CITY OF SAN JUAN
LIFT STATION No. 6 RELOCATION PROJECT
RFB NO. 25-005-04-09

ADDENDUM NO. 3

Addendum Date: April 7, 2025

Notice to Bidders:

The Request for Bid (RFB) is modified as set forth in this Addendum. The Original RFB documents and any previously issued Addenda remain in effect. This addendum will be part of the contract documents and shall be included with Bid submittal. Non-receipt of addendum by bidder under no circumstances relieves bidder of obligation of compliance with the terms and conditions stated in the addendum.

Bid Opening Receipt Date:

The pre-bid date has been changed from April 9, 2025, to **April 16, 2025**. The time and location remain unchanged.

Revision To The RFB: Specifications

1. Section 00300: Remove and Replace Entire Section.
   a. Revision to Table 1 Revised Bid Item No. 19 – *Self Priming Pump (4) four, with discharge pipe and support; complete in place.*
   b. Revision to Table 1 Revised Bid Item No. 24 – *VFD's installation for Self Priming Pump*
   c. Table 2 Alternative Bid Items added to Section 00300.

Questions:

1. What is the Engineering Estimate on this project?
   The Engineering Estimate is $3,449,100.00.
2. The Specifications call out a voltage of 280 volts, 3 phase. Can you please confirm that it should be 480/3 phase?
   Yes, Biofilter is 480 volts / 3 phase.
3. Can you provide a Geotechnical Report for the Project Area?
   Geotechnical report is provided at the end of the solicitation document.

Acknowledgement by Respondent:

Respondents shall acknowledge receipt of this Addendum No. 3. Submit Completed Addendum with Statement of Bid. Failure to acknowledge receipt of this addendum may render your bid "Incomplete".

Trimad Consultants, L.L.C.
Texas Firm No. 18526

Signature of Respondent

Date

END OF ADDENDUM

SECTION 00300
BID PROPOSAL FORM

CITY OF SAN JUAN
LIFT STATION NO.6 RELOCATION PROJECT
PROJECT NO. 25-005-04-09

BID OPENING: APRIL 16, 2025 AT 3:00, P.M.

TO: OWNER (CITY OF SAN JUAN)

The undersigned, as bidders, declares that the only person or parties interested in this proposal as principals are those named herein, that this proposal is made without collusion with any other person, firm or corporation; that he has carefully examined the form of contract, Notice of Contractors, specifications and plans thereon referred to, and has carefully examined the plans, specifications, locations, and conditions and classes of materials of the proposed work; and agrees that he will provide all the necessary labor, machinery, tools, and apparatus, and other incidental to construction, and will do all the work and furnish all the materials called for in the contract and specifications in the manner prescribed therein and according to the requirements of the Engineer/Architect as therein set forth.

It is further agreed that quantities of work to done at unit prices and materials to be furnished may be increased or diminished as may be considered necessary, in the opinion of the Engineer, to complete the contemplated, and that quantities of work, whether increased or decreased are to be performed at the unit price set forth below or as provided in the Specifications.

It is further agreed that the lump sum prices may be increased to cover additional work ordered by the Engineer and approved by the Owner, but not shown on the Plans or required by the Specifications, in accordance with the provisions of the General Conditions. Similarly, they may be decreased to cover deletion of work so ordered.

It is understood that the Owner reserves the right to reject any and all bids.

Bidders are revised that Formal Sealed Bids are to be submitted at the Purchasing Department of San Juan City Hall. As previously instructed via Invitation, Notice to Bidders, Instructions to Bidders, and at the Pre-Bid Conference, Bidders can go online to the City of San Juan web site address: www.sjtx.us to download any and all related project documents, or may contain copies of same by contacting the office of Lori A. Maldonado, Purchasing Agent. Located at 709 S. Nebraska Avenue., San Juan, Texas 78589 or by calling (956) 223-2204 or by emailing your request to lmaldonado@sjtx.us. Kindly submit your **Bid** Submittal to the Purchasing Department of San Juan City Hall on or before the Bid Opening date and time.

Accompanying this proposal is a five (5) percent (%) of the bid price by certified check, or cashier's check or bid bond payable to the City of San Juan.

BID PROPOSAL

The bid security accompanying shall be returned to the bidder, unless in case of the acceptance of the proposal, the bidder shall fail to execute a Contract and file a performance and payment bond within ten (10) days after its acceptance, in which case the bid security shall become the property of the City of San Juan and shall be considered as payment for damages due to delay and other inconveniences suffered by the OWNER on account of such failure of the bidder.

ENGINEER'S/ARCHITECT ESTIMATE OF QUANTITIES – APPROXIMATELY ONLY

Bidder agrees to perform all work described in the specifications and shown on the plans, for the following prices:

TABLE 1 BID ITEMS:

ITEM NO.	SECTION NO.	ITEM DESCRIPTION	UNIT	UNIT QTY	UNIT PRICE	TOTAL
1	02233	Clearing and Grubbing	LS	1		
2	01745	Site Restoration	LS	1		
3	01574, 01577	Erosion and Sedimentation Control	LS	1		
4	01578	Ground and Surface Water Control	LS	1		
5	01561	Trench Excavation Safety Protection (4' to 8')	LF	102		
6	01561	Trench Excavation Safety Protection (12' to 16')	LF	1162		
7	01561	Trench Excavation Safety Protection (20' to 24')	LF	1509		
8	02509	24-Inch PVC (SDR 26) Gravity Sanitary Sewer Line (12' to 14'), complete in place	LF	862		
9	02509	24-Inch PVC (SDR 26) Gravity Sanitary Sewer Line (14' to 16'), complete in place	LF	300		
10	02509	24-Inch PVC (SDR 26) Gravity Sanitary Sewer Line (20' to 22'), complete in place	LF	1509		
11	02082	48-Inch Dia. Sanitary Sewer Manholes (8' to 12'), complete in place	EA	1		
12	02082	48-Inch Dia. Sanitary Sewer Manholes (12' to 16'), complete in place	EA	2		
13	02082	48-Inch Dia. Sanitary Sewer Manholes (20' to 22'), complete in place	EA	3		

14	02082	60-Inch Dia. Drop Sanitary Sewer Manholes (18’ to 22’), complete in place	EA	2		
15	02082	Tie to Existing Manhole, complete in place	EA	1		
16		24-Inch Cap, complete in place	EA	1		
17		12-Inch Cap, complete in place	EA	1		
18		Installation of a new lift station. Lift Station to a depth of as per Plans and Specifications, power pole and electrical service, yellowmine discharge pipe and certalok plastic fittings to install yellowmine discharge pipe in wetwell, control panels, generator plug; 8' fencing and two (2) 12' wide galvanized gates per plans and specifications, fiberglass 19'-9"' diameter wetwell with all penetrations made during manufacturing; with approved analog telemetry and service for 3 years transferable to the City of San Juan, electrical power (3-Phase) 480V and all panels (stainless) and racks; generator plug; safety hatches per pump manufacturer and per plans and specifications, steel pipe manifold with protective coatings and paint and air release valves, gate valves, ductile iron force main and fittings, gauges, as per plans and specifications; by pass pumping and dewatering included; any and all startup requirements for power, water, disposal, trucking to be included in pricing, complete in place	LS	1		
19		Self Priming Pumps (4) four, with discharge pipe and supports; complete in place. • Gorman Rupp <u>Alternates:</u> • Sulzer • Xylem • Atlas Copco	EA	4	_____ <u>Alternate:</u> _____ _____ _____	_____ <u>Alternate:</u> _____ _____ _____

		**Contractor to put price to the corresponding pump selection.*				
20		Provide and install Biotrickling Odor Control System and all necessary components as per plans and specifications; including all labor, materials, and incidentals in order to construction and install fully operational odor control system; and items not on plans or specifications for fully operational system; complete in place.	LS	1		
21		Bypass pumping Lift Station, Receiving Manhole; and Sewer Line; Complete in Place. Owner has the option to delete this item if the Engineer determines this item is not needed; by submitting this bid the Contractor agrees to the deduction.	LS	1		
22		Dewatering for Project utilizing Pumps and Temporary Wellpoints; obtaining of all permits; all use of water, et. al.	LS	1		
23		Installation of Pump Vault; constructed of concrete and steel rebar as per plans and specifications; complete in place.	LS	1		
24		VFD's installation for Self Priming Pump • Gorman Rupp <u>Alternates:</u> • Sulzer • Xylem • Atlas Copco **Contractor to put price to the corresponding VFD selection.*	EA	3	_____ <u>Alternate:</u> _____ _____ _____	_____ <u>Alternate:</u> _____ _____ _____
25	02509	12-Inch PVC (C-900) Force Main, complete in place	LF	102		
26		Bore & 24-Inch Steel Casing, complete in place	LF	30		
27	02509	12-Inch 45 Degree Elbow, complete in place	EA	2		
28	05105	2-Inch Air Release Valve, complete in place	EA	1		

29	02745	Hot Mix Asphalt (2-Inch), complete in place	SY	70		
30	02717	8-Inch Flex Base, complete in place	SY	70		
31		8-Inch Subgrade Lime Stabilized, complete in place	SY	70		
32	01555	Traffic Control, complete in place	LS	1		
33	01020	Mobilization and Demobilization	LS	1		

ITEM NO.	SECTION NO.	ITEM DESCRIPTION	UNIT	UNIT QTY	UNIT PRICE	TOTAL
ALLOWANCES						
34		Betterment	ALW	1	$250,000	$250,000

BID ITEMS (1-34) – BASE BID: $_____ (IN FIGURES)

SUMMARY BID TABULATION

TABLE 1 – BID ITEMS 1-34

TOTAL AMOUNT OF BID (ITEMS 1-34) $_____

TOTAL AMOUNT OF BID (ITEMS 1-34 WRITTEN): _____

_____

TABLE 2 ALTERNATIVE BID ITEMS:

ITEM NO.	SECTION NO.	ITEM DESCRIPTION	UNIT	UNIT QTY	UNIT PRICE	TOTAL
1		Installation of Atlas Copco PAC F66 Diesel Self Priming Backup Pump with all fittings, full tank of diesel; startup; manuals, 3 year warranty, complete in place.	LS	1		
2		Provide and install Overhead Bridge Crane; 2-Ton Capacity; utilizing steel construction with paint for corrosive use as per manufacturer; including 2 trolleys; electric lift with cables (SS); cable controls; panels, electrical components, footings, anchors, all labor for installation; fully functional for 4 pumps; including items not	LS	1		

		mentioned for fully functional system; complete in place.				

