GENERAL GEOTECHNICAL SUBSURFACE SOILS EVALUATION REPORT

FOR

EL PASO WATER- PERSHING 16-INCH WATER MAIN IMPROVEMENTS PROJECT

BISHOP WAY, STEVENS STREET, CAMBRIDGE AVENUE, HAPPER STREET, LEEDS AVENUE, PERSHING DRIVE & SPARKMAN STREET
EL PASO, EL PASO COUNTY, TEXAS
CQC PROJECT NO. AGCQC20-010-03

el paso WATER

PREPARED FOR

EL PASO WATER
1154 HAWKINS BOULEVARD
EL PASO, TEXAS 79925

construction quality control testing and engineering

CQC TESTING AND ENGINEERING, L.L.C.
TBPE FIRM REGISTRATION NO. F-10632
4606 TITANIC AVE.
EL PASO, TEXAS 79904
PH.: (915)-771-7766
FX.: (915) 771-7786

construction quality control testing and engineering
4606 Titanic Avenue
El Paso, Texas 79904
Ph. (915) 771-7766
Fx. (915) 771-7786

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

October 11, 2021(Final Report Date December 9, 2022)

El Paso Water
1154 Hawkins Boulevard
El Paso, Texas 79925

Attn: **Mr. Francisco J. Martinez, P.E.**
Utility Engineer

Re: **General Geotechnical Subsurface Soils Evaluation Report**
EPW – Pershing 16-inch Water Main Project
El Paso, El Paso County, Texas
CQC Project No.: AGCQC20-010-03

Dear Mr. Martinez,

In accordance with our contract agreement and approved scope of services described under proposal No. PGCQC20-025-04, dated February 22, 2021 (revised June 4, 2021), CQC Testing and Engineering, L.L.C. (CQC) is pleased to provide El Paso Water (Client/Owner) with our general geotechnical subsurface soils evaluation report for the above referenced project. This report also presents the results of our supplemental exploration borings scope of work approved by EPW under our master contract agreement and Proposal No. PGCQC20-025-03.1, dated November 23, 2021. The results of our soil exploration borings, laboratory engineering soil classification test results, guidance information with respect to suitability of observed and tested subsurface soils, bearing resistance, potential construction use for structure backfilling and general trench safety guideline considerations. At the time this report was submitted, final design plans and specifications were not available for CQC's review. We recommend that this information be provided to CQC, so that we may review and/or modify our recommendations submitted 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 final design and construction documents development phase 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.
TBPE Firm Registration No. F-10632

12/9/2022
STATE OF TEXAS
JAIME ROJAS
89944
LICENSED
PROFESSIONAL ENGINEER

Jose Luis Arias
Project Engineer
jarias@cqceng.com

Jaime Rojas, P.E.
Principal Engineer
jrojas@cqceng.com

Copies: 1.) Above Distribution – 1 copy by e-mail (fjmartinez@epwater.org)
2.) CEA Group – 1 copy by e-mail (agarcia@ceagroup.net / mcastaneda@ceagroup.net)

D:\Dropbox\CQC Files\CQC Working Files\GEO\Reports\2020\20-010-03 EPW Pershing 16-Inch Water Main (EPW)\07-Final Report Documents\20-010-03_CoverLetter_Final.docx

Report Table of Contents

List of Tables

List of Appendices

Section 1.0 – General Project Information

This general geotechnical subsurface soils evaluation report has been prepared for the use of **El Paso Water (Client/Owner)** for the El Paso Water Pershing 16-inch Water Main Improvement Project. Based on general information and an aerial photo provided by CEA Group (Project Civil Engineer), we understand that the project consists of the installation of a new water main line. The new waterline shall commence at the intersection of Alta Street and Bishop Way and shall run through Stevens Street, Cambridge Avenue, Pershing Drive, Leeds Avenue and end at Sparkman Street (See Appendix A, Sheet 1-1). The new waterline route is located in central El Paso, El Paso County, Texas. After the submittal of our initial geotechnical report on October 11, 2021, the owner (El Paso Water) changed the waterline alignment of the project. Based on new information provided by our client, we understand that the new waterline alignment shall run through Cambridge Avenue, Pershing Drive and end at the north end of Sparksman Street (revised alignment presented in Sheet A1-1). The project includes the design and specification of approximately 3,950 linear feet along the initial pipeline route and an additional 3,180 feet along the new pipeline route with a 16-inch diameter. We understand that the project may also include a trenchless crossing at a railroad crossing at the end of the pipeline. It is our understanding that the water line invert depth shall be approximately 7½ feet, below existing ground and/or pavement surface elevation.

Our scope of services for this project consisted of generally evaluating the subsurface soil conditions along the new water line alignment route by collecting subsurface soil information, conducting Standard Penetration Tests (SPT's) and developing soil related information with respect to the suitability of the on-site soils, engineering soil classifications, bearing resistance, and potential construction use for pipeline backfilling.

The following sections of this report present our field evaluation methods, site soil-related considerations, estimated allowable bearing capacity values, and guideline information with respect to site preparation, pipe embedment, soil backfilling and trench safety considerations. 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 is not correct and/or if the owner changes the new water system route for this project. Waterline route changes may result in our information and recommendations within this report to be invalid without further review and evaluation by CQC.

1.1 - Site Geologic Considerations

The Geologic Atlas of Texas (Van Horn-El Paso Sheet, Revised 1983) published by the Bureau of Economic Geology at the University of Texas at Austin indicates that that the waterline route is located in an area of Old Quaternary (Qao) and Bolson deposits (QTb) deposits. These deposits typically consist of colluvium, alluvium and fan deposits. These geologic formations will contain deposits of gravel, silt, sand, clay, caliche and gypsum in bolsons. These deposits are usually variable over relatively short distances. The geologic atlas also indicated that the project site is located west of the Franklin Mountain fault zone.

Excavations through the very dense and/or hard sand/gravel soil formations in the area shall require relatively heavy equipment to perform excavation operations along the pipeline route area. It should be considered that once the formations are unconfined the shall tend to slough and collapse during excavation. Subsequent sections in this report present additional excavation considerations, especially with respect to surface soil/gravel formations and suitability of excavated soil materials for pipeline backfill.

Based on our review of the City of El Paso floodplain maps, the project area appears to be outside of a flood zone. A general Flood Zone Aerial Plan is presented on Appendix A, Sheet A1-2 for reference. The indicated flood plain information and zones on the aerial plan may not represent the exact flood plain path locations. It is recommended this be further evaluated with a site specific topographic survey and drainage analysis.

It has been reported that no significant ground movement caused by the existing faults has been recorded for the past 50 years in the El Paso area. Although the local seismic observatory at the University of Texas at El Paso (UTEP) has indicated that, the frequency of recordable ground movements has increased.

Please note that our scope of work did not include the specific delineation of faults along the pipeline route. However, these services may be provided as an additional scope of work and services to our Client, if required.

1.2 – Existing Site Conditions and Topography

The original waterline route is located within city-dedicated street sections and a portion of the new waterline route shall be located within a Texas Department of Transportation (TXDOT) dedicated street. As previously mentioned, the waterline shall commence at the intersection of Alta Street and Bishop Way, continuous along Pershing Drive and end at Sparkman Street. The general pipeline alignment is bounded by residential properties. Based on our general review of satellite ground elevation information, the roadway ground elevations along the pipeline route range from 3794 to 3832 feet. The streets are paved with asphaltic concrete

and existing underground utility infrastructure includes gas lines, fiber optic lines, water and sanitary sewer lines. The encountered asphaltic-concrete pavement section within our completed borings measured approximately 2 to 4 inches thick. Based on our observations, the apparent base material supporting the pavement ranged in thickness from approximately 6 to 12 inches.

CQC was not provided with any historical survey plans, historical topographic surveys, historical photographs, historical grading plans, environmental reports or construction reports for review from our Client. Therefore, CQC has no knowledge if previous site excavations or fill required to construct the existing roadways, surrounding properties and utility infrastructure were appropriately backfilled with suitable soils and tested for compaction verification. We anticipate that existing utility infrastructure is over 30 years old.

1.3 – Seismic Considerations

On March 26, 2020 a 5.0 magnitude earthquake occurred near the town of Mentone, Texas that resulted in tremors in El Paso, El Paso County, Texas. There was a total of 5 earthquakes that registered near the town of Mentone. The earthquakes have registered on the richter scale between 2.6 to 5.0. Another recent earthquake was reported on November 16, 2022 near Toyah, Texas. The tremors were felt throughout West Texas. It is not known if any of the existing utility infrastructures within the project area exhibited any damage or movement.

Seismic ground motion values are defined in the table below. The seismic coefficients were generated through Seismic Design Maps, a USGS web service developed by the Structural Engineers Association of California's (SEAOC) and California's Office of Statewide Health Planning and Development (OSHPD). These values should be verified by the project structural engineer prior to use in structural analysis. CQC should be informed if the reported values vary significantly.

Table 1 - Seismic Ground Motion Values

Latitude	Longitude	Site Classification	Period (Seconds)	Spectral Accelerations (g)	Site Coefficient, F_a	Site Coefficient, F_v
31.791563	-106.451122	D	0.2 (S_s)	0.333	1.534	-
			1.0 (S_1)	0.109	-	2.382

Remarks: Site Class is based on the current National Earthquake Hazards Reduction Program (NEHRP 2015) and Site Classification for Seismic Design Definitions in conjunction with our review of the geologic conditions in the area. 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.

Section 2.0 – General Subsurface Soils Evaluation Methods and Testing

As requested, the subsurface soils along the proposed original waterline routes were evaluated by completing ten (10) subsurface exploration vertical borings and proposed additional route was evaluated by an additional three (3) vertical borings with a truck mounted drilling rig. The approximate boring locations are shown in the "General Geotechnical Subsurface Exploration Boring Location Aerial Plan" presented in Sheet A1-1. A summary of our subsurface vertical boring evaluation is reported in the table below. Our vertical exploration boring logs are presented in Sheets A2 through A14.

Our engineering soil classification tests (i.e., moisture contents, soil particle size analysis and Atterberg Limit Tests) were performed in accordance with accepted ASTM and/or TXDOT test procedures. 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 Sheets A28 through A30. In general, at the completion of our drilling activities, the borings were backfilled and patched with rapid set concrete to the pavement surface elevations.

The following table summarizes the completion depth of our borings, type of samples, number of soil samples collected, and observed groundwater or water seepage depth at the time of our drilling operations.

Table 2 – Summary of Subsurface Vertical Boring Evaluation

Borehole No.		Borehole Drilling Completion Date	Approximate Termination Depth (ft.)	No. Split-Spoon Samples	Approx. Observed Groundwater / Water Seepage Depth (ft.)
B-1		7/21/21	6[1]	3	NE
B-2		7/21/21	15	6	NE
B-3		7/21/21	14	6	NE
B-4		7/22/21	15	6	NE
B-5		7/22/21	15	6	NE
B-6		7/22/21	15	6	NE
B-7		7/22/21	15	6	NE
B-8		7/22/21	10½[2]	5	NE
B-9		7/21/21	15	6	NE
B-10		7/21/21	10[1]	5	NE
Supplemental Borings	B-11	1/24/22	15	5	NE
	B-12	1/24/22	14[2]	5	NE
	B-13	1/24/22	18½[2]	6	NE

Remarks: The vertical borings were logged during our drilling operations by a member of our geotechnical engineering staff. 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 at discrete depth intervals and were containerized and transported to our laboratory for further observation and engineering soil classification testing on selected samples.

NE- Not encountered immediately at the completion of our drilling activities. See comment in report Section 3.1 with respect to potential water seepage locations
[1] - Auger refusal was experienced at the indicated depth.
[2] – Split Spoon refusal was experienced at the indicated depth.

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. Please review all other sections of this report for additional specification and construction considerations, especially Section 6.2 for trenchless crossings.

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

Type of Test	ASTM/TXDOT Test Procedure	Total Number Conducted	Number Conducted for Supplemental Evaluation
Moisture Content Tests	D 2216	31	13
Atterberg Limit Tests	D 4318	31	13
Soil Particle Size Analysis Tests	D 6913	31	13
Soil Moisture-Density Relationship Tests	D 1557	9	3
Soil California Bearing Ratio (CBR) Tests	D 1883	5	1
Soil Resistivity Tests	Tex-129-E	6	3
Soil pH Test	Tex-128-E	6	3

Selected soil particle size analysis test report results are reported in Sheets A15 through A27.

2.2 – Soil Moisture-Density Relationship Test Results

At the time of our drilling activities, twelve (12) bulk composite soil samples were obtained from the reported boring locations for soil moisture-density relationship testing. The samples were collected during our

drilling activities from auger cuttings from approximately the ground surface to the reported depth. The test results are reported in Sheets A31 through A42.

Table 4 – Summary of Soil Moisture-Density Relationship Test Results

Borehole No.		Approx. Sample Depth (ft)	ASTM D 1557, Method	Soil Classification[1]	Plasticity Index	Opt. Dry Density (pcf)	Opt. Moisture (%)
B-2		1 - 5	B	SC-SM	4	141.9	4.8
B-3		1 - 5	A	SC	8	124.6	10.5
B-4		1 - 5	B	SC-SM	5	136.4	6.4
B-5		1 - 5	C	GC-GM	7	141.8	4.4
B-6		1 - 5	C	GP-GC	5	145.8	4.3
B-7		1 - 5	C	GP-GM	NP	143.4	3.5
B-8		1 - 5	C	GP-GC	5	148.6	3.4
B-9		1 - 5	C	GC-GM	4	147.5	4.1
B-10		1 - 5	C	GP-GC	10	150.1	2.9
Supplemental Borings	B-11	1 - 5	B	SC-SM	4	131.0	7.5
	B-12	5 - 10	C	SC	14	137.2	5.5
	B-13	5 - 10	C	SC-SM	5	144.6	3.8

NP – None Plastic.
Note [1] - Soil description is reported in our test report results in Sheets A31 through A42.

2.3 – Soil California Bearing Ratio (CBR) Test Results

The results of six (6) California Bearing Ratio (CBR) tests conducted on collected bulk composite soil samples from the reported boring locations and are presented in the table below and Sheets A43 through A48. The tests were performed in general accordance with ASTM standard test method D 1883. Based on our CBR test results, the soils at the sample locations shall provide a relatively moderate to high level of support for the new replacement pavement sections along the pipeline route.

Table 5 – Summary of California Bearing Ratio (CBR) Test Results

Borehole No.	Sample Depth (ft)	Dry Density prior to Soaking (pcf)	Dry Density after Soaking (pcf)	Swell %	CBR at 0.1" Pen.	CBR at 0.2" Pen.	Support Level
B-2	1 - 5	133.7	127.4	0.1778	60	64	High
B-4	1 - 5	129.7	126.6	0.2444	67	65	High
B-6	1 - 5	139.6	138.2	0.0*	50	108	High
B-8	1 - 5	139.8	137.1	0.0*	64	77	High
B-10	1 - 5	141.4	138.7	0.0222	38	40	High

Supplemental Borings	B-11	1 - 5	125.6	122.7	0.2889	27	28	Moderate

Note *: No swelling recorded with standard test procedure equipment.

2.4 – 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, buried steel structures 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 and in Sheets A49 through A55.

Table 6 – Summary of Soil pH Test Results

Borehole No.		Sample Depth (ft)	pH
B-2		5 - 10	9.4
B-4		5 - 10	9.5
B-6		5 - 10	9.4
B-8		5 - 10	9.3
B-9		5 - 10	9.3
B-10		5 - 10	9.2
Supplemental Borings	B-11	5 - 10	9.3
	B-12	10 – 15`	9.1
	B-13	10 - 15	9.0

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.

2.5 - Laboratory Soil Resistivity Test Results

In general, testing was performed on nine (9) samples collected from approximately below the existing ground surface elevation in borings B-2, B-4, B-6, B-8, B-9, B-10, B-11, B-12 and B-13. The soil resistivity test results along with a graphical plot are presented in Sheets A56 through A66. Based on these results that aid in better defining the potential corrosion properties of subsurface soils, the tested subsurface soils may be considered non-corrosive to corrosive at a very moist to saturated state, particularly for steel pipe or casings (See table below).

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. The specification of cathodic protection should also be considered where 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

Remarks: 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 may represent the resistivity of the tested soil sample. 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.

Section 3.0 – Subsurface Soil Classification and Strength Considerations

Based on our soil classifications and laboratory tests, the subsurface soils encountered in our exploration borings along the pipeline route area may be described by generalized soil stratums presented in the following table. The logged depth of the soil formation types is approximately delineated in our boring logs. Based on past geotechnical evaluations within the project area, it is possible for variations in the types and depths of the soil formations to occur over relatively short distances.

Table 8 – Summary of Subsurface Soil Classification & Strength

Stratum	General Description	Consistency (SPT Blow Counts)	Moisture Content (%)	Atterberg Limits		%Passing No. 200	USCS Classification
				Liquid Limit	Plasticity Index		
I	Stratum I: Silty Sand, Clayey Sand, Poorly Graded Sand, Gravelly Sand and sandy gravels. Fine to coarse grained with gravel and various amounts of silt.	Loose to Hard (6 to 71)	1 to 11	18 to 27	1 to 9	6 to 46	SM, SW, SC, SC-SM SP-SM, GW-GM, GC-GM, GP-GC, GP-GM and GM
	***Remarks*:** [1] Stratum I soil zones which exhibit SPT values less than 11 blows per foot shall be susceptible to soil sloughing during excavations. Sandy gravel formations shall also be well consolidated and hard to excavate, however, once they unconfined these gravel layers shall tend to slough and collapse, especially since they are in a relatively dry state. [2] It should be anticipated that screening of the Stratum I gravelly soils shall be required to meet the requirements of Class II and Class III backfill soil materials. Based on the observed and tested Stratum I formations, primarily gravel was encountered in the borings. As a result, excavated gravelly material that the time of construction shall require complete removal and replacement with Imported suitable backfill soil material for pipe bedding, pipe zone backfill and general backfill above the pipe zone. [3] These sandy gravel formations shall require relatively heavy equipment to excavate the subsurface soil. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soil and allow penetration through encountered dense to hard sandy gravel formations.						

	[4] Trenchless crossings through poorly graded sand layers and gravel formations may require pre grouting methods to maintain soils relatively stable during tunnel boring. This may be further evaluated with test pits prior to tunneling, however should be considered in bid estimates.						
II	Stratum II: Sandy Fat Clay and Lean Clay with gravel.	Very Stiff to Hard (21 to 60)	13 to 24	37 to 62	25 to 44	51 to 88	CH and CL
	Pocket Penetrometer Readings (tsf):	3.0 to 4.5					
	***Remarks*:** [1] In general the Stratum II clays are considered Class IV backfill soil materials and are not considered suitable backfill soil materials. Excavated Stratum II soils shall be replaced with approved suitable backfill soil materials.						

It should be anticipated that the Stratum I sandy gravels reported on our boring logs shall require heavy equipment to perform excavations. Gravelly Soil formations which exhibited SPT N-Values of 25 or greater shall require relatively large excavations to perform excavations (see additional remarks in Table 8 above). At Boring B-1 auger refusal was experienced at a relatively shall depth of 6 feet. It should be considered that excavation shall be hard along Bishop Way. In this area, excavations may require impact hammers to break through hard soil/gravel formations. In general, the selected excavation method by the contractor shall limit vibratory impacts to adjacent structures or private properties, site work and existing utility lines within the project limits and reasonable other influence areas beyond the project limits. The general contractor shall perform a demonstration for the owner for documentation of the effectiveness of the selected excavation method that limit potential impacts to existing structures.

It should be noted that due to the hard bearing and gravelly nature of the subsurface soils and the standard size of our sample containers, the collected samples may not represent the degree of larger size particles. As a result, the USCS classification indicated above for soil Stratum I may vary and shall be confirmed at the time of construction

All imported fill soil materials shall meet the Select Fill requirements of Section 10.0.

3.1 - Groundwater Depth Considerations

At the time of our drilling activities, groundwater or water seepage was not observed or encountered immediately at the completion of our subsurface exploratory borings. The groundwater depth in this area is anticipated to be below an anticipated maximum excavation depth of 10 feet for this project. In general, the subsurface soils were encountered at a relatively dry to moist condition. The moisture content of tested soil samples ranged from about 1 to 24 percent.

However, based on our past experience with projects near the foothills of the Franklin Mountains it is possible to encounter shallower perched water zones and flowing water zones where relatively high permeability soils overlay low permeability soils or after periods of significant precipitation. We anticipate that water seepage may be encountered at depths ranging from 23 feet to 50 feet below existing ground surface in the vicinity of the project area. The aerial plan presented in Sheet A1-3 indicates areas where water seepage was encountered in past projects by CQC for reference and consideration in design and construction. If water seepage is encountered provisions may include the excavation of a temporary diversion pits or swamps within the excavation trench to allow pumping and removal of water seepage, while pipe installation is proceeding. Collected water within the excavation pit may be appropriately pumped out and re-directed as approved by the design engineer. The portion of the pipeline exposed to water seepage may be installed in accordance with standard pipeline installation below groundwater conditions, which should include wrapping the backfill trench with approved geofabric and Class I bedding backfill materials. Other methods to bridge-over water seepage may also include the installation of 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. In any event, CQC should be immediately contacted to perform site observation of the noted conditions to develop additional recommendations, if necessary. Workers shall be prohibited from working in excavations where water has accumulated or is accumulating.

Our scope of work did not include the development of a dewatering plan or review of prepared submittals by the general contractor, if required. 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, as required.

3.2 - Soil Related Movement Considerations

The results of our observations and soil classification tests were used to evaluate the Potential Vertical Rise (PVR) of the Stratum II subsurface 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. 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 classification test results, 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 an active soil zone of 15 feet; the following PVR values where estimated for each boring.

Table 9 - Estimated PVR Values

Borehole No. [1]		Estimated PVR Value (in.)
B-1		< ½
B-2		< ¾
B-3		< ½
B-4		< ¾
B-5		< ¼
B-6		< ¾
B-7		Negligible
B-8		Negligible
B-9		< ¼
B-10		Negligible
Supplemental Borings	B-11	< ¾
	B-12	< ¾
	B-13	< ½

[1] Borehole approximate locations are indicated in General Geotechnical Subsurface Exploration Boring Location Aerial Plan in Sheet A1-1.

According to the results, the subsurface clayey soils within the waterline alignment exhibit a relatively low potential for swelling. Based on the invert depths of the waterline we anticipate that portions of the pipeline shall be placed above on lean and fat clay soils. This is especially true for areas near borings B-4, B-6, B-10, B-11 and B-12 where clayey soils where encountered at approximately 10 feet. Should plastic clayey soils be encountered at the embedment depth, the clayey soil shall be removed and replaced with suitable approved back fill soil materials along the pipeline trench at the time of construction. It is anticipated that the existing soils shall be modified during pipeline excavation trenching as a result shall exhibit a relatively low swell potential.

3.3 - Drainage Considerations

Drainage is an important key to the successful performance of any excavation and soil supported structure or pipeline. 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 water system installation trenches. It is also possible for sinkholes to be created if trenches are left open during periods of significant rainfall events, especially in construction areas that have significant vertical changes in elevation.

3.4 – Waterline Subgrade Embedment Preparation Considerations

The existing subgrade soils that will support compacted Select Fill and/or Class III backfill soil materials and pipeline structures should be cleared of all vegetation, large rock particles, organic matter and/or any foreign matter or as required by the project plans and specifications, whichever is most stringent. As previously mentioned, screening of the native soils shall be required to meet the pipeline Select Fill and/or Class III or Class II backfill requirements.

Should high plasticity clayey soil be encountered at the pipe embedment depth, the clayey soils at the pipe embedment elevation shall be overexcavated and replaced with Select Fill and/or Class III backfill soils to a minimum 10 inches. This is specifically true for borings B-4, B-6, B-10, B-11 and B-12 where clayey soils may be encountered at the pipe embedment depth. As previously indicated screening of native soil/gravel materials may be required along this pipeline route.

The exposed subgrade at the specified cut depth or below specified Select Fill shall be scarified to a minimum depth of 6 inches, moisture conditioned and re compacted. Subgrade soils with a PI less than 18 shall be scarified and recompacted to 90 percent of maximum dry density determined per ASTM D 1557. Moisture content of subgrade shall be maintained within ±3 percent of optimum moisture content until permanently covered. Cohesive clay subgrade soils (i.e., soils with a PI greater than 18) should be compacted to at least 90 percent of maximum dry density per ASTM D 1557 with water content within 0 to 4 percentage points of optimum. The contractor should also control the application of moisture to the subgrade soils during earthwork operations to mitigate potential subgrade pumping. Weak or compressible soil zones identified during earthwork operations should be removed and replaced with properly compacted Select Fill or approved rock material to a minimum depth of 8 inches or as required to appropriately bridge over these soils, whichever is deeper.

Once the subgrade soils have been compacted and tested, prepared exposed subgrade soils shall be proof rolled with manual equipment such as jumping jack or robotic compactors that may access excavation trenches. Weak or pumping compressible soil zones identified during proof rolling shall be over excavated and replaced with approved Select Fill or Class III backfill soil materials to a minimum depth of 12 inches or as required to appropriately bridge over these soils, whichever is deeper. Any subgrade areas that demonstrates permanent deformation greater than 1 inch shall also be over excavated and replaced with compacted Select Fill material.

It is recommended that a unit bid price be requested from bidding contractors for the placement of gravel or rock material (i.e, minimum of 4 to 8 inch clean, uniformly angular, stable crushed limestone rock) at the over-

excavation bottom cut depth, in the event that pumping of the subgrade soils is experienced. The placement of gravel shall serve as bridge over soft or loose wet spots at the bottom of the cut elevation.

The earthwork contractor shall consider that temporary excavation slopes shall be at least 1 ½ :1 or shored to control sloughing or cave-ins of the encountered soils in order to conduct specified earthwork excavations and place approved water pipe lines.

Section 4.0 – Soil Bearing Capacity and Design Considerations

4.1 – Pipeline Design Considerations

At the time this report was submitted, final pipeline invert depth, details and plans were not available for our review. Once available, CQC should be provided this information reevaluate our recommendations with respect to allowable soil bearing capacities and recommended soil improvement below the new pipeline presented within this report. At this time we understand that the waterline embedment depth shall be about 7 ½ feet below the existing pavement surface elevations. The encountered subsurface soils at the anticipated waterline invert depth is anticipated to provide an allowable soil bearing capacity of 3,500 pounds per square foot (psf). The recommendations in the following sections of this report should also be considered in the design of the water line, associated structures, pipeline embedment and backfilling.

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

-γ_s ≥135 pcf (Estimated Soil Total unit weight)
-Category 1 - Sandy & Gravel Profile
- E' = 1,000 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 450 pounds per cubic foot may be used for design purposes. Thrust blocks should bear solidly against undisturbed trench walls in all directions.

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.

The estimated unit weights of soil in the table below may also be utilized to estimate vertical earth loads above the buried water pipes and boxes. Vehicles live loads and surcharge pressures should also be considered in analysis, as applicable.

Table 10 – Earth Pressure Coefficients

Soil Type	Estimated Total Unit Weight Ranges (pcf)	Presumptive Soil Angle of Internal Friction Ranges (deg)	Lateral Earth Pressure Coefficients		Equivalent Fluid Weight (pcf)	
			At-Rest (K_o)	Active (K_a)	At-Rest (K_o)	Active (K_a)
Structural Fill (Base Course Material)	145	42	0.33	0.20	49	30
Select Fill Soils (Select Backfill Soil) (PI<15)	115	32	0.47	0.31	54	35
Silty and Poorly Graded Sands	129 – 132	29 – 32	0.51 – 0.47	0.35 – 0.31	66 – 62	45 – 41
Clayey Sands	128 – 130	30 – 34	0.50 – 0.44	0.33 – 0.28	64 - 56	42 – 36
Sandy Gravel	140 – 145	35 – 37	0.43 – 0.39	0.27 – 0.25	60 - 56	38 – 36
Lean/Fat Clay	120	-	0.80	0.66	96	80

Section 6.0 – General Trench Safety Considerations

The following report sections present general trench safety 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.

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.

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

In the event that trenchless crossings shall be specified for this project, especially across the railroad at the north end of the project, it is recommended that specified trenchless crossings for this project consist of limited personnel non-entry required methods such as Horizontal Boring 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 pre-grouting should be considered at the pipeline trenchless crossing. Grouting would be performed prior to tunneling to strengthen loose soil zones and dry gravel/sand formations that will slough and collapse during tunneling. Test pits should be conducted by the general contractor at the tunnel crossing area to evaluate the stability of the existing soil formations and observed side wall conditions.

In the event that the contractor elects to use pipe jacking methods 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 general contractor'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 routed to mitigate the potential settlement of the trench as required by the engineer or manufacturer. It is recommended that the selected contractor provide a boring 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) 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. An estimate of potential ground settlement along the crown of the tunnel shall also be provided for the engineers review. 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.

Annular space grouting plans, required by contract documents.

Section 7.0 – Pipe Embedment and Backfill Considerations

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

Bidding contractors shall anticipate that import of suitable backfill soil materials and/or screening of the on-site gravelly soils shall be required to meet the specified backfill soil requirements for the pipe embedment zone, pipe zone, and backfill soils above the pipe zone. As previously mentioned, screening of on-site soil material shall be required to meet the specified backfill soil requirements. Excavated Class IV (Stratum II) soil layers shall be stockpiled separately and remove and disposed of properly.

The pipeline backfill soil materials shall meet the specified requirements and/or the El Paso Water (EPW) standard construction specifications for installation of water utility lines and applicable structures. The following table presents general guidelines for backfill soil materials. Section 10.0 of this report presents backfill soil material specifications. Pipeline backfill soil materials shall also meet the pipe manufacturer requirements.

