GEOTECHNICAL ENGINEERING REPORT
NEW BANK
NW PRYOR RD & NW LOWENSTEIN DR
LEE'S SUMMIT, MISSOURI

Prepared For:

ENVIROBUSINESS, INC.
2 Batterymarch Park, Suite 100
Quincy, Massachusetts 02169

Prepared By:

KAW VALLEY ENGINEERING, INC.
14700 West 114th Terrace
Lenexa, Kansas 66215

December 6, 2021

Project No. **C21G1105**

KAW VALLEY ENGINEERING, INC.

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December 6, 2021 **C21G1105**

Mr. Kevin Sanders
EnviroBusiness, Inc. dba EBI Consulting
2 Batterymarch Park, Suite 100
Quincy, Massachusetts 02169

RE: GEOTECHNICAL ENGINEERING REPORT
NEW BANK
NW PRYOR RD & NW LOWENSTEIN DR
LEE'S SUMMIT, MISSOURI

Dear Mr. Sanders:

This report presents the results of a geotechnical exploration conducted for the referenced project. This exploration was conducted in general accordance with our proposal dated October 6, 2021. The purpose of this study was to define the subsurface conditions at the site and develop geotechnical recommendations for the proposed improvements to the site.

EXECUTIVE SUMMARY

Information, conclusions, and recommendations, which in our opinion are significant to the design and construction of this project, are provided below. Additional details, the general subsurface profile, other related items, and general information regarding the various phases of our exploration are included in the main body of the report.

Typical subsurface conditions consist of fat (high plasticity) and lean to fat (medium plasticity) clay fills overlying weathered shale and limestone bedrock at depths of 3 to 7.5 feet below existing grade. On the basis of the anticipated maximum loading conditions and the finish floor elevation being within 1 foot of existing grade, structural loads may be supported by continuous trench or strip and shallow spread footings founded entirely upon the existing shale bedrock. A net allowable bearing pressure of 3,500 pounds per square foot may be used to design and proportion the footings.

PROJECT AND SITE DESCRIPTION

The proposed building site is located in a paved parking lot in Lee's Summit, Missouri. In general, the topography of the site is relatively level with approximately 2 feet of elevation change between the borings.

The proposed building is understood to be one story, slab-on-grade structure with the planned finish floor elevation near existing grade. Anticipated maximum structural loads are 80 kips for columns and 3 kips per linear foot for walls. Based upon the anticipated finish floor elevation and existing topography, shallow cuts or fills up to 1 foot are anticipated within the building area. The site and surrounding area are displayed on Plate 1.

FIELD EXPLORATION

The field exploration was performed on November 5, 2021 and included drilling seven test holes identified as Borings B-1 through B-7. Borings B-1 through B-4 were located for the building. Borings B-5 through B-7 were positioned in parking lot and drive areas. The boring locations were estimated using measurements from existing features. The boring elevations were determined by differential leveling using the existing storm manhole cover #753 as a benchmark with an elevation of 990.4 feet. The boring locations and elevations are displayed on Plate 1 and the logs of the borings, respectively.

The borings were drilled using an ATV-mounted CME 45C drill rig with 4-inch O.D. continuous flight augers. Samples were obtained utilizing thin-walled steel tubes and a split-barrel sampler (standard penetration test). Soil samples were obtained at various intervals through the depths of the borings. The borings were drilled to depths of 9.9 to 12.9 feet below the existing ground surface. All borings were terminated at auger refusal. Detailed logs of the borings are displayed on Plates 2 through 8.

The borings were logged in the field by the driller based upon visual classifications of materials encountered during drilling, as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include revisions based upon results of the laboratory testing and a visual-manual review of the samples.

LABORATORY TESTING PROGRAM

The laboratory testing program was designed to determine the pertinent engineering and index properties of the soil. Moisture content, in-situ density, Atterberg limits, and unconfined compressive strengths were determined for select samples. Results of the laboratory tests are displayed upon the borings logs. All tests were performed in general accordance with applicable ASTM standards.

SUBSURFACE CONDITIONS

Stratigraphy. Typical subsurface conditions consist of fat (high plasticity) and lean to fat (medium plasticity) clay fills overlying weathered shale and limestone bedrock at depths of 3 to 7.5 feet below existing grade.

