ADDENDUM NO. 4

TO: PLANS AND SPECIFICATIONS FOR STATE OF MISSOURI

Construct New Columbarium Walls
Higginsville Veterans Cemetery
Higginsville, Missouri
PROJECT NO.: U2406-01

Bid Opening Date: 1:30 PM, July 23, 2024 (Not Changed)

Bidders are hereby informed the construction Plans and/or Specifications are modified as follows:

SPECIFICATION CHANGES:

1. **Section 011000 – Summary of Work 1.06.A.2**:
   Attached to this Addendum is the Geotechnical report it references.

DRAWING CHANGES:

No Change

GENERAL:

1. The Pre-Bid Meeting was held on July 9, 2024 at 10:00 PM.
2. The project Geotech Report is attached.
3. Bidders needing an additional site inspection should contact Kelly Larkin at (660) 362-6111 kelly.larkin@mvc.dps.mo.gov
4. Please contact Paul Girouard, Contract Specialist, at (573) 751-4797 for questions regarding bidding procedures and MBE/WBE/SDVE goals and submittal requirements.
5. Changes to, or clarification of, the bid documents are only made as issued in the addenda.
6. Current Plan Holders list is available online at: U2406-01 Construct New Columbarium Wall: Plan Holders: State of Missouri Office of Administration (oafmdcplanroom.com)
7. Prospective Bidders contact American Document Solutions, 1400 Forum Blvd Suite 1C, Columbia MO 65201, 573-446-7768 to order official plans and specifications.
8. All bids shall be submitted on the bid form without additional terms and conditions, modifications, or stipulations. Each space on the bid form shall be properly filled. Failure to do so will result in rejections of the bid.
9. MBE/WBE/SDVE participation requirements can be found in DIVISION 00. The MBE/WBE/SDVE participation goals are 10% / 10% / 3% respectively. Only certified firms as of the bid opening date can be used to satisfy the MBE/WBE/SDVE participation goals for this project. If a bidder is unable to meet a participation goal, a Good Faith Effort Determination Form must be completed. Failure to complete this process will result in rejection of the bid.

ATTACHMENTS:

1. Project Geotech Report

July 18, 2024

END OF ADDENDUM NO. 4

ALPHA-OMEGA GEOTECH

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GEOTECHNICAL ENGINEERING REPORT

MISSOURI VETERANS' CEMETERY EXPANSION

20109 BUSINESS HWY 13
HIGGINSVILLE, MO
(AOG 240135 E)

Date: March 6, 2024

Submitted to: Archimages, Inc.
Kile R Morrison, RA, NCARB
14205 W. 95th St.
Lenexa, KS 66215

Submitted by: ALPHA-OMEGA GEOTECH, INC.

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MISSOURI VETERANS' CEMETERY EXPANSION

20109 BUSINESS HWY 13
HIGGINSVILLE, MO
(AOG 240135 E)

Kile,

Alpha Omega Geotech, Inc. (AOG) has completed its geotechnical engineering investigation for the above-referenced project.

Attached are the following items that were utilized in the analysis and evaluation of the subsurface conditions at this site: a sketch giving the approximate location of the four (4) auger borings completed during this investigation with reference to the existing site features; detailed laboratory results of four (4) moisture contents (ASTM D2216), four (4) dry densities (ASTM D7263), four (4) set of Atterberg limits (ASTM D4318); four (4) unconfined compression (ASTM D2166) eight (8) calibrated pocket penetrometer readings; and four (4) auger boring (ASTM D1452) logs that describe the materials encountered, their approximate thicknesses, and the sampling depths where Shelby tube, thin-walled steel, samplers (ASTM D1587) and Standard Penetration (ASTM D1586) tests were performed.

Representatives of AOG located each of the selected borings by measuring from the existing site features, and these measurements should be considered accurate only to the extent implied by the method of measurement. Elevations were not determined in the field at the time of drilling. Each of the borings was completed by AOG using a CME 55 high-torque drill rig.

1.0 PROJECT DESCRIPTION

Alpha Omega Geotech (AOG) understand this project consists of the construction of an expansion at Veterans' Cemetery. The current construction site covers an area of approximately 0.50 acres. The site is grass covered and relatively flat with elevation change of approximately 4 feet across the site.

Based on the information provided, AOG understands that the proposed expansion consists of 4 new columbarium storge walls with surrounding walkway/patio around them as well as widening the drive to accommodate parking. The free-standing columbarium walls will be slab-on-grade with approximate dimensions of, length 44 ft, width of 4 ft and a height of 8 feet. The finished grade and foundation loads were not provided, AOG assumes the finished grade will be close to the existing surface elevation and that the loads will be relatively light to moderate.

A grading plan for the site has not been provided at this time. AOG assumes cuts and fills will be in the range of approximately one (1) to three (3) feet to achieve the desired construction grade.

2.0 SUBSURFACE INVESTIGATION

Based on the information provided as well as discussions with the design team, AOG drilled four (4) auger borings at the proposed site. The borings were advanced to their planned depths or auger refusal, whichever occurred first. Boring depths are shown on the following table:

Table 1: Boring Depths

BORING DEPTH TABLE (FT)			
Boring #	Boring Location	Top of Weathered Rock	Practical Refusal Depth (*)
B1	SEE SITE SKETCH	~ 13.5	~ 19.5
B2	SEE SITE SKETCH	~ 13.5	~ 19.5
B3	SEE SITE SKETCH	~ 13.5	~ 19.5
B4	SEE SITE SKETCH	~ 13.5	~ 19.5
(*) Very hard, weathered limestone and shale that was penetrable using our high-torque drilling equipment was encountered above the auger refusal depths shown above (see the boring logs enclosed in Appendix Section 1 of this report).			

It should be understood that the depth of boring, split-spoon refusal or auger refusal reported herein applies to the type of drilling equipment that was used. As such, it might be possible to extend some of these borings deeper using different drilling equipment and/or techniques. Conversely, residual sandstone, shale, and limestone materials through which AOG's drill rig penetrated, without achieving refusal, may be difficult to excavate depending upon the equipment being used. As such, Alpha-Omega Geotech, Inc. shall not be responsible for the determination of Others, regarding the rippability, or ease of excavation, of the in-situ subgrade, bedrock and/or geo-intermediate materials.

Above the depth, at which boring termination occurred, predominantly clay materials were encountered in the borings. Thin-walled, steel, Shelby tube samplers (ASTM D1587) were used to collect relatively undisturbed samples from these borings for laboratory analysis. Standard Penetration tests (SPT) (ASTM D1586) were also used to sample and evaluate the consistency of the in-situ subgrade materials encountered in these test borings. Standard

Penetration Tests are conducted by advancing a hollow, split spoon sampler into the base of the auger hole by means of dropping a 140-pound hammer a distance of 30 inches onto the drill rods. Each drop of the hammer is one blow, and these blow counts are recorded for each of three, 6-inch advances of the sampler. The first 6-inch advance is the seating drive, and the summation of the blow counts of the final two, 6-inch advances is taken as the standard penetration resistance. The standard penetration resistance, or N-value, as it is known, along with the soil classification, can be used to estimate the density, shear strength and other engineering properties of the materials encountered.

The N-values obtained from each of the SPT's completed in these borings using a CME automatic hammer are included on the boring logs and summarized in the Summary of Laboratory Testing sheet found in Appendix B. Samples retrieved during drilling efforts were returned to AOG's laboratory for testing and evaluation.

3.0 LABORATORY TESTING PROGRAM

Laboratory testing on materials collected during drilling was performed on samples selected by AOG. Results from these tests can be found in Appendix B and on the boring logs in Appendix C. The following laboratory tests were performed by qualified AOG personnel in accordance with ASTM specifications to determine pertinent engineering properties of the soils:

- Visual Classification (ASTM D2488)
- Moisture Content tests (ASTM D2216)
- Atterberg Limits tests (ASTM D4318)
- Dry Unit Weight (ASTM D7263)
- Unconfined Compression tests (ASTM D2166)

The dry unit weights of specimens cut from the Shelby tube samples were found to be moderate, ranging from 101.3 and 104.8 pounds per cubic foot (pcf) to pcf. Depending upon the material composition and depth below existing grade, the moisture content of the specimens extracted from these tube samples ranged from 20.8 to 23.4 percent. The unconfined compressive strength of the specimen cut from the Shelby tube sample ranged from 5593 to 6155 pounds per square foot (psf). It should be noted that some of the maximum unconfined compressive strength values were obtained at high strain rates nearing or exceeding 10 percent. As a result, given the onsite soil types, these high strain rates typically indicate that larger settlements could occur unless a lower allowable bearing capacity value is used than otherwise indicated by the unconfined compressive strength test results. Calibrated pocket penetrometer readings ranging from 2.75 tons per square foot (tsf) (5500 psf) to >4.5 tsf (>9000 psf) were obtained on the recovered Shelby tube samples. However, it should be noted that the pocket penetrometer values tend to over-estimate the strength of in-situ subgrade materials relative to the actual unconfined compressive strength test.

