Request for Bids	**Marshall University** **Office of Purchasing** **One John Marshall Drive** **Huntington, WV 25755-4100** **Direct all inquiries regarding this order to: (304) 696-2822**	**Bid #** R1901451

Vendor:

Phone:

Fax:

FEIN/SSN:

For information contact:
Purchasing Contact: Harold R. Sanders
Email: sanders13@marshall.edu
& purchasing@marshall.edu
Phone: (304) 696-2822

Sealed requests to bid for furnishing the supplies, equipment or services described below will be received by the Institution. TO RECEIVE CONSIDERATION FOR AWARD, UNLESS OTHERWISE NOTED, THE BID WILL BE SUBMITTED ON THIS FORM IN ORIGINAL AND (1) COPY, SIGNED IN FULL IN INK, AND RECEIVED IN THE OFFICE OF PURCHASING TO HAVE A DATE/TIME STAMP AFFIXED, ON OR BEFORE THE DATE AND TIME SHOWN FOR THE BID OPENING. When applicable, prices will be based on units specified; and Bidders will enter the delivery date or time for items contained herein. The Institution reserves the right to accept or reject bids on each item separately or as a whole, to reject any or all bids, to waive informalities or irregularities and to contract as the best interests of the Institution may require. BIDS ARE SUBJECT TO THE GENERAL TERMS AND CONDITIONS AS SET FORTH HEREIN.

DATE 02/08/2019	DELIVERY IS REQUIRED NO LATER THAN	**DEPARTMENT REQUISITION NO.** R1901451	BIDS OPEN: 3:00 p.m. on 02/21/19	**BIDDER MUST ENTER DELIVERY DATE FOR EACH ITEM BID**

Item #	Quantity	Description	Unit Price	Extended Price
		Addendum #1 Project: Old Main Renovations Bid Opens: February 21, 2019 Time: 3:00pm The purpose of this addendum is to modify and/or clarify project requirements, specifications, and drawings as per the attached information prepared by RossTarrant Architects. The updated information must be taken into account in preparing proposals and shall become a part of the final contract documents. Receipt of this addendum must be acknowledged in the space provided on this front page and within this addendum, see page 24.		
			Total	

To the Office of Purchasing,
In compliance with the above, the undersigned offers and agrees, if this offer is accepted within _____ calendar days (30 calendar days unless a different period is inserted by the purchaser) from the bid open date, specified above, to furnish any or all items upon which prices are offered, at the price set opposite each item, delivered at the designated point(s), within the time specified.

Bidder guarantees shipment from ______________ within ______ days

FOB ______________ After receipt of order at address shown

Terms ______________

Bidder's name Vendor ______________

Signed By ______________

Typed Name ______________

Title ______________

Street Address ______________

City/State/Zip ______________

Date ______________ Phone ______________

Fein ______________

BOG 43
MU Rev. 05/15/14

ADDENDUM NO. 1

TO THE DRAWINGS AND SPECIFICATIONS
FOR THE
OLD MAIN PARTIAL RENOVATION
FOR
MARSHALL UNIVERSITY

FEBRUARY 7, 2019

To All Plan Holders of Record:

This Addendum modifies bid documents dated January 15, 2019 for the above project, and shall become part of said documents in the preparation of proposals and execution of work of the subject project.

General:

1. All questions must be written and emailed to Michael Neureither (mneureither@rosstarrant.com) by 5:00PM EST on Tuesday, February 12, 2019. Questions received after this time will not be replied to. All answers to questions will be included in an addendum to be issued no later than Thursday, February 14, 2019.

2. The location for the bid opening is shown correctly in the pre-bid package and not in the quick guide. All bids will be opened in the Office of Purchasing, Old Main Room 125, One John Marshall Drive, Huntington, WV 25755.

Specifications:

1. Refer to new Section 012400 – Geotechnical Data, attached as a part of this addendum.

END OF ADDENDUM

SECTION 012400 - GEOTECHNICAL DATA

PART 1 GENERAL

1.01 GEOTECHNICAL REPORT

A. A geotechnical exploration of the site was conducted by American Geotech, Inc., dated December 26, 2018.

B. The report of the geotechnical exploration is appended hereto for reference only and is not a part of the Contract Documents. The boring layout and log of borings is appended to the set of contract drawings. No warranty of content or accuracy is expressed or implied. Neither the Owner nor the Architect will be responsible for interpretations or conclusions drawn from this report by the Contractor. This data is made available solely for the convenience of the Contractor.

END OF SECTION

American Geotech, Inc.
601 Ohio Avenue
Charleston, WV 25302
(304) 340-4277
Fax 340-4278

AMERICAN GEOTECH, INC.

Geotechnical, Environmental and Testing Engineers

REPORT OF

GEOTECHNICAL EXPLORATION & ENGINEERING ANALYSIS
PROPOSED 4-STORY ELEVATOR ADDITION
OLD MAIN RENOVATIONS
MARSHALL UNIVERSITY
HUNTINGTON, WEST VIRGINIA

Prepared For

ROSS TARRANT ARCHITECTS
LEXINGTON, KENTUCKY
DECEMBER - 2018

(This report contains 11 pages, plus appendices)

AMERICAN GEOTECH, INC.

