THE WARREN GROUP
ARCHITECTS INC.

1801 South 2nd Street, Ste. 330 McAllen, TX 78503

Addendum No. 7

DATE: Monday, March 18, 2019

PROJECT: Edinburg Consolidated Independent School District
Freddy Gonzalez Elementary Gymnasium Improvements

PROJECT NO: 1611801

LOCATION: McAllen, Texas

FROM: Laura N. Warren, The Warren Group Architects, Inc.

The following revisions and clarifications shall be considered part of the record contract documents dated February 15, 2019 for the above referenced project and included in the contract amount. All general notes and specifications shall apply to this addendum. Where provisions of the following supplementary data differ from those of the original Contract Documents, this Addendum shall govern and take precedence.

As requested by Owner, the following scope adjustments have been made. Please adjust bids with the following noted changes:

Item No. 1: *Refer attached 8.5"x11" Geotechnical Engineering Study Report dated January 28, 2019.*

Item No. 2: *Refer attached 8.5"x11" Bid Plan Holders List.*

ISSUED BY:

Laura N. Warren, AIA/Principal
The Warren Group Architects, Inc.

REGISTERED ARCHITECT
LAURA N. WARREN
18378
STATE OF TEXAS

Attachments:
PDF Format – 8.5"x11" Geotech Report dated 01/28/2019
PDF Format – 8.5"x11" Bid Plan Holders List

Distribution:
Robert Estrada, District Architect
Jacqueline W. Kingan, ECISD Senior Buyer
Bidding Vendors
File

GEOTECHNICAL ENGINEERING STUDY

FOR

PROPOSED GYMNASIUM BUILDING ADDITION
EDINBURG, HIDALGO COUNTY, TEXAS

800 East Hackberry
McAllen, TX 78501
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Project No. AMA19-002-00
January 28, 2019

Mr. Robert Estrada, A.I.A., District Architect
Edinburg Consolidated Independent School District (Edinburg CISD)
Facilities Department
1305 E. Schunior
Edinburg, Texas 78541

RE: Geotechnical Engineering Study
Proposed Gymnasium Building Addition to the
Edinburg CISD Freddy Gonzalez Elementary School Campus
2401 S. Sugar Road
Edinburg, Hidalgo County, Texas

Dear Mr. Estrada:

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 in accordance with **RKCI** Proposal No. PMA18-079-00, dated December 4, 2018. Written authorization to proceed with this study was received by our firm via electronic-mail attachment on January 11, 2019. The purpose of this study was to drill borings within the subject 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 gymnasium building addition.

The following report contains our foundation recommendations and considerations based on our current understanding of the design tolerances, and structural loads. If any of these parameters change, then there may be alternatives for value engineering of the foundation system, and **RKCI** recommends that a meeting be held with Edinburg CISD (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 Edinburg CISD 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.

STATE OF TEXAS
KATRIN M. LEONARD
95810
LICENSED
PROFESSIONAL ENGINEER
Jan 28, 2019

Saul Cruz
Graduate Engineer

Katrin M. Leonard, P.E.
Associate

Attachments

SC/KML

Copies Submitted: Above (1)
The Warren Group Architects, Inc. (1)

GEOTECHNICAL ENGINEERING STUDY

For

PROPOSED GYMNASIUM BUILDING ADDITION TO THE EDINBURG CISD FREDDY GONZALEZ ELEMENTARY SCHOOL CAMPUS 2401 S. SUGAR ROAD EDINBURG, HIDALGO, TEXAS

Prepared for

EDINBURG CISD
Edinburg, Texas

Prepared by

RABA KISTNER CONSULTANTS, INC.
McAllen, Texas

PROJECT NO. AMA19-002-00

January 28, 2019

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 gymnasium building addition within the existing Edinburg Consolidated Independent School District (Edinburg CISD) Freddy Gonzalez Elementary School, situated at 2401 S. Sugar Road in Edinburg, Hidalgo County, Texas. This report briefly describes the procedures utilized during this study and presents our findings along with our recommendations for site preparation, and foundation design and construction considerations for the proposed building addition.

PROJECT DESCRIPTION

We understand that the proposed project consists of the design and construction of a single-story, rectangular-shaped, about 1,550 ft^2 gymnasium building addition at the Edinburg CISD Freddy Gonzalez Elementary School campus. The existing Edinburg CISD Freddy Gonzalez Elementary School campus is situated at 2401 S. Sugar Road in Edinburg, Hidalgo County, Texas. The proposed building addition is expected to create light to moderate loads to be carried by the foundation system, which is anticipated to consist of a shallow foundation system.