Table 11 - Pipeline Backfill Material Guidelines

BACKFILL ZONE	BACKFILL MATERIAL TYPE	ASTM COMPACTION REQUIREMENTS
Below Pipe Embedment Zone	Class III or Select Fill	90% per ASTM D-1557
Embedment Pipe Zone	Class I, II or as specified	90% per ASTM D-1557
Trench Backfill Above Pipe Zone	Class III or Select Fill	90% per ASTM D-1557
Backfill Material from Finished Surface to 36-inches	Class III or Select Fill	95% per ASTM D-1557

Additional Requirements:

1) The moisture content of the backfill materials shall be maintained within ±3% of optimum moisture content or as specified. Pipe zone backfill material shall be maintained within +/- 2 % optimum moisture content.

2) The supporting subgrade soils at the cut excavation that shall support embedment backfill material and the pipes should be stripped of all vegetation, organic matter, clay soil lumps, topsoil, construction/pavement debris and/or any foreign matter.

3) 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.

4) 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.

7.1 – Vault Structure Considerations

Based on the understanding of the project, we anticipate that water improvements may include the installation of concrete vault boxes. We recommend that structures be supported by a minimum of 8 inches of compacted Structural Fill material, TXDOT Standard Specification 2014-Item 247, Type A, Grade 3. The Structural Fill shall be placed in loose lifts not to exceed 6 inches to allow proper consolidation of the backfill material. The Structural Fill should be compacted to at least 95 percent of the maximum dry density as per ASTM D 1557. The suitable subgrade soils that shall support the base coarse material should be 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 until permanently covered.

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 pavement recommendations.

8.1 – Existing Pavement Removal and Material Recycling

The approximate depth of the observed pavement materials within our soil borings are generally reported in our soil boring logs. In general the asphaltic concrete pavement depth ranged from 2 to 4 inches and the apparent base course material layer depth of 6 to 12 inches.

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 Section 10.0 of this report. The re-use of recycled base materials shall be approved by the engineer of record and owner prior to re-use.

8.2 – Proposed Flexible Pavement Structures within City of El Paso Right of Way

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.

Asphaltic-Concrete (AC) pavement 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.

8.3 – Proposed Flexible Pavement Structures within TXDOT Right of Way

Based on our general observations of the existing pavement conditions, soil exploration boring soil samples and laboratory engineering soil classification test results, we anticipate the existing asphaltic-concrete (AC) pavement shall be removed and replaced. The following flexible pavement sections may be considered. Our pavement analysis was based on Texas Department of Transportation (TXDOT) design procedures for a 20-year design period.

Our general analysis considered traffic data based on traffic projections found in the TXDOT Statewide Traffic Analysis and Reporting System (STARS II) database. The estimated average daily traffic (ADT) with the pipeline route on Pershing Drive is approximately 6,000 to 6,500 vehicles per day. Our pavement analysis considers the 18-kip Equivalent Single Axle Load (ESAL) value of approximately 2,000,000 over a period of 20 years. 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 table presents our AC pavement section recommendations and lists the minimum pavement thicknesses and specifications:

Table 12 – Pershing Drive– Flexible Pavement Section

Material Layer	Material Section Description	Minimum Thickness (in.)	Specified Compaction, %, ASTM/TXDOT Methods
1	Hot Mix Asphaltic Concrete (HMAC), TXDOT Item 341 - Type C, SAC-A with Superpave Gyratory Compactor – 50 gyrations [1]	4	91.5% - 96.2 (Max Specific Gravity)
2	Prime Coat TXDOT Item 310 – SS-1H [2]	-	Application rate at 0.15 to 0.20 gal/yd2
3	Flexible Base Material TXDOT Item 247, Type A Grade I-II [2]	10	100%, ASTM D-1557
4	Compacted Pipeline Backfill Soil Material	As Required	95 % per ASTM D 1557

[1] **Hot-Mix Asphaltic Concrete (HMAC)** should be in conformance with the gradation requirements of a surface course Grade A, 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 asphaltic concrete

material shall be compacted between 91.5 to 96.2 percent of max specific gravity. The bitumen binder grade should consist of a PG76-22 material or as established by the approved mix design for the seasonal temperature cycles. 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.

[2] **Prime Coat** should be specified in conformance with Items 310 of the TXDOT Standard Specifications for Construction. The prime coat shall meet the test requirements for a Slow-Setting Cationic Emulsified Asphalt and applicable material quality tolerances, Type SS-1H. General notes shall indicate that prime coat shall be worked into the surface of the flexible base course and subgrade soils where applicable. The prime coat shall be residual asphalt and not diluted. The application rate shall be 0.15 to 0.20 gallons for square yard. The final specifications on this material and the rate of application shall be further reviewed once final pavement designs are specified, as applicable.

[3] **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 percent points of the optimum moisture content as determined by ASTM D 1557. A prime coat shall be applied to the pavement surface prior to placement of the AC layer. The prime coat shall consist of a CSS-1H (TXDOT Item 310). Application rate at 0.15 t to 0.20 gal/yd^2

Section 9.0 – Additional Evaluation Considerations

In excavations adjacent to existing structures, 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 pipeline 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 project 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 setting-up an array of monitoring points near the pipeline alignment and at radial distances from construction activities to monitor potential ground movements. It is recommended that the general contractor retain the services of a licensed professional engineer or geologist to develop a monitoring plan and provide site monitoring services as required. It may be necessary for the contractor to establish a contingency plan for 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 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. Structural Fill shall consist of a crushed stone base (CSB) coarse material conforming to requirements of a 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 135 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 civil engineer or owner.

Table 13 – Structural Fill Gradation Requirements

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

B. Select Fill should consist of granular clayey, silty sands or sandy clayey, silty gravel mixtures, free of clay lumps, clay balls, 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 15 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 14 – 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).

C. Native Fill Soils (Existing On-Site Soils) should consist of granular clayey, silty sands or sandy gravel mixtures, free of clay lumps, deleterious materials, vegetation, organic material, roots, cobbles or boulders over 3 inches in nominal size. Native Fill soils are not considered suitable Select Fill or Structural Fill soils unless approved by the engineer of record. The Native Fill soils shall have a liquid limit less than 40 and a plasticity index

of 15 or less. Suitable Native Fill soils should meet the gradation requirements below. Native Fill soils are not considered specified Imported Select Fill or Structural Fill soils unless they strictly meet the requirements specified above.

Table 15 – 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 shall also classify as: SM, SW, SC, SP-SM, SP-SC, SC-SM, GW, GP, GM, GC, GP-GM and GP-GC.

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 18 are not considered suitable for use as Native Fill, Select Fill and Structural Fill soil materials.

D. 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.

Table 16 - Recycled Paving Materials Aggregate Base Grading Requirements

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.

E. 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 V 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 15 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 – Additional Specification and Construction Considerations

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.

- At the time that this report was completed, a final civil design grading plan had not been provided for the review of CQC. We have prepared our recommendations based on the assumption that final grading elevations shall remain at or within ± ½ foot of the existing grade elevations. Site work should be performed in accordance with the Site Preparation section of this report or as required by the project plans and specifications, whichever is more stringent.

- The project Contractor 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 material 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 and/or Class III soil materials within of this report should be considered by the design team and bidding general contractor.

- 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.

- When utility lines are removed and/or installed at this site, the utility contractor should adequately overexcavate the soils in the utility line trench area and backfill with properly compacted approved on-site soils or pipe backfill soils to mitigate potential settlements caused by uncontrolled backfill during construction. In-situ and/or pipe backfill soils should be placed in loose lifts not to exceed 8 inches in thickness to the finished subgrade elevation or in accordance with the project plans and specifications, whichever is more stringent and compacted to at least 90 percent of the maximum dry density as determined by ASTM D 1557. Prior to placing the specified pipe backfill soils, the existing native soils at

the bottom of the trench should be scarified and recompacted to a minimum 90 percent of the maximum dry density as determined by ASTM D 1557.

10.3 - 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 one (1) nuclear density test per 8 inch lift at 100 to 150 lineal feet spacing for pipe bedding and backfill operations shall be performed, according to ASTM D 6938 or D 1556.

4. ampling and testing for quality assurance of placed **mortar**, Type S (minimum compressive strength of 1800 psi) should be performed for the project. The design strength of the mortar mix shall be evaluated by collecting 6-cube specimens for lab curing and testing in accordance with applicable ASTM procedures. At least two (2) sets of 3 mortar cubes should be collected for every day of mortar placement or as directed by the project engineer. The mortar specimens should be tested at 7 days (2 cubes) and 28 days (4 cubes) for verification of the specified design strength or as directed by the project plans and specifications. Cube samples may be also placed on hold for testing beyond 28 days.

5. Sampling and testing for quality assurance of placed **grout** materials (3/8" maximum aggregate with a minimum compressive strength of 2,500 psi) should be performed for the project. Grout field testing shall include testing for temperature and slump (8 to 10 inches maximum). The design strength of the grout mix shall be evaluated by collecting prisms specimens molded with on-site CMU blocks for lab curing and testing in accordance with applicable ASTM procedures. At least one set of four (4) grout prisms should be collected for each days batching or as directed by the project engineer. Grout with additives should be batched and placed in not more than 2 cubic yard volumes. The grout specimens should be tested at 7 days (1 prism) and 28 days (3 prisms) for verification of the specified design strength or as directed by the project plans and specifications.

6. 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 (1 cylinder) and 28 days (4 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 and shrinkage/contraction cracking of the concrete materials during significant periods of high (above 95˚ F) and low (below 35° F) temperatures.

7. 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 or in accordance with current TXDOT construction standards per TXDOT Item 340 or 341 and to determine the laboratory density of the material. The placed HMAC mat should be tested by conducting a minimum of one field density test every 50 to 150 if or as directed by the project engineer or project specifications.

Section 11.0 – Soils Evaluation Report Considerations and Limitations

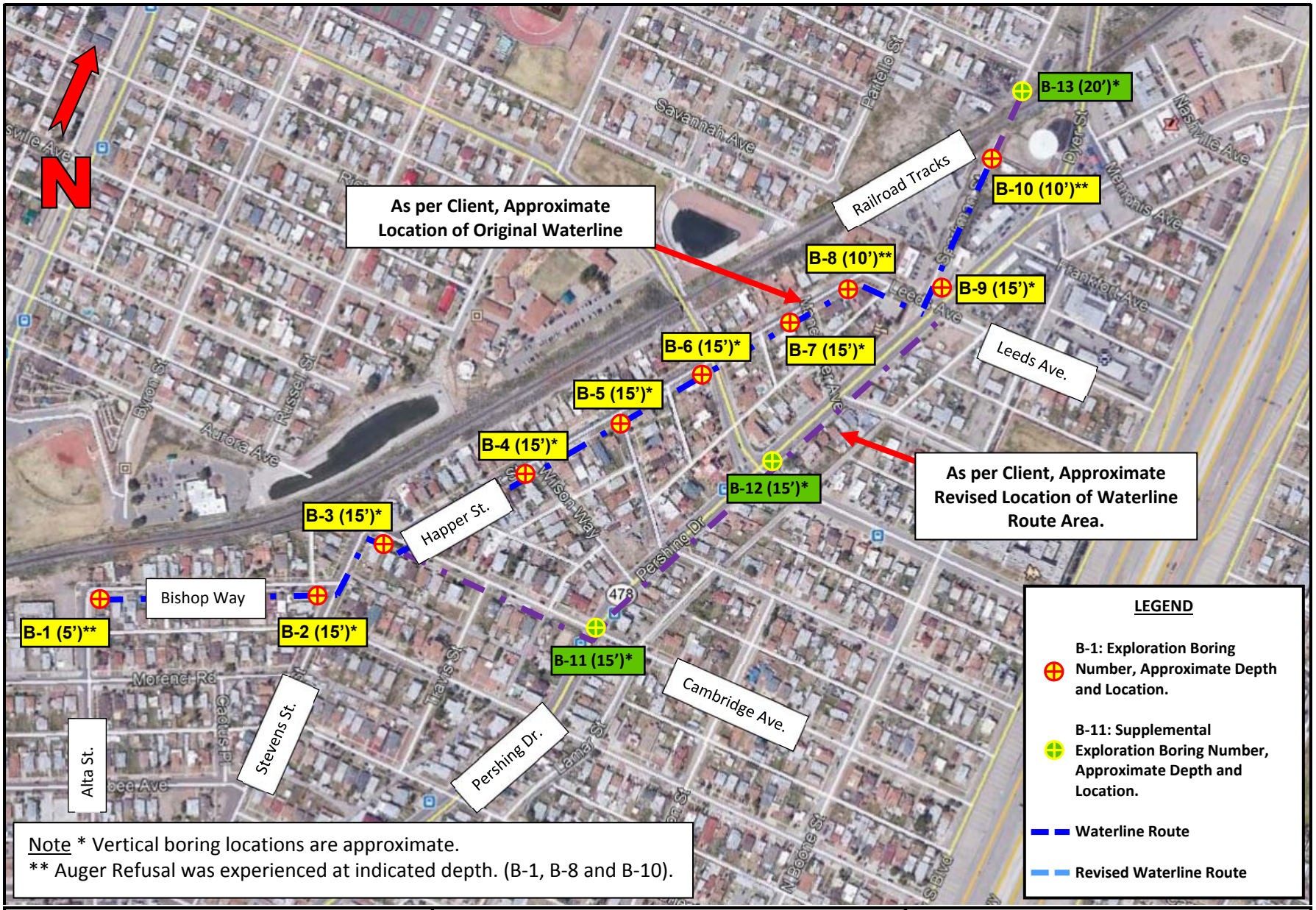
The analysis and recommendations in this report are based on the data obtained from ten (10) subsurface exploration vertical borings and three (3) supplemental exploration vertical borings performed at the approximate locations indicated on the attached General Geotechnical Subsurface Exploration Boring Location Aerial Plan, Sheet A1-1. This report may not reflect all the variations that may occur between the vertical 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 limits 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, sinkhole study, landslide study, soil slope stability analysis, delineation of buried structures or material, 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. If there are any misstatements or omissions in accordance with our proposed scope of work, it should be brought to the attention of CQC so that these items

may be addressed. Our geotechnical scope of work for this site did not include an environmental assessment or chemical testing and analysis of the subsurface soils.

D:\Dropbox\CQC Files\CQC Working Files\GEO\Reports\2020\20-010-03 EPW Pershing 16-Inch Water Main (EPW)\07-Final Report Documents\20-010-03_Report_Final.docx

APPENDIX A

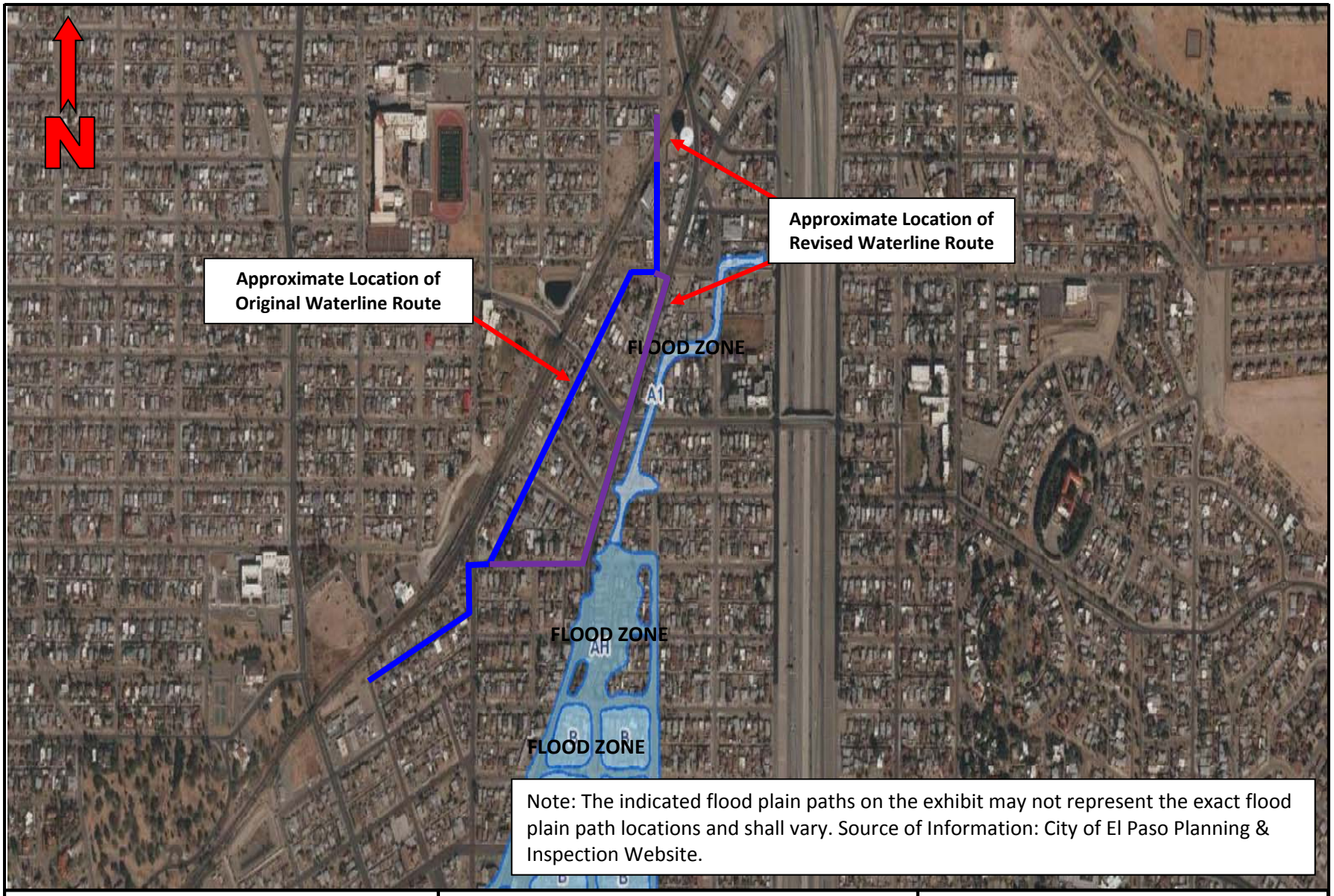


construction quality control testing and engineering

General Geotechnical Subsurface Exploration Boring Location Aerial Plan

EPW-Pershing 16-Inch Water Main Project
Various Street
El Paso, El Paso County, Texas

Client: El Paso Water	
CQC Project No. AGCQC20-010-03	
Scale: NTS	Check by: JR
Date: 12/2/2022	Sheet A1-1



construction quality control testing and engineering

City of El Paso - Flood Zone Aerial Plan

EPW-Pershing 16-Inch Water Main Project
Various Streets
El Paso, El Paso County, Texas

Client: El Paso Water	
CQC Project No. AGCQC20-010-03	
Scale: NTS	Check by: JR
Date: 12/9/2022	Sheet A1-2

construction quality control testing and engineering

Water Seepage Aerial Plan

EPW - Pershing 16-Inch Water Main Project
Morenci Rd., Stevens St. and Happer St.
From Alta St. to Leeds Ave.
El Paso, El Paso County, Texas

Client: El Paso Water	
CQC Project No. AGCQC20-010-03	
Scale: NTS	Check by: JR
Date: 12/9/2022	Sheet A1-3

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 El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Improvements Project
PROJECT NUMBER AGCQC20-010-03
PROJECT LOCATION Pershing Drive, El Paso, Texas
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 3800 ft **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY PG **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0			Asphaltic Concrete Material- Approx. 2 in thick.							
			Apparent Base Course Material- Approx. 6 in thick.							
	SS 1		SAND, Fine to Coarse Grained, Gravelly, Silty, Tannish Brown to Multicolored, Medium Dense, Dry. (Stratum I)	7-12-14 (26)						
2.5										
	SS 2		SAND, Fine to Coarse Grained, Gravelly, Poorly Graded, Grayish Brown to Multicolored, Subangular, Dense, Dry with silt. (Stratum I) - It should be anticipated that heavy equipment shall be required to excavate the subsurface soils. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soils and allow penetration through the dense to hard sand and gravel formations. In addition, please note that due to the gravelly nature of the subsurface soils and the standard size of the Split Spoon Sampler, the collected samples may not represent the degree of larger size particles.	18-20-22 (42)	1.9	56	10	NP		SW-SM
5.0										
	SS 3		GRAVEL, Fine, Sandy, Poorly Graded, Grayish Brown to Multicolored, Subangular, Hard, Dry with silt. (Stratum I) - Auger refusal experienced at approx. 6 feet.	20-40-50/5"	1.6	40	8	NP		GW-GM
			NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation. Bottom of borehole at 6.5 feet.							

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
16 32 48 64
% - 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 B-2

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Improvements Project
PROJECT NUMBER AGCQC20-010-03
PROJECT LOCATION Pershing Drive, El Paso, Texas
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 3801 ft **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY PG **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0	SS 1		Asphaltic Concrete Material- Approx. 2 in thick. - a layer of concrete was encountered approx. 1 inch thick after HMAC. Apparent Base Course Material- Approx. 6 in thick. SAND, Fine to Medium Grained, Silty, Clayey, Tannish Brown to Multicolored, Loose, Moist with gravel. (Stratum I)	2-3-3 (6)	8.3	88	29	6		SC-SM
2.5	SS 2		- Encountered loose sandy soils shall be susceptible to soil sloughing and collapse during excavation.	4-3-4 (7)						
5.0	SS 3		SAND, Fine to Medium Grained, Poorly Graded, Gravelly, Tannish Brown to Multicolored, Medium Dense, Dry with silt. (Stratum I)	5-7-9 (16)	3.3	65	6	NP		SP-SM
7.5	SS 4		- Fine to coarse grained, dense with gravel at approx. 7-1/2 feet.	24-21-22 (43)	2.4	70	7	NP		SP-SM
10.0	SS 5		SAND, Fine to Coarse Grained, Gravelly, Silty, Light Brown to Tannish Brown, Very Dense, Dry to Slightly Moist. (Stratum I) - It should be anticipated that heavy equipment shall be required to excavate the subsurface soils. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soils and allow penetration through the dense to hard sand and gravel formations. In addition, please note that due to the gravelly nature of the subsurface soils and the standard size of the Split Spoon Sampler, the collected samples may not represent the degree of larger size particles.	18-50/2"						
12.5										
15.0	SS 6		FAT CLAY, Highly Plastic, Reddish Brown to Dark Brown, Hard, Slightly Moist. (Stratum II) NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation. Bottom of borehole at 15.0 feet.	20-25-35 (60)	15.8	92	60	40	3.0	CH

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
16 32 48 64
% - 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

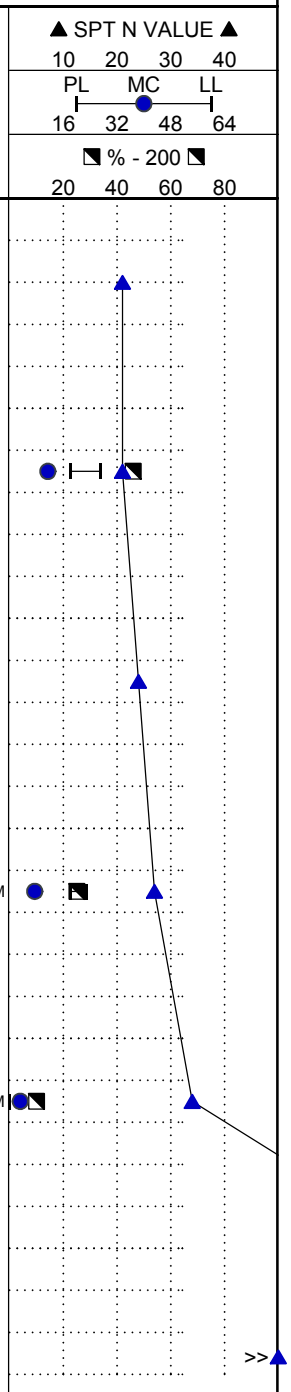
BORING NUMBER B-3

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Improvements Project
PROJECT NUMBER AGCQC20-010-03
PROJECT LOCATION Pershing Drive, El Paso, Texas
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 3808 ft **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY PG **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0			Asphaltic Concrete Material- Approx. 4 in thick.							
			Apparent Base Course Material- Approx. 6 in thick.							
	SS 1		SAND, Fine to Medium Grained, Clayey, Light Brown to Tannish Brown, Medium Dense, Moist. (Stratum I)	6-9-12 (21)						
2.5	SS 2			5-6-15 (21)	11.4	100	46	9		SC
5.0	SS 3		SAND, Fine to Medium Grained, Silty, Clayey, Tannish Brown to Multicolored, Medium Dense, Moist with gravel. (Stratum I)	6-7-17 (24)						
7.5	SS 4			7-7-20 (27)	7.5	85	25	5		SC-SM
10.0	SS 5		SAND, Fine to Medium Grained, Gravelly, Poorly Graded, Tannish Brown to Multicolored, Dense, Dry with silt. (Stratum I)	8-19-15 (34)	3.2	61	10	NP		SP-SM
12.5			SAND, Fine to Medium Grained, Gravelly, Clayey, Light Brown to Tannish Brown, Dense, Dry. (Stratum I)							
	SS 6		GRAVEL, Fine, Sandy, Silty, Grayish Brown to Tannish Brown, Hard, Subangular, Dry. (Stratum I)	50-50/1"						

NOTE: 1.) SS- Split Spoon Sample
2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation.

Bottom of borehole at 14.0 feet.



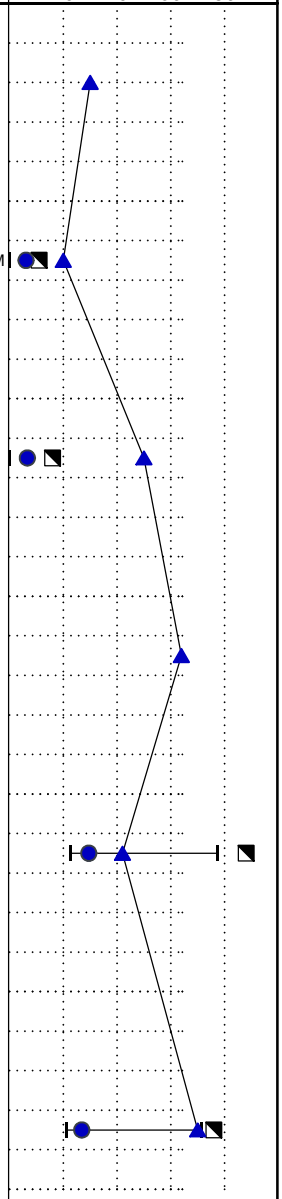
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

BORING NUMBER B-4

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Improvements Project
PROJECT NUMBER AGCQC20-010-03
PROJECT LOCATION Pershing Drive, El Paso, Texas
DATE STARTED 7/22/21 **COMPLETED** 7/22/21
GROUND ELEVATION 3806 ft **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY PG **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0			Asphaltic Concrete Material- Approx. 4 in thick.							
			Apparent Base Course Material- Approx. 6 in thick.							
	SS 1		SAND, Fine to Medium Grained, Poorly Graded, Tannish Brown to Multicolored, Medium Dense, Slightly Moist to Moist with silt and gravel. (Stratum I)	5-5-10 (15)						
2.5	SS 2		- Loose at approx. 2-1/2 feet. - Encountered loose sandy soils shall be susceptible to soil sloughing and collapse during excavation.	7-5-5 (10)	4.9	79	11	NP		SP-SM
5.0	SS 3		SAND, Fine to Medium Grained, Silty, Tannish Brown to Multicolored, Medium Dense, Moist with gravel. (Stratum I)	9-11-14 (25)	5.3	80	16	NP		SM
7.5	SS 4		- Dense at approx. 7-1/2 feet.	12-22-10 (32)						
10.0	SS 5		FAT CLAY, Highly Plastic, Reddish Brown to Dark Brown, Very Stiff, Slightly Moist to Moist. (Stratum II)	5-8-13 (21)	23.6	100	88	44	4.0	CH
12.5	SS 6			11-19-16 (35)	21.5	82	76	40	4.5	CH
15.0			NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation. Bottom of borehole at 15.0 feet.							

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
16 32 48 64
% - 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 B-5

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Improvements Project
PROJECT NUMBER AGCQC20-010-03
PROJECT LOCATION Pershing Drive, El Paso, Texas
DATE STARTED 7/22/21 **COMPLETED** 7/22/21
GROUND ELEVATION 3808 ft **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY PG **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0			Asphaltic Concrete Material- Approx. 3 in thick.							
			Apparent Base Course Material- Approx. 6 in thick.							
	SS 1		SAND, Fine to Coarse Grained, Gravelly, Silty, Clayey, Tannish Brown to Multicolored, Medium Dense, Slightly Moist. (Stratum I)	8-6-6 (12)						
2.5										
	SS 2		- Loose at approx. 2-1/2 feet. - Encountered loose sandy gravel soil material shall be susceptible to soil sloughing and collapse during excavation.	4-5-5 (10)	4.6	56	18	6		
5.0										
	SS 3		- Dense at approx. 5 feet. - It should be anticipated that heavy equipment shall be required to excavate the subsurface soils. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soils and allow penetration through the dense to hard sand and gravel formations. In addition, please note that due to the gravelly nature of the subsurface soils, and the standard size of the Split Spoon Sampler, the collected samples may not represent the degree of larger size particles.	20-24-25 (49)						
7.5										
	SS 4		SAND, Fine to Medium Grained, Poorly Graded, Tannish Brown to Multicolored, Very Dense, Slightly Moist to Moist with silt and gravel. (Stratum I)	13-25-29 (54)	3.7	73	10	NP		SP-SM
10.0										
	SS 5			19-24-26 (50)						
12.5										
	SS 6		SAND, Fine to Medium Grained, Silty, Light Brown to Tannish Brown, Very Dense, Slightly Moist to Moist with traces of gravel. (Stratum I)	20-30-32 (62)	5.3	93	19	NP		SM
15.0			NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation. Bottom of borehole at 15.0 feet.							