ALTERNATIVE BID ITEMS (1-2) – BASE BID: $_____ (IN FIGURES)

SUMMARY BID TABULATION

TABLE 2 – ALTERNATIVE BID ITEMS 1-2

TOTAL AMOUNT OF BID (ITEMS 1-2) $_____

TOTAL AMOUNT OF BID (ITEMS 1-2 WRITTEN): _____

_____

In the event of the award of a Contract to the undersigned, the undersigned will furnish a performance and payment bond for the full amount of the Contract, to secure proper compliance with the terms and provisions of the Contract, to insure and guarantee payment of all lawful claims for performed labor performed and materials furnished in the fulfillment of this Contract. The proposed work to be done shall be accepted when fully completed and finished in accordance with the Plan and Specifications to the satisfaction of the Engineer.

The undersigned certifies that the bid prices contained in this Proposal have been carefully checked and are submitted as correct and final.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of ninety (90) days after the scheduled closing for receiving bids.

Unit and lump sum prices must be shown in figures for each item listed in the Bid Proposal form. Should bid prices on any item be omitted, the right is reserved to apply to the lowest prices submitted by and other bidders for the omitted items in payment for work done under this Proposal. In the event of discrepancies, the Owner reserves the right to accept or reject formalities.

The undersigned agrees, unless hereinafter stated otherwise to furnish all materials as shown on the Specification and Detail sheets.

Bidder hereby agrees to commence work under this contract within **ten (10) days** after the Notice to Proceed is issued and complete work within **five hundred and forty-eight (548) Calendar Days.**

Receipt is hereby acknowledged of the following agenda to the Contract Document.

Addendum No. 1 dated: _____ Received: _____

Addendum No. 2 dated: _____ Received: _____

Addendum No. 3 dated: _____ Received: _____

Addendum No. 4 dated: _____ Received: _____

Addendum No. 5 dated: _____ Received: _____

Bidder agrees that the Owner has the right to accept or reject any or all bids to waive any or all formalities.

Date:_____

Respectfully submitted:

_____

Authorized Signor:

_____

Type/Print Name (Authorized Signor):

_____

Title:

_____

Legal Company Name:

_____

Address:

_____

City, State and Zip Code:

_____

Business Phone:

_____

Cell Number:

_____

(Seal – If bidder is a corporation)

Email Address:

_____

MEG GEOTECHNICAL ENGINEERING REPORT

PROPOSED
LIFT STATION NO. 6

SAN JUAN, HIDALGO COUNTY, TEXAS

Geotechnical Engineering • Construction Materials Engineering & Testing
Environmental • Consulting • Forensics

GEOTECHNICAL ENGINEERING REPORT
FOUNDATION RECOMMENDATIONS
PROPOSED LIFT STATION NO. 6
SAN JUAN, HIDALGO COUNTY, TEXAS

Prepared For
Ricardo Salazar
TRIMAD Consultants

MEG Report No. 01-23-29179

February 7, 2024

MILLENNIUM ENGINEERS GROUP, INC.
TBPE FIRM NO. F-3913
5804 N. GUMWOOD AVENUE
PHARR, TEXAS 78577
TEL:956-702-8500
FAX:956-702-8140
WWW.MEGENGINEERS.COM

February 7, 2024

Ricardo Salazar
TRIMAD Consultants, Inc.
1803 Mozelle Street
Pharr, TX 78577
(956)497-5355
rsalazar@trimadstx.com

Subject: **Geotechnical Engineering Report**
MEG Report No. 01-23-29179
Foundation Recommendations
Proposed Lift Station No. 6
San Juan, Hidalgo County, Texas

Dear Mr. Salazar (CLIENT):

Millennium Engineers Group, Inc. is pleased to submit the enclosed geotechnical engineering report that was prepared for the above subject project. This report addresses the procedures and findings of our geotechnical engineering study. Our recommendations should be incorporated into the design and construction documents for the proposed development.

We want to emphasize the importance that all our recommendations presented in this report and/or addendums to this report be followed. We look forward to continuing our involvement in the project by providing construction monitoring in accordance with the report recommendations and materials testing services during construction. We strongly recommend that we be a part of the preconstruction meeting to address any specific issues that are pertinent to this project.

Thank you for the opportunity to be of service to you in this phase of the project and we would like the opportunity to assist you in the upcoming phases of the project. If you have any questions, please contact our office at the address, telephone, fax or electronic address listed below.

Cordially,
Millennium Engineers Group, Inc.
TBPE Firm No. F-3913

Amos Emerson, P.E.
Geotechnical Engineering Manager

Quyet Thang Pham, Ph.D., P.E.
Geotechnical Engineer

The seal appearing on this document was authorized Quyet Thang Pham, P.E. 131836 on February 7, 2024. Alteration of a sealed document without proper notification to the responsible engineer is an offence under the Texas Engineering Practice Act

Cc: 1 Original and PDF Document

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APPENDIX

1.0 INTRODUCTION

Millennium Engineers Group, Inc. (MEG) has completed and is pleased to submit this document that presents our findings as a result of a geotechnical engineering study of this project to our client. The project site is located approximately 1300 feet north of the intersection between Cesar Chavez Road and E Farm to Market Road and the project site being on the north side of Cesar Chavez Road in San Juan, Hidalgo County, Texas. The project location is shown on the Project Location Map, found in the Appendix section of this report. This report briefly describes the procedures utilized during this study and presents our findings along with our recommendation, for foundation design and construction considerations.

Our scope of services for the project was outlined in MEG proposal No. 01-23-216GR, dated November 03, 2023 and approved by Ricardo Salazar, P.E. on November 14, 2023.

2.0 PROJECT DESCRIPTION

It is our understanding that the proposed site will accommodate for lift station improvements. It is also our understanding that the proposed development will consist of a new lift station structure. The site construction for the proposed structure is anticipated to be on a slab-on-grade or on-fill foundation provided expansive, soil-related movements will not impair the performance of the structure.

3.0 SCOPE AND LIMITATIONS OF STUDY

This engineering report has been prepared in accordance with accepted geotechnical engineering practices currently exercised by geotechnical engineers in this area. No warranty, expressed or implied, is made or intended. This report is intended for the exclusive use by the client and client's authorized project team for use in preparing design and construction documents for this project only. This report may only be reproduced in its entirety for inclusion in construction documents. This report in its entirety shall not be reproduced or used for any other purposes without the written consent of our firm. This report may not contain sufficient information for purposes of other parties or other uses and is not intended for use in determining construction means and methods.

The recommendations presented in this report are based on data obtained from the soil borings drilled at this site and our understanding of the project information provided to us by our client and other project team members, and the assumption that site grading will result in only minor changes in the existing topography. Subsurface soil conditions have been observed and interpreted at the boring locations only.

This report may not reflect the actual variations of the subsurface conditions across the subject site. It is important to understand that variations may occur due to real geologic conditions or previous uses of the site. The nature and extent of variations across the subject site may not become evident until specific design locations are identified and/or construction commences. The construction process itself may also alter subsurface conditions. If variations appear evident at the time during the design phase and/or

construction phase, we should be notified immediately to determine if our opinions, conclusions and recommendations need to be reevaluated. It may be necessary to perform additional field and laboratory tests and engineering analyses to establish the engineering impact of such variations. These services are additional and are not a part of our project scope.

The engineering report was conducted for the proposed project site described in this report. The conclusions and recommendations contained in this report are not valid for any other project sites. If the project information described in this report is incorrect, is altered, or if new information becomes available, we should be retained to review and modify our recommendations. These services are additional and are not a part of our project scope.

Our scope of services was limited to the proposed work described in this report, and did not address other items or areas. The scope of our geotechnical engineering study does not include environmental assessment of the air, soil, rock or water conditions on or adjacent to the site. No environmental opinions are presented in this report. If the client is concerned with environmental risk at this project site, the client should perform an environmental site assessment.

If final grade elevations are significantly different from existing grades at the time of our field activities (more than plus or minus one (1) foot), our office should be informed about these changes. If desired, we will reexamine our analyses and make supplemental recommendations.

4.0 FIELD EXPLORATION PROCEDURES

Subsurface conditions at the subject site were evaluated by one (1) 40-foot soil boring. The Borings were drilled at the locations shown on the Borings Location Map, found in the Appendix section of this report. This location is approximate and distances were measured using a measuring wheel, tape, angles, and/or pacing from existing references. The structural soil borings were drilled in general accordance with American Society of Testing Materials (ASTM) D 420 procedures.

As part of our sampling procedures, the samples were collected in general conformance with ASTM D 1586 procedures. Representative portions of the samples were sealed in containers to reduce moisture loss, identified, packaged, and transported to our laboratory for subsequent testing. In the laboratory, each sample was evaluated and visually classified by a member of our Geotechnical Engineering staff. The geotechnical engineering properties of the strata were evaluated by a series of laboratory tests. The results of the laboratory and field-testing are tabulated on the boring logs and Summary of Soil Sample Analyses which are found in the Attachments section of this report.

Standard penetration test results are noted on the boring logs as blows per 12 inches of penetration. Two 6 inch increments are performed for each standard penetration test. The sum of the blows for the two 6 inch increments is considered the “standard penetration resistance value” or “N-value.” Where hard or very dense materials were

encountered, the tests are terminated as follows: (1) when a total of 50 blows have been applied in any of the 6 inch increments, or (2) when a total of 100 blows have been applied, or (3) when there is no observed advance of the sampler in the application of 10 successive blows. The boring logs in the case of hard or very dense materials will be noted as follows: 50/3", where 50 is the number of blows applied in 3 inches of penetration, or 100/7½" where 100 is the number of blows applied in a total of 7 ½ inches of penetration, or 10/0", where 10 is the number of blows applied in 0 inches of penetration.

Samples will be retained in our laboratory for 30 days after submittal of this report. Other arrangements may be provided at the request of the Client.

5.0 GENERAL SITE CONDITIONS

5.1 Site Description

The project site is located approximately 1300 feet north of the intersection between Cesar Chavez Road and E Farm to Market Road and the project site being on the north side of Cesar Chavez Road in San Juan, Hidalgo County, Texas. The project location is shown on the Project Location Map, found in the Appendix section of this report. At the time of our field operations, the subject site can be described as an undeveloped tract of land. The general topography of the site is relatively flat sloping down to the east with a visually estimated vertical relief of less than 2 feet. Surface drainage is visually estimated to be poor to fair.