We understand that the finished grade elevation (FGE) of the proposed building addition is planned to match the existing building's FGE, which is about 1-1/2 ft above the ground surface elevation existing at the time of our study within the proposed building addition footprint area.

LIMITATIONS

This engineering report has been prepared in accordance with accepted Geotechnical Engineering practices in the region of South Texas for the use of Edinburg CISD (CLIENT) and his 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 two borings drilled at the subject site, our understanding of the project information provided to us by the CLIENT, and the assumption that site grading will result in only minor changes in the topography existing at the time of our study. 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 final grade elevations are significantly different from the grades existing at the time of our study (more than plus or minus 1 ft), our office should be informed about these changes. If needed and/or desired, we will reexamine our analyses and make supplemental recommendations.

BORINGS AND LABORATORY TESTS

Subsurface conditions at the subject site were evaluated by conducting two borings as shown in the following table:

Structure	Number	Depth, ft*	Boring Identification
Building Addition	2	25	B-1 and B-2

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

The borings (designated as “B-”) were drilled on January 16, 2019, 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 the untitled and undated site plan provided it to our office via electronic-mail attachment from Ms. Andrina De Anda, Associate AIA/Director, with The Warren Group Architects, Inc., the project’s architectural firm via electronic-mail attachment on Monday, December 3, 2018. The borings were conducted utilizing straight flight augers and were backfilled with the auger cuttings following completion of the drilling operations. During the drilling activities, Split-Spoon (with Standard Penetration Test, SPT) and Shelby-tube (ST) samples were collected.

The SPT and ST 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 following laboratory tests: natural moisture content, Atterberg limits, and percent passing a No. 200 sieve determinations.

The results of the field and laboratory tests are presented in graphical or numerical form on the boring logs illustrated on Figures 2 and 3. A key to the classification of terms and symbols used on the logs is presented on Figure 4. The results of the laboratory and field testing are also tabulated on Figure 5 for ease of reference.

SPT results are noted as “blows per ft” on the boring logs and on Figure 5, 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.

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 gymnasium building addition is located within the existing Edinburg CISD Freddy Gonzalez Elementary School campus, situated at 2401 S. Sugar Road in Edinburg County, Texas, Texas. At the time of our field activities, the study area can be described as an undeveloped tract of land. The topography of the site is relatively flat, with a visually estimated vertical relief of less than 3 ft. Surface drainage is visually estimated to be poor-to-fair. The subject site is bounded to the north by an undeveloped tract of land, followed by an existing irrigation canal; to the east by the existing gymnasium building; and to the south and west by existing landscape areas, followed by residential buildings.

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, 0 to 1 percent slopes.

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.

- Site Class Definition (Chapter 20 of the American Society of Civil Engineers [ASCE] 7): **Class D**. Based on the soil borings conducted for this investigation, the upper 100 feet of soil may be may be characterized as a stiff soil profile.
- Risk-Targeted Maximum Considered Earthquake Ground Motion Response Accelerations for the Conterminous United Stated of a 0.2-Second, Spectral Response Acceleration (5% of Critical Damping) (Figure 1613.3.1(1)): $\mathbf{S_s = 0.043g}$. Note that the value taken from Figure 1613.3.1(1) is based on Site Class B and is adjusted as per 1613.3.3 below.
- Risk-Targeted Maximum Considered Earthquake Ground Motion Response Accelerations for the Conterminous United States of a 1-Second, Spectral Response Acceleration (5% of

Critical Damping) (Figure 1613.3.1(2)): **S_1 = 0.015g**. Note that the value taken from Figure 1613.3.1(2) is based on Site Class B and is adjusted as per 1613.3.3 below.

- Value of Site Coefficient (Table 1613.3.3 (1)): *from worksheet* **F_a = 1.6**.
- Value of Site Coefficient (Table 1613.3.3 (2)): *from worksheet* **F_v = 2.4**.

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, Tables 1613.3.5(1) and 1613.3.5(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) website, the Seismic Design Category for both short period and 1 second response accelerations is **A**. As part of the assumptions required to complete the calculations, a Risk Category of **II** was selected.