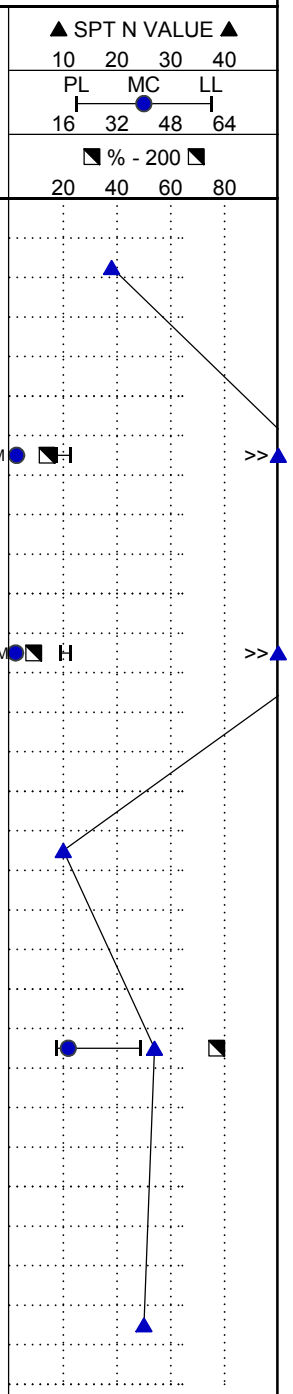
▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
16 32 48 64
% - 200
20 40 60 80

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 B-6

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Improvements Project
PROJECT NUMBER AGCQC20-010-03
PROJECT LOCATION Pershing Drive, El Paso, Texas
DATE STARTED 7/22/21 **COMPLETED** 7/22/21
GROUND ELEVATION 3804 ft **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY PG **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0			Asphaltic Concrete Material- Approx. 3 in thick.							
			Apparent Base Course Material- Approx. 6 in thick.							
	SS 1		GRAVEL, Fine, Sandy, Silty, Grayish Brown to Tannish Brown, Medium Dense, Subangular, Dry. (Stratum I)	10-7-12 (19)						
2.5										
	SS 2		SAND, Fine to Coarse Grained, Gravelly, Silty, Clayey, Grayish Brown to Tannish Brown, Very Dense, Dry. (Stratum I) - It should be anticipated that heavy equipment shall be required to excavate the subsurface soils. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soils and allow penetration through the dense to hard sand and gravel formations. In addition, please note that due to the gravelly nature of the subsurface soils and the standard size of the Split Spoon Sampler, the collected samples may not represent the degree of larger size particles.	16-28-27 (55)	2.1	61	14	4		SC-SM
5.0										
	SS 3		GRAVEL, Fine, Sandy, Well Graded, Grayish Brown to Tannish Brown, Very Dense, Subangular, Dry with silt. (Stratum I)	31-29-32 (61)	1.8	48	9	3		GW-GM
7.5										
	SS 4		SAND, Fine Grained, Poorly Graded, Tannish Brown to Multicolored, Loose, Dry with silt. (Stratum I) - Encountered loose sandy soils shall be susceptible to soil sloughing and collapse during excavation. - Cave-In was measured from approx. 10 feet after removal of hollow stem augers.	4-5-5 (10)						
10.0										
	SS 5		LEAN CLAY, Plastic, Reddish Brown to Dark Brown, Very Stiff, Slightly Moist with sand. (Stratum II)	9-11-16 (27)	17.5	100	77	25	4.5	CL
12.5										
	SS 6			8-10-15 (25)					4.5	
15.0			NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation. Bottom of borehole at 15.0 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-7

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Improvements Project
PROJECT NUMBER AGCQC20-010-03
PROJECT LOCATION Pershing Drive, El Paso, Texas
DATE STARTED 7/22/21 **COMPLETED** 7/22/21
GROUND ELEVATION 3820 ft **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY PG **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0			Asphaltic Concrete Material- Approx. 3 in thick.							
	SS 1		Apparent Base Course Material- Approx. 6 in thick. SAND, Fine to Coarse Grained, Gravelly, Silty, Grayish Brown to Tannish Brown, Dense, Dry. (Stratum I)	10-19-27 (46)						
2.5	SS 2		- It should be anticipated that heavy equipment shall be required to excavate the subsurface soils. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soils and allow penetration through the dense to hard sand and gravel formations. In addition, please note that due to the gravelly nature of the subsurface soils and the standard size of the Split Spoon Sampler, the collected samples may not represent the degree of larger size particles.	12-25-25 (50)	1.4	55	13	1		
5.0	SS 3		SAND, Fine to Coarse Grained, Gravelly, Well Graded, Grayish Brown to Multicolored, Very Dense, Dry with silt. (Stratum I)	9-19-32 (51)						
7.5	SS 4			14-50/5"	1.2	57	10	NP		SW-SM
10.0	SS 5			15-40-35 (75)						
12.5	SS 6		SAND, Fine to Coarse Grained, Gravelly, Poorly Graded, Gravelly, Tannish Brown to Multicolored, Very Dense, Dry with silt. (Stratum I)	13-31-40 (71)	2.5	70	9	NP		SP-SM
15.0			NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation. Bottom of borehole at 15.0 feet.							

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
16 32 48 64
% - 200
20 40 60 80

THE INFORMATION PRESENTED SHOULD NOT BE SEPARATED FROM THE GEOTECHNICAL REPORT

CQC STANDARD LOG W/ POCKET PEN 20-010-03.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

BORING NUMBER B-8

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Improvements Project
PROJECT NUMBER AGCQC20-010-03
PROJECT LOCATION Pershing Drive, El Paso, Texas
DATE STARTED 7/22/21 **COMPLETED** 7/22/21
GROUND ELEVATION 3824 ft **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY PG **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0			Asphaltic Concrete Material- Approx. 3 in thick.							
			Apparent Base Course Material- Approx. 6 in thick.							
	SS 1		GRAVEL, Fine, Poorly Graded, Grayish Brown to Tannish Brown, Very Dense, Subangular, Dry with silt and sands (Stratum I).	25-28-30 (58)	1.9	25	7	NP		GP-GM
2.5	SS 2		- It should be anticipated that heavy equipment shall be required to excavate the subsurface soils. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soils and allow penetration through the dense to hard sand and gravel formations. In addition, please note that due to the gravelly nature of the subsurface soils and the standard size of the Split Spoon Sampler, the collected samples may not represent the degree of larger size particles.	28-30-31 (61)						
5.0	SS 3		GRAVEL, Fine, Well Graded, Grayish Brown to Tannish Brown, Very Dense, Subangular, Dry with silt (Stratum I).	30-35-36 (71)	1.3	51	10	2		GW-GM
7.5	SS 4		SAND, Fine to Coarse Grained, Gravelly, Silty, Grayish Brown to Tannish Brown, Hard, Dry. (Stratum I)	27-30-50/5"						
10.0	SS 5		- Very dense at approx. 10 feet. - Auger refusal was experienced at approx. 10-1/2 feet. NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation.	20-50/1"	1.7	67	13	NP		SM
			Bottom of borehole at 10.5 feet.							

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
16 32 48 64
% - 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 B-9

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Improvements Project
PROJECT NUMBER AGCQC20-010-03
PROJECT LOCATION Pershing Drive, El Paso, Texas
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 3821 ft **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY PG **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0			Asphaltic Concrete Material- Approx. 2 in thick.							
			Apparent Base Course Material- Approx. 6 in thick.							
	SS 1		SAND, Fine to Medium Grained, Silty, Tannish Brown to Multicolored, Medium Dense, Slightly Moist. (Stratum I)	8-11-10 (21)						
2.5										
	SS 2		GRAVEL, Fine, Sandy, Silty, Grayish Brown to Tannish Brown, Dense, Subangular, Dry (Stratum I).	11-10-23 (33)	2.9	50	13	NP		GM
5.0										
	SS 3		- Medium dense at approx. 5 feet. - It should be anticipated that heavy equipment shall be required to excavate the subsurface soils. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soils and allow penetration through the dense to hard sand and gravel formations. In addition, please note that due to the gravelly nature of the subsurface soils and the standard size of the Split Spoon Sampler, the collected samples may not represent the degree of larger size particles.	3-3-21 (24)						
7.5										
	SS 4		- With sand and very dense at approx. 7-1/2 feet.	25-30-31 (61)	3.7	38	14	NP		GM
10.0										
	SS 5		- Medium dense at approx. 10 feet.	10-12-14 (26)						
12.5			LEAN CLAY, Plastic, Sandy, Reddish Brown to Dark Brown, Very Stiff, Slightly Moist. (Stratum II)		12.9	98	51	25	3.0	CL
	SS 6		SAND, Fine to Coarse Grained, Light Brown to Multicolored, Dense, Dry. (Stratum I)	10-20-22 (42)						
15.0			NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation. Bottom of borehole at 15.0 feet.							

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
16 32 48 64
% - 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 B-10

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Improvements Project
PROJECT NUMBER AGCQC20-010-03
PROJECT LOCATION Pershing Drive, El Paso, Texas
DATE STARTED 7/21/21 **COMPLETED** 7/21/21
GROUND ELEVATION 3831 ft **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY PG **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0			Asphaltic Concrete Material- Approx. 2 in thick.							
			Apparent Base Course Material- Approx. 6 in thick.							
	SS 1		GRAVEL, Fine, Sandy, Silty, Grayish Brown to Tannish Brown, Medium Dense, Subangular, Dry to Slightly Moist. (Stratum I)	8-12-8 (20)						
2.5										
	SS 2		GRAVEL, Fine, Sandy, Well Graded, Grayish Brown to Tannish Brown, Dense, Subangular, Dry with silt. (Stratum I)	29-21-28 (49)	0.5	44	8	NP		GW-GM
5.0										
	SS 3		GRAVEL, Fine, Sandy, Clayey, Well Graded, Grayish Brown to Tannish Brown, Dense, Subangular, Dry. (Stratum I)	13-34-38 (72)	1.4	52	11	5		GW-GC
			- It should be anticipated that heavy equipment shall be required to excavate the subsurface soils. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soils and allow penetration through the dense to hard sand and gravel formations. In addition, please note that due to the gravelly nature of the subsurface soils and the standard size of the Split Spoon Sampler, the collected samples may not represent the degree of larger size particles.							
7.5	SS 4		- Hard below approx. 7-1/2 feet.	50-50/3"						
10.0	SS 5		SAND, Fine to Coarse Grained, Gravelly, Poorly Graded, Grayish Brown to Multicolored, Very Dense, Dry with silt. (Stratum I)	50/5"	1.4	51	12	NP		GP-GM
			- Auger Refusal experienced at approx. 10-1/2 feet.							
			NOTE: 1.) SS- Split Spoon Sample							
			2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation.							
			Bottom of borehole at 10.0 feet.							

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
16 32 48 64
% - 200
20 40 60 80

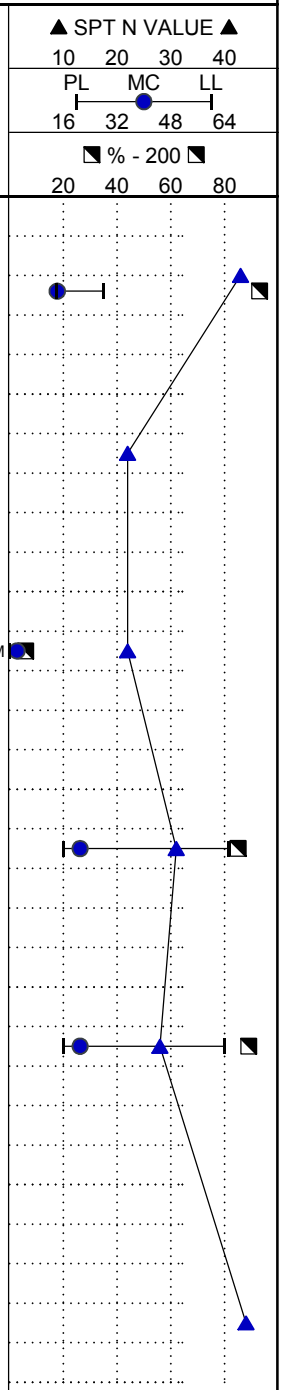
>>

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 B-11

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Project
PROJECT NUMBER AGCQC20-010-03.1
PROJECT LOCATION Pershing Drive & Sparkman Street
DATE STARTED 1/24/22 **COMPLETED** 1/24/22
GROUND ELEVATION Ext Grade **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY JC **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1.
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0			Asphaltic Concrete Pavement- Approx. 3 inches thick							
	SS 1		Apparent Base Course Material- Approx. 12 inches thick.	32-30-13 (43)	14.2	100	93	14		CL
2.5			LEAN CLAY, Sandy, Moderate Plasticity, Light Brown to Tannish Brown, Very Stiff, Slightly Moist with calcareous material (Stratum II).							
	SS 2		SAND, Fine to Medium Grained, Poorly Graded, Tannish Brown to Multicolored, Medium Dense, Dry with silt and traces of gravel (Stratum I).	11-9-13 (22)						
5.0										
	SS 3		- Poorly Graded sands shall be susceptible to sloughing when unconfined during excavation.	8-9-13 (22)	2.2	100	6	NP		SP-SM
7.5										
	SS 4		FAT CLAY, Highly Plastic, Reddish Brown to Dark Brown, Very Stiff, Slightly Moist with traces of calcareous material (Stratum II).	13-11-20 (31)	21.0	100	85	49	4.5	CH
10.0										
	SS 5			10-10-18 (28)	21.0	94	89	48	4.5	CH
12.5										
	SS 6		SAND, Fine Grained, Poorly Graded, Light Brown to Multicolored, Dense, Dry with silt (Stratum I).	10-12-32 (44)						
15.0			NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation. Bottom of borehole at 15.0 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-12

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Project
PROJECT NUMBER AGCQC20-010-03.1
PROJECT LOCATION Pershing Drive & Sparkman Street
DATE STARTED 1/24/22 **COMPLETED** 1/24/22
GROUND ELEVATION Ext Grade **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY JC **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1.
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0.0	SS 1		Asphaltic Concrete Pavement- Approx. 3-1/2 inches thick. Apparent Base Course Material- Approx. 12 inches thick. SAND, Fine to Coarse Grained, Poorly Graded, Tannish Brown to Multicolored, Medium Dense, Dry with silt and gravel (Stratum I). - Black Stained Soil (Organic Odor) encountered below Base Coarse Material at approx. 1-1/2 feet.	17-12-6 (18)						
2.5	SS 2			11-8-11 (19)	2.7	51	7	NP		GP-GM
5.0	SS 3		GRAVEL, Fine, Sandy, Clayey, Tannish Brown and Grayish Brown, Subangular, Loose, Dry (Stratum I). - Encountered loose sandy soils shall be susceptible to soil sloughing during excavation. - It should be anticipated that heavy equipment shall be required to excavate the subsurface soils. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soils and allow penetration through the dense to hard sand and gravel formations. In addition, please note that due to the gravelly nature of the subsurface soils and the standard size of the Split Spoon Sampler, the collected samples may not represent the degree of larger size particles.	8-4-6 (10)	3.5	31	14	13		GC
7.5	SS 4		LEAN CLAY, Sandy, Moderate Plasticity, Reddish Brown to Dark Brown, Stiff, Slightly Moist (Stratum II).	3-4-7 (11)	12.7	100	89	9		CL
10.0	SS 5			6-4-9 (13)	17.5	100	68	13		CL
12.5	SS 6		SAND, Fine to Coarse Grained, Gravelly, Silty, Tannish Brown to Multicolored, Very Dense, Dry (Stratum I). NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation. Bottom of borehole at 13.9 feet.	50/3"	3.2	77	14	NP		SM

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
16 32 48 64
% - 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 B-13

CLIENT El Paso Water
PROJECT NAME EPW- Pershing 16-inch Water Main Project
PROJECT NUMBER AGCQC20-010-03.1
PROJECT LOCATION Pershing Drive & Sparkman Street
DATE STARTED 1/24/22 **COMPLETED** 1/24/22
GROUND ELEVATION Ext Grade **HOLE SIZE** 9 inches
DRILLING CONTRACTOR CQC **DRILLED BY** SC
GROUND WATER LEVELS:
DRILLING METHOD CME-75 w/ 4-1/4" ID HSA
AT TIME OF DRILLING ---
LOGGED BY JC **CHECKED BY** JLA
AT END OF DRILLING ---
NOTES Boring Location: See Attached Boring Location Plan, Sheet A1-1.
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	BLOW COUNTS (N VALUE)	% Moisture Content	% - 4	% - 200	PI (LL-PL)	Pocket Pen. (tsf)	USCS
0	SS 1		SAND, Fine to Coarse Grained, Gravelly, Silty, Dark Brown to Tannish Brown, Medium Dense, Slightly Moist (Stratum I).	6-9-14 (23)						
	SS 2			4-7-8 (15)	5.4	69	20	2		SM
5	SS 3		- Loose at approx. 5 feet. - Encountered loose sandy soils shall be susceptible to soil sloughing during excavation.	8-4-5 (9)						
	SS 4		GRAVEL, Fine, Sandy, Well Graded, Tannish Brown and Grayish Brown, Subangular, Very Dense, Dry with clay particles (Stratum I). - It should be anticipated that heavy equipment shall be required to excavate the subsurface soils. Excavations shall require equipment that may achieve adequate tooth penetration to split the subsurface soils and allow penetration through the dense to hard sand and gravel formations. In addition, please note that due to the gravelly nature of the subsurface soils and the standard size of the Split Spoon Sampler, the collected samples may not represent the degree of larger size particles.	50/4"	2.4	59	9	6		SW-SC
10	SS 5		GRAVEL, Fine, Sandy, Poorly Graded, Tannish Brown and Grayish Brown, Very Dense, Subangular, Dry with clay particles (Stratum I).	29-50/3"	1.7	39	9	5		GP-GC
15	SS 6		GRAVEL, Fine, Sandy, Well Graded, Tannish Brown and Grayish Brown, Hard, Subangular, Dry with clay particles (Stratum I).	50/5"	1.5	50	12	4		GW-GC
	SS 7		NOTE: 1.) SS- Split Spoon Sample 2.) Sandy Gravel and Sand Layers were encountered in a relatively dry condition. It should be anticipated that these layers shall tend to slough and collapse during excavation. Bottom of borehole at 18.7 feet.	50/1"						

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
16 32 48 64
% - 200
20 40 60 80

>>

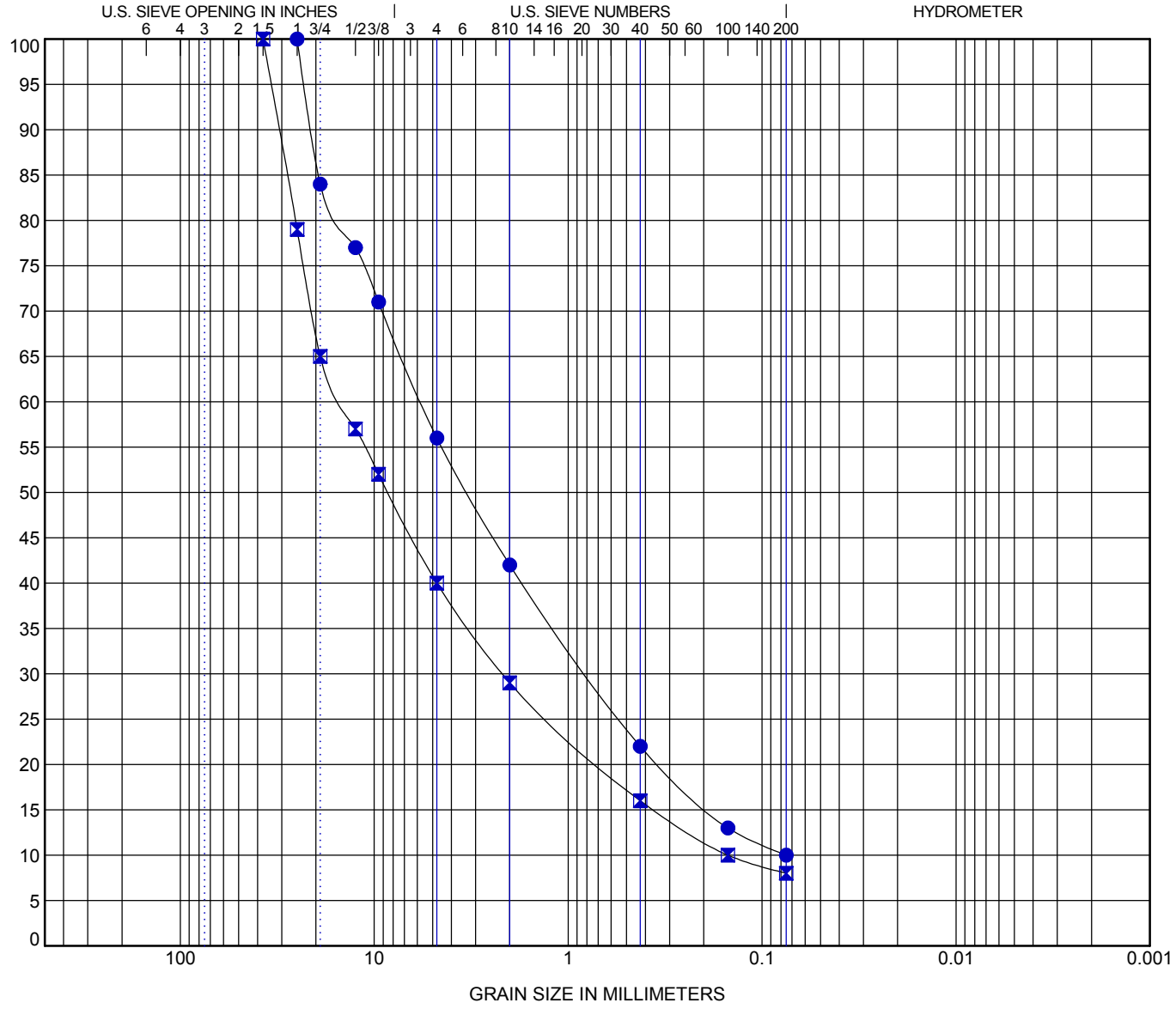
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
B-1	2.5 - 3.9	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)	NP	NP	NP	1.45	76.19
B-1	5.0 - 6.4	WELL-GRADED GRAVEL with SILT and SAND(GW-GM)	NP	NP	NP	2.13	97.50

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
B-1	2.5 - 3.9	25	5.714	0.79	0.075	44.0	46.0	10.0	
B-1	5.0 - 6.4	37.5	14.625	2.164	0.15	60.0	32.0	8.0	

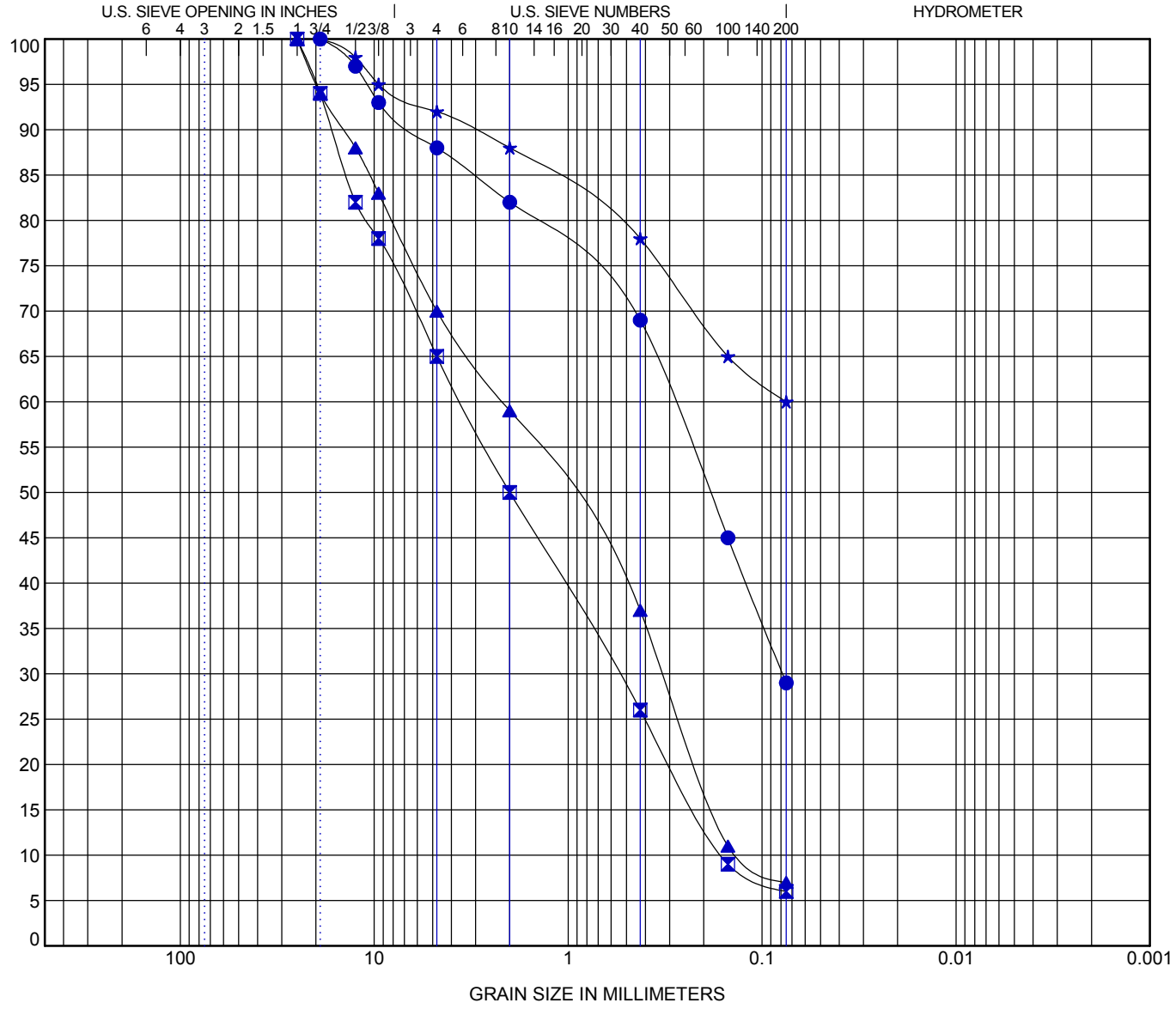
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-2	0.8 - 2.3	SILTY, CLAYEY SAND(SC-SM)	23	17	6		
⊠	B-2	5.0 - 6.5	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	0.53	22.32
▲	B-2	7.5 - 9.0	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	0.38	17.15
★	B-2	13.5 - 15.0	SANDY FAT CLAY(CH)	53	13	40		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-2	0.8 - 2.3	19	0.288	0.078		12.0	59.0	29.0	
⊠	B-2	5.0 - 6.5	25	3.56	0.55	0.159	35.0	59.0	6.0	
▲	B-2	7.5 - 9.0	25	2.164	0.321	0.126	30.0	63.0	7.0	
★	B-2	13.5 - 15.0	19	0.075			8.0	32.0	60.0	