GEOTECHNICAL, ENVIRONMENTAL AND TESTING ENGINEERS

601 OHIO AVENUE
CHARLESTON, WV 25302
(304) 340-4277
Fax (304) 340-4278

December 26, 2018

Mr. Michael Neureither
Ross Tarrant Architects
101 Old Lafayette Avenue
Lexington, KY 40502

Re: Report of Geotechnical Exploration and Engineering Analysis
Proposed 4-Story Elevator Addition - Old Main Renovations
Marshall University
Huntington, West Virginia

Dear Mr. Neureither:

In accordance with your request and authorization, American Geotech, Inc. (AGI) has performed a geotechnical subsurface exploration and engineering analysis for the proposed 4-story elevator addition, to be located in Huntington, West Virginia. The detailed geotechnical report is attached herewith.

It is recommended that the contract documents must follow International Building Code (IBC) requirements, including a Schedule of Special Inspection Services for soils and foundations in the plans. The owner must employ a geotechnical testing agency practicing under a licensed geotechnical engineer for quality assurance and special inspections as set forth in IBC requirements Chapter 17.0, Sections 1704.2 to 1704.14.

We appreciate the opportunity of providing these services to you. If you have any questions concerning the information in this report, or should questions develop as the design proceeds, please contact our office at 304-340-4277.

Thank you for your consideration.

Respectfully Submitted,

AMERICAN GEOTECH, INC.

Kanti S. Patel, M.S.C.E., P.E.
Principal Engineer

GEOTECHNICAL ENGINEERING EXPLORATION AND ANALYSIS

PROPOSED 4-STORY ELEVATOR ADDITION
OLD MAIN RENOVATIONS
HUNTINGTON, WEST VIRGINIA

EXECUTIVE SUMMARY

A brief summary of our recommendations for this project is presented below. This summary should be read in context with the entire report for proper interpretation.

Special Issues

- It is recommended that the contract documents must follow International Building Code (IBC) requirements, including a Schedule of Special Inspection Services for soils and foundations in the plans. The owner must employ a geotechnical testing agency practicing under a licensed geotechnical engineer for quality assurance and special inspections as set forth in IBC requirements Chapter 17.0, Sections 1704.2 to 1704.14.
- Due to numerous underground utilities and related trapped water, our exploration encountered good soil layers and soft soil layers at this site.
- Construction of the proposed building addition at the currently planned location will require the use of a deep foundation system installed to the rated torque refusal, which is expected to be at approximately 35 to 40 feet below the basement.
- Based on our review of the foundation plans for the existing building, the lateral projections of the existing footings within the elevator addition area will protrude 14.5 inches into the footprint of the elevator pit. These existing spread footings should first be underpinned wherever they are undermined by the new elevator pit or foundations.

Foundations

- The proposed building addition should be supported on a grade beam and steel helical pier foundation system extended to torque refusal conditions. A typical helical pier installed to torque refusal can carry a load of 40 kips (20 tons).
- The helical piers should consist of an MH325B square-shaft helical pier (Magnum Piering) with an uncased grout column of 7 inches in diameter. We recommend a minimum compressive strength of 4,000 psi grout be used around the square shaft.
- The lead auger must have a 3 helix configuration of 8 inches, 10 inches, and 12 inches.
- We estimate that the drilled lengths at this site will range from approximately 35 to 40 feet below the existing ground surface.
  Should any piles refuse at shallower depths as a result of boulders/obstructions, additional piles should be provided on both sides of the refused pile. We expect that 10% of the piles may refuse on rubble and obstructions in the fill strata.
- Hoe-ramming and removal of buried slabs or foundations may also be needed.

Floor Slab Support

- Slab-on-grade floors can be supported on existing soil materials, new engineered fill or natural soils.
- A slab-on-grade floor can be designed for a subgrade modulus of reaction of 90 pounds-per-cubic-inch (PCI).

INTRODUCTION

This report presents the results of our geotechnical subsurface exploration and engineering analysis for the proposed elevator addition to the Old Main building on the Marshall University campus in Huntington, West Virginia. The purpose of this exploration was to generally define the subsurface conditions at this site and to characterize these conditions for the proposed structure.

The exploration included the drilling of two (2) Standard Penetration Test borings, visual observations of the general project site, and the report preparation. The exploration was authorized by Mr. Michael Neureither of Ross Tarrant Architects, and the work was performed in accordance with our proposal/agreement dated October 29, 2018.

This report is intended to provide detailed information concerning subsurface conditions within the proposed construction site, sufficient for the basic design of the foundation system, and to provide geotechnical engineering recommendations for the foundation design and floor slab support.

PROJECT INFORMATION

It is proposed to construct a 4-story elevator addition to the Old Main building at the referenced site. The elevator addition will be located inside the existing building and is expected to consist of masonry loaded-bearing walls. The proposed building loads will be supported on interior walls. The ground floor will be constructed as an industry standard concrete slab-on-grade.

The proposed elevator location is adjacent to an existing stairwell and the file storage room of the building. Underground utilities are present within the proposed building addition footprint.