STRATIGRAPHY

On the basis of the borings, the subsurface stratigraphy at this site can be described by a single generalized stratum with similar physical and engineering characteristics. This stratum consists of dark brown to brown to light brown, firm to hard, lean clay soils, lean clay soils with sand, sandy lean clay soils, and sandy fat clay soils with roots, black ferrous stains, and calcareous nodules. This layer was noted in the borings from the ground surface elevation existing at the time of our drilling operations, extending down to at least the termination depth of the borings. Measured moisture contents range from about 15 to 23 percent. This stratum is classified as plastic to highly plastic, with measured plasticity indices ranging from 23 to 46 percent. Percent passing a No. 200 sieve tests demonstrate percent fines ranging from 56 to 73 percent. Undrained shear strength values of about 0.7 and 1.1 tsf were measured, based two unconfined compression strength tests. Two dry unit weight values of about 100 and 103 pounds per cubic foot (pcf) were measured for this layer. SPT N-values ranging from 5 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 not observed in the borings either during or immediately upon completion of the field drilling activities. The boreholes were left open for the duration of the field exploration phase to allow monitoring of water levels, and remained dry. However, it is possible for groundwater to exist beneath this site 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.

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 berm and conventional sump-and-pump dewatering methods.

FOUNDATION ANALYSIS

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 the order of about 1-3/4 inches were estimated for the stratigraphic conditions encountered in the borings. 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 calculated PVR values due to isolated changes in moisture content (such as due to leaks, landscape watering...) or if water seeps into the soils to greater depths than the assumed active zone depth due to deep trenching or excavations.

PVR REDUCTION RECOMMEDATIONS

As previously mentioned, we understand that the FGE of the proposed building addition is planned to match the existing building's FGE, which is about 1-1/2 ft above the ground surface elevation existing at the time of our study within the proposed building addition footprint area.

To reduce expansive, soil-related movements in at-grade construction beneath the building addition footprint area to about 1 inch, we recommend the following site improvement procedure be implemented:

- Remove a minimum of about 1-1/2 ft (18 inches) of the existing subgrade clay soils and discard them. The excavation shall extend a minimum of 5 ft beyond the building addition's perimeter.
- Proofroll the exposed subgrade as indicated in the *Site Preparation* subsection of the *Foundation Construction Considerations* section of this report.
- Once the proofrolling operations are complete and documented, place suitable, select fill materials into the excavation in uniform 6-inch thick compacted lifts to reach the

building addition's FGE. Each lift should be compacted and tested as indicated in the *Select Fill* subsection of the *Foundation Construction Considerations* section of this report.

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 plastic clays with relatively pervious select fill material creates a "bathtub" beneath the structure, which can result in ponding or trapped water within the fill unless good surface and subsurface drainage is provided.

Water entering the fill surfaces during construction or entering the fill exposed beyond the building 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 areas to divert surface runoff away from the excavation/fill area 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 building addition) over the select fill material and any perimeter drain extending beyond the structure lines, with a minimum gradient of 6 in. 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

As with any project where a new addition is to be connected to an existing structure, differential movements between the existing structure and the 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 old and the new structure and between architectural trim materials along walls/ceilings.

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 pavement surface elevations and the stratigraphic conditions encountered in the borings at the time of our study. If site grading plans differ from the grades existing at the time of our study by more than plus or minus 1 ft, we must be retained to review the site grading plans prior to bidding the project for construction. This will enable us to provide input for any changes in our original recommendations, which may be required as a result of site grading operations or other considerations.

SHALLOW FOUNDATIONS

The proposed gymnasium building addition may be founded on rigid-engineered beam and slab-on-fill foundation and/or on a conventional spread and/or continuous footing foundation, 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 structure.

Allowable Soil-Bearing Capacity

Shallow foundation founded on new, properly-compacted, suitable, select fill materials, following the implementation of the ground improvement procedure presented in the *PVR Reduction Recommendations* subsection of the *Foundation Analysis* section of this report may be proportioned using the design parameters shown in the following table:

Minimum depth below FGE:	24 in.
Minimum beam width:	12 in.
Maximum allowable soil-bearing pressure for continuous footings – grade beams:	1,500 psf
Maximum allowable soil-bearing pressure for spread footings – widened beams:	1,800 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 Recommendations* 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 on the previous table 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

Beam and slab-on-fill foundations are sometimes designed using criteria developed by the WRI. On the basis of the subsurface stratigraphy encountered, a general effective plasticity index for the proposed building addition's foundation of 34 percent and a climatic rating (C_w) of 15 should be utilized for the design of the proposed 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 structure's performance.