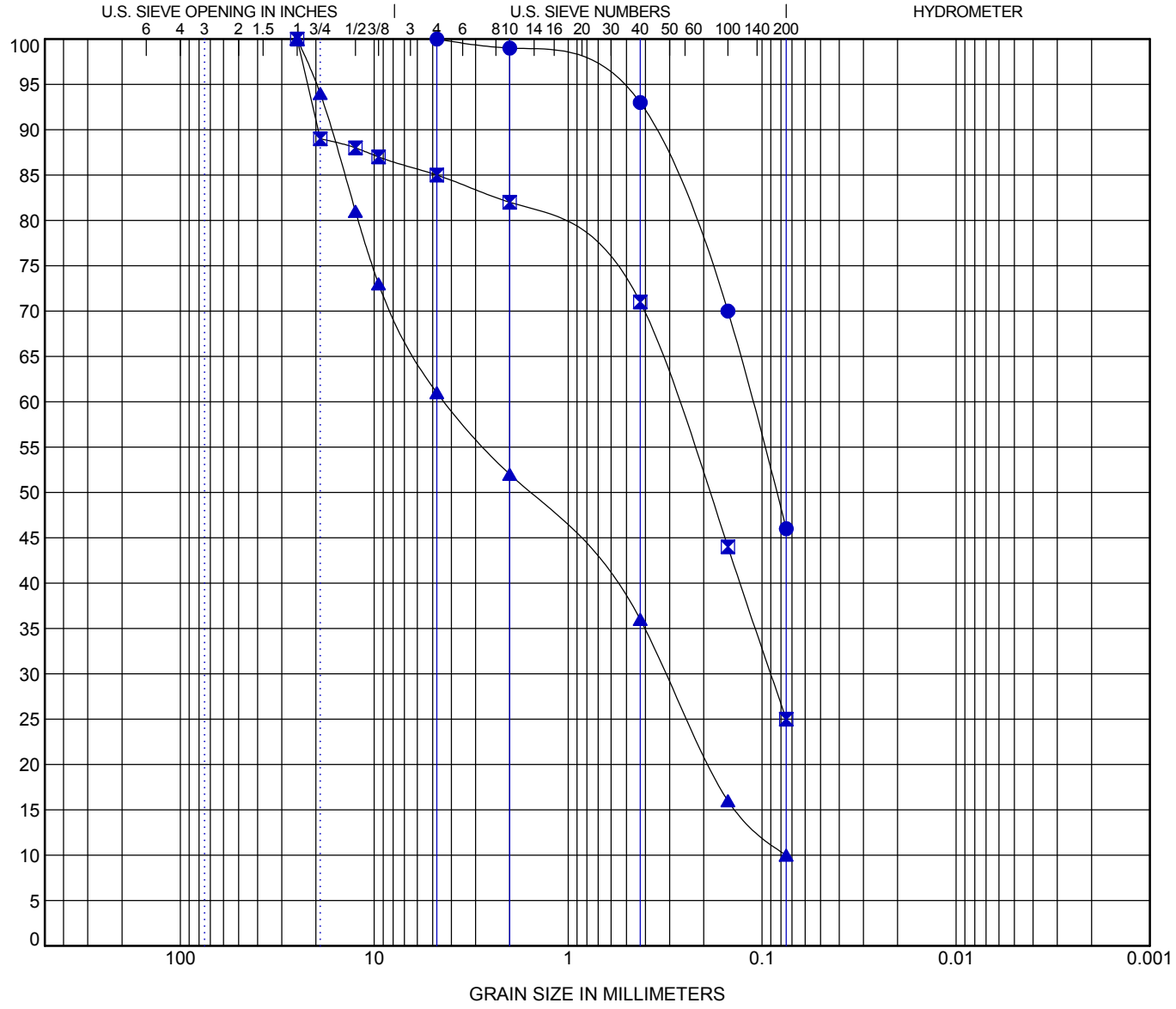
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
B-3	2.5 - 4.0	CLAYEY SAND(SC)	27	18	9		
B-3	7.5 - 9.0	SILTY, CLAYEY SAND with GRAVEL(SC-SM)	23	18	5		
B-3	10.0 - 11.5	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	0.30	57.53

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
B-3	2.5 - 4.0	4.75	0.112			0.0	54.0	46.0	
B-3	7.5 - 9.0	25	0.278	0.09		15.0	60.0	25.0	
B-3	10.0 - 11.5	25	4.315	0.311	0.075	39.0	51.0	10.0	

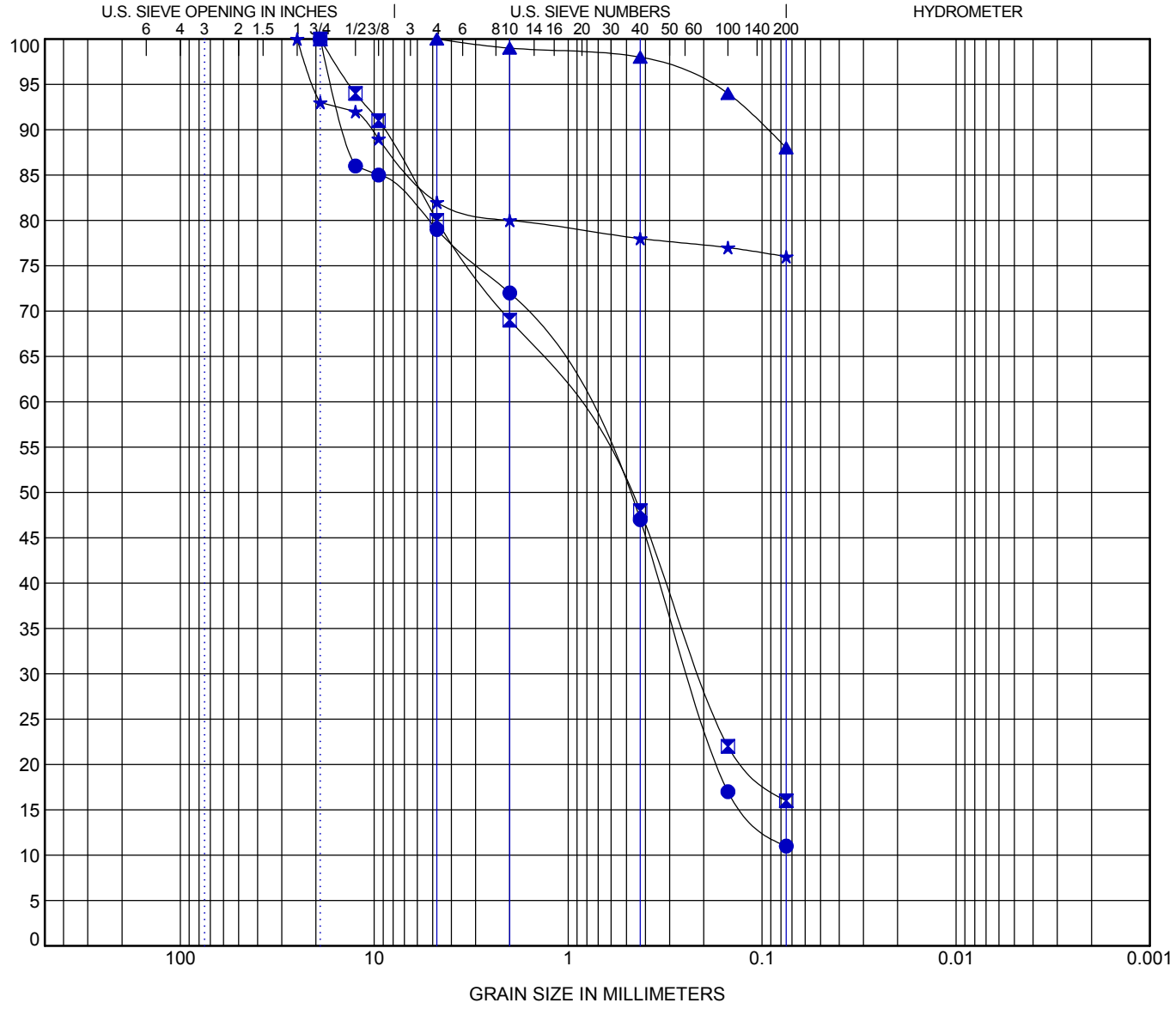
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-4	2.5 - 4.0	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	0.87	14.23
⊠	B-4	5.0 - 6.5	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
▲	B-4	10.0 - 11.5	FAT CLAY(CH)	62	18	44		
★	B-4	13.5 - 15.0	FAT CLAY with GRAVEL(CH)	57	17	40		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-4	2.5 - 4.0	19	0.951	0.236		21.0	68.0	11.0	
⊠	B-4	5.0 - 6.5	19	1.03	0.207		20.0	64.0	16.0	
▲	B-4	10.0 - 11.5	4.75				0.0	12.0	88.0	
★	B-4	13.5 - 15.0	25				18.0	6.0	76.0	

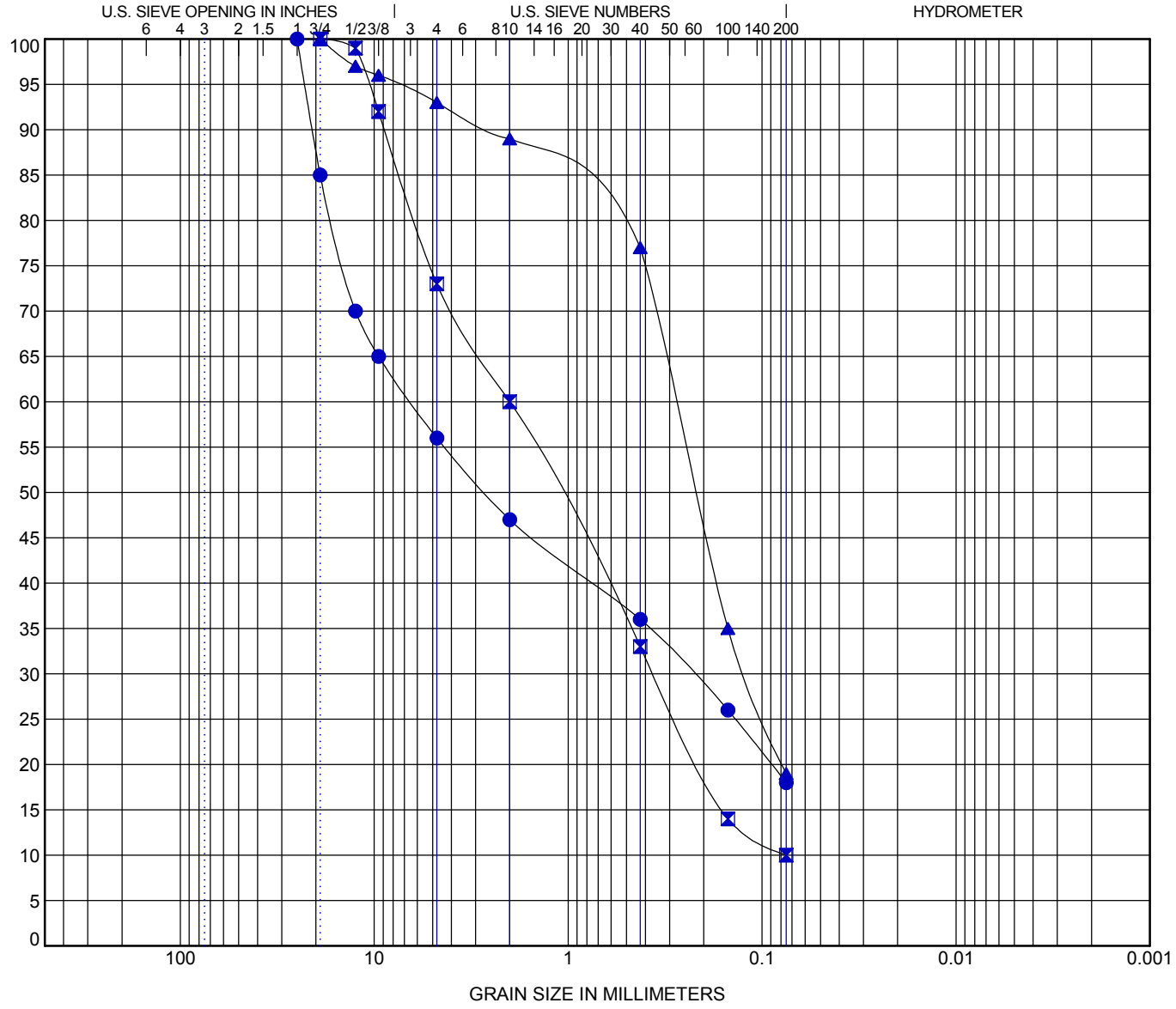
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE		DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-5	2.5 - 4.0	SILTY, CLAYEY GRAVEL with SAND(GC-GM)	23	17	6		
⊠	B-5	7.5 - 9.0	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	0.87	26.67
▲	B-5	13.5 - 15.0	SILTY SAND(SM)	NP	NP	NP		

BOREHOLE		DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-5	2.5 - 4.0	25	6.464	0.228		44.0	38.0	18.0	
⊠	B-5	7.5 - 9.0	19	2	0.361	0.075	27.0	63.0	10.0	
▲	B-5	13.5 - 15.0	19	0.279	0.121		7.0	74.0	19.0	

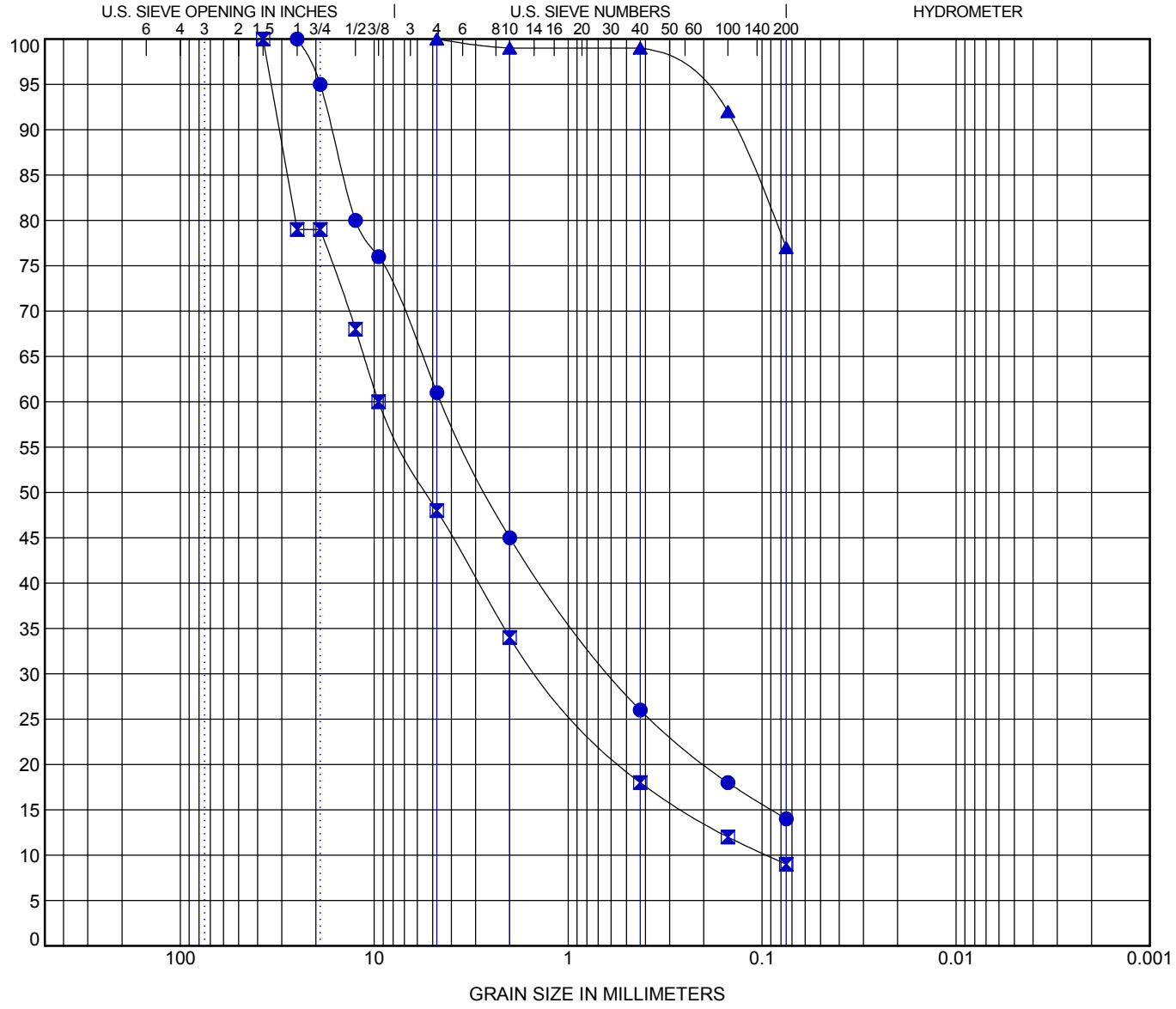
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-6	2.5 - 4.0	SILTY, CLAYEY SAND with GRAVEL(SC-SM)	18	14	4		
⊠	B-6	5.0 - 6.5	WELL-GRADED GRAVEL with SILT and SAND(GW-GM)	18	15	3	2.05	100.54
▲	B-6	10.0 - 11.5	LEAN CLAY with SAND(CL)	39	14	25		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-6	2.5 - 4.0	25	4.5	0.589		39.0	47.0	14.0	
⊠	B-6	5.0 - 6.5	37.5	9.5	1.358	0.094	52.0	39.0	9.0	
▲	B-6	10.0 - 11.5	4.75				0.0	23.0	77.0	

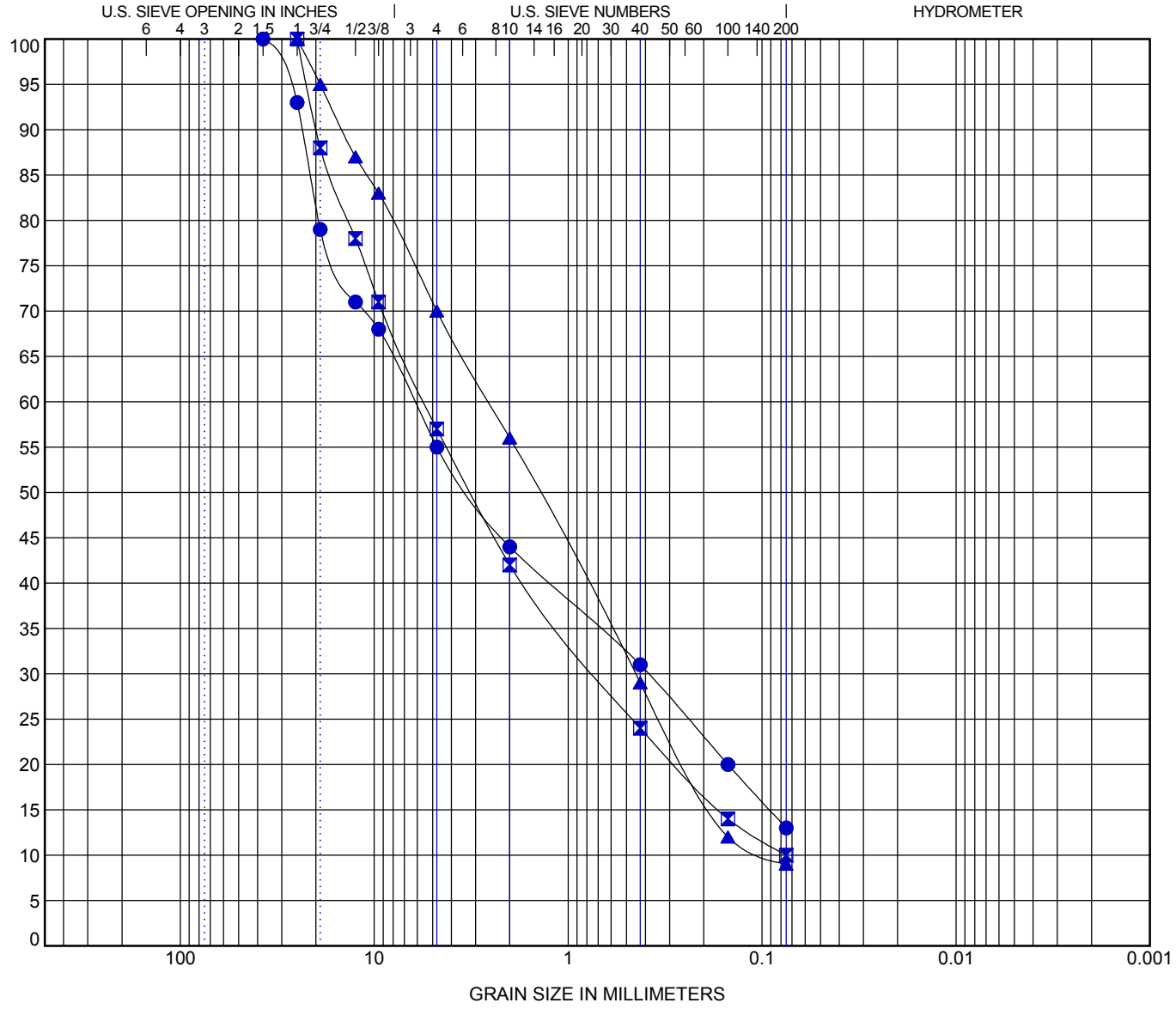
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
B-7	2.5 - 4.0	SILTY GRAVEL with SAND(GM)	19	18	1		
B-7	7.5 - 9.0	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)	NP	NP	NP	1.23	73.47
B-7	13.5 - 15.0	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)	NP	NP	NP	0.84	27.10

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
B-7	2.5 - 4.0	37.5	6.201	0.387		45.0	42.0	13.0	
B-7	7.5 - 9.0	25	5.511	0.712	0.075	43.0	47.0	10.0	
B-7	13.5 - 15.0	25	2.561	0.45	0.094	30.0	61.0	9.0	

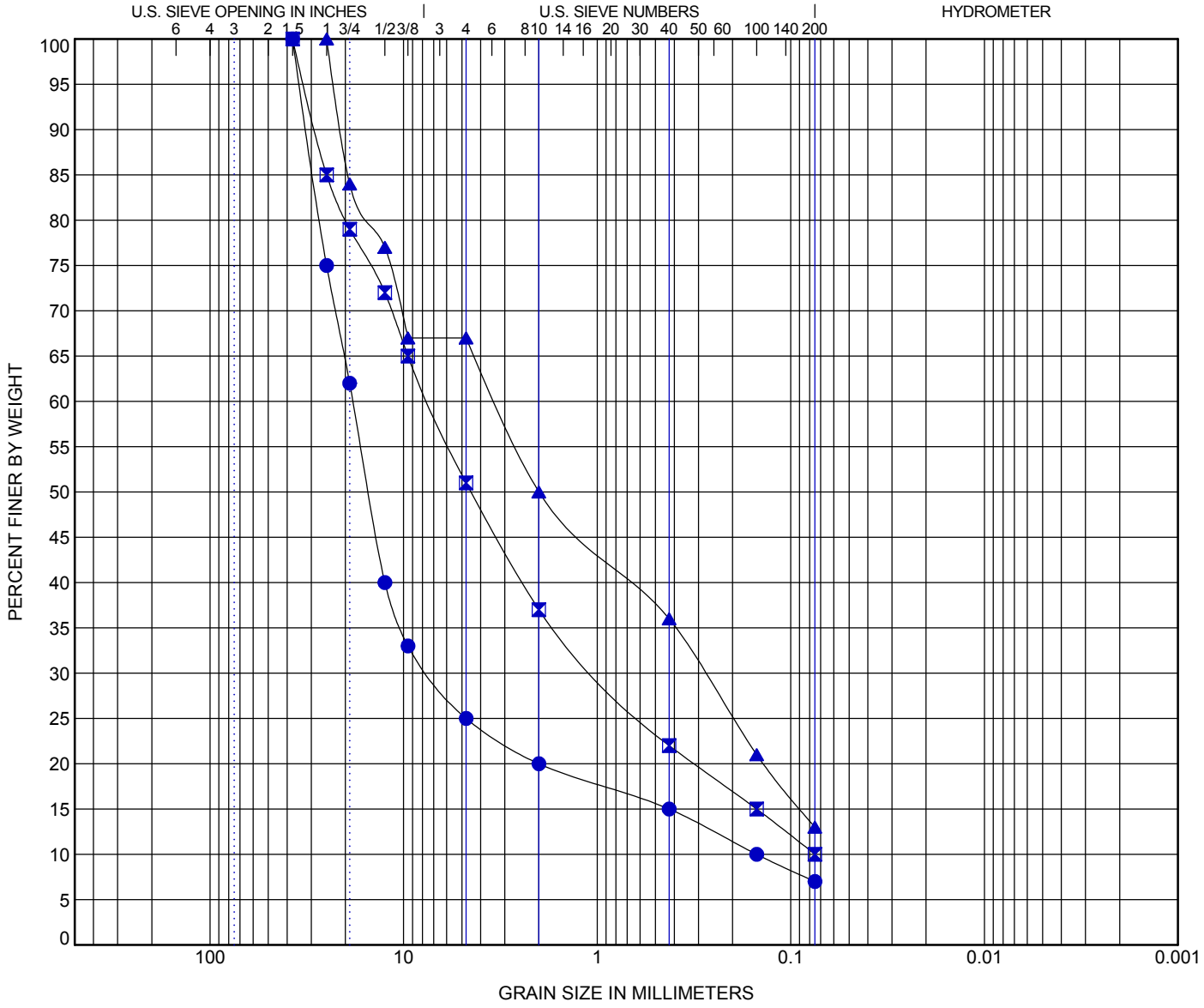
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-8	0.8 - 1.4	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)	NP	NP	NP	19.56	121.94
⊠ B-8	5.0 - 5.6	WELL-GRADED GRAVEL with SILT and SAND(GW-GM)	18	16	2	1.69	98.89
▲ B-8	10.0 - 10.6	SILTY SAND with GRAVEL(SM)	NP	NP	NP		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-8	0.8 - 1.4	37.5	18.29	7.326	0.15	75.0	18.0	7.0	
⊠ B-8	5.0 - 5.6	37.5	7.417	0.971	0.075	49.0	41.0	10.0	
▲ B-8	10.0 - 10.6	25	3.327	0.28		33.0	54.0	13.0	

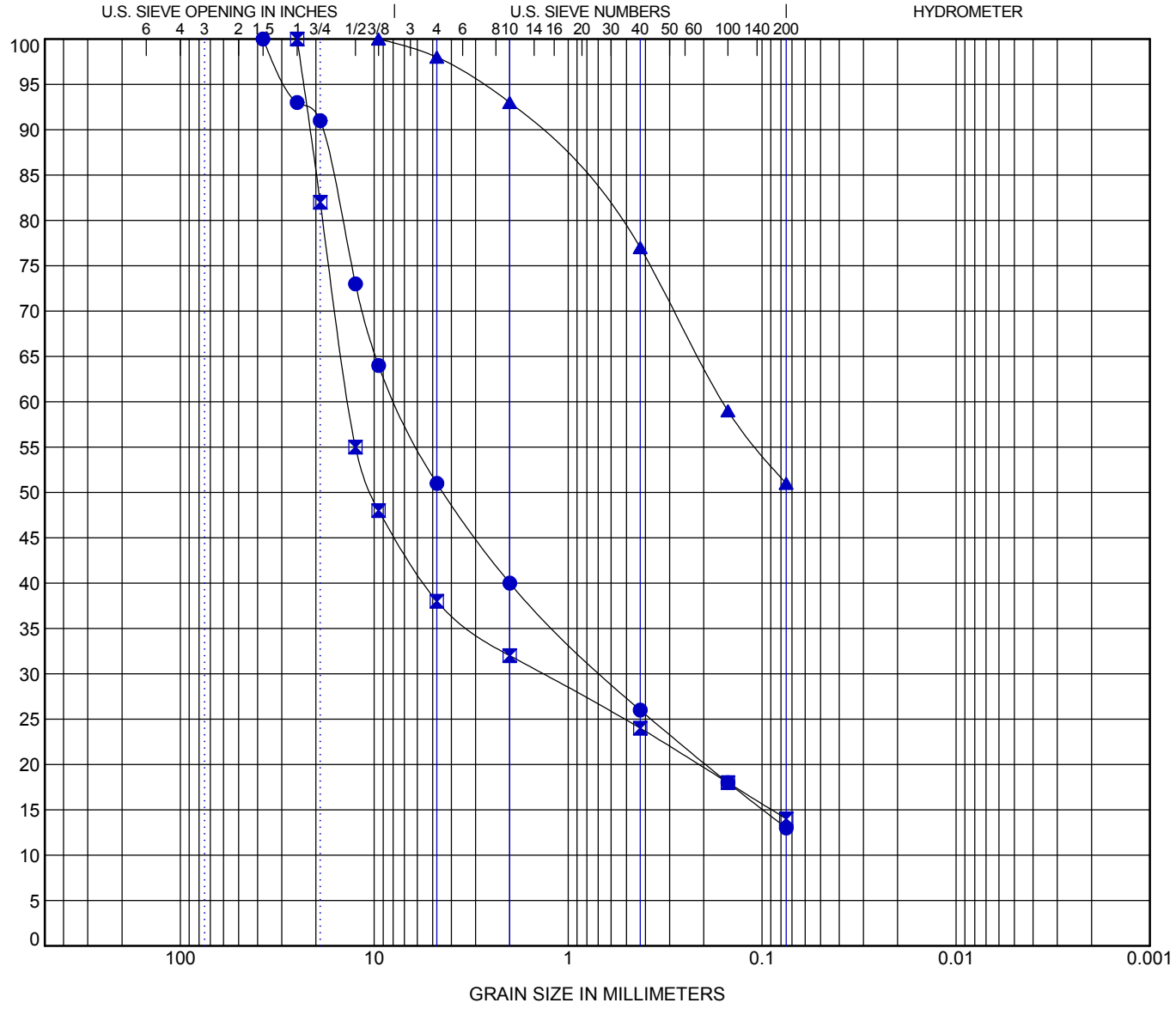
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-9	2.5 - 4	SILTY GRAVEL with SAND(GM)	NP	NP	NP		
⊠	B-9	7.5 -9	SILTY GRAVEL with SAND(GM)	NP	NP	NP		
▲	B-9	12.0 -13.5	SANDY LEAN CLAY(CL)	37	12	25		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-9	2.5 - 4	37.5	7.675	0.662		49.0	38.0	13.0	
⊠	B-9	7.5 - 9	25	13.508	1.358		62.0	24.0	14.0	
▲	B-9	12.0 - 13.5	9.5	0.159			2.0	47.0	51.0	