SUBSURFACE EXPLORATION

Two (2) Standard Penetration Test soil borings (B-1 and B-2) were drilled by AGI at the approximate locations shown on the attached Test Boring Location Plan. The test borings were drilled using hand sampling equipment or a track-mounted drill rig on November 13 and December 19, 2018. The test borings were staked in the field by AGI personnel referencing the building layout provided by the client. The inside test boring (B-1) was drilled through the existing concrete slab using a diamond tipped core barrel and was advanced using a hand auger to document the depth and project of the existing footer. The outside test boring was advanced, and the bore hole was stabilized, using 2.25-inch interior diameter hollow stem augers. Sampling was accomplished in the undisturbed material below the bottom of the augers using a split-spoon sampler. The split-spoon sampler, having an exterior diameter of 2.0-inches and an interior diameter of 1⅜-inch, was driven with a 140-pound automatic hammer falling 30 inches, in accordance with ASTM D 1586. The soil samples were recovered at 2.5 foot intervals to a depth of 10.0 feet and at 5 foot intervals thereafter. The test borings were drilled to depths of 3.0 to 73 feet below the present site grades.

Upon completion of the test borings, the holes were backfilled using the auger cuttings and the soil samples were returned to our soil mechanics laboratory, where they were visually examined and grouped for laboratory testing by the project engineer. The laboratory testing program included moisture contents and pocket penetrometer readings on the representative samples.

The attached test boring logs were then prepared by the project engineer, using the recovered soil samples, the laboratory testing results, and notes taken by the drill foreman during the drilling operations. The classified logs and the basis for recommendations are included in the appendix. Each log gives the depth, thickness, and visual description of the soil strata penetrated, along with the sample identification data.

SUBSURFACE CONDITIONS

The surface condition at our inside boring location consisted of roughly 6 inches of concrete slab and bank-run sand and gravel base. Unengineered fill materials were encountered to depths of roughly 2.0 to 2.5 feet below the existing ground surface (bgs). Natural soils were encountered below the referenced fill and consisted of alluvial deposits of variable stiffness and moisture contents. Generally, the subsurface profile can be described as shallow deposits of unengineered fill materials underlain by moist to damp and loose natural soils.

The encountered unengineered fill materials consisted of brown clayey sand with rock and brick fragments. Standard Penetration Test (SPT) N-values within the fill layer were on the order of 7 blows-per-foot (bpf), which are classified as loose in relative density. The fill was also noted as moist. A pocket penetrometer reading on the *in-situ* materials yielded a strength of 0.0 tons-per-square-foot (TSF). The referenced unengineered fill stratum extended to a depth of approximately 2.5 feet bgs, where natural soil materials were encountered.

The upper natural soil stratum consisted primarily of brown clayey to silty sand. Boring B-1 was terminated in this stratum at a depth of 3.0 feet below the existing top of slab level. The materials in B-2 consisted of alternating layers of fine to medium-grained sand to clayey sand. Below a depth of approximately 29 feet, the sand strata included significant percentages of pebbles, with coarse-grained sand and gravel deposits beginning at 55.0 feet. These strata were very loose to medium dense in relative density, having N-values varying from 2 to 17 blows-per-foot (bpf). These deposits were generally described as moist to wet for these material types with moisture contents ranging from 7.5% to 16.7%. Pocket penetrometer readings within the natural soil layer varied from 0.0 to 0.25 TSF. An unconfined compressive strength test on a sample from B-2 produced a result of 0.37 TSF.

Auger refusal was encountered at a depth of 73.0 feet below the existing surface on the underlying bedrock formation.

Groundwater was encountered at a depth of 55 feet in test boring B-2. We should state, however, that fluctuations in the location of the groundwater table, as well as perched or trapped water, can occur as a result of seasonal variations in precipitation, evaporation, surface runoff, and other factors not immediately apparent at the time of our exploration.

ANALYSIS AND RECOMMENDATIONS

Based on the subsurface conditions encountered during our exploration, the existing fill materials, and loose underlying natural granular soils below the elevator pit, a deep foundation system, such as helical piers with grade beams, is recommended to support the proposed elevator addition. Existing slabs, stairs, or foundations are also present within the addition area and will require removal if encountered. Wherever the new elevator pit or foundations will undermine the existing shallow spread footings, the existing footings or columns should be underpinned.

Foundation Design

Based on the results of this exploration, the use of conventional spread footings would not be recommended for this project, considering the site conditions. The best option for supporting the elevator addition would be deep foundations, such as steel helical piers. Deep foundations would be the most trouble free option for foundation support given the magnitude of potential settlement produced by random fill deposits and underlying soft granular soils at this site. Anticipated settlement of the 4-story addition structure if supported on shallow footings could be up to 1.5 inches. The helical pier and grade beam system should be designed by a licensed structural engineer.

The proposed elevator addition should be founded on a steel helical piers and grade beam foundation system installed to the rated torque refusal conditions and settlement. The helical piers should consist of an MH325B square-shaft helical pier (Magnum Piering) with an uncased grout column of 7 inches in diameter. The lead auger must have a 3 helix configuration of 8 inches, 10 inches, and 12 inches. The MH325B (10,000 ft-lbs. maximum torque rating) Magnum Piering helical pile should have three (3) helical bearing plates (8", 10", & 12" diameters) with 7-inch digger plates that attach just below the extension collar sleeves. A typical MH325B pier will have an allowable axial capacity of 40 kips, tension (uplift) of 20 kips, and lateral capacity of 3 kips. We recommend a minimum compressive strength of 4,000 psi grout be used around the square shaft. The underlying bedrock surface within the building area is present at approximately 73 feet below the existing surface grades. The pier refusal depths at this site should range from approximately 35 to 40 feet below the existing ground surface. The helical piers should be tied to the grade beams using the standard new construction brackets. The base of all grade beams should be at least 36 inches below the final exterior grade for adequate frost protection.