The Atterberg consistency limits were determined for four (4), generally, representative sample taken at relatively shallow depth from within the proposed structures' footprints. Based on the Atterberg limits, the samples were classified in accordance with the Unified Soil Classification System (USCS) as Fat Clay (CH) classification materials. The results of these laboratory analyses are presented in the following table:

Table #2: Atterberg Limits Results

ATTERBERG LIMITS TESTS					
Sample	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	USCS Classification
B1, ST-2	3.0-5.0	56	21	35	Fat Clay (CH)
B3, ST-2	3.0-5.0	64	20	44	Fat Clay (CH)

Based on the Atterberg limits, it is anticipated the majority of the onsite soil materials generally possess a moderate swelling potential. The swelling potential of a clay soil is an indication of the volume changes that may take place with variations in the soil moisture content.

Except for the samples for which the Atterberg limits were determined, all of the other soil classifications given throughout the laboratory test data, as well as the boring logs, were made using the visual and tactile techniques described in ASTM D2488. As a result, additional analyses could reveal other soil types of different classification and potentially higher plasticity and swelling potential both onsite and within the nearby vicinity.

4.0 GROUNDWATER

Free water was not encountered during the time of drilling. However, a twenty-four-hour water level was not established in these borings due to time restrictions, as well as potential safety hazards associated with open bore holes.

Although the ground water levels given on the boring logs reflect the conditions observed at the time the borings were made, they should not be construed to represent an accurate or permanent condition. There is uncertainty involved with short-term water level observations in bore holes especially in clay soils of relatively low permeability. The groundwater level should be expected to fluctuate with variations in precipitation, site grading and drainage conditions. In addition, it is also possible that seasonal perched ground water may be encountered within these soil deposits and bedrock formations at different depths during other times of the year based on drainage conditions, seasonal snowmelt, and rainwater infiltration.

5.0 GEOTECHNICAL CONSIDERATIONS

The following considerations are given based on observations made by AOG at the time of drilling, during reconnaissance trips, and based on the project requirements and description as stated above:

1) *Expansive Materials:* Moderately expansive clays were encountered during this exploration. Expansive clays are known to experience significant volume changes with changes in moisture. Expansive clays located beneath any slabs on grade should be removed in accordance with Section 8.0, SLABS ON GRADE of this report.

6.0 SITE DEVELOPMENT

6.1 Site Preparation

Based on the information provided, AOG anticipates amounts of cut and fill, one (1) to three (3) feet +/-, from the current elevation within the proposed structure footprint will be required to achieve finish floor elevations. It is possible that additional cuts and fills may be required to obtain improved surface drainage.

Appropriate erosion control measures, such as proper site contouring during grading activities, as well as silt fences, should be maintained to help keep any eroded materials onsite.

Within the footprint of the proposed new structure and associated paving, it is recommended that any topsoil, vegetation, utility backfill, and other deleterious material (i.e. concrete slabs, relic foundations, utilities, etc.) or pavements should be stripped and removed prior to the placement of any fill required to achieve the finished floor elevation.

Transitions between cuts and fills should be on slopes of 5:1 (H:V), or flatter, and will require proper benching. Additionally, any placement of engineered fill on existing slopes will require proper benching with the native clay soils during placement.

In accordance with the local building code, the exposed subgrade and any benching required during fill placement must be verified by a representative of Alpha-Omega Geotech, Inc. prior to the placement of fill.

Once initial site stripping operations have been completed and prior to the placement of any engineered fill in this area, it is recommended that the exposed subgrade be moisture conditioned and recompacted, as needed, and be thoroughly evaluated by means of a proof-roll with a fully loaded, tandem-axle dump truck to locate any soft, compressible areas within the proposed project site. Any soft, compressible areas identified on the proposed project site must be corrected by over-excavation to a suitable subgrade and replaced with an acceptable material. Although it is not typically anticipated that any extensive removal and replacement would be necessary, it is possible that some effort may be required to develop a stable platform on which to place the necessary fill material and address any other existing site conditions that become known during construction. It is generally anticipated that the extent of these efforts would strongly depend upon the ground moisture conditions at the time the site work begins. In the event that the ground is generally dry, it is possible that only a minimal amount of stabilization would be required, which may be possible to accomplish by simple moisture conditioning and re-compaction efforts. *Nevertheless, it is recommended that a representative of Alpha-Omega Geotech, Inc. should be onsite to witness this proof-rolling and offer recommendations, as needed, to correct any problem areas identified.*

6.2 Undocumented Fill

Undocumented fill is a foreign material, of which no records of testing or evaluation by a qualified professional during the time of placement exist. Undocumented fill is, generally, unsuitable beneath structures, and where encountered during development, should typically be fully removed beneath structures.

6.3 Engineered Fill Placement

It is assumed that any fill material needed will come from cut areas and, if necessary, on-site, or nearby borrow sources of similar material. It is recommended that silts and any un-weathered shales should NOT be used to construct any of the necessary fill within either the new building or paved portions of the site. Assuming they are properly moisture conditioned and compacted, it generally appears that the clean clay soils encountered in the borings that are free of rubble, trash, concrete, asphalt, and other debris would be acceptable for use as controlled fill.

Any imported fill materials for use as structural fill should be tested by Alpha-Omega Geotech, Inc. to determine if they are acceptable for the intended use. Any groundwater seeps that are encountered must be diverted prior to placing fill.

In addition, no compaction of soil fill material should be performed during freezing weather. Nevertheless, as weather conditions dictate, it may be possible to substitute crusher-run limestone in lieu of soil fill to allow placement of engineered controlled fill material to continue during the cold fall and winter months. However, any frozen fill material must be stripped prior to placing subsequent lifts.

All general fill within the area of the new structure should be placed in lifts not exceeding 6 inches in thickness, and compacted to a minimum density of 95 percent of the Standard Proctor (ASTM D698) maximum dry density at a moisture content within ± 3 percent of the optimum moisture content.

As required by the local building code, the compaction of any structural fill beneath the new buildings, pavements, and any other areas where settlement control is necessary, as well as any slopes that are steeper than 4:1 (H:V), should be tested lift-by-lift by a representative of Alpha-Omega Geotech, Inc.

6.4 Drainage Considerations

Fluctuations of the groundwater level can occur due to seasonal variations in the amount of rainfall and other climatic factors that were not evident at the time the borings were made. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project. In spring and late fall, soil moisture contents may be abnormally high and drying of the soils that are exposed and/or undercutting may be required to develop a suitable base for the placement and compaction of engineered fill. Disking and aeration of the exposed soils may be sufficient to develop a stable base. However, if site grading begins during the summer or early fall, moisture contents may be abnormally low and the plastic clay soils encountered during this exploration may undergo significant volume changes with subsequent increases in their moisture content. Therefore, when these conditions exist, disking and moisture conditioning of the exposed subgrade soils may be required.

It is important to consider drainage and construction elements that will help to inhibit future slab on grade problems, foundation cracks, as well as intolerable settlements due to volume changes of the onsite soils. The surface drainage must be designed to prevent ponding and effectively move water away from both the new and existing buildings, pavements, and other structures. It is also very important to place all materials under carefully controlled conditions of moisture and density to inhibit significant soil volume changes. Shrubs and trees with deep root systems and requiring large quantities of water should not be planted within 20 feet of the building lines. Any

planters located near the building should have impermeable bases with weep holes to discharge water away from the wall lines. Down spouts should be connected to subsurface drains to carry the water to safe exits beyond the building lines, retaining walls, pavements, slopes and other site features or structures that could be adversely affected by water seepage.

In addition to controlling surface drainage, it is recommended that a gravity drainage system, such as a French drain or similar, designed to intercept free water prior to contact with foundations be installed in areas where the topography will direct water toward the proposed structure. foundation drainage systems should, also, be considered to prevent any free water accumulation and/or ingress at the foundations where shallow groundwater was encountered. Any basement or below grade slabs should have a permanent dewatering system, such as a sump pump or similar type system, installed to alleviate water accumulation.

6.5 General

Permanent slopes should not be steeper than 3:1 (H:V) to help ensure their future stability and accommodate normal mowing equipment. The responsibility for excavation safety and stability of temporary construction slopes should lie solely with the contractor and should follow the OSHA regulations given in 29 CFR Part 1926.650 - .652, Subpart P. The stability of open excavations is dependent upon a number of factors including but not limited to the presence of gravel, sand and/or silt seams, groundwater seepage, strength characteristics of the soil layers, slickensides and other unique geological features, the slope and height of the cut, surcharge loading and vibrations during construction, weather conditions, as well as the length of time the excavation is left open. Alpha-Omega Geotech, Inc. does not assume any responsibility for construction site safety or the contractor's or other parties' compliance with all local, state, and federal safety or other regulations including imprudent excavating practices that results in any damage to nearby structures, roadways, utilities, as well as onsite or offsite improvements.