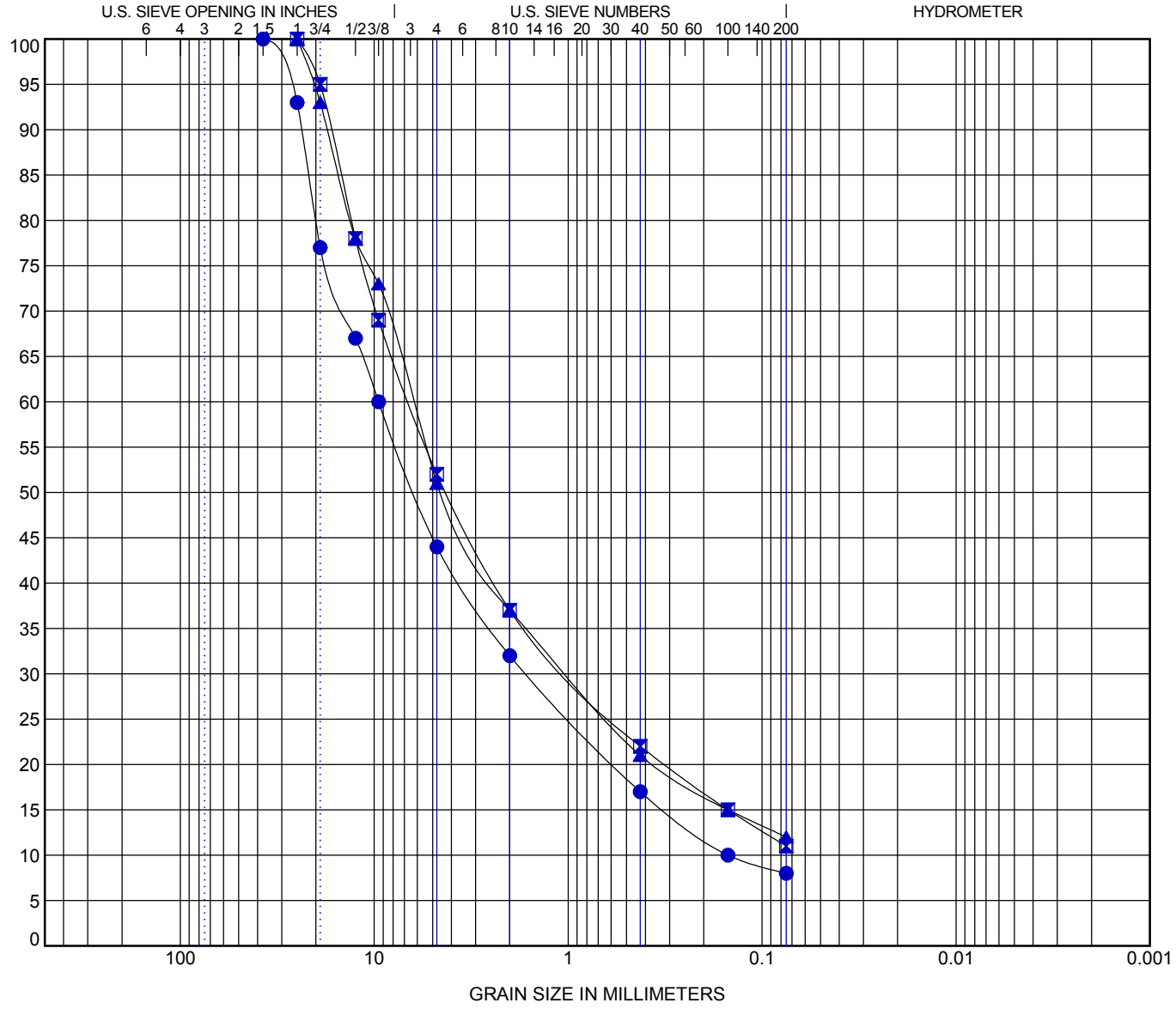
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-10	2.5 - 2.9	WELL-GRADED GRAVEL with SILT and SAND(GW-GM)	NP	NP	NP	1.86	63.33
⊠	B-10	5.0 - 5.4	WELL-GRADED GRAVEL with SILTY CLAY and SAND(GW-GC)	21	16	5	2.27	104.36
▲	B-10	10.0 - 10.4	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)	NP	NP	NP	3.46	133.50

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-10	2.5 - 2.9	37.5	9.5	1.627	0.15	56.0	36.0	8.0	
⊠	B-10	5.0 - 5.4	25	6.582	0.971		48.0	41.0	11.0	
▲	B-10	10.0 - 10.4	25	6.307	1.016		49.0	39.0	12.0	

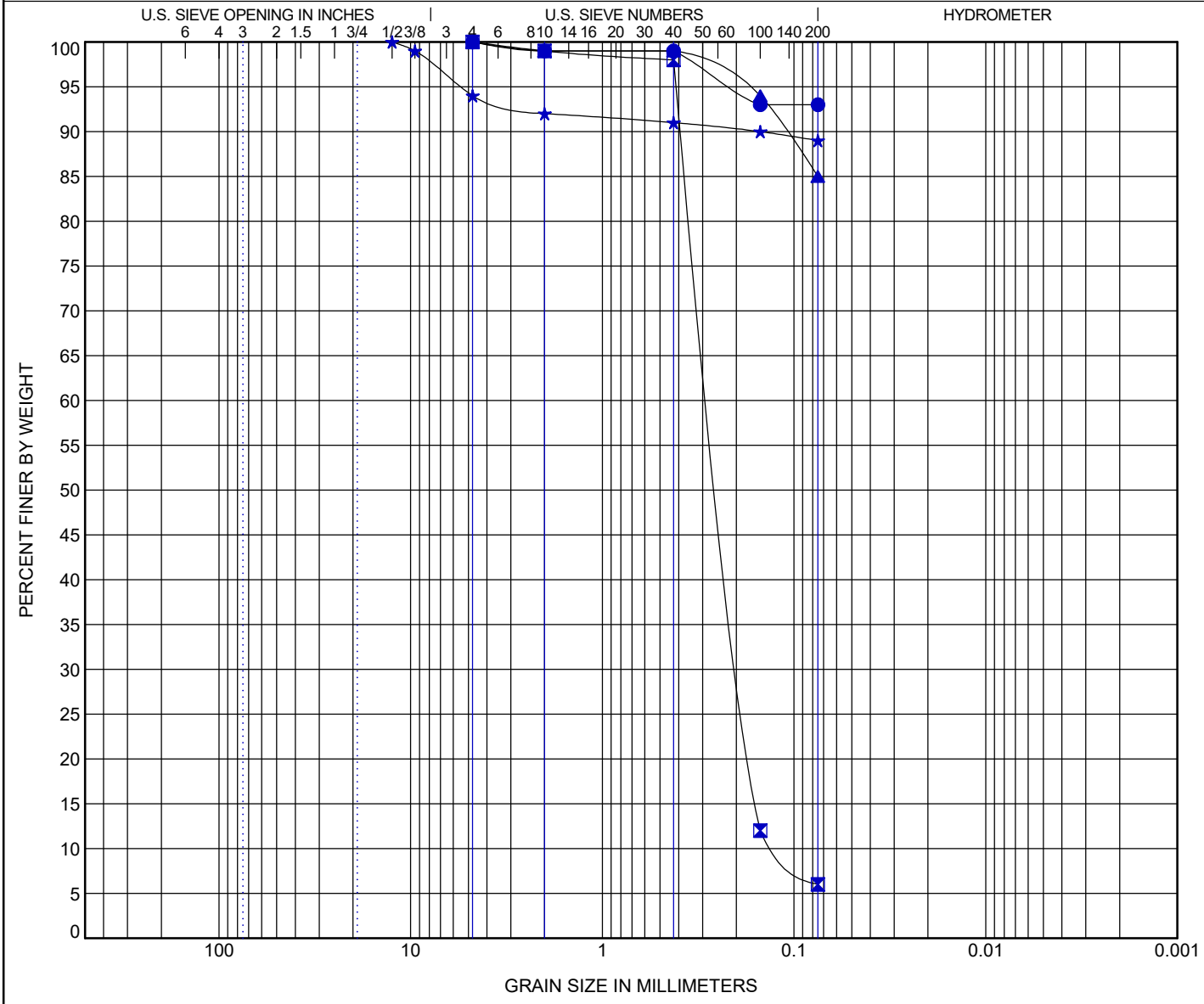
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Project

PROJECT NUMBER AGCQC20-010-03.1 **PROJECT LOCATION** Pershing Drive & Sparkman Street



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-11	1.2 - 2.7	LEAN CLAY(CL)	28	14	14		
⊠	B-11	5.0 - 6.5	POORLY GRADED SAND with SILT(SP-SM)	NP	NP	NP	1.09	2.25
▲	B-11	7.5 - 9.0	FAT CLAY with SAND(CH)	65	16	49		
★	B-11	10.0 - 11.5	FAT CLAY(CH)	64	16	48		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-11	1.2 - 2.7	4.75				0.0	7.0	93.0	
⊠	B-11	5.0 - 6.5	4.75	0.268	0.187	0.119	0.0	94.0	6.0	
▲	B-11	7.5 - 9.0	4.75				0.0	15.0	85.0	
★	B-11	10.0 - 11.5	12.5				6.0	5.0	89.0	

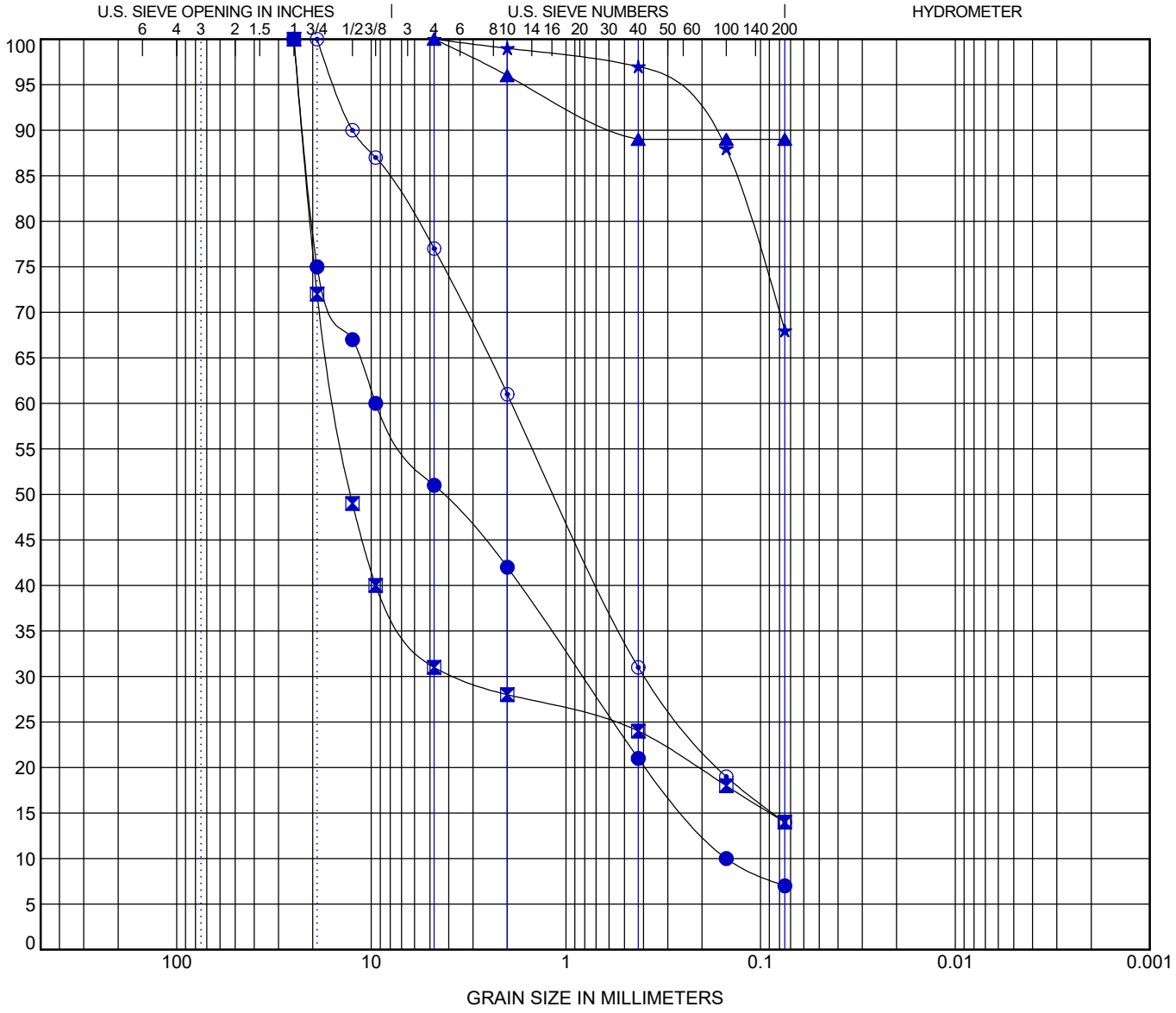
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Project

PROJECT NUMBER AGCQC20-010-03.1 **PROJECT LOCATION** Pershing Drive & Sparkman Street



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-12	2.5 - 2.8	POORLY GRADED GRAVEL with SILT and SAND(GP-GM)	NP	NP	NP	0.48	63.33
⊠	B-12	5.0 - 5.3	CLAYEY GRAVEL with SAND(GC)	27	14	13		
▲	B-12	7.5 - 7.8	LEAN CLAY(CL)	25	16	9		
★	B-12	10.0 - 10.3	SANDY LEAN CLAY(CL)	29	16	13		
⊙	B-12	13.5 - 13.8	SILTY SAND with GRAVEL(SM)	NP	NP	NP		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-12	2.5 - 2.8	25	9.5	0.825	0.15	49.0	44.0	7.0	
⊠	B-12	5.0 - 5.3	25	15.271	3.56		69.0	17.0	14.0	
▲	B-12	7.5 - 7.8	4.75				0.0	11.0	89.0	
★	B-12	10.0 - 10.3	4.75				0.0	32.0	68.0	
⊙	B-12	13.5 - 13.8	19	1.899	0.39		23.0	63.0	14.0	

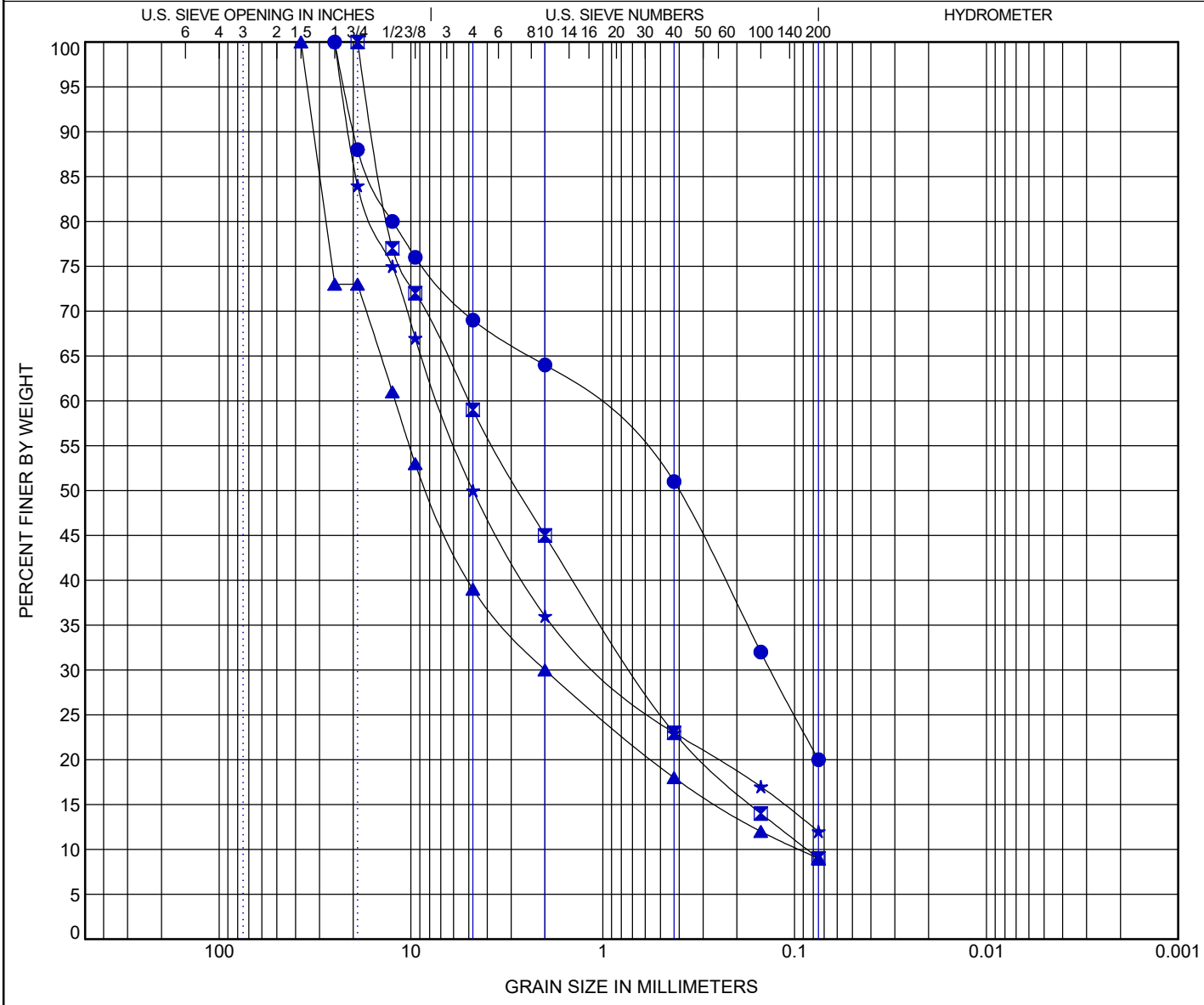
CQC Testing and Engineering LLC - TBPE Firm No. F-10632
4606 Titanic Avenue
El Paso, Texas 79904
Ph: (915) 771-7766
Fx: (915) 771-7786

SOIL PARTICLE SIZE ANALYSIS TESTS

Test Method: ASTM D6913

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Project

PROJECT NUMBER AGCQC20-010-03.1 **PROJECT LOCATION** Pershing Drive & Sparkman Street



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-13	2.5 - 2.9	SILTY SAND with GRAVEL(SM)	18	16	2		
⊠	B-13	7.5 - 7.9	WELL-GRADED SAND with SILTY CLAY and GRAVEL(SW-SC)	24	18	6	1.12	58.15
▲	B-13	10.0 - 10.4	POORLY GRADED GRAVEL with SILTY CLAY and SAND(GP-GC)	21	16	5	3.50	127.82
★	B-13	15.0 - 15.4	WELL-GRADED GRAVEL with SILTY CLAY and SAND(GW-GC)	17	13	4	2.36	125.64

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-13	2.5 - 2.9	25	1.242	0.134		31.0	49.0	20.0	
⊠	B-13	7.5 - 7.9	19	5.01	0.696	0.086	41.0	50.0	9.0	
▲	B-13	10.0 - 10.4	37.5	12.078	2	0.094	61.0	30.0	9.0	
★	B-13	15.0 - 15.4	25	7.141	0.979		50.0	38.0	12.0	

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

SUMMARY OF LABORATORY ENGINEERING SOIL CLASSIFICATION TEST RESULTS

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas

Borehole	Depth	N - Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4	% Passing No. 200	Pocket Pen. (tsf)	Total Unit Weight (pcf)	Classification
B-1	2.5- 4.0	42	1.9	NP	NP	NP	56	10			SW-SM
	5.0- 6.5	50 / 5"	1.6	NP	NP	NP	40	8			GW-GM
B-2	0.8- 2.3	6	8.3	23	17	6	88	29			SC-SM
	2.5- 4.0	7									
	5.0- 6.5	16	3.3	NP	NP	NP	65	6			SP-SM
	7.5- 9.0	43	2.4	NP	NP	NP	70	7			SP-SM
	10.0- 11.5	50 / 2"									
	13.5- 15.0	60	15.8	53	13	40	92	60	3.0		CH
B-3	2.5- 4.0	21	11.4	27	18	9	100	46			SC
	5.0- 6.5	24									
	7.5- 9.0	27	7.5	23	18	5	85	25			SC-SM
	10.0- 11.5	34	3.2	NP	NP	NP	61	10			SP-SM
	13.5- 15.0	50 / 1"									
B-4	0.3- 1.8	15									
	2.5- 4.0	10	4.9	NP	NP	NP	79	11			SP-SM
	5.0- 6.5	25	5.3	NP	NP	NP	80	16			SM
	7.5- 9.0	32									
	10.0- 11.5	21	23.6	62	18	44	100	88	4.0		CH
	13.5- 15.0	35	21.5	57	17	40	82	76	4.5		CH
B-5	0.1- 1.6	12									
	2.5- 4.0	10	4.6	23	17	6	56	18			GC-GM
	5.0- 6.5	49									
	7.5- 9.0	54	3.7	NP	NP	NP	73	10			SP-SM
	10.0- 11.5	50									
	13.5- 15.0	62	5.3	NP	NP	NP	93	19			SM
B-6	0.1- 1.6	19									
	2.5- 4.0	55	2.1	18	14	4	61	14			SC-SM
	5.0- 6.5	61	1.8	18	15	3	48	9			GW-GM
	7.5- 9.0	10									
	10.0- 11.5	27	17.5	39	14	25	100	77	4.5		CL
	13.5- 15.0	25							4.5		
B-7	0.0- 1.5	46									
	2.5- 4.0	50	1.4	19	18	1	55	13			GM
	5.0- 6.5	51									
	7.5- 9.0	50 / 5"	1.2	NP	NP	NP	57	10			SW-SM
	10.0- 11.5	75									
	13.5- 15.0	71	2.5	NP	NP	NP	70	9			SP-SM
B-8	0.1- 1.6	58									

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

SUMMARY OF LABORATORY ENGINEERING SOIL CLASSIFICATION TEST RESULTS

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Improvements Project

PROJECT NUMBER AGCQC20-010-03 **PROJECT LOCATION** Various Streets, El Paso, Texas

Borehole	Depth	N - Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4	% Passing No. 200	Pocket Pen. (tsf)	Total Unit Weight (pcf)	Classification
	0.8- 2.3		1.9	NP	NP	NP	25	7			GP-GM
	2.5- 4.0	61									
	5.0- 6.5	71	1.3	18	16	2	51	10			GW-GM
	7.5- 9.0	50 / 5"									
	10.0- 11.5	50 / 1"	1.7	NP	NP	NP	67	13			SM
B-9	0.2- 1.7	21									
	2.5- 4.0	33	2.9	NP	NP	NP	51	13			GM
	5.0- 6.5	24									
	7.5- 9.0	61	3.7	NP	NP	NP	38	14			GM
	10.0- 11.5	26									
	12.0- 13.5		12.9	37	12	25	98	51	3.0		CL
	13.5- 15.0	42									
B-10	0.2- 1.7	20									
	2.5- 4.0	49	0.5	NP	NP	NP	44	8			GW-GM
	5.0- 6.5	72	1.4	21	16	5	52	11			GW-GC
	7.5- 9.0	50 / 3"									
	10.0- 11.5	50 / 5"	1.4	NP	NP	NP	51	12			GP-GM

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

SUMMARY OF LABORATORY ENGINEERING SOIL CLASSIFICATION TEST RESULTS

CLIENT El Paso Water **PROJECT NAME** EPW- Pershing 16-inch Water Main Project

PROJECT NUMBER AGCQC20-010-03.1 **PROJECT LOCATION** Pershing Drive & Sparkman Street

Borehole	Depth	N - Value	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 4	% Passing No. 200	Pocket Pen. (tsf)	Total Unit Weight (pcf)	Classification
B-11	1.2- 2.7	43	14.2	28	14	14	100	93			CL
	2.5- 4.0	22									
	5.0- 6.5	22	2.2	NP	NP	NP	100	6			SP-SM
	7.5- 9.0	31	21.0	65	16	49	100	85	4.5		CH
	10.0- 11.5	28	21.0	64	16	48	94	89	4.5		CH
	13.5- 15.0	44									
B-12	0.3- 1.8	18									
	2.5- 4.0	19	2.7	NP	NP	NP	51	7			GP-GM
	5.0- 6.5	10	3.5	27	14	13	31	14			GC
	7.5- 9.0	11	12.7	25	16	9	100	89			CL
	10.0- 11.5	13	17.5	29	16	13	100	68			CL
	13.5- 15.0	50 / 3"	3.2	NP	NP	NP	77	14			SM
B-13	0.3- 1.8	23									
	2.5- 4.0	15	5.4	18	16	2	69	20			SM
	5.0- 6.5	9									
	7.5- 9.0	50 / 4"	2.4	24	18	6	59	9			SW-SC
	10.0- 11.5	50 / 3"	1.7	21	16	5	39	9			GP-GC
	15.0- 16.5	50 / 5"	1.5	17	13	4	50	12			GW-GC
	18.5- 20.0	50 / 1"									

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Bishop Way
El Paso , El Paso County, Texas

SAMPLE INFORMATION

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

SOIL SAMPLE LOCATION: B-2 **SAMPLE DATE:** 7/21/2021

SOIL SAMPLE APPROX. DEPTH: 1'-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Medium Grained, Silty, Clayey, Tannish 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"	2	98
3/4"	3	97
1/2"	18	82
3/8"	23	77
No. 4	32	68
No. 10	40	60
No. 40	56	44
No. 100	76	24
No. 200	84.2	15.8

Atterberg Limits Test
Test Method: ASTM D 4318

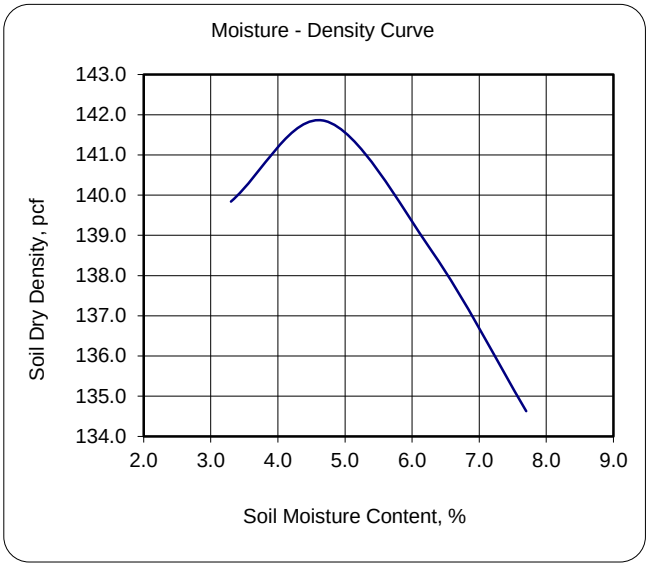
Limit Test	Index Test Result
LL	20
PL	16
PI	4

Soil Classification: **SC-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	3.3	139.8
2	4.7	141.8
3	6.3	138.6
4	7.7	134.6

Maximum Dry Density, pcf: **141.9**
Optimum Moisture Content, %: **4.8**



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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Cambridge Avenue
El Paso , El Paso County, Texas

SAMPLE INFORMATION

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

SOIL SAMPLE LOCATION: B-3 **SAMPLE DATE:** 7/21/2021

SOIL SAMPLE APPROX. DEPTH: 1-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Medium Grained, Clayey, Light Brown to Tannish 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	4	96
No. 10	7	93
No. 40	13	87
No. 100	43	57
No. 200	64.2	35.8

Atterberg Limits Test
Test Method: ASTM D 4318

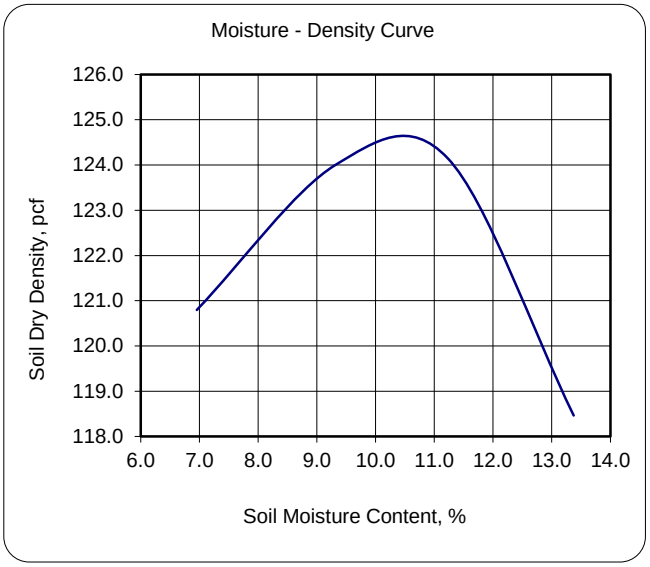
Limit Test	Index Test Result
LL	26
PL	18
PI	8

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	7.0	120.8
2	9.3	124.0
3	11.2	124.2
4	13.4	118.5

Maximum Dry Density, pcf: **124.6**
Optimum Moisture Content, %: **10.5**



construction quality control
testing and engineering

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

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

SOIL SAMPLE LOCATION: B-4 **SAMPLE DATE:** 7/21/2021

SOIL SAMPLE APPROX. DEPTH: 1-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Medium Grained, Silty, Clayey, Tannish 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"	4	96
3/4"	6	94
1/2"	11	89
3/8"	14	86
No. 4	30	70
No. 10	38	62
No. 40	57	43
No. 100	82	18
No. 200	87.4	12.6

Atterberg Limits Test
Test Method: ASTM D 4318

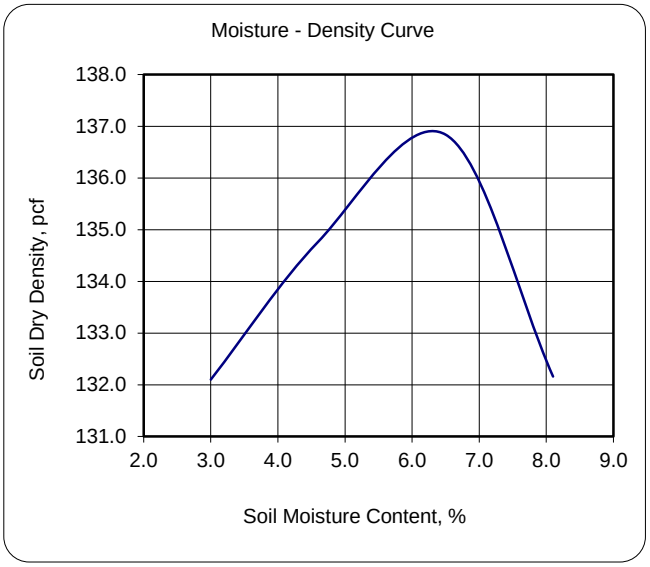
Limit Test	Index Test Result
LL	21
PL	16
PI	5

Soil Classification: **SC-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	3.0	132.1
2	4.6	134.8
3	6.5	136.8
4	8.1	132.2

Maximum Dry Density, pcf: **136.9**
Optimum Moisture Content, %: **6.4**



construction quality control
testing and engineering

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

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

SOIL SAMPLE LOCATION: B-5 **SAMPLE DATE:** 7/21/2021

SOIL SAMPLE APPROX. DEPTH: 1-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Coarse Grained, Gravelly, Silty, Clayey, Tannish 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"	1	99
3/4"	17	83
1/2"	22	78
3/8"	27	73
No. 4	38	62
No. 10	47	53
No. 40	64	36
No. 100	82	18
No. 200	88.0	12.0

Atterberg Limits Test
Test Method: ASTM D 4318

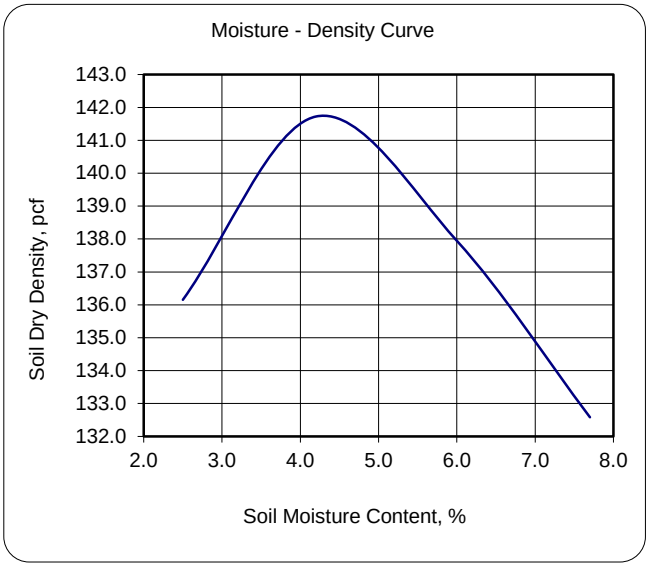
Limit Test	Index Test Result
LL	23
PL	16
PI	7

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

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

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	2.5	136.2
2	4.2	141.7
3	6.0	137.9
4	7.7	132.6

Maximum Dry Density, pcf: **141.8**
Optimum Moisture Content, %: **4.4**



construction quality control
testing and engineering

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

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

SOIL SAMPLE LOCATION: B-6 **SAMPLE DATE:** 7/22/021

SOIL SAMPLE APPROX. DEPTH: 1'-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ GRAVEL, Fine, Sandy, Poorly Graded, Grayish Brown to Tannish Brown with clay.

