DOCUMENT 00 91 13-4
ADDENDA

ADDENDUM NUMBER FOUR

11/14/2013

DATE: November 14, 2013

PROJECT: City of Edinburg Safe Room – South Park Site

PROJECT NUMBER: 1204

OWNER: City of Edinburg

ARCHITECT: Negrete & Kolar Architects, LLP

TO: Prospective Bidders

This Addendum forms a part of the Contract Documents and modifies the Bidding Documents dated October 15, 2013, Addendum Number One issued November 5, 2013, Addendum Number Two issued November 8, 2013, and Addendum Number Three issued November 11, 2013, with amendments and additions noted below.

Acknowledge receipt of this Addendum in the space provided in the Bid Form. Failure to do so may disqualify the Bidder.

This Addendum consists of two pages and the following Exhibits:

No.	Exhibit Title	Issue Date
	Pre-Bid Sign In Sheet	November 4, 2013
	Pre-Bid Sign In Sheet	November 11, 2013
	System for Award Management Registration	November 2013
AMA13-023-00	Geotechnical Engineering Study	May 10, 2013

CHANGES TO THE PROJECT MANUAL

1. Table of Contents: Before 00 09 13 Form of Addenda, add the following entry: "COE SYSTEM FOR AWARD MANAGEMENT REGISTRATION". Add attached document with this name in the corresponding location within the project manual.
2. In the table of contents, under the heading labeled PART TWO is listed AMA13-023-00 Geotechnical Engineering Report. The referenced report is included this addendum as an exhibit and is hereby incorporated into the project manual.
3. Notice to Bidders, second page after the bolded sentence/paragraph beginning with the word "Bids", add the following two sentences: "Bid package shall contain one original and four copies of all original documents. The original and the copies of the bid form must all bear original signatures."
4. Instructions to Bidders, Item #2, add the following three sentences: "All Bidders, both General Contractors and their sub-contractors, must be registered, before award with System for Award Management (SAM) at www.sam.gov. If contractor does not already have a D.U.N.S. Number (Dunn & Bradstreet), they must do so before they can register w/ SAM. Additional information regarding this can be found in the document titled "System for Award Management Registration" in the project manual."
5. Instructions to Bidders, Item #12, insert the following two sentences before the last sentence. "Bid package shall contain one original and four copies of all original documents. The original and the copies of the bid form must all bear original signatures."
6. Section 01 20 00 Price and Payment Procedures. At paragraph 1.1, delete sub-paragraphs A, B, and C referencing allowances.
7. Delete section 02 41 16 Structure Demolition.

CHANGES TO THE DRAWINGS

1. Cover Sheet: Delete D.100 from the list of drawings.
2. Sheet DS.100:
    a. Change all notes reading "OWNER TO REMOVE TREE" to read "DEMO/REMOVE TREE." Removal of such trees is now in the scope of this project.
    b. Delete the note that reads "REMOVE EXISTING ENTRY CANOPY" to the south of the existing buildings. Removal of this canopy is not in the scope of work of this project.
    c. Change the note reading "DEMO EXISTING BUILDING RE: D.100" and pointing to the hatched existing buildings to read "EXSTING BUILDINGS TO BE DEMO'D/REMOVED BY OTHERS" The demolition and removal of the existing buildings in no longer in the scope of this project.
    d. At the note pointing to the existing gymnasium and reading "EXISTING BUIDING TO REMIAN RE: D.100", Remove the reference to Sheet D.100.
    e. Remove the note between the baseball fields that reads "REMOVE CONCRETE PAD: OWNER TO REMOVE CANOPY". No work regarding these canopies or pads remains in this project.
3. Sheet D.100: Remove Sheet D.100. The demolition indicated this sheet is not included in the scope of this project and will be done by others.
4. Sheet AS.100: Add a general note to read: "Contractor construction area is defined by the new construction fence and silt fences indicated this sheet. Site access will be at the northeast corner of the site through the existing City work yard adjacent to the water tower. The area between the City's work yard the defined construction area may be utilized as a staging area. The southeast quadrant of the construction area, and associated fencing, is subject to adjustment based upon work by others. Coordination of the exact location of the fencing with others will be required."

CLARIFICATIONS TO THE DRAWINGS

1. Sheet DS.100:
    a. There is a hexagonal area defined by flatwork to be demolished within the southwest quadrant of where the building will be located that is not fully intact. The concrete is partially broken up and there are pits, small mounds, and playground surfacing debris in this area. These conditions described but not limited to are required to be demolished and removed as indicated and necessary to prepare the site for footings and foundations of the building and final site preparation.

END OF DOCUMENT

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CITY OF EDINBURG SAFE ROOM — TUE · 12 · NOV · '13

PRE · PROPOSAL CONF — CITY LIBRARY 3:00

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SYSTEM FOR AWARD MANAGEMENT REGISTRATION

Any business choosing to bid or provide proposals on Federal government projects must be registered in the **System for Award Management**. To register, please go to the following internet website: http://www.sam.gov. To register in SAM, a firm must have a Data Universal Numbering System (DUNS) number. The DUNS Number is assigned by Dun & Bradstreet, Inc. (D&B) to identify unique business entities.

(If you do not have a DUNS number, go to www.grants.gov/applicants/org_step1.jsp or *http://fedgov.dnb.com/webform to obtain one.)*

System for Awards Management (SAM) is the primary federal registrant database. SAM collects, validates, stores and disseminates data on federal awards.

*****<u>PROSPECTIVE VENDORS MUST BE REGISTERED IN</u>*****

*****<u>SAM PRIOR TO THE AWARD OF A CONTRACT</u>*****

.

1. Does your organization have active registration status with SAM? ____Yes ____No

2. Please provide you organizations DUNS number: _____

Note: Please submit this completed form to the Community Development Department when submitting your bid package. The Community Development Department is located at the Edinburg City Hall on the first floor in Suite F. Please address it to the attention of Eddie Garza, Grants Accountant. If you have any questions please call me at (956) 388-8206 or email me at egarza@cityofedinburg.com.

Thank you.

RABA KISTNER

GEOTECHNICAL ENGINEERING STUDY

FOR

Proposed City of Edinburg
Parks & Recreation Center Renovation and Expansion
315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER CONSULTANTS

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TBPE Firm F-3257

Project No. AMA13-023-00
May 10, 2013

Mr. David Negrete, A.I.A.
Negrete & Kolar Architects, LLP
204 East Stubbs Street
Edinburg, Texas 78539

Re: Geotechnical Engineering Services
Proposed City of Edinburg Parks & Recreation Center Renovation and Expansion
315 East Palm Drive
Edinburg, Hidalgo County, Texas

Dear Mr. Negrete:

Raba Kistner Consultants, Inc. (RKCI) is pleased to submit the report of our Geotechnical Engineering Study for the above-referenced project. This study was performed with in accordance with the executed Agreement between the Architect and Consultant (**RKCI**), effective February 7, 2013, referring to **RKCI** Proposal No. PMA13-005-00, dated February 7, 2013. Written authorization to proceed with this study was received by our office via electronic-mail attachment on Wednesday, April 3, 2013, by means of the Agreement between Negrete & Kolar Architects, LLP (Architect) and **RKCI** (Consultant), dated February 7, 2013. The purpose of this study was to drill borings within the proposed recreational building expansion site, to perform laboratory testing on selected samples to classify and characterize subsurface conditions, and to prepare an engineering report presenting foundation design and construction recommendations for the proposed recreational building expansion.

The following report contains our foundation recommendations and considerations based on our current understanding of the finished floor elevations, design tolerances, and structural loads. If any of these parameters changes, then there may be alternatives for value engineering of the foundation system, and **RKCI** recommends that a meeting be held with Negrete & Kolar Architects, LLP (CLIENT) and the design team to evaluate these alternatives.

We appreciate the opportunity to be of professional service to you on this project. Should you have any questions about the information presented in this report, please call. We look forward to assisting Negrete & Kolar Architects, LLP during the construction of the project by conducting the construction materials engineering and testing services (quality assurance program).

Very truly yours,

RABA KISTNER CONSULTANTS, INC.

Jorge L. Perez
Graduate Engineer

Katrin M. Leonard, P.E.
Associate

Attachments

JLP/KML

Copies Submitted: Above (1)
Hinojosa Engineering, Inc. (1)
Rio Delta Engineering (1)
Engineering System Solutions, ES^2 (1)

GEOTECHNICAL ENGINEERING STUDY

For

PROPOSED CITY OF EDINBURG PARKS & RECREATION CENTER
RENOVATION AND EXPANSION
315 EAST PALM DRIVE
EDINBURG, HIDALGO COUNTY, TEXAS

Prepared for

NEGRETE & KOLAR ARCHITECTS, LLP
Edinburg, Texas

Prepared by

RABA KISTNER CONSULTANTS, INC.
McAllen, Texas

PROJECT NO. AMA13-023-00

May 10, 2013

TABLE OF CONTENTS

TABLE OF CONTENTS

ATTACHMENTS

INTRODUCTION

Raba Kistner Consultants, Inc. (RKCI) has completed the authorized subsurface exploration and foundation recommendations for the proposed building addition to the existing City of Edinburg Parks and Recreation Center, located at 315 East Palm Drive in Edinburg, Hidalgo County, Texas. This report briefly describes the procedures utilized during this study and presents our findings along with our recommendations for foundation design and construction considerations.