7.0 FOUNDATIONS

7.1 Spread Footings Foundations

Based on the laboratory test data, the available subsurface information that has been obtained and our understanding of the project requirements, it is our opinion that a shallow foundation system consisting of either earth-formed trench or spread footings may be used for this structure as economical foundation elements.

Perimeter footings, and any footings in unheated areas, should be placed at least 3 feet below final exterior grade to provide adequate frost protection and place them in a more stable moisture environment. The footing excavations should be carried to undisturbed, inorganic soil or engineered fill.

7.2 Allowable Bearing Pressure

Provided all design and inspection recommendations as given in this report are closely followed and good construction practices are exercised, it is recommended an allowable bearing value of 2,500 psf may be used for design purposes to proportion the spread/wall footings. A twenty-percent increase, i.e. 3,000 psf, may be used for individual column footings. These allowable bearing capacity values, which are based on shear strength alone and not on settlement, incorporate a factor of safety of 3.0. *The actual bearing capacity of all subgrade supporting the foundation elements must be confirmed by a representative of Alpha-Omega Geotech, Inc. as the excavations for*

the load-bearing wall and column footings are completed and prior to placement of reinforcing steel and concrete. For transient loading conditions, such as unsustained wind and earthquake, a 33 percent increase may be applied to the above-referenced allowable bearing capacity values.

Based on the subsurface conditions that have been identified, Site Class C conditions (IBC 2018) may be assumed for seismic considerations.

7.3 Anticipated Settlement

Uniform bearing conditions should be provided beneath the footings to minimize differential settlements. If any soft or otherwise unsuitable material is encountered in the footing excavations, it will have to be removed and replaced with engineered controlled fill. Recommendations for the over-excavation and replacement with engineered controlled fill can be made when the footing excavations are inspected during construction, as needed. *A representative of Alpha-Omega Geotech, Inc. should inspect all of the footing excavations to verify that uniform and competent bearing material is present beneath all of the foundation elements prior to the placement of any reinforcing steel and concrete.*

For spread footings designed and constructed in accordance with this report, it is anticipated that settlements will be limited to 0.75 inches of differential and 1.0 inches in total.

7.4 General

Except for the moisture conditioning discussed in the "Slab On Grade" section of this report, it is recommended that all fill within the new building and paved areas of the site should be constructed as engineered controlled fill placed in lifts not exceeding 6 inches in thickness and compacted to a minimum density of 95 percent of the Standard Proctor (ASTM D698) maximum dry density at a moisture content within ± 3 percent of the optimum moisture content. In accordance with the local building code, a representative of Alpha-Omega Geotech, Inc. should be onsite during placement of all engineered controlled fill within the new building and paved areas to confirm lift thickness and test the compaction of the engineered controlled fill lift-by-lift as it is being placed.

If possible, the excavated footings should not be left open for more than 24 hours. The base of the footing excavations should be free of water and loose soil prior to placing reinforcing steel and concrete. No ground water is expected in the footing excavations since ground water was not encountered in any of the borings that were made at the time of drilling. However, if ground water is encountered within the expected depth of excavation for the footings, it is generally anticipated that it can be removed by the use of sumps and pumps. Based on the subsurface conditions that have been identified, it is anticipated that earth-formed trench footing excavations may be used effectively on this project. However, due to the possible presence of existing rocky fill material, it may become necessary to utilize formed footings. A minimum width of 12 inches should be used for trenched wall footings to allow for steel placement and inspection. Minimum widths of 16 and 24 inches should be used for formed wall and column footings, respectively.

8.0 SLABS ON GRADE

8.1 Slab Thicknesses

Slabs on grade that will be subjected to repeated wheel loads, such as passenger vehicles, should be at least 6 inches in thickness. Slabs that are **not** exposed to repeated wheel loads, should be at least 4 inches in thickness. Slabs in storage areas may need to be thicker due to shelving post and other concentrated floor loads. Actual slab thicknesses should be determined by the project structural engineer.

8.2 Low Volume Change (LVC)

The following recommendations provided to help protect the slabs from damage caused by volume changes within the underlying subgrade, and should be implemented in conjunction with Section 7.0, FOUNDATIONS of this report:

1) Cut the subgrade a minimum of 28-inches beneath the base of slab elevation to allow placement of a 24-inch subbase and a 4-inch base course beneath the slab-on-grade.

2) Scarify and recompact the upper 9 inches of exposed subgrade to within 95 to 100 percent of the Standard Proctor (ASTM D698) maximum dry density at a moisture content wet of the optimum moisture content 0 to 3 percent.

3) For the 24-inch granular subbase, place crusher-run limestone or rock dust in three (3) approximately equal lifts and compact to a minimum density of 95 percent of the Standard Proctor (ASTM D698) maximum dry density. The moisture content of this material at the time of placement must be sufficient to achieve the specified level of compaction.

4) Place a 4-inch base course of clean, open-graded crushed limestone. This granular base course should be compacted with a suitable vibratory steel wheel roller.

8.3 General

It is recommended that under-slab utility trenches should be backfilled with impermeable clay soil (*), flowable fill or lean concrete to help reduce the potential of these trenches acting as aqueducts transmitting groundwater beneath the new building, pavements, retaining walls and other structures.

(*) If impermeable clay soil is used as backfill, it should be placed in lifts not exceeding 6 inches in thickness and compacted to a minimum density of 95 percent of the Standard Proctor (ASTM D698) maximum dry density at a moisture content within ± 3 percent of the optimum moisture content, which should be verified lift-by-lift during placement by a representative of Alpha-Omega Geotech, Inc. Although clay soil may be less costly than flowable fill or lean concrete, the OSHA excavation safety regulations given in 29 CFR Part 1926.650 - .652, Subpart P must be followed in the event that clay soil is used to backfill any utility trenches.

Finally, it should be noted that the recommendations given, herein, regarding placement of low-volume change fill to help protect the slabs on grade from volume changes associated with fluctuations within the moisture content of the underlying subgrade materials, would still apply.

Plumbing lines and other water leaks occurring beneath the structure's slab-on-grade floor can induce volume changes within the underlying subgrade materials. Therefore, it is recommended that all water supply and wastewater lines should be tested for leaks prior to backfilling the utility trenches. In addition, it is also recommended that every effort should be made to maintain the plumbing in good working order and prevent or minimize water leaks and discharges.

It is assumed the concrete will be reinforced with properly placed steel reinforcement, such as #4 bars, and control joints will be cut during or shortly after finishing (to be designed by the project structural engineer). Properly placed wire mesh may be used as secondary reinforcement. Fiber reinforcement may also be considered to help control shrinkage cracking and the use of other admixtures may be considered to enhance the workability and performance of the concrete. Suitable construction and sawed joints should be used to control cracking of the slab. In addition, it is recommended that the slump and temperature of the concrete at the time of placement should be limited to standard American Concrete Institute (ACI) guidelines. Furthermore, it is also recommended that proper concrete curing techniques should be utilized and the addition of jobsite water to the concrete be avoided or very closely controlled to within acceptable parameters. Nevertheless, it should be noted that cracking of concrete used for slabs on grade is a normal occurrence and should be expected.

If a 20-inch thick subbase layer of crusher-run limestone (AB-3) or rock dust is used, as recommended, a modulus of subgrade reaction of 150 pci may be assumed for reinforcement and thickness design to support surface loads. If a higher modulus of subgrade reaction were desired, we would be pleased to work with the project's structural engineer to develop recommendations for alternate bases and/or subbases to achieve a higher modulus of subgrade reaction.

9.0 EARTH PRESSURE COEFICIENTS

A coefficient of sliding friction over the in-situ clay soils at this site may be taken as 0.32. A minimum factor of safety of 1.5 should be used when considering sliding resistance.

Active, passive, and at-rest earth pressure coefficients of 0.25, 4.2 and 0.4 may be assumed for backfills of clean, open-graded crushed limestone.

Active, passive, and at-rest earth pressure coefficients of 0.5, 1.9 and 1.0 may be assumed for the in-situ clay soils at this site.

However, some of the in-situ soils encountered during this exploration are classified as Fat Clay and possess a high swelling potential, and, as such, should not be used as backfill since considerable lateral loads may develop with the addition of water.

If deflection of extended foundation walls or retaining walls is not tolerable, as rest earth pressures should be assumed.

These earth pressure coefficients do not include the effect of surcharge loads, hydrostatic loading or a sloping backfill nor do they incorporate a factor of safety. Also, these earth pressure coefficients do not account for high lateral pressures that may result from volume changes when expansive clay soils are used as backfill behind walls with unbalanced fill depths. In addition, any disturbed soils that are relied upon to provide some level of passive

resistance should be placed in lifts not exceeding 6 inches in thickness and compacted to a minimum density of 95 percent of the Standard Proctor (ASTM D698) maximum dry density at a moisture content within ± 3 percent of the optimum moisture content. It is recommended that a representative of Alpha-Omega Geotech, Inc. should verify the compaction of any such materials relied upon to provide passive pressure lift-by-lift during placement.

