½'	17							
	6	SS	15' – 16 ½'	21	2						
	7	SS	18 ½' – 20'	20							
2B-24	1	SS	0' – 1 ½'	13	12	-	-	NP	87	49	SM
	2	SS	2 ½' – 4'	4	11	-	-	NP	93	31	SM
	3	SS	5' – 6 ½'	10							
	4	SS	7 ½' – 9'	15	9						
	5	SS	10' – 11 ½'	15							
	6	SS	15' – 16 ½'	14	7	-	-	NP	94	11	SP-SM
	7	SS	20' – 21 ½'	44							
	8	SS	23 ½' – 25'	31	2						
2B-25	1	SS	0' – 1 ½'	14	9	31	20	11	74	38	SC
	2	SS	2 ½' – 4'	10							
	3	SS	5' – 6 ½'	8	6						
	4	SS	7 ½' – 9'	4							
	5	SS	10' – 11 ½'	18	5	-	-	NP	100	15	SM
	6	SS	15' – 16 ½'	33							
	7	SS	18 ½' – 20'	15	4						
2B-26	1	SS	0' – 1 ½'	13	7	26	13	13	86	23	SC
	2	SS	2 ½' – 4'	14	12	-	-	NP	99	48	SM
	3	SS	5' – 6 ½'	2							
	4	SS	7 ½' – 9'	10	9						
	5	SS	10' – 11 ½'	17							
	6	SS	15' – 16 ½'	23	4	-	-	NP	100	6	SP-SM
	7	SS	18 ½' – 20'	16							

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-27	1	SS	0' – 1 ½'	10							
	2	SS	2 ½' – 4'	4	10	-	-	NP	97	36	SM
	3	SS	5' – 6 ½'	6							
	4	SS	7 ½' – 9'	13	6						
	5	SS	10' – 11 ½'	12	4	-	-	NP	100	10	SP-SM
	6	SS	15' – 16 ½'	30							
	7	SS	18 ½' – 20'	34	4	-	-	NP	100	4	SP-SM
2B-28	1	SS	0' – 1 ½'	17	6	-	-	NP	74	21	SM
	2	SS	2 ½' – 4'	1							
	3	SS	5' – 6 ½'	15	5						
	4	SS	7 ½' – 9'	22	8	-	-	NP	97	18	SM
	5	SS	10' – 11 ½'	27							
	6	SS	15' – 16 ½'	21	7	-	-	NP	96	15	SM
	7	SS	18 ½' – 20'	11							
2B-29	1	SS	0' – 1 ½'	7	11	24	17	7	100	9	SC-SM
	2	SS	2 ½' – 4'	6							
	3	SS	5' – 6 ½'	16	4	-	-	NP	92	45	SM
	4	SS	7 ½' – 9'	16							
	5	SS	10' – 11 ½'	15							
	6	SS	15' – 16 ½'	26	2	-	-	NP	100	5	SP-SM
	7	SS	20' – 21 ½'	14							
	8	SS	25' – 26 ½'	22	3	-	-	NP	100	4	SP-SM
	9	SS	28 ½' – 30'	6							
2B-30	1	SS	0' – 1 ½'	11	8	27	18	9	89	24	SC
	2	SS	2 ½' – 4'	11							
	3	SS	5' – 6 ½'	11	6	-	-	NP	92	20	SM
	4	SS	7 ½' – 9'	14							

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-30	5	SS	10' – 11 ½'	18	6	-	-	NP	100	7	SP-SM
	6	SS	15' – 16 ½'	24							
	7	SS	20' – 21 ½'	32	4	-	-	NP	100	2	SP
	8	SS	25' – 26 ½'	31							
	9	SS	28 ½' – 30'	32	4						
2B-31	1	SS	0' – 1 ½'	14	7	27	16	11	76	25	SC
	2	SS	2 ½' – 4'	15							
	3	SS	5' – 6 ½'	3							
	4	SS	8 ½' – 10'	5	14	-	-	NP	93	72	ML
	5	SS	10' – 11 ½'	5	8	-	-	NP	99	26	SM
	6	SS	15' – 16 ½'	15							
	7	SS	18 ½' – 20'	35	14						
2B-32	1	SS	0' – 1 ½'	16	6	24	17	7	73	19	SC-SM
	2	SS	2 ½' – 4'	22	7	-	-	NP	100	29	SM
	3	SS	5' – 6 ½'	28	6	-	-	NP	99	20	SM
	4	SS	7 ½' – 9'	15							
	5	SS	10' – 11 ½'	8	7	-	-	NP	99	12	SP-SM
	6	SS	15' – 16 ½'	18							
	7	SS	18 ½' – 20'	2	15						
2B-33	1	SS	0' – 1 ½'	20	9	-	-	NP	90	41	SM
	2	SS	2 ½' – 4'	10							
	3	SS	5' – 6 ½'	8	8	-	-	NP	93	28	SM
	4	SS	7 ½' – 9'	8							
	5	SS	10' – 11 ½'	11							
	6	SS	15' – 16 ½'	15	8	-	-	NP	100	12	SP-SM
	7	SS	20' – 21 ½'	20							
	8	SS	23 ½' – 25'	18	4						

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Boring No.	Sample No.	Sample Type	Approx. Sample Depth (ft.)	N-Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4 Sieve	% Passing No. 200 Sieve	USCS
2B-34	1	SS	0' – 1 ½'	16	8	-	-	NP	89	27	SM
	2	SS	2 ½' – 4'	6	18	-	-	NP	91	79	ML
	3	SS	5' – 6 ½'	12	4	-	-	NP	99	6	SP-SM
	4	SS	7 ½' – 9'	10							
	5	SS	10' – 11 ½'	7							
	6	SS	15' – 16 ½'	19	3	-	-	NP	91	4	SP
	7	SS	20' – 21 ½'	21							
	8	SS	25' – 26 ½'	17							
	9	SS	30' – 31 ½'	35	2	-	-	NP	100	5	SP-SM
	10	SS	33 ½' – 35'	30							

Note: SS – Split-Spoon Sample, NP – Non-plastic by test, GB – Grab Sample

Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 1 **SAMPLED BY:** MN

SOIL SAMPLE LOCATION: 2B-1 **SAMPLE DATE:** 10/9/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	1	99
No. 4	4	96
No. 10	8	92
No. 40	24	76
No. 100	59	41
No. 200	74	26

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

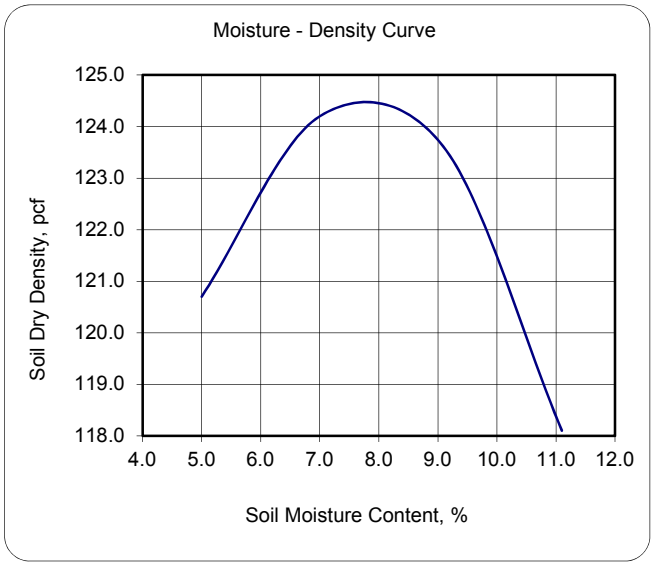
NP-Non Plastic
NS - Not Specified

Soil Classification: **SM**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	5.0	120.7
2	7.0	124.2
3	9.1	123.6
4	11.1	118.1

Maximum Dry Density, pcf: **124.5**
Optimum Moisture Content, %: **7.9**



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 2 **SAMPLED BY:** MN

SOIL SAMPLE LOCATION: 2B-3 **SAMPLE DATE:** 11/3/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	0	100
No. 4	1	99
No. 10	3	97
No. 40	15	85
No. 100	61	39
No. 200	75	25

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

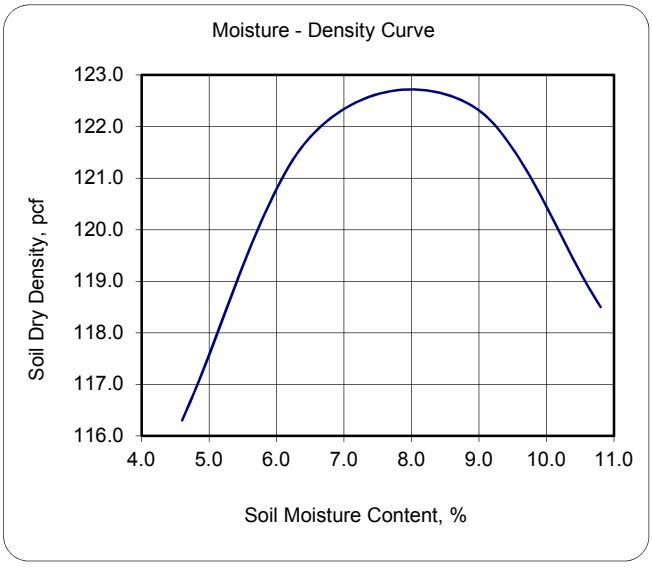
NP-Non Plastic
NS - Not Specified

Soil Classification: **SM**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	4.6	116.3
2	6.5	121.8
3	8.9	122.4
4	10.8	118.5

Maximum Dry Density, pcf: **122.8**
Optimum Moisture Content, %: **8.0**



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 3 **SAMPLED BY:** JA

SOIL SAMPLE LOCATION: 2B-4 **SAMPLE DATE:** 10/11/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	0	100
No. 4	0	100
No. 10	1	99
No. 40	10	90
No. 100	80	20
No. 200	90	10

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

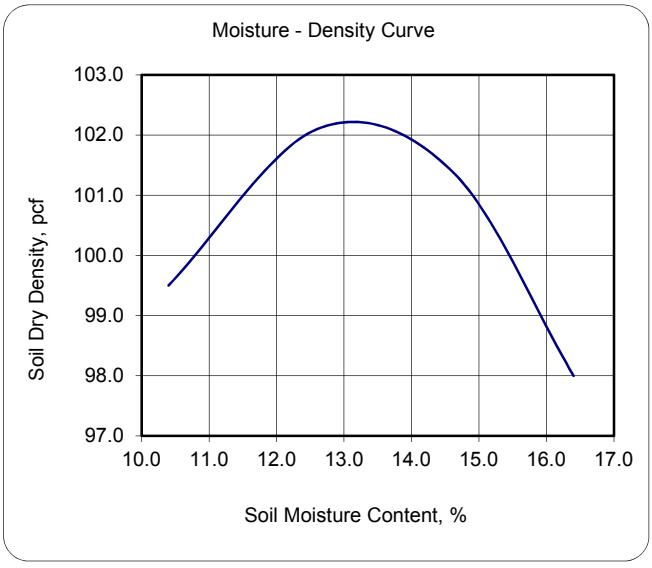
NP-Non Plastic
NS - Not Specified

Soil Classification: **SP-SM**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	10.4	99.5
2	12.6	102.1
3	14.6	101.4
4	16.4	98.0

Maximum Dry Density, pcf: **102.2**
Optimum Moisture Content, %: **13.1**



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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 4 **SAMPLED BY:** MN

SOIL SAMPLE LOCATION: 2B-9 **SAMPLE DATE:** 10/7/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Clayey, Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	1	99
3/8"	3	97
No. 4	7	93
No. 10	11	89
No. 40	24	76
No. 100	52	48
No. 200	63	37

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	26
PL	15
PI	11

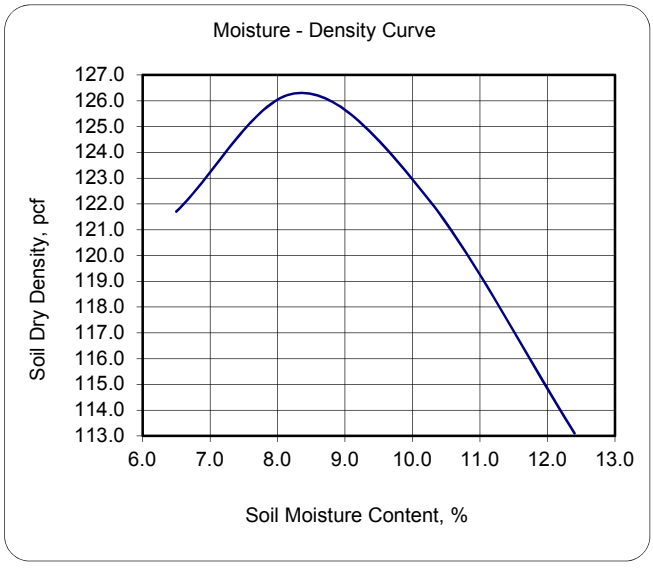
NP-Non Plastic
NS - Not Specified

Soil Classification: **SC**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "B"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	6.5	121.7
2	8.3	126.3
3	10.2	122.3
4	12.4	113.1

Maximum Dry Density, pcf: **126.3**
Optimum Moisture Content, %: **8.5**



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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 5 **SAMPLED BY:** DN

SOIL SAMPLE LOCATION: 2B-11 **SAMPLE DATE:** 9/28/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Poorly Graded, Light Brown to Multicolored with silt

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	1	99
3/8"	1	99
No. 4	2	98
No. 10	3	97
No. 40	17	83
No. 100	83	17
No. 200	94	6

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

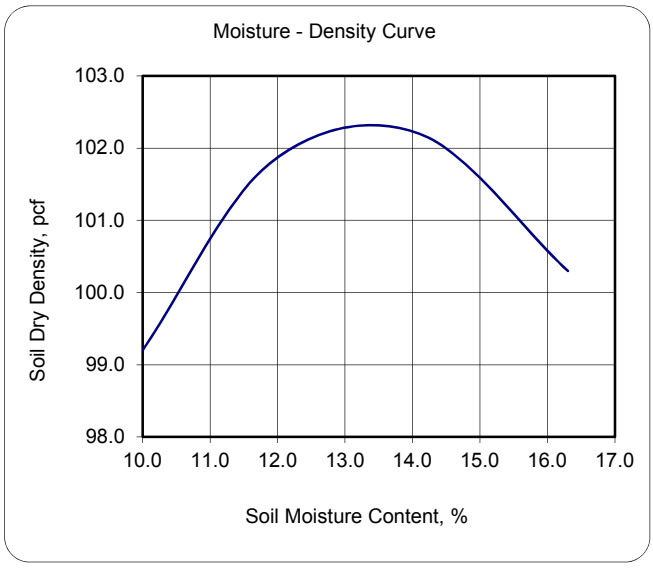
NP-Non Plastic
NS - Not Specified

Soil Classification: **SP-SM**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	10.0	99.2
2	11.9	101.8
3	14.1	102.2
4	16.3	100.3

Maximum Dry Density, pcf: **102.3**
Optimum Moisture Content, %: **13.4**



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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
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SAMPLE INFORMATION

PROCTOR NO.: 6 **SAMPLED BY:** MN

SOIL SAMPLE LOCATION: 2B-12 **SAMPLE DATE:** 9/20/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / CLAY, Sandy, Dark Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	2	98
3/8"	2	98
No. 4	4	96
No. 10	6	94
No. 40	11	89
No. 100	19	81
No. 200	25	75

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	37
PL	18
PI	19

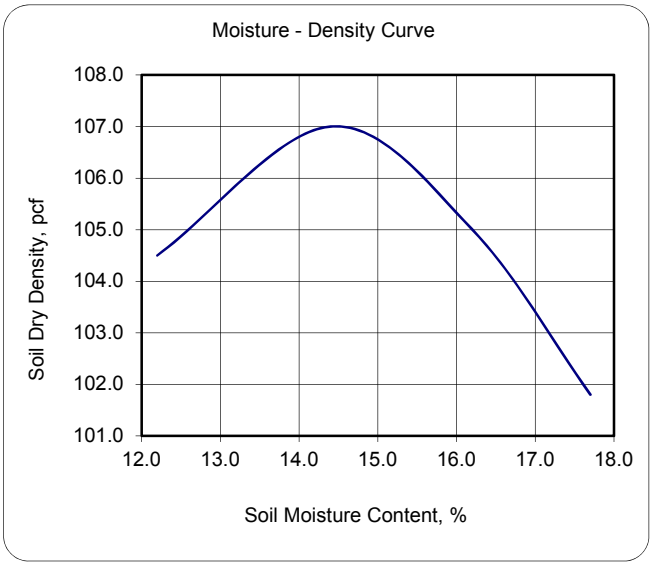
NP-Non Plastic
NS - Not Specified

Soil Classification: **CL**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	12.2	104.5
2	14.4	107.0
3	16.2	105.0
4	17.7	101.8

Maximum Dry Density, pcf: **107.0**
Optimum Moisture Content, %: **14.5**



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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
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El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 7 **SAMPLED BY:** MN

SOIL SAMPLE LOCATION: 2B-13 **SAMPLE DATE:** 9/20/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	0	100
No. 4	1	99
No. 10	2	98
No. 40	5	95
No. 100	33	67
No. 200	57	43

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

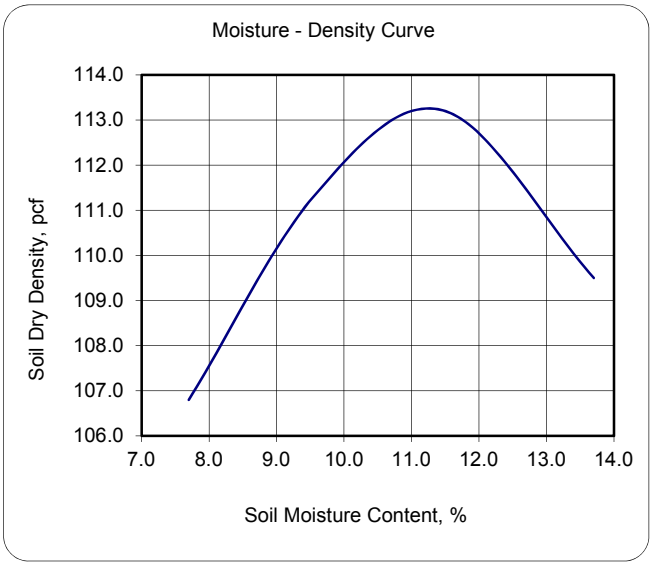
NP-Non Plastic
NS - Not Specified

Soil Classification: **SM**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	7.7	106.8
2	9.6	111.4
3	11.5	113.2
4	13.7	109.5

