Midwest Testing
GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

8606 Page Avenue
St. Louis, Missouri 63114
www.mwtesting.com

314 739-2727 Office
314 739-5429 Fax
314 739-8589 Accounting Fax

June 11, 2025

Cochran Engineering
530A E Independence Drive
Union, Missouri 63084

Attn: Mr. Elliott R. Reed, P.E.

GEOTECHNICAL FEASIBILITY STUDY
MT JOB NO. 15599
OLDENBURG INDUSTRIAL PARK
WASHINGTON, MISSOURI

Gentlemen:

Transmitted herein is the report of our geotechnical feasibility study performed for the referenced project. This work was authorized via email on June 6, 2025.

INTRODUCTION

A geotechnical feasibility study has been performed for an approximately 82-acre property (75-acre future development, plus 7-acre common ground storm water and utility easement) south of Missouri Route 100, approximately ½ mile west of the intersection of 100 and KK in Washington, Missouri. The study consisted of widely spaced borings, laboratory testing, and preliminary engineering analyses.

These borings were performed at the site in May, 2023. Since that time, it is our understanding that that the infrastructure (roadways, utilities, drainage basins) have been constructed over the last year or so, and that individual lots have been rough graded. Therefore, soils information as depicted in this report may not represent current conditions at the site.

Purpose and Scope. The purpose of the study was to explore the generalized subsurface conditions at the site, and develop preliminary recommendations for the earth–related aspects of the design and construction of the development of the site.

The scope of the study included:

- drilling widely spaced borings;
- conducting limited laboratory testing;

- performing preliminary engineering analyses to determine possible foundation schemes and probable range of design parameters, suitability of on–site soils for use in engineered fills, pavement design considerations, general site drainage, general site grading considerations, and erosion and siltation control; and
- the preparation of this summary report.

Project Understanding. An industrial park is planned for an approximately 82-acre property in Washington, Missouri. The development is known as Oldenburg Industrial Park, Plat 1. Location of the park is approximately ½ mile west of Highway KK, south of Highway 100. Preliminary development plans for the tract are assumed warehouses and manufacturing facilities.

It is our understanding that the infrastructure (roadways, utilities, drainage basins) have been constructed over the last year or so, and that individual lots have been rough graded. The exact location and size of the buildings under consideration are not known at this time. However, the buildings are anticipated to be single-story warehouse-type structures, with light to moderate loads.

Site Description. At the time of our soil drilling, the study area was undeveloped, agricultural land. The topography of the property sloped downward from the north to the south, with approximately 45 feet of vertical difference.

FIELD EXPORATION

Seventeen widely spaced borings were made for this study at the locations shown in Figure 1. These borings are labeled B-1 through B-17. The boring locations were established in the field by Cochran Engineering and their elevations interpolated from Google Earth. The borings were advanced to depths of 6 to 20 feet below the existing ground surface by a truck–mounted rotary drill rig using continuous–flight augers.

Split–spoon samples were obtained at 2.5– to 5.0–foot intervals in the overburden soils. Representative samples of the soils encountered were sealed in glass jars for further observation and laboratory testing.

The samples were secured and transported to our laboratory for observation and classification. The sampling intervals, soil descriptions, standard penetration data, ground water observations, and other pertinent field information are summarized on the boring logs in Appendix B.

LABORATORY TESTING

The samples were examined and visually classified, and the boring logs were edited as necessary. Moisture content determinations were made for all samples. The results of the laboratory tests are presented on the boring logs.

SUBSURFACE CONDITIONS

The subsurface conditions were explored by drilling 17 widely spaced borings at the locations shown in Figure 1. Two borings (B-15 and B-16) were placed within planned detention areas, one boring was placed in the area of a lift station (B-17), and the remainder were spread throughout the site. An idealized soil profile for this site generally consists of natural, undisturbed cohesive soil to the drilled depths. Fill was encountered in one of the borings. Generalized soil profiles were developed from select borings and are presented in Figures 2 and 3 in Appendix A. A legend to aid in the interpretation of these profiles is provided in Figure 4.

Topsoil. Topsoil was encountered at all of the boring locations. The topsoil thickness ranged from 1 to 5 inches, averaging 2¾ inches.

Natural Overburden. The overburden profile generally consists of low plastic silty clay and clayey silt overlying high plastic clay. The upper silty clay is of loessial (windblown) origin. The high plastic clay is of residual origin, having formed as a result of weathering of the underlying parent bedrock. This deposit contains various amounts of rock fragments.

Standard penetration resistances (N–values) obtained indicated the natural soils to mostly be of medium stiff consistency with isolated very soft, soft and stiff zones. The residual soils typically increase in strength with increasing depth.

Bedrock. Refusal of the drilling auger, which is indicative of the presence of bedrock, was encountered in Boring B-2, at a depth of 6 feet below grade. All remaining borings were extended to their planned termination depth without encountering rock.

Ground Water. Short-term ground water readings made during the field exploration indicated water in the following borings (depth below grade in parentheses): B-6 (8½ feet), B-8 (13 feet), B-9 (8½ feet), B-15 (12½ feet), and B-17 (13 feet). The remaining borings were dry during drilling and upon completion.

GEOTECHNICAL FEASIBILITY

Our preliminary findings indicate that the soils at this site are suitable for the support of structures with light to moderate loading on shallow foundation and slab-on-grade floors.