5.2 Site Geology

According to the Soil Survey of Hidalgo County, Texas, published by the United States Department of Agriculture – Soil Conservation Service, the project site appears to be located within the Hidalgo soil association.

- The Hidalgo series consist of deep, well drained, loamy soils and nearly level soils that are on convex uplands. These soils formed in calcareous loamy and clayey sediments. This soil is well drained, surface runoff is slow and permeability is moderate. The hazards of water erosion and soil blowing are slight. Slopes range from 0 to 5 percent. Areas are mostly broad and irregular in shape and range from 25 to more than 900 acres or more. The corresponding soil symbol is 28, Hidalgo sandy clay loam.

5.3 Subsurface Conditions

On the basis of our borings, two (2) generalized strata that possess similar physical and engineering characteristics can describe the subsurface stratigraphy at this site. Table 5.1 summarizes the approximate strata range in our boring logs. These were prepared by visual classification and were aided by laboratory analyses of selected soil samples. The lines designating the interfaces between strata on the boring logs represent

approximate boundaries. Transitions between strata may be gradual details for each of the borings can be found on the boring logs in the appendix of this report.

Table 5.1. Approximate Subsurface Stratigraphy Depths.

Stratum	Range in Depth, ft[1]	Stratum Description[1]
I	0 – 20	sandy lean CLAY to lean CLAY w/ sand, brown, moist to wet, medium stiff to stiff
II	20 – 40	clayey SAND, brown, wet, loose to dense

Note 1: The stratum thickness and depths to strata interfaces are approximate. Our measurements are rounded off to the nearest foot increment and are referenced from ground surface at the time of our drilling activities. Subsurface conditions may vary between the boring locations.

5.4 Groundwater Conditions

The dry auger drilling technique was used to complete the soil borings in an attempt to observe the presence of subsurface water. During our drilling operations we encountered the groundwater table to be at approximately twenty-three (23) feet below natural ground elevation for short term conditions. Moisture content test exhibited high moisture content at a depth of eight (8) feet below natural ground elevation. Table 5.2 summarizes the approximate groundwater and cave in depths measured in our explorations. It should be noted that the groundwater level measurements recorded are accurate only for the specific dates on which measurement were obtained and does not show fluctuations throughout the year.

Fluctuations in Groundwater levels are influenced by variations in rainfall and surface water run-off from season to season. The construction process itself may also cause variations in the groundwater level. If the subsurface water elevation is critical to the construction process the contractor should check the subsurface water conditions just prior to construction excavation activities.

Table 5.2. Approximate Groundwater and Cave-in Depths.

Boring No.	Depth to Subsurface Water, Ft[1]	Depth of Cave-In, Ft[1]
	Time of Drilling	Time of Drilling
B-1	23	22

Note 1: Subsurface water levels and cave-in depths have been rounded to the nearest foot.

Based on the findings in our borings and on our experience in this region, we believe that groundwater seepage will be encountered during site earthwork activities. If groundwater seepage is encountered during site earthwork activities, it may be controlled using temporary earthen berms and/or conventional sump-and-pump dewatering methods.

6.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

6.1 General

The analysis and recommendations presented in this report are applicable specifically to the proposed foundation structure. The data gathered from both the field and laboratory testing programs on soil samples obtained from the borings was utilized to establish geotechnical engineering parameters to develop recommendations for the proposed structure. The foundation system(s) considered in this report to provide support for the proposed structure must meet two independent criteria. One of the criteria is that the movement below the foundation structure due to compression (consolidation) or expansion (swell) of the underlying soils must be within tolerable limits. This criterion is addressed in the Soil Related Movements section of this report. The other criterion is that the dead and live loads must be distributed appropriately and the foundation structure designed with an acceptable factor of safety to minimize the potential for bearing capacity failure of the underlying soils.

Geotechnical and structural engineers in this general area consider soil movements or Potential Vertical Rise (PVR) of approximately one (1) inch or less to be within acceptable structural design tolerances for most structures but may be different depending on structure use and the desired performance of the foundation. Therefore, movements of the underlying soils are not eliminated and thus one should expect a slab foundation structure to exhibit differential vertical movements. However, structural engineers design slab foundations for the expected magnitude of soil movements without failure of the structure. More stringent soil movement criteria may be established but the owner should consider the exponential increase in cost required to design and construct a structure for such soil movements. Data obtained in this study indicate that the soils at this site have strength characteristics capable of supporting the foundation and structure if designed appropriately. Stratum I is composed of fat clay and has a high potential to exhibit volumetric changes (contraction and expansion). Stratum II is composed of sandy lean clay to clayey sand and has a low potential to exhibit volumetric changes. The potential for soil volumetric changes is dependent on variations in moisture contents of the underlying soils. Based on this data, this site is suitable for a slab foundation provided the subgrade is modified in accordance with the recommendations established in this report to reduce the potential for these soil volumetric changes.

6.2 Soil-Related Movements

The anticipated ground movements due to swelling of the underlying soils at this site were estimated for slab foundation construction using the Texas Department of Transportation (TxDOT) procedures of test method TEX-124-E for determining Potential Vertical Rise (PVR). A PVR value of one and a half (1 ½) inches was estimated for the stratigraphic conditions encountered in our subsurface borings. A surcharge of 1 pound per square inch for the concrete slab, an active zone of 15 feet, and dry subsurface moisture conditions were assumed in estimating the above PVR values.

The following methods are generally acceptable for use in modifying the subgrade to reduce the potential for soil movements and volumetric changes below the foundation structure.

Excavate expansive clay soils and replace with select fill.
Chemical injection of expansive clay soils.
A combination of methods 1 and 2.

The method to be used is dependent on specific site conditions. At this site the grade will most likely need to be raised to obtain the proposed Finished Floor Elevation (FFE). As of the date of this report the CLIENT/OWNER has provided the proposed FFE to be at 103.30 feet AMSL elevation. We recommend that the project civil engineer evaluate the proposed FFE with our recommendations to ensure that the subgrade modifications presented in the report are not diminished or compromised. Adding select fill is generally the most cost effective method for reducing the potential for soil related movements. Therefore, we only discuss this method in this report but we can provide details for the other methods if requested.

Based on the data obtained, the proposed FFE of 103.30 feet AMSL elevation, approximate natural ground elevation of 101.00 feet AMSL elevation, information provided by our client and our analysis of the site, we recommend the following modification (Table 6.1. Subgrade Modifications) of the subgrade at this area to accomplished finish floor elevation of the subgrade at this site. This method will maintain the potential for soil related movements to an approximate PVR value of less than one (1) inch, which is generally desired for projects of this type.

Table 6.1. Subgrade Modifications
(Approximate Natural Ground Elevation of 101.00 feet AMSL elevation)

Item	Description
1	See and adhere to the Site Preparation Recommendations section of this report.
2	Excavate existing soils to a depth of 98.00 feet AMSL elevation in accordance with the Site Preparation Recommendations section of this report.
3	Condition and compact twelve (12) inches of subgrade below excavated soils in accordance with the Site Preparation Recommendations section of this report.
4	Place **select fill** at an elevation of 102.80 feet AMSL elevation (a minimum of one and a half (1 ½) feet above natural ground, for a minimum total of 4 and a half (4 ½) feet select fill) condition and compact up to the proposed FFE in accordance with the Select Fill Recommendations section of this report.

The PVR method of estimating expansive, soil-related movements is based on empirical

correlations utilizing the measured plasticity indices and assuming typical seasonal fluctuations in moisture content. If desired, other methods of estimating expansive, soil-related movements are available, such as estimations based on swell tests and/or soil-suction analyses. However, the performance of these tests and the detailed analyses of expansive, soil-related movements were beyond the scope of the current study. It should also be noted that actual movements can exceed the calculated PVR values as a result of isolated changes in moisture content (such as leaks, landscape watering, etc.) or if water seeps into the soils to greater depths than the assumed active zone depth due to deep trenching and/or excavations.

6.3 Conventional Shallow Slab-on-Grade Foundation Design Criteria

As indicated previously a slab foundation may be used at this site in conjunction with the subgrade modifications listed under the Soils Related Movements section. We recommend the following soil bearing pressures, and dimensional criteria for the slab grade beams. These recommendations ensure proper utilization of soil bearing capacity of continuous beam sections in the slab-on-grade foundation and reduce the potential of water migration from the outside to beneath the slab foundation. For structural considerations the beams may need to be greater and should be evaluated and designed by the structural engineer. Where concentrated load areas are present the grade beams or slab may be thickened and widened to serve as spread footings. Soil bearing pressures and beam dimensional criteria are as follows:

Table 6.2. Bearing Criteria

Grade Beams and Continuous Footings	
Minimum depth below finished grade:	24 inches
Maximum depth below finished grade:	36 inches
Maximum width:	30 inches
Maximum allowable bearing pressure:	1,800 psf
Spread Footings (square)	
Minimum depth below finished grade:	24 inches
Maximum depth below finished grade:	36 inches
Maximum width:	60 inches
Maximum allowable bearing pressure:	2,100 psf

The above-presented maximum allowable bearing pressures will provide a factor of safety of 3 with respect to the design soil strengths. For a slab foundation structure designed and constructed in accordance with the recommendations of this report, it is anticipated that total settlements will be in the order of one (1) inch or less. If lower anticipated total settlements are required for this project further mitigation may be required and MEG must be consulted for further recommendations.

Furthermore, the above design parameters are contingent upon the fill materials (if utilized) being selected and placed in accordance with the recommendations presented in the Select Fill Recommendations section of this report. Should select fill selection and placement differ from the recommendations presented herein, MEG should be informed of the deviations in order to reevaluate our recommendations and design criteria.

Excavations for slab on grade and spread footing foundations should be performed relatively clean and with an undisturbed bearing area. The bottom 6 inches of the excavation should be performed using a flat plate excavation bucket. The excavations should be neatly excavated. No foreign debris or undisturbed soil should be left in the footing bottom. Should there be any abundance of foreign debris or disturbed soil found, it may be necessary to re-assess the fill site of its bearing capacity suitability. If the bearing area is found to be disturbed, the bearing area will require preparation and compaction for the entire depth of the disturbance in accordance with the Site Preparation and/or the Select Fill sections of this report.

The bearing surface of the grade beams and spread footings should be evaluated after excavation and immediately prior to concrete placement. We recommend that footing inspections be performed by a representative of MEG. The required inspections shall include inspecting for clean, dry (The moisture content should be within limits specified by the appropriate section in this report.) and undisturbed footing bottom, depth of footing, clearances from sides and size and spacing of reinforcing steel. Test results shall comply with the recommendations of this geotechnical report and shall be verified by an on-site representative of MEG.