Maximum Dry Density, pcf: **113.3**
Optimum Moisture Content, %: **11.2**



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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 8 **SAMPLED BY:** MN

SOIL SAMPLE LOCATION: 2B-15 **SAMPLE DATE:** 9/8/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Light Brown to Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	1	99
No. 4	3	97
No. 10	3	97
No. 40	4	96
No. 100	26	74
No. 200	54	46

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

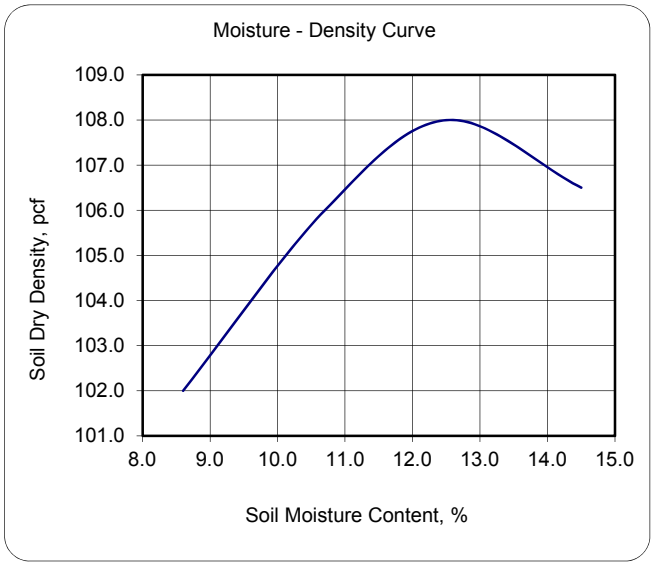
NP-Non Plastic
NS - Not Specified

Soil Classification: **SC**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "B"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	8.6	102.0
2	10.7	106.0
3	12.5	108.0
4	14.5	106.5

Maximum Dry Density, pcf: **108.0**
Optimum Moisture Content, %: **12.5**



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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 9 **SAMPLED BY:** MN

SOIL SAMPLE LOCATION: 2B-20 **SAMPLE DATE:** 9/1/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SILT, Sandy, Dark Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	0	100
No. 4	0	100
No. 10	1	99
No. 40	4	96
No. 100	8	92
No. 200	28	72

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	23
PL	20
PI	3

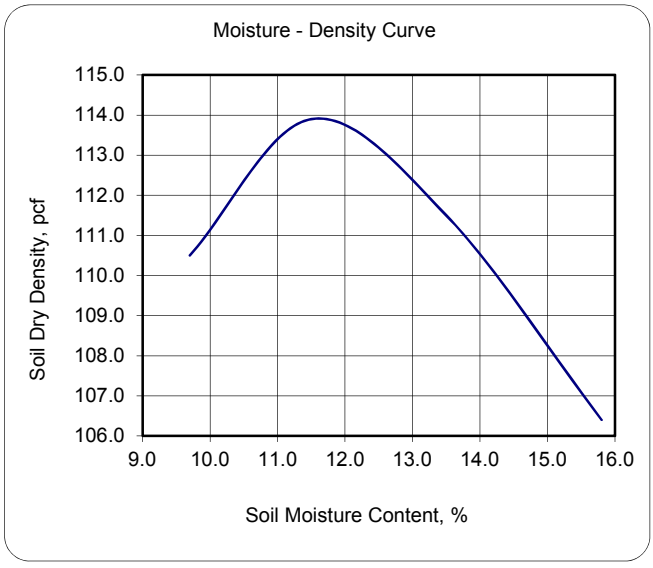
NP-Non Plastic
NS - Not Specified

Soil Classification: **ML**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	9.7	110.5
2	11.5	113.9
3	13.5	111.5
4	15.8	106.4

Maximum Dry Density, pcf: **113.9**
Optimum Moisture Content, %: **11.6**



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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 10 **SAMPLED BY:** MN

SOIL SAMPLE LOCATION: 2B-24 **SAMPLE DATE:** 9/1/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	2	98
3/8"	2	98
No. 4	4	96
No. 10	5	95
No. 40	7	93
No. 100	20	80
No. 200	65	35

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

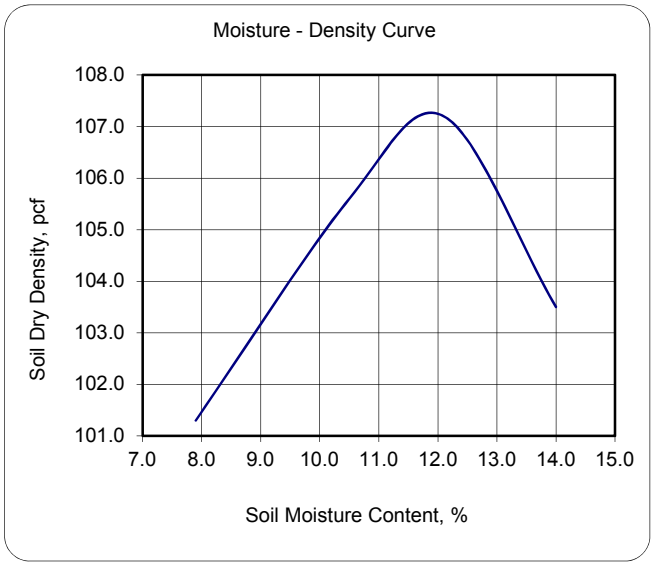
NP-Non Plastic
NS - Not Specified

Soil Classification: **SC**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	7.9	101.3
2	10.5	105.6
3	12.1	107.2
4	14.0	103.5

Maximum Dry Density, pcf: **107.3**
Optimum Moisture Content, %: **11.9**



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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 11 **SAMPLED BY:** MN

SOIL SAMPLE LOCATION: 2B-27 **SAMPLE DATE:** 9/1/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Light Brown to Brown

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	2	98
1/2"	11	89
3/8"	12	88
No. 4	17	83
No. 10	20	80
No. 40	23	77
No. 100	32	68
No. 200	54	46

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

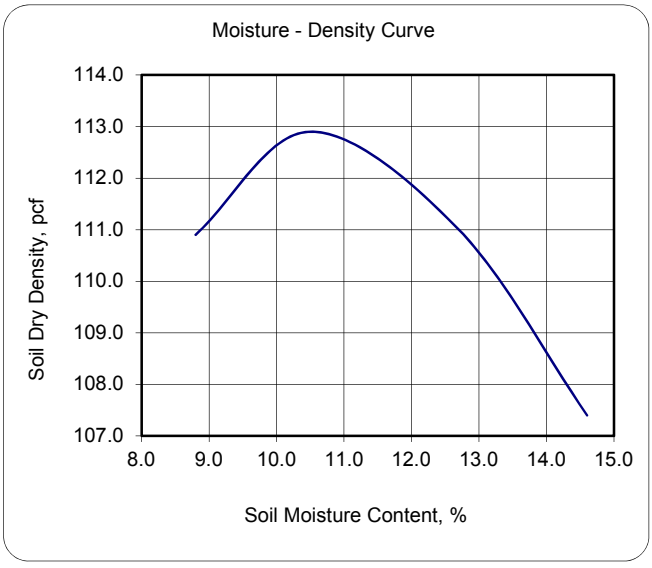
NP-Non Plastic
NS - Not Specified

Soil Classification: **SC**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	8.8	110.9
2	10.5	112.9
3	12.7	111.0
4	14.6	107.4

Maximum Dry Density, pcf: **112.9**
Optimum Moisture Content, %: **10.5**



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SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/2017

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 12 **SAMPLED BY:** MN

SOIL SAMPLE LOCATION: 2B-32 **SAMPLE DATE:** 10/2/2017

SOIL SAMPLE APPROX. DEPTH: 10'-15'

SOIL TYPE/DESCRIPTION: On Site Subsurface Soils / SAND, Fine to Coarse Grained, Silty, Brown to Multicolored

SAMPLE TEST RESULTS

Sieve Analysis Test
Test Method: ASTM D 6913

Sieve Size/No.	Percent Retained	Percent Passing
3"	0	100
2-1/2"	0	100
1-1/2"	0	100
1"	0	100
3/4"	0	100
1/2"	0	100
3/8"	0	100
No. 4	0	100
No. 10	0	100
No. 40	2	98
No. 100	60	40
No. 200	85	15

NS- Not Specified

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	---
PL	---
PI	NP

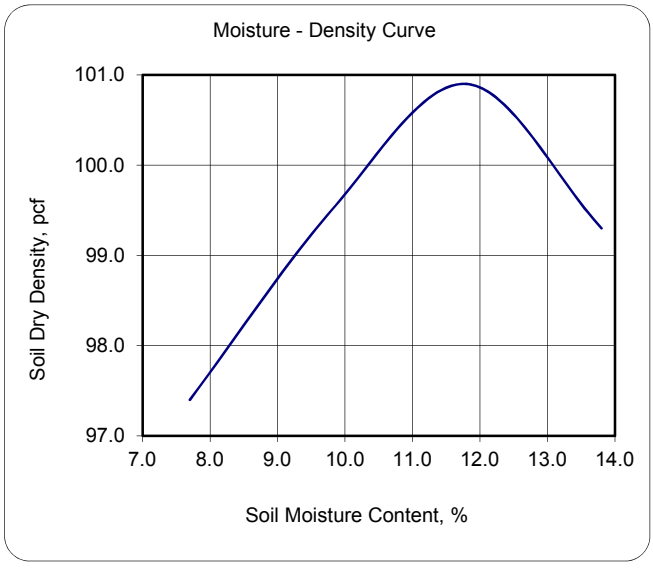
NP-Non Plastic
NS - Not Specified

Soil Classification: **SM**
Test Method: ASTM D 2487

Moisture-Density Relationship Test
Test Method: ASTM D 1557, Method "A"

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	7.7	97.4
2	9.8	99.5
3	11.8	100.9
4	13.8	99.3

Maximum Dry Density, pcf: **100.9**
Optimum Moisture Content, %: **11.8**



SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
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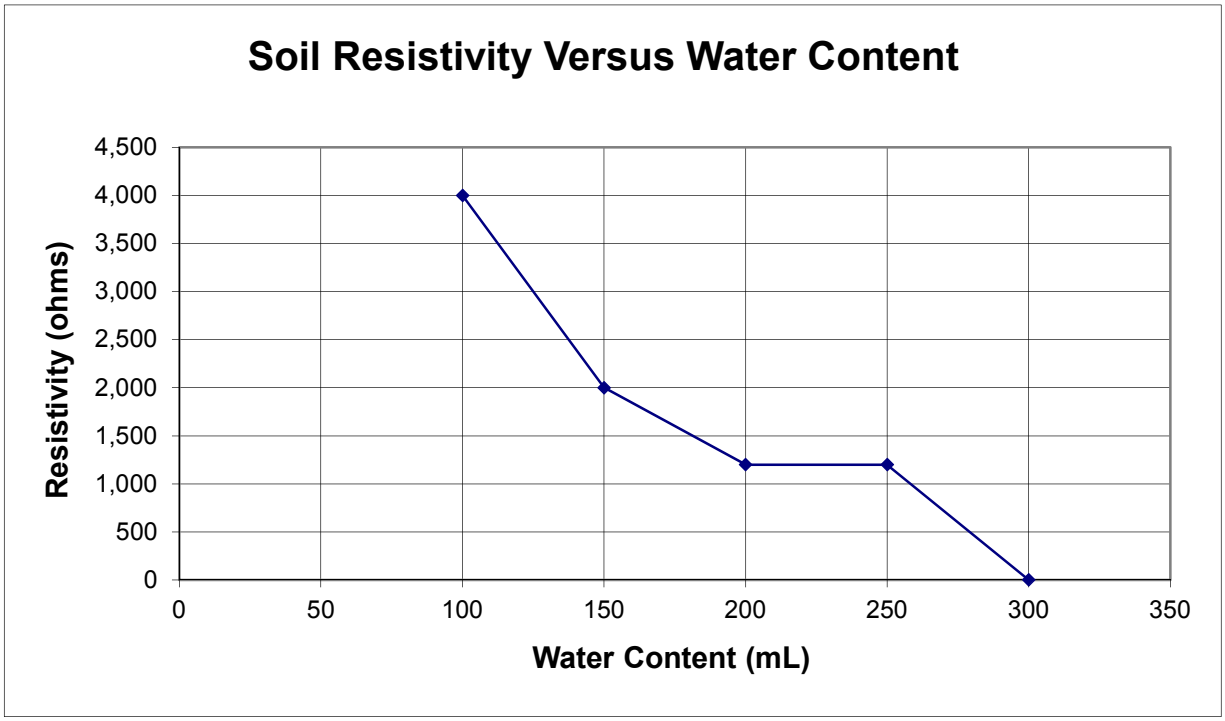
SAMPLE LOCATION: 2B-1

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: SAND, Fine to Coarse Grained, Silty, Brown

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	4.0	10^3	4,000	0.45	1,800
150	2.0	10^3	2,000	0.45	900
200	1.2	10^3	1,200	0.45	540
250	1.2	10^3	1,200	0.45	540
300	0.0	10^3	0	0.45	0

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
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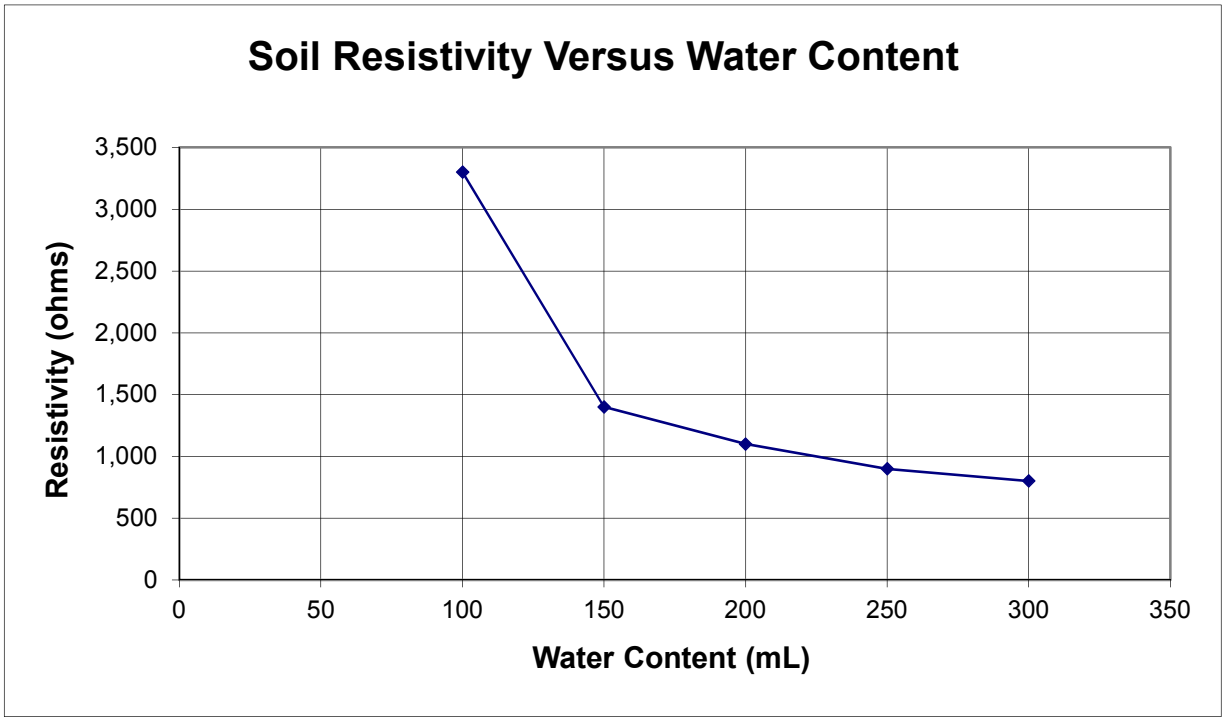
SAMPLE LOCATION: 2B-3

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: SAND, Fine to Coarse Grained, Silty, Brown

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	3.3	10^3	3,300	0.45	1,485
150	1.4	10^3	1,400	0.45	630
200	1.1	10^3	1,100	0.45	495
250	0.9	10^3	900	0.45	405
300	0.8	10^3	800	0.45	360

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



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SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
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El Paso, El Paso County, Texas