The scope of this evaluation was not sufficient to formulate final design criteria. A more detailed geotechnical exploration will be required once additional information becomes available regarding this development.

High Plastic Clay. The boring data indicates that high plastic clay is present in deeper soils across the site. Without knowing the proposed grading at the site, is not known if this soil will comprise portions of the floor slab subgrade following grading activities. High plastic clay can cause volume change (shrink–swell) problems with corresponding changes in moisture content. High plastic clay poses two considerations: 1) High plastic clay may be present at or near the surface upon completion of grading. 2) The overburden soil removed in cut areas must be handled such that the high plastic clay is not placed as fill in the near–surface zone of the building pads.

High plastic clay present in the upper 2 feet of the building pad subgrades or in the 2-foot-zone below the bearing level of foundations will require remediation prior to building construction. Remediation of the high plastic clay will likely involve undercutting the deposit (within 2 feet of floor slab subgrade and 2 feet below foundation bearing level) and replacing it with low plastic, cohesive soil or granular fill with at least 25 percent by weight fines (i.e., material passing the No. 200 sieve).

High plastic clay used as building pad fill should not be placed in the upper 2 feet of the floor slab subgrade nor in the 2-foot-zone below footings.

Building Construction. The field and laboratory data indicate that the soils at this site are capable of supporting light- to medium-loaded structures on shallow foundations bearing on compacted fill or natural, undisturbed soil. Allowable net bearing pressures in the range of 2000 to 2500 pounds per square foot (psf) could be used for the design of footings, depending on building locations. Exterior footings and foundations in unheated areas should be located at least 2.5 feet below final exterior grade for frost protection. Interior footings in heated areas (if any) can be located at a nominal depth below the finished floor provided they ear on natural, undisturbed soil or compacted fill.

Medium to heavily-loaded structures, depending on location of the building on the site, may require ground improvement such as stone columns to increase the bearing capacity and reduce settlement.

Seismic Design Considerations. The IBC (International Building Code) uses a site classification for seismic design which is determined based on average soil properties within the top 100 feet of the site profile. A composite subsurface profile created by the on–site boring data yields an average N–value over 15 but less than 50 bpf, which corresponds to Site Class 'D' according to Section 1615 of the IBC code.

Pavement Design Considerations. The soils at this site, in an undisturbed natural condition and in compacted fills, are suitable for the support of conventional pavement sections. Compacted fills in paved areas should be placed and densified to a minimum of 95 percent of the material's standard Proctor (ASTM D 698) maximum dry density.

A detailed pavement design is beyond the scope of this study. However, for preliminary development planning, a typical pavement section for car traffic only areas would be 3 inches of asphaltic concrete over 8 inches of base course. The corresponding section for the truck traffic and drive areas is 4 inches of asphaltic concrete over 10 inches of base course. These pavement sections are estimated and would need to be confirmed during a final geotechnical study using expected traffic design criteria and design life.

Drainage, Grading, and Slopes. Positive drainage must be provided to minimize infiltration of surface water around areas of fill, roads, structures, and beneath the parking lot subgrade. Grades must be sloped away from structures, and surface drainage collected and discharged in such a manner that it is not permitted to infiltrate the near–surface soils.

Of particular concern are construction joints between pavements and slabs, and abutting buildings. These joints must be sealed with a high quality flexible caulk, and storm water drains (e.g., trench drains, grates, individual drains, etc.) must be kept clean to prevent ponding and the subsequent infiltration of surface water into the ground adjacent to foundations. Infiltration of surface water adjacent to foundations can cause settlement, as the water can soften cohesive soils and densify granular materials through flooding.

It is recommended that all cut and fill slopes be made not steeper than 1 vertical to 3 horizontal. Steeper slopes must be evaluated for slope stability. It is recommended that all exposed earth slopes be seeded to provide protection against erosion. Seeded slopes should be protected with erosion mat until the vegetation is established.

Existing slopes steeper than 5H:1V must be benched prior to the placement of new fill in an attempt to prevent the formation of a weak plane which could lead to a slide between the new fill mass and the existing slope. The benches should

be cut flat in the existing slope, and be approximately one machine width by a maximum vertical height of 5 feet.

GENERAL CONSTRUCTION PROCEDURES/RECOMMENDATIONS

A geotechnical engineer must be retained during the earth–related portions of construction to verify compliance with the project documents and the recommendations presented herein.

Demolition and Site Preparation. The surface of the proposed construction must be stripped of all vegetation and organic materials. The strippings can be placed in landscaped areas, stockpiled for later use, or wasted off–site. Trees and the associated root balls will require complete removal. The resulting hole, following removal of the root ball, must be backfilled with properly compacted fill. The numerous large trees on the property suggest root ball removal and backfilling will be significant. Failure to properly backfill the excavations could result in unwanted settlement.

A heavy proofroll must be performed to verify that the existing surface is stable and no isolated soft spots exist prior to the placement of additional fill or pavement base course. Density tests must be performed to verify that the near–surface zone is compacted to at least 95 percent of the material's standard Proctor (ASTM D 698) maximum dry density and the ground surface is stable. If areas of insufficient compaction exist, they must be compacted and retested. If compaction is still below 95 percent of the material's standard Proctor maximum dry density, the material should be removed and replaced with compacted fill.

Siltation Control. The surface soils at this site are extremely susceptible to erosion. Appropriate erosion control measures such as proper site contouring during grading and straw bales or siltation fences must be used during construction. These siltation control devices will likely require periodic maintenance during construction in the form of removing accumulated sediments and re–establishing the siltation device.