The helical pier and grade beam foundation system should be designed by a licensed structural engineer. It is our opinion that the helical pier sections for this project should at least be equivalent to Magnum Piering MH325B shafts. The structural engineer should evaluate the need for more heavy duty pier sections, due to potential lateral stability concerns and seismic design considerations.

The main limitation with respect to the use of helical piers is the potential for the piles to refuse on obstructions prior to encountering bedrock. In fact, we expect that 10% of the helical piles may refuse on rubble in the fill strata, buried utilities, or dense obstructive strata in the subsurface. In the event that any piles refuse prior to reaching the proper torque refusal, we recommend installing additional piers in proximity to the refused pier to ensure that the proper bearing material is encountered. It may also be necessary to break up buried abandoned slabs or foundations using a hoe-ram for pile installation.

The soil materials at the foundation bearing level may become weakened or softened if left exposed to the environment for too long a time. Should the degradation of the bearing materials take place, we recommend that these materials be removed from the foundation excavations prior to concrete placement. All rubble deposits, brick, and loose materials should also be removed from the foundation excavations prior to reinforcing steel placement. A hand operated tamper can be used to compact the bearing surface to minimize the disturbance caused by the excavation process. The materials at the base of the foundation excavations should be observed and tested by the geotechnical engineer or his authorized representative prior to concrete placement, to verify competency.

For a foundation system designed and constructed as recommended above, the total and differential settlements should be on the orders of 0.5 inches and 0.25 inch, respectively. This would result in an angular distortion of approximately 0.001 inch-per-inch across a distance of 20 feet. The potential for cracking in the masonry walls can be minimized by providing control/construction joints at critical locations and every 20 feet along the walls. At a minimum, the control/construction joints should be placed where changes in the wall height or loading conditions occur. We do not recommend a rigid connection between the existing building and new addition.

Seismic Soils Classification and Seismic Hazard Evaluation

Site Class D is recommended for the seismic design considerations, based upon our test borings, our knowledge and understanding of the area geology, and Table 1613.5.2 of the 2015 International Building Code (IBC). The overburden soils at this site are identified as Site Class D. The depth of weathered bedrock at this site is at least 73 feet below the present surface and belongs to Site Class B. Although the IBC site classification is based on the average soil conditions within the top 100 feet of the subsurface profile, the IBC permits the soil properties to be estimated by a geotechnical engineer based upon known regional geologic conditions where site-specific data is not available to the depth of 100 feet. A 100 foot deep test boring, possibly in conjunction with more sophisticated laboratory testing or field geophysical testing, would be required to more accurately determine the soil properties and soil site class. The actual seismic design should be performed by a structural engineer. The following potential seismic hazards resulting from earthquake motions have been evaluated.

1. A slope stability analysis was not included in the scope of this exploration. The ground surface within the building area is level and stable.

2. The groundwater table was encountered at a depth of 55 feet during our subsurface exploration. Because the foundations will be extended to dense strata, liquefaction of the bearing soils due to earthquake motions will not be an issue.

3. As no ponds, slopes or low lying areas are present within the proposed building vicinity, lateral spreading is unlikely.

4. As no faults are present within the site area, surface rupture is also unlikely.

Floor Slab Support

A conventional slab-on-grade can be used in conjunction with the helical pier and grade beam foundation system. The existing fill materials, new engineered fill, or natural soils will be suitable for floor slab support following the recommended building pad preparation activities. We recommend that any existing soft or wet materials within the building footprint be removed to the level of the underlying firm materials and be replaced with controlled, compacted, engineered fill or compacted clean #57 stone.

The floor slab subgrade should be prepared as outlined in the previous Site Preparation section. The subgrade should be compacted using a vibra-plate or hand operated tamper under the supervision of the geotechnical engineer, or his authorized representative, to identify any areas in need of undercutting and replacement with controlled, compacted, engineered fill. A floor slab-on-grade underlain with a subgrade prepared as outlined above can be designed utilizing a modulus of subgrade reaction of 90 pounds-per-cubic-inch (pci).

Additionally, we recommend that a minimum 4 inch thick freely-draining granular base course be placed beneath any floor slab. This granular layer will aid in the final grading of the slab subgrade, and help to inhibit any water from rising to the floor slab. Prior to the placement of concrete, we also recommend that a vapor barrier, conforming to ASTM E 1745, be placed on top of the granular material to provide additional moisture protection. The surface curing of the slab should also be given attention, so as to minimize uneven drying and the associated potential cracking. A conventional concrete floor slab-on-grade should be isolated from the associated building foundation system. This can be accomplished with the use of proper construction joints. Also, to help minimize the widths and propagation of any shrinkage cracks which may develop near the surface of the slab, wire mesh reinforcement placed within the top half of the slab section, or fiber mesh reinforcement mixed with the slab concrete, should be included in the floor slab design. Based on our evaluation, up to 0.5-inch of differential settlement could occur below the floor slab.