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"	3	97
1"	12	88
3/4"	24	76
1/2"	33	67
3/8"	40	60
No. 4	55	45
No. 10	66	34
No. 40	78	22
No. 100	85	15
No. 200	88.7	11.3

Atterberg Limits Test
Test Method: ASTM D 4318

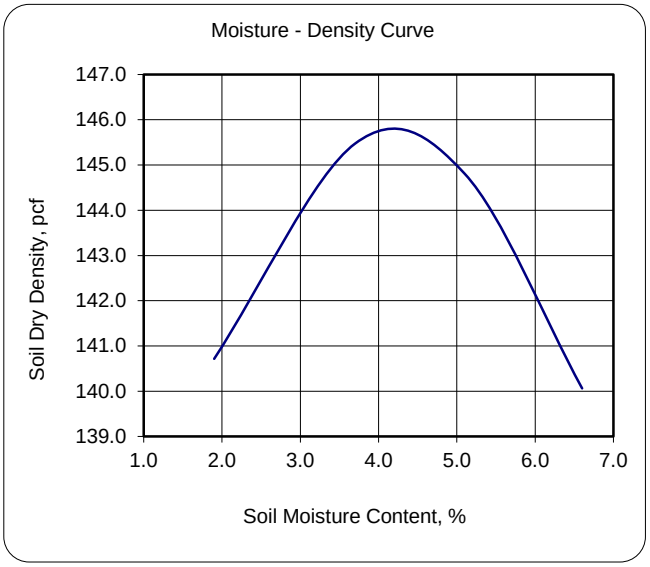
Limit Test	Index Test Result
LL	20
PL	15
PI	5

Soil Classification: **GP-GC**
Test Method: ASTM D 2487

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

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	1.9	140.7
2	3.7	145.5
3	5.1	144.8
4	6.6	140.1

Maximum Dry Density, pcf: **145.8**
Optimum Moisture Content, %: **4.3**



construction quality control
testing and engineering

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

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

SOIL SAMPLE LOCATION: B-7 **SAMPLE DATE:** 7/22/2021

SOIL SAMPLE APPROX. DEPTH: 1-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Coarse Grained, Gravelly, Silty, Poorly Graded, Grayish Brown to Tannish 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"	10	90
3/4"	24	76
1/2"	31	69
3/8"	36	64
No. 4	49	51
No. 10	59	41
No. 40	73	27
No. 100	85	15
No. 200	91.4	8.6

Atterberg Limits Test
Test Method: ASTM D 4318

Limit Test	Index Test Result
LL	-
PL	-
PI	NP

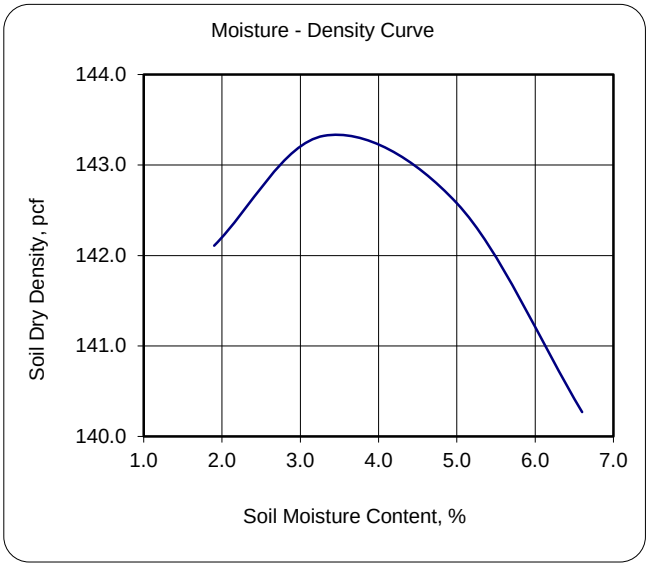
NP-Non Plastic

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

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

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	1.9	142.1
2	3.3	143.3
3	5.0	142.6
4	6.6	140.3

Maximum Dry Density, pcf: **143.4**
Optimum Moisture Content, %: **3.5**



construction quality control
testing and engineering

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 7 **SAMPLED BY:** PG

SOIL SAMPLE LOCATION: B-8 **SAMPLE DATE:** 7/22/021

SOIL SAMPLE APPROX. DEPTH: 1'-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ GRAVEL, Fine, Poorly Graded, Grayish Brown to Tannish Brown with clay.

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"	7	93
3/4"	29	71
1/2"	33	67
3/8"	43	57
No. 4	51	49
No. 10	61	39
No. 40	72	28
No. 100	82	18
No. 200	88.5	11.5

Atterberg Limits Test
Test Method: ASTM D 4318

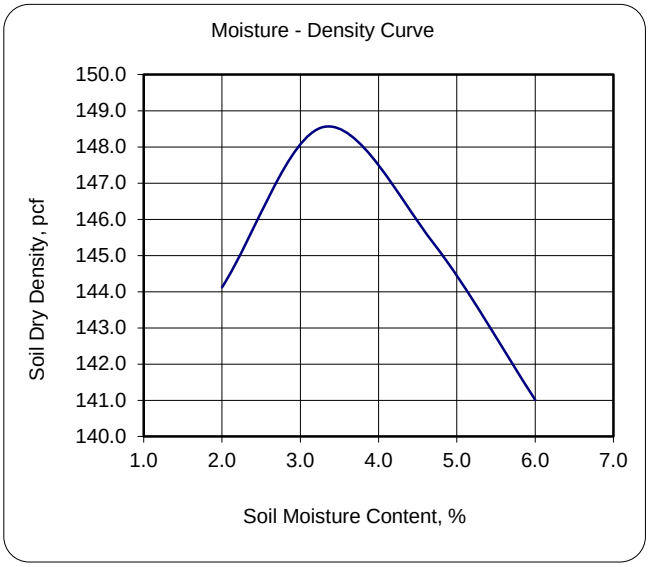
Limit Test	Index Test Result
LL	24
PL	19
PI	5

Soil Classification: **GP-GC**
Test Method: ASTM D 2487

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

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	2.0	144.1
2	3.3	148.6
3	4.7	145.3
4	6.0	141.0

Maximum Dry Density, pcf: **148.6**
Optimum Moisture Content, %: **3.4**



construction quality control
testing and engineering

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Sparkman Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 8 **SAMPLED BY:** PG

SOIL SAMPLE LOCATION: B-9 **SAMPLE DATE:** 7/22/2021

SOIL SAMPLE APPROX. DEPTH: 1-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ GRAVEL, Fine, Sandy, Silty, Clayey, Grayish Brown to Tannish 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"	4	96
1"	11	89
3/4"	27	73
1/2"	36	64
3/8"	43	57
No. 4	54	46
No. 10	62	38
No. 40	73	27
No. 100	82	18
No. 200	87.1	12.9

Atterberg Limits Test
Test Method: ASTM D 4318

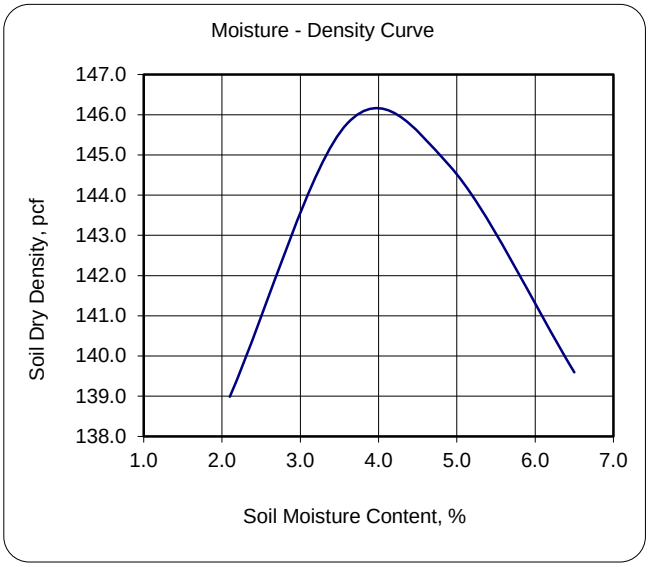
Limit Test	Index Test Result
LL	21
PL	17
PI	4

Soil Classification: **GC-GM**
Test Method: ASTM D 2487

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

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	2.1	139.0
2	3.6	145.8
3	4.9	144.7
4	6.5	139.6

Maximum Dry Density, pcf: **147.5**
Optimum Moisture Content, %: **4.1**



construction quality control
testing and engineering

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 9 **SAMPLED BY:** PG

SOIL SAMPLE LOCATION: B-10 **SAMPLE DATE:** 7/22/2021

SOIL SAMPLE APPROX. DEPTH: 1'-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ GRAVEL, Fine, Sandy, Clayey, Poorly Graded, Grayish Brown to Tannish 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"	9	91
3/4"	31	69
1/2"	38	62
3/8"	46	54
No. 4	63	37
No. 10	73	27
No. 40	82	18
No. 100	87	13
No. 200	90.6	9.4

Atterberg Limits Test
Test Method: ASTM D 4318

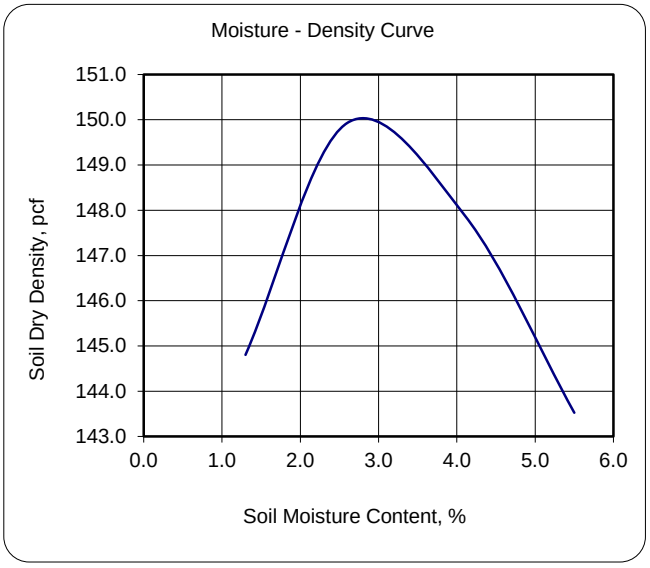
Limit Test	Index Test Result
LL	27
PL	17
PI	10

Soil Classification: **GP-GC**
Test Method: ASTM D 2487

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

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	1.3	144.8
2	2.6	149.9
3	4.1	147.9
4	5.5	143.5

Maximum Dry Density, pcf: **150.1**
Optimum Moisture Content, %: **2.9**



construction quality control
testing and engineering

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-03.1

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Pershing Drive
El Paso , El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 10 **SAMPLED BY:** JC

SOIL SAMPLE LOCATION: B-11 **SAMPLE DATE:** 1/24/2022

SOIL SAMPLE APPROX. DEPTH: 0-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Medium Grained, Silty, Clayey, Light Brown to Tannish 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"	4	96
No. 4	9	91
No. 10	13	87
No. 40	27	73
No. 100	60	40
No. 200	70.4	29.6

Atterberg Limits Test
Test Method: ASTM D 4318

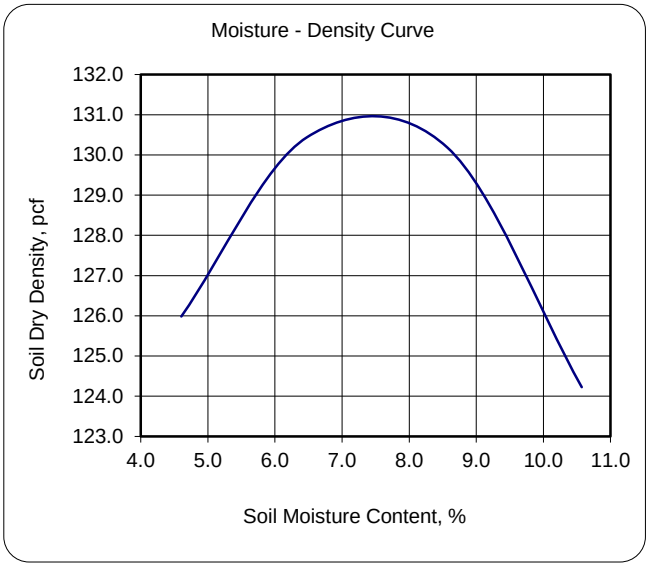
Limit Test	Index Test Result
LL	20
PL	16
PI	4

Soil Classification: **SC-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	4.6	126.0
2	6.5	130.4
3	8.6	130.2
4	10.6	124.2

Maximum Dry Density, pcf: **131.0**
Optimum Moisture Content, %: **7.5**



construction quality control
testing and engineering

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-031

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Pershing Drive
El Paso , El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 10 **SAMPLED BY:** JC

SOIL SAMPLE LOCATION: B-12 **SAMPLE DATE:** 1/24/2022

SOIL SAMPLE APPROX. DEPTH: 0-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Coarse Grained, Clayey, Light Brown to Tannish 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"	4	96
3/4"	10	90
1/2"	18	82
3/8"	23	77
No. 4	33	67
No. 10	42	58
No. 40	52	48
No. 100	64	36
No. 200	72.2	27.8

Atterberg Limits Test
Test Method: ASTM D 4318

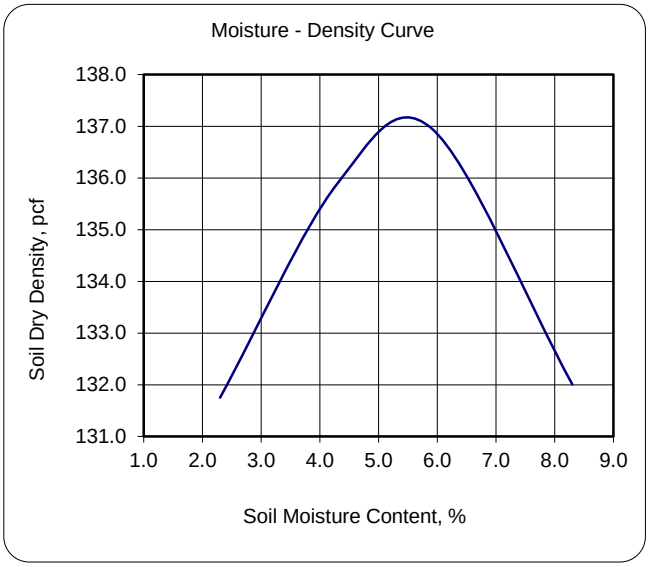
Limit Test	Index Test Result
LL	28
PL	14
PI	14

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

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

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	2.3	131.8
2	4.3	135.9
3	5.9	137.0
4	8.3	132.0

Maximum Dry Density, pcf: **137.2**
Optimum Moisture Content, %: **5.5**



construction quality control
testing and engineering

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

SOIL MOISTURE - DENSITY RELATIONSHIP TEST RESULTS

PROJECT NO.: AGCQC20-010-031

PROJECT NAME: **General Geotechnical Subsurface Soils Evaluation**
El Paso Water - Pershing 16-inch Water Main Improvement Project
Pershing Drive
El Paso , El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 11 **SAMPLED BY:** JC

SOIL SAMPLE LOCATION: B-13 **SAMPLE DATE:** 1/24/2022

SOIL SAMPLE APPROX. DEPTH: 0-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Coarse Grained, Silty, Clayey, Light Brown to Tannish 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"	5	95
3/4"	9	91
1/2"	23	77
3/8"	32	68
No. 4	48	52
No. 10	58	42
No. 40	68	32
No. 100	80	20
No. 200	85.1	14.9

Atterberg Limits Test
Test Method: ASTM D 4318

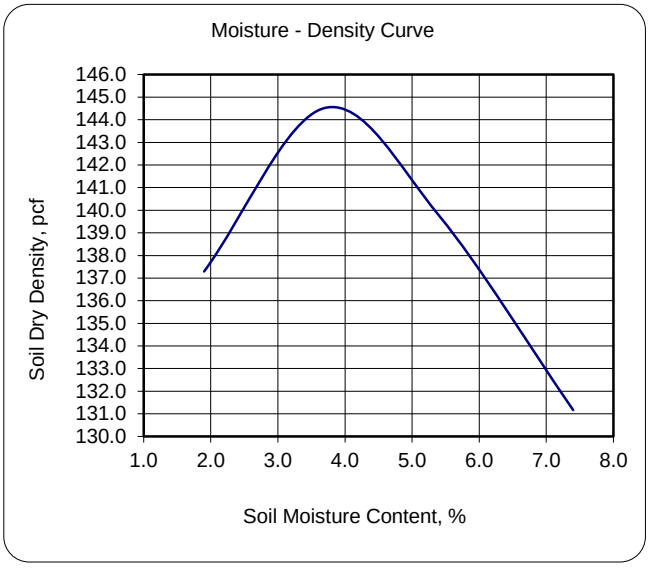
Limit Test	Index Test Result
LL	19
PL	14
PI	5

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

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

Test Sample No.	Moisture Content (%)	Sample Dry Density (pcf)
1	1.9	137.3
2	3.7	144.5
3	5.4	139.8
4	7.4	131.2

Maximum Dry Density, pcf: **144.6**
Optimum Moisture Content, %: **3.8**



4606 Titanic Avenue
El Paso, Texas 79904
Ph.(915) 771-7766
Fx. (915) 771-7786

SOIL CALIFORNIA BEARING RATIO (CBR) TEST RESULTS
ASTM D - 1883

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Bishop Way
El Paso , El Paso County, Texas

SAMPLE INFORMATION

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

SOIL SAMPLE LOCATION: B-2 **SAMPLE DATE:** 7/21/2021

SOIL SAMPLE DEPTH: 1'-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Medium Grained, Silty, Clayey, Tannish Brown to Multicolored.

TEST SPECIMEN INFORMATION:

Soil Sample Height, in.	4-1/2"
Soil Sample Approx. Diameter, in.	6"
Soil Optimum Dry Density, pcf	141.9
Soil Optimum Moisture Content, %	4.8

CBR Test Data:

Stress Contact Area, in^2	3.02
Sample Surcharge Load, lbs.	12.5
Soaking Period, hr's.	96

SPECIMEN SWELL TEST INFORMATION:

Intial Swell Reading:	0.5870
Final Swell Reading:	0.5950
Sample Vertical Swell, %	0.1778

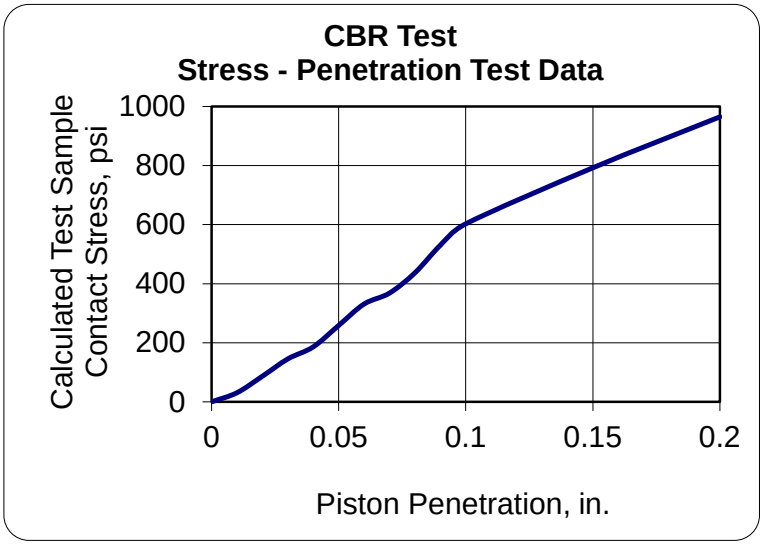
	Before Soaking	After Soaking
Dry Density, pcf	133.7	127.4
Moisture, %	4.7	9.9
% Compaction	94.2	89.8

UNCORRECTED CALCULATED SOAKED CBR VALUES:

CBR @ 0.1" Penetration	60
CBR @ 0.2" Penetration	64

Stress Versus Penetration Data

PEN.	Load, lbs.	Stress, psi
0	0	0
0.01	93	31
0.02	262	87
0.03	439	145
0.04	562	186
0.05	781	259
0.06	1000	331
0.07	1112	368
0.08	1319	437
0.09	1601	530
0.1	1820	603
0.15	2393	792
0.2	2914	965



4606 Titanic Avenue
El Paso, Texas 79904
Ph.(915) 771-7766
Fx. (915) 771-7786

SOIL CALIFORNIA BEARING RATIO (CBR) TEST RESULTS
ASTM D - 1883

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

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

SOIL SAMPLE LOCATION: B-4 **SAMPLE DATE:** 7/21/2021

SOIL SAMPLE DEPTH: 1-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Medium Grained, Silty, Clayey, Tannish Brown to Multicolored.

TEST SPECIMEN INFORMATION:

Soil Sample Height, in.	4-1/2"
Soil Sample Approx. Diameter, in.	6"
Soil Optimum Dry Density, pcf	136.9
Soil Optimum Moisture Content, %	6.4

CBR Test Data:

Stress Contact Area, in^2	3.02
Sample Surcharge Load, lbs.	12.5
Soaking Period, hr's.	96

SPECIMEN SWELL TEST INFORMATION:

Intial Swell Reading:	0.6070
Final Swell Reading:	0.6180
Sample Vertical Swell, %	0.2444

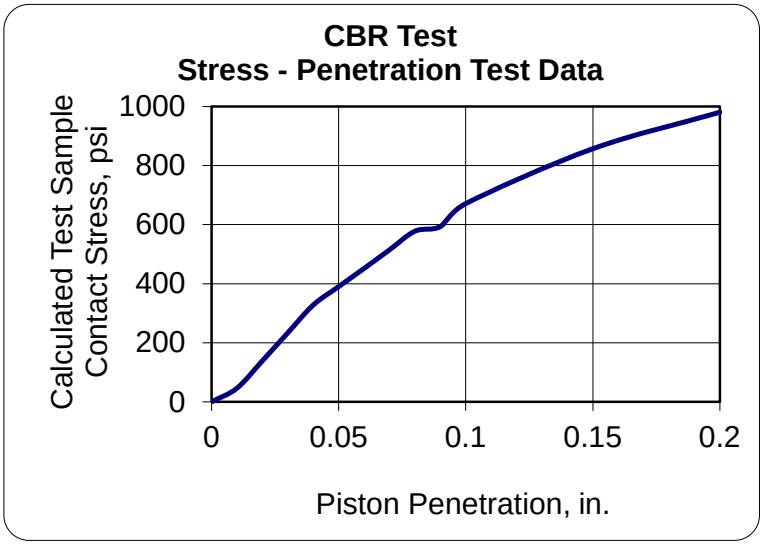
	Before Soaking	After Soaking
Dry Density, pcf	129.7	126.6
Moisture, %	5.7	8.3
% Compaction	94.7	92.5

UNCORRECTED CALCULATED SOAKED CBR VALUES:

CBR @ 0.1" Penetration	67
CBR @ 0.2" Penetration	65

Stress Versus Penetration Data

PEN.	Load, lbs.	Stress, psi
0	0	0
0.01	140	46
0.02	420	139
0.03	706	234
0.04	990	328
0.05	1178	390
0.06	1364	452
0.07	1554	515
0.08	1745	578
0.09	1792	593
0.1	2027	671
0.15	2588	857
0.2	2961	980



4606 Titanic Avenue
El Paso, Texas 79904
Ph.(915) 771-7766
Fx. (915) 771-7786

SOIL CALIFORNIA BEARING RATIO (CBR) TEST RESULTS
ASTM D - 1883

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

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

SOIL SAMPLE LOCATION: B-6 **SAMPLE DATE:** 7/22/021

SOIL SAMPLE DEPTH: 1'-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ GRAVEL, Fine, Sandy, Poorly Graded, Grayish Brown to Tannish Brown with clay.

TEST SPECIMEN INFORMATION:

Soil Sample Height, in.	4-1/2"
Soil Sample Approx. Diameter, in.	6"
Soil Optimum Dry Density, pcf	145.8
Soil Optimum Moisture Content, %	4.3

CBR Test Data:

Stress Contact Area, in^2	3.02
Sample Surcharge Load, lbs.	12.5
Soaking Period, hr's.	96

SPECIMEN SWELL TEST INFORMATION:

Intial Swell Reading:	--
Final Swell Reading:	--
Sample Vertical Swell, %	--

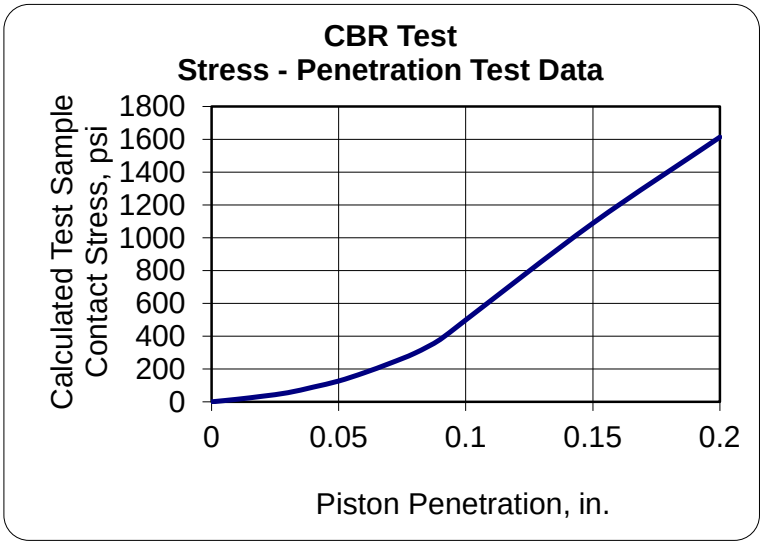
	Before Soaking	After Soaking
Dry Density, pcf	139.6	138.2
Moisture, %	3.8	4.9
% Compaction	95.7	94.8

UNCORRECTED CALCULATED SOAKED CBR VALUES:

CBR @ 0.1" Penetration	50
CBR @ 0.2" Penetration	108

Stress Versus Penetration Data

PEN.	Load, lbs.	Stress, psi
0	0	0
0.01	47	16
0.02	103	34
0.03	168	56
0.04	271	90
0.05	383	127
0.06	534	177
0.07	706	234
0.08	896	297
0.09	1149	380
0.1	1507	499
0.15	3287	1088
0.2	4872	1613



4606 Titanic Avenue
El Paso, Texas 79904
Ph.(915) 771-7766
Fx. (915) 771-7786

SOIL CALIFORNIA BEARING RATIO (CBR) TEST RESULTS
ASTM D - 1883

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 7 **SAMPLED BY:** PG

SOIL SAMPLE LOCATION: B-8 **SAMPLE DATE:** 7/22/021

SOIL SAMPLE DEPTH: 1'-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ GRAVEL, Fine, Poorly Graded, Grayish Brown to Tannish Brown with clay.