10.0 TESTING AND INSPECTION RECOMMENDATIONS

Unless Alpha-Omega Geotech, Inc. is retained to provide the construction observation, monitoring and testing services for this project, we cannot accept any responsibility for any conditions that deviate from those identified in this subsurface investigation nor for the performance of the foundations, pavements and other structures including any retaining walls that are a part of this project. Alpha-Omega Geotech, Inc. is accredited by AASHTO and we are experienced in construction quality control and have a fully-equipped soil, concrete, aggregate, rock, and asphalt testing laboratory, as well as qualified field technicians to provide these field services.

It is not economically practical to perform enough exploratory borings on any site to identify all subsurface conditions. Some conditions affecting the design and/or construction may not become known until the project is underway. The boring logs, field SPT and laboratory test results depict subsurface conditions only at the specified locations and depths at the site. The boundaries between soil and rock layers indicated on the boring logs are based on observations made during drilling and an interpretation of the laboratory testing results. The exact depths of these boundaries are approximate and the transitions between soil and rock types may be gradual rather than being clearly defined. Also, due to the prior development at this site, as well as the natural conditions of the formation of soils and rock, it is possible that unanticipated subsurface conditions may be encountered during construction. Monitoring of the subsurface conditions that are revealed during construction is needed to verify that subsurface conditions are consistent with those conditions identified in this preliminary geotechnical investigation. If variations in subsurface conditions are encountered, it will be necessary for Alpha-Omega Geotech, Inc. to re-evaluate the recommendations that have been made in this report.

Special Inspections should be performed in accordance with the local building code under which the project is designed, as adopted by Higginsville, MO.

Prior to filling, it is recommended that a representative of Alpha-Omega Geotech, Inc. should verify that the site has been properly stripped of all topsoil and other deleterious material, benched as needed and prepared for the placement of fill. The compaction of any structural fill beneath the new building, pavements, and any other areas where settlement control is necessary should be tested lift-by-lift by a representative of Alpha-Omega Geotech, Inc. as it is being placed. This should include the prepared subgrade layers beneath the building's slab-on-grade, as well as any other fill material relied upon to provide passive resistance. Also, in accordance with the local building code, any fill that is used to construct slopes steeper than 4:1 (H:V) must be placed as engineered controlled fill and the compaction tested lift-by-lift during placement.

Assuming that uniform fill material is used, nuclear density gauges (ASTM D2922/D3017) should be used to test compaction wherever necessary. However, if fill material of non-uniform consistency is used, other evaluation methods may be required. Such methods may include, but not be limited to, the use of a GeoGauge Stiffness meter, Dynamic Cone Penetrometer (DCP), proof-rolling or other visual inspection techniques.

Any geotextile fabric and geogrid reinforcement that is utilized should be placed and overlapped as needed in accordance with the manufacturer's recommendations, which should be verified by a representative of Alpha-Omega Geotech, Inc. Proper placement of the reinforcing steel for drilled piers, grade beams, pier caps, foundation walls and other structural elements including any necessary wing walls and retaining walls should be verified prior to the placement of concrete. The subgrade under the slabs on grade and pavements should be checked to verify they are in compliance with the density and moisture requirements. Wherever possible, in addition to compaction testing, cut and fill areas should be proof-rolled with a loaded tandem-axle dump truck to identify soft areas that will need to be corrected. A representative of Alpha-Omega Geotech, Inc. should observe this proof-rolling. Checks should also be made of the subbases, concrete and any pavement materials.

Finally, the inspection and testing services listed herein are given as a minimum and it should be understood that additional inspection and testing services might also be required or otherwise beneficial.

11.0 LIMITATIONS

This report is presented in broad terms to provide a comprehensive assessment of the interpreted subsurface conditions and their potential effect on the adequate design and economical construction of the proposed Veterans' Cemetery Expansion project located in Higginsville, MO, as discussed herein. This report has been prepared for the exclusive use of our client for specific application to the project discussed herein and has been prepared within our client's directive and budgetary constraints and in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

It should be noted that the concept of risk is an important aspect of the geotechnical engineering evaluation and report since the recommendations given in this report are not based on exact science but rather analytical tools and empirical methods in conjunction with engineering judgment and experience. Therefore, the recommendations given herein should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soil materials and the proposed structures will perform as planned. Nevertheless, the geotechnical engineering recommendations presented herein are Alpha-Omega Geotech, Inc.'s professional opinion of those measures that are necessary for the proposed structures to perform according to the proposed design based on the information provided to Alpha-Omega Geotech, Inc., the referenced information gathered during the course of this investigation and our experience with these conditions.

Any significant structural changes to the proposed new structure or its location on this site relative to where these test borings were completed shall be assumed to invalidate the conclusions and recommendations given in this report until we have had the opportunity to review these changes and, if necessary, modify our conclusions and recommendations accordingly. It is also strongly suggested that Alpha-Omega Geotech, Inc. should review your plans and specifications dealing with the earthwork, foundations, as well as any pavements prior to construction to confirm compliance with the recommendations given herein. Particular details of foundation design, construction specifications or quality control may develop, and we would be pleased to respond to any questions regarding these details.

If Alpha-Omega Geotech, Inc. is not retained to review the project plans and specifications, address to the proposed building or their location on the site relative to where these test borings were completed, provide the recommended construction phase observation, monitoring and testing services and respond to any subsurface conditions that are identified during construction to evaluate whether or not changes in the recommendations given in this report are needed, we cannot be held responsible for the impact of those conditions on the project or the future performance of the buildings, pavements and/or structures that may be involved.

The scope of our services did not include any environmental assessment or investigation for the presence of hazardous or toxic materials in the soil, surface water, groundwater, or air, either on, below or adjacent to this site. In addition, no determination regarding the presence or absence of wetlands was made. Furthermore, it should be understood that the scope of geotechnical services for this project does not include either specifically or by implication any biological (i.e., mold, fungi, or bacteria) assessment of the site or the proposed construction. Any statements in this report or included on the boring logs regarding odors, colors and unusual or suspicious items or conditions are strictly for informational purposes only.

We appreciate the opportunity to be of service to Archimages, Inc., as well as the project developers and look forward to working with you throughout the construction process. We are prepared to provide the Special Inspection services that will be required by the local building code under which this project is designed, as adopted by the City of Higginsville, MO, as well as the other necessary construction observation, monitoring and testing services discussed in this report. If you have any questions concerning this report, or if we may be of further assistance, please call us at (913) 371-0000.

Sincerely,
ALPHA-OMEGA GEOTECH, INC.

Garic Abendroth

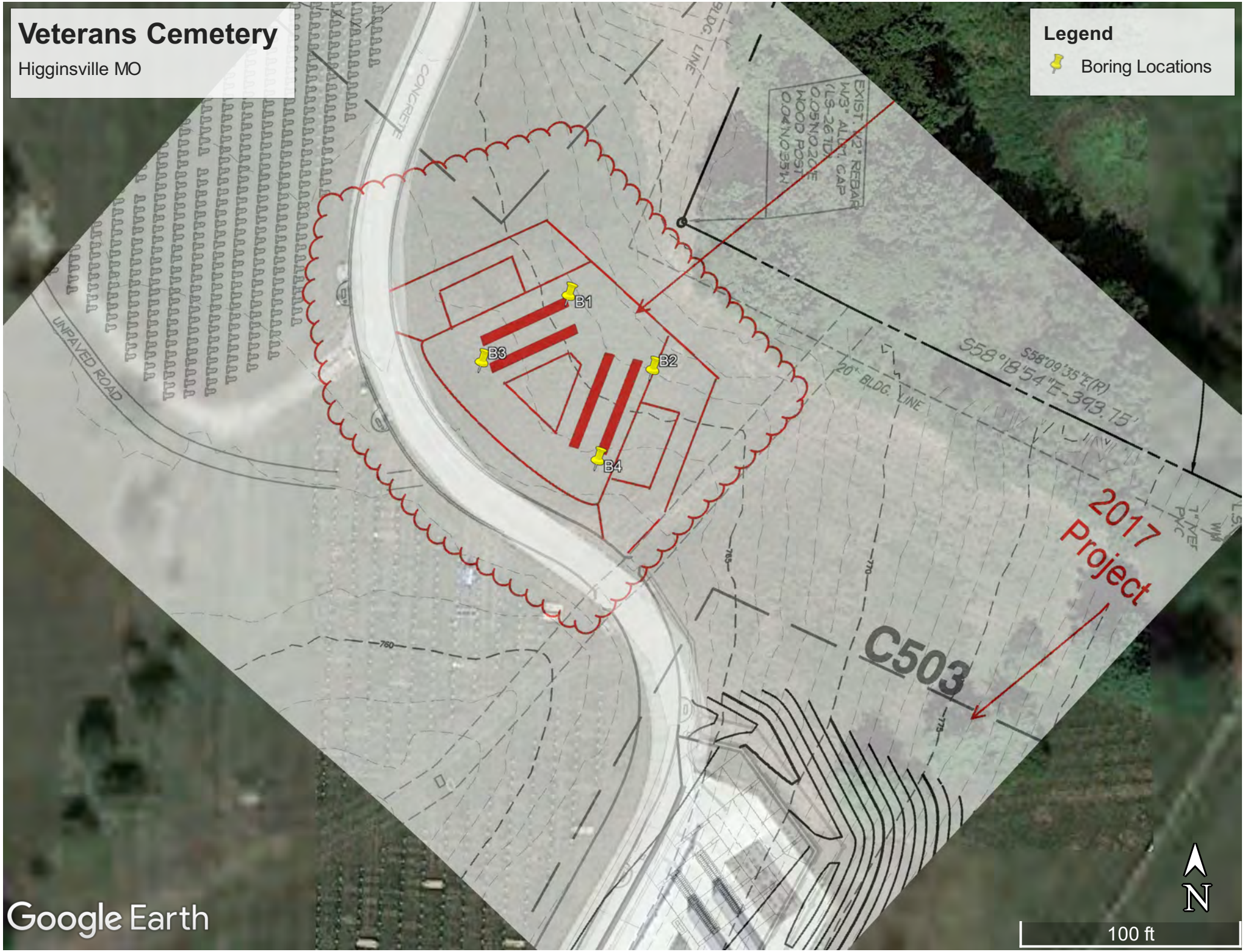
Garic Abendroth, P.E.
Director of Engineering