Retaining Wall Construction

Below grade walls that will retain 4 or more feet of unbalanced earth should be designed as retaining walls. Such retaining walls must be capable of resisting the lateral earth pressures that will be imposed on them. Lateral earth pressures to be resisted by the walls will be partially dependent upon the method of construction. Assuming that the walls are relatively rigid and structurally braced against rotation, they should be designed for a condition approaching "at rest" lateral pressures. However, in the event that the walls are free to deflect during backfilling, as for any exterior walls that are not restrained or rigidly braced, the "active" pressure conditions will be applicable for the design. The following lateral earth pressure parameters are recommended for the retaining wall design, assuming a level backfill and assuming that hydrostatic water pressure does not develop behind the walls.

Lateral Earth Pressure Coefficient	Value
At Rest Coefficient	0.50
Active Coefficient	0.33
Passive Coefficient	3.0
Unit Weight of Soil (Moist)	120 pcf
Friction Factor for Foundations and Bearing Materials	0.32

Again, the above design parameters assume that a two foot wide blanket of clean, well graded granular backfill (less than 7% fines) is placed behind the wall in order to provide positive drainage. Any soil backfill should be compacted to 95% of its maximum dry density per ASTM D-698. We caution that operating compaction equipment directly behind the walls can create lateral earth pressures far in excess of those recommended for design.

Construction Considerations

The exposed subgrade soils can deteriorate and lose support when exposed to construction activity and environmental changes (this is particularly true for the fine grained fill soils). Subgrade soil deterioration can occur in the form of freezing, erosion, softening from ponded water, and rutting from construction traffic. If the exposed subgrade surface in the slab areas becomes softened and deteriorated, it must be properly repaired through scarification and re-compaction immediately prior to stone placement. If this has to be performed during wet weather conditions, it would be worthwhile to consider undercutting the disturbed soil and replacing it with crushed stone, or providing a flowable fill "mud mat" working surface.

Construction Monitoring

Close testing and monitoring by geotechnical personnel will be a critical aspect of this project. As a minimum, these services should be provided during site preparation, structural fill placement, foundation and grade beam installation, and floor slab construction.

LIMITATIONS

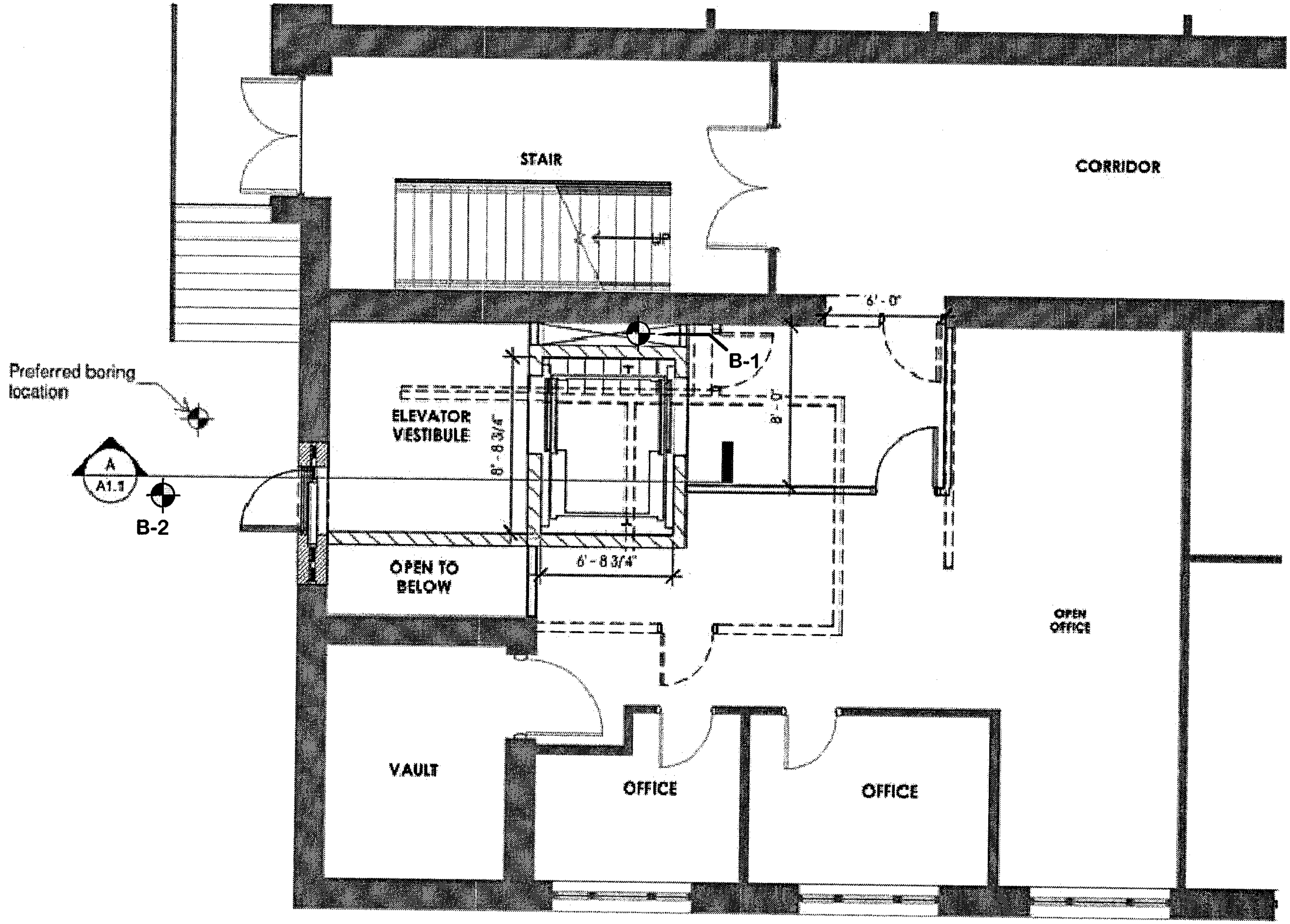
This report was prepared for use by Ross Tarrant Architects, and their authorized consultants, to aid in the design of this project. The report has been prepared in accordance with accepted geotechnical engineering practices and no other warranties, either expressed or implied, are made. The recommendations stated herein are contingent on American Geotech observing and evaluating all geotechnical aspects of the required work. We cannot be held responsible for any misinterpretations or improper implementation of our recommendations by other firms providing quality control services.