TEST SPECIMEN INFORMATION:

Soil Sample Height, in.	4-1/2"
Soil Sample Approx. Diameter, in.	6"
Soil Optimum Dry Density, pcf	148.6
Soil Optimum Moisture Content, %	3.4

CBR Test Data:

Stress Contact Area, in^2	3.02
Sample Surcharge Load, lbs.	12.5
Soaking Period, hr's.	96

SPECIMEN SWELL TEST INFORMATION:

Intial Swell Reading:	0.5700
Final Swell Reading:	0.5700
Sample Vertical Swell, %	0.0

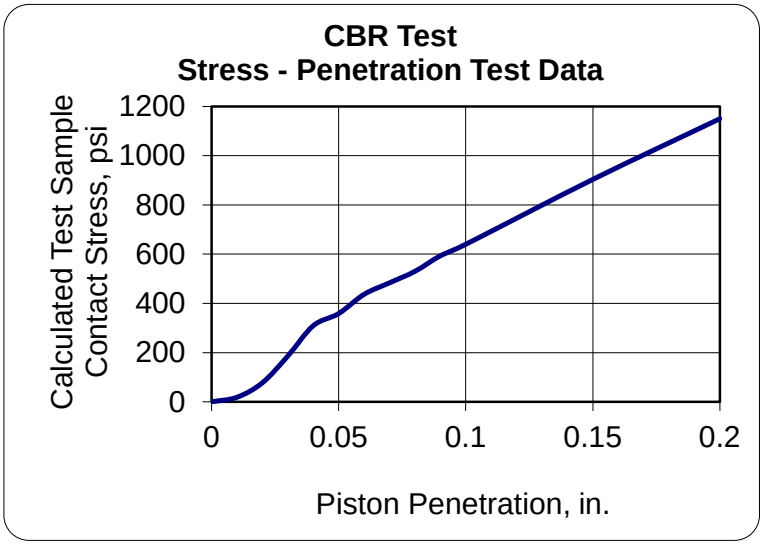
	Before Soaking	After Soaking
Dry Density, pcf	139.8	137.1
Moisture, %	3.2	5.3
% Compaction	94.1	92.3

UNCORRECTED CALCULATED SOAKED CBR VALUES:

CBR @ 0.1" Penetration	64
CBR @ 0.2" Penetration	77

Stress Versus Penetration Data

PEN.	Load, lbs.	Stress, psi
0	0	0
0.01	56	19
0.02	234	77
0.03	562	186
0.04	934	309
0.05	1083	359
0.06	1319	437
0.07	1460	483
0.08	1601	530
0.09	1792	593
0.1	1933	640
0.15	2729	904
0.2	3474	1150



4606 Titanic Avenue
El Paso, Texas 79904
Ph.(915) 771-7766
Fx. (915) 771-7786

SOIL CALIFORNIA BEARING RATIO (CBR) TEST RESULTS
ASTM D - 1883

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 9 **SAMPLED BY:** PG

SOIL SAMPLE LOCATION: B-10 **SAMPLE DATE:** 7/22/2021

SOIL SAMPLE DEPTH: 1'-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ GRAVEL, Fine, Sandy, Clayey, Poorly Graded, Grayish Brown to Tannish Brown with silt.

TEST SPECIMEN INFORMATION:

Soil Sample Height, in.	4-1/2"
Soil Sample Approx. Diameter, in.	6"
Soil Optimum Dry Density, pcf	150.1
Soil Optimum Moisture Content, %	2.9

CBR Test Data:

Stress Contact Area, in^2	3.02
Sample Surcharge Load, lbs.	12.5
Soaking Period, hr's.	96

SPECIMEN SWELL TEST INFORMATION:

Intial Swell Reading:	0.3230
Final Swell Reading:	0.3240
Sample Vertical Swell, %	0.0222

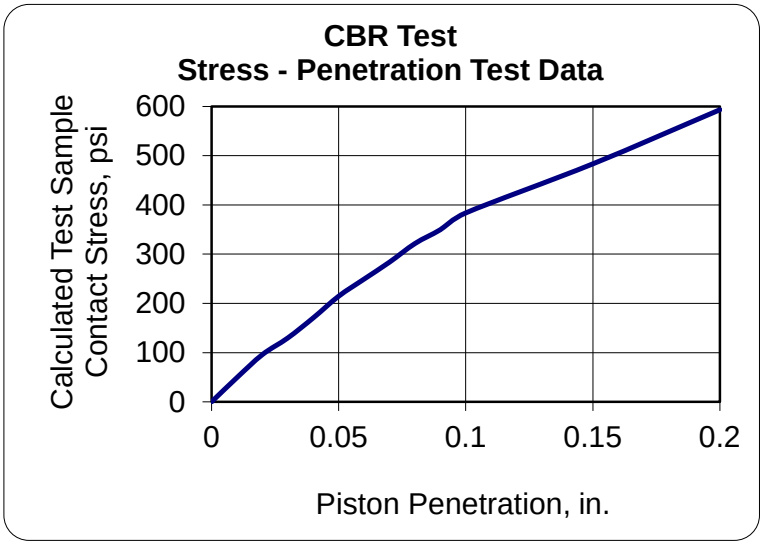
	Before Soaking	After Soaking
Dry Density, pcf	141.4	138.7
Moisture, %	3.2	5.3
% Compaction	94.2	92.4

UNCORRECTED CALCULATED SOAKED CBR VALUES:

CBR @ 0.1" Penetration	38
CBR @ 0.2" Penetration	40

Stress Versus Penetration Data

PEN.	Load, lbs.	Stress, psi
0	0	0
0.01	149	49
0.02	290	96
0.03	392	130
0.04	515	171
0.05	648	215
0.06	753	249
0.07	857	284
0.08	971	322
0.09	1056	350
0.1	1159	384
0.15	1460	483
0.2	1792	593



4606 Titanic Avenue
El Paso, Texas 79904
Ph.(915) 771-7766
Fx. (915) 771-7786

SOIL CALIFORNIA BEARING RATIO (CBR) TEST RESULTS
ASTM D - 1883

PROJECT NO.: AGCQC20-010-03.1

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Pershing Drive
El Paso , El Paso County, Texas

SAMPLE INFORMATION

PROCTOR NO.: 10 **SAMPLED BY:** JC

SOIL SAMPLE LOCATION: B-11 **SAMPLE DATE:** 1/24/2022

SOIL SAMPLE DEPTH: 0-5'

SOIL TYPE/DESCRIPTION: Composite Subsurface Soils Sample/ SAND, Fine to Medium Grained, Silty, Clayey, Light Brown to Tannish Brown.

TEST SPECIMEN INFORMATION:

Soil Sample Height, in.	4-1/2"
Soil Sample Approx. Diameter, in.	6"
Soil Optimum Dry Density, pcf	131.0
Soil Optimum Moisture Content, %	7.5

CBR Test Data:

Stress Contact Area, in^2	3.02
Sample Surcharge Load, lbs.	12.5
Soaking Period, hr's.	96

SPECIMEN SWELL TEST INFORMATION:

Intial Swell Reading:	0.5710
Final Swell Reading:	0.5840
Sample Vertical Swell, %	0.2889

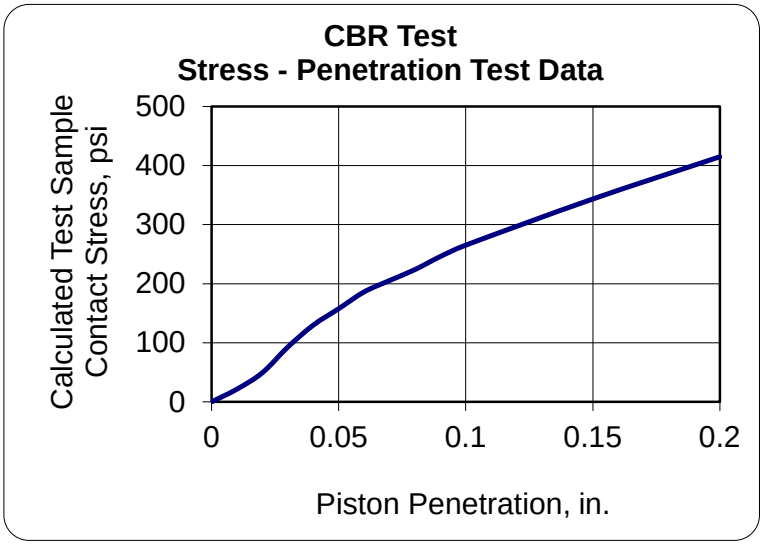
	Before Soaking	After Soaking
Dry Density, pcf	125.6	122.7
Moisture, %	7.8	10.3
% Compaction	95.9	93.7

UNCORRECTED CALCULATED SOAKED CBR VALUES:

CBR @ 0.1" Penetration	27
CBR @ 0.2" Penetration	28

Stress Versus Penetration Data

PEN.	Load, lbs.	Stress, psi
0	0	0
0.01	65	22
0.02	149	49
0.03	280	93
0.04	392	130
0.05	476	158
0.06	562	186
0.07	620	205
0.08	676	224
0.09	743	246
0.1	801	265
0.15	1037	343
0.2	1253	415



TEXAS DEPARTMENT OF TRANSPORTATION

Determining Soil pH
Tex-128-E

Refresh Workbook

File Version: 08/26/09 23:41:16

SAMPLE ID:	B-2 (5-10')	SAMPLED DATE:	07/21/2021
TEST NUMBER:	1	LETTING DATE:	--
SAMPLE STATUS:	Complete	CONTROLLING CSJ:	--
COUNTY:	El Paso	SPEC YEAR:	
SAMPLED BY:	PG / SC	SPEC ITEM:	--
SAMPLE LOCATION:	EPW - Pershing 16in. Waterline	SPECIAL PROVISION:	
MATERIAL CODE:	SP-SM	GRADE:	
MATERIAL NAME:	SAND, Fine to Medium Grained, Poorly Graded, Gravelly, Tannish Brown to Multicolored		
PRODUCER:			
AREA ENGINEER:	--	PROJECT MANAGER:	JLA

COURSE\LIFT:		STATION:		DIST. FROM CL:	

Determining Soil pH:

Soil pH:	9.4

Remarks:

Temperature 23.8° C

Test Method:	Tested By:	Tested Date:
TX128	Marcos Garcia	08/19/21

Test Stamp Code:	Omit Test:	Completed Date:	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

TEXAS DEPARTMENT OF TRANSPORTATION

Determining Soil pH
Tex-128-E

Refresh Workbook

File Version: 08/26/09 23:41:16

SAMPLE ID:	B-4 (5-10')	SAMPLED DATE:	07/21/2021
TEST NUMBER:	2	LETTING DATE:	--
SAMPLE STATUS:	Complete	CONTROLLING CSJ:	--
COUNTY:	El Paso	SPEC YEAR:	
SAMPLED BY:	PG / SC	SPEC ITEM:	--
SAMPLE LOCATION:	EPW - Pershing 16in. Waterline	SPECIAL PROVISION:	
MATERIAL CODE:	SM	GRADE:	
MATERIAL NAME:	SAND, Fine to Medium Grained, Silty, Tannish Brown to Multicolored with gravel.		
PRODUCER:	N/A		
AREA ENGINEER:	--	PROJECT MANAGER:	

COURSE\LIFT:		STATION:		DIST. FROM CL:	

Determining Soil pH:

Soil pH:	9.5

Remarks:

Temperature 23.7° C

Test Method:	Tested By:	Tested Date:
TX128	Marcos Garcia	08/19/21

Test Stamp Code:	Omit Test:	Completed Date:	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

TEXAS DEPARTMENT OF TRANSPORTATION

Determining Soil pH
Tex-128-E

Refresh Workbook

File Version: 08/26/09 23:41:16

SAMPLE ID:	B-6 (5-10')	SAMPLED DATE:	07/22/2021
TEST NUMBER:	3	LETTING DATE:	--
SAMPLE STATUS:	Complete	CONTROLLING CSJ:	--
COUNTY:	El Paso	SPEC YEAR:	
SAMPLED BY:	PG / SC	SPEC ITEM:	--
SAMPLE LOCATION:	EPW - Pershing 16in. Waterline	SPECIAL PROVISION:	
MATERIAL CODE:	GW-GM	GRADE:	
MATERIAL NAME:	GRAVEL, Fine, Sandy, Well Graded, Grayish Brown to Tannish Brown with silt.		
PRODUCER:	N/A		
AREA ENGINEER:	--	PROJECT MANAGER:	JLA

COURSE\LIFT:		STATION:		DIST. FROM CL:	

Determining Soil pH:

Soil pH:	9.4

Remarks:

Temperature 23.6° C

Test Method:	Tested By:	Tested Date:
TX128	Marcos Garcia	08/19/21

Test Stamp Code:	Omit Test:	Completed Date:	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

TEXAS DEPARTMENT OF TRANSPORTATION

Determining Soil pH
Tex-128-E

Refresh Workbook

File Version: 08/26/09 23:41:16

SAMPLE ID:	B-8 (5-10')	SAMPLED DATE:	07/22/2021
TEST NUMBER:	4	LETTING DATE:	--
SAMPLE STATUS:	Complete	CONTROLLING CSJ:	--
COUNTY:	El Paso	SPEC YEAR:	
SAMPLED BY:	PG / SC	SPEC ITEM:	--
SAMPLE LOCATION:	EPW - Pershing 16in. Waterline	SPECIAL PROVISION:	
MATERIAL CODE:	GW-GM	GRADE:	
MATERIAL NAME:	GRAVEL, Fine, Well Graded, Grayish Brown to Tannish Brown with silt.		
PRODUCER:	N/A		
AREA ENGINEER:	--	PROJECT MANAGER:	

COURSE\LIFT:		STATION:		DIST. FROM CL:	

Determining Soil pH:

Soil pH:	9.3

Remarks:

Temperature 23.5° C

Test Method:	Tested By:	Tested Date:
TX128	Marcos Garcia	08/19/21

Test Stamp Code:	Omit Test:	Completed Date:	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

TEXAS DEPARTMENT OF TRANSPORTATION

Determining Soil pH
Tex-128-E

Refresh Workbook

File Version: 08/26/09 23:41:16

SAMPLE ID:	B-9 (5-10')	SAMPLED DATE:	--
TEST NUMBER:	5	LETTING DATE:	--
SAMPLE STATUS:	Complete	CONTROLLING CSJ:	--
COUNTY:	El Paso	SPEC YEAR:	
SAMPLED BY:	PG / SC	SPEC ITEM:	--
SAMPLE LOCATION:	EPW - Pershing 16in. Waterline	SPECIAL PROVISION:	
MATERIAL CODE:	GM	GRADE:	
MATERIAL NAME:	GRAVEL, Fine, Sandy, Silty, Grayish Brown to Tannish Brown.		
PRODUCER:	N/A		
AREA ENGINEER:	--	PROJECT MANAGER:	

COURSE\LIFT:		STATION:		DIST. FROM CL:	

Determining Soil pH:

Soil pH:	9.3

Remarks:

Temperature 23.3° C

Test Method:	Tested By:	Tested Date:
TX128	Marcos Garcia	08/19/21

Test Stamp Code:	Omit Test:	Completed Date:	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

TEXAS DEPARTMENT OF TRANSPORTATION

Determining Soil pH
Tex-128-E

Refresh Workbook

File Version: 08/26/09 23:41:16

SAMPLE ID:	B-10 (5-10')	SAMPLED DATE:	07/22/2021
TEST NUMBER:	6	LETTING DATE:	--
SAMPLE STATUS:	Complete	CONTROLLING CSJ:	--
COUNTY:	El Paso	SPEC YEAR:	
SAMPLED BY:	PG / SC	SPEC ITEM:	--
SAMPLE LOCATION:	EPW - Pershing 16in. Waterline	SPECIAL PROVISION:	
MATERIAL CODE:	GW-GC	GRADE:	
MATERIAL NAME:	GRAVEL, Fine, Sandy, Clayey, Well Graded, Grayish Brown to Tannish Brown.		
PRODUCER:	N/A		
AREA ENGINEER:	--	PROJECT MANAGER:	JLA

COURSE\LIFT:		STATION:		DIST. FROM CL:	

Determining Soil pH:

Soil pH:	9.2

Remarks:

Temperature 23.4° C

Test Method:	Tested By:	Tested Date:
TX128	Marcos Garcia	08/19/21

Test Stamp Code:	Omit Test:	Completed Date:	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

TEXAS DEPARTMENT OF TRANSPORTATION

Determining Soil pH
Tex-128-E

Refresh Workbook

File Version: 08/26/09 23:41:16

SAMPLE ID:	B-11 (5'-10')	SAMPLED DATE:	01/24/2022
TEST NUMBER:	1	LETTING DATE:	--
SAMPLE STATUS:	Complete	CONTROLLING CSJ:	--
COUNTY:	El Paso	SPEC YEAR:	
SAMPLED BY:	PG / SC	SPEC ITEM:	--
SAMPLE LOCATION:	EPW - Pershing 16in. Waterline	SPECIAL PROVISION:	
MATERIAL CODE:	SP-SM	GRADE:	
MATERIAL NAME:	SAND, Fine to Medium Grained, Poorly Graded, Tannish Brown to Multicolored with silt and traces of gravel.		
PRODUCER:			
AREA ENGINEER:	--	PROJECT MANAGER:	JLA

COURSE\LIFT:		STATION:		DIST. FROM CL:	

Determining Soil pH:

Soil pH:	9.3

Remarks:

Temperature 22.4° C

Test Method:	Tested By:	Tested Date:
TX128	Marcos Garcia	02/24/22

Test Stamp Code:	Omit Test:	Completed Date:	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

TEXAS DEPARTMENT OF TRANSPORTATION

Determining Soil pH
Tex-128-E

Refresh Workbook

File Version: 08/26/09 23:41:16

SAMPLE ID:	B-12 (5'-10')	SAMPLED DATE:	01/24/2022
TEST NUMBER:	2	LETTING DATE:	--
SAMPLE STATUS:	Complete	CONTROLLING CSJ:	--
COUNTY:	El Paso	SPEC YEAR:	
SAMPLED BY:	PG / SC	SPEC ITEM:	--
SAMPLE LOCATION:	EPW - Pershing 16in. Waterline	SPECIAL PROVISION:	
MATERIAL CODE:	GC	GRADE:	
MATERIAL NAME:	GRAVEL, Fine, Sandy, Clayey, Tannish Brown and Grayish Brown.		
PRODUCER:			
AREA ENGINEER:	--	PROJECT MANAGER:	JLA

COURSE\LIFT:		STATION:		DIST. FROM CL:	

Determining Soil pH:

Soil pH:	9.1

Remarks:

Temperature 21.8° C

Test Method:	Tested By:	Tested Date:
TX128	Marcos Garcia	02/24/22

Test Stamp Code:	Omit Test:	Completed Date:	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

TEXAS DEPARTMENT OF TRANSPORTATION

Determining Soil pH
Tex-128-E

Refresh Workbook

File Version: 08/26/09 23:41:16

SAMPLE ID:	B-13 (5'-10')	SAMPLED DATE:	01/24/2022
TEST NUMBER:	3	LETTING DATE:	--
SAMPLE STATUS:	Complete	CONTROLLING CSJ:	--
COUNTY:	El Paso	SPEC YEAR:	
SAMPLED BY:	PG / SC	SPEC ITEM:	--
SAMPLE LOCATION:	EPW - Pershing 16in. Waterline	SPECIAL PROVISION:	
MATERIAL CODE:	GW-GC	GRADE:	
MATERIAL NAME:	GRAVEL, Fine, Sandy, Clayey, Well Graded, Tannish Brown and Grayish Brown.		
PRODUCER:	N/A		
AREA ENGINEER:	--	PROJECT MANAGER:	JLA

COURSE\LIFT:		STATION:		DIST. FROM CL:	

Determining Soil pH:

Soil pH:	9.0

Remarks:

Temperature 21.3° C

Test Method:	Tested By:	Tested Date:
TX128	Marcos Garcia	02/24/22

Test Stamp Code:	Omit Test:	Completed Date:	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

TxDOT Designation: Tex-129-E

PROJECT NO.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

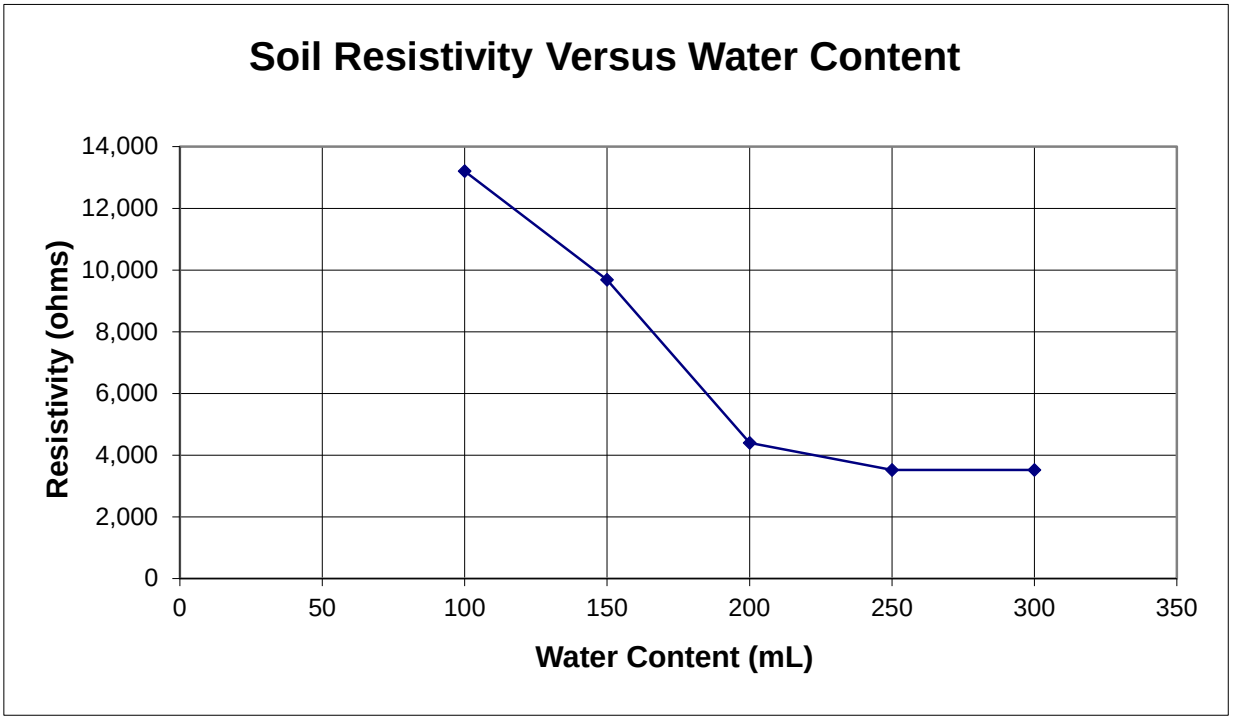
SAMPLE LOCATION: B-2

SAMPLE DEPTH: 5-10'

SOIL TYPE/DESCRIPTION: SAND, Fine to Medium Grained, Poorly Graded, Clayey, Tannish Brown to Multicolored with silt.

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	1.5	10^4	15,000	0.44	13,200
150	1.1	10^4	11,000	0.44	9,680
200	0.5	10^4	5,000	0.44	4,400
250	0.4	10^4	4,000	0.44	3,520
300	0.4	10^4	4,000	0.44	3,520

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.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

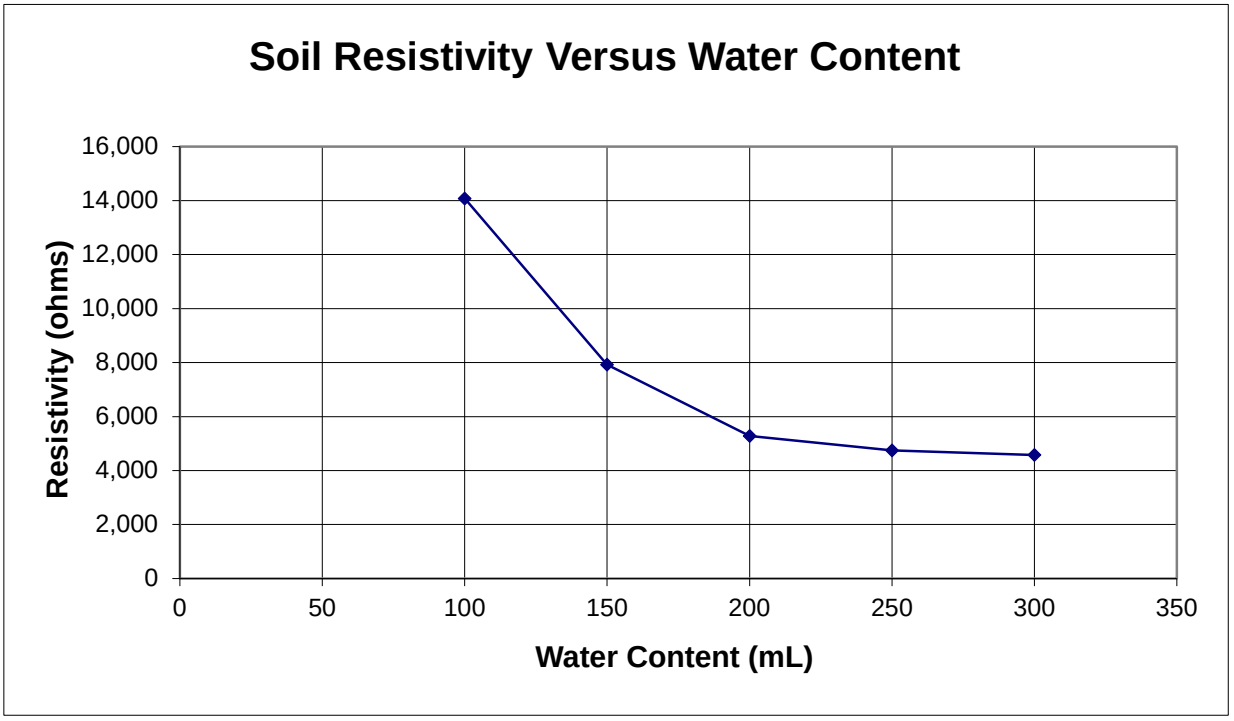
SAMPLE LOCATION: B-4

SAMPLE DEPTH: 5-10'

SOIL TYPE/DESCRIPTION: SAND, Fine to Medium Grained, Silty, Tannish Brown to Multicolored with gravel.

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	1.6	10^4	16,000	0.44	14,080
150	0.9	10^4	9,000	0.44	7,920
200	0.6	10^4	6,000	0.44	5,280
250	5.4	10^3	5,400	0.44	4,752
300	5.2	10^3	5,200	0.44	4,576

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.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

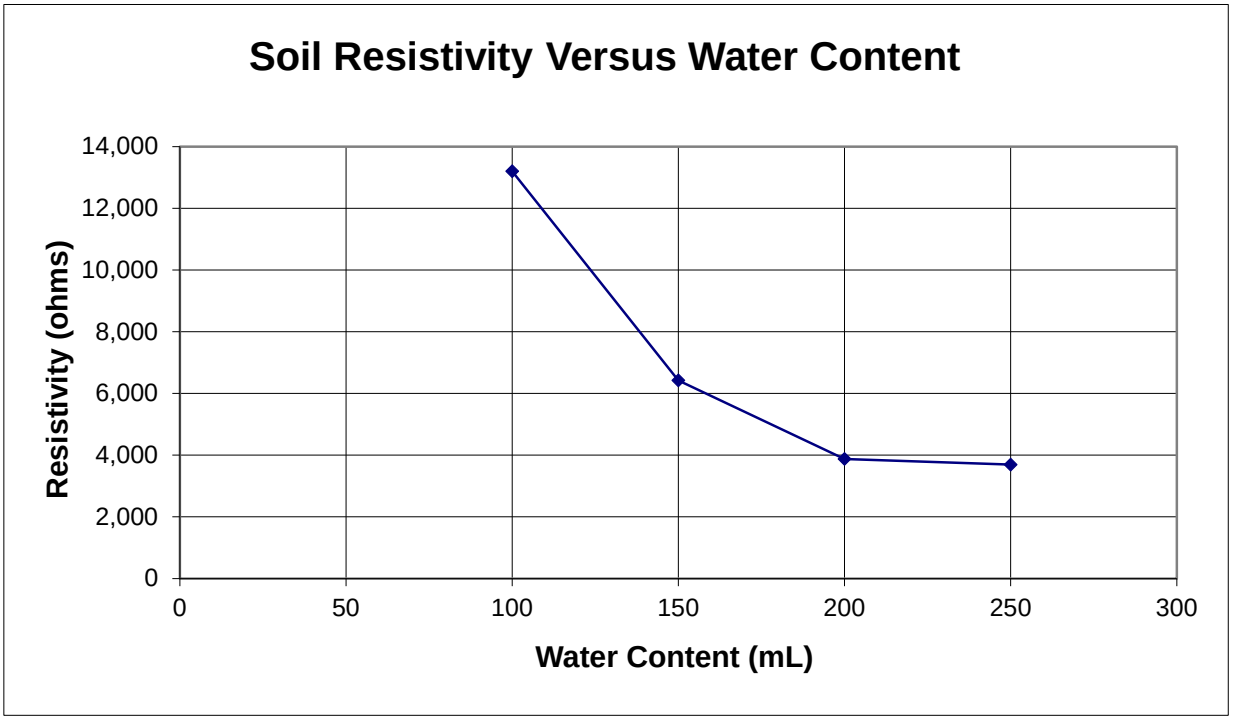
SAMPLE LOCATION: B-6

SAMPLE DEPTH: 5-10'

SOIL TYPE/DESCRIPTION: GRAVEL, Fine, Sandy, Well Graded, Grayish Brown to Tannish Brown with silt.