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 building addition's foundation and to facilitate rapid drainage away from the 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 (which can in turn result in cracking in the sheetrock partition walls, and shifting of ceiling tiles, as well as improper operation of windows and doors).

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

Also to help control drainage in the vicinity of the structure, we recommend that roof/gutter downspouts and landscaping irrigation systems not be located adjacent to the building addition's foundation. Where a select fill overbuild is provided outside of the floor slab/foundation footprint, 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 Analysis* section of this report.

SITE PREPARATION

The building addition's area and all areas to support select fill should be stripped of all vegetation, and/or organic topsoil down to a minimum depth of 8 inches and extending a minimum of 5 ft beyond the building addition's footprint area. Further, we recommend that site improvement procedure presented in the *PVR Reduction Recommendations* section of this report be implemented to reduce the soil-related movements within the proposed building addition.

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 pads 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/her 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 or slab construction, the exposed subgrade should be moisture conditioned by scarifying to a minimum depth of 6 in. and recompacting to a minimum of 98 percent of the maximum density determined from the American Society 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 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 2014 Standard Specification for Construction and Maintenance of Highways, Streets, and Bridges, Item 247, Flexible Base, Type A through Type E, Grades 1, 2, 3, and 5.

Alternatively, the following soils, as classified according to the USCS, may be considered satisfactory for use as select fill materials at this site: SC, GC, CL, and combinations of these soils. In addition to the USCS classification, alternative select fill materials shall have a maximum liquid limit of 40 percent, a plasticity index between 7 and 18 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 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, 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/her representative prior to placement of reinforcing steel and concrete. This is necessary to document 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.

Disturbance from foot traffic and from the accumulation of excess water can result in losses in bearing capacity and increased settlement. If inclement weather is anticipated at the time construction, consideration should be given to protecting the bottoms of beam trenches by placing a thin mud mat (layer of flowable fill or lean concrete) at the bottom of trenches immediately following excavation. This will reduce disturbance from foot traffic and will impede the infiltration of surface water. All necessary precautions should be implemented to protect open excavations from the accumulation of surface water runoff and rain.

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 earthwork and utility contractors interested in bidding on the work perform their own tests in the form of test pits determine the quantities of the different materials to be excavated, as well as the preferred excavation methods and equipment for this 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:

- All 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 all 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) to reduce the infiltration and loss of fines from backfill material into the interstitial voids in bedding materials.

ADDITIONAL CONSIDERATIONS

As previously mentioned, as with any project where new additions are to be connected to an existing structure, differential movements between the existing structure and addition should be anticipated. To reduce possible differential movements, it is typically desirable to match the old and the new foundation types. However, this will not eliminate the potential for differential movements. Therefore, the recommendations and options 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 old and new structures and between architectural trim materials along walls/ceilings.

Should excavations adjacent to existing structures be required, precautions should be taken not to undermine or damage existing grade beams, footings, and/or utility lines.

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 Consultants, Inc.**, 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 Maps
Figures 2 and 3	Logs of Borings
Figure 4	Key to Terms and Symbols
Figure 5	Results of Soil Sample Analyses

ATTACHMENTS

O:\Active Projects\McAllen\2019\AMA19-002-00 Prop. Freddy Gonzalez Gym Add-Edinburg CISD\Drawings\Figure 1.dwg

RABA KISTNER CONSULTANTS

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TBPE Firm F-3257

BORING LOCATION MAP
PROPOSED GYMNASIUM BUILDING ADDITION

EDINBURG CISD FREDDY GONZALEZ E.S.
2401 S. SUGAR ROAD
EDINBURG, HIDALGO COUNTY, TEXAS

REVISIONS:

No.	DATE	DESCRIPTION

PROJECT No.:	AMA19-002-00
ISSUE DATE:	1-28-19
DRAWN BY:	DV
CHECKED BY:	SC
REVIEWED BY:	KML
FIGURE:	1

LOG OF BORING NO. B-1

Proposed Gymnasium Building Addition
Edinburg CISD Freddy Gonzalez E.S.- 2401 S. Sugar Road
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