Moisture contents of selected soil samples ranged from 14.0 to 25.5 percent. In situ dry densities of the clay ranged from 98.7 to 105.2 pounds per cubic foot (pcf). Unconfined compression strength tests yielded results of 6,116 and 7,068 pounds per square foot (psf). The Atterberg limits

tests indicate the upper soils on site can be classed as CH (fat clay) and CL-CH (lean to fat clay) in general accordance with the Unified Soil Classification System. These soils are inorganic clays and silts of high to medium plasticity, with corresponding high to medium swell potential, respectively.

Groundwater. Groundwater was not encountered in the borings in the depths explored. It should be understood that the level of the groundwater may fluctuate due to rainfall and other climatic factors, and that groundwater may or may not be present during construction or at other times during the life of the project.

DESIGN CONSIDERATIONS AND RECOMMENDATIONS

Site Preparation. Site preparation for the proposed project should commence with stripping of all pavements, vegetation, and topsoil from the proposed building and pavement areas. Stripping should extend a minimum of 5 feet beyond the building footprint. A minimum stripping depth of approximately 12 inches should be anticipated in the grass-covered areas. However, stripping depths will likely vary and should be adjusted to remove all vegetation and root systems. Soils removed during site stripping operations could be used for final site grading outside the proposed building and pavement areas. Care should be exercised to separate these materials to avoid incorporation of the organic matter in structural fill sections. A representative of Kaw Valley Engineering, Inc. should monitor the stripping operations to observe that all unsuitable materials have been removed.

Relocation of any existing utility lines within the zone of influence of proposed construction areas should also be completed as part of the site preparation. The lines should be relocated to areas outside of the proposed construction. Excavations created by removal of the existing lines should be cut wide enough to allow for use of heavy construction equipment to recompact the fill. In addition, the base of the excavations should be thoroughly evaluated by a geotechnical engineer or engineering technician prior to placement of fill. All fill should be placed in accordance with the recommendations presented in the *Structural Fill* section of this report.

Immediately after site stripping, the remaining area of the proposed building footprint and proposed pavement areas should be cut below planned design grade to a level that will allow placement of a minimum of 12 inches of lower plasticity structural fill below the floor slab and 8 inches below the pavements. The undercutting should extend a minimum of 5 feet outside all building wall lines. The low plasticity structural fill below the floor slab and pavements is recommended to reduce the potential for subgrade movement. The recommended lower plasticity structural fill thickness is in addition to any granular sections that will be required below the floor slab and pavements. Based on subsurface conditions encountered at this site, it does not appear as though there is suitable material on-site for use as the lower plasticity structural fill below the floor slabs.

Immediately after site stripping and overexcavation, the moisture content of the exposed soils should be evaluated. Depending on the in-situ moisture content of the exposed soils, moisture conditioning of the exposed grade may be required. The moisture content of the exposed grade should be adjusted to within the range recommended for structural fill to allow the exposed material to be compacted to a minimum density of 95 percent of maximum density as determined

by the standard Proctor compaction test. Extremely wet or unstable areas that hamper compaction of the subgrade may require undercutting and replacement with structural fill or other stabilization techniques.

Following moisture conditioning of the exposed soils, it is recommended that the exposed grade in-place density shall be confirmed to meet or exceed 95% of the maximum dry density as determined by ASTM D 698. Unsuitable areas identified by the density verification should be undercut and replaced with structural fill. Following density verification, suitable structural fill should be placed to design grade as soon as practical to avoid moisture changes in the underlying soils.

Structural Fill. All structural fill should consist of approved materials, free of organic matter and debris. The onsite soils may be used for structural fill with the exception of within 12 inches of the building subgrade elevation and within 8 inches of the pavement subgrade elevation. Soils in these areas should consist of low swell potential cohesive soils with a liquid limit less than 45 and a plasticity index between 10 and 25. These are also identified as low volume change (LVC) soils. These LVC soils are not present on the site, and will need to be imported.

In lieu of importing low plasticity material for use as low plasticity fill beneath the building floor slab and pavements, the on-site fat clay soils could be stabilized following the procedures outlined in the "Chemical Stabilization" section of this report.

All fill should be placed in lifts having a maximum loose lift thickness of 8 inches, and should be compacted to a minimum of 95% of the material's maximum dry density as determined by ASTM D 698 (standard Proctor compaction). The moisture content of the fill at the time of compaction should be within a range of optimum moisture to 3% above optimum moisture content as defined by the standard Proctor compaction procedure. Moisture contents should be maintained within this range until completion of the floor slab and pavement.