Enclosures

Appendix Section A

SITE SKETCH

Site and Boring Location Plans


Veterans Cemetery
Higginsville MO
Legend
Boring Locations
B1
B2
B3
B4
UNPAVED ROAD
CONCRETE
BLDG. LINE
20' BLDG. LINE
S58°18'54"E-393.75'
S58°09'35"E(R)
2017 Project
C503
760
765
770
775
N
100 ft
Google Earth

Appendix Section B

LABORATORY TEST RESULTS

Summary of Laboratory Testing

SLT 22205

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
Office: (913) 371-0000 Fax: (913) 371-6710
Website: www.aogeotech.com

ALPHA-OMEGA GEOTECH

PROJECT NAME: MISSOURI VETERANS' CEMETERY
PROJECT LOCATION: 20109 BUSINESS HWY 13, HIGGINSVILLE, MO
PROJECT NUMBER: 240135 E
DATE: 3/6/2024

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	PL	PI	USCS/ Visual Class.	% Passing No. 200	Unconfined Compression (psf)	%e	% Swell	Remarks
B1	SS-1	1.0-2.5	Light brown, speckled reddish brown FAT CLAY with trace of organics (finger roots)						CH					N=8
B1	ST-2	3.0-5.0	Brown, spotted reddish brown, speckled dark brown FAT CLAY	20.6	102.4	56	21	35	CH		5901	2.2		PP= >4.50
B1	ST-3	5.0-7.0	Light brown, spotted reddish brown, light gray and dark brown FAT CLAY						CH					PP=4.50
B1	SS-4	8.5-10.0	Light reddish brown, spotted olive brown, speckled dark brown LEAN/FAT CLAY						CL-CH					N=11
B1	SS-5	13.5-15.0	Light brown LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)						SH					N=50/5
B1	SS-6	18.5-19.5	Light brown, spotted light reddish brown and gray LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)						SH					N=50/5
B2	SS-1	1.0-2.5	Brown, spotted reddish brown, speckled dark brown FAT/LEAN CLAY						CH-CL					N=7
B2	ST-2	3.0-5.0	Light brown, spotted reddish brown and light gray FAT CLAY	21.9	101.3				CH		5593	16.6		PP=2.75

Summary of Laboratory Testing

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1701 State Avenue
Kansas City, KS 66102
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ALPHA-OMEGA GEOTECH

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PROJECT LOCATION: 20109 BUSINESS HWY 13, HIGGINSVILLE, MO
PROJECT NUMBER: 240135 E
DATE: 3/6/2024

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	PL	PI	USCS/ Visual Class.	% Passing No. 200	Unconfined Compression (psf)	%e	% Swell	Remarks
B2	ST-3	5.0-7.0	Brown, mottled reddish brown and dark brown FAT CLAY						CH					PP=4.50
B2	SS-4	8.5-10.0	Light brown, mottled light reddish brown FAT CLAY						CH					N=14
B2	SS-5	13.5-15.0	Light brown, mottled light reddish brown LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)						SH					N=61
B2	SS-6	18.5-19.5	Light brown, mottled light reddish brown LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)						SH					N=50/6
B3	SS-1	1.0-2.5	Brown, speckled reddish brown and dark brown FAT/LEAN CLAY						CH-CL					N=5
B3	ST-2	3.0-5.0	Light brown, mottled light reddish brown, spotted light gray FAT CLAY	23.4	103.5	64	20	44	CH		5761	8.8		PP=3.25
B3	ST-3	5.0-7.0	Light brown, spotted reddish brown, gray and dark brown FAT CLAY						CH					PP=3.50
B3	SS-4	8.5-10.0	Light reddish brown, spotted dark brown FAT/LEAN CLAY						CH-CL					N=12

Summary of Laboratory Testing

SLT 22205

Alpha-Omega Geotech, Inc.
1701 State Avenue
Kansas City, KS 66102
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ALPHA-OMEGA GEOTECH

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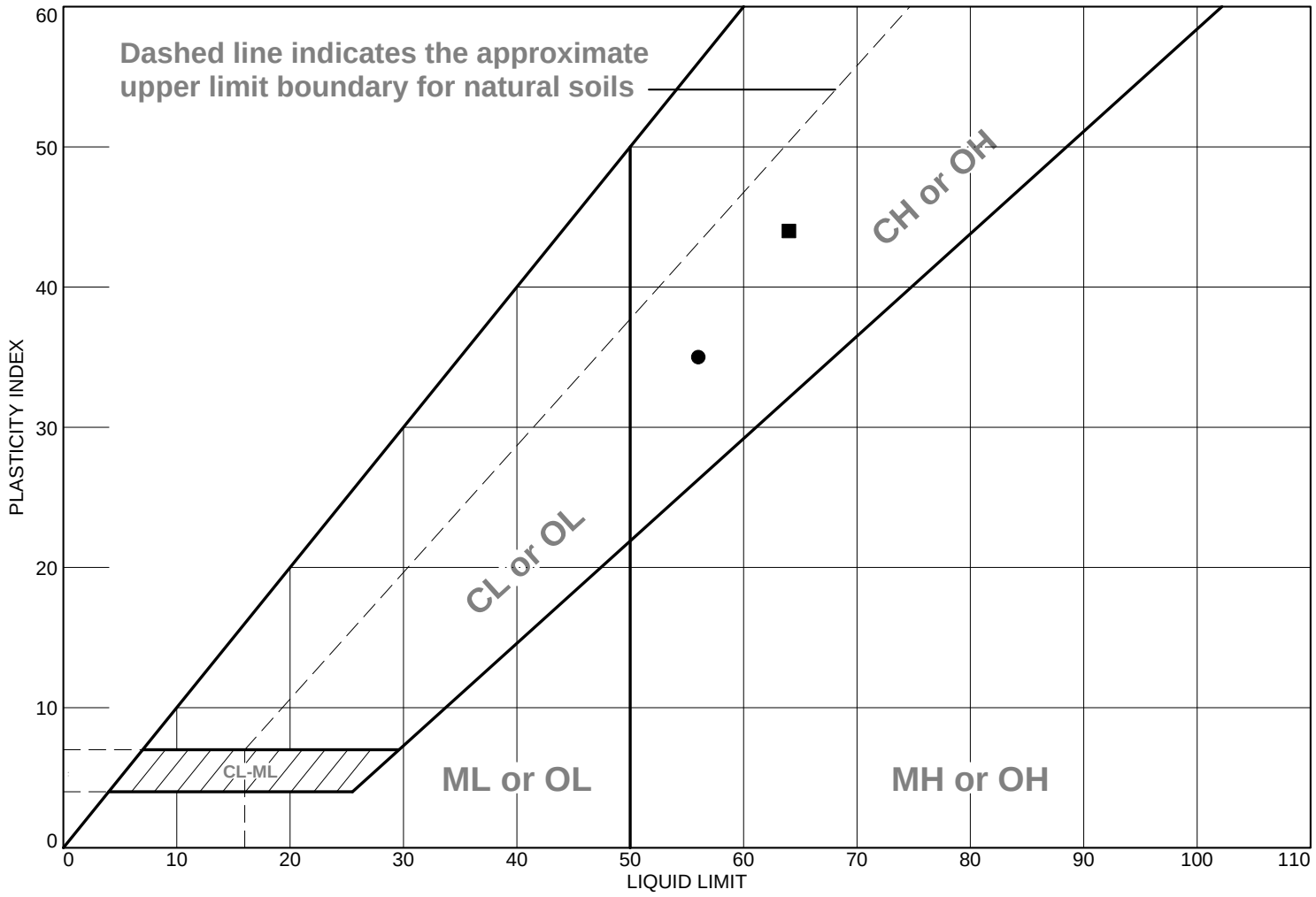
PROJECT LOCATION: 20109 BUSINESS HWY 13, HIGGINSVILLE, MO
PROJECT NUMBER: 240135 E
DATE: 3/6/2024