The recommendations presented in this report are based on data obtained from test borings made at the approximate locations shown on the Test Boring Location Plan. Variations which may exist between the test borings may not become evident until during construction. If significant variations are noted, we should be contacted so that the field conditions can be examined and the applicable recommendations revised, if necessary. Similarly, in the event of changes in the nature, design or location of the structure, or if other developments are planned, we should be notified so that we may review such changes to verify or make appropriate modifications to our previous conclusions and recommendations, which may be invalidated by any such changes.

We recommend that this complete report be provided to the various design team members, the contractors and the project owner. Potential contractors should be informed of this report in the "Instructions to Bidders" section of the bid documents. The report should not be included or referenced in the actual contract documents.

TEST BORING LOCATION

American Geotech, Inc.
601 Ohio Avenue
Charleston, West Virginia 25302



TEST BORING LOCATION PLAN Old Main Renovations Marshall University Huntington, West Virginia	**AMERICAN GEOTECH, INC.** 601 OHIO AVENUE CHARLESTON, WV 25302 (304) 340-4277	DATE 12-24-18 DRAWN BY RTA ADAPTED BY RDJ	SCALE NONE CHECKED BY KSP SHEET 1 OF 1

Soil Test Boring Logs and Laboratory Data

American Geotech, Inc.
601 Ohio Avenue
Charleston, West Virginia 25302

Test Boring Log: Terminology and Symbols

Terminology

Grain Size

Soil Fraction		Particle Size	U.S. STD. Sieve Size
Boulders		Larger than 12"	Larger than 12"
Cobbles		3" to 12"	3" to 12"
Gravel	Coarse	¾" to 3"	¾" to 3"
	Fine	4.75 mm to ¾"	#4 to ¾"
Sand	Coarse	2.00 to 4.75 mm	#10 to #4
	Medium	0.425 to 2.00 mm	#40 to #10
	Fine	0.075 to 0.475 mm	#200 to #40
Fines	Clays & Silts	smaller than 0.075 mm	smaller than #200

Plasticity characteristics differentiate between silts and clays

Relative Density

Term	"N" Value
very loose	0 - 4
loose	5 - 10
medium dense	11 - 30
dense	31 - 50
very dense	over 50

Consistency

Term	ID Procedures	"N" Value
Soft	Easily penetrated by thumb	0 - 4
Medium Stiff	Penetrated by thumb with moderate effort	5 - 8
Stiff	Penetrated by thumb with great effort	9 - 15
Very Stiff	Readily indented by thumbnail	16 - 30
Hard	Indented by thumbnail with difficulty	31 - 50
Very Hard		over 50

Relative Moisture Description

Dry	Soil noticeably below optimum moisture
Moist	near optimum, but less then liquid limit
Damp	near or exceeding liquid limit
Wet	soil below water table

Symbols

Drilling and Sampling

RC - Rock Coring: Sizes AW, BW, NW, NQ
RQD - Rock Quality Designator
DC - Drive Casing
HSA - Hollow Stem Auger
FA - Flight Auger
AG - Auger
HA - Hand Auger
SS - 2" diameter Split Barrel Sampler
ST - 3" diameter Thin-Walled Tube Sampler
AS - Auger Sample
WS - Wash Sample
NR - No Recovery
S- Sounding
ATV - All Terrain Vehicle

Laboratory Tests

PP - Pocket Penetrometer Reading, Tons/ft^2
QU - Unconfined Strength, Tons/ft^2
W - Moisture Content, %
LL - Liquid Limit, %
PL - Plastic Limit,%
D - Dry Unit Weight, lbs/ft^3

Standard Penetration Test

The penetration resistance, or N-value as it is commonly referred to, is the summation of the number of blows required to drive the last two successive 6" penetrations of the 2" diameter -18" long split barrel sampler. The sampler is driven with a 140 lb. weight falling 30". The standard penetration test is performed in compliance with procedures as set forth in ASTM D-1586

Water Level Measurement

NW - No water encountered
WD - While drilling
BCR - Before casing removal
ACR - After casing removal
CW - Caved and wet
CM - Caved and moist
BP - Backfilled upon completion

LOG OF TEST BORING

CLIENT Ross Tarrant Architects **BORING NO.** B – 1

PROJECT Proposed Old Main Renovations – Huntington, WV **DATE START** 11/13/18

BORING LOCATION As shown on plan **DATE COMP.** 11/13/18

ELEV. REF. None available **ORDER NO.** ______

ELEV. FT.	DEPTH FT.	DESCRIPTION OF MATERIALS	SAMPLE				
			NO.	TP	DEPTH	P.P. (TSF)	REC.
	0.0						
		0.3’ Concrete slab(3.5”).					
	0.3						
		0.2’ Bank-run sand and gravel(2.5”).					
	0.5						
		2.0’ Brown clayey sand with brick fragments (FILL).	1	ha	1.3’ - 2.1’	0.0	
	2.5						
		0.5’ Brown silty sand.	2	ha	2.5’ - 3.0’	0.0	
	3.0						
		Boring completed.					