The geotechnical engineer should approve all fill material. Approval requires that a moisture-density relationship and Atterberg limits be performed for each proposed fill material prior to its placement.

All utility trenches should be backfilled with either on-site or imported fill material. Granular materials such as clean sand or gravel should not be used to bed utilities or backfill trenches unless the bottom of the trench is graded so that water flows away from the structure and pavement areas.

Where fill is being placed on a slope steeper than 5:1 (horizontal:vertical), the existing slope should be benched as fill placement progresses. These benches should be vertically stepped between 12 and 36 inches. This procedure would better key the fill into the original slope and will facilitate compaction of the fill.

Final slopes greater than 3:1 (horizontal:vertical) should not be used for ease of maintenance.

Continuous observation by the geotechnical engineer or his representative should be maintained during site preparation and compaction of all fill and backfill material.

Chemical Stabilization. In order to reduce the effects of the high swell potential of the on-site soils, the on-site clays can be chemically stabilized using lime, cement, or fly ash, thereby removing the need to import low plastic fill soils. Following site stripping, stabilization should begin by stockpiling the top 6 inches of the existing soil for the structure. Scarify and moisture condition the exposed surfaces for a minimum depth of 6 inches at a moisture content of 5 to 8% above optimum moisture. Add 5% hydrated lime, 5% Portland cement, or 15% Type C fly ash by dry weight, and blend with moisture-conditioned soil utilizing a Bomag pulvamixer or approved equivalent. Recompact the soil mixture to a minimum dry density of 95% of the maximum dry density, with the moisture content between optimum and 3% above optimum as determined by ASTM D 698. Moisture condition, mix, and recompact the stockpiled material in a 6 inch compacted lift utilizing the procedures outlined above. Compaction of the chemically stabilized soil should be completed within 2 hours of the incorporation of the chemical stabilizer. Stabilization of the pavement areas may be accomplished in one lift.

Foundations. On the basis of the anticipated maximum loading conditions and the planned finish floor elevation being near existing grade, structural loads may be supported by continuous trench or strip and shallow footings founded entirely upon the existing shale bedrock. The footings may need to be extended a few feet to reach shale bedrock in some areas of the buildings and the overexcavations may be replaced with flowable fill or additional concrete. A net allowable bearing pressure of 3,500 pounds per square foot may be used to design and proportion the footings.

The base of the exterior footings should be placed a minimum of 3 feet below the lowest adjacent exterior grade for moisture stability and frost protection. Interior footings, within areas which will be continuously heated, may be placed a minimum of 2 feet below the interior finished floor.

Isolated footings should have a minimum width of 24 inches. Strip and trench footings should have minimum widths of 18 and 12 inches, respectively. Trench footings should be reinforced with a minimum of two number 4 bars at both the top and bottom. The base of footing excavations should be free of all water, loose debris, and not allowed to become excessively wet or dry prior to placement of concrete.

All footing excavations should be observed by the geotechnical engineer of record or a representative to verify the suitability of the bearing material prior to placement of reinforcing steel.

Seismic Soil Classification. According to the 2018 International Building Code, the site soils are best characterized by the "Class D" site classification. This classification can be utilized by the structural engineer as a seismic design parameter.

Settlement. Footings proportioned and constructed as recommended above should settle one inch or less, with differential settlement between any two adjacent footings being less than one-half inch.

Lateral Loads. A coefficient of base friction of 0.25 may be used for the contact between concrete and soil.

Uplift. Uplift forces, if any, may be resisted by the weight of the foundation.

Drainage. The site should be graded so that surface water flows away from the structure and pavement areas and is not allowed to accumulate near or under the slab-on-grade or pavement. Where sidewalks or paving do not immediately adjoin the structure, a grade of at least 5 percent for a minimum of 10 feet from the perimeter walls is recommended.

Lateral Pressures. Unrestrained walls below grade, if required, should be designed for an equivalent active fluid pressure of 40 psf/ft. Restrained walls below grade should be designed for an "at rest" equivalent fluid pressure of 60 psf/ft. The provided pressures do not include a factor of safety or the effects of hydrostatic loading.