Over excavation, if necessary, for compacted backfill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of over excavation depth below footing base elevation. The over excavation should then be backfilled up to the footing base elevation select fill placed in lifts of 8 inches or less in loose thickness and prepared and compacted in accordance with the Site Preparation and/or the Select Fill sections of this report. Equipment should not be operated and materials should not be placed or stockpiled within a horizontal distance equal to the excavation depth from the edge of the excavation. Excavations should not be placed next to existing structures or buried utilities/structures closer than a horizontal distance equal to the excavation depth unless some form of protection for the facilities is provided.

Water should not be allowed to accumulate at the bottom of the foundation excavation. Proper barriers such as berms or swales should be placed to divert any surface runoff away from excavations. To reduce the potential for groundwater seepage into the excavations and to minimize disturbance to the bearing area, we recommend that steel and concrete be placed as soon as possible after the excavations are completed, properly prepared and cleaned. Excavations should not be left open overnight.

6.4 BRAB Design Criteria for Slab-on-Grade Foundations

Table 6.3 list the values for criteria developed by the Building Research Advisory Board (BRAB) for the design of shallow slab-on-grade foundations. On the basis of stratigraphy encountered and the anticipated site modifications discussed earlier, the design criteria are as follows:

Table 6.3. BRAB Values

For Existing Conditions	
Effective Plasticity Index	22
Climatic Rating Cw.	15
Soil Support Index, (c)	0.93
For Proposed Conditions	
Effective Plasticity Index	19
Climatic Rating Cw.	15
Soil Support Index, (c)	0.96

Note 1: Subgrade Modifications as outlined in the recommendations of this report;

6.5 Foundations for Below-Grade Structures

As previously stated, we understand the below-grade structures including the lift station structure is planned to be supported by gravel bedding underlain by native soils. We also understand these structures may be placed at depth of 30 feet to 35 feet below existing grade. Presented in the following table is the net allowable bearing capacity for the slab on grade foundations for the below-grade structure planned at this site.

Table 6.4. Below Grade Structures Bearing Criteria

Structure	Approximate Depth of Installation (ft)	Recommended Net allowable Bearing Capacity (psf)
Below Grade Structure	15	1,300
Below Grade Structure	20	1,200

These allowable bearing pressure values are based on the assumption that the bases of the foundation excavations are relatively dry and undisturbed.

The soil subgrade at the base of the foundations should be evaluated before placement of gravel and/or concrete. Preparation of the excavations and bearing pads should be done in accordance with the same requirements in section 6.3 Conventional Shallow Slab-on Grade Foundations Design Criteria section of this report. If the subgrade is

deemed stable place a minimum of 12 inches of gravel bedding before placing the lift station structures.

6.6 Lateral Earth Pressures

Presented below are at-rest, active and passive earth pressure coefficients for various backfill types adjacent to below-grade walls or site retaining walls. At-rest earth pressures are recommended in cases where little wall yield is expected (such as structural below-grade walls). Active earth pressures may be utilized in cases where the walls can exhibit a certain degree of horizontal movements (such as cantilevered retaining walls).

Table 6.5. Earth Pressures

Backfill Type	Estimated Total Unit Weight (pcf)	Angle of Internal Friction Ø, deg	Active Condition		At rest Condition	
			Earth Pressure Coefficient K_a	Equivalent Fluid Density (pcf)	Earth Pressure Coefficient K_o	Equivalent Fluid Density (pcf)
Washed Gravel	135	33	0.29	40	0.45	60
Crushed Limestone	145	38	0.24	35	0.38	55
Clean Sand	120	30	0.33	40	0.50	60
Pit Run Clayey Gravels or Sands	135	31	0.32	45	0.48	65
On-Site Clays	120	15	0.59	70	0.74	90
On-Site Sands	125	31	0.32	40	0.48	60

The above values do not include a hydrostatic or ground-level surcharge component. To prevent hydrostatic pressure build-up, retaining walls should incorporate functional drainage (via free-draining aggregate or manufactured drainage mats) within the backfill zone. The effect of surcharge loads, where applicable, should be incorporated into wall pressure diagrams by adding a uniform horizontal pressure component equal to the applicable lateral earth pressure coefficient times the surcharge load, applied to the full height of the wall. The structure walls should be designed for hydrostatic pressures if drainage cannot be provided. Ports for release of hydrostatic pressure need to be provided during construction.

The compactive effort should be controlled during backfill operations adjacent to walls. Overcompaction can produced lateral earth pressures in excess of at-rest magnitudes. Compaction levels adjacent to walls should be maintained between 95 and 100 percent of standard proctor (ASTM D 698) maximum dry density.

For retaining walls bearing on-site soils, we recommend a coefficient of sliding resistance of 0.4 (maximum allowable resistance of 500 psf) and a maximum footing bearing capacity as stated in *section 6.5 Foundation for Below-Grade Structures* section of this

report. All retaining walls should be checked against failure due to overturning, sliding, and overall slope stability. Such analysis can only be performed once the dimensions of the wall and cut/fill scenarios are known.

We recommend that a buffer area of at least 5 feet for all pavement areas be placed adjacent to retaining walls designed for active earth pressures. In building areas, this buffer zone from retaining walls should be increased to at least 10 feet. These recommended buffer zones are to reduce the potential of distress from any long-term ("creep") movements of the wall and backfill pedestrian sidewalks may be exempted from the above criteria; however, some distress could still be observed in the sidewalks due to movements of the retaining walls backfill.

A wall drain (consisting of freely-drained aggregate or manufactured drainage mat, along with outlet piping) is recommended for collection and removal of surface water percolation behind the walls. Proper control of surface water percolation will help to prevent buildup of higher wall pressures/. In unpaved areas, the final 12 inches of backfill should preferably consist of clayey soils to help reduced percolation of subsurface water in to the backfill.

7.0 CONSIDERATIONS DURING CONSTRUCTION

7.1 Site Grading Recommendations

Site grading plans can result in changes in almost all aspects of foundation recommendations. We have prepared the foundation recommendations based on the existing ground surface; there is a one and a half (1 ½) feet surcharge addition for the stratigraphic conditions encountered at the time of our study. If site grading plans differ from existing grades by more than plus or minus 1 foot, we must be retained to review the site grading plans prior to bidding the project for construction. This will enable us to provide input for any changes in our original recommendations that may be required as a result of site grading operations or other considerations.

7.2 Site Drainage Recommendations

Drainage is one of the most important aspects to be addressed to ensure the successful performance of any foundation. Positive surface drainage should be implemented prior to, during and maintained after construction to prevent water ponding at or adjacent to the building facilities. It is recommended that the building and site design include rain gutters, downspouts and concrete gutters to channel runoff to paving or storm drains.

7.3 Site Preparation Recommendations

Building areas and all area to support select fill should be stripped of all vegetation and organic topsoil up to a minimum of 5 ft. beyond the building perimeters. After stripping, remove at least six (6) inches of on-site soil as measured from existing grade when excavation of existing subgrade is not recommended in other sections of this report. The excavated material, if free of organic and/or deleterious material, may be stockpiled for

use in the non-structural areas of the site. Where excavation of the subgrade is recommended in this report, the bottom of the excavation will extend at least five (5) feet beyond the limits of the planned building perimeter including canopies and sidewalks. Exposed subgrades should be thoroughly proof rolled in order to locate and compact any weak, compressible and soft spots. Proof rolling shall be in accordance with TxDOT 2014 Specification Item 216. Proof rolling operations should be observed by the Geotechnical Engineer or his representative to document subgrade condition and preparation. Weak or soft areas identified during proof rolling or areas where large tree roots have been removed within the limits of excavation should be removed and replaced with a suitable, compacted select fill in accordance with the recommendations presented under the Select Fill Recommendations section of this report. Proof rolling operations and any excavation/backfill activities should be observed by **MEG** representatives to document subgrade preparation.

Prior to fill placement, the exposed subgrade shall be prepared based on what option is selected from the foundation and pavement recommendations. The exposed subgrade should be prepared, moisture-conditioned by scarifying to a minimum depth as recommended in the foundation and pavement recommendations and recompacting to a minimum 98 percent of the maximum dry density as determined in accordance with ASTM D 698, moisture-density relationship. The moisture content of the subgrade should be maintained within the range of minus two (-2) percentage points below optimum to plus two (2) percentage points above the optimum moisture content until the fill is permanently covered. The soil should be properly compacted in accordance with these recommendations and tested by **MEG** personnel for compaction as specified.

7.4 Select Fill Recommendations

Materials used for select fill shall meet the following requirements:

1. Material shall conform to TxDOT 2014 Specification Item 247, Flexible Base; Type A, Grades 1 through 3.
2. Material shall conform to TxDOT 2014 Specification Item 247, Flexible Base, Types B or C, Grades 1 through 5 with a minimum plasticity index of 7.
3. Material shall conform to TxDOT 2014 Specification Item 247, Flexible Base, Type E, Grade 4 with a plasticity index between and inclusive of 7 and 15. Type E material shall be defined as Caliche (argillaceous limestone, calcareous or calcareous clay particles) and may contain stone, conglomerate, gravel, sand or granular materials when these materials are in situ with the caliche. Flexible Base (Type E, Grade 4) shall conform to the following requirements:

Table 7.1. Type E, Grade 4 Requirements

Retained on Sq. Sieve	Percent Retained
2”	0
½”	20-60
No. 4	40-75
No. 40	70-90
Max. PI:	15
Max. Wet Ball PI:	15
Wet Ball Mill Max Amount:	50
Wet Ball Increase, Max Passing No. 40 sieve	20

4. Soils classified according to USCS as SM, SC, GM, GC, CL, ML and combinations of these soils. The soils shall be relatively free of organic matter. In addition to the USCS classification, select materials shall have a liquid limit of less than 40 and a plasticity index between and inclusive of 10 and 17.
5. Soils classified, as CH, MH, OH, OL and PT, under the USCS are not considered suitable for use as select fill materials at this site.

Select fill shall be placed in loose lifts not to exceed 8 inches (6 inches compacted) and compacted to a minimum 98 percent of the maximum dry density as determined in accordance with ASTM D 698. The moisture content of the fill shall be maintained within the range of minus two (-2) percentage points below optimum to plus two (+2) percentage points above the optimum moisture content until the fill is permanently covered. The select fill should be properly compacted in accordance with these recommendations and tested by **MEG** personnel for compaction as specified.