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits LL	PL	PI	USCS/ Visual Class.	% Passing No. 200	Unconfined Compression (psf)	%e	% Swell	Remarks
B3	SS-5	13.5-15.0	Light brown, speckled reddish brown and light gray LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)						SH					N=46
B3	SS-6	18.5-19.5	Light brown LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)						SH					N=50/5
B4	SS-1	1.0-2.5	Brown, speckled reddish brown FAT CLAY						CH					N=11
B4	ST-2	3.0-5.0	Reddish brown, mottled light brown FAT CLAY	20.8	104.8				CH		6155	16.8		PP=3.75
B4	ST-3	5.0-7.0	Brown, speckled reddish brown, gray, and dark brown FAT CLAY						CH					PP= >4.50
B4	SS-4	8.5-10.0	Light reddish brown, speckled dark brown FAT/LEAN CLAY						CH-CL					N=13
B4	SS-5	13.5-15.0	Light brown LEAN/FAT CLAY (Possible Weathered SHALE) (Very hard, very slow drilling)						SH					N=50/3
B4	SS-6	18.5-19.5	Light brown, light gray LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)						SH					N=50/6

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown, spotted reddish brown, speckled dark brown FAT CLAY	56	21	35			CH
■	Light brown, mottled light reddish brown, spotted light gray FAT CLAY	64	20	44			CH

Project No. 240125 **Client:** ARCHIMAGES, INC.

Project: MISSOURI VETERANS CEMETERY EXPANSION

● **Source of Sample:** B1 **Depth:** 3.0 **Sample Number:** ST-2

■ **Source of Sample:** B3 **Depth:** 3.0 **Sample Number:** ST-2

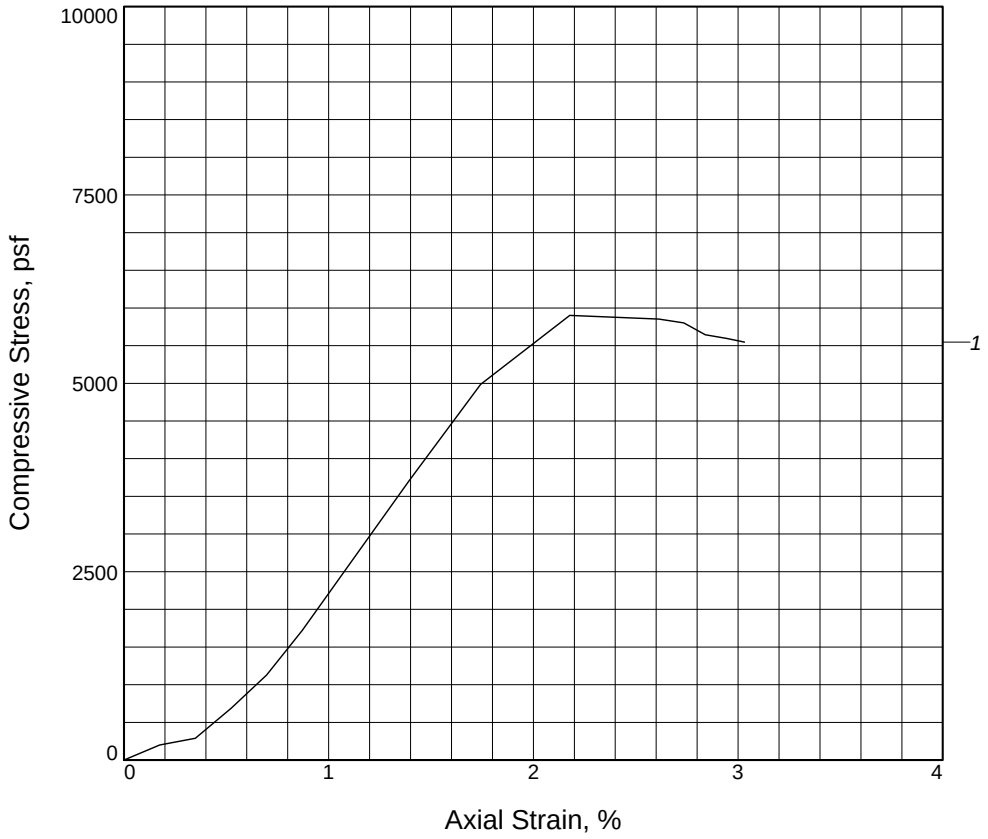
Remarks:

ALPHA-OMEGA GEOTECH

Figure

Tested By: A.M. **Checked By:** T.B.

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	5901			
Undrained shear strength, psf	2950			
Failure strain, %	2.2			
Strain rate, in./min.	0.088			
Water content, %	20.6			
Wet density, pcf	123.4			
Dry density, pcf	102.4			
Saturation, %	85.8			
Void ratio	0.6468			
Specimen diameter, in.	2.870			
Specimen height, in.	5.740			
Height/diameter ratio	2.00			

Description: Brown, spotted reddish brown, speckled dark brown FAT CLAY

LL = 56	**PL =** 21	**PI =** 35	**Assumed GS=** 2.70	**Type:** Undisturbed

Project No.: 240125
Date Sampled: 2/29/2024
Remarks:

Client: ARCHIMAGES, INC.

Project: MISSOURI VETERANS CEMETERY EXPANSION

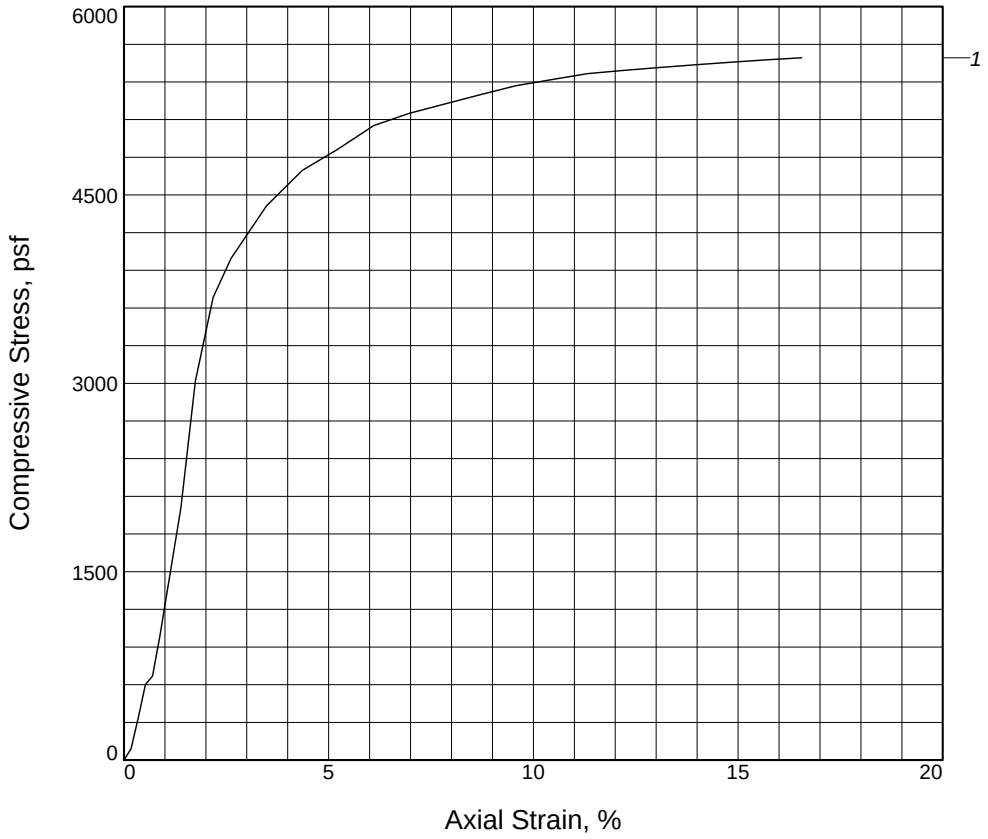
Source of Sample: B1 **Depth:** 3.0
Sample Number: ST-2

ALPHA-OMEGA GEOTECH

Figure 1 of 1

Tested By: D.B. **Checked By:** T.B.

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	5593			
Undrained shear strength, psf	2796			
Failure strain, %	16.6			
Strain rate, in./min.	0.088			
Water content, %	21.9			
Wet density, pcf	123.5			
Dry density, pcf	101.3			
Saturation, %	89.0			
Void ratio	0.6633			
Specimen diameter, in.	2.860			
Specimen height, in.	5.740			
Height/diameter ratio	2.01			

Description: Light brown, spotted reddish brown and light gray FAT CLAY

LL =	**PL =**	**PI =**	**Assumed GS=** 2.70	**Type:** Undisturbed

Project No.: 240125
Date Sampled: 2/29/2024
Remarks:

Client: ARCHIMAGES, INC.