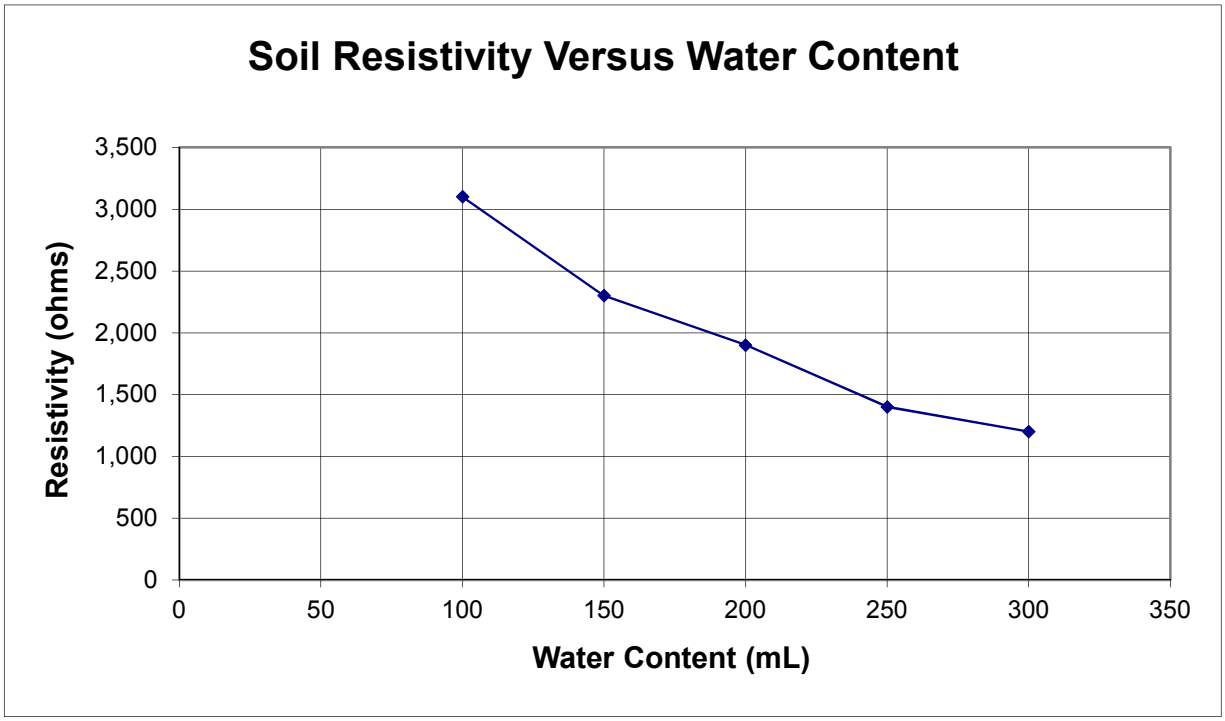
SAMPLE LOCATION: 2B-4

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored with silt

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	3.1	10^3	3,100	0.45	1,395
150	2.3	10^3	2,300	0.45	1,035
200	1.9	10^3	1,900	0.45	855
250	1.4	10^3	1,400	0.45	630
300	1.2	10^3	1,200	0.45	540

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

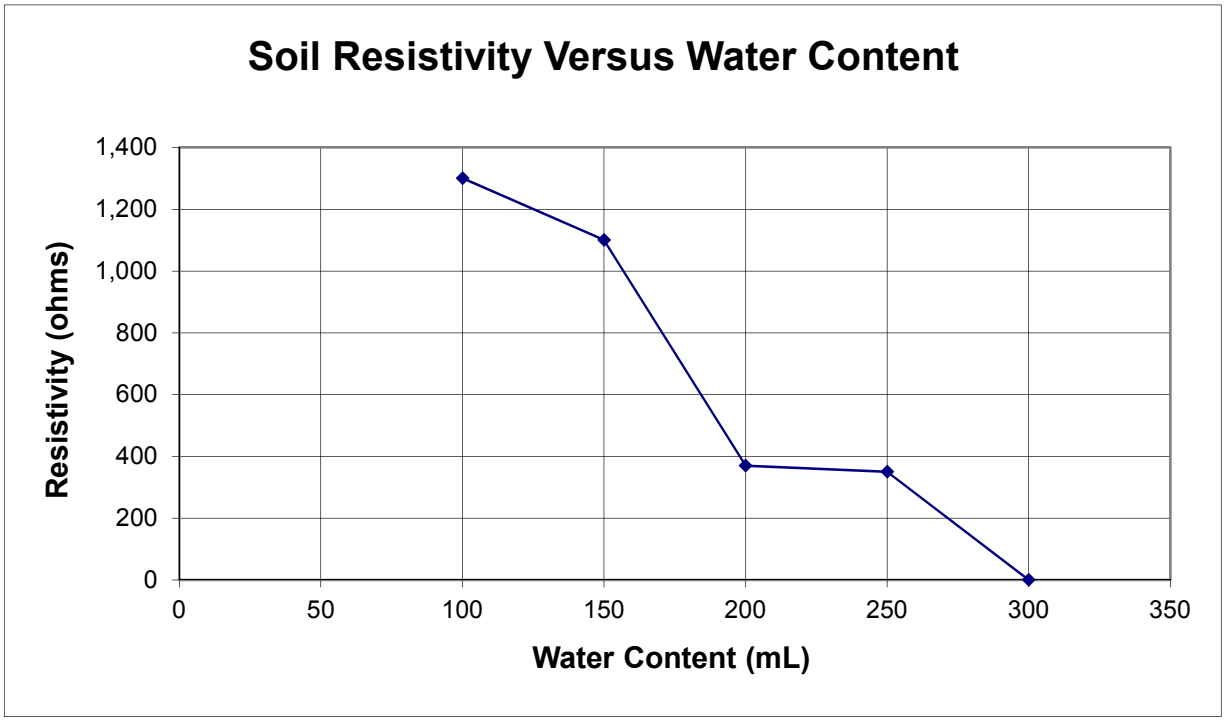
SAMPLE LOCATION: 2B-9

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: CLAY, Sandy, Brown

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	1.3	10^3	1,300	0.45	585
150	1.1	10^3	1,100	0.45	495
200	3.7	10^2	370	0.45	167
250	3.5	10^2	350	0.45	158
300	0.0	10^2	0	0.45	0

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

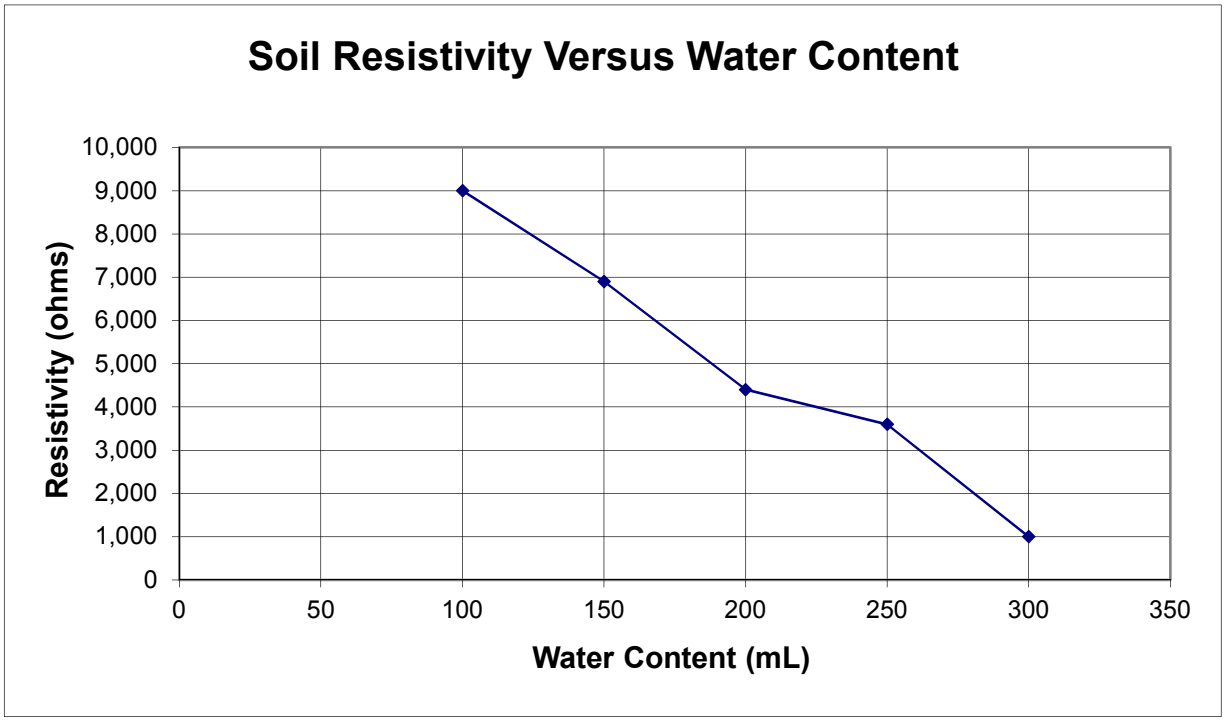
SAMPLE LOCATION: 2B-11

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: SAND, Fine to Coarse Grained, Poorly Graded, Brown to Multicolored with silt

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	0.9	10^4	9,000	0.45	4,050
150	6.9	10^3	6,900	0.45	3,105
200	4.4	10^3	4,400	0.45	1,980
250	3.6	10^3	3,600	0.45	1,620
300	1.0	10^3	1,000	0.45	450

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

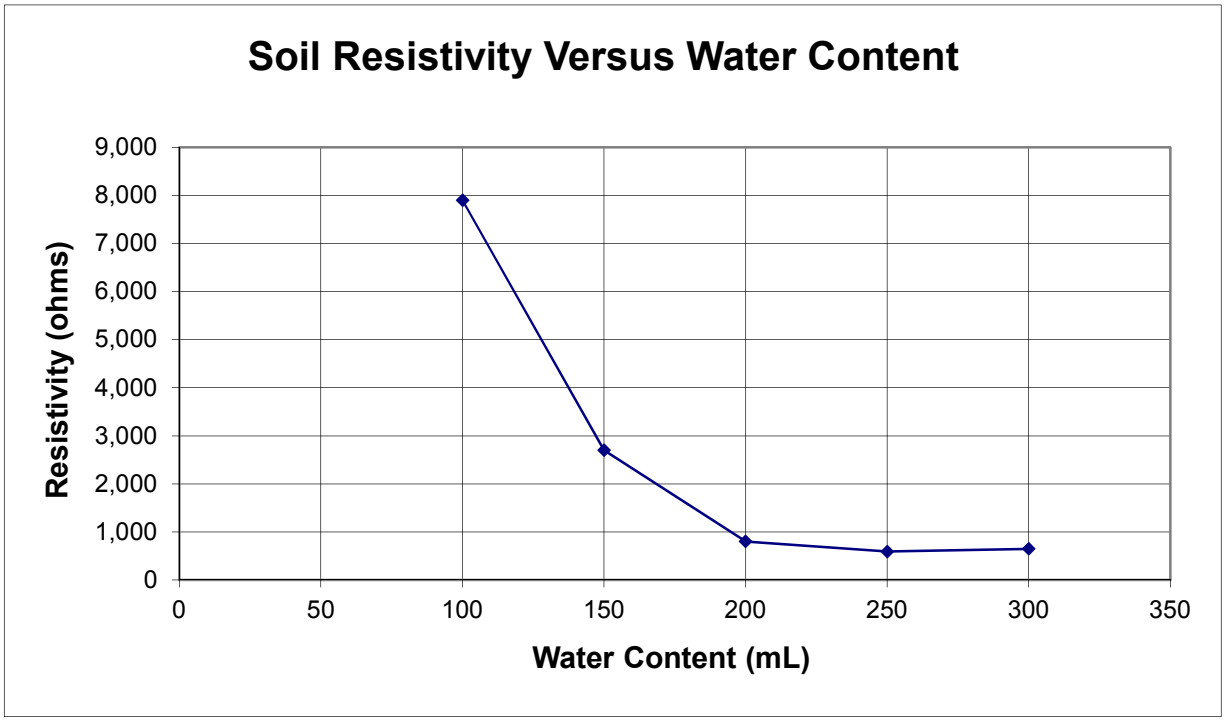
SAMPLE LOCATION: 2B-12

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: CLAY, Sandy, Brown

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	7.9	10^3	7,900	0.45	3,555
150	2.7	10^3	2,700	0.45	1,215
200	0.8	10^3	800	0.45	360
250	5.9	10^2	590	0.45	266
300	6.5	10^2	650	0.45	293

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

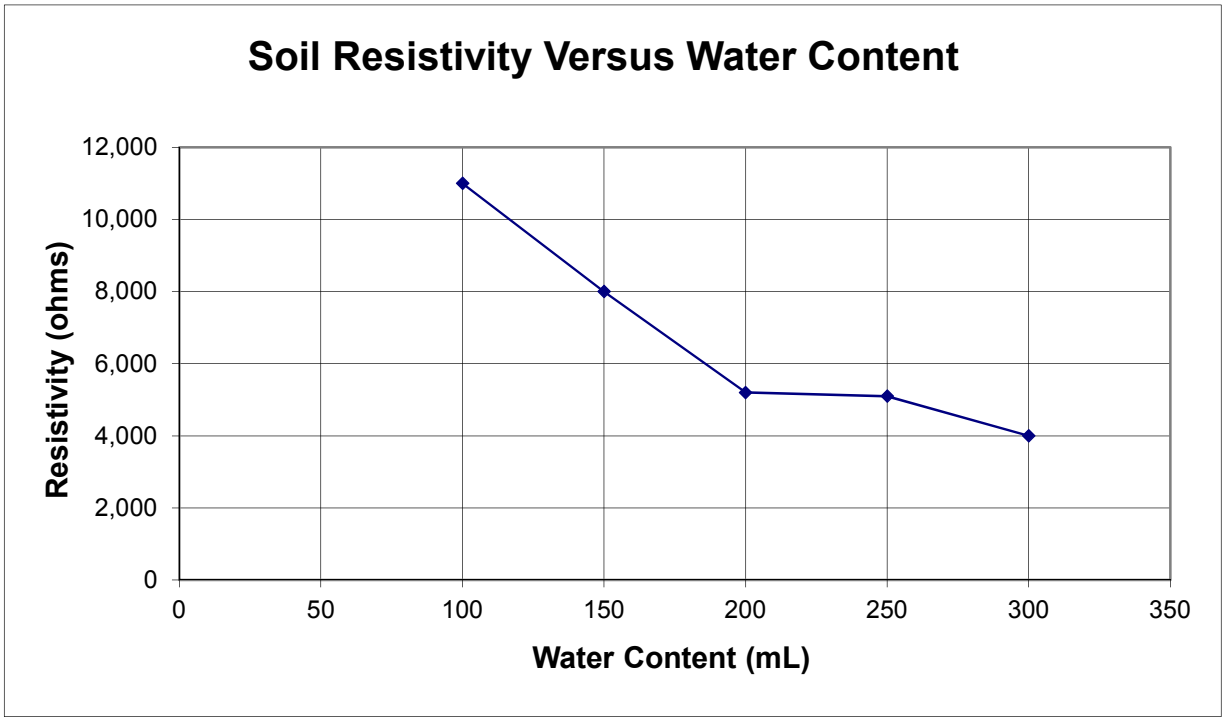
SAMPLE LOCATION: 2B-13

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: SAND, Fine to Coarse Grained, Silty, Brown

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	1.1	10^4	11,000	0.45	4,950
150	0.8	10^4	8,000	0.45	3,600
200	5.2	10^3	5,200	0.45	2,340
250	5.1	10^3	5,100	0.45	2,295
300	4.0	10^3	4,000	0.45	1,800

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

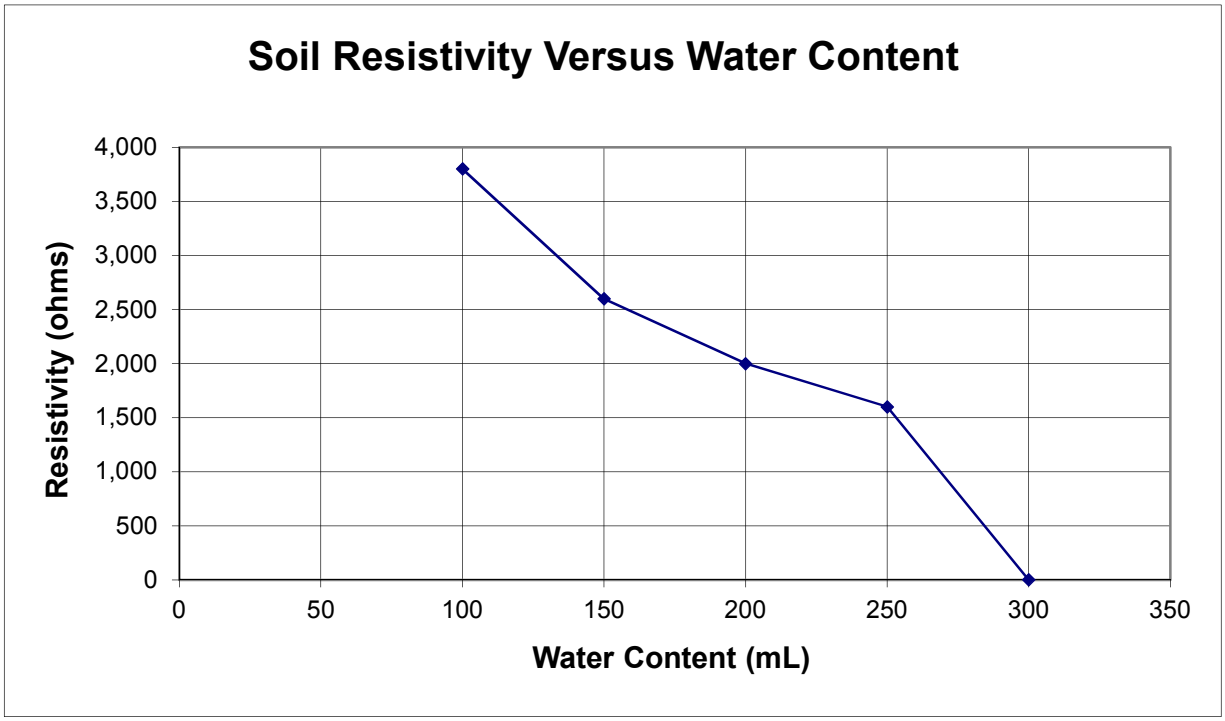
SAMPLE LOCATION: 2B-15

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: SAND, Fine to Coarse Grained, Silty, Brown

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	3.8	10^3	3,800	0.45	1,710
150	2.6	10^3	2,600	0.45	1,170
200	2.0	10^3	2,000	0.45	900
250	1.6	10^3	1,600	0.45	720
300	0.0	10^3	0	0.45	0

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



Construction Materials Testing
Geotechnical Engineering
Environmental Site Assessments
Forensic Analysis/Testing

SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

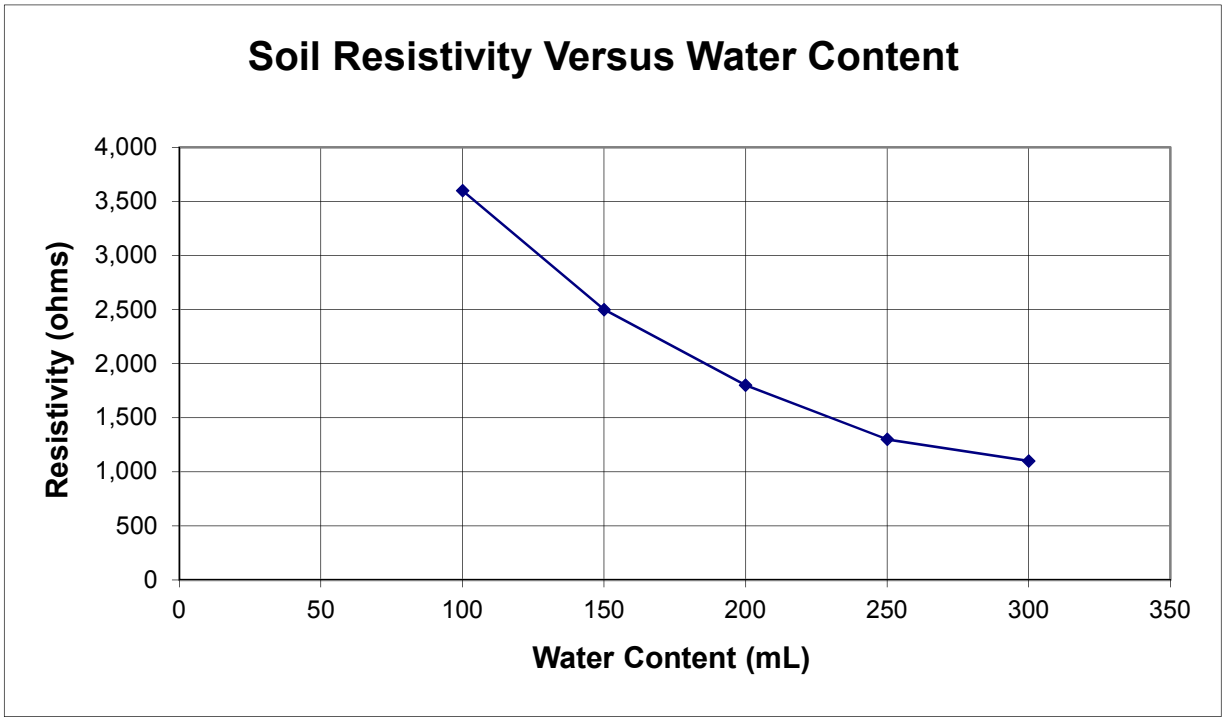
SAMPLE LOCATION: 2B-20

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: SAND, Fine to Coarse Grained, Silty, Brown

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	3.6	10^3	3,600	0.45	1,620
150	2.5	10^3	2,500	0.45	1,125
200	1.8	10^3	1,800	0.45	810
250	1.3	10^3	1,300	0.45	585
300	1.1	10^3	1,100	0.45	495

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

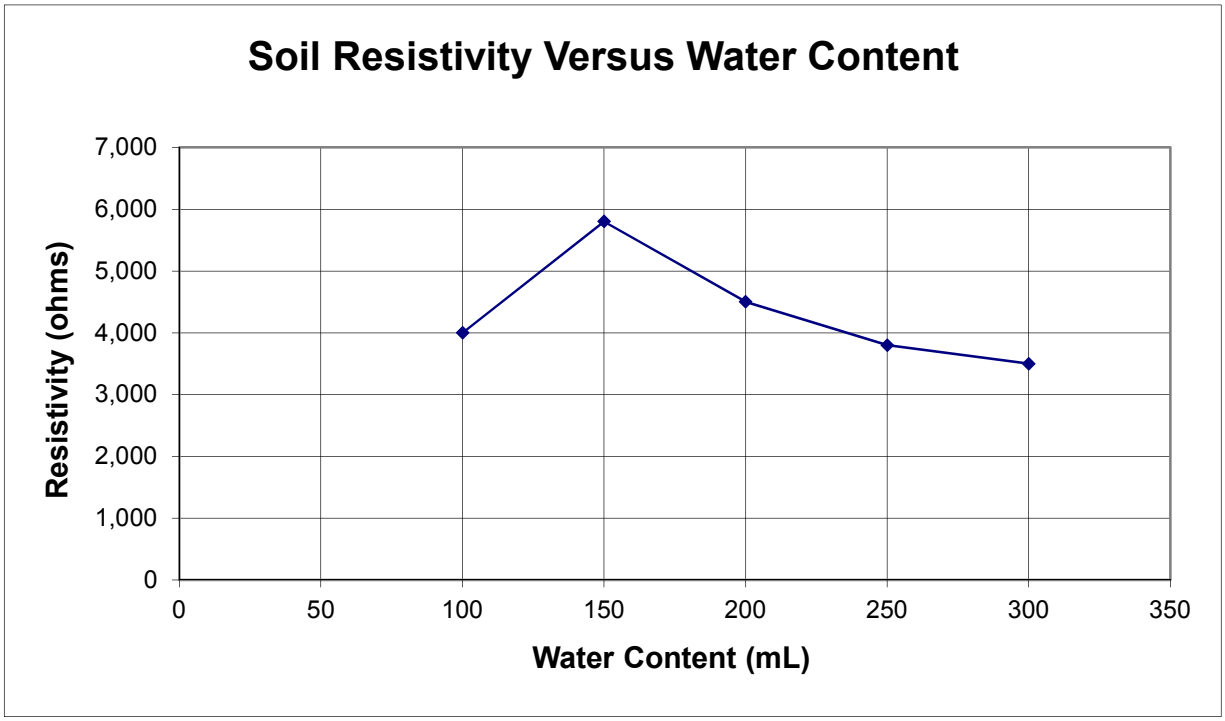
SAMPLE LOCATION: 2B-24

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: SAND, Fine to Coarse Grained, Silty, Brown

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	0.4	10^4	4,000	0.45	1,800
150	5.8	10^3	5,800	0.45	2,610
200	4.5	10^3	4,500	0.45	2,025
250	3.8	10^3	3,800	0.45	1,710
300	3.5	10^3	3,500	0.45	1,575

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

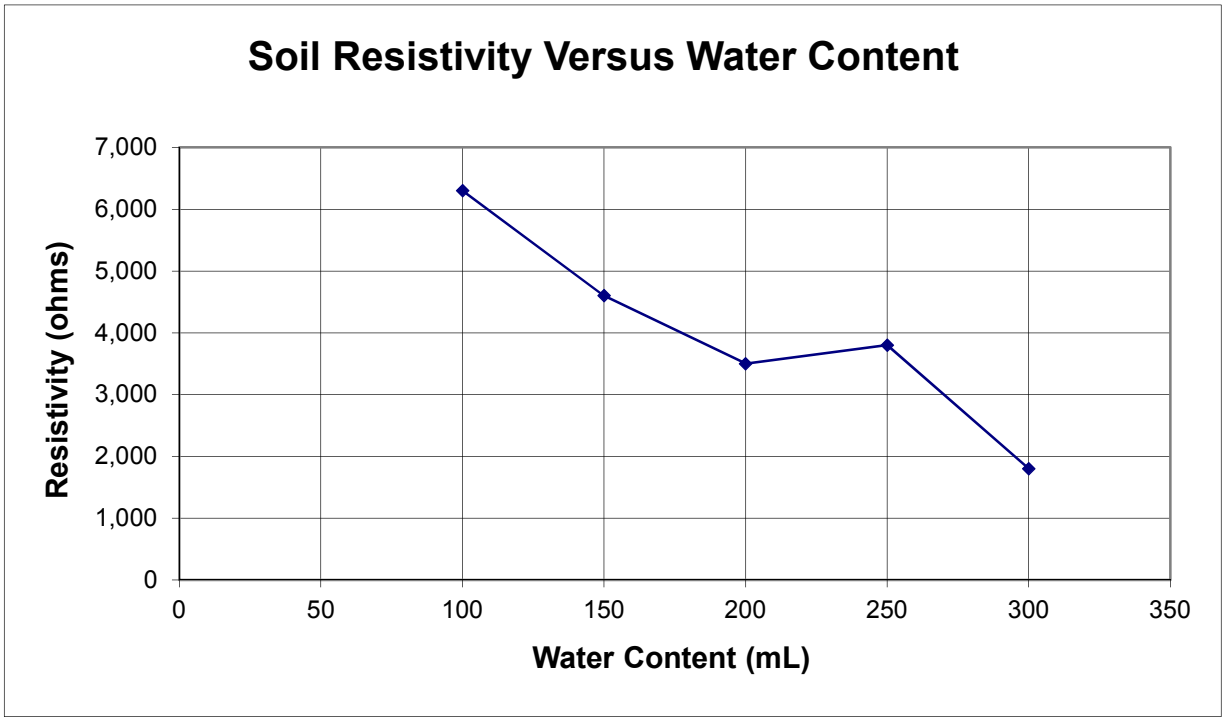
SAMPLE LOCATION: 2B-27

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: SAND, Fine to Coarse Grained, Silty, Brown

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	6.3	10^3	6,300	0.45	2,835
150	4.6	10^3	4,600	0.45	2,070
200	3.5	10^3	3,500	0.45	1,575
250	3.8	10^3	3,800	0.45	1,710
300	1.8	10^3	1,800	0.45	810

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.



SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC16-056 **REPORT DATE:** 11/17/17

PROJECT NAME: Geotechnical General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

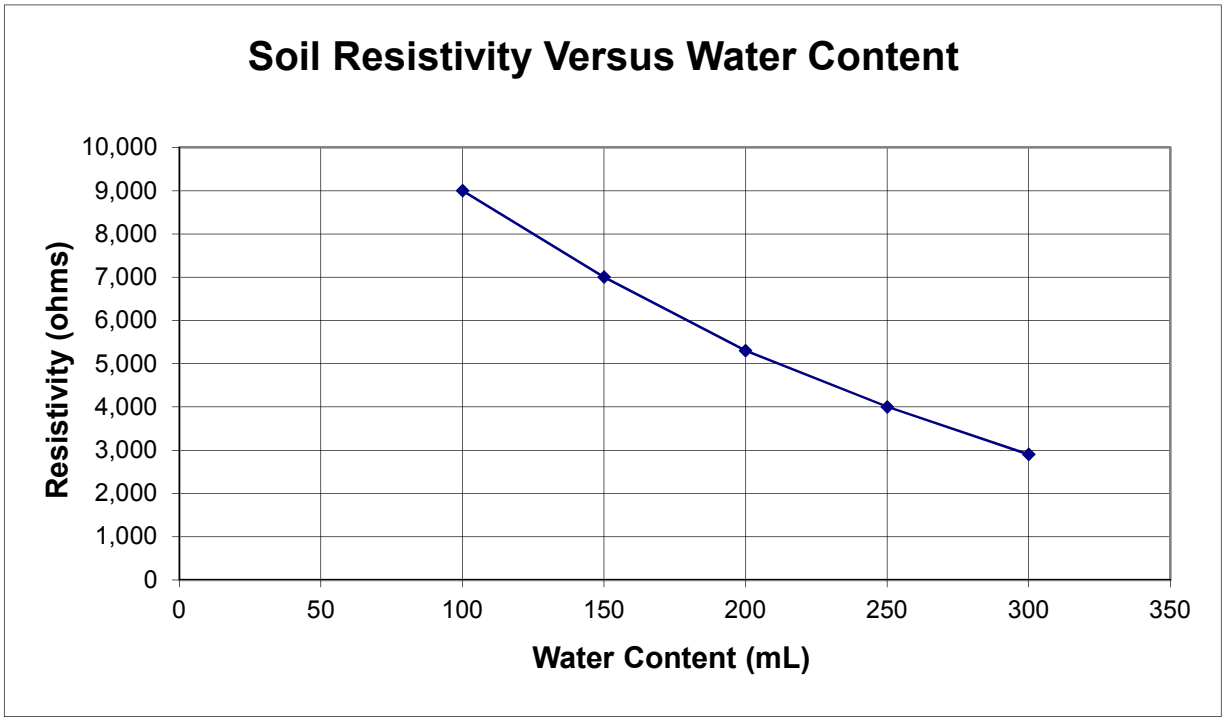
SAMPLE LOCATION: 2B-32

SAMPLE DEPTH: 10' - 15'

SOIL TYPE/DESCRIPTION: SAND, Fine to Coarse Grained, Silty, Brown

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	0.9	10^4	9,000	0.45	4,050
150	0.7	10^4	7,000	0.45	3,150
200	5.3	10^3	5,300	0.45	2,385
250	4.0	10^3	4,000	0.45	1,800
300	2.9	10^3	2,900	0.45	1,305

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E test procedure.

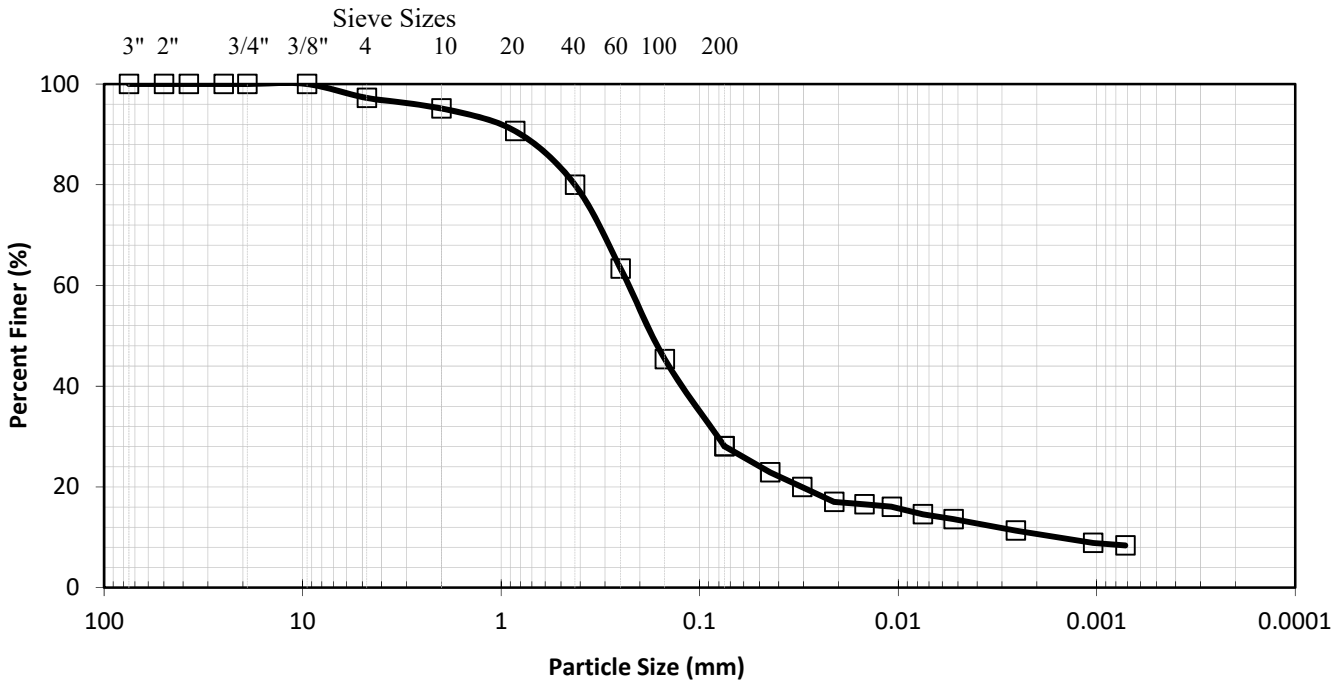


RRC Power & Energy, LLC
3801 Doris Lane
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing and Engineering
Project: EPW-Boone Street Sewer Interceptor (AGCQC16-056)
Sample: 16-056, B-3, 10' -15'

RRC Project No.: LT1709097
Test Method: ASTM D6913 & D7928
Test Date: 12/19/2017



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	97.2
No. 10 (2.0 mm)	95.1
No. 20 (850 µm)	90.7
No. 40 (450 µm)	80.0
No. 60 (250 µm)	63.3
No. 100 (150 µm)	45.4
No. 200 (75 µm)	28.1

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0441 mm	22.9
0.0305 mm	20.0
0.0210 mm	17.0
0.0148 mm	16.5
0.0108 mm	16.0
0.0075 mm	14.6
0.0053 mm	13.6
0.0026 mm	11.3
0.0010 mm	8.9
0.0007 mm	8.4

Note: S.G. assumed to be 2.67, sample was prepared moist.

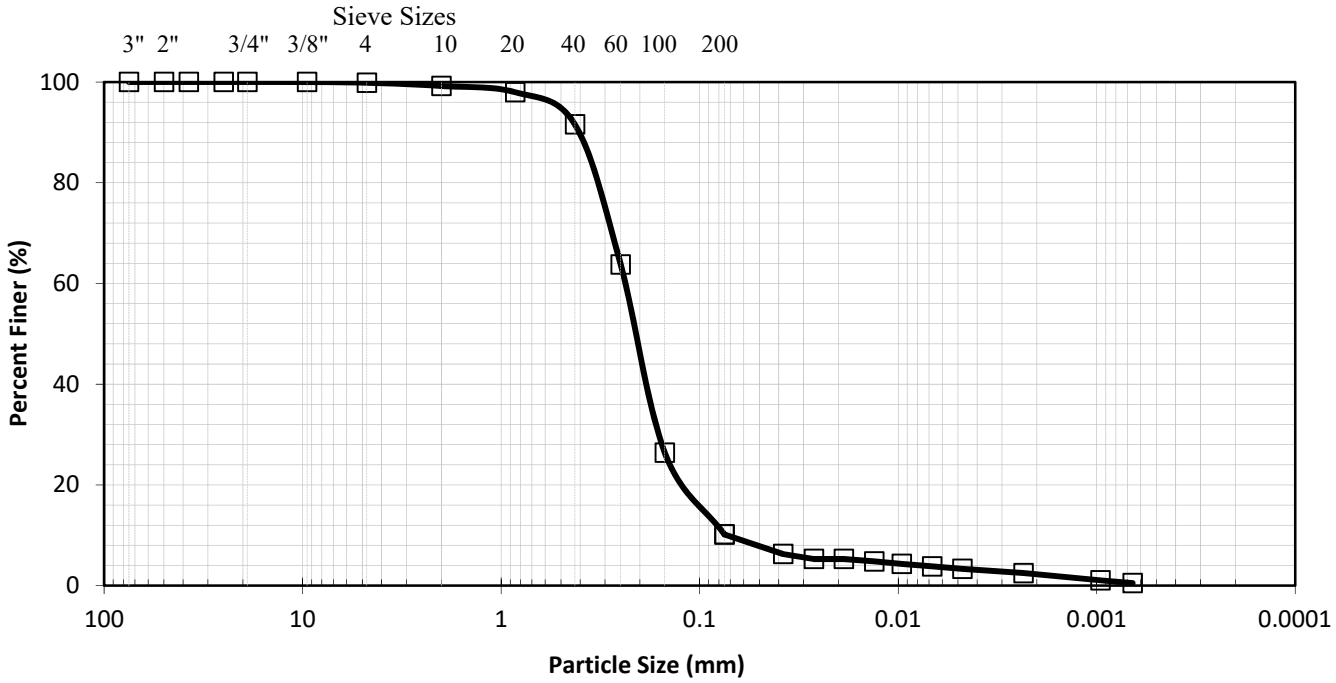
Olga Vasquez, 1/3/18
Quality Review/Date
Tested by: T.D. & A.G.