PROJECT DESCRIPTION

It is our understanding that the proposed project consists of the demolition by others of about 5,080 ft^2 portion of an existing 11,000 ft^2 gymnasium and storage building, and the design and construction of an about 54,880 ft^2 recreational building addition to be constructed adjacent to the remaining building. The proposed new building addition will include two gymnasium dome Federal Emergency Management Agency (FEMA) structures (about 26,400 ft^2 in footprint area), administration offices, library, and recreational rooms. The existing City if Edinburg Parks & Recreation Center is located at 315 East Palm Drive in Edinburg, Hidalgo County, Texas. The proposed new building addition is expected to create relatively moderate to heavy loads to be carried by the foundation system, which is anticipated to consist of either a slab-on-fill, shallow foundation system or drilled, straight-shaft piers, deep foundation system.

On the basis of the topographic plan titled "Existing Topographic Layout - City of Edinburg Parks and Recreation Dept. Renovation and Addition", dated April 3, 2013, and provided to us on Wednesday, May 8, 2013, by Mr. Ivan Garcia, EIT with Rio Delta Engineering, the project's civil engineering firm, it is our understanding that the ground surface elevations existing at the time of our study within the proposed recreational building addition's footprint area range from about 100.0 to about 101.2 ft above mean sea level (MSL) and the finished floor elevation (FFE) of the proposed addition will match the FFE of the existing gymnasium and storage building of 101.47 ft above MSL. Further, on the basis of the information provided to us via electronic-mail on May 9, 2013 by Mr. Simon Solorio, P.E., with Solorio & Associates, Inc., one of the project's structural engineering firms, we also understand that maximum column loads of about 40 kips and maximum wall loads of about 5 kips per linear foot are anticipated for the proposed structure.

LIMITATIONS

This engineering report has been prepared in accordance with accepted Geotechnical Engineering practices in the region of South Texas for the use of Negrete & Kolar Architects, LLP (CLIENT) and its representatives for design purposes. 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 submitted in this report are based on the data obtained from seven borings drilled at the subject site and our understanding of the project information provided to us by others. If the project information described in this report is incorrect, is altered, or if new information is available, we should be retained to review and modify our recommendations.

This report may not reflect the actual variations of the subsurface conditions across the subject site. The nature and extent of variations across the subject site may not become evident until construction commences. The construction process itself may also alter subsurface conditions. If variations appear evident at the time of construction, it may be necessary to reevaluate our recommendations after performing on-site observations and tests to establish the engineering impact of the variations.

The scope of our Geotechnical Engineering Study does not include an environmental assessment of the air, soil, rock, or water conditions either on or adjacent to the site. No environmental opinions are presented in this report. **RKCI**'s scope of work does not include the investigation, detection, or design related to the prevention of any biological pollutants. The term "biological pollutants" includes, but is not limited to, mold, fungi, spores, bacteria, and viruses, and the byproduct of any such biological organisms.

If the final grade elevation is significantly different from the site grading information provided to us by others, our office should be informed about these changes. If needed and/or if desired, we will reexamine our analyses and make supplemental recommendations.

BORINGS AND LABORATORY TESTS

Subsurface conditions at the subject site were evaluated by seven borings as shown on the following table:

Proposed Boring Location	Number of Borings	Depth, ft. *	Boring Identification
Proposed Gymnasium Dome FEMA Structure Area	4	40	B-1 through B-4
Proposed Remaining Recreational Building Addition Area	3	30	B-5 through B-7

* below the ground surface elevations existing at the time of our study.

The borings (designated as "B-") were drilled on April 15 and April 16, 2013, at the locations shown on the Boring Location Map, Figure 1. The boring locations are approximate and were located in the field by an **RKCI** representative based on an undated and untitled site plan, provided to us by the CLIENT, via electronic-mail attachment on Wednesday, January 16, 2013. The borings were drilled to the depths indicated in the above table below the ground surface elevations existing at the time of our study using a truck-mounted, rotary-drilling rig. The borings were conducted utilizing straight flight augers and were backfilled with the auger cuttings following completion of the drilling operations. During the drilling operations, the samples shown in the table presented in the following page were collected:

Sample Type	Number Collected
Split-Spoon (with Standard Penetration Test, SPT)	57
Shelby Tubes (ST)	14

The ST and SPT samples were obtained in accordance with accepted standard practices and the penetration test results are presented as "blows per foot" on the boring logs. Representative portions of

the samples were sealed in containers to reduce moisture loss, labeled, packaged, and transported to our laboratory for subsequent testing and classification.

In the laboratory, each sample was evaluated and visually classified by a member of our Geotechnical Engineering staff in general accordance with the Unified Soil Classification System (USCS). The geotechnical engineering properties of the strata were evaluated by the laboratory tests tabulated in the following table:

Test Type	Number Conducted
Natural Moisture Content	70
Atterberg Limits	25
Percent Passing a No. 200 Sieve	18
Unconfined Compressive Strength	5
Dry Unit Weight	12
Corrosivity (Including Electrical Resistivity, pH, and Sulfate Content Determinations)	1

With the exception of the laboratory corrosivity (including electrical resistivity, pH, sulfate content), the results of the field and laboratory tests are presented in graphical or numerical form on the boring logs illustrated on Figures 2 through 8. A key to the classification of terms and symbols used on the logs is presented on Figure 9. The results of the laboratory and field testing are also tabulated on Figure 10 for ease of reference.

The corrosion potential of the subsurface soils to concrete and uncoated steel was preliminarily evaluated by conducting laboratory analyses (pH, electrical resistivity, and sulfate content) on a bulk soil sample obtained within the proposed building addition's footprint area from an approximate depth of about 1-1/2 ft below the ground surface elevations existing at the time of our study. The laboratory test results are presented and discussed in a subsequent section of this report.

SPT results are noted as "blows per ft" on the boring logs and on Figure 10, where "blows per ft" refers to the number of blows by a falling 140-lb (pound) hammer required for 1 ft of penetration into the subsurface materials. Where hard materials were encountered, the tests were terminated at 50 blows even if one foot of penetration had not been achieved.

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

GENERAL SITE CONDITIONS

SITE DESCRIPTION

The subject site for the proposed building addition to the existing City of Edinburg Parks and Recreation Center is located at 315 East Palm Drive in Edinburg, Hidalgo County, Texas. At the time of our field activities, the project site can be described as a grass-covered landscaped area with concrete sidewalks, playground areas, canopies, and isolated stands of trees within the existing City of Edinburg Parks and Recreation Center facility. In general, the topography at the subject site is relatively flat, with a visually estimated vertical relief of less than about 3 ft across the site. Surface drainage is estimated to be poor-to-fair. The existing City of Edinburg Parks and Recreation Center is bounded to the north by East Freddy Gonzalez Drive; to the south by East Palm Drive; to the west by the existing City of Edinburg Custodial Services facility, followed by South Closner Boulevard; and to the east by the existing Citrus Mobile & RV Park.

SITE GEOLOGY

A cursory review of the Geologic Atlas of Texas (McAllen-Brownsville Sheet, dated 1976), published by the Bureau of Economic Geology at the University of Texas at Austin, indicates that the subject site appears to be located within the Lissie Formation consisting of clays, silts, sands, gravel, and caliche deposits of the Quaternary epoch (Pleistocene period).

According to the Soil Survey of Hidalgo County, Texas, published by the United States Department of Agriculture - Soil Conservation Service, in cooperation with the Texas Agricultural Experiment Station, the project site appears to be located within the Hidalgo soil association consisting of deep, moderately permeable soils that typically have a dark grayish-brown, sandy clay loam surface layer. The corresponding soil symbol appears to be 31, Hidalgo-Urban land complex.

SEISMIC COEFFICIENTS

Based upon a review of Section 1613 *Earthquake Loads* of the 2012 International Building Code (IBC), the following information has been summarized for seismic considerations associated with this site based on Latitude 26.285156°N and Longitude 98.162564°W.

- Site Class Definition (Table 1613.5.2): **Class D**. Based on the borings conducted for this investigation, the upper 100 feet of soil may be characterized as a soft soil profile.
- Mapped Maximum Considered Earthquake Ground Motion for a 0.2 sec., Spectral Response Acceleration (Figure 1613.5(1)): **S_s = 0.043g**. Note that the value taken from Figure 1613.5(1) is based on Site Class B and is adjusted as per 1613.5.3 below.
- Mapped Maximum Considered Earthquake Ground Motion for a 1 sec., Spectral Response Acceleration (Figure 1613.5(2)): **S_1 = 0.015g**. Note that the value taken from Figure 1613.5(2) is based on Site Class B and is adjusted as per 1613.5.3 below.
- Value of Site Coefficient (Table 1613.5.3 (1)): *from worksheet* **F_a = 2.5**.
- Value of Site Coefficient (Table 1613.5.3 (2)): *from worksheet* **F_v = 3.5**.

The Maximum Considered Earthquake Spectral Response Accelerations are as follows:

- 0.2 sec., adjusted based on equation 16-37: *from worksheet* **S_{ms} = 0.069g**.
- 1 sec., adjusted based on equation 16-38: *from worksheet* **S_{m1} = 0.035g**.

The Design Spectral Response Acceleration Parameters are as follows:

- 0.2 sec., based on equation 16-39: *from worksheet* **S_{DS} = 0.046g**.
- 1 sec., based on equation 16-40: *from worksheet* **S_{D1} = 0.023g**.