Project: MISSOURI VETERANS CEMETERY EXPANSION

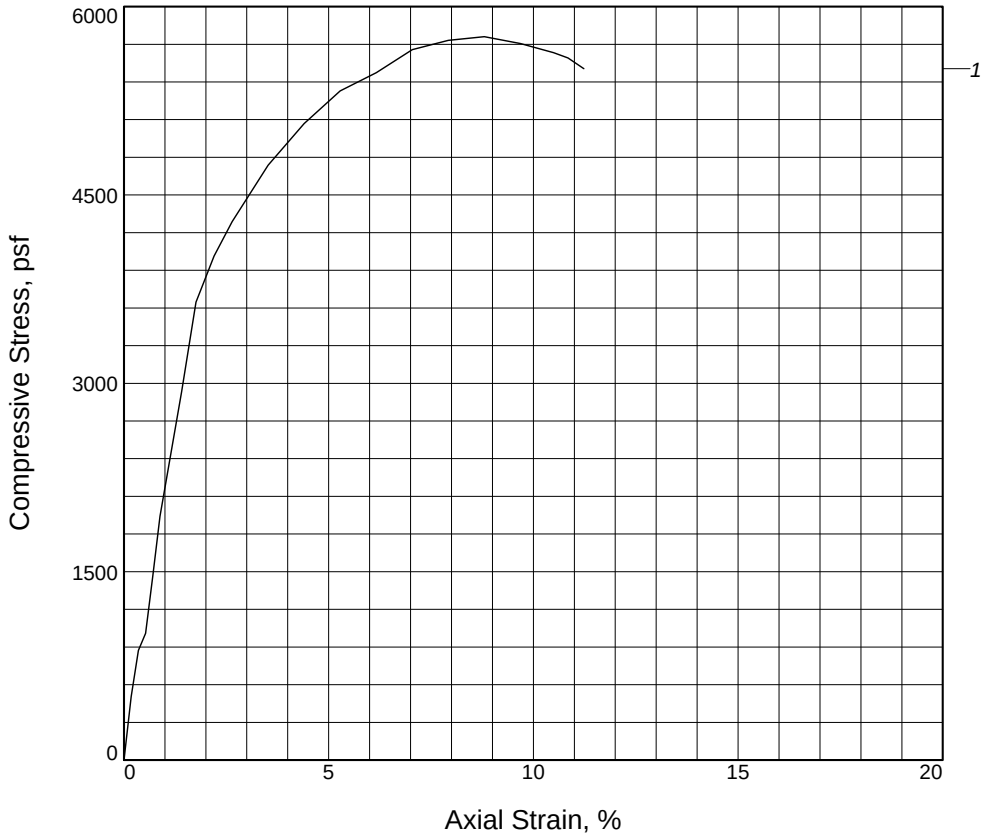
Source of Sample: B2 **Depth:** 3.0
Sample Number: ST-2

ALPHA-OMEGA GEOTECH

Figure 1 of 1

Tested By: D.B. **Checked By:** T.B.

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	5761			
Undrained shear strength, psf	2881			
Failure strain, %	8.8			
Strain rate, in./min.	0.088			
Water content, %	23.4			
Wet density, pcf	127.8			
Dry density, pcf	103.5			
Saturation, %	98.9			
Void ratio	0.6459			
Specimen diameter, in.	2.820			
Specimen height, in.	5.680			
Height/diameter ratio	2.01			

Description: Light brown, mottled light reddish brown, spotted light gray FAT CLAY

LL = 64	**PL =** 20	**PI =** 44	**Assumed GS=** 2.73	**Type:** Undisturbed

Project No.: 240125
Date Sampled: 2/29/2024
Remarks:

Client: ARCHIMAGES, INC.

Project: MISSOURI VETERANS CEMETERY EXPANSION

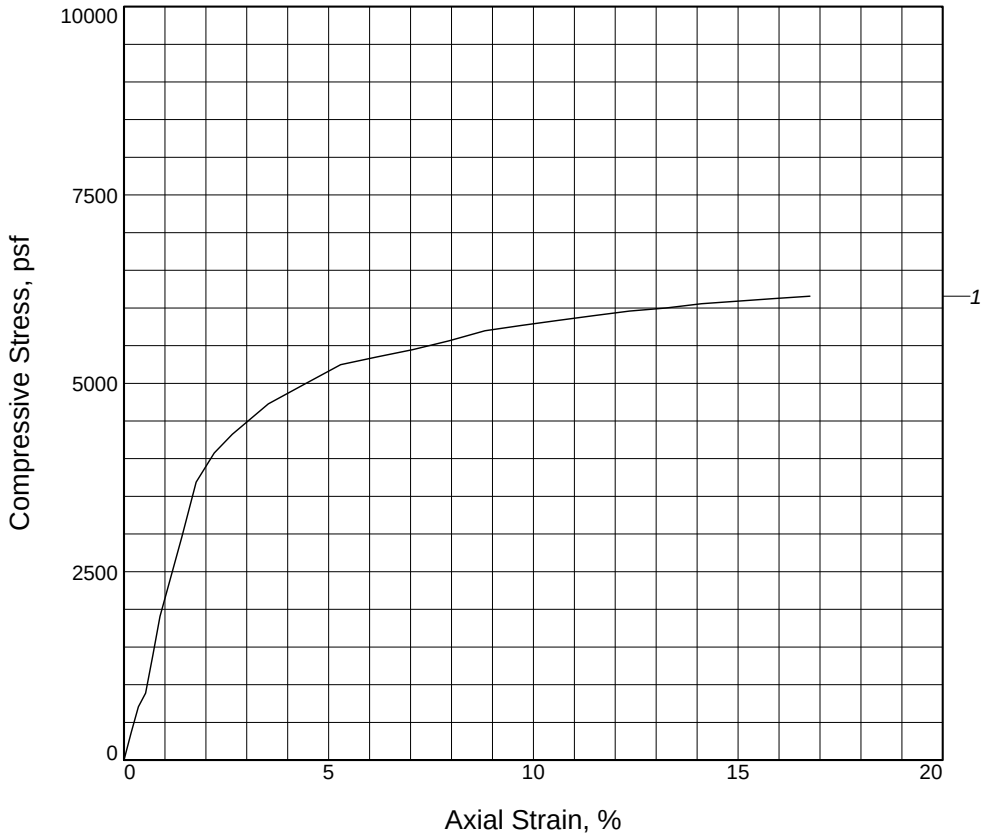
Source of Sample: B3 **Depth:** 3.0
Sample Number: ST-2

Figure 1 of 1

ALPHA-OMEGA GEOTECH

Tested By: D.B. **Checked By:** T.B.

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	6155			
Undrained shear strength, psf	3078			
Failure strain, %	16.8			
Strain rate, in./min.	0.088			
Water content, %	20.8			
Wet density, pcf	126.6			
Dry density, pcf	104.8			
Saturation, %	92.4			
Void ratio	0.6077			
Specimen diameter, in.	2.830			
Specimen height, in.	5.670			
Height/diameter ratio	2.00			

Description: Reddish brown, mottled light brown FAT CLAY

LL =	**PL =**	**PI =**	**Assumed GS=** 2.70	**Type:** Undisturbed

Project No.: 240125
Date Sampled: 2/29/2024
Remarks:

Client: ARCHIMAGES, INC.

Project: MISSOURI VETERANS CEMETERY EXPANSION

Source of Sample: B4 **Depth:** 3.0
Sample Number: ST-2

ALPHA-OMEGA GEOTECH

Figure 1 of 1

Tested By: D.B. **Checked By:** T.B.

Appendix Section C

BORING LOGS

Note: The logs of subsurface conditions shown in this section apply only at the specific boring location and depths at the date indicated and might not be indicative of all subsurface conditions that may be encountered. This information is not warranted to be representative of subsurface conditions at other locations, depths and times. The passage of time or construction operations at or adjacent to this site may result in changes to the soil conditions at these boring locations and depths. As a result, the character of subsurface materials shall be each bidder's responsibility.