Subgrade Considerations. The near–surface soils at this site are *extremely* susceptible to disturbance in the presence of moisture and the traffic of construction. Care should be exercised to maintain the integrity of the subgrade when preparing the site for the placement of fill, making excavations, and other earth–related construction activities. The moisture content of the fill materials must be controlled such that pumping of the fill subgrade does not exceed 1 inch vertical deflection under the traffic of the earthwork equipment. If pumping and rutting occur, activity should be halted until the affected area can be stabilized. This can normally be accomplished with aeration and recompaction, the use of ground stabilization fabric, or a working mat of clean coarse crushed stone.

The need for these measures will depend on soil, moisture, and weather conditions at the time of grading and can best be evaluated at that time. Obviously, an increase in site precipitation will likely increase soil moistures and, possibly, dictate the need for undercutting and recompaction to stabilize the subgrade.

Fill Materials. The soils at this site are suitable for reuse in an engineered fill, with the exception of high plastic clay placed in the upper 2 feet of the floor slab subgrade or in the 2-foot-zone below the bearing level of foundations. Imported borrow material should be free of organics and deleterious matter with a liquid limit not to exceed 45 and a plasticity index (PI) of less than 20. Cohesive fill material should be used where it is desired to earth–form foundations.

Depending on moisture conditions at the time of construction, it may be necessary to add water or aerate the fill material to achieve the required compaction. Moistures above 20 percent or so are on the wet side of optimum, and will require moisture reduction in order to achieve compaction.

In cold or wet weather conditions, it is often necessary to increase expenditures to facilitate the construction schedule. The use of aeration, admixtures (e.g., lime products, Class C fly–ash, or kiln dust), and granular fill may be required to perform earthwork under adverse conditions. The risk of dusting adjacent roadways and residential properties may preclude the use of powered admixtures in windy conditions.

Compaction. On–site and imported fill and backfill must be placed in loose lifts and mechanically compacted. Field density tests must be performed as needed by a qualified soils technician to verify compliance with the density requirement. We recommend the following compaction criteria:

Area	*Percent of Standard Proctor (ASTM D 698)*
Building pad fill	95
Pavement area fill	95
Utility trench backfill	
Beneath building and pavements	95
Beneath landscaped areas	90
Landscape area fills	90
Slopes ($H \geq 5$ ft)	95

The maximum loose lift thickness conducive to achieving the required compaction is a function of the material type and the compactor, among other factors. We recommend the following for consideration:

Material	*Compactor*	*Area*	*Loose Lift Thickness, in.*
Cohesive	Sheepsfoot	Open	6–8
	Jumping jack	Confined	5–6
	Vibratory plate (backhoe)	Confined	8
	Tracking	Open	4
Granular	Vibratory roller (large)	Open	8–10
	Vibratory roller (small)	Confined	6
	Vibratory plate/sled	Confined	4–5
	Vibratory plate (backhoe)	Confined	12–18

The moisture content of the upper 2 feet of floor slab and pavement area subgrades (both fill and natural) should be in the range of optimum plus or minus 2 points to minimize pumping and establish a firm subgrade. Should the current elevated moisture contents be present during construction, this may require the undercutting, moisture reduction, and compaction of the *natural* soils in the building areas to establish a stable subgrade.

Compaction of any fill or backfill by jetting (sometimes referred to as flooding) is not considered acceptable. The success of this method requires a free–draining fill material and the drainage of the water through and away from a fill area. Jetting in cohesive soils or confined areas will result in the entrapment of water by the fill boundaries (e.g., backfill in a trench) or by cohesive fill materials. This technique will generally not achieve the desired compaction because of nonuniformity, submergence, and the weakening of the resultant fill.

Construction Dewatering. Construction dewatering is not anticipated. If ground water seepage is experienced in shallow excavations, it is expected that it can be handled by pumping from sumps or using perimeter trenches to collect and discharge the water away from the work area.

Additional Study. As this study is preliminary, and the data suggest that bearing and settlement may be of concern with medium to heavily-loaded structures, we recommend that the additional geotechnical work focus on the following:

- determining design bearing pressures for specific buildings, as the current data suggest variations across the site,

LIMITATIONS OF REPORT

The analyses, conclusions, and recommendations contained in this report are based on the generalized site conditions described herein and further assume that the exploratory borings are representative of the subsurface conditions throughout the site (i.e., the subsurface conditions everywhere are not signifi-

cantly different from those disclosed by the borings). If, during construction, subsurface conditions different from those encountered in the exploratory borings are observed or appear to be present beneath excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary.

If there is a substantial lapse of time from the submittal of this report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we recommend that this report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse.

The intention of this report is to address the general earth–related considerations for the development of the site (i.e., site grading and general foundation schemes). The data and findings with regard to the possible future buildings are preliminary and intended to be used only as a general guide in site selection and planning. It may be necessary to perform a site–specific geotechnical exploration for the future buildings, depending on foundation and floor loads and proposed finished grades.

The scope of the exploration reported herein did not include any environmental assessment or exploration for the presence or absence of hazardous or toxic materials in the soil, ground water, or air on, around, or beneath this site. Any notations or statements in this report, including notes on the boring logs, regarding odors or unusual conditions observed are strictly presented for informational purposes only and are not intended as a definitive assessment of potential contaminants present.