7.5 Site Fill Recommendations

Site fill shall be placed in loose lifts not to exceed 8 inches (6 inches compacted) and compacted to a minimum 98 percent of the maximum dry density as determined in accordance with ASTM D 698. The moisture content of the fill shall be maintained within the range of minus two (-2) percentage points below optimum to plus two (2) percentage points above the optimum moisture content until the fill is permanently covered. The site fill should be properly compacted in accordance with these recommendations and tested by **MEG** personnel for compaction as specified.

7.6 Back Fill Recommendations

Back fill shall be placed in loose lifts not to exceed 8 inches (6 inches compacted) and compacted to a minimum 98 percent of the maximum dry density as determined in accordance with ASTM D 698. The moisture content of the fill shall be maintained within the range of minus two (-2) percentage points below optimum to plus two (2) percentage points above the optimum moisture content until the fill is permanently covered. The back

fill should be properly compacted in accordance with these recommendations and tested by **MEG** personnel for compaction as specified.

7.7 Dewatering

If the proposed excavation is to be done with conventional equipment and extends into the underlying water-bearing silty sands, temporary dewatering will be necessary. Prior to design and installation of the dewatering system, we recommend that piezometers be installed and monitored to verify the groundwater levels. The groundwater level should be lowered at least 2 feet below the base of the planned excavation prior to digging the excavation.

The design, operation, and maintenance of dewatering systems and groundwater control should be the responsibility of the contractor. This is appropriate since water control affects construction operations, e.g. excavation and scheduling. We anticipate the system would likely consist of a vacuum wellpoint or jet eductor system. The deeper soils generally consist of clayey sand soils that would not generally be expected to be highly porous or cause rapid seepage rates. However, more pervious layers capable of producing higher seepage rates should be anticipated. Wellpoints should be installed with suitable screen and filters so that pumping of fines does not occur. Discharge should be arranged to facilitate sampling by the engineer.

We anticipate that the temporary groundwater control would likely be performed in stages as the excavation proceeds. Temporary earthen berms may be beneficial to limit the length of each dewatered reach. The Geotechnical Engineer should be given an opportunity to review the proposed temporary groundwater control system prior to its implementation to assist with determining the impact of the proposed system.

7.8 Utility Considerations

Utilities that project through the slab-on-grade, slab-on-fill, floating floor slabs, or any other rigid unit should be designed with some degree of flexibility or with sleeves. Such features will help reduce the risk of damage to utility facilities from soil movements related to shrinkage and expansion.

7.9 Utility Trench Recommendations

Bedding and initial backfill are buried around utility lines to support and protect the utility. The secondary backfill above the initial backfill also helps protect and support the foundation and/or pavement above. To ensure that settlement is not excessive in this secondary backfill we recommend the following:

1) If possible, trench and install utilities prior to work such as lime treatment and/or compaction of subgrade or placement of other fills or bases.
2) Place, moisture condition and compact the secondary backfill in accordance with the pertinent project requirements. Within the footprint of a building pad the secondary backfill should meet the same compaction requirements for select fill.

Within the footprint of a pavement structure the secondary backfill should meet the same compaction requirements for the subgrade. When compaction of the subgrade is not specified it should meet the same compaction level of the adjacent natural ground. An alternative to compaction of secondary backfill is the use of flowable fill where secondary backfill is to be placed. If properly designed, the flowable fill can be excavated easily at a later date if necessary. No compaction and no testing is required when properly designed flowable fill is used.

7.10 Excavation, Sloping and Benching Considerations

The soils encountered in the borings can easily be excavated using conventional earthwork equipment. No major hard soil and/or rock units were encountered in the borings through completion depth. In the case that excavations occur through granular soil or submerged soils it will be necessary to either slope the excavation sidewalls or provide temporary bracing to control excavation wall instability.

The side slopes of excavations through the overburden soils should be made in such a manner to provide for their stability during construction. Pipe lines or other facilities which are constructed prior to or during the currently proposed construction and which require excavation should be protected from loss of end bearing or lateral support.

Temporary construction slopes and/or permanent embankment slopes should be protected from surface runoff water. Site grading should be designed to allow drainage at planned areas where erosion protection is provided instead of allowing surface water to flow down unprotected slopes.

Permanent slopes at the site should be as flat as practical to reduce creep and occurrence of shallow slides. The following slope angles are recommended as maximums. The presented angles refer to the total height of a slope. Site improvement should be maintained away from the top of the slope to reduce the possibility of damage due to creep or shallow slides.

Table 7.2. Slopes Angles Requirements

Height (ft.)	Horizontal to vertical
0 – 3	1:1
3 – 6	2:1
6 – 9	3:1
>9	4:1

The contractor or persons doing the trenching should adhere to the current Occupational Health and Safety Administration (OSHA) guidelines on trench excavation safety and protection measures. Other industry standards may be applicable. The collection of specific geotechnical data and development of a plan for trench safety, sloping, benching or various types of temporary shoring, is beyond the scope of this study.

7.11 Shallow Foundation Excavation Considerations

The Geotechnical Engineer or his representative prior to the placement of reinforcing steel and concrete should observe shallow foundation excavations. This is necessary to verify that the bearing soils at the bottom of the excavations are similar to those encountered during the subsurface soil exploration phase and that excessive loose materials and water are not present in the excavations. If soft pockets of soil are encountered in the foundation excavations, they should be removed and replaced with a compacted non-expansive fill material or lean concrete up to the design foundation bearing elevation.

7.12 Landscaping Considerations

Even though landscaping is a vital aesthetic component of any project, the owner, client and design team should be aware that placing trees or large bushes adjacent to any structure may distress the structure in the future. It is recommended that if any landscaping is to be placed adjacent to the structure in this project, it should be limited to small plants and shrubs. Trees and large bushes should be placed at a distance such that at their mature height, their canopy or “drip line” does not extend over the structures. The owner, client and design team should also be aware that if any watering is to be done in connection with the landscaping for this project it should be controlled, consistent and timely. Excessive or prolonged watering is not recommended. If watering is part of the landscaping plan, termination of watering for any extended period of time may also be detrimental to the structure. It is important that the moisture level in the subsurface soils remain constant so that shrinking and swelling of soils may be mitigated.

7.13 Perimeter Foundation Cap

We recommend that a cap of impervious fill be placed around the perimeter of the foundation to mitigate the intrusion of moisture into the soils surrounding the foundation. The top eighteen inches of fill around the foundation structure should be a low permeance clay cap to keep surface water away from the foundation. The low permeance clay cap should be sloped away from the foundation at a minimum slope of 2% and the surrounding areas should have positive drainage. The low permeance clay shall meet the USCS classification of CL and meeting the requirements in Tables 7.2 Gradation Requirements and Table 7.3 Atterberg Limits Requirements. The low permeance clay shall be compacted to minimum of 95 percent of the maximum dry density as determined in accordance with ASTM D 698. The moisture content of the subgrade should be maintained within the range of optimum to four (4) percentage points above the optimum moisture. If plantings are intended, add 4 to 6 inches of loam on top of the clay cap.

Table 7.2. Gradation Requirements

Sieve Size	Percent Passing (by dry weight)
1/2 inch	100
No 4	70-100
No. 200	50 – 100

Table 7.3. Atterberg Limits Requirements

Test / ASTM	Requirement
Atterberg Limits D4318	LL ≤ 45 20 ≤ PI ≤ 30

8.0 PROJECT REVIEW AND QUALITY CONTROL

Each project site is unique and it is important that the appropriate design data, construction drawings, specifications, change orders and related documents be reviewed by the respective design and construction professionals participating in this project. The performance of foundations, construction building pads and/or parking areas for this project will depend on correct interpretation of our geotechnical engineering report and proper compliance of and adherence to our geotechnical recommendations and to the construction drawings and specifications.

It is important that **MEG** be provided the opportunity to review the final design and construction documents to check that our geotechnical recommendations are properly interpreted and incorporated in the design and construction documents. We cannot be responsible for misinterpretations of our geotechnical recommendations if we have not had the opportunity to review these documents. This review is an additional service and not part of our project scope.

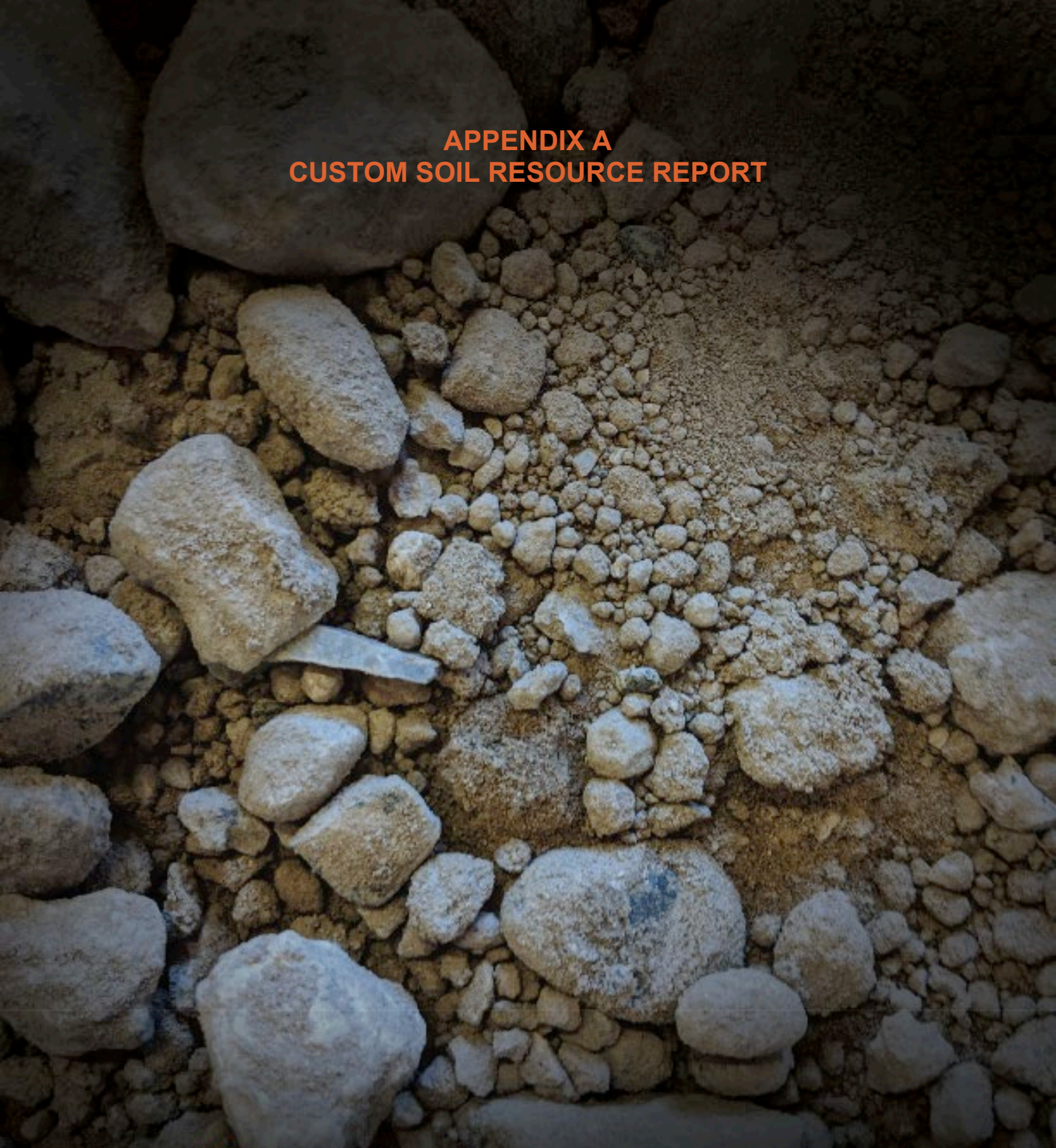
MEG should be retained to provide construction materials testing and observation services during all phases of the construction process of this project. As the Geotechnical Engineer of Record, it is important to let our technical personnel provide these services to make certain that our recommendations are interpreted properly and to ensure that actual field conditions are those described in our geotechnical report. Since our personnel are familiar with this project, **MEG**'s participation during the construction phase of this project would help mitigate any problems resulting from variations or anomalies in subsurface conditions, which are among the most prevalent on construction projects and often lead to delays, changes, costs overruns, and disputes. If the client does not follow all of our recommendations presented in this report and/or addendums to this report, the client assumes the responsibility and liability of such actions and will hold our firm harmless and without responsibility and liability for client's actions.