Based on the parameters listed above, the critical nature of the structure addition, Tables 1613.5.6(1) and 1613.5.6(2), and calculations performed using a Java program titled, "Seismic Hazard Curves and Uniform Hazard Response Spectra" published by the United States Geological Survey (USGS), the Seismic Design Category for both short period and 1 second response accelerations is **IVA**.

STRATIGRAPHY

The subsurface stratigraphy at this site can be described by a single generalized stratum with similar physical and engineering characteristics. This stratum consists of brown to light brown to light reddish-brown, stiff to hard, sandy lean clay soils, sandy fat clay soils, lean clay soils with sand, fat clay soils with sand, lean clay soils, and fat clay soils with roots, shell fragments, calcareous nodules, black and orange ferrous stains, and gypsum crystals. This layer was noted in the borings from the ground surface elevations existing at the time of our drilling operations down to at least the termination depths of the borings. Measured moisture contents range from about 8 to 30 percent. This stratum is classified as moderately plastic to highly plastic, with measured plasticity indices ranging from 19 to 65 percent. Percent passing a No. 200 sieve tests demonstrate percent fines ranging from about 53 to 91 percent. Undrained shear strength values ranging from about 0.7 to 1.4 tons per square foot (tsf) were measured, based on unconfined compression strength tests. Unit dry weight values ranging from about 92 to 111 pound per cubic foot (pcf) were measured for this layer. SPT N-values ranging from 8 blows to 50 blows per foot of penetration were measured for this stratum. These soils are classified as CL soils and/or CH soils in general accordance with the USCS.

GROUNDWATER

Groundwater was encountered during our drilling operations only in Borings B-2 and B-4 at a depth of about 36 ft and 38 ft, respectively, below the ground surface elevations existing at the time of our study. Please note that a layer with perched water was encountered at a depth of about 10 ft in Boring B-4. The boreholes were left open for the duration of the field exploration phase to allow monitoring of water levels. It is possible for groundwater to exist beneath this site at shallower depths on a transient basis following periods of precipitation. Fluctuations in groundwater levels occur due to variations in rainfall and surface water run-off. The construction process itself may also cause variations in the groundwater level.

Please note that the borings for this study were conducted at drought conditions, which have been predominant at the time of this study. Based on the field data obtained for this study, we do not

anticipate encountering groundwater during shallow earthwork excavations; however, if the excavations are conducted during or after a rain event, then groundwater intrusion into the excavations will likely become an issue. Based on the findings in the borings and on our experience in this region, we believe that groundwater seepage encountered during site earthwork activities and shallow foundation construction may be controlled using temporary earthen berms and conventional sump-and-pump dewatering methods. For deep foundation excavations, this could include the use of temporary casing to reduce groundwater seepage and sloughing of the clay soils.

CORROSIVITY POTENTIAL

The corrosivity characteristics of the subsurface soils were evaluated with a pH test, an electrical resistivity test, and a sulfate content test. These tests were conducted on a single bulk specimen from the subsurface soils obtained within the proposed building addition's footprint area from an approximate depth of about 1-1/2 ft below the ground surface elevations existing at the time of our study. Results are summarized in the following table:

Composite Sample Identification	Electrical Resistivity (ohm-cm)	pH	Sulfate Content (ppm)
Proposed Recreational Building Addition's Footprint (Approximate Depth: 1-1/2 ft)	764	8.1	20,000

Where: ppm = parts per million
mg/kg = milligrams per kilogram

The results of the electrical resistivity laboratory test result indicates that the subsurface soils at this site have an extremely corrosion potential to buried metals. According to the American Concrete Institute (ACI) document titled "Guide to Durable Concrete" (ACI 201), concrete usually provides protection against rusting of adequately embedded steel because of the highly alkaline environment of the Portland cement paste. The adequacy of that protection is dependent upon the amount of concrete cover, the quality of the concrete, the details of the construction, and the degree of exposure to chlorides from concrete-making components and external sources. It is recommended that no chloride-containing admixtures be utilized in the concrete mixes for this project. Consideration should also be given to implementing corrosion protection measures for buried metals in direct contact with the soil, such as coating metal structural elements, pipings, and/or fittings. The pH laboratory test result indicates that the near-surface native soils within the proposed recreational addition's footprint area are moderately alkaline. On the basis of the laboratory sulfate content test result, the subsurface clay soils at this site appear to result in a high exposure of concrete to corrosion. According to these laboratory test results, the native clay soils result in a Class 3 severity of potential exposure of concrete to corrosion. The ACI 201 Guide indicates that special cementitious material consisting of Portland Cement Class C 150 Type V plus pozzolan or slag is required for sulfate resistance for a Class 3 exposure.

FOUNDATION ANALYSES

EXPANSIVE, SOIL-RELATED MOVEMENTS

The anticipated ground movements due to swelling of the underlying soils at the site were estimated for slab-on-grade construction using the empirical procedure, Texas Department of Transportation (TxDOT) Tex-124-E, Method for Determining the Potential Vertical Rise (PVR). PVR values on order of about **1-3/4 inches** were estimated for the stratigraphic conditions encountered in the borings at the time of our field drilling operations. The PVR values were estimated using a surcharge load of 1 pound per square inch (psi) for the concrete slab and dry moisture conditions within the regional zone of seasonal moisture variation.

The TxDOT 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 analysis of expansive, soil-related movements were beyond the scope of the current study. It should also be noted that actual movements can exceed the estimated PVR values due to isolated changes in moisture content (such as due to leaks, landscape watering, etc.) or if water seeps into the soils to greater depths than the assumed active zone depth due to deep trenching or excavations.

PVR REDUCTION RECOMMENDATIONS

As mentioned previously, on the basis of the topographic plan titled “Existing Topographic Layout - City of Edinburg Parks and Recreation Dept. Renovation and Addition”, dated April 3, 2013, and provided to us on Wednesday, May 8, 2013, by the project’s civil engineering firm, it is our understanding that the ground surface elevations existing at the time of our study within the proposed recreational building expansion footprint area range from about 100.0 to about 101.2 ft above MSL and the FFE of the proposed addition will match the FFE of the existing gymnasium and storage building of 101.47 ft above MSL.

To reduce expansive, soil-related movements in at-grade construction beneath the proposed structure footprint area to about 1 inch, we recommend the removal of the upper on-site clay soils down to elevation 98.5 ft above MSL, and replace them with properly-compacted, suitable, select fill material within the proposed recreational building expansion footprint area up to the proposed recreational building addition’s finished grade elevation (FGE). Keep in mind that the estimated PVR values are computed based on the recommendations for the selection and placement of suitable, select fill materials which are addressed in the *Foundation Construction Considerations* section of the report.

Drainage Considerations When overexcavation and select fill replacement is selected as a method to reduce the potential for expansive, soil-related movements at any site, considerations of surface and subsurface drainage may be crucial to construction and adequate foundation performance of the soil-supported structure. Filling an excavation in relatively impervious clay soils with relatively pervious select fill material creates a “bathtub” beneath the proposed building addition, which can

result in ponding or trapped water within the fill unless good surface and subsurface drainage is provided.

Water entering the fill surface during construction or entering the fill exposed beyond the building addition lines after construction may create problems with fill moisture control during compaction and increased access for moisture to the underlying expansive clays both during and after construction.

Several surface and subsurface drainage design features and construction precautions can be used to limit problems associated with fill moisture. These features and precautions may include, but are not limited to, the following:

- Installing berms or swales on the uphill side of the construction area to divert surface runoff away from the excavation/fill areas during construction;
- Sloping of the top of the subgrade with a minimum downward slope of 1.5 percent out to the base of a dewatering trench located beyond the structure addition's perimeter;
- Sloping the surface of the fill during construction to promote runoff of rain water to drainage features until the final lift is placed;
- Sloping of a final, well-maintained, impervious clay or pavement surface (downward away from the proposed structure addition) over the select fill material and any perimeter drain extending beyond the building lines, with a minimum gradient of 6 inches in 5 ft;
- Constructing final surface drainage patterns to prevent ponding and limit surface water infiltration at and around the structure addition's perimeter;
- Locating the water-bearing utilities, roof drainage outlets, and irrigation spray heads outside of the select fill and perimeter drain boundaries; and
- Raising the elevation of the ground level floor slab.

Details relative to the extent and implementation of these considerations must be evaluated on a project-specific basis by all members of the project design team. Many variables that influence fill drainage considerations may depend on factors that are not fully developed in the early stages of design. For this reason, drainage of the fill should be given consideration at the earliest possible stages of the project.

FOUNDATION RECOMMENDATIONS

FOUNDATION OPTIONS

The following recommendations are based on the data obtained from our field and laboratory test results, our past experience with geotechnical conditions similar to those at this site, and our engineering design analyses.

The following foundation systems are available to support the structure:

- A shallow foundation system consisting of conventional spread and/or continuous footing foundations in conjunction with the implementation of the ground improvement procedure presented in the *PVR Reduction Recommendation* subsection of the *Foundation Analysis* section of this report; or
- A deep foundation system consisting of drilled, straight-shaft piers, deep foundation system, in conjunction with the implementation of the ground improvement procedure presented in the *PVR Reduction Recommendation* subsection of the *Foundation Analysis* section of this report.

The CLIENT may select either one of these foundation systems, depending on the performance criteria established for the structure. Cost analyses have not been conducted for any foundation system and are beyond the scope of this study.