RRC Power & Energy, LLC
3801 Doris Lane
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing and Engineering
Project: EPW-Boone Street Sewer Interceptor (AGCQC16-056)
Sample: 16-056, B-4, 10' -15'

RRC Project No.: LT1709097
Test Method: ASTM D6913 & D7928
Test Date: 12/19/2017



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.9
No. 10 (2.0 mm)	99.2
No. 20 (850 µm)	98.0
No. 40 (450 µm)	91.6
No. 60 (250 µm)	63.8
No. 100 (150 µm)	26.4
No. 200 (75 µm)	10.2

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0380 mm	6.3
0.0266 mm	5.3
0.0188 mm	5.3
0.0132 mm	4.8
0.0096 mm	4.3
0.0068 mm	3.8
0.0047 mm	3.3
0.0023 mm	2.5
0.0010 mm	1.0
0.0007 mm	0.5

Note: S.G. assumed to be 2.67, sample was prepared moist.

Olga Vasquez, 1/3/18
Quality Review/Date
Tested by: T.D. & A.G.

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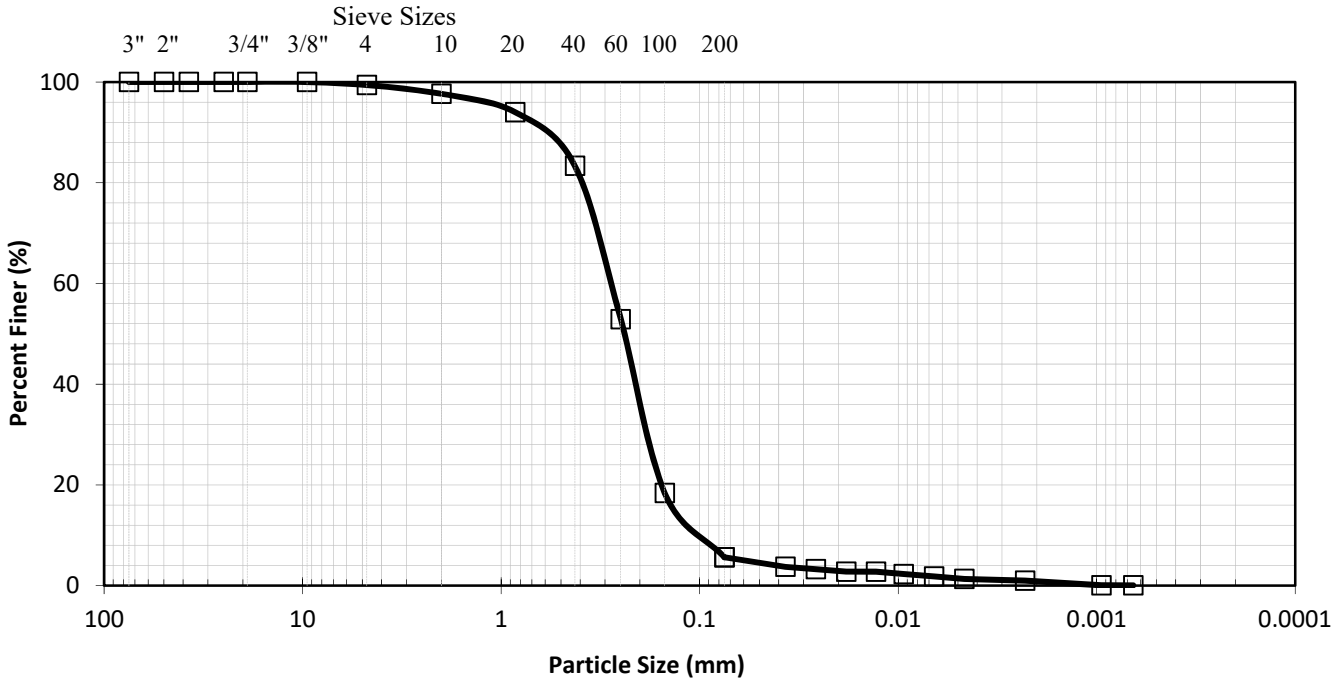
3801 Doris Lane
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing and Engineering
Project: EPW-Boone Street Sewer Interceptor (AGCQC16-056)
Sample: 16-056, B-11, 10' -15'

RRC Project No.: LT1709097
Test Method: ASTM D6913 & D7928
Test Date: 12/19/2017



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	99.4
No. 10 (2.0 mm)	97.6
No. 20 (850 µm)	94.0
No. 40 (450 µm)	83.3
No. 60 (250 µm)	52.9
No. 100 (150 µm)	18.4
No. 200 (75 µm)	5.6

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0370 mm	3.7
0.0260 mm	3.3
0.0183 mm	2.8
0.0129 mm	2.8
0.0094 mm	2.3
0.0066 mm	1.8
0.0046 mm	1.3
0.0023 mm	1.0
0.0009 mm	0.1
0.0007 mm	0.0

Note: S.G. assumed to be 2.67, sample was prepared moist.

Olga Vasquez, 1/3/18
Quality Review/Date
Tested by: T.D. & A.G.

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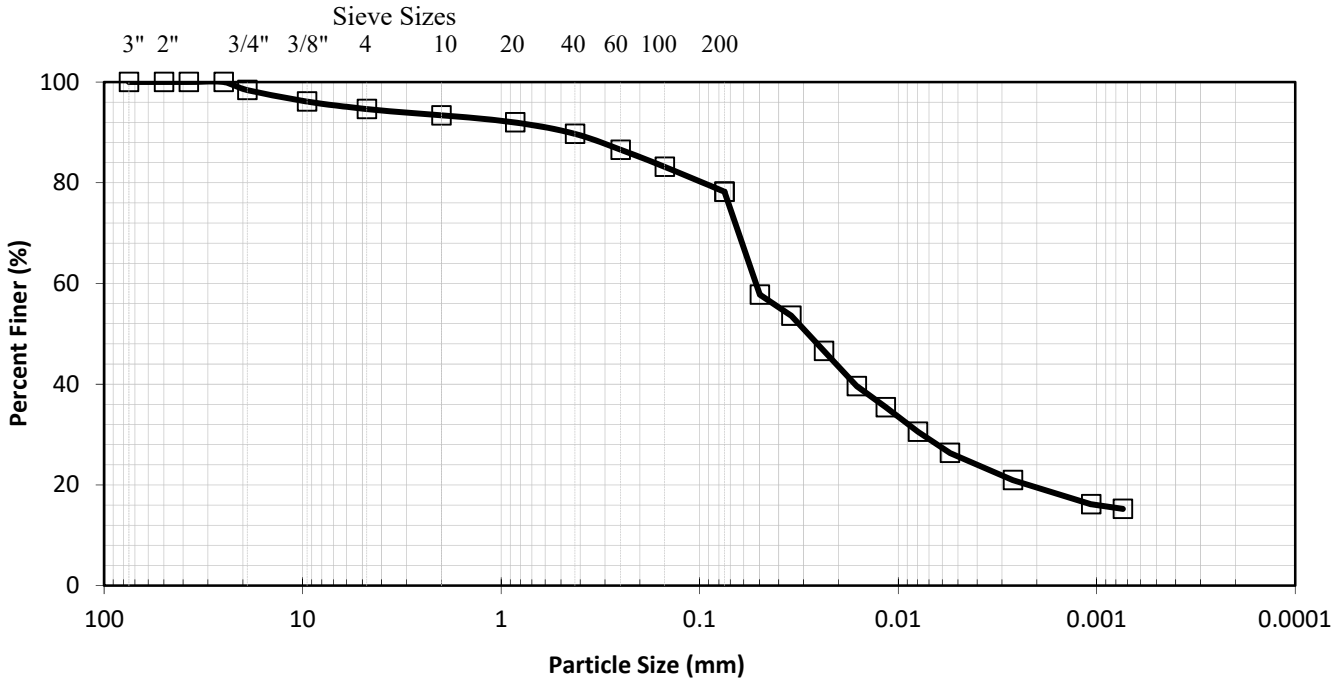
3801 Doris Lane
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing and Engineering
Project: EPW-Boone Street Sewer Interceptor (AGCQC16-056)
Sample: 16-056, B-12, 10' -15'

RRC Project No.: LT1709097
Test Method: ASTM D6913 & D7928
Test Date: 12/19/2017



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	98.4
3/8 in.	96.1
No. 4 (4.75 mm)	94.7
No. 10 (2.0 mm)	93.4
No. 20 (850 µm)	92.0
No. 40 (450 µm)	89.7
No. 60 (250 µm)	86.6
No. 100 (150 µm)	83.2
No. 200 (75 µm)	78.2

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0498 mm	57.8
0.0346 mm	53.6
0.0237 mm	46.6
0.0162 mm	39.6
0.0116 mm	35.4
0.0080 mm	30.5
0.0055 mm	26.4
0.0026 mm	21.0
0.0011 mm	16.1
0.0007 mm	15.2

Note: S.G. assumed to be 2.67, sample was prepared moist.

Olga Vasquez, 1/3/18
Quality Review/Date
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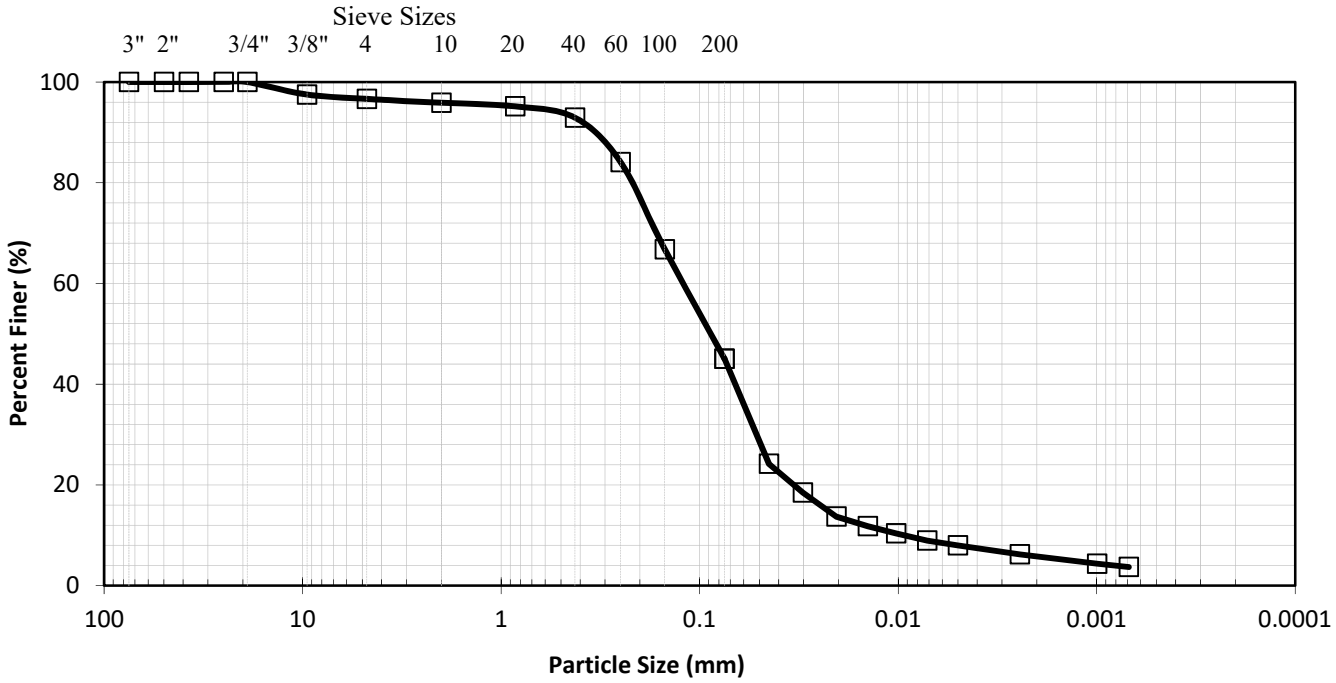
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing and Engineering
Project: EPW-Boone Street Sewer Interceptor (AGCQC16-056)
Sample: 16-056, B-13, 10' -15'

RRC Project No.: LT1709097
Test Method: ASTM D6913 & D7928
Test Date: 12/19/2017



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	97.5
No. 4 (4.75 mm)	96.7
No. 10 (2.0 mm)	95.9
No. 20 (850 µm)	95.2
No. 40 (450 µm)	92.9
No. 60 (250 µm)	84.1
No. 100 (150 µm)	66.8
No. 200 (75 µm)	45.1

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0448 mm	24.2
0.0302 mm	18.5
0.0205 mm	13.7
0.0142 mm	11.8
0.0102 mm	10.4
0.0071 mm	8.9
0.0050 mm	8.0
0.0024 mm	6.2
0.0010 mm	4.4
0.0007 mm	3.7

Note: S.G. assumed to be 2.67, sample was prepared moist.

Olga Vasquez, 1/3/18
Quality Review/Date
Tested by: T.D. & A.G.

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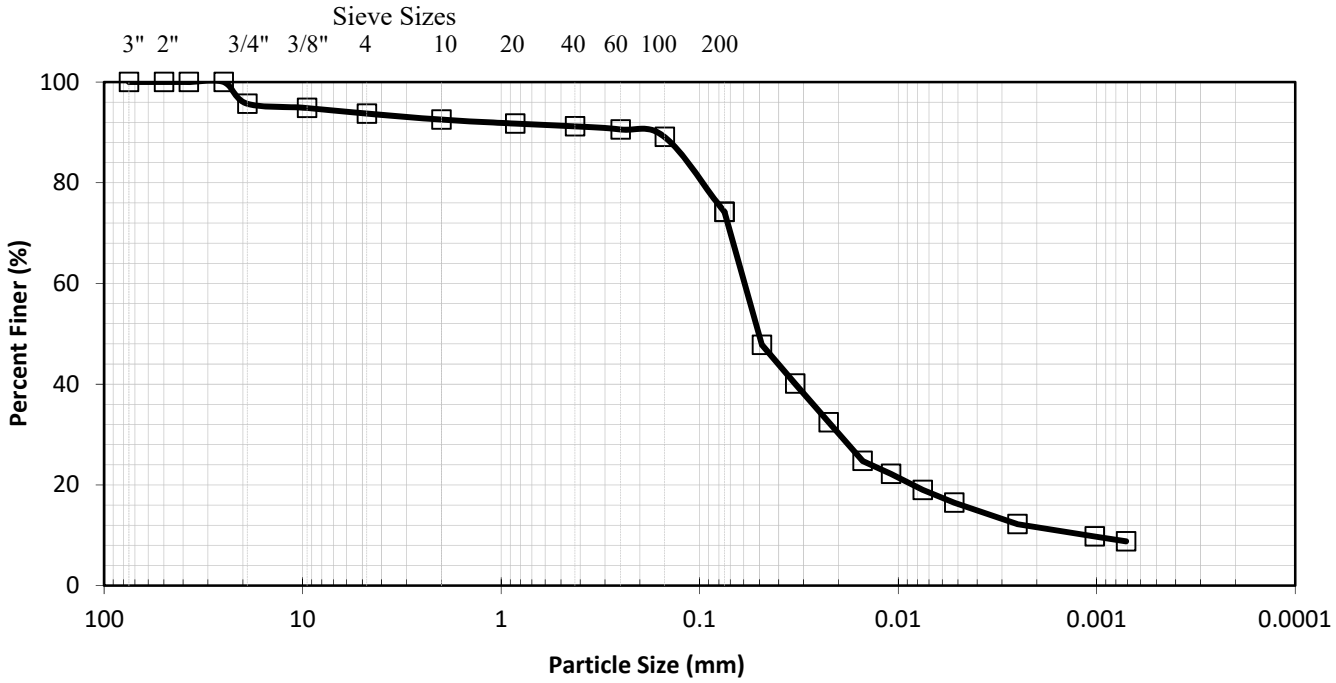
3801 Doris Lane
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing and Engineering
Project: EPW-Boone Street Sewer Interceptor (AGCQC16-056)
Sample: 16-056, B-22, 10' -15'

RRC Project No.: LT1709097
Test Method: ASTM D6913 & D7928
Test Date: 12/19/2017



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	95.7
3/8 in.	94.9
No. 4 (4.75 mm)	93.7
No. 10 (2.0 mm)	92.5
No. 20 (850 µm)	91.7
No. 40 (450 µm)	91.2
No. 60 (250 µm)	90.6
No. 100 (150 µm)	89.1
No. 200 (75 µm)	74.2

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0486 mm	47.8
0.0331 mm	40.1
0.0224 mm	32.4
0.0151 mm	24.8
0.0109 mm	22.2
0.0075 mm	19.0
0.0052 mm	16.5
0.0025 mm	12.2
0.0010 mm	9.8
0.0007 mm	8.8

Note: S.G. assumed to be 2.67, sample was prepared moist.

Olga Vasquez, 1/3/18
Quality Review/Date
Tested by: T.D. & A.G.