GENERAL NOTES
DRILLER J. Francis
RIG NO. ______
RIG TYPE Hand
METHOD HA/S

AMERICAN GEOTECH, INC.
Geotechnical, Environmental & Testing Engineers
601 Ohio Avenue
Charleston, WV 25302
(304) 340-4277

WATER LEVEL OBSERVATIONS
IMMEDIATE NW FT.
AT COMPLETION NW FT.
AFTER BP HRS. NW FT.
WATER USED IN DRILLING No FT.

LOG OF TEST BORING

CLIENT Ross Tarrant Architects **BORING NO.** B – 2

PROJECT Proposed Old Main Renovations – Huntington, WV **DATE START** 12/19/18

BORING LOCATION As shown on plan **DATE COMP.** 12/19/18

ELEV. REF. None available **ORDER NO.** ______

ELEV. FT.	DEPTH FT.	DESCRIPTION OF MATERIALS	SAMPLE				
			NO.	TP	DEPTH	BLOWS/6"	REC.
	0.0						
		2.0' Brown clayey sand with rock fragments (FILL), moist, loose.	1	ss	0.0' - 1.5'	4-4-3	11"
	2.0						
		5.0' Brown clayey to silty sand, moist, very loose.	2	ss	2.5' - 4.0'	2-1-2	12"
			3	ss	5.0' - 6.5'	2-2-3	18"
	7.0						
		17.0' Brown sand, fine-grained, clayey @ 20 ft, moist, very loose to loose.	4	ss	7.5' - 9.0'	1-1-1	15"
			5	ss	10.0' - 11.5'	3-3-4	17"
			6	ss	15.0' - 16.5'	3-3-2	18"
			7	ss	20.0' - 21.5'	3-2-4	18"
	24.0						
		5.0' Brown sand, medium-grained, moist, medium dense.	8	ss	25.0' - 26.5'	3-8-9	18"
	29.0						
		26.0' Brown clayey sand with pebbles, damp, medium dense.	9	ss	30.0' - 31.5'	3-8-5	11"
	55.0						
		18.0' Brown sand and gravel, coarse-grained, wet.					
	73.0	Auger refusal @ 73.0 feet. Boring completed.					

GENERAL NOTES
DRILLER J. Francis
RIG NO. CME-45
RIG TYPE Track
METHOD HSA/SS

AMERICAN GEOTECH, INC.
Geotechnical, Environmental & Testing Engineers
601 Ohio Avenue
Charleston, WV 25302
(304) 340-4277

WATER LEVEL OBSERVATIONS
IMMEDIATE 55.0 FT.
AT COMPLETION NW FT.
AFTER BP HRS. NW FT.
WATER USED IN DRILLING No FT.

AMERICAN GEOTECH, INC.
601 Ohio Avenue
Charleston, West Virginia 25302

Ross Tarrant Architects
Proposed 4-Story Elevator Addition
Huntington, West Virginia

TABULATION OF TEST DATA

Hole No.	Sample No.	Depth (ft.)	Unconfined Compressive Strength (tsf)	Failure Strain (%)	Dry Density (pcf)	Water Content (%)	Pocket Penetrometer (tsf)
B-2	S-2	2.5 - 4.0	0.37	5.43	112.9	15.2	
	S-3	5.0 - 6.5				16.7	0.25
	S-4	7.5 - 9.0				12.7	
	S-5	10.0 - 11.5				7.5	

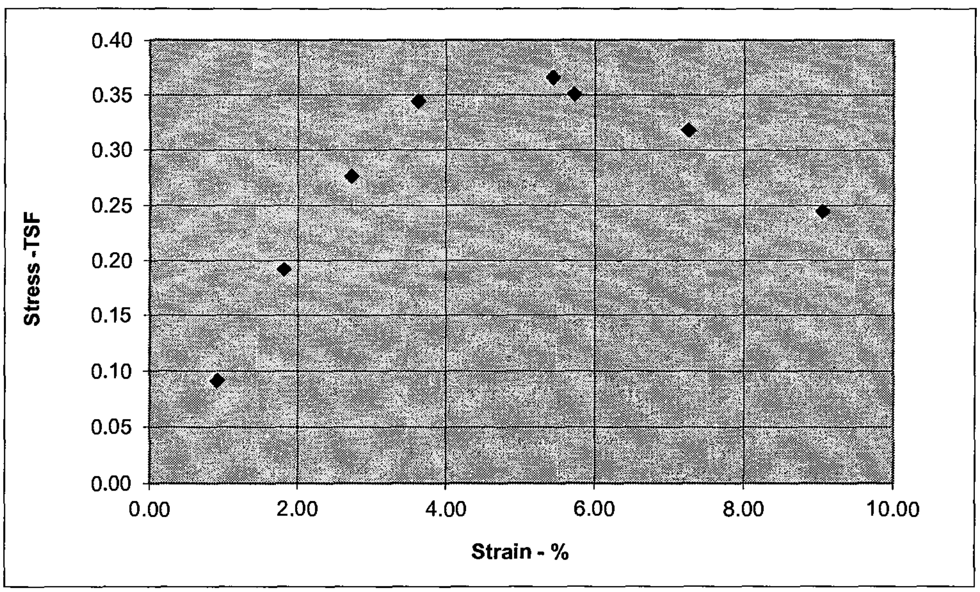
American Geotech, Inc.