A construction testing frequency plan and budget needs to be developed for the required construction materials engineering and testing services for this project. Before

construction, we recommend that **MEG**, the project design team members and the project general contractor meet and jointly develop the testing plan and budget, as well as review the testing specifications as it pertains to this project. **A failure to implement a complete testing plan will negate the recommendations provided in this report.**

MEG looks forward to the opportunity to provide continued support on this project.

APPENDIX A
CUSTOM SOIL RESOURCE REPORT



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5840 N. Gumwood Avenue ■ Pharr, Texas 78577 ■ Tel: 956-702-8500 ■ Fax: 956-702-8140

Soil Map—Hidalgo County, Texas
(01-23-29179 Proposed Lift Station No. 6)

Map Scale: 1:2,990 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hidalgo County, Texas
Survey Area Data: Version 22, Sep 5, 2023

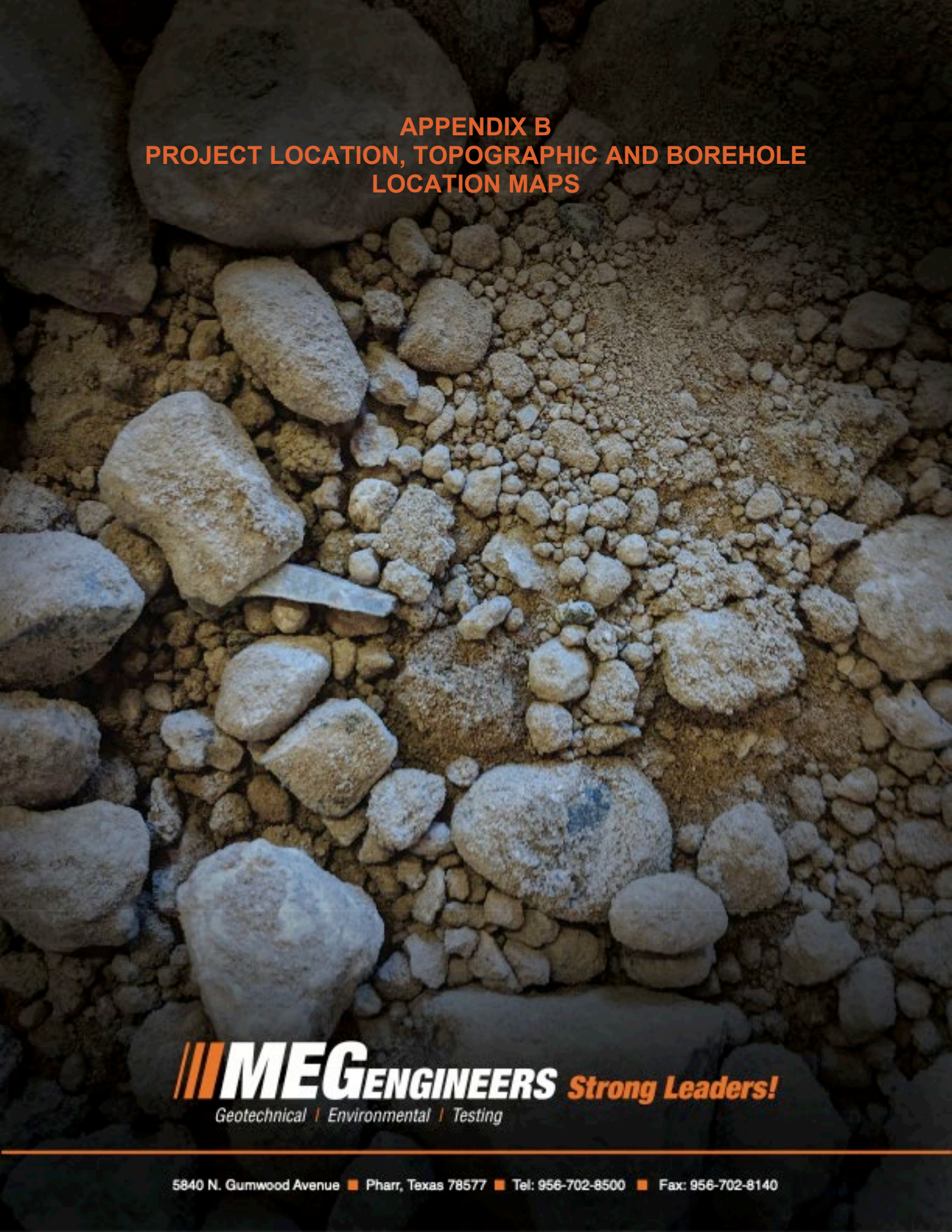
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 7, 2021—Jan 14, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
28	Hidalgo sandy clay loam, 0 to 1 percent slopes	28.6	100.0%
Totals for Area of Interest		**28.6**	**100.0%**



APPENDIX B
PROJECT LOCATION, TOPOGRAPHIC AND BOREHOLE LOCATION MAPS

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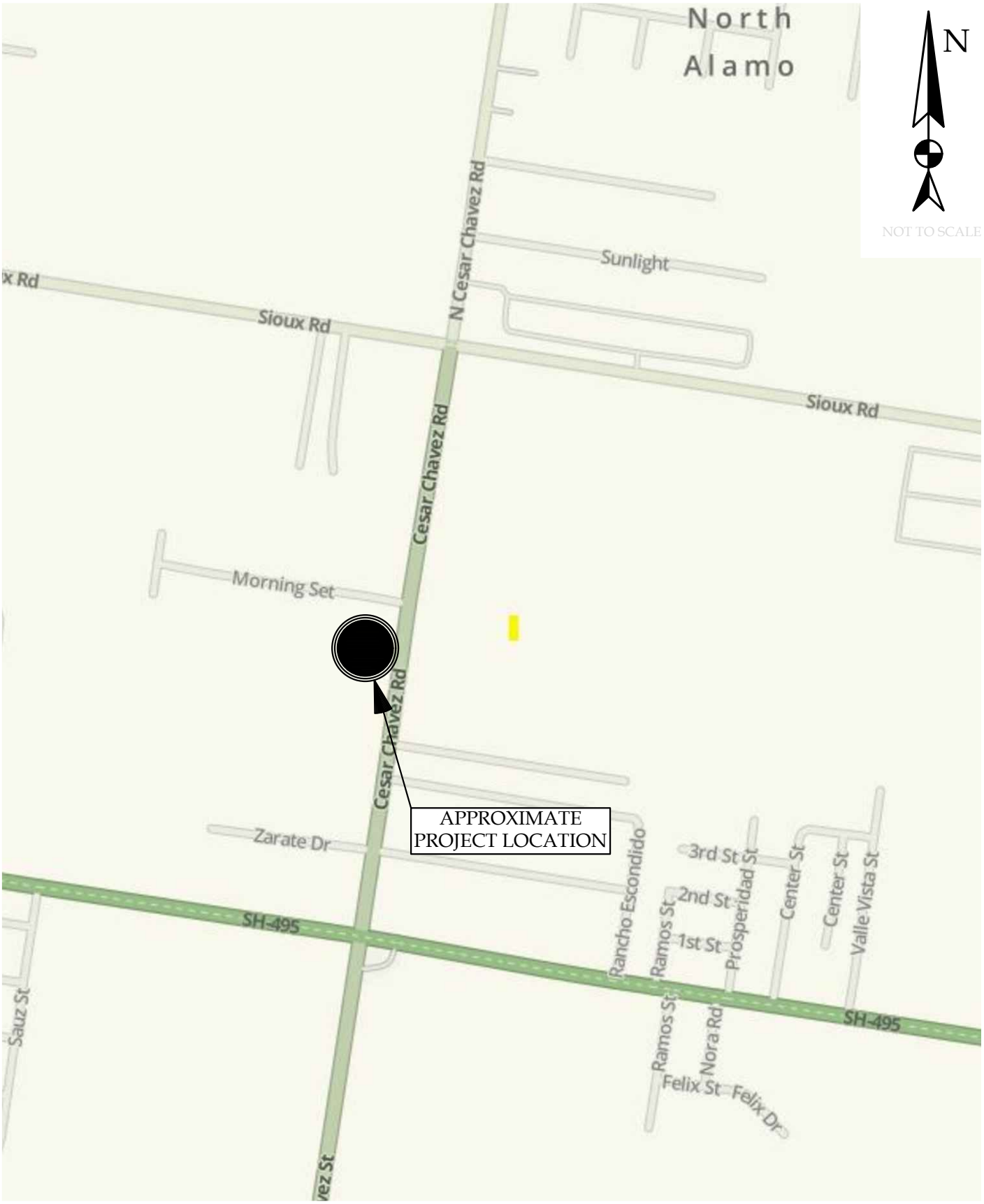