ALPHA-OMEGA GEOTECH

LOG OF BORING
No. B1

PROJECT: MISSOURI VETERANS CEMETERY EXPANSION **PROJECT NO.:** 240125
CLIENT: ARCHIMAGES, INC.
PROJECT LOCATION: 20109 BUSINESS HWY 13, HIGGINSVILLE, MO
LOCATION: SEE SITE SKETCH **ELEVATION:** N/D
DRILLER: E.G. **LOGGED BY:** N.N.
DRILLING METHOD: POWER AUGER **DATE:** 2-22-24
DEPTH TO - WATER> INITIAL: ▽ NONE **AFTER 24 HOURS:** ▽ _____ **CAVING>** ℄ NONE

Elevation / Depth (ft.)	Soil Symbols Sampler Symbols and Field Test Data	Description	w%	DDen pcf	LL	PI	200 %	Uncomp. psf	PPen. tsf	USCS/ Visual Class.
0		Brown FAT CLAY (Root Zone)								CH
	2 3 5	0.33								CH
		Light brown, speckled reddish brown FAT CLAY with trace of organics (finger roots)								CH
		1.0								CH
		Light brown, speckled reddish brown FAT CLAY with trace of organics (finger roots)	20.6	102.4	56	35		5901	>4.50	CH
5		2.5								
		Light brown, speckled reddish brown FAT CLAY with trace of organics (finger roots)							4.50	CH
		3.0								CH
		Brown, spotted reddish brown, speckled dark brown FAT CLAY								
	4 4 7	5.0								CL-CH
10		Light brown, spotted reddish brown, light gray and dark brown FAT CLAY								CL-CH
		7.0								
		Light brown, spotted reddish brown, light gray and dark brown FAT CLAY								
		8.5								
	26 50/5	Light reddish brown, spotted olive brown, speckled dark brown LEAN/FAT CLAY								SH
15		10.0								SH
		Light reddish brown, spotted olive brown, speckled dark brown LEAN/FAT CLAY								
		13.5								
		Light brown LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)								SH
	33 50/5	15.0								
20		Light brown LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)								
		18.5								
		Light brown, spotted light reddish brown and gray LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)								
		19.5								
25		End of boring at about 19.5 feet								
30										
35										

ALPHA-OMEGA GEOTECH

LOG OF BORING
No. B2

PROJECT: MISSOURI VETERANS CEMETERY EXPANSION **PROJECT NO.:** 240125
CLIENT: ARCHIMAGES, INC.
PROJECT LOCATION: 20109 BUSINESS HWY 13, HIGGINSVILLE, MO
LOCATION: SEE SITE SKETCH **ELEVATION:** N/D
DRILLER: E.G. **LOGGED BY:** N.N.
DRILLING METHOD: POWER AUGER **DATE:** 2-22-24
DEPTH TO - WATER> INITIAL: ▽ NONE **AFTER 24 HOURS:** ▽ _____ **CAVING>** ℄ NONE

Elevation / Depth (ft.)	Soil Symbols Sampler Symbols and Field Test Data	Description	w%	DDen pcf	LL	PI	200 %	Uncomp. psf	PPen. tsf	USCS/ Visual Class.
0	3 3 4	Brown FAT CLAY (Root Zone)								CH
		0.33								
		Brown, spotted reddish brown, speckled dark brown FAT/LEAN CLAY								CH-CL
		1.0								
		Brown, spotted reddish brown, speckled dark brown FAT/LEAN CLAY	21.9	101.3				5593	2.75	CH-CL
5		2.5								CH
		Brown, spotted reddish brown, speckled dark brown FAT/LEAN CLAY							4.50	CH
		3.0								
		Light brown, spotted reddish brown and light gray FAT CLAY								CH
	4 6 8	5.0								
10		Brown, mottled reddish brown and dark brown FAT CLAY								CH
		7.0								
		Brown, mottled reddish brown and dark brown FAT CLAY								
		8.5								
	18 21 40	Light brown, mottled light reddish brown FAT CLAY								SH
15		10.0								
		Light brown, mottled light reddish brown FAT CLAY								SH
		13.5								
	29 50/6	Light brown, mottled light reddish brown LEAN/ FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)								SH
20		15.0								
		Light brown, mottled light reddish brown LEAN/ FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)								
		18.5								
25		Light brown, mottled light reddish brown LEAN/ FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)								
		19.5								
		End of boring at about 19.5 feet								
30										
35										

ALPHA-OMEGA GEOTECH

LOG OF BORING
No. B3

PROJECT: MISSOURI VETERANS CEMETERY EXPANSION **PROJECT NO.:** 240125
CLIENT: ARCHIMAGES, INC.
PROJECT LOCATION: 20109 BUSINESS HWY 13, HIGGINSVILLE, MO
LOCATION: SEE SITE SKETCH **ELEVATION:** N/D
DRILLER: E.G. **LOGGED BY:** N.N.
DRILLING METHOD: POWER AUGER **DATE:** 2-22-24
DEPTH TO - WATER> INITIAL: ▽ NONE **AFTER 24 HOURS:** ▽ _____ **CAVING>** ℄ NONE

Elevation / Depth (ft.)	Soil Symbols Sampler Symbols and Field Test Data	Description	w%	DDen pcf	LL	PI	200 %	Uncomp. psf	PPen. tsf	USCS/ Visual Class.
0		Brown FAT CLAY (Root Zone)								CH
	WOH 2 3	0.33								
		Brown, speckled reddish brown and dark brown FAT/LEAN CLAY								CH-CL
		1.0								
		Brown, speckled reddish brown and dark brown FAT/LEAN CLAY	23.4	103.5	64	44		5761	3.25	CH-CL
5		2.5								CH
		Brown, speckled reddish brown and dark brown FAT/LEAN CLAY							3.50	CH
		3.0								
		Light brown, mottled light reddish brown, spotted light gray FAT CLAY								CH
	4 5 7	5.0								
10		Light brown, spotted reddish brown, gray and dark brown FAT CLAY								CH-CL
		7.0								
		Light brown, spotted reddish brown, gray and dark brown FAT CLAY								CH-CL
		8.5								
	10 15 31	Light reddish brown, spotted dark brown FAT/ LEAN CLAY								SH
15		10.0								
		Light reddish brown, spotted dark brown FAT/ LEAN CLAY								SH
		13.5								
	43 50/5	Light brown, speckled reddish brown and light gray LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)								SH
20		15.0								
		Light brown, speckled reddish brown and light gray LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)								
		18.5								
		Light brown LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)								
25		19.5								
		End of boring at about 19.5 feet								
30										
35										

ALPHA-OMEGA GEOTECH

LOG OF BORING
No. B4

PROJECT: MISSOURI VETERANS CEMETERY EXPANSION **PROJECT NO.:** 240125
CLIENT: ARCHIMAGES, INC.
PROJECT LOCATION: 20109 BUSINESS HWY 13, HIGGINSVILLE, MO
LOCATION: SEE SITE SKETCH **ELEVATION:** N/D
DRILLER: E.G. **LOGGED BY:** N.N.
DRILLING METHOD: POWER AUGER **DATE:** 2-22-24
DEPTH TO - WATER> INITIAL: ▽ NONE **AFTER 24 HOURS:** ▼ _____ **CAVING>** ℄ NONE

Elevation / Depth (ft.)	Soil Symbols Sampler Symbols and Field Test Data	Description	Depth	w%	DDen pcf	LL	PI	200 %	Uncomp. psf	PPen. tsf	USCS/ Visual Class.
0		Brown FAT CLAY (Root Zone)	0.3								CH
	4 5 6	Brown, speckled reddish brown FAT CLAY	1.0								CH
		Brown, speckled reddish brown FAT CLAY	2.5								CH
		Brown, speckled reddish brown FAT CLAY	3.0	20.8	104.8				6155	3.75	CH
5		Reddish brown, mottled light brown FAT CLAY	5.0							>4.50	CH
		Brown, speckled reddish brown, gray, and dark brown FAT CLAY	7.0								CH
	4 6 7	Brown, speckled reddish brown, gray, and dark brown FAT CLAY	8.5								CH-CL
10		Light reddish brown, speckled dark brown FAT/ LEAN CLAY	10.0								CH-CL
		Light reddish brown, speckled dark brown FAT/ LEAN CLAY	13.5								SH
	23 40 50/3	Light brown LEAN/FAT CLAY (Possible Weathered SHALE) (Very hard, very slow drilling)	15.0								SH
15		Light reddish brown, speckled dark brown FAT/ LEAN CLAY	18.5								SH
	23 50/6	Light brown, light gray LEAN/FAT CLAY (Weathered SHALE) (Very hard, very slow drilling)	19.5								
20		End of boring at about 19.5 feet									
25											
30											
35											

KEY TO SYMBOLS

Symbol Description

Strata symbols

FAT CLAY

FAT/LEAN CLAY

Weathered SHALE

Soil Samplers

Standard penetration test

Undisturbed thin wall Shelby tube

Notes:

1. Borings were drilled on February 22, 2024 using solid auger, split spoon sampler and shelby tube sampler techiniques.

2. Ground water was not encountered while drilling at the reported depths.

3. Borings were staked by Alpha-Omega, Inc.

4. These logs are subject to the limitations, conclusions, and recommendations in this report.

5. Results of tests conducted on samples recovered are reported on the logs. Abbreviations are:

DDen =	**natural dry density (pcf)**	**LL =**	**Liquid limit**
w% =	**natural moisture content (%)**	**PI =**	**Plasticity index**
UComp =	**Unconfined compression (psf)**	**PPen =**	**Pocket Penetrometer**
-200 =	**percent passing #200 sieve (%)**	**RQD =**	**Rock Quality**
DCP =	**Dynamic Cone Penetrometer**		