We recommend that we be retained to review those portions of the plans and specifications which pertain to earthwork and underground utilities to determine if they are consistent with our recommendations. In addition, we are available to observe construction, particularly construction of parking lots, installation of underground utilities, site grading, and earthwork. We would also be available to make such other field observations as may be necessary.

This report was prepared for the exclusive use of the owner, architect, and engineer for evaluating the general development of the property as it relates to the geotechnical aspects discussed herein. It should be made available to prospective contractors for information on factual data only and not as a warranty of subsurface conditions included in this report. Unanticipated soil conditions are commonly encountered and cannot be fully determined by taking soil samples from the borings. Such unexpected conditions require that additional expense should be made to attain a properly constructed project.

Therefore, some contingency fund is recommended to accommodate such potential extra costs.

The following are made part of and complete this report:

APPENDIX A
Figure 1: Boring Plan
Figure 2: Generalized Soil Profile/Section A–A
Figure 3: Generalized Soil Profile/Section B–B
Figure 4: Soil Profile Legend

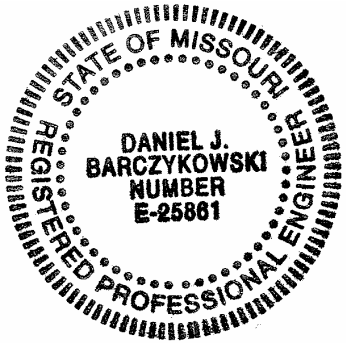
APPENDIX B
Field Classification System
Logs of Borings 1 through 17

We appreciate the opportunity to be of service to you on this project. If we may be of further assistance, such as providing our testing and observation services during construction, please call.

Very truly yours,
MIDWEST TESTING

Katherine L. Lindley, E.I.T.
Project Engineer

Daniel J. Barczykowski, P.E.
Principal



KLL/DJB/

Electronic copy: Cochran Engineering/E. Reed, P.E.

APPENDIX A

Scale: 1"=300'

LEGEND

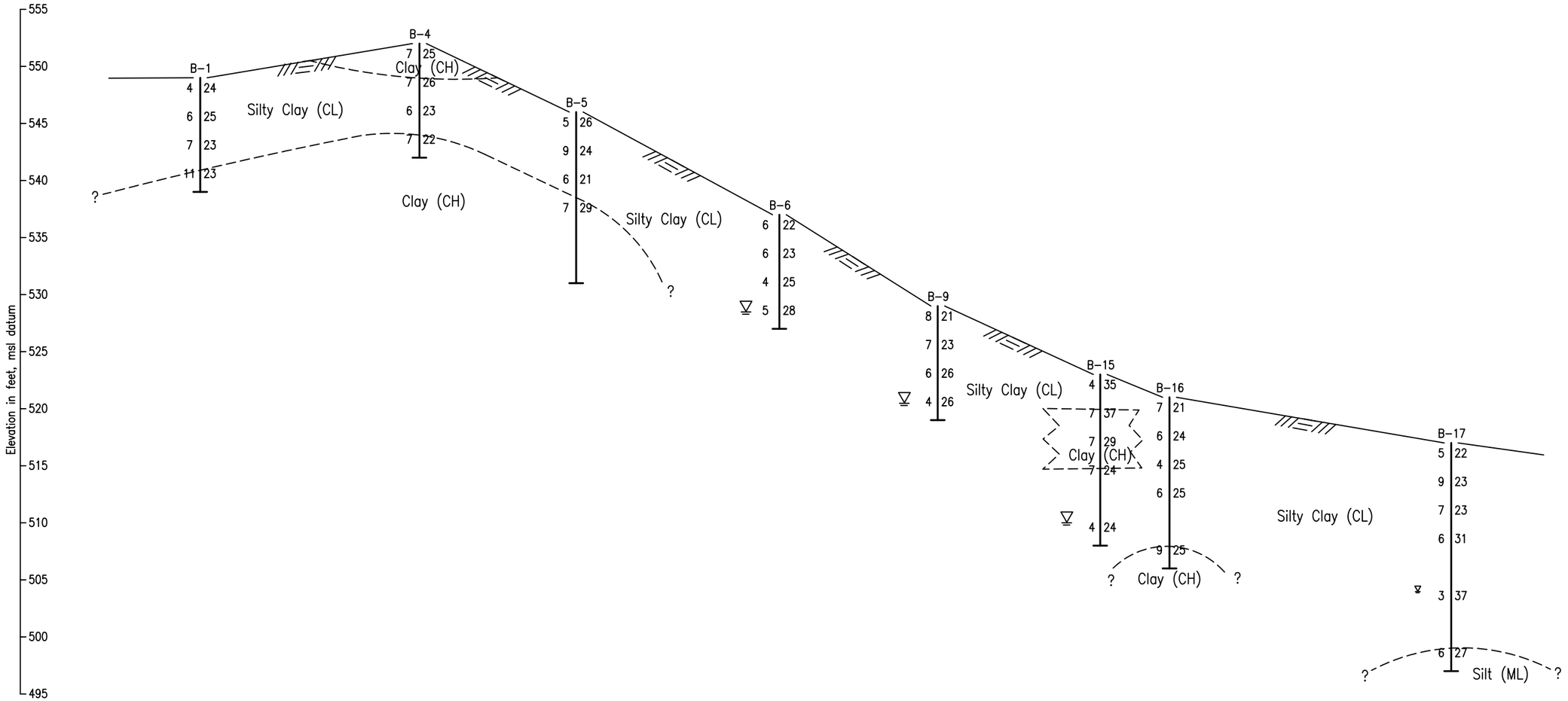
Boring location

15599

BORING PLAN
Oldenburg Industrial Park
Washington, Missouri

Figure 1

SECTION A–A



SCALES

Horizontal: 1" = 300'
Vertical: 1" = 10'