Slab-On-Grade. The slab-on-grade should be designed such that axial column loads are not transferred through the slab. A 4-inch layer of open graded gravel (ASTM C33 No. 57) should be placed directly below the slab-on-grade. A moisture barrier should be placed between the slab and the open graded gravel. Fill within 12 inches of the slab base materials should consist of low swell potential cohesive soils with a liquid limit less than 45 and a plasticity index between 10 and 25, or chemically stabilized on-site soils. We recommend that the slab-on-grade be designed for a modulus of subgrade reaction of 125 pounds per cubic inch.

Thickened slab sections can be used to support interior non-load bearing walls provided that:

- Loads do not exceed 900 pounds per linear foot.
- Thickened sections have a minimum thickness and width of 8 inches and 12 inches, respectively.
- Thickness and reinforcement are consistent with structural requirements.

Landscaping. Consideration should be given to limiting landscaping and irrigation adjacent to the building and pavement areas. Trees and large bushes can draw moisture from subgrade soils resulting in settlement of foundations and pavements. Excess irrigation can cause swelling soils and pavement failures.

Pavement Sections. The CBR value for the soil types encountered on the site is typically estimated to be 3; therefore, the following pavement sections are recommended for parking areas and drives. Recommendations for both flexible and rigid pavements are presented in Table 1.

Table 1 – Recommended Pavement Sections for Pavement Life of 20 Years

Loading Type	Concrete	Asphaltic Concrete	Asphaltic Concrete with Aggregate Base
Light Traffic (customer/employee and small delivery truck parking)	5″ Portland Cement Concrete 4″ Well Graded Granular Base 8" Moisture Conditioned & Compacted LVC Soil or Stabilized Onsite Soil	6″ Hot-Mixed Asphalt Concrete 8" Moisture Conditioned & Compacted LVC Soil or Stabilized Onsite Soil	5″ Hot-Mixed Asphalt Concrete 6″ Well Graded Granular Base Course 8" Moisture Conditioned & Compacted LVC Soil or Stabilized Onsite Soil
Heavy Traffic (delivery drives and loading areas)	8″ Portland Cement Concrete 4″ Well Graded Granular Base 8" Moisture Conditioned & Compacted LVC Soil or Stabilized Onsite Soil	9″ Hot-Mixed Asphalt Concrete 8" Moisture Conditioned & Compacted LVC Soil or Stabilized Onsite Soil	7″ Hot-Mixed Asphalt Concrete 6″ Well Graded Granular Base Course 8" Moisture Conditioned & Compacted LVC Soil or Stabilized Onsite Soil

OBSERVATION OF CONSTRUCTION

The conclusions and recommendations given in this report are based on interpretation of field boring and laboratory data coupled with our experience. Variations may occur from conditions observed within test borings; therefore, it is imperative to involve the geotechnical engineer in the final design and construction process.

Field observation services are viewed as a continuation of the design process. Unless these services are provided, the geotechnical engineer will not be responsible for improper use of recommendations, or failure by others to recognize conditions which may be detrimental to the successful completion of the project.

LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based on the site conditions and project layout described herein and further assume that the conditions observed in the exploratory borings are representative of the subsurface conditions throughout the site, i.e., the subsurface conditions elsewhere on the site are the same as 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 in time between the submittal of this report and the start of work at the site, or if conditions or the project layout 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 conclusions and recommendations considering the changed conditions and time lapse.

We recommend that we be retained to review the project layout and those portions of plans and specifications which pertain to foundations and earthwork to determine if they are consistent with our findings and recommendations. In addition, we are available to observe construction, particularly site grading, earthwork, and foundation construction. We would be available to make other field observations as may be necessary.

This report was prepared for the exclusive use of the owner, architect, and engineer for evaluating the design of the project 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 the report. Unanticipated soil conditions may require that additional expense be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

* * * * * *

The following plates are attached to and complete this report:

Plate 1 - Boring Location Plan

Plates 2 through 8 - Logs of Borings

Boring Log Reference Legend

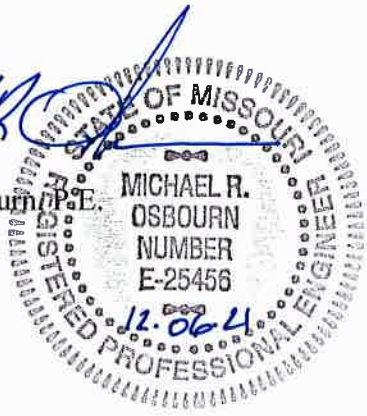
* * * * * *

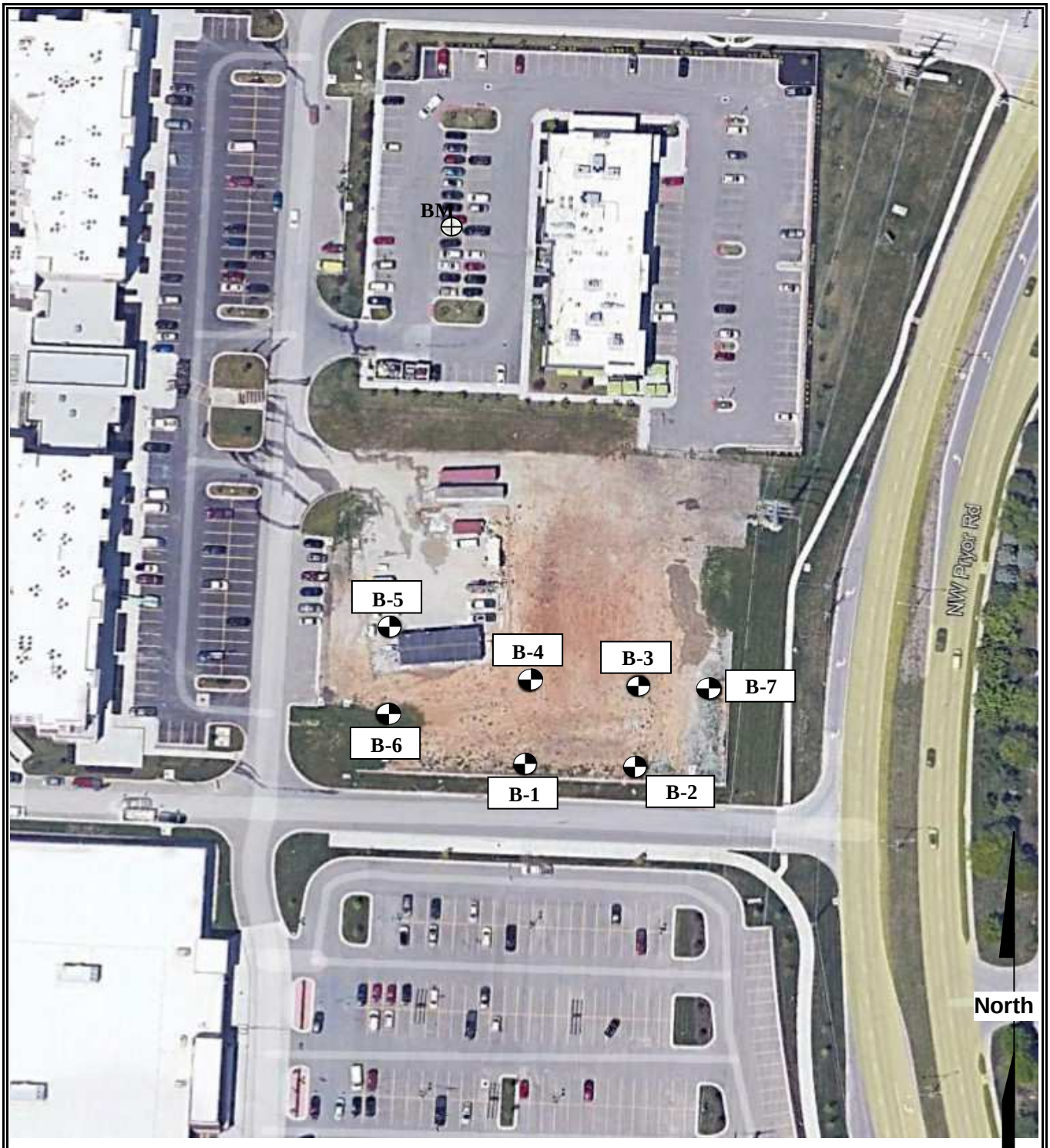
We appreciate the opportunity to be of service to you on this project. Please contact us if you have any questions or comments.

Respectfully submitted,
Kaw Valley Engineering, Inc.

Jessica A. Nixon, P.E.
Geotechnical Engineer

Michael R. Osbourn, P.E.
Principal





Site Plan and Boring Locations

Plate 1

NEW BANK
NW Pryor Rd and Lowenstein Dr
Lee's Summit, Missouri

Approved By: JN	Not to Scale	Project No. C21G1105

KAW VALLEY ENGINEERING

LOG OF BORING B