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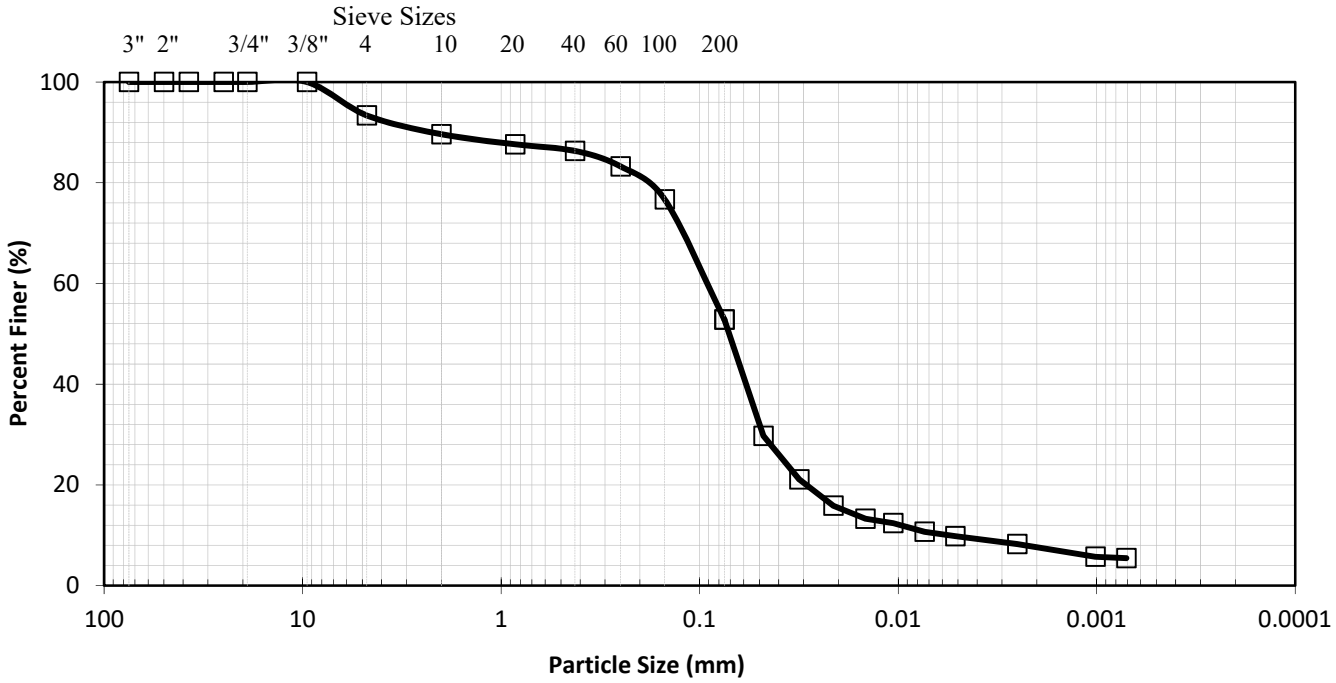
3801 Doris Lane
Round Rock, TX 78664
Phone: (512) 992-2087

Particle Size Analysis for Soils

Client: CQC Testing and Engineering
Project: EPW-Boone Street Sewer Interceptor (AGCQC16-056)
Sample: 16-056, B-29, 10' -15'

RRC Project No.: LT1709097
Test Method: ASTM D6913 & D7928
Test Date: 12/19/2017



Sieve Analysis	
Sieve Size	Percent Passing (%)
3 in.	100.0
2 in.	100.0
1.5 in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	100.0
No. 4 (4.75 mm)	93.4
No. 10 (2.0 mm)	89.6
No. 20 (850 µm)	87.6
No. 40 (450 µm)	86.3
No. 60 (250 µm)	83.2
No. 100 (150 µm)	76.7
No. 200 (75 µm)	52.8

Hydrometer Analysis	
Particle Size	Percent Passing (%)
0.0477 mm	29.7
0.0315 mm	21.1
0.0212 mm	15.9
0.0146 mm	13.3
0.0106 mm	12.4
0.0074 mm	10.7
0.0052 mm	9.8
0.0025 mm	8.2
0.0010 mm	5.7
0.0007 mm	5.5

Note: S.G. assumed to be 2.67, sample was prepared moist.

Olga Vasquez, 1/3/18
Quality Review/Date
Tested by: T.D. & A.G.

STATE OF TEXAS WELL REPORT for Tracking #466530

Owner:	**TXDOT**	Owner Well #:	**MW-1**
Address:	**125 E. 11th Street Austin , TX 78701**	Grid #:	**49-13-8**
Well Location:	**4001 Durazno St. El Paso, TX 79905**	Latitude:	**31° 46' 37.07" N**
		Longitude:	**106° 26' 38.79" W**
	Well located on north side of park near Gateway East Blvd., approximately 150' east of Lincoln Center NE corner	Elevation:	**3711 ft. above sea level**
Well County:	**El Paso**		
Type of Work:	**New Well**	Proposed Use:	**piezometer**

Drilling Start Date: **10/12/2017** Drilling End Date: **10/12/2017**

	Diameter (in.)	*Top Depth (ft.)*	*Bottom Depth (ft.)*
Borehole:	**8**	**0**	**35**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: **Screened**

Annular Seal Data:

Top Depth (ft.)	*Bottom Depth (ft.)*	*Description (number of sacks & material)*
0	**2**	**Concrete 0.5 Bags/Sacks**
2	**21**	**Grout 4 Bags/Sacks**
21	**23**	**Bentonite 1 Bags/Sacks**

Seal Method: **Poured**

Sealed By: **Driller**

Variance Number: **no**

Distance to Property Line (ft.): **35**

Distance to Septic Field or other concentrated contamination (ft.): **NA**

Distance to Septic Tank (ft.): **NA**

Method of Verification: **measured**

Surface Completion: **Surface Slab Installed** **Surface Completion by Driller**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **No Data**

Well Tests: **No Test Data Specified**

	Strata Depth (ft.)	Water Type
Water Quality:	**No Data**	**No Data**

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **Tierra Drilling & Environmental Services, Inc.**

128 Montoya Lane
El Paso, TX 79932

Driller Name: **John P. McDuffee** License Number: **2994**

Apprentice Name: **Carlos Guerra** Apprentice Number: **57225**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

Top (ft.)	Bottom (ft.)	Description
0	**35**	**brown sand and sandy clay**

Casing:
BLANK PIPE & WELL SCREEN DATA

Dia (in.)	Type	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
2	**Blank**	**New Plastic (PVC)**	**40**	**0**	**25**
2	**Screen**	**New Plastic (PVC)**	**40 0.010**	**25**	**35**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

Texas Department of Licensing and Regulation
P.O. Box 12157
Austin, TX 78711
(512) 334-5540

APPENDIX B

GEOTECHNICAL REPORT
TECHNICAL REFERENCE INFORMATION

DEFINITION OF DESCRIPTIVE TERMS

DENSITY OF GRANULAR SOILS

SPT N Value	Relative Density
< 4	Very Loose
4 – 10	Loose
11 – 30	Med. Dense
31 – 50	Dense
50 – 80	Very Dense
> 80	Hard

CONSISTENCY OF COHESIVE SOILS

SPT N Value	Consistency
< 2	Very Soft
2 – 4	Soft
5 – 8	Medium Stiff
9 – 15	Stiff
16 – 50	Very Stiff
> 80	Very Hard

DEGREE OF PLASTICITY

Nonplastic –	Has no cohesion; will not roll into a thread.
Trace of Plasticity –	Barely hold its shape when rolled into a thread.
Low Plasticity –	Has sufficient cohesion to form a thread but will quickly rupture when deformed.
Med. Plasticity –	Has considerable cohesion. Can be molded into a thread and will withstand considerable deformation without rupture.
High Plasticity –	Can be kneaded like dough without trace of rupture.

MOISTURE DESCRIPTIONS

	GRANULAR SOILS	COHESIVE SOILS
Dry	No Apparent Moisture	No Apparent Moisture
Slightly Moist	< Than 3% by Weight	< Less Than Plastic Limit
Moist	3% to 9% by Weight	Approximately Plastic Limit
Very Moist	> 9% by Weight	> than PL but < than LL
Wet	Submerged or Saturated	Submerged or Saturated

PLASTICITY

Cohesion TSF	Plasticity Index	Degree of Plasticity
0-0.125	0-5	None
0.125-0.25	5-10	Low
0.25-0.5	10-20	Moderate
0.5-1.0	20-40	Plastic
1.0-2.0	> 40	Highly Plastic
> 2.0		

ABBREVIATIONS

V. – Very	Fl. – Fairly	Sl. – Slightly	Med. – Medium
Tr. – Trace	< - Less Than	> - Greater Than	PL – Plastic Limit
Mod. – Moderately			

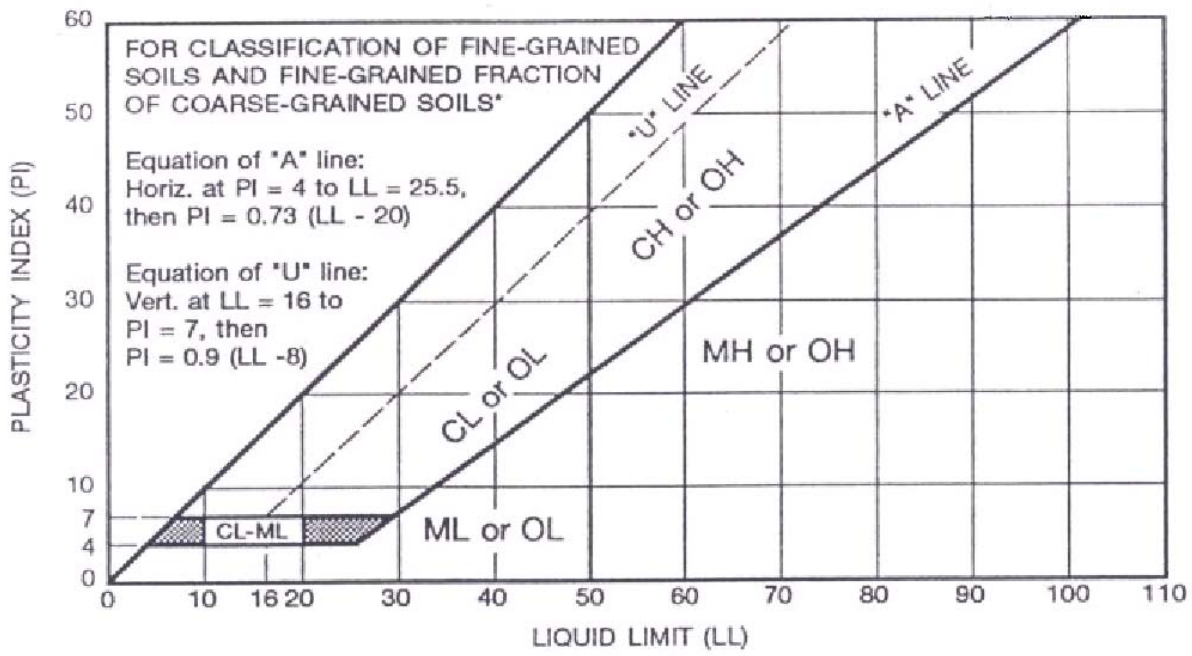
SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

GEOTECHNICAL REPORT
SOIL CLASSIFICATION REFERENCE INFORMATION

Cohesive Soil Classification Chart



U.S. STANDARD SIEVE

	12"	3"	¾"	4	10	40	200		
BOULDERS	COBBLES	GRAVEL		SAND				SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE			
152	76.2	19.1	4.76	2.00	0.420	0.074	0.002		

SOIL GRAIN SIZE IN MILLIMETERS

Laboratory Test Methods:

Moisture Content Tests:

Moisture Contents are determined from representative portions of a soil sample. The samples initial weight is recorded and it is then dried to a constant weight. From this data the moisture content is calculated.

Atterberg Limit Tests:

Liquid Limit (LL), Plastic Limit (PL) and Shrinkage Limit (SL) tests are performed to aid in the classification of soils and to determine the plasticity and volume change characteristics of the materials. The Liquid Limit is the minimum moisture content at which a soil will flow as a heavy viscous fluid. The Plastic Limit is the minimum moisture content at which the soil behaves as a plastic material. The Shrinkage Limit is the moisture content below which no further volume change will take place with continued drying. The Plasticity Index (PI) is the numeric difference between the Liquid Limit and the Plastic Limit and indicates the range of moisture content over which a soil remains plastic.

Grain Size Distribution Test (Particle Size Analysis, Sieve Analysis):

The distribution of soils finer than the No. 200 sieve is determined by passing a representative soil sample through a standard set of nested sieves. The weight of material retained on each sieve is determined and the percentage passing (or retained) is calculated. For determination of the percentage of material finer than the No. 200 sieve, the specimen is first washed through the sieve. The distribution of the materials finer than the No. 200 is determined by use of the different size particles while suspended in water.

APPENDIX C

CLIENT: Brown and Caldwell

PROJECT NAME: EPW – Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

PHOTO NO. 1: General view of drilling activities at exploration soil boring B-1 location.

PHOTO NO. 2: General view of the location of monitor well M-1 location.

PHOTO NO. 3: General view of drilling activities at exploration soil boring B-2 location.

PHOTO NO. 4: General view of drilling activities at exploration soil boring B-3 location.

CLIENT: Brown and Caldwell

PROJECT NAME: EPW – Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

PHOTO NO. 5: General view of drilling activities at exploration soil boring B-4 location.

PHOTO NO. 6: General view of drilling activities at exploration soil boring B-5 location.

PHOTO NO. 7: General view of drilling activities at exploration soil boring B-6 location.

PHOTO NO. 8: General view of drilling activities at exploration soil boring B-7 location.

CLIENT: Brown and Caldwell

PROJECT NAME: EPW – Boone Street Sewer Interceptor Relief Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

PHOTO NO. 9: General view of drilling activities at exploration soil boring 2B-1 location.

PHOTO NO. 10: General view of drilling activities at exploration soil boring 2B-3 location.

PHOTO NO. 11: General view of drilling activities at exploration soil boring 2B-4 location.

PHOTO NO. 12: General view of drilling activities at exploration soil boring 2B-5 location.

CLIENT: Brown and Caldwell

PROJECT NAME: EPW – Boone Street Sewer Interceptor Relief Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

PHOTO NO. 13: General view of the location of monitor well M-3 location.

PHOTO NO. 14: General view of drilling activities at exploration soil boring 2B-9 location.

PHOTO NO. 15: General view of drilling activities at exploration soil boring 2B-10 location.

PHOTO NO. 16: General view of drilling activities at exploration soil boring 2B-11 location.

CLIENT: Brown and Caldwell

PROJECT NAME: EPW – Boone Street Sewer Interceptor Relief Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

PHOTO NO. 17: : General view of drilling activities at exploration soil boring 2B-13 location.

PHOTO NO. 18: General view of drilling activities at exploration soil boring 2B-16 location.

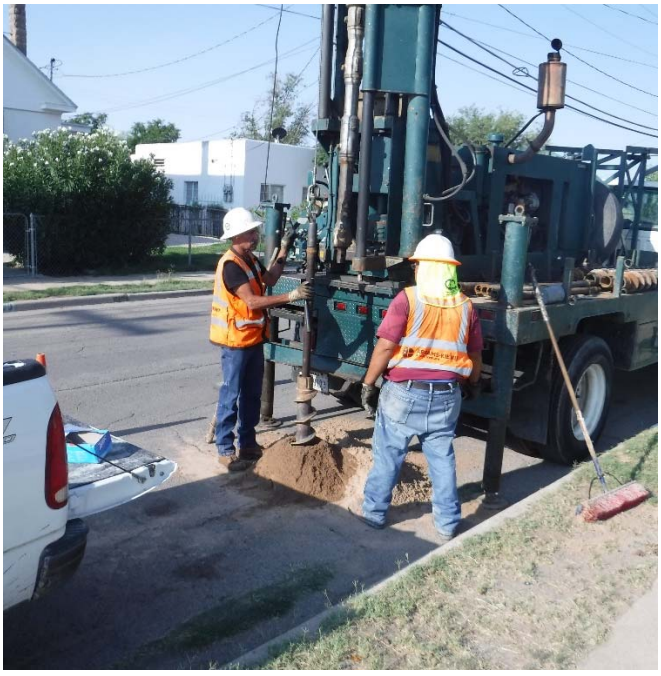


PHOTO NO. 19: General view of drilling activities at exploration soil boring 2B-20 location.

PHOTO NO. 20: General view of drilling activities at exploration soil boring 2B-22 location.

CLIENT: Brown and Caldwell

PROJECT NAME: EPW – Boone Street Sewer Interceptor Relief
Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

PHOTO NO. 21: : General view of drilling activities at exploration soil boring 2B-28 location.

PHOTO NO. 22: General view of drilling activities at exploration soil boring 2B-29 location.

PHOTO NO. 23: General view of drilling activities at exploration soil boring 2B-30 location.

PHOTO NO. 24: General view of drilling activities at exploration soil boring 2B-34 location.