NOTES

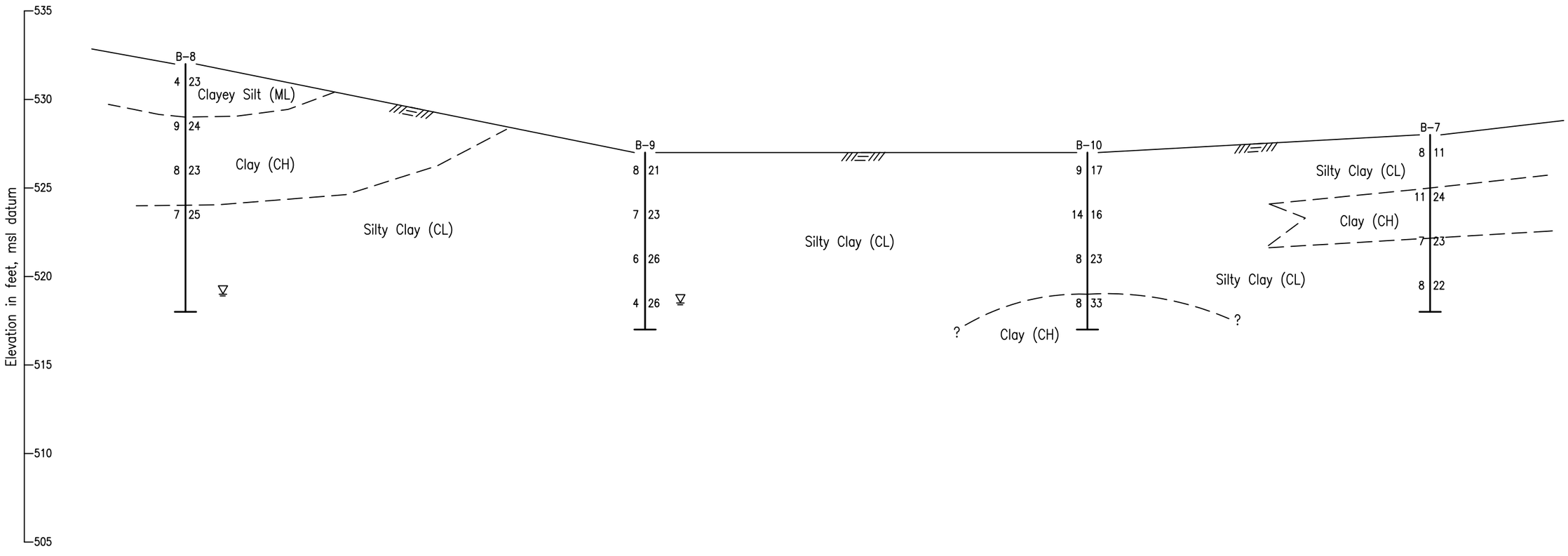
1) See Figure 1 for location of section.
2) See Figure 4 for legend.