SITE GRADING

Site grading plans can result in changes in almost all aspects of foundation recommendations. We have prepared the foundation recommendations based on the stratigraphic conditions encountered in the borings drilled at the project site and our understanding of the site grading information provided to us by others. If site grading plans differ from the information provided to us by others, **RKCI** must be retained to review the site grading plans prior to bidding the project for construction. This will enable **RKCI** to provide input for any changes in our original recommendations that may be required as a result of site grading operations or other considerations.

SHALLOW FOUNDATIONS

The proposed recreational building addition may be founded on a rigid-engineered beam and slab-on-fill foundations and/or on a conventional spread and/or continuous footing foundations, provided that the shallow foundation type(s) can be designed to withstand the anticipated soil-related movements (see the *Foundation Analyses* section of this report) without impairing either the structural or the operational performance of the proposed building structure.

Allowable Soil-Bearing Capacity

Shallow foundations founded on new, properly-compacted, suitable, select fill materials or on native soils in conjunction with the site improvement procedure presented in the *PVR Reduction Recommendation* subsection of the *Foundation Analyses* section of this report may be proportioned using the design parameters in the following table:

Minimum depth below final grade:	24 in.
Minimum beam width:	12 in.
Maximum allowable soil-bearing pressure for continuous footings-grade beams:	1,700 psf
Maximum allowable soil-bearing pressure for spread footings-widened beams:	2,100 psf

Where psf = pounds per square feet

The above maximum allowable soil-bearing pressures will provide a factor of safety of about 3 with respect to the measured soil shear strength, provided that the subgrade is prepared in accordance with the recommendations outlined in the *Site Preparation* subsection of the *Foundation Construction Considerations* section of this report, and the ground improvement procedure is implemented in accordance with the recommendations presented in the *PVR Reduction Recommendation subsection* of the *Foundation Analysis* section of this report. We estimate total settlements to be on the order of about 1 inch. Differential settlements are typically estimated to be about one-half of the total estimated settlement for most subsurface conditions.

Furthermore, the design parameters presented previously are contingent upon the fill materials being selected and placed in accordance with the recommendations presented in the *Select Fill* subsection of the *Foundation Construction Considerations* section of this report. Should select fill selection and placement differ from the recommendations presented herein, **RKCI** should be informed of the deviations in order to reevaluate our recommendations and design criteria.

Wire Reinforcement Institute (WRI) Criteria

The slab-on-fill or on-grade shallow foundation may also be designed using WRI design criteria. On the basis of the subsurface stratigraphy encountered, a general effective plasticity index for the proposed recreational building addition of 31 percent and a climatic rating (C_w) of 15 should be utilized for the design of the proposed building addition's foundation. However, if the previously mentioned site grading alternative is implemented to reduce the estimated PVR values to about 1 inch, then a modified design plasticity index of 28 percent and a climatic rating (C_w) of 15 can be utilized for the design of the proposed recreational building addition's foundation.

AREA FLATWORK

It should be noted that ground-supported flatwork such as walkways, driveways, courtyards, sidewalks, etc., will be subject to the same magnitude of potential soil-related movements as discussed previously (see the *Foundation Analyses* section of the report) for this site. Thus, where these types of elements abut rigid building foundations or isolated structures, differential movements should be anticipated. As a minimum, we recommend that flexible joints be provided where such elements abut the main structure to allow for differential movement at these locations. Where the potential for differential movement is objectionable, it may be beneficial to consider methods of reducing anticipated movements to match the adjacent building's performance.

DEEP FOUNDATIONS

Alternatively, drilled, straight-shaft piers may be considered for the proposed recreational building addition. The piers should be designed as both end bearing and friction units, utilizing the allowable side shear resistance and allowable end-bearing pressures presented in the following tables:

Bearing Depth (ft) *	Maximum Allowable End-Bearing Pressure (ksf)
20	7.5
25	12.7

* below the ground surface elevations existing at the time of our study.

Depth Range Below the Ground Surface Elevations Existing at the Time of our Study (ft)	Allowable Side Shear Resistance (ksf)
0 to 8	0
8 to 20	0.75
20 to 25	0.50
25 to 35	1.00

The side shear resistance values presented above should be used for the portion of the shaft extending below a depth of 8 ft. If the drilled, straight-shaft piers are designed as both end bearing units and as friction units, the side shear resistance value should be neglected along the portion of the shaft located one shaft diameter from the bottom of the pier, in order to proportion the drilled piers for axial compression.

The allowable values for end bearing and side shear resistance were evaluated using factors of safety of 3 and 2, respectively, with respect to the measured soil shear strength. Based on the 40-ft maximum depth of exploration, drilled-and-underreamed pier depth should not exceed a depth of 35 ft below the ground surface elevations existing at the time of our study.

Pier Shafts

The pier shafts will be subjected to potential uplift forces if the surrounding expansive soils within the active zone are subjected to alternate drying and wetting conditions. The maximum potential uplift force acting on the shafts may be estimated by:

$$F_u = 23\ D$$

Where: F_u = uplift force in kips; and
D = diameter of the shaft in feet.

It is recommended that the pier shafts be a minimum of 24 inches in diameter to facilitate reinforcing steel placement and shaft observation prior to placing concrete.

Allowable Uplift Resistance

Resistance to uplift forces exerted on the drilled, straight-shaft piers will be provided by the sustained compressive axial force (dead load) plus the allowable uplift resistance provided by the soil. The resistance provided by the soil depends on the shear strength of the soils adjacent to the pier shaft and below the depth of the active zone. The allowable uplift resistance values provided by the soils at this site are tabulated on the following table. These values were evaluated using a factor of safety of 2.

Depth Range Below the Ground Surface Elevations Existing at the Time of our Study (ft)	Allowable Uplift Resistance (ksf)
0 to 8	0
8 to 20	0.50
20 to 25	0.35
25 to 35	0.65

Reinforcing steel will be required in each pier shaft to withstand a net force equal to the uplift force minus the uplift resistive force and the sustained compressive load carried by the pier. We recommend that each pier be reinforced to withstand this net force or an amount equal to 1 percent of the cross-sectional area of the shaft, whichever is greater.

Pier Spacing

Where possible, we recommend that the piers be spaced at a center-to-center distance of at least three shaft diameters on-center. Such spacing will not require a reduction in the load carrying capacity of the individual piers.

If design and/or construction restraints require that piers be spaced closer than the recommended three shaft diameters, **RKCI** must re-evaluate the allowable bearing capacities presented above for the individual piers. Reductions in load carrying capacities may be required depending upon individual loading and spacing conditions.

GRADE BEAMS

For the structure being considered, we recommend that the grade beams interconnecting the piers be ground-supported on properly-compacted, suitable select fill materials, but designed to span the piers.

FLOOR SLABS

For the structure being considered, the floor slabs may be ground supported on properly-compacted, suitable, select fill materials, provided that the anticipated movements discussed under the *Expansive Soil-Related Movements* section of this report will not impair the performance of the floor, frame, or roof systems.

LATERAL RESISTANCE

Resistance to lateral loads and the expected pier behavior under the applied loading conditions will depend not only on subsurface conditions, but also on loading conditions, the pier size(s), and the engineering properties of the pier. Once the structural loadings are known, as well as the pier sizes and properties, the piers should be analyzed to determine the resulting lateral deflections, maximum bending moments, and ultimate bending moments. This type of analysis is typically performed utilizing a computer analysis program and usually requires a trial and error procedure to appropriately size the piers and meet project tolerances.

To assist the structural engineering firm in this procedure, we are providing the following soil parameters for use in lateral analysis:

Approximate Depth Range (ft) *	Ultimate Passive Pressure (psf/ft of depth)
0 to 8	Neglect
8 to 20	90
20 to 35	100

* Below the ground surface elevation existing at the time of our study.

The design parameters presented above **do not** include factors of safety. Consequently, it is recommended that a factor of safety of at least 2 be introduced to the analysis by doubling the applied lateral loads and moments.

FOUNDATION CONSTRUCTION CONSIDERATIONS

SITE DRAINAGE

Drainage is an important key to the successful performance of any foundation. Good surface drainage should be established prior to and maintained after construction to help prevent water from ponding within or adjacent to the recreational building addition's foundation and to facilitate rapid drainage away from the recreational building addition's foundation. Failure to provide positive drainage away

from the structure can result in localized differential vertical movements in soil supported foundation and floor slab.

Current ordinances, in compliance with the Americans with Disabilities Act (ADA), may dictate maximum slopes for walks and drives around and into a new building. These slope requirements can result in drainage problems for buildings supported on expansive soils. We recommend that, on all sides of the recreational building addition, the maximum permissible slope be provided away from the recreational structure addition.

Also to help control drainage in the vicinity of the proposed recreational building addition, we recommend that roof/gutter downspouts and landscaping irrigation systems not be located adjacent to the recreational building addition's foundation. Where a select fill overbuild is provided outside of the floor slab/foundation footprints, the surface should be sealed with an impermeable layer (pavement or clay cap) to reduce infiltration of both irrigation and surface waters. Careful consideration should also be given to the location of water bearing utilities, as well as to provisions for drainage in the event of leaks in water bearing utilities. All leaks should be immediately repaired.

Other drainage and subsurface drainage issues are discussed in the *Foundation Analyses* section of this report.

SITE PREPARATION

The recreational building addition area and all areas to support select fill should be stripped of all existing pavement and foundation constituents, all underground utilities, vegetation, and/or organic topsoil down to a minimum depth of 8 inches and extending a minimum of 5 ft beyond the proposed structure addition's footprint. Further as discussed in a previous section of this report, we recommend that the site improvement procedure be implemented to reduce the estimated PVR values to about 1 inch. Care should be taken in order not to undermine the existing gymnasium and storage building's foundation and structures to remain in place.