APPENDIX D

construction quality control
testing and engineering

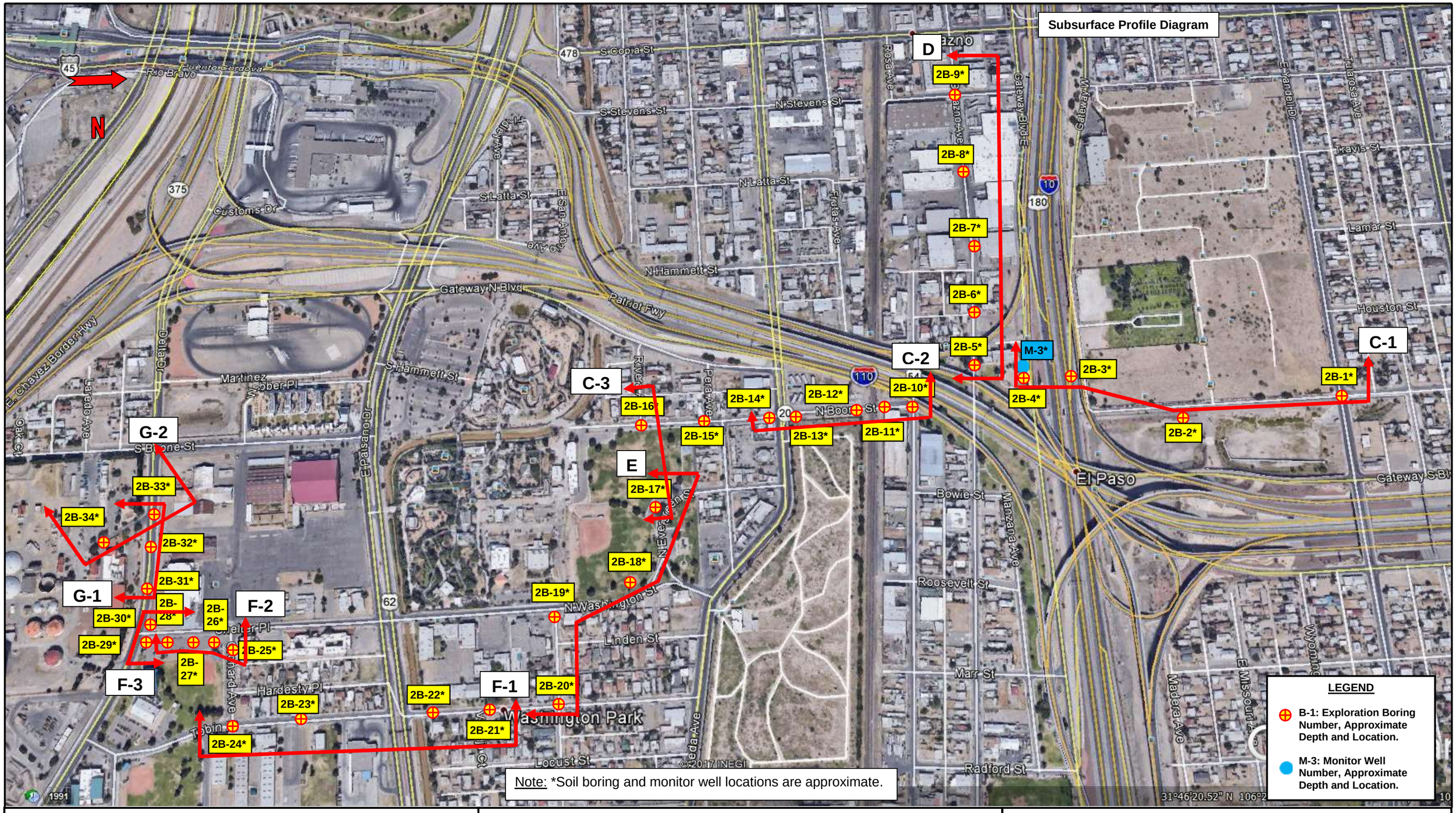
Subsurface Profile Diagram Boring Location Aerial Plan

General Subsurface Soils Evaluation
EPW-Boone Street Sewer Interceptor Relief Route Study Phase I and Design Phase II Project
El Paso, El Paso County, Texas

Client: Brown & Caldwell

Project No. AGCQC16-056

Scale: NTS	Check by: JR
Date: 11/17/17	Sheet D1



construction quality control
testing and engineering

Subsurface Profile Diagram Boring Location Aerial Plan

General Subsurface Soils Evaluation
EPW - Boone Street Sewer Interceptor Relief
Route Phase I and Design Phase II Project
Various Streets in El Paso
El Paso, El Paso County, Texas

Client: Brown & Caldwell	
CQC Project No. AGCQC16-056	
Scale: NTS	Check by: JR
Date: 11/17/17	Sheet D2

CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SUBSURFACE PROFILE DIAGRAM
Diagram A

CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Study Phase I

PROJECT LOCATION Various Locations

USCS Clayey Sand
USCS Silty Sand
USCS Low Plasticity Clay
USCS Low Plasticity Silty Clay
Asphalt
USCS Clayey Gravel
USCS Poorly-graded Sand

- The presented ground elevations and coordinates for each boring were obtained by Google Earth and shall not be utulized for construction staking, bid estimating and engineering design purposes

B-2

N Value	%MC	%4	%200	PI	USCS
9-11-6 (17)	19	94	41	26	SC
4-4-6 (10)					
5-9-9 (18)	5	100	1	NP	SP
3-8-12 (20)					
4-4-5 (9)	5				
4-6-9 (15)					
8-11-10 (21)	5				
4-7-13 (20)					
5-9-13 (22)	5				
12-12-10 (22)					
2-3-3 (6)					
4-3-5 (8)	29	100	78	14	CL
2-5-4 (9)					

B-1

N Value	%MC	%4	%200	PI	USCS
5-15-17 (32)					
18-18-50 (68)	7	95	29	12	SC
13-12-10 (22)					
8-13-12 (25)	9				
5-3-5 (8)	10	99	32	NP	SM
7-6-4 (10)					
8-7-7 (14)	15	100	56	16	CL
4-5-4 (9)					
5-7-5 (12)	11				
8-9-12 (21)					
5-5-9 (14)	23	100	60	5	CL-ML
4-5-4 (9)					
3-4-5 (9)					
3-9-11 (20)					

Elevation (ft)

Distance Along Baseline (ft)

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SUBSURFACE PROFILE DIAGRAM
Diagram B

CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Study Phase I

PROJECT LOCATION Various Locations

USCS Silty Sand
Asphalt
USCS Silt
USCS High Plasticity Clay
USCS Clayey Gravel
USCS Poorly-graded Sand
USCS Low Plasticity Clay

- The presented ground elevations and coordinates for each boring were obtained by Google Earth and shall not be utulized for construction staking, bid estimating and engineering design purposes

B-4

N Value	%MC	%4	%200	PI	USCS
6-5-8 (13)					
4-4-5 (9)	11	100	72	NP	ML
7-3-3 (6)	27	100	95	17	CL
3-2-2 (4)					
3-2-2 (4)	26	94	84	NP	ML
3-11-17 (28)					
10-15-15 (30)	4				
6-12-17 (29)					
5-10-12 (22)	3				
6-11-10 (21)					
6-18-23 (41)	2				
9-24-24 (48)					
17-18-21 (39)					
9-16-16 (32)					

B-3

N Value	%MC	%4	%200	PI	USCS
25-21-18 (39)					
11-21-21 (42)	7	99	25	NP	SM
4-6-9 (15)	25	100	79	38	CH
3-10-12 (22)					
5-7-5 (12)	4				
3-4-5 (9)					
3-3-8 (11)	3	94	2	NP	SP
6-6-9 (15)					
7-6-3 (9)	4				
6-7-8 (15)					
4-3-4 (7)	6				
3-8-6 (14)					
3-1-1 (2)					
6-8-11 (19)					

Elevation (ft): 3,740 3,735 3,730 3,725 3,720 3,715 3,710 3,705 3,700 3,695 3,690 3,685 3,680

Distance Along Baseline (ft): 0 100 200 300 400 500 600 700 800 900 1,000

THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

STRATIGRAPHY & GW - B SIZE 16-056-LOGS.GPJ GINT STD US LAB.GDT

CQC Testing and Engineering LLC - TBPE Firm No. F-10632
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SUBSURFACE PROFILE DIAGRAM Diagram C-1

CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II

PROJECT LOCATION Various Locations

- Asphalt
- USCS Silty Sand
- USCS Poorly-graded Sand with Silt
- USCS Clayey Gravel
- Concrete
- Topsoil
- USCS Clayey Sand
- USCS Low Plasticity Clay
- USCS High Plasticity Clay

- The presented ground elevations and coordinates for each boring were obtained by Google Earth and shall not be utulized for construction staking, bid estimating and engineering design purposes

2B-4

N Value	%MC	%4	%200	PI	USCS
2-3-3 (6)					
3-3-4 (7)	24	100	79	31	CH
2-3-5 (8)	27	100	89	31	CH
4-5-7 (12)					
6-8-8 (16)	4	96	4	NP	SP
5-6-7 (13)					
4-5-7 (12)	5				
4-4-7 (11)					
6-8-10 (18)	5	96	7	NP	SP-SM
5-5-6 (11)					
2-2-2 (4)					
2-1-2 (3)	45	100	99	71	CH
1-1-1 (2)					
4-4-4 (8)					
3-6-9 (15)					

2B-3

N Value	%MC	%4	%200	PI	USCS
5-8-3 (11)					
2-3-3 (6)	8	100	29	NP	SM
3-3-5 (8)					
3-4-6 (10)	7	100	21	NP	SM
2-4-5 (9)					
3-4-7 (11)	8	99	29	NP	SM
2-6-5 (11)					
4-8-6 (14)	4	88	13	NP	SM
2-3-5 (8)					
3-8-6 (14)	22	100	39	NP	SM
2-4-4 (8)	17	99	53	14	CL
7-7-15 (22)					
4-9-5 (14)	19	96	12	NP	SP-SM
4-6-7 (13)					
4-8-8 (16)					

2B-2

N Value	%MC	%4	%200	PI	USCS
4-4-5 (9)					
5-5-4 (9)	8	97	31	NP	SM
1-1-2 (3)					
3-2-3 (5)	5				
4-3-3 (6)	7	99	26	NP	SM
10-14-8 (22)					
1-1-1 (2)	9				
2-3-1 (4)					

2B-1

N Value	%MC	%4	%200	PI	USCS
8-13-17 (30)	12	93	26	10	SC
2-3-3 (6)					
3-2-2 (4)	7	94	21	NP	SM
1					
1-1-1 (2)	5	98	20	NP	SM
4-3-3 (6)					
3-3-3 (6)	7	100	36	NP	SM
4-3-3 (6)					

Elevation (ft)

Distance Along Baseline (ft)

THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

STRATIGRAPHY & GW - B SIZE 16-056-LOGS PH II.GPJ GINT STD US LAB.GDT

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4606 Titanic Avenue
El Paso, Texas 79904
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Fx: (915) 771-7786

SUBSURFACE PROFILE DIAGRAM Diagram C-2

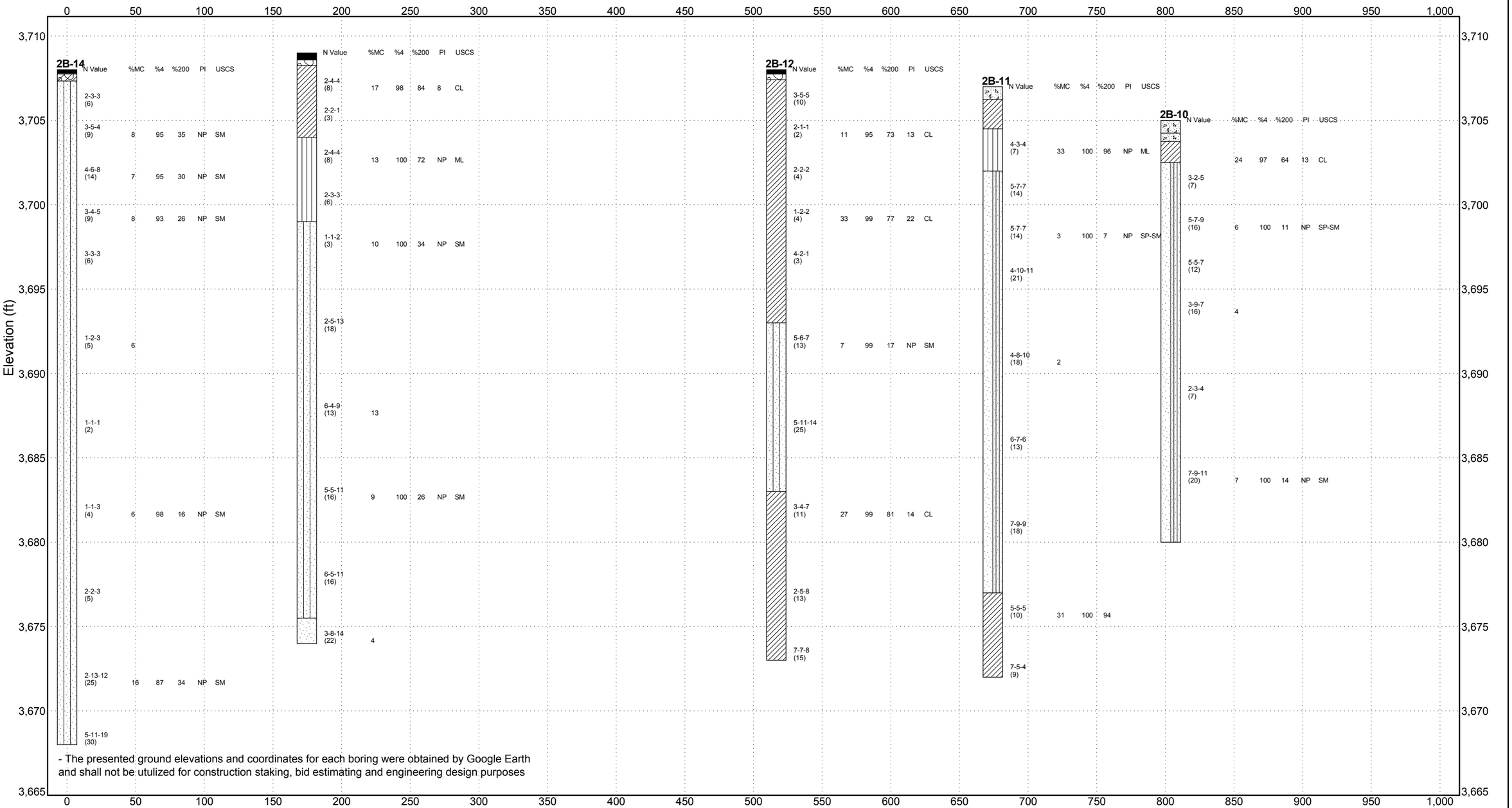
CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II

PROJECT LOCATION Various Locations

Concrete
USCS Silt
USCS Silty Sand
USCS Low Plasticity Clay
Asphalt
USCS Poorly-graded Sand
USCS Poorly-graded Sand with Silt
USCS Poorly-graded Gravel
USCS Clayey Gravel



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SUBSURFACE PROFILE DIAGRAM Diagram C-3

CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II

PROJECT LOCATION Various Locations

Asphalt
USCS Silty Sand
USCS Poorly-graded Gravel
USCS Poorly-graded Sand with Silt
USCS Silt
USCS Low Plasticity Clay

- The presented ground elevations and coordinates for each boring were obtained by Google Earth and shall not be utulized for construction staking, bid estimating and engineering design purposes

2B-16

N Value	%MC	%4	%200	PI	USCS
15-5-7 (12)					
5-5-7 (12)	10	97	32	NP	SM
4-6-8 (14)					
2-2-1 (3)	11				
1-1-1 (2)	15	98	49	7	SC-SM
1-3-4 (7)	3	94	6	NP	SP-SM
1-2-3 (5)					
4-5-5 (10)	21	99	58	14	CL

2B-15

N Value	%MC	%4	%200	PI	USCS
3-2-2 (4)	18	100	62	NP	ML
3-3-2 (5)					
2-3-3 (6)	14				
4-7-13 (20)	6	100	13	NP	SM
6-10-11 (21)					
5-7-7 (14)	5				
3-3-7 (10)					
9-11-10 (21)	2				

Elevation (ft)

Distance Along Baseline (ft)

THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

STRATIGRAPHY & GW - B SIZE 16-056-LOGS PH II.GPJ GINT STD US LAB.GDT

CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SUBSURFACE PROFILE DIAGRAM
Diagram D

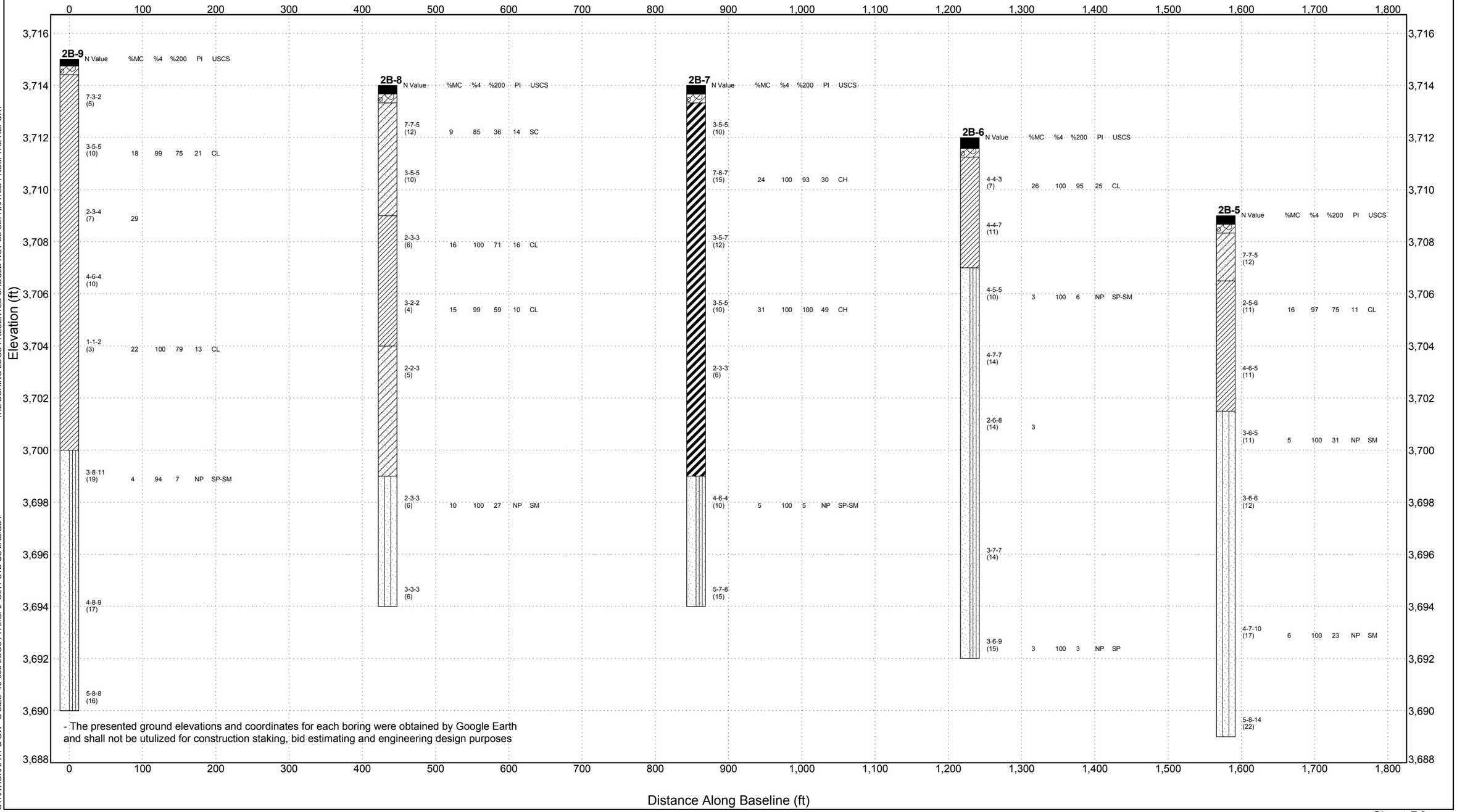
CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II