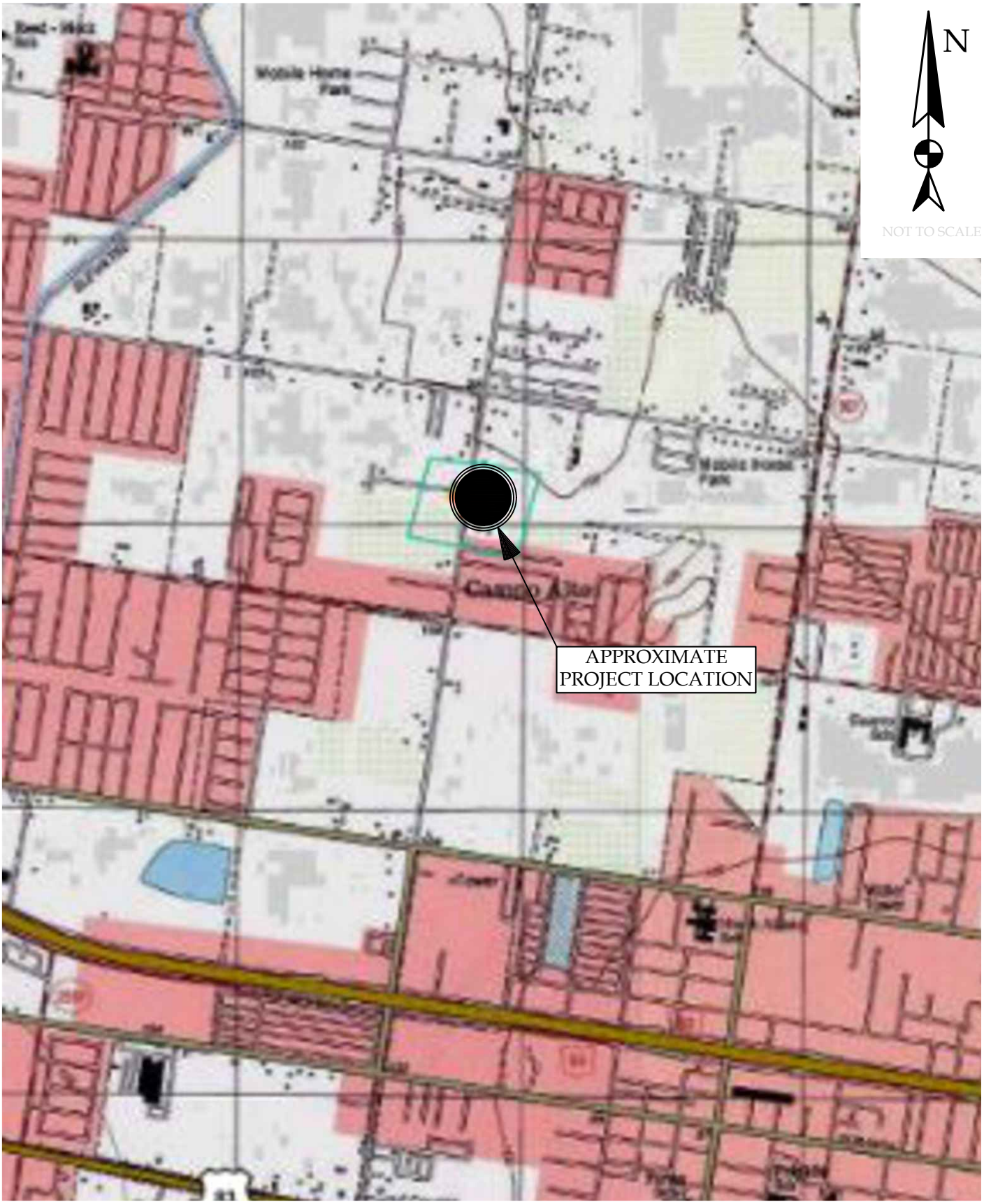
MEG PROJECT: 01-23-29179 / DATE: 1/23/29179 / APPROVED BY: A. PALMA / DRAWN BY: S. MORENO

PROJECT SITE LOCATION MAP

PROPOSED
LIFT STATION NO. 6

SAN JUAN, HIDALGO COUNTY, TEXAS

MILLENNIUM ENGINEERS GROUP, INC.
5804 N. GUMWOOD AVENUE
PHARR, TEXAS 78577
WWW.MEGENGINEERS.COM
TEL: 956-702-8500
FAX: 956-702-8140



PROJECT TOPOGRAPHY MAP

PROPOSED
LIFT STATION NO. 6

SAN JUAN, HIDALGO COUNTY, TEXAS

MILLENNIUM ENGINEERS GROUP, INC.
5804 N. GUMWOOD AVENUE
PHARR, TEXAS 78577
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FAX: 956-702-8140

MEG PROJECT: 01-23-29179 / DATE: 1/23/29179 / APPROVED BY: A. PALMA / DRAWN BY: S. MORENO

MEG PROJECT: 01-23-29179 / DATE: 1/23/29179 / APPROVED BY: A. PALMA / DRAWN BY: S. MORENO

PROJECT BOREHOLE LOCATION MAP

PROPOSED
LIFT STATION NO. 6

SAN JUAN, HIDALGO COUNTY, TEXAS

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APPENDIX C
PROJECT BORING LOGS AND PROFILE

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Project: **Proposed Lift Station No.6**

Project Location: **San Juan, Hidalgo County, Texas**

Project Number: **01-23-29179**

Log of Boring B-1

Sheet 1 of 2

Date(s) Drilled **12/6/2023**	Logged By **Ayme**	Checked By **Raul Palma**
Drilling Method **Straight Flight**	Drill Bit Size/Type **4" soil bit**	Total Depth of Borehole **40 feet bgs**
Drill Rig Type **Simco2800**	Drilling Contractor **RGV Drilling**	Approximate Surface Elevation
Groundwater Level and Date Measured **23 feet ATD**	Sampling Method(s) **SPT**	Hammer Data **140 lb., 30 in. drop, auto trip**
Borehole Backfill **Subgrade Cuttings**	Location **See Boring Location Map**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	LL, %	PI, %	Percent Fines	UC, ksf
	0				CL		sandy lean CLAY to lean CLAY with sand, brown, moist to wet, medium stiff to stiff					
	1		1	5				17	35	22		
	2											
	3		2	4				19			71	
	4											
	5		3	4				18	37	22		
	6											
	7		4	11				18				
	8											
	9		5	11				23	39	26		
	10											
	11											
	12											
	13											
	14		6	12				16			63	
	15											
	16											
	17											
	18											
	19		7	7				19				
	20				SC		clayey SAND, brown, wet, loose to dense					
	21											
	22											
	23						ATD ▽					
	24		8	8				27		LS=1		
	25											
	26											
	27											
	28											
	29		9	13				27			22	
	30											
	31											
	32											
	33											
	34		10	21				26		LS=1		
	35											

Project: **Proposed Lift Station No.6**
Project Location: **San Juan, Hidalgo County, Texas**
Project Number: **01-23-29179**

Log of Boring B-1

Sheet 2 of 2

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	LL, %	PI, %	Percent Fines	UC, ksf
	35				SC		clayey SAND, brown, wet, loose to dense					
			11	32				20			18	
	40						BORE TERMINATION					
	45											
	50											
	55											
	60											
	65											
	70											
	75											
	80											
	85											
	90											

Project: **Proposed Lift Station No.6**
Project Location: **San Juan, Hidalgo County, Texas**
Project Number: **01-23-29179**

Key to Log of Boring
Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	LL, %	PI, %	Percent Fines	UC, ksf
1	2	3	4	5	6	7	8	9	10	11	12	13

COLUMN DESCRIPTIONS

1. Elevation (feet): Elevation (MSL, feet).
2. Depth (feet): Depth in feet below the ground surface.
3. Sample Type: Type of soil sample collected at the depth interval shown.
4. Sample Number: Sample identification number.
5. Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
6. Material Type: Type of material encountered.
7. Graphic Log: Graphic depiction of the subsurface material encountered.
8. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
9. Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
10. LL, %: Liquid Limit, expressed as a water content.
11. PI, %: Plasticity Index, expressed as a water content.
12. Percent Fines: The percent fines (soil passing the No. 200 Sieve) in the sample. WA indicates a Wash Sieve, SA indicates a Sieve Analysis.
13. UC, ksf: Unconfined compressive strength, in kips per square foot.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)

Clayey SAND (SC)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- Auger sampler
- Bulk Sample
- 3-inch-OD California w/ brass rings
- CME Sampler
- Grab Sample
- Hand auger sampler
- 2.5-inch-OD Modified California w/ brass liners
- Pitcher Sample
- 2-inch-OD unlined split spoon (SPT)
- Texas Cone Penetrometer
- Shelby Tube (Thin-walled, fixed head)