Beyond the building pad footprint existing utilities and trenches that are not removed should be properly abandoned. This would include grouting abandoned pipes and sealing off granular fill in utility trenches to prevent the migration and seepage of water into the building pad of the new building addition.

Exposed subgrades should be thoroughly proofrolled in order to locate and densify any weak, compressible zones. A minimum of 5 passes of a fully-loaded dump truck or a similar heavily-loaded piece of construction equipment should be used for planning purposes. Proofrolling operations should be observed by the Geotechnical Engineer or his representative to document subgrade conditions and preparation. Weak or soft areas identified during proofrolling activities should be treated with hydrated lime or Portland cement or removed and replaced with suitable, compacted select fill in accordance with the recommendations presented under the *Select Fill* subsection of this section of the report. If the treatment option is selected, the weak or soft areas may be mixed with hydrated lime or Portland cement down to a minimum depth of 8 inches in order to aid in drying the soils and develop a firm working

surface. Proofrolling operations and any excavation/backfill activities should be observed by **RKCI** representatives to document subgrade preparation.

Upon completion of the proofrolling operations and just prior to fill placement, the exposed subgrades should be moisture-conditioned by scarifying to a minimum depth of 8 in. and recompacting to a minimum of 98 percent of the maximum dry density as determined from the American Standards for Testing and Materials (ASTM) D698, Compaction Test. The moisture content of the subgrade should be maintained within the range of optimum moisture content to three percentage points above the optimum moisture content until the final lift of fill is permanently covered.

SELECT FILL

Materials used as select fill for final site grading preferably should be crushed stone or gravel aggregate. We recommend that materials specified for use as select fill meet the TxDOT 2004 Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, Item 247, Flexible Base, Type A, Type B, or Type C, Grades 1 through 3.

Alternatively, the following soils, as classified according to the USCS, may be considered satisfactory for use as select fill materials at this site: CL, SC, GC, and combinations of these soils. In addition to the USCS classification, alternative select fill materials shall have a maximum liquid limit of 35 percent, a plasticity index between 5 and 17 percent, and a maximum particle size not exceeding 4 inches or one-half the loose lift thickness, whichever is smaller. In addition, if these materials are utilized, grain size analyses and Atterberg Limits must be performed during placement at a minimum rate of one test each per 5,000 cubic yards of material due to the high degree of variability associated with pit-run materials.

If the above listed alternative materials are being considered for bidding purposes, the materials should be submitted to the Geotechnical Engineer for pre-approval at a minimum of 10 working days or more prior to the bid date. Failure to do so will be the responsibility of the General Contractor. The General Contractor will also be responsible for ensuring that the properties of all delivered alternate select fill materials are similar to those of the pre-approved submittal. It should also be noted that when using alternative fill materials, difficulties may be experienced with respect to moisture control during and subsequent to fill placement, as well as with erosion, particularly when exposed to inclement weather. This may result in sloughing of beam trenches and/or pumping of the fill materials.

Soils classified as CH, CL, MH, ML, SM, GM, OH, OL, and Pt under the USCS and not meeting the alternative select fill material requirements, are **not** considered suitable for use as select fill materials at this site. The native soils at this site are **not** considered suitable for use as select fill materials.

Select fill should be placed in loose lifts **not** exceeding 8 in. in thickness and compacted to at least 98 percent of the maximum dry density as determined by ASTM D698. The moisture content of the fill should be maintained within the range of two percentage points below the optimum moisture content to two percentage points above the optimum moisture content until the final lift of fill is permanently covered.

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

SHALLOW FOUNDATION EXCAVATIONS

Shallow foundation excavations should be observed by the Geotechnical Engineer or his representative prior to placement of reinforcing steel and concrete. This is necessary to observe that the bearing soils at the bottom of the excavations are similar to those encountered in the borings and that excessive soft materials and water are not present in the excavations. If soft soil pockets 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 elevations.

DRILLED PIERS

If implemented, drilled pier excavations must be examined by an **RKCI** representative who is familiar with the geotechnical aspects of the subsurface stratigraphy, the structural configuration, foundation design details, and assumptions prior to placing concrete. This is to observe that:

- The shaft has been excavated to the specified dimensions at the correct depth established by the previously mentioned criteria;
- The shaft has been drilled plumb within specified tolerances along its total length; and
- Excessive cuttings, buildup and soft, compressible materials have been removed from the bottom of the excavation.

Drilled pier excavation observations should be scheduled with the Geotechnical Engineer a minimum of 48 hours prior to pier drilling. Failure to do so will be the responsibility of the General Contractor.

Reinforcement and Concrete Placement

Reinforcing steel should be checked for size and placement prior to concrete placement. Placement of concrete should be accomplished as soon as possible after excavation to reduce changes in the moisture content or the state of stress of the foundation materials. Concrete should not be placed in the pier excavations without the approval of the Engineer. No foundation element should be left open overnight without concreting.

EXCAVATION SLOPING AND BENCHING

Excavations that extend to or below a depth of 5 ft below construction grade shall require the General Contractor to develop a trench safety plan to protect personnel entering the trench or trench vicinity. The collection of specific geotechnical data and the development of such a plan, which could include designs for sloping and benching or various types of temporary shoring, is beyond the scope of the current study. Any such designs and safety plans shall be developed in accordance with current Occupational Safety and Health Administration (OSHA) guidelines and other applicable industry standards.

EXCAVATION EQUIPMENT

The boring logs are not intended for use in determining construction means and methods and may therefore be misleading if used for that purpose. We recommend that earth-work and utility contractors interested in bidding on the work perform their own tests in the form of test pits and/or test piers determine the quantities of the different materials to be excavated, as well as the preferred excavation methods and equipment for the site.

UTILITIES

Utilities which project through slab-on-grade, slab-on-fill, "floating" floor slabs, or any other rigid unit should be designed with either some degree of flexibility or with sleeves. Such design features will help reduce the risk of damage to the utility lines as vertical movements occur.

Our experience indicates that significant settlement of backfill can occur in utility trenches, particularly when trenches are deep, when backfill materials are placed in thick lifts with insufficient compaction, and when water can access and infiltrate the trench backfill materials. The potential for water to access the backfill is increased where water can infiltrate flexible base materials due to insufficient penetration of curbs, and at sites where geological features can influence water migration into utility trenches. It is our belief that another factor which can significantly impact settlement is the migration of fines within the backfill into the open voids in the underlying free-draining bedding material.

To reduce the potential for settlement in utility trenches, we recommend that consideration be given to the following:

- Backfill materials should be placed and compacted in controlled lifts appropriate for the type of backfill and the type of compaction equipment being utilized and backfilling procedures should be tested and documented.
- Consideration should be given to wrapping free-draining bedding gravels with a geotextile fabric (similar to Mirafi 140N or CONTECH C-Drain Geocomposite) to reduce the infiltration and loss of fines from backfill material into the interstitial voids in bedding materials.

ADDITIONAL CONSIDERATIONS

As with any project where a new addition is to be connected to an existing structure, differential movements between the existing gymnasium and storage building and the new building addition should be anticipated. Therefore, the recommendations discussed in this report should be carefully considered by the design team to obtain the desired performance of the new structural system. As a minimum, control/expansion joints are recommended at connection points between the existing gymnasium and storage building and the addition, and between architectural trim materials along walls/ceilings.

CONSTRUCTION RELATED SERVICES

CONSTRUCTION MATERIALS ENGINEERING AND TESTING SERVICES

As presented in the attachment to this report, *Important Information About Your Geotechnical Engineering Report*, subsurface conditions can vary across a project site. The conditions described in this report are based on interpolations derived from a limited number of data points. Variations will be encountered during construction, and only the geotechnical design engineer will be able to determine if these conditions are different than those assumed for design.

Construction problems resulting from variations or anomalies in subsurface conditions are among the most prevalent on construction projects and often lead to delays, changes, cost overruns, and disputes. These variations and anomalies can best be addressed if the geotechnical engineer of record, **Raba Kistner**, is retained to perform the construction materials engineering and testing services during the construction of the project. This is because:

- **RKCI** has an intimate understanding of the geotechnical engineering report's findings and recommendations. **RKCI** understands how the report should be interpreted and can provide such interpretations on site, on the CLIENT's behalf.
- **RKCI** knows what subsurface conditions are anticipated at this site.
- **RKCI** is familiar with the goals of the CLIENT and the project's design professionals, having worked with them in the development of the project geotechnical workscope. This enables **RKCI** to suggest remedial measures (when needed) which help meet others' requirements.
- **RKCI** has a vested interest in client satisfaction, and thus assigns qualified personnel whose principal concern is client satisfaction. This concern is exhibited by the manner in which contractors' work is tested, evaluated and reported, and in selection of alternative approaches when such may become necessary.
- **RKCI** cannot be held accountable for problems which result due to misinterpretation of our findings or recommendations when we are not on hand to provide the interpretation which is required.

BUDGETING FOR CONSTRUCTION TESTING

Appropriate budgets need to be developed for the required construction materials engineering and testing services. At the appropriate time before construction, we advise that **RKCI** and the project designers meet and jointly develop the testing budgets, as well as review the testing specifications as it pertains to this project.