PROJECT LOCATION Various Locations

Asphalt
USCS Low Plasticity Clay
USCS High Plasticity Clay
USCS Clayey Gravel
USCS Silty Sand
USCS Clayey Sand
USCS Poorly-graded Sand with Silt



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SUBSURFACE PROFILE DIAGRAM
Diagram E

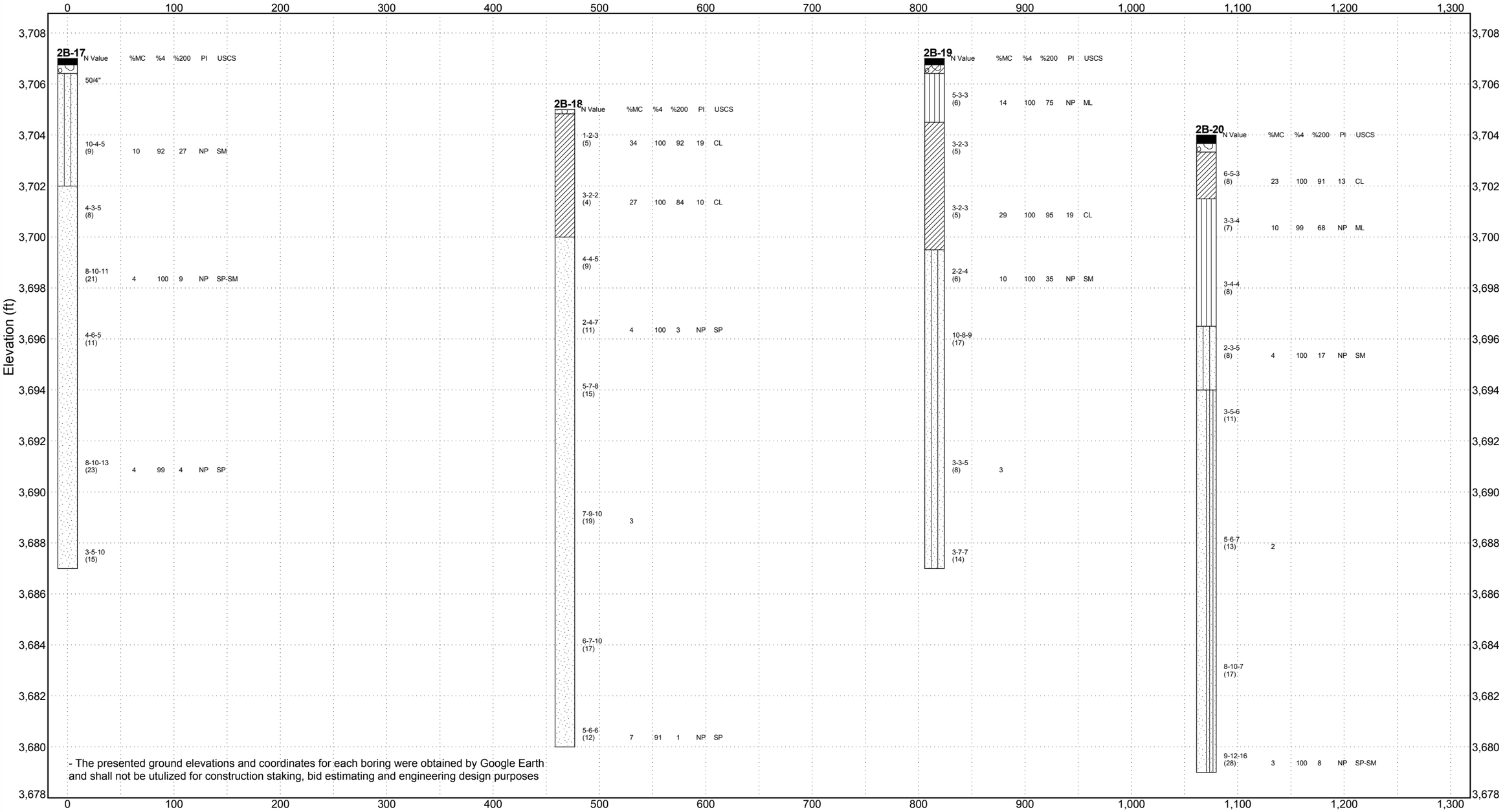
CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II

PROJECT LOCATION Various Locations

Asphalt
USCS Poorly-graded Sand
USCS Clayey Gravel
USCS Poorly-graded Gravel
Topsoil
USCS Silt
USCS Silty Sand
USCS Low Plasticity Clay
USCS Poorly-graded Sand with Silt



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SUBSURFACE PROFILE DIAGRAM Diagram F-1

CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II

PROJECT LOCATION Various Locations

Asphalt
USCS Poorly-graded Sand with Silt
USCS Silt
USCS Poorly-graded Gravel
USCS Clayey Sand
USCS Low Plasticity Clay
USCS Silty Sand

- The presented ground elevations and coordinates for each boring were obtained by Google Earth and shall not be utulized for construction staking, bid estimating and engineering design purposes

2B-24

N Value	%MC	%4	%200	PI	USCS
8-7-6 (13)	12	87	49	NP	SM
2-2-2 (4)	11	93	31	NP	SM
3-4-6 (10)					
3-5-10 (15)	9				
6-5-10 (15)					
4-5-9 (14)	7	94	11	NP	SP-SM
12-19-25 (44)					
14-19-12 (31)	2				

2B-23

N Value	%MC	%4	%200	PI	USCS
4-3-7 (10)	16	100	14	NP	SM
5-4-4 (8)	7	98	63	NP	ML
3-5-6 (11)	8	100	12	NP	SP-SM
8-13-14 (27)	5	100	21	NP	SM
6-8-9 (17)					
8-7-14 (21)	2				
9-10-10 (20)					

2B-22

N Value	%MC	%4	%200	PI	USCS
5	66	29	12	SC	
4-3-4 (7)	17	94	72	8	CL
4-4-4 (8)	9	100	31	NP	SM
2-2-5 (7)					
2-2-3 (5)					
3-7-7 (14)	3	100	3	NP	SP
1-4-8 (12)					
2-9-12 (21)					
2-14-17 (31)	3	78	7	NP	SP-SM
2-5-5 (10)					

2B-21

N Value	%MC	%4	%200	PI	USCS
14	99	65	11	CL	
6-5-5 (10)					
3-5-5 (10)	3	100	6	NP	SP-SM
4-5-7 (12)					
4-5-6 (11)	3	100	7	NP	SP-SM
3-4-6 (10)					
3-9-11 (20)	3				

Elevation (ft)

3,710 3,705 3,700 3,695 3,690 3,685 3,680 3,675 3,670

0 100 200 300 400 500 600 700 800 900 1,000 1,100 1,200 1,300 1,400 1,500 1,600

Distance Along Baseline (ft)

THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

STRATIGRAPHY & GW - B SIZE 16-056-LOGS PH II.GPJ GINT STD US LAB.GDT

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SUBSURFACE PROFILE DIAGRAM Diagram F-2

CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II

PROJECT LOCATION Various Locations

Asphalt
USCS Silty Sand
USCS Poorly-graded Gravel
USCS Poorly-graded Sand with Silt
USCS Clayey Sand
USCS Poorly-graded Sand

- The presented ground elevations and coordinates for each boring were obtained by Google Earth and shall not be utulized for construction staking, bid estimating and engineering design purposes

Elevation (ft)

Distance Along Baseline (ft)

2B-28

N Value	%MC	%4	%200	PI	USCS
8-8-9 (17)	6	74	21	NP	SM
2-5-10 (15)	5				
7-9-13 (22)	8	97	18	NP	SM
11-12-15 (27)					
12-9-12 (21)	7	96	15	NP	SM
5-6-5 (11)					

2B-27

N Value	%MC	%4	%200	PI	USCS
9-5-5 (10)					
3-2-2 (4)	10	97	36	NP	SM
2-3-3 (6)					
4-5-8 (13)	6				
8-6-6 (12)	4	100	10	NP	SP-SM
7-13-17 (30)					
9-17-17 (34)	4	100	4	NP	SP-SM

2B-26

N Value	%MC	%4	%200	PI	USCS
5-6-7 (13)	7	86	23	13	SC
1-7-7 (14)	12	99	48	NP	SM
3-5-5 (10)	9				
4-7-10 (17)					
7-12-11 (23)	4	100	6	NP	SP-SM
6-7-9 (16)					

2B-25

N Value	%MC	%4	%200	PI	USCS
16-10-4 (14)	9	74	38	11	SC
5-3-7 (10)					
7-4-4 (8)	6				
2-2-2 (4)					
6-7-11 (18)	5	100	15	NP	SM
9-18-15 (33)					
10-9-6 (15)	4				

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SUBSURFACE PROFILE DIAGRAM Diagram F-3

CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II

PROJECT LOCATION Various Locations

Asphalt
USCS Silty Sand
USCS Poorly-graded Gravel
USCS Poorly-graded Sand with Silt
USCS Clayey Sand
USCS Clayey Sand

- The presented ground elevations and coordinates for each boring were obtained by Google Earth and shall not be utulized for construction staking, bid estimating and engineering design purposes

2B-30

N Value	%MC	%4	%200	PI	USCS
6-4-7 (11)	8	89	24	9	SC
4-4-7 (11)					
6-5-6 (11)	6	92	20	NP	SM
2-5-9 (14)					
4-7-11 (18)	6	100	7	NP	SP-SM
3-9-15 (24)					
7-14-18 (32)	4	100	2	NP	SP
8-15-16 (31)					
8-16-16 (32)	4				

2B-29

N Value	%MC	%4	%200	PI	USCS
3-3-4 (7)	11	100	9	7	SC-SM
4-3-3 (6)					
4-8-8 (16)	4	92	45	NP	SM
7-8-8 (16)					
5-7-8 (15)					
8-11-15 (26)	2	100	5	NP	SP-SM
10-9-5 (14)					
13-11-11 (22)	3	100	4	NP	SP-SM
7-3-3 (6)					

Elevation (ft)

Distance Along Baseline (ft)

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SUBSURFACE PROFILE DIAGRAM Diagram G-1

CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II

PROJECT LOCATION Various Locations

Asphalt
USCS Silt
USCS Poorly-graded Sand with Silt
USCS Poorly-graded Gravel
USCS Silty Sand
USCS Clayey Sand
USCS Clayey Sand

- The presented ground elevations and coordinates for each boring were obtained by Google Earth and shall not be utulized for construction staking, bid estimating and engineering design purposes

2B-33

N Value	%MC	%4	%200	PI	USCS
5-9-11 (20)	9	90	41	NP	SM
2-3-7 (10)					
3-3-5 (8)	8	93	28	NP	SM
3-4-4 (8)					
2-5-6 (11)					
3-6-9 (15)	8	100	12	NP	SP-SM
5-7-13 (20)					
5-8-10 (18)	4				

2B-32

N Value	%MC	%4	%200	PI	USCS
5-9-7 (16)	6	73	19	7	SC-SM
5-11-11 (22)	7	100	29	NP	SM
9-12-16 (28)	6	99	20	NP	SM
5-7-8 (15)					
3-3-5 (8)	7	99	12	NP	SP-SM
5-9-9 (18)					
1-1-1 (2)	15				

2B-31

N Value	%MC	%4	%200	PI	USCS
7-7-7 (14)	7	76	25	11	SC
15-7-8 (15)					
2-1-2 (3)					
3-3-2 (5)	14	93	72	NP	ML
3-3-2 (5)	8	99	26	NP	SM
3-7-8 (15)					
14-17-18 (35)	14				

Elevation (ft)

Distance Along Baseline (ft)

THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

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SUBSURFACE PROFILE DIAGRAM Diagram G-2

CLIENT Brown & Caldwell

PROJECT NUMBER AGCQC16-056

PROJECT NAME EPW-Boone Street Sewer Interceptor Design Phase II

PROJECT LOCATION Various Locations

Asphalt
USCS Poorly-graded Sand with Silt
USCS Poorly-graded Gravel
USCS Silt
USCS Silty Sand

- The presented ground elevations and coordinates for each boring were obtained by Google Earth and shall not be utulized for construction staking, bid estimating and engineering design purposes

2B-34

N Value	%MC	%4	%200	PI	USCS
4-9-7 (16)	8	89	27	NP	SM
4-3-3 (6)	18	91	79	NP	ML
2-5-7 (12)	4	99	6	NP	SP-SM
2-4-6 (10)					
5-5-2 (7)					
6-8-11 (19)	3	91	4	NP	SP
5-9-12 (21)					
4-4-13 (17)					
7-16-19 (35)	2	100	5	NP	SP-SM
7-9-21 (30)					

2B-33

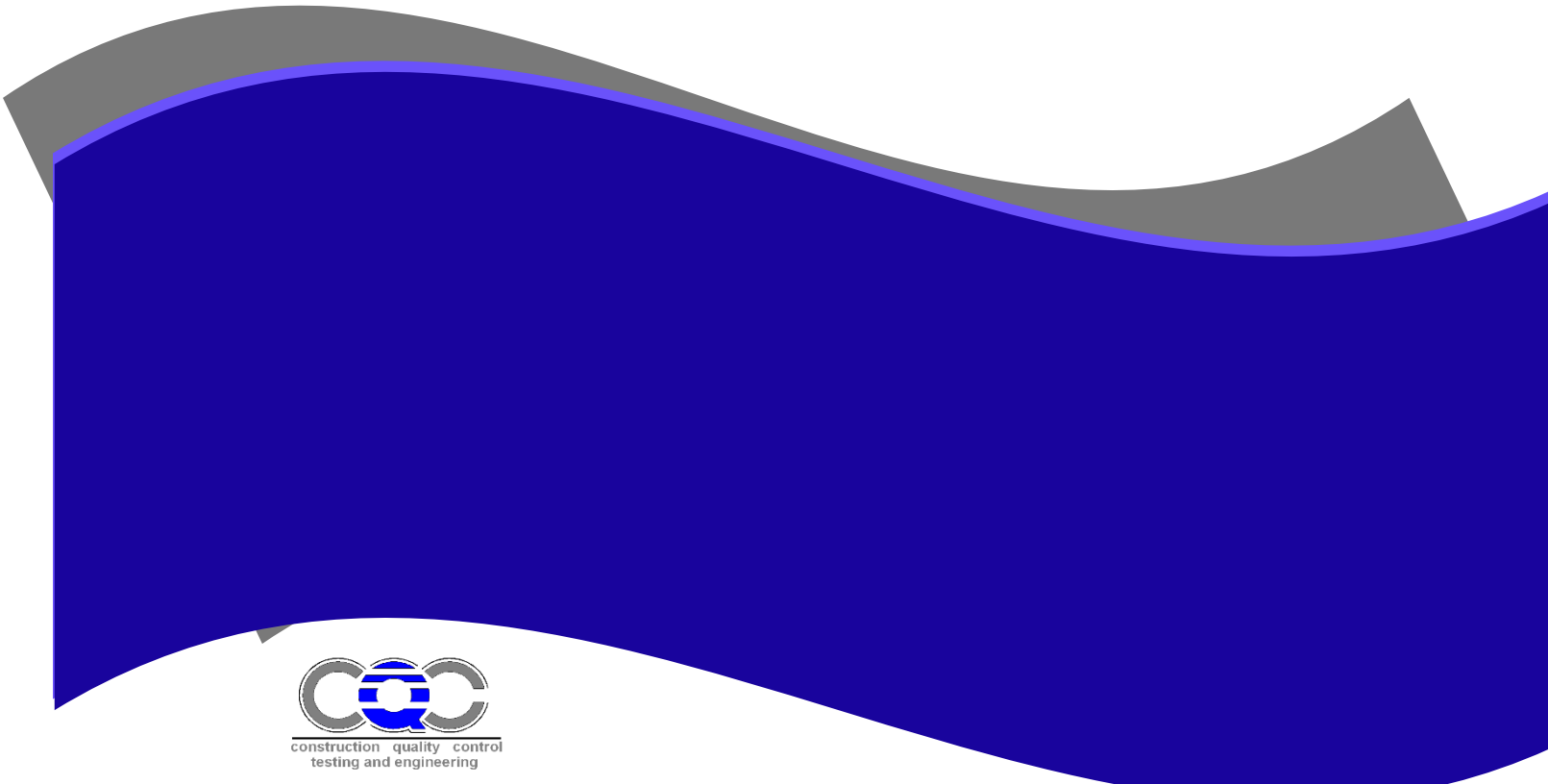
N Value	%MC	%4	%200	PI	USCS
5-9-11 (20)	9	90	41	NP	SM
2-3-7 (10)					
3-3-5 (8)	8	93	28	NP	SM
3-4-4 (8)					
2-5-6 (11)					
3-6-9 (15)	8	100	12	NP	SP-SM
5-7-13 (20)					
5-8-10 (18)	4				

Elevation (ft)

Distance Along Baseline (ft)

THE BORING LOGS PRESENTED SHOULD NOT BE SEPARATED FROM THE REPORT

STRATIGRAPHY & GW - B SIZE 16-056-LOGS PH II.GPJ GINT STD US LAB.GDT



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