15599

GENERALIZED SOIL PROFILE
Oldenburg Industrial Park
Washington, Missouri

Figure 2

SECTION B–B



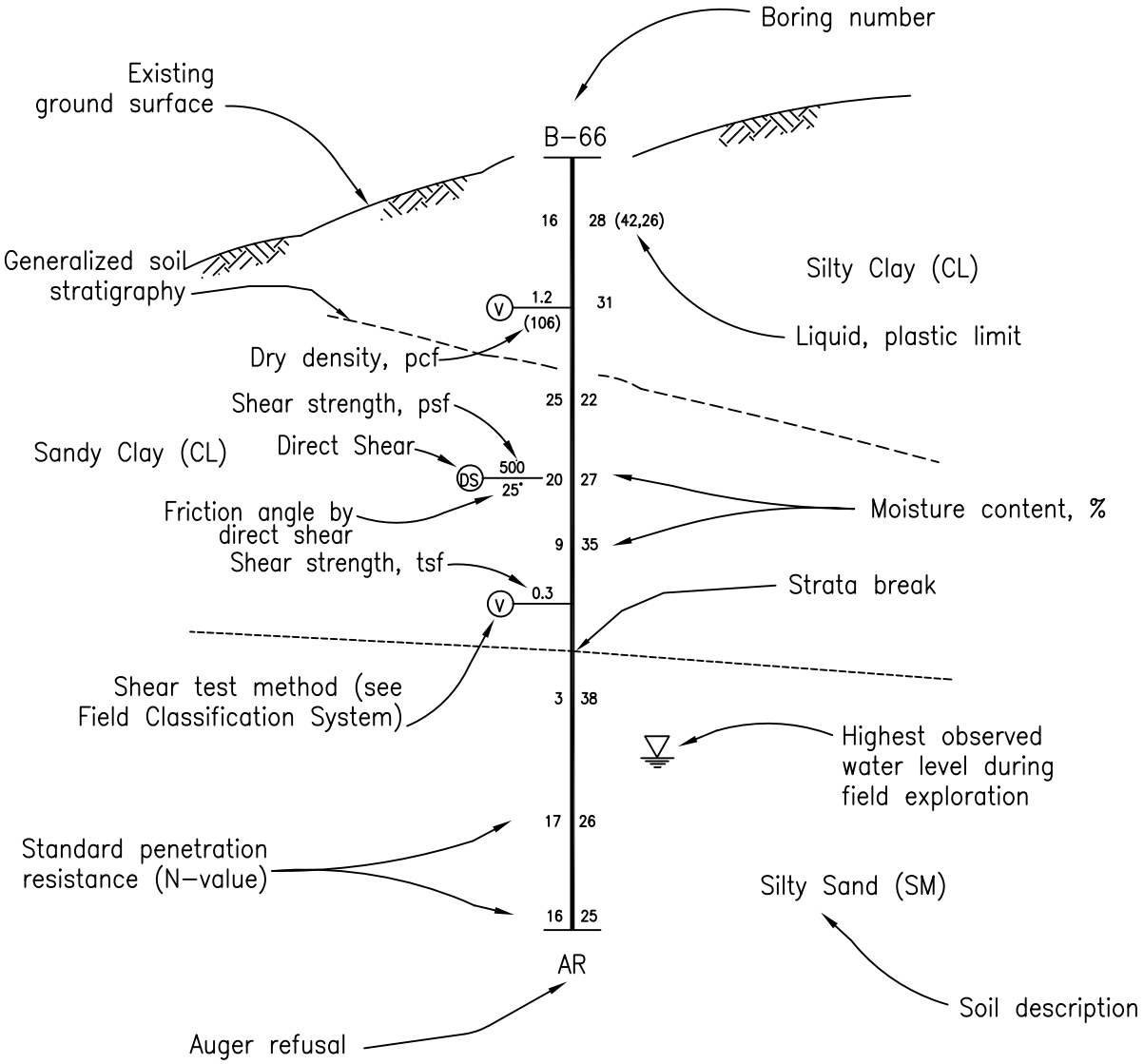
SCALES
Horizontal: 1" = 80'
Vertical: 1" = 6'

NOTES
1) See Figure 1 for location of section.
2) See Figure 4 for legend.

15599

GENERALIZED SOIL PROFILE
Oldenburg Industrial Park
Washington, Missouri

Figure 3



NOTE
This is an example and does not represent an actual boring drilled at the site.

NOT TO SCALE

15599

SOIL PROFILE LEGEND
Oldenburg Industrial Park
Washington, Missouri

Figure 4

APPENDIX B

FIELD CLASSIFICATION SYSTEM

BORING METHOD

HSA	Hollow-stem auger
CFA	Continuous-flight auger
RB	Rollerbit
MR	Mud rotary
RC	Rock coring
CA	Casing advancer
DC	Driven casing
HA	Hand-auger

SHEAR STRENGTH DATA

UC	Unconfined compression
TX-UU	Unconsolidated-undrained triaxial
TX-CU	Consolidated-undrained triaxial
V	Miniature vane
FV	Field vane
T	Torvane
PP	Pocket penetrometer
SCP	Static cone penetrometer

SOIL PARTICLE SIZE

Cohesive		Granular or Non-Cohesive							
		Sand			Gravel				
Clay	Silt	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
0.002 mm	0.05 mm	0.02 mm	0.6 mm		0.25 in.	0.5 in.	1 in.	3 in.	8 in.

STANDARD PENETRATION TEST (ASTM D 1586)

Driving a 3.0-inch O.D. split-spoon sampler 18 inches with a 140-pound hammer free-falling a distance of 30 inches. The number of blows to drive the sampler these three successive 6-inch increments is recorded; the sum of the last two increments being the N-value.

N-VALUE & SHEAR STRENGTH CORRELATIONS

Granular Soils		Cohesive Soils		
N-Value	Relative Density	N-Value	Shear Strength, tsf	Consistency
		0-2	< 0.125	Very soft
0-4	Very loose	3-4	0.125 – 0.25	Soft
5-10	Loose	5-8	0.25 – 0.5	Medium stiff
11-30	Medium dense	9-15	0.5– 1.0	Stiff
31-50	Dense	16-30	1.0 – 2.0	Very stiff
Over 50	Very dense	Over 30	> 2.0	Hard

SOIL CLASSIFICATIONS of samples are made by visual inspection and/or laboratory test results in accordance with the Unified Soil Classification System, the symbol of which is indicated in parentheses following the description.

RELATIVE PROPORTIONS are indicated by the following descriptive terms: trace (0-15%), some (15-35%), and (35-50%).

STRATA CHANGES are indicated on the boring logs by horizontal lines. A solid line represents an observed change while a dashed line indicates an estimated change.

GROUND WATER OBSERVATIONS are made at the times and under the conditions stated on the boring logs. Fluctuations may occur due to changes in precipitation, temperature, site topography, etc.

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 1

PROJECT NO. 15599 **DATE:** 5/10/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 10 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 549 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT: SPLIT SPOON / BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
		2 2 2			
		2 3 3			
5		2 3 4			
	8.0				
10		4 5 6			
	10.0				

3 in. Topsoil
Browish-gray soft Silty Clay (CL)

- increasing clay, medium stiff below 3 feet

Reddish-brown stiff Clay (CH) with rock fragments

Boring terminated at 10 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit — Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS		
DURING DRILLING	Dry	**FT.**
AT COMPLETION	Dry	**FT.**
AFTER HRS.		**FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 2

PROJECT NO. 15599 **DATE:** 5/10/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 6 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 587 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE

Shear Strength from Indicated: 1 2 3 4 5
Dry Density, pcf: 90 100 110 120 130
Water Content, %
Plastic Limit — Liquid Limit
Standard Penetration Resistance, Blows/Ft.: 10 20 30 40 50

1 in. Topsoil
Reddish-brown medium stiff silty Clay (CL)

3.0

Reddish-brown stiff Clay (CH) with rock fragments

5.0

Weathered rock

6.0

Auger refusal at 6 feet

SPT blows/6 in.: 2 3 4; 8 7 8

WATER LEVEL OBSERVATIONS		
DURING DRILLING	Dry	**FT.**
AT COMPLETION	Dry	**FT.**
AFTER HRS.		**FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 3

PROJECT NO. 15599 **DATE:** 5/9/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 14 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 539 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT: SPLIT SPOON / BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
		2 3 4			
		8 7 8			
5		1 2 3			
		2 3 3			
10					
15	14.0				
20					
25					
30					
35					

1 in. Topsoil
Brownish-gray medium stiff Silty Clay (CL) with trace roots

- gray, stiff below 3 feet

- increasing silt, medium stiff below 6 feet

- increasing clay below 12 feet

Boring terminated at 14 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING Dry **FT.**
AT COMPLETION Dry **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 4

PROJECT NO. 15599 **DATE:** 5/10/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 10 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 552 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT: SPLIT SPOON / BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
		3 3 4			
	3.0				
5		2 3 4			
		2 3 3			
	8.0				
10	10.0	2 3 4			

2 in. Topsoil
Brown medium stiff Clay (CH) with trace roots

Brown medium stiff Silty Clay (CL)

- reddish-brown below 6 feet

Reddish-brown medium stiff Clay (CH) with trace rock fragments

Boring terminated at 10 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit — Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING Dry **FT.**
AT COMPLETION Dry **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 5

PROJECT NO. 15599 **DATE:** 5/9/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 14 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 546 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT: SPLIT SPOON / BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
		2 2 3			
		3 4 5			
5					
		3 3 3			
	8.0				
		2 3 4			
10					
	14.0				
15					
20					
25					
30					
35					

2 in. Topsoil
Brownish-gray medium stiff Silty Clay (CL)

- stiff below 3 feet

- increasing silt, medium stiff below 6 feet

Reddish-brown and gray medium stiff Clay (CH)

Boring terminated at 14 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit — Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING Dry **FT.**
AT COMPLETION Dry **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 6

PROJECT NO. 15599 **DATE:** 5/10/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 10 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 535 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
0						
			2 3 3			
			2 3 3			
5						
			1 2 2			
			1 2 3			
10	10.0					
15						
20						
25						
30						
35						

4 in. Topsoil
Brown medium stiff Silty Clay (CL)

- increasing silt below 3 feet

- gray, soft below 6 feet

-medium stiff below 8 feet

Boring terminated at 10 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING 8.5 **FT.**
AT COMPLETION **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 7

PROJECT NO. 15599 **DATE:** 5/9/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 10.5 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 538 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
			3 4 4			
	3.0					
5			4 4 7			
	6.0					
			2 3 4			
10			3 3 5			
	10.5					
15						
20						
25						
30						
35						

3 in. Topsoil
Brown medium stiff Silty Clay (CL)

Gray stiff Clay (CH)

Gray medium stiff silty Clay (CL)

- increasing clay, brown and gray below 8 feet

Boring terminated at 10.5 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING Dry **FT.**
AT COMPLETION Dry **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 8

PROJECT NO. 15599 **DATE:** 5/9/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 14 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 532 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
0						
			1 2 2			
	3.0					
			3 3 6			
5						
			3 3 5			
	8.0					
			2 3 4			
10						
	14.0					
15						
20						
25						
30						
35						

3 in. Topsoil
Brown soft Clayey Silt (ML)

Brown and gray stiff Clay (CH)

- medium stiff below 6 feet

Gray medium stiff Silty Clay (CL)

Boring terminated at 14 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING 13 **FT.**
AT COMPLETION **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 9

PROJECT NO. 15599 **DATE:** 5/9/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 10 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 527 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
5						
10	10.0					
15						
20						
25						
30						
35						

5 in. Topsoil
Dark brown medium stiff Silty Clay (CL) with trace roots

- dark gray below 3 feet

- increasing silt below 6 feet

- soft below 8 feet

Boring terminated at 10 feet

Blows/6 in.
3 4 4
3 3 4
2 3 3
1 2 2

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING 8.5 **FT.**
AT COMPLETION **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 10

PROJECT NO. 15599 **DATE:** 5/10/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 10 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 527 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
0						
			3 4 5			
			5 6 8			
5						
			3 3 5			
	8.0					
			4 4 4			
10	10.0					
15						
20						
25						
30						
35						

2 in. Topsoil
Gray stiff Silty Clay (CL)

- medium stiff below 6 feet

Gray medium stiff Clay (CH)

Boring terminated at 10 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING Dry **FT.**
AT COMPLETION Dry **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 11

PROJECT NO. 15599 **DATE:** 5/10/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 10 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 528 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
0						
			1 1 1			
			1 1 2			
5						
	6.0		3 3 5			
	8.0					
10			3 3 4			
	10.0					
15						
20						
25						
30						
35						

3 in. Topsoil
Brownish-gray very soft Clayey Silt (ML)

Gray medium stiff Silty Clay (CL)

Gray medium stiff Clay (CH) with trace rock fragments

Boring terminated at 10 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit — Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING Dry **FT.**
AT COMPLETION Dry **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 12

PROJECT NO. 15599 **DATE:** 5/10/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 10 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 526 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
0						
			3 3 4			
			5 5 5			
5						
			3 3 3			
			2 3 5			
10	10.0					
15						
20						
25						
30						
35						

1 in. Topsoil
Brown medium stiff Clay (CH)

- gray, stiff below 3 feet

- medium stiff below 6 feet

Boring terminated at 10 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING Dry **FT.**
AT COMPLETION Dry **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 13

PROJECT NO. 15599 **DATE:** 5/9/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 10 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 528 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
0						
			3 4 5			
			3 3 6			
5						
			2 3 4			
			2 3 4			
10	10.0					
15						
20						
25						
30						
35						

2 in. Topsoil
Brown stiff Silty Clay (CL)

- gray below 3 feet

- medium stiff below 6 feet

Boring terminated at 10 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING Dry **FT.**
AT COMPLETION Dry **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 14

PROJECT NO. 15599 **DATE:** 5/9/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 14 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 518 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
			2 3 4		26	
	3.0					
5			3 3 4		39	
			2 3 4		31	
10			2 3 5		28	
15	14.0					
20						
25						
30						
35						

3 in. Topsoil
Gray medium stiff Clay (CH) with trace roots

Gray medium stiff Silty Clay (CL)

- increasing silt below 8 feet

- increasing clay below 12 feet

Boring terminated at 14 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING Dry **FT.**
AT COMPLETION Dry **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 15

PROJECT NO. 15599 **DATE:** 5/10/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 15 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 521 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE
			1 2 2			
	3.0					
5			2 3 4			
			3 3 4			
	8.0					
10			3 3 4			
15	15.0		1 2 2			
20						
25						
30						
35						

3 in. Topsoil
Brown and gray soft Silty Clay (CL)

Gray medium stiff Clay (CH)

- some silt below 6 feet

Gray medium stiff silty Clay (CL)

- with some fine sand below 13 feet

Boring terminated at 15 feet

Shear Strength from Indicated
1 2 3 4 5
Dry Density, pcf
90 100 110 120 130
Water Content, %
Plastic Limit Liquid Limit
Standard Penetration Resistance, Blows/Ft.
10 20 30 40 50

WATER LEVEL OBSERVATIONS

DURING DRILLING 12.5 **FT.**
AT COMPLETION **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 16

PROJECT NO. 15599 **DATE:** 5/10/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 15 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 519 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE

Shear Strength from Indicated: 1 2 3 4 5
Dry Density, pcf: 90 100 110 120 130
Water Content, %
Plastic Limit — Liquid Limit
Standard Penetration Resistance, Blows/Ft.: 10 20 30 40 50

DEPTH, FT.		STRATUM DEPTH, FT.	SPT BLOWS/6 in. THREE 6-in. INCREMENTS
	4 in. Topsoil Dark brown medium stiff Silty Clay (CL)		3 3 4
	- gray, increasing silt below 3 feet		3 3 3
5			
	- brownish-gray, soft below 6 feet		1 2 2
	- medium stiff below 8 feet		2 3 3
10			
	Brownish-gray stiff Clay (CH)	13.0	2 4 5
15	Boring terminated at 15 feet	15.0	
20			
25			
30			
35			

WATER LEVEL OBSERVATIONS

DURING DRILLING Dry **FT.**
AT COMPLETION Dry **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING

Oldenburg Industrial Park
Washington, Missouri

LOG OF BORING 17

PROJECT NO. 15599 **DATE:** 5/10/23 **LOCATION:** See Figure 1

COMPLETION DEPTH 20 FT.
BORING METHOD CFA
ROCK CORE DIAMETER N/A IN.
SURFACE ELEVATION 515 FT.

DEPTH, FT.	STRATUM DEPTH, FT.	SPT SPLIT SPOON	SPT BLOWS/6 in. THREE 6-in. INCREMENTS	UNDISTURBED SAMPLE	PERCENT RECOVERY	ROCK CORE

Shear Strength from Indicated: 1 2 3 4 5
Dry Density, pcf: 90 100 110 120 130
Water Content, %
Plastic Limit — Liquid Limit
Standard Penetration Resistance, Blows/Ft.: 10 20 30 40 50

	5 in. Topsoil Dark brown medium stiff Silty Clay (CL) with trace roots		2 2 3
	- stiff, increasing clay below 3 feet		4 4 6
5			
	- medium stiff, decreasing clay below 6 feet		2 3 4
			2 3 3
10			
	- soft below 13 feet		1 1 2
15			
	Gray medium stiff Silt (ML) with trace fine sand	18.0	4 2 4
20	Boring terminated at 20 feet	20.0	
25			
30			
35			

WATER LEVEL OBSERVATIONS

DURING DRILLING 13 **FT.**
AT COMPLETION **FT.**
AFTER HRS. **FT.**

NOTES

Elevations approximated using Google Earth

Shear Test Types - Static Cone: ● Pocket Penetrometer: ■ Unconf. Compr.: ▼ Miniature Vane: ▲ Field Vane: ◆

MIDWEST TESTING