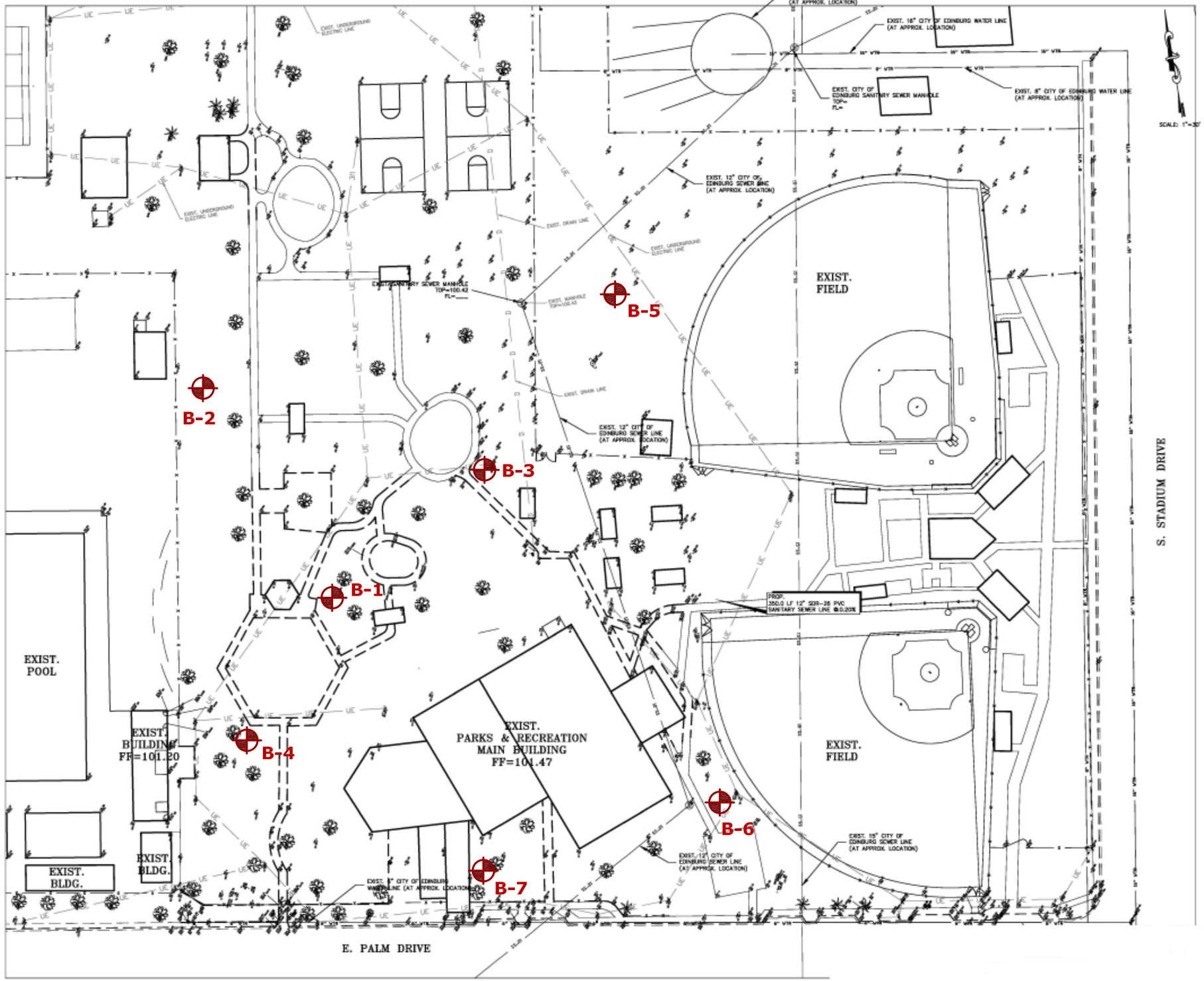
Once the construction testing budget and scope of work are finalized, we encourage a preconstruction meeting with the selected General Contractor to review the scope of work to make sure it is consistent with the construction means and methods proposed by the contractor. **RKCI** looks forward to the opportunity to provide continued support on this project, and would welcome the opportunity to meet with the Project Team to develop both a scope and budget for these services.

* * * * * * * * * * * * * * * * * * *

The following figures are attached and complete this report:

Figure 1	Boring Location Map
Figures 2 through 8	Logs of Borings
Figure 9	ey to Terms and Symbols
Figure 10	Results of Soil Sample Analyses

ATTACHMENTS



O:\Active Projects\McAllen\2013\AMA13 - McAllen\AMA13-023-00 Edinburg Parks & Recreation Center\Drawings\Figure 1 - 11x17.dwg

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BORING LOCATION MAP
PROPOSED CITY OF EDINBURG PARKS & RECREATION RENOVATION AND EXPANSION

315 EAST PALM DRIVE
EDINBURG, HIDALGO COUNTY, TEXAS

REVISIONS:

No.	DATE	DESCRIPTION

PROJECT No.:	AMA13-023-00
ISSUE DATE:	05-09-13
DRAWN BY:	NES
CHECKED BY:	JLP
REVIEWED BY:	KML

FIGURE
1

LOG OF BORING NO. B-1

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

SURFACE ELEVATION: Approx. 101.2 ft

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	PLASTICITY INDEX	% -200
0			**LEAN CLAY with SAND (CL)** stiff to hard, light brown, with roots extending down to a depth of about 2 ft	14			
			- with shell fragments below a depth of about 2 ft		109	28	
5					104		75
			FAT CLAY with SAND (CH) very stiff to stiff to hard, light brown, with calcareous nodules	16		34	
10			- with black ferrous stains below a depth of about 10 ft	13			74
15				29		42	
20				21			77
25				49		65	
30			- with orange ferrous stains below a depth of about 30 ft	40			
35				37			
40				47			
			Boring terminated at a depth of about 40 ft.				
45			NOTES: Upon completion of the drilling operations, the boring was observed dry. The ground surface elevation shown above is approximate and is based on a topographical plan titled "Exist. Topographic Layout - City of Edinburg Parks and Recreation Dept. Renovation				

SHEAR STRENGTH, TONS/FT^2: 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT: 10 20 30 40 50 60 70 80

91

DEPTH DRILLED:	40.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA13-023-00
DATE DRILLED:	4/16/2013	**DATE MEASURED:**	4/16/2013	**FIGURE:**	2a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-1

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Approx. 101.2 ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 PLASTIC LIMIT WATER CONTENT LIQUID LIMIT 10 20 30 40 50 60 70 80		
			and Addition", dated April 3, 2013 and provided to RKCI via electronic-mail attachment on May 8, 2013 by Rio Delta Engineering, the project's civil engineering firm.					
55								
60								
65								
70								
75								
80								
85								
90								
95								

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED:	40.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA13-023-00
DATE DRILLED:	4/16/2013	**DATE MEASURED:**	4/16/2013	**FIGURE:**	2b

LOG OF BORING NO. B-2

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

SURFACE ELEVATION: Approx. 100.5 ft

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	PLASTICITY INDEX	% -200
0	**SANDY LEAN CLAY (CL)** stiff to very stiff to stiff, brown to light brown, with calcareous nodules	14	101	30	58
5	- with black ferrous stains below a depth of about 5 ft	10		25	
	FAT CLAY with SAND (CH) very stiff, light brown, with calcareous nodules and black ferrous stains	99			76
10		18		36	
15	**FAT CLAY (CH)** very stiff to hard, light brown, with calcareous nodules, black and orange ferrous stains, and gypsum crystals	24			87
20		17		28	
25		49			
30	- becomes light reddish-brown in color below a depth of about 30 ft	43			
35		44			
40	Boring terminated at a depth of about 39.9 ft.	50/11"			
45	NOTES: During the drilling operations, groundwater was encountered at a depth of about 36 ft. Upon completion of the drilling operations, groundwater was measured at a depth of about 38.5 ft. The ground surface elevation shown above is approximate and is based on a				

SHEAR STRENGTH, TONS/FT²

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT

10 20 30 40 50 60 70 80

DEPTH DRILLED:	39.9 ft	**DEPTH TO WATER:**	36 ft	**PROJ. No.:** AMA13-023-00
DATE DRILLED:	4/15/2013	**DATE MEASURED:**	4/15/2013	**FIGURE:** 3a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-2

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Approx. 100.5 ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
						PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT		
						10 20 30 40 50 60 70 80		
			topographical plan titled "Exist. Topographic Layout - City of Edinburg Parks and Recreation Dept. Renovation and Addition", dated April 3, 2013 and provided to RKCI via electronic-mail attachment on May 8, 2013 by Rio Delta Engineering, the project's civil engineering firm.					
55								
60								
65								
70								
75								
80								
85								
90								
95								

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED:	39.9 ft	**DEPTH TO WATER:**	36 ft	**PROJ. No.:**	AMA13-023-00
DATE DRILLED:	4/15/2013	**DATE MEASURED:**	4/15/2013	**FIGURE:**	3b

LOG OF BORING NO. B-3

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

SURFACE ELEVATION: Approx. 100.8 ft

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	PLASTICITY INDEX	% -200
	SANDY LEAN CLAY (CL) hard, brown, with roots extending down to a depth of about 2 ft	37			
5	**LEAN CLAY with SAND (CL)** hard, brown to light brown, with calcareous nodules - with black ferrous stains below a depth of about 7 ft	36 41		26 20	80
15	**LEAN CLAY (CL)** very stiff, light reddish-brown, with calcareous nodules, black ferrous stains, and gypsum crystals	27 21		31	90
25	**FAT CLAY (CH)** hard, light brown, with black and orange ferrous stains	34			94
30	- with calcareous nodules below a depth of about 30 ft	36		41	
35		46			
		50/7"			
40	Boring terminated at a depth of about 39.6 ft.				
45	NOTES: Upon completion of the drilling operations, the boring was observed dry. The ground surface elevation shown above is approximate and is based on a topographical plan titled "Exist. Topographic Layout - City of Edinburg Parks and Recreation Dept. Renovation and Addition", dated April 3, 2013 and				