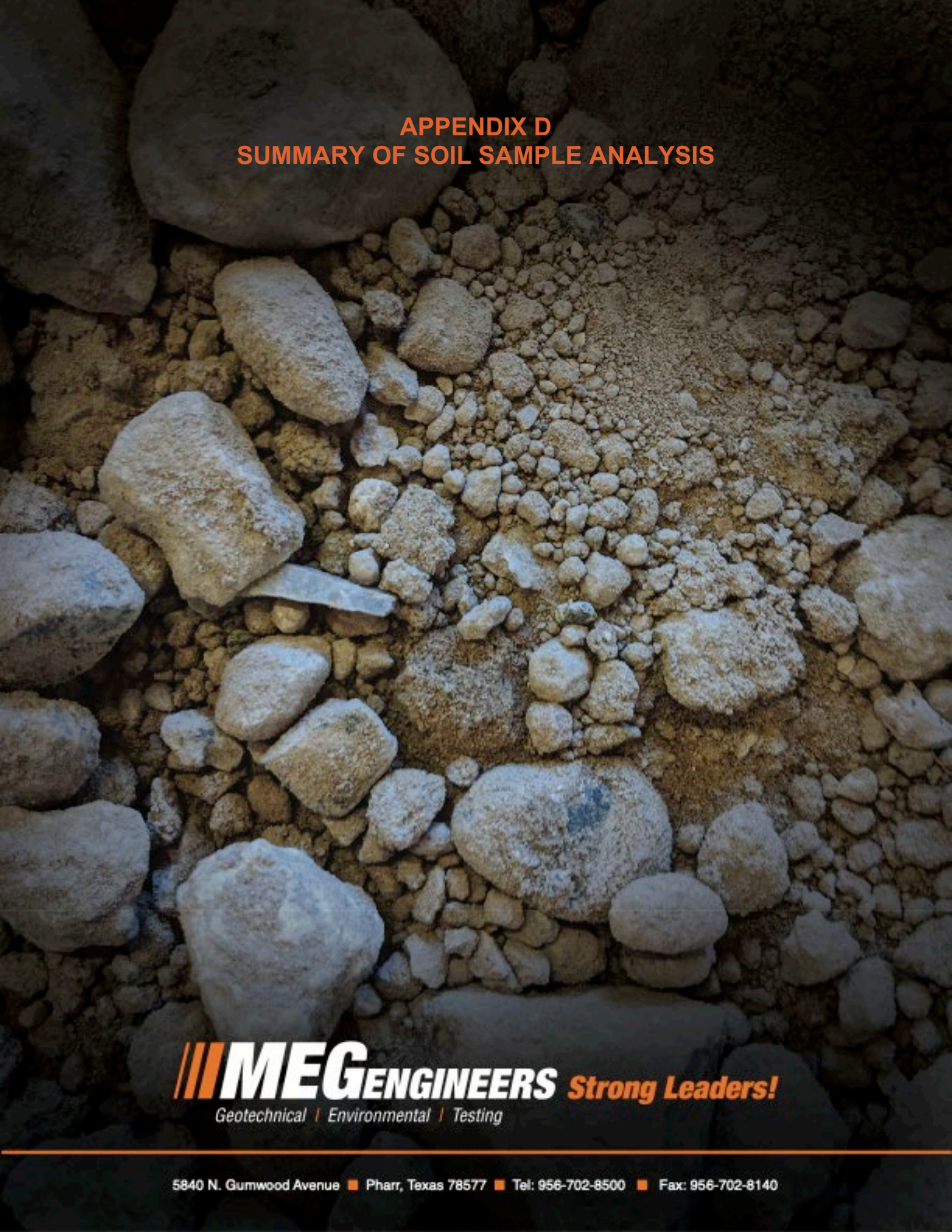
OTHER GRAPHIC SYMBOLS

- Water level (at time of drilling, ATD)
- Water level (after waiting, AW)
- Minor change in material properties within a stratum
- Inferred/gradational contact between strata
- Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Figure B-1



APPENDIX D
SUMMARY OF SOIL SAMPLE ANALYSIS

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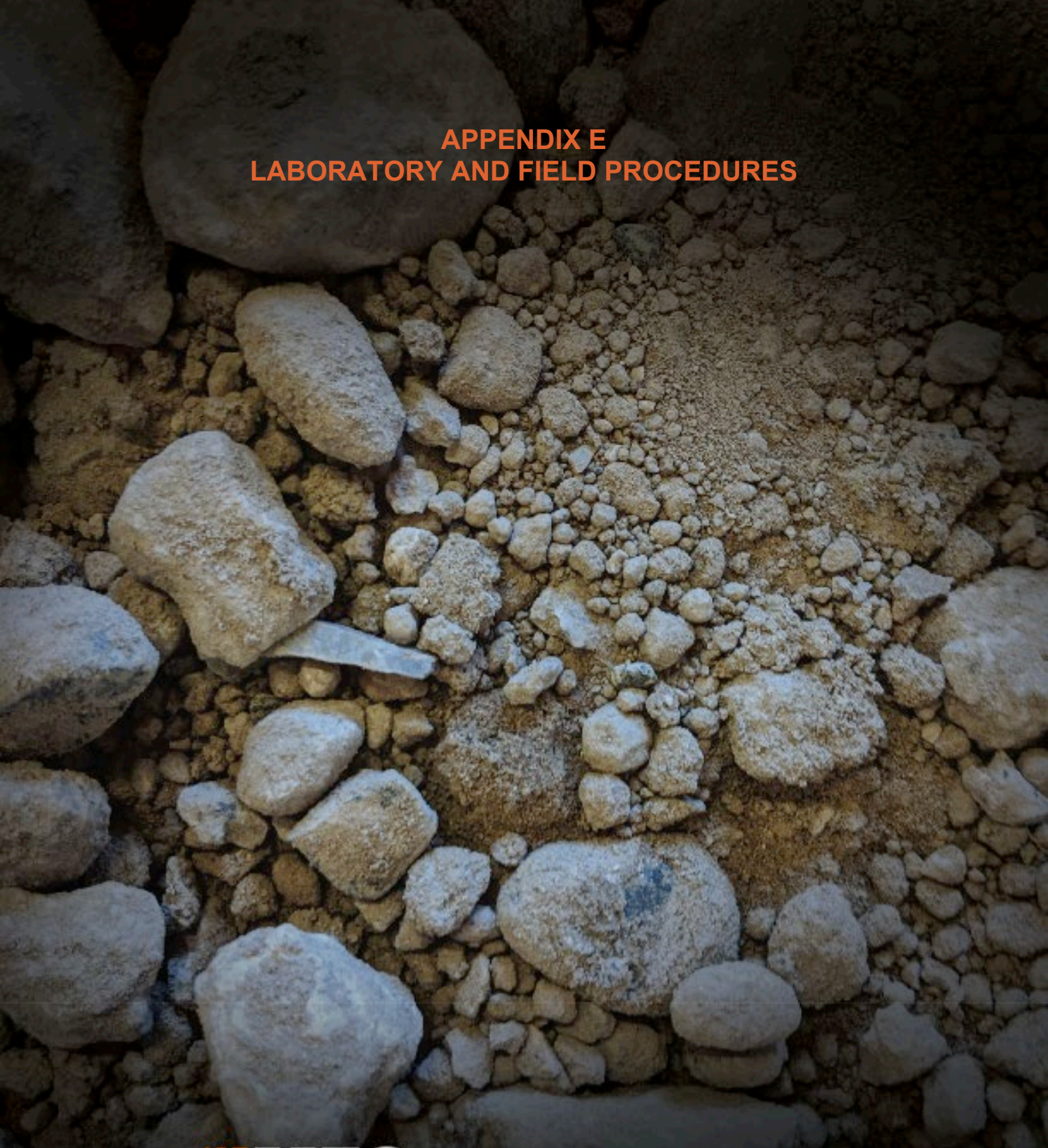
Summary of Soil Sample Analyses

Project Name: Proposed Lift Station No. 6

Boring No.	Sample Depth (ft)	Blows Per (ft)	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	-200% Sieve	Shear Strength (tsf)	Dry Unit Weight (pcf)	USCS
B-1	.5 - 2	5	17	35	13	22				CL
	2.5 - 4	4	19				71			
	4.5 - 6	4	18	37	15	22				CL
	6.5 - 8	11	18							
	8.5 - 10	11	23	39	13	26				CL
	13.5 - 15	12	16				63			
	18.5 - 20	7	19							
	23.5 - 25	8	27			LS=1				CL
	28.5 - 30	13	27				22			
	33.5 - 35	21	26			LS=1				CL
	38.5 - 40	32	20				18			

LS = Linear Shrinkage

APPENDIX E
LABORATORY AND FIELD PROCEDURES



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Laboratory and Field Test Procedures

Soil Classification Per ASTM D2487-93:

This soil-testing standard was used for classifying soils according to the Unified Soil Classification System. The soil classifications of the earth materials encountered are as noted in the attached boring logs.

Soil Water Content Per ASTM D2216-92:

This test determines the water content of soil or rock expressed as a percentage of the solid mass of the soil. The test results are listed under **MC** in the attached boring logs.

Soil Liquid Limit Per ASTM D4318-93:

The soil Liquid Limit identifies the upper limit soil water content at which the soil changes from a moldable (plastic) physical state to a liquid state. The Liquid Limit water content is expressed as a percentage of the solid mass of the soil. The test results are listed under **LL** in the attached boring logs.

Soil Plastic Limit Per ASTM D4318-93:

The soil Plastic Limit identifies lower limit soil water content at which the soil changes from a moldable (plastic) physical state to a non-moldable (semi-solid) physical state. The Plastic Limit water content is expressed as a percentage of the solid mass of the soil. The test results are listed under **PL** in the attached boring logs.

Plasticity Index Per ASTM D4318-93:

This is the numeric difference between the Liquid Limit and Plastic Limit. This index also defines the range of water content over which the soil-water system acts as a moldable (plastic) material. Higher Plasticity Index (PI) values indicate that the soil has a greater ability to change in soil volume or shrink and swell with lower or higher water contents, respectively. The test results are listed under **PI** in the attached boring logs.

Standard Penetration Test (SPT) and Split Spoon Sampler (SS) per ASTM D 1586:

This is the standard test method for both the penetration test and split-barrel (spoon) sampling of soils. This sampling method is used for soils or rock too hard for sampling using Shelby Tubes. The method involves penetration of a split spoon sampler into the soil or rock through successive blows of a 140-pound hammer in a prescribed manner.

Blow Counts (N) per ASTM D 1586:

This is the number of blows required to drive a Split Spoon Sampler by means of a 140 pound hammer for a distance of 12 inches in accordance with the variables stated in the test procedures.

Shelby Tube (ST) per ASTM D 1587:

This procedure is for using a thin-walled metal tube to recover relatively undisturbed soil samples suitable for laboratory tests of physical properties.

Dry Density (DD) per ASTM D 2937:

This procedure is for the determination of in-place density of soil. The test results are measured in pounds per cubic foot, pcf.

Unconfined Compression Test (Uc) per ASTM D 2166:

This test method covers the determination of the unconfined compressive strength of cohesive soil in the undisturbed, remolded, or compacted condition, using strain-controlled application of the axial load.

Minus No. 200 Sieve per ASTM D 1140:

This test method covers determination of the amount of material finer than a Number 200 sieve by washing. The results are stated as a percent of the total dry weight of the sample.

Pocket Penetrometer (PP):

This test method is an accepted modification of ASTM D 1558 test method for establishing the moisture-penetration resistance relationships of fine-grained soils. The test results are measured in tons per square foot, tsf. The strength values provided by this method should be considered qualitatively.

Rock Quality Designation (RQD):

The measure of the quality of a rock mass defined by adding intact rock core pieces greater than four inches in length by the total length of core advance.

Recovery Ratio (REC):

The Recovery Ratio is equal to the total length of core recovered divided by the total length of core advance.

Boring Logs:

This is a summary of the above-described information at each boring location.