DRILLING METHOD: Straight Flight Auger

LOCATION: See Figure 1

SURFACE ELEVATION: Existing Grade, 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

DEPTH, FT	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WEIGHT, pcf	PLASTICITY INDEX	% -200
0	**LEAN CLAY with SAND (CL)** firm to stiff, brown, with calcareous nodules and roots extending down to a depth of about 2 ft	5		23	
			103		73
5	**SANDY FAT CLAY (CH)** very stiff to hard, brown	18		41	
	- with black ferrous stains below a depth of about 7 ft				61
10	- with olive clay lenses below a depth of about 10 ft	18			
15					
20	- becomes brown in color and with black ferrous stains below a depth of about 20 ft	28			
		50			
25	Boring terminated at a depth of about 25 ft.				
30					

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

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

DEPTH DRILLED:	25.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-002-00
DATE DRILLED:	1/16/2019	**DATE MEASURED:**	1/16/2019	**FIGURE:**	2

LOG OF BORING NO. B-2

Proposed Gymnasium Building Addition
Edinburg CISD Freddy Gonzalez E.S.- 2401 S. Sugar Road
Edinburg, Hidalgo County, Texas

RABA KISTNER
TBPE Firm Registration No. F-3257

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

DEPTH, FT	DESCRIPTION OF MATERIAL (SURFACE ELEVATION: Existing Grade, ft)	BLOWS PER FT	UNIT DRY WEIGHT, pcf	PLASTICITY INDEX	% -200
0	**SANDY LEAN CLAY (CL)** firm, dark brown, with roots extending down to a depth of about 2 ft	6			56
	- becomes brown in color and with black ferrous stains below a depth of about 2-1/2 ft	5		23	
5	**SANDY FAT CLAY (CH)** stiff to hard, brown		100		67
	- becomes light brown in color below a depth of about 7-1/2 ft	21		46	
10					
15	- becomes brown in color below a depth of about 15 ft	37			
20					
	- with gypsum crystals below a depth of about 23-1/2 ft	49			
25	Boring terminated at a depth of about 25 ft.				
30					

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.

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

DEPTH DRILLED:	25.0 ft	**DEPTH TO WATER:**	DRY	**PROJ. No.:**	AMA19-002-00
DATE DRILLED:	1/16/2019	**DATE MEASURED:**	1/16/2019	**FIGURE:**	3

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. AMA19-002-00

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-BARREL 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 Gymnasium Building Addition
Edinburg CISD Freddy Gonzalez E.S.- 2401 S. Sugar Road
Edinburg, Hidalgo County, Texas

FILE NAME: AMA19-002-00.GPJ 1/24/2019

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	5	15	41	18	23	CL				
	2.0 to 4.0		21					103	73	1.06	UC
	5.0 to 6.5	18	21	61	20	41	CH				
	7.0 to 9.0		23						61	2.05	PP
	10.0 to 11.5	18	21								
	15.0 to 17.0		20							2.25	PP
	20.0 to 21.5	28	21								
	23.5 to 25.0	50	18								
B-2	0.0 to 1.5	6	17						56		
	2.5 to 4.0	5	18	42	19	23	CL				
	5.0 to 7.0		23					100	67	0.73	UC
	7.5 to 9.0	21	18	67	21	46	CH				
	10.0 to 12.0		18							2.25	PP
	15.0 to 16.5	37	16								
	20.0 to 22.0		20							2.25	PP
	23.5 to 25.0	49	21								

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

CU = Consolidated Undrained Triaxial CNBD = Cound Not Be Determined NP = Non-Plastic PROJECT NO. AMA19-002-00

Important Information about This

Geotechnical-Engineering Report

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

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

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 constructor — 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 this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this 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.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many 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;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the 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 geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this 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 geotechnical-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 confirmation-dependent recommendations included in your report. *Confirmation-dependent 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 confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront 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. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical 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 Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors 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 constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors 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 constructors fail to 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.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental 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 environmental 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, many 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 GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GBC GEOTECHNICAL BUSINESS COUNCIL of the Geoprofessional Business Association

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ARCHITECTS INC.

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**Construction Documents for this project have also been shared with plan rooms; this list does not reflect the companies that have accessed plans through them.*

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**Construction Documents for this project have also been shared with plan rooms; this list does not reflect the companies that have accessed plans through them.*