SHEAR STRENGTH, TONS/FT^2: 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT

10 20 30 40 50 60 70 80

DEPTH DRILLED:	39.6 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA13-023-00
DATE DRILLED:	4/15/2013	**DATE MEASURED:**	4/15/2013	**FIGURE:**	4a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-3

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Approx. 100.8 ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
						PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT		
						10 20 30 40 50 60 70 80		
			provided to RKCI via electronic-mail attachment on May 8, 2013 by Rio Delta Engineering, the project's civil engineering firm.					
55								
60								
65								
70								
75								
80								
85								
90								
95								

DEPTH DRILLED:	39.6 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA13-023-00
DATE DRILLED:	4/15/2013	**DATE MEASURED:**	4/15/2013	**FIGURE:**	4b

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-4

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

SURFACE ELEVATION: Approx. 100.6 ft

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	PLASTICITY INDEX	% -200
0	**SANDY LEAN CLAY (CL)** hard to very stiff, brown, with calcareous nodules and roots extending down to a depth of about 2 ft	40			
			110	19	
5		17			69
	LEAN CLAY (CL) very stiff, light brown, with calcareous nodules		97		
10	- Perched water encountered at a depth of about 10 ft	29		20	
15		28			91
20	**FAT CLAY (CH)** hard, light brown, with calcareous nodules, black and orange ferrous stains, and gypsum crystals	40			
25		44		47	
30	- becomes light reddish-brown in color below a depth of about 30 ft	49			97
35		48		44	
40		50/8"			
	Boring terminated at a depth of about 39.7 ft.				
45	NOTES: During the drilling operations, groundwater was encountered at a depth of about 38 ft. Upon completion of the drilling operations, groundwater was measured at a depth of about 38 ft. The ground surface elevation shown above is approximate and is based on a				

SHEAR STRENGTH, TONS/FT^2: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0

PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT: 10, 20, 30, 40, 50, 60, 70, 80

DEPTH DRILLED:	39.7 ft	**DEPTH TO WATER:**	38 ft	**PROJ. No.:**	AMA13-023-00
DATE DRILLED:	4/16/2013	**DATE MEASURED:**	4/16/2013	**FIGURE:**	5a

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-4

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Approx. 100.6 ft			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		
						PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT		
						10 20 30 40 50 60 70 80		
			topographical plan titled "Exist. Topographic Layout - City of Edinburg Parks and Recreation Dept. Renovation and Addition", dated April 3, 2013 and provided to RKCI via electronic-mail attachment on May 8, 2013 by Rio Delta Engineering, the project's civil engineering firm.					
55								
60								
65								
70								
75								
80								
85								
90								
95								

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED:	39.7 ft	**DEPTH TO WATER:**	38 ft	**PROJ. No.:**	AMA13-023-00
DATE DRILLED:	4/16/2013	**DATE MEASURED:**	4/16/2013	**FIGURE:**	5b

LOG OF BORING NO. B-5

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

SURFACE ELEVATION: Approx. 101.1 ft

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	PLASTICITY INDEX	% -200
0	**LEAN CLAY with SAND (CL)** very stiff to stiff, brown, with calcareous nodules and some gravel	19			
	- becomes light brown in color below a depth of about 2 ft	8		26	
5			104		75
	SANDY LEAN CLAY (CL) stiff to hard, light brown, with calcareous nodules and black ferrous stains		104	24	
10		35			65
15	**FAT CLAY (CH)** hard, light brown, with calcareous nodules and black ferrous stains	38		40	
20	- with gypsum crystals below a depth of about 20 ft	41			
25		50/ 11"			
30		50/ 11"			
	Boring terminated at a depth of about 29.9 ft.				
35	NOTES: Upon completion of the drilling operations, the boring was observed dry.				
	The ground surface elevation shown above is approximate and is based on a topographical plan titled "Exist. Topographical Layout - City of Edinburg Parks and Recreation Dept. Renovation and Addition", dated April 3, 2013 and provided to RKCI via electronic-mail attachment on May 8, 2013 by Rio Delta Engineering, the project's civil engineering firm.				
40					
45					

SHEAR STRENGTH, TONS/FT^2: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0

PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT: 10, 20, 30, 40, 50, 60, 70, 80

DEPTH DRILLED:	29.9 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA13-023-00
DATE DRILLED:	4/15/2013	**DATE MEASURED:**	4/15/2013	**FIGURE:**	6

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

LOG OF BORING NO. B-6

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger **LOCATION:** See Figure 1

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	SHEAR STRENGTH, TONS/FT^2 (0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0)	PLASTICITY INDEX	% -200
			SURFACE ELEVATION: Approx. 100.5 ft			PLASTIC LIMIT / WATER CONTENT / LIQUID LIMIT (10 20 30 40 50 60 70 80)		
			SANDY LEAN CLAY (CL) very stiff to hard, brown, with roots extending down to a depth of about 2 ft	24	92		22	
5			- with calcareous nodules and black ferrous stains below a depth of about 5 ft	39				65
			SANDY LEAN CLAY (CL) very stiff to stiff to hard, light brown, with calcareous nodules and black ferrous stains	25			29	
10					111			69
15				31			29	
20				26				
25				42				
				50/8"				
30			Boring terminated at a depth of about 29.7 ft.					
35			NOTES: Upon completion of the drilling operations, the boring was observed dry. The ground surface elevation shown above is approximate and is based on a topographical plan titled "Exist. Topographic Layout - City of Edinburg Parks and Recreation Dept. Renovation and Addition", dated April 3, 2013 and provided to RKCI via electronic-mail attachment on May 8, 2013 by Rio Delta Engineering, the project's civil engineering firm.					
40								
45								

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

DEPTH DRILLED:	29.7 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA13-023-00
DATE DRILLED:	4/16/2013	**DATE MEASURED:**	4/16/2013	**FIGURE:**	7

LOG OF BORING NO. B-7

Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

SURFACE ELEVATION: Approx. 100.9 ft

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	PLASTICITY INDEX	% -200
0	**SANDY FAT CLAY (CH)** very stiff, brown, with calcareous nodules and roots extending down to a depth of about 2 ft	19		33	
		21			53
5	**SANDY LEAN CLAY (CL)** hard, light brown, with calcareous nodules, black ferrous stains, and shell fragments		103	23	
			110		70
10	**FAT CLAY (CH)** very stiff to hard, light brown, with calcareous nodules and black ferrous stains	26		37	
15		31			
20	- with orange ferrous stains below a depth of about 20 ft	37			
25		48			
	- with gypsum crystals below a depth of about 28 ft	50/8"			
30	Boring terminated at a depth of about 29.7 ft.				

SHEAR STRENGTH, TONS/FT^2: 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0

PLASTIC LIMIT — WATER CONTENT — LIQUID LIMIT

10 20 30 40 50 60 70 80

NOTES:
Upon completion of the drilling operations, the boring was observed dry.

The ground surface elevation shown above is approximate and is based on a topographical plan titled "Exist. Topographic Layout - City of Edinburg Parks and Recreation Dept. Renovation and Addition", dated April 3, 2013 and provided to RKCI via electronic-mail attachment on May 8, 2013 by Rio Delta Engineering, the project's civil engineering firm.

DEPTH DRILLED:	29.7 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA13-023-00
DATE DRILLED:	4/16/2013	**DATE MEASURED:**	4/16/2013	**FIGURE:**	8

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT

KEY TO TERMS AND SYMBOLS

MATERIAL TYPES

SOIL TERMS


CALCAREOUS


PEAT


CALICHE


SAND


CLAY


SANDY


CLAYEY


SILT


GRAVEL


SILTY


GRAVELLY


FILL

ROCK TERMS


CHALK


LIMESTONE


CLAYSTONE


MARL


CLAY-SHALE


METAMORPHIC


CONGLOMERATE


SANDSTONE


DOLOMITE


SHALE


IGNEOUS


SILTSTONE

OTHER


ASPHALT


BASE


CONCRETE/CEMENT


BRICKS / PAVERS


WASTE


NO INFORMATION

WELL CONSTRUCTION AND PLUGGING MATERIALS


BLANK PIPE


BENTONITE


BENTONITE & CUTTINGS


CUTTINGS


SAND


SCREEN


CEMENT GROUT


CONCRETE/CEMENT


GRAVEL


VOLCLAY

SAMPLE TYPES

AIR ROTARY

MUD ROTARY

SHELBY TUBE

GRAB SAMPLE

NO RECOVERY

SPLIT BARREL

CORE

NX CORE

SPLIT SPOON

GEOPROBE SAMPLER

PITCHER

TEXAS CONE PENETROMETER

ROTOSONIC -DAMAGED

ROTOSONIC -INTACT

DISTURBED

STRENGTH TEST TYPES

POCKET PENETROMETER

TORVANE

UNCONFINED COMPRESSION

TRIAXIAL COMPRESSION UNCONSOLIDATED-UNDRAINED

TRIAXIAL COMPRESSION CONSOLIDATED-UNDRAINED

NOTE: VALUES SYMBOLIZED ON BORING LOGS REPRESENT SHEAR STRENGTHS UNLESS OTHERWISE NOTED

PROJECT NO. AMA13-023-00

RABAKISTNER

REVISED 08/2011

FIGURE 9a

KEY TO TERMS AND SYMBOLS (CONT'D)

TERMINOLOGY

Terms used in this report to describe soils with regard to their consistency or conditions are in general accordance with the discussion presented in Article 45 of SOILS MECHANICS IN ENGINEERING PRACTICE, Terzaghi and Peck, John Wiley & Sons, Inc., 1967, using the most reliable information available from the field and laboratory investigations. Terms used for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in American Society for Testing and Materials D2487-06 and D2488-00, Volume 04.08, Soil and Rock; Dimension Stone; Geosynthetics; 2005.