Geotechnical, Environmental, and Testing Engineers
601 Ohio Avenue
Charleston, West Virginia 25302
(304) 340-4277

Client	Ross Tarrant Architects	Job No.	
Project	Proposed 4-Story Elevator Addition - Huntington, WV		
Soil Description	Brown clayey sand, moist		
Test By	MW	Testing Date	12/21/2018

Boring Number	B-2	Sample Number	S-2	Depth	2.5 - 4.0
Confining Pressure		Dry Density	112.9	Water Content	15.2

Percent Strain (%)	Sample stress (TSF)
0.91	0.09
1.81	0.19
2.72	0.28
3.62	0.34
5.43	0.37
5.72	0.35
7.24	0.32
9.05	0.24

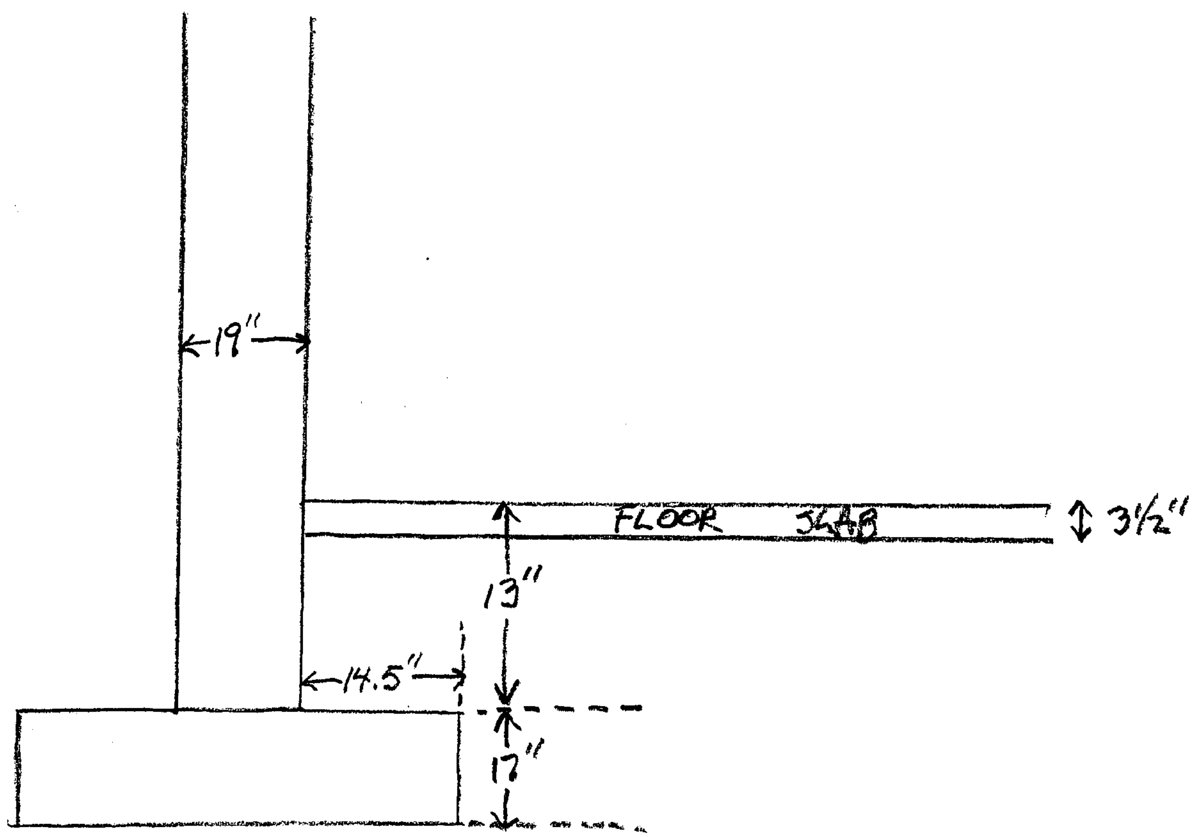


Unconfined Compressive Strength 0.37 TSF
Failure Strain 5.43 %

Remarks:

11/13/18

OLD MAIN – MARSHALL UNIV.



Requisition No.: R1901451

ADDENDA ACKNOWLEDGEMENT

I hereby acknowledge receipt of the following checked addenda and have made the necessary revisions to my proposal, plans, and/or specifications, etc.

Addenda:

No. 1 ________________

No. 2 ________________

No. 3 ________________

No. 4 ________________

No. 5 ________________

I understand that failure to confirm the receipt of the each Addendum is cause for rejection of bids.

____
Signature

____
Company

____
Date