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	1.5	10^4	15,000	0.44	13,200
150	7.3	10^3	7,300	0.44	6,424
200	4.4	10^3	4,400	0.44	3,872
250	4.2	10^3	4,200	0.44	3,696

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.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

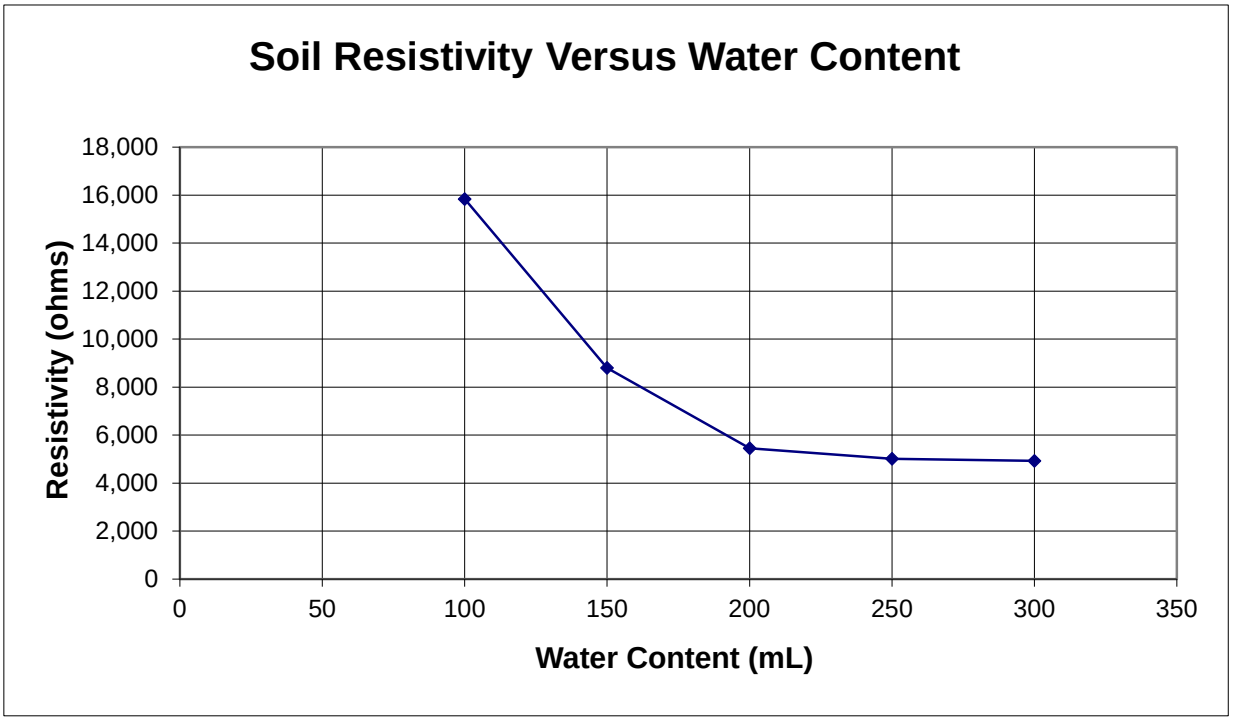
SAMPLE LOCATION: B-8

SAMPLE DEPTH: 5-10'

SOIL TYPE/DESCRIPTION: GRAVEL, Fine, Sandy, Well Graded, Grayish Brown to Tannish Brown with silt.

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	1.8	10^4	18,000	0.44	15,840
150	1.0	10^4	10,000	0.44	8,800
200	6.2	10^3	6,200	0.44	5,456
250	5.7	10^3	5,700	0.44	5,016
300	5.6	10^3	5,600	0.44	4,928

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.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

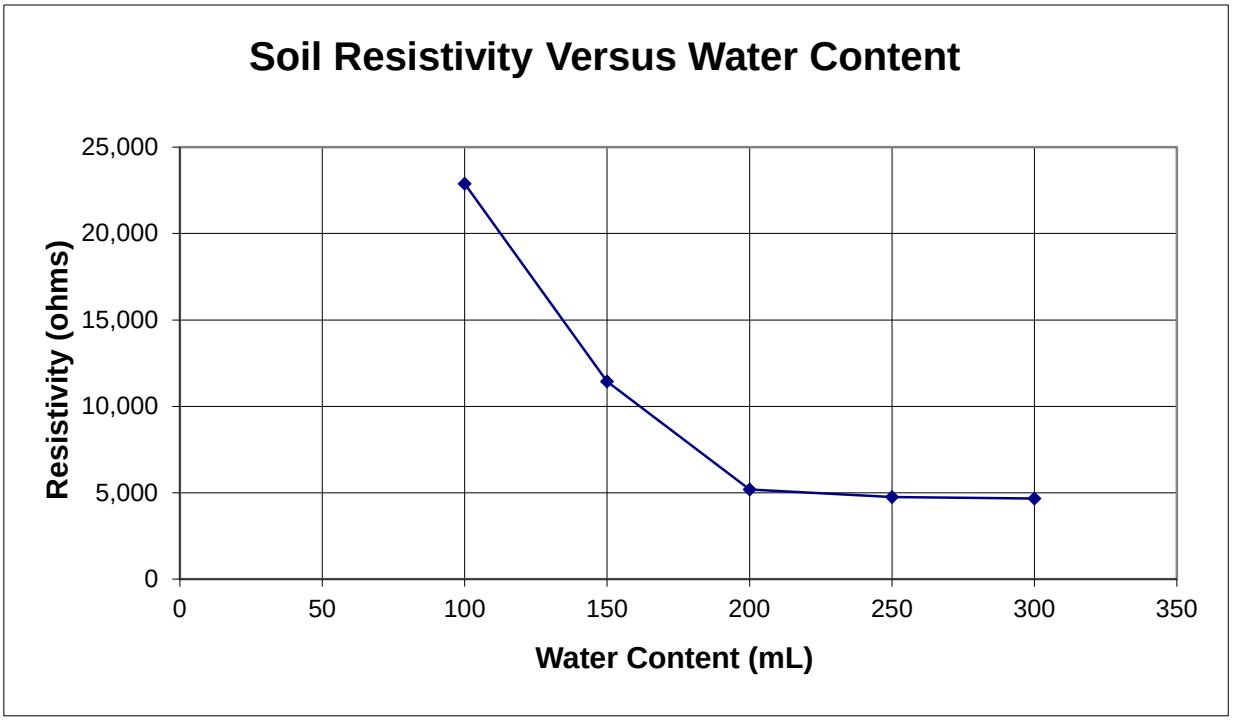
SAMPLE LOCATION: B-9

SAMPLE DEPTH: 5-10'

SOIL TYPE/DESCRIPTION: GRAVEL, Fine, Sandy, Silty, Grayish Brown to Tannish Brown.

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	2.6	10^4	26,000	0.44	22,880
150	1.3	10^4	13,000	0.44	11,440
200	5.9	10^3	5,900	0.44	5,192
250	5.4	10^3	5,400	0.44	4,752
300	5.3	10^3	5,300	0.44	4,664

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.: AGCQC20-010-03

PROJECT NAME: General Geotechnical Subsurface Soils Evaluation
El Paso Water - Pershing 16-inch Water Main Improvement Project
Happer Street
El Paso , El Paso County, Texas

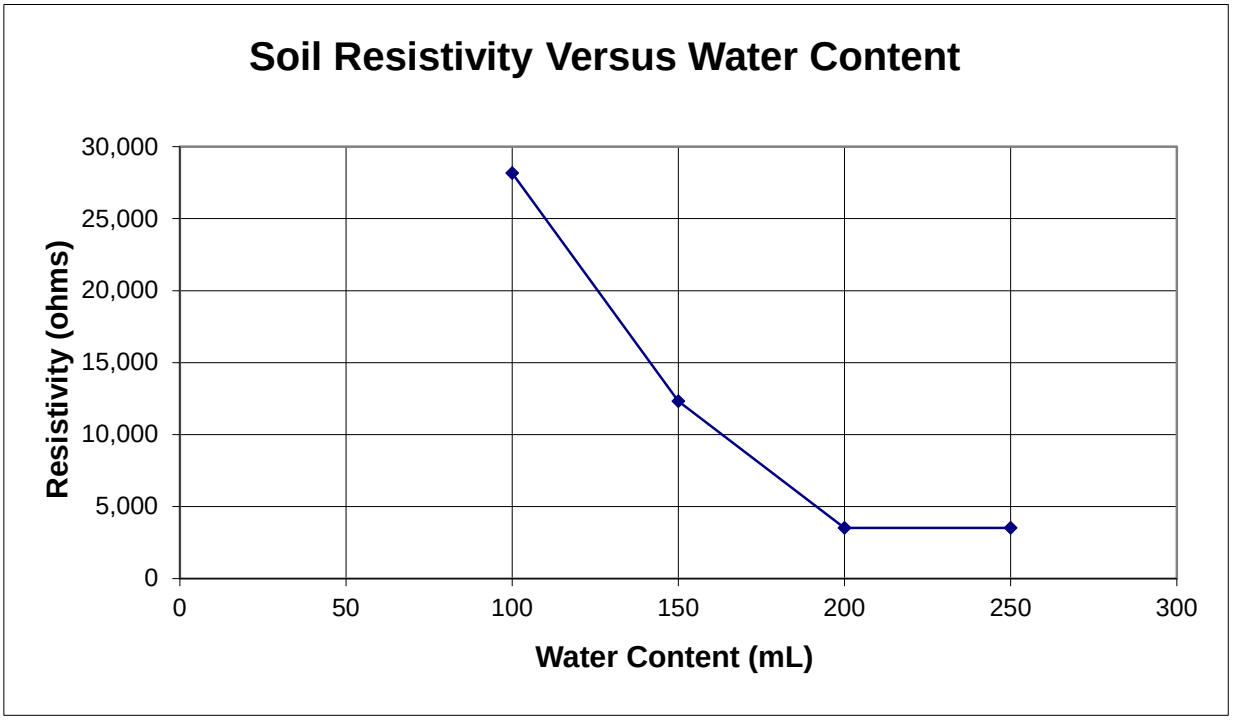
SAMPLE LOCATION: B-10

SAMPLE DEPTH: 5-10'

SOIL TYPE/DESCRIPTION: GRAVEL, Fine, Sandy, Clayey, Well Graded, Grayish Brown to Tannish Brown.

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	3.2	10^4	32,000	0.44	28,160
150	1.4	10^4	14,000	0.44	12,320
200	0.4	10^4	4,000	0.44	3,520
250	0.4	10^4	4,000	0.44	3,520

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

Tex-129-E / AASTHO T 288

PROJECT NAME: EPW - Pershing 16in. Water Main **PROJECT No.:** AGCQC20-010-03

CLIENT: El Paso Water

SAMPLE DATE: 1/24/2022 **SAMPLED BY:** PG

SOIL SAMPLE LOCATION B-11 5'-10'

SOIL TYPE/DESCRIPTION SAND, Fine to Medium Grained, Poorly Graded, Tannish Brown to Mu

Performed By and Date: MG **Calculated By and Date:** MG **Checked By and Date:** JLA

Box Type: TxDot / AASTHO

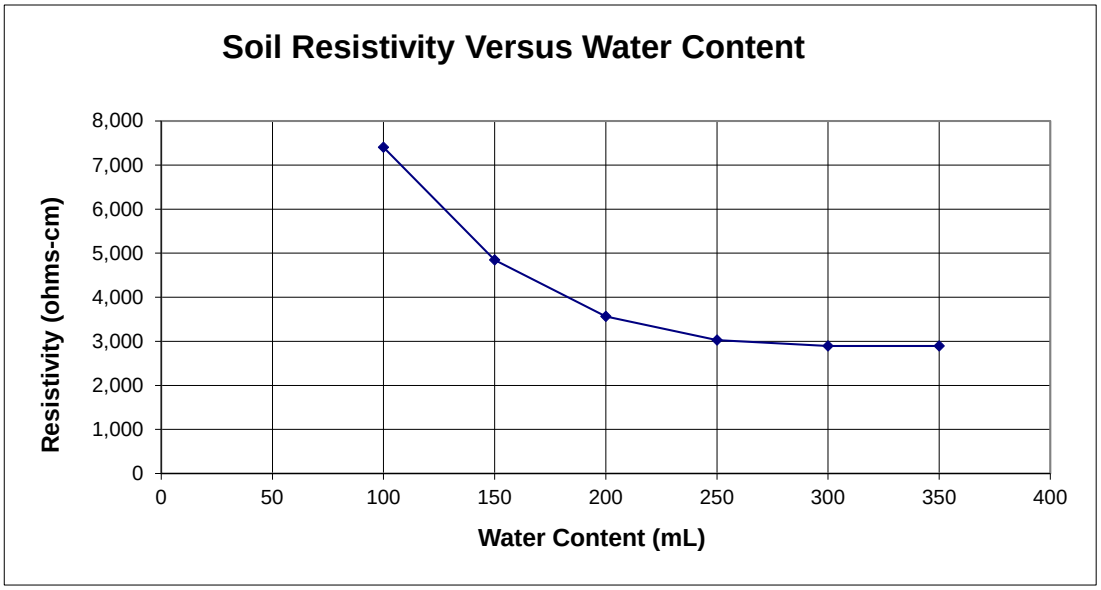
Soil Box Factor 6.73

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	1.1	10^3	1,100	6.73	7,403
150	7.2	10^2	720	6.73	4,846
200	5.3	10^2	530	6.73	3,567
250	4.5	10^2	450	6.73	3,029
300	4.3	10^2	430	6.73	2,894
350	4.3	10^2	430	6.73	2,894

Minimum Resistance Reading: 4.3

Resistivity (ohm-cm) = Box Factor X Minimum Resistance: 2,894

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E / AASTHO T-288 test procedure.



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

SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

Tex-129-E / AASTHO T 288

PROJECT NAME: EPW - Pershing 16in. Water Main **PROJECT No.:** AGCQC20-010-03.1

CLIENT: El Paso Water

SAMPLE DATE: 1/24/2022 **SAMPLED BY:** PG

SOIL SAMPLE LOCATION B-12 5'-10'

SOIL TYPE/DESCRIPTION GRAVEL, Fine, Sandy, Clayey, Tannish Brown and Grayish Brown.

Performed By and Date: MG **Calculated By and Date:** MG **Checked By and Date:** JLA

Box Type: TxDot / AASTHO

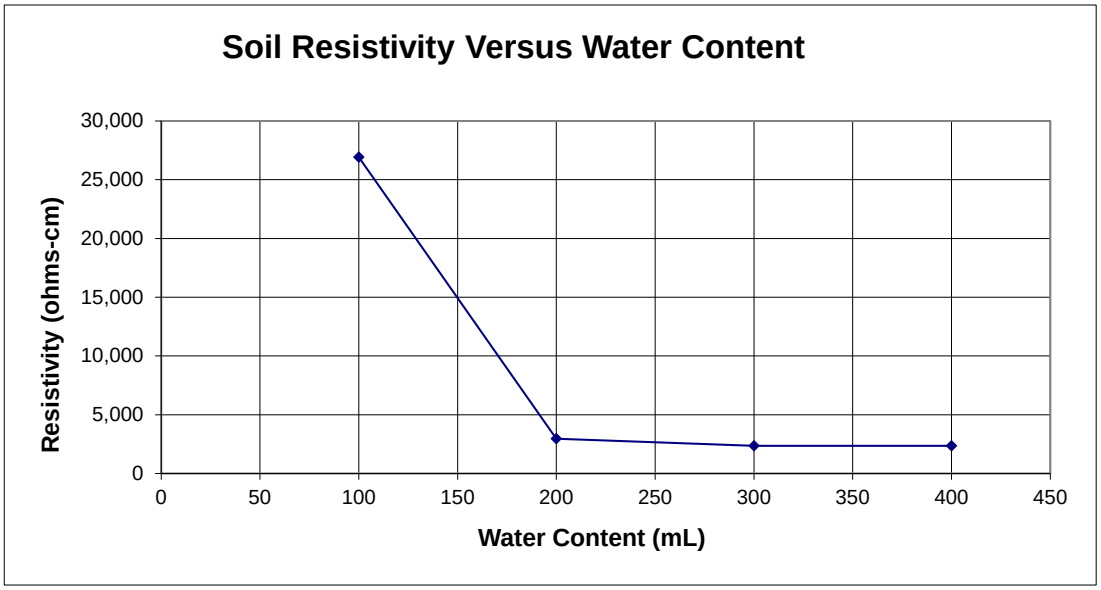
Soil Box Factor 6.73

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	4.0	10^3	4,000	6.73	26,920
200	4.4	10^2	440	6.73	2,961
300	3.5	10^2	350	6.73	2,356
400	3.5	10^2	350	6.73	2,356

Minimum Resistance Reading: 3.5

Resistivity (ohm-cm) = Box Factor X Minimum Resistance: 2,356

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E / AASTHO T-288 test procedure.



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

SOIL RESISTIVITY TEST RESULTS

MEASURING THE RESISTIVITY OF SOIL MATERIALS

Tex-129-E / AASTHO T 288

PROJECT NAME: EPW - Pershing 16in. Water Main **PROJECT No.:** AGCQC20-010-03.1

CLIENT: El Paso Water

SAMPLE DATE: 1/24/2022 **SAMPLED BY:** PG

SOIL SAMPLE LOCATION B-13 10'-15'

SOIL TYPE/DESCRIPTION GRAVEL, Fine, Sandy, Poorly Graded, Tannish Brown and Grayish Brown with clay

Performed By and Date: MG **Calculated By and Date:** MG **Checked By and Date:** JLA

Box Type: TxDot / AASTHO

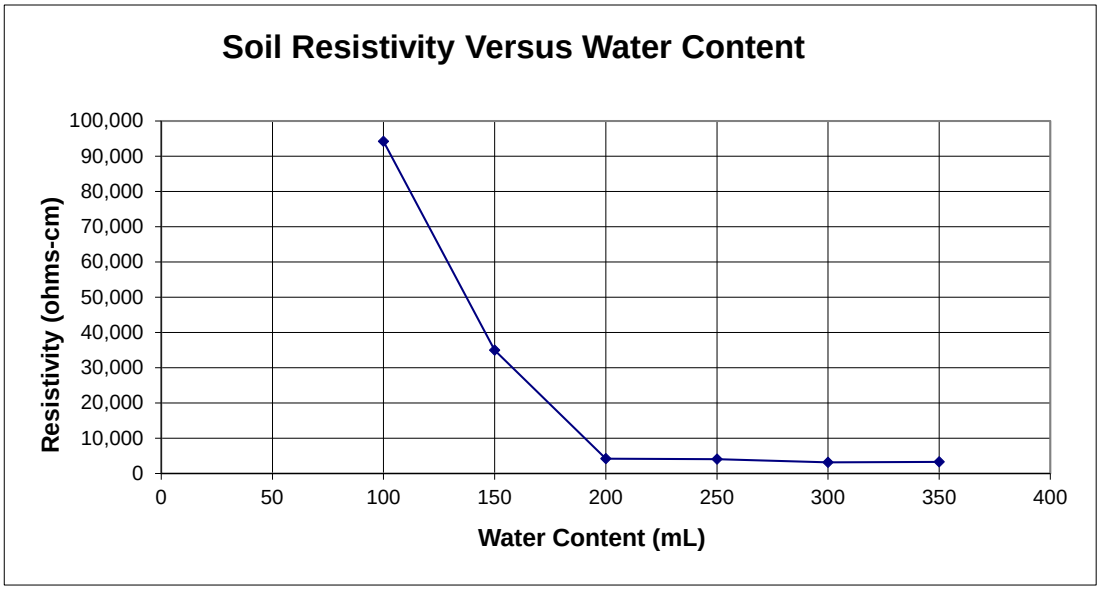
Soil Box Factor 6.73

Water Added (mL)	Dial Reading	Multiplier	Resistance (ohms)	Box Factor	Resistivity (ohms-cm)
100	1.4	10^4	14,000	6.73	94,220
150	5.2	10^3	5,200	6.73	34,996
200	6.2	10^2	620	6.73	4,173
250	6.0	10^2	600	6.73	4,038
300	4.7	10^2	470	6.73	3,163
350	4.9	10^2	490	6.73	3,298

Minimum Resistance Reading: 4.7

Resistivity (ohm-cm) = Box Factor X Minimum Resistance: 3,163

The approximate resistivity readings reported above are in accordance with TxDOT Designation: Tex-129-E / AASTHO T-288 test procedure.



APPENDIX B

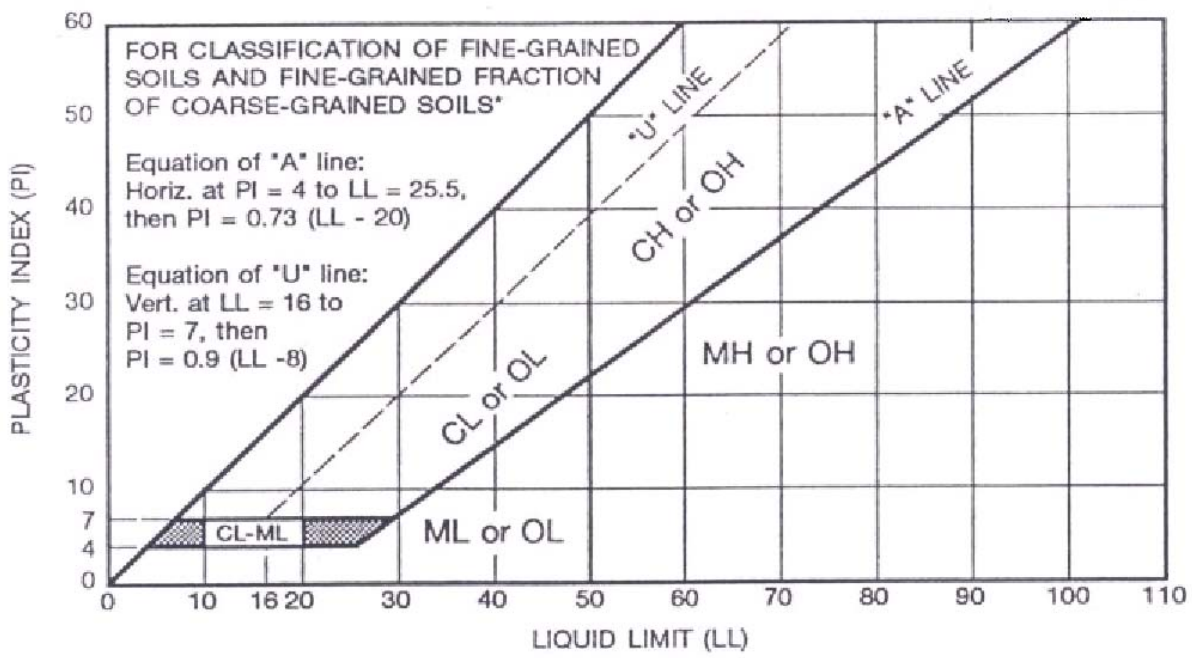
SOIL CLASSIFICATION CHART

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		4	10	40	200		
BO DERS	COBB ES	GRA E			SAND			SI T	C A
		COARSE	INE		COARSE	MEDI M	INE		
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. rom this data the moisture content is calculated.

Atterberg Limit Tests:

i uid imit ( ) Plastic imit (P) and Shrinkage imit (S) tests are performed to aid in the classification of soils and to determine the plasticity and volume change characteristics of the materials. The i uid imit is the minimum moisture content at which a soil will flow as a heavy viscous fluid. The Plastic imit is the minimum moisture content at which the soil behaves as a plastic material. The Shrinkage imit 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 i uid imit and the Plastic imit 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. or 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 si e particles while suspended in water.

APPENDIX C

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 1: General view of original pipeline route on Alta Street looking southeast.

PHOTO NO. 2: General view of original pipeline route on Bishop Way looking northeast.

PHOTO NO. 3: General view of original pipeline route on Bishop Way looking southwest.

PHOTO NO. 4: General view of original pipeline route on Bishop Way looking northeast.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 5: General view of original pipeline route on Stevens Street looking south.

PHOTO NO. 6: General view of original pipeline route on Stevens Street looking east.

PHOTO NO. 7: General view of original pipeline route on Happer Street looking southwest.

PHOTO NO. 8: General view of original pipeline route on Happer Street looking northeast.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 9: General view of original pipeline route on Happer Street looking southwest.

PHOTO NO. 10: General view of original pipeline route on Happer Street looking northeast.

PHOTO NO. 11: General view of original pipeline route on Happer Street looking southwest.

PHOTO NO. 12: General view of original pipeline route on Happer Street looking northeast.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 13: General view of original pipeline route on Happer Street looking southwest.

PHOTO NO. 14: General view of original pipeline route on Happer Street looking northeast.

PHOTO NO. 15: General view of original pipeline route on Happer Street looking southwest.

PHOTO NO. 16: General view of original pipeline route on Happer Street looking northeast.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 17: General view of original pipeline route on Sparkman Street looking south.

PHOTO NO. 18: General view of original pipeline route on Happer Street looking north.

PHOTO NO. 19: General view of original pipeline route on Happer Street looking south.

PHOTO NO. 20: General view of our subsurface soil drilling operations at vertical boring B-1.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 21: General view of our subsurface soil drilling operations at vertical boring B-2.

PHOTO NO. 22: General view of our subsurface soil drilling operations at vertical boring B-3.

PHOTO NO. 23: General view of our subsurface soil drilling operations at vertical boring B-5.

PHOTO NO. 24: General view of our subsurface soil drilling operations at vertical boring B-6.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 25: General view of our subsurface soil drilling operations at vertical boring B-7.

PHOTO NO. 26: General view of our subsurface soil drilling operations at vertical boring B-9.

PHOTO NO. 27: General view of gravelly soils encountered in vertical boring B-2.

PHOTO NO. 28: General view of gravelly soils encountered in vertical boring B-1.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 29: General view of gravelly soils encountered in vertical boring B-6.

PHOTO NO. 30: General view of gravelly soils encountered in vertical boring B-7.

PHOTO NO. 31: General view of gravelly soils encountered in vertical boring B-8.

PHOTO NO. 32: General view of gravelly soils encountered in vertical boring B-10.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 33: General view of our ground penetrating radar operations on Bishop way.

PHOTO NO. 34: General view of our ground penetrating radar operations on Cambridge Avenue.

PHOTO NO. 35: General view of our ground penetrating radar operations on Happer Street.

PHOTO NO. 36: General view of our utility locate operations on Happer Street.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 37: General view of site existing pavement conditions at vertical boring location B-11 looking north.

PHOTO NO. 38: General view of site existing pavement conditions at vertical boring location B-12 looking northeast.

PHOTO NO. 39: General view of site existing pavement conditions at vertical boring location B-13 looking north.

PHOTO NO. 40: General GPR utility locate activities at vertical boring B-11.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 41: General GPR utility locate activities at vertical boring B-12.

PHOTO NO. 42: General GPR utility locate activities at vertical boring B-13.

PHOTO NO. 43: General view of coring activities at vertical boring B-11.

PHOTO NO. 44: General view of coring activities at vertical boring B-12.

CLIENT: El Paso Water

PROJECT NAME: **EPW- Pershing 16-inch Water Main Improvements Project**
Various Locations
El Paso, El Paso County, Texas

PHOTO NO. 45: General view of subsurface drilling operations at vertical boring B-11.

PHOTO NO. 46: General view of subsurface drilling operations at vertical boring B-12.

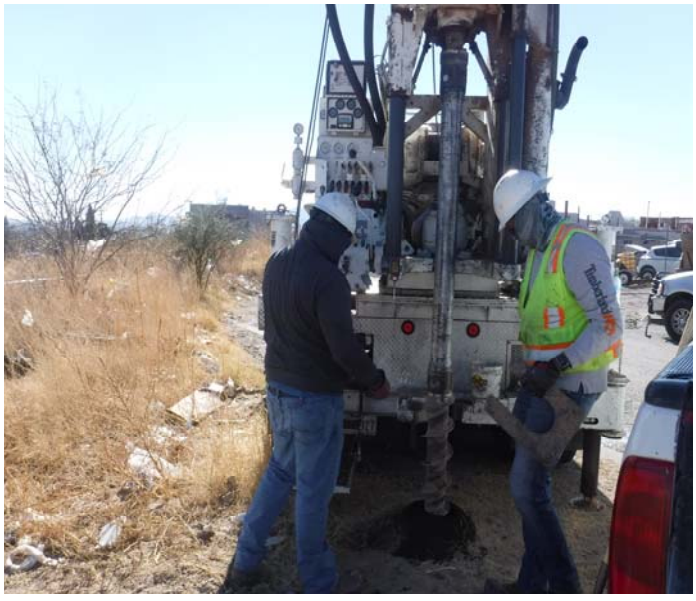


PHOTO NO. 47: General view of subsurface drilling operations at vertical boring B-13.

PHOTO NO. 48: General view of gravelly soils encountered in vertical boring B-13.

CQC TESTING AND ENGINEERING, L.L.C.
TBPE FIRM REGISTRATION NO. F-10632
4606 TITANIC AVE.
EL PASO, TEXAS 79904
PH.: (915-771-7766
FX.: (915) 771-7786