The depths shown on the boring logs are not exact, and have been estimated to the nearest half-foot. Depth measurements may be presented in a manner that implies greater precision in depth measurement, i.e 6.71 meters. The reader should understand and interpret this information only within the stated half-foot tolerance on depth measurements.

RELATIVE DENSITY

Penetration Resistance Blows per ft	Relative Density
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
> 50	Very Dense

COHESIVE STRENGTH

Resistance Blows per ft	Consistency	Cohesion TSF
0 - 2	Very Soft	0 - 0.125
2 - 4	Soft	0.125 - 0.25
4 - 8	Firm	0.25 - 0.5
8 - 15	Stiff	0.5 - 1.0
15 - 30	Very Stiff	1.0 - 2.0
> 30	Hard	> 2.0

PLASTICITY

Plasticity Index	Degree of Plasticity
0 - 5	None
5 - 10	Low
10 - 20	Moderate
20 - 40	Plastic
> 40	Highly Plastic

ABBREVIATIONS

B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
BTEX = Total BTEX
TPH = Total Petroleum Hydrocarbons
ND = Not Detected
NA = Not Analyzed
NR = Not Recorded/No Recovery
OVA = Organic Vapor Analyzer
ppm = Parts Per Million

Qam, Qas, Qal = Quaternary Alluvium
Qat = Low Terrace Deposits
Qbc = Beaumont Formation
Qt = Fluviatile Terrace Deposits
Qao = Seymour Formation
Qle = Leona Formation
Q-Tu = Uvalde Gravel
Ewi = Wilcox Formation
Emi = Midway Group
Mc = Catahoula Formation
El = Laredo Formation
Kknm = Navarro Group and Marlbrook Marl
Kpg = Pecan Gap Chalk
Kau = Austin Chalk

Kef = Eagle Ford Shale
Kbu = Buda Limestone
Kdr = Del Rio Clay
Kft = Fort Terrett Member
Kgt = Georgetown Formation
Kep = Person Formation
Kek = Kainer Formation
Kes = Escondido Formation
Kew = Walnut Formation
Kgr = Glen Rose Formation
Kgru = Upper Glen Rose Formation
Kgrl = Lower Glen Rose Formation
Kh = Hensell Sand

KEY TO TERMS AND SYMBOLS (CONT'D)

TERMINOLOGY

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil type.
Interlayered	Soil sample composed of alternating layers of different soil type.
Intermixed	Soil sample composed of pockets of different soil type and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of carbonate.
Carbonate	Having more than 50% carbonate content.

SAMPLING METHODS

RELATIVELY UNDISTURBED SAMPLING

Cohesive soil samples are to be collected using three-inch thin-walled tubes in general accordance with the Standard Practice for Thin-Walled Tube Sampling of Soils (ASTM D1587) and granular soil samples are to be collected using two-inch split-barrel samplers in general accordance with the Standard Method for Penetration Test and Split-Barrel Sampling of Soils (ASTM D1586). Cohesive soil samples may be extruded on-site when appropriate handling and storage techniques maintain sample integrity and moisture content.

STANDARD PENETRATION TEST (SPT)

A 2-in.-OD, 1-3/8-in.-ID split spoon sampler is driven 1.5 ft into undisturbed soil with a 140-pound hammer free falling 30 in. After the sampler is seated 6 in. into undisturbed soil, the number of blows required to drive the sampler the last 12 in. is the Standard Penetration Resistance or "N" value, which is recorded as blows per foot as described below.

SPLIT-BARRELL SAMPLER DRIVING RECORD

Blows Per Foot	Description
25	25 blows drove sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows drove sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows drove sampler 3 inches during initial 6-inch seating interval.

NOTE: To avoid damage to sampling tools, driving is limited to 50 blows during or after seating interval.

RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

FILE NAME: AMA13-023-00.GPJ 5/10/2013

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-1	0.0 to 1.5	14	8								
	2.0 to 4.0		13	44	16	28	CL	109		1.41	UC
	4.0 to 6.0		21					104	75	2.21	PP
	7.5 to 9.0	16	23	55	21	34	CH				
	10.0 to 11.5	13	19						74		
	15.0 to 16.5	29	19	59	17	42	CH				
	20.0 to 21.5	21	21						77		
	25.0 to 26.5	49	24	91	26	65	CH				
	30.0 to 31.5	40	18								
	35.0 to 36.5	37	24								
	38.5 to 40.0	47	17								
B-2	0.0 to 1.5	14	11	49	19	30	CL				
	2.0 to 4.0		20					101	58	1.25	PP
	5.0 to 6.5	10	23	44	19	25	CL				
	7.0 to 9.0		22					99	76	1.59	PP
	10.0 to 11.5	18	21	54	18	36	CH				
	15.0 to 16.5	24	20						87		
	20.0 to 21.5	17	20	45	17	28	CL				
	25.0 to 26.5	49	20								
	30.0 to 31.5	43	18								
	35.0 to 36.5	44	25								
	38.5 to 39.9	50/ 11"	21								
B-3	0.0 to 1.5	37	8								
	2.0 to 4.0										
	5.0 to 6.5	36	9	40	14	26	CL				
	7.5 to 9.0	41	14						80		
	10.0 to 12.0		15	36	16	20	CL				
	15.0 to 16.5	27	22						90		
	20.0 to 21.5	21	19	49	18	31	CL				
	25.0 to 26.5	34	29						94		
	30.0 to 31.5	36	21	60	19	41	CH				
	35.0 to 36.5	46	26								
	38.5 to 39.6	50/7"	30								
B-4	0.0 to 1.5	40	10								
	2.0 to 4.0		16	34	15	19	CL	110		1.23	UC
	5.0 to 6.5	17	23						69		
	7.0 to 9.0		24					97		1.30	PP
	10.0 to 11.5	29	23	37	17	20	CL				
	15.0 to 16.5	28	21						91		

PP = Pocket Penetrometer TV = Torvane UC = Unconfined Compression FV = Field Vane UU = Unconsolidated Undrained Triaxial

CU = Consolidated Undrained Triaxial CNBD = Could Not Be Determined NP = Non-Plastic

RESULTS OF SOIL SAMPLE ANALYSES

PROJECT NAME: Proposed City of Edinburg Parks & Recreation Center
Renovation and Expansion - 315 East Palm Drive
Edinburg, Hidalgo County, Texas

FILE NAME: AMA13-023-00.GPJ 5/10/2013

Boring No.	Sample Depth (ft)	Blows per ft	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS	Dry Unit Weight (pcf)	% -200 Sieve	Shear Strength (tsf)	Strength Test
B-4	20.0 to 21.5	40	19								
	25.0 to 26.5	44	25	70	23	47	CH				
	30.0 to 31.5	49	18						97		
	35.0 to 36.5	48	16	65	21	44	CH				
	38.5 to 39.7	50/8"	21								
B-5	0.0 to 1.5	19	12								
	2.5 to 4.0	8	21	42	16	26	CL				
	5.0 to 7.0		20					104	75	0.67	UC
	7.0 to 9.0		23	41	17	24	CL	104		0.99	UC
	10.0 to 11.5	35	19						65		
	15.0 to 16.5	38	19	56	16	40	CH				
	20.0 to 21.5	41	18								
	25.0 to 26.4	50/ 11"	18								
	28.5 to 29.9	50/ 11"	22								
B-6	0.0 to 1.5	24	9								
	2.0 to 4.0		10	36	14	22	CL	92		2.25	PP
	5.0 to 6.5	39	11						65		
	7.5 to 9.0	25	17	49	20	29	CL				
	10.0 to 12.0		17					111	69	0.96	UC
	15.0 to 16.5	31	17	47	18	29	CL				
	20.0 to 21.5	26	15								
	25.0 to 26.5	42	16								
	28.5 to 29.7	50/8"	18								
B-7	0.0 to 1.5	19	8	57	24	33	CH				
	2.5 to 4.0	21	9						53		
	5.0 to 7.0		10	43	20	23	CL	103		2.25	PP
	7.0 to 9.0		17					110	70	2.25	PP
	10.0 to 11.5	26	17	55	18	37	CH				
	15.0 to 16.5	31	21								
	20.0 to 21.5	37	18								
	25.0 to 26.5	48	17								
	28.5 to 29.7	50/8"	17								

PP = Pocket Penetrometer TV = Torvane UC = Unconfined Compression FV = Field Vane UU = Unconsolidated Undrained Triaxial

CU = Consolidated Undrained Triaxial CNBD = Could Not Be Determined NP = Non-Plastic PROJECT NO. AMA13-023-00

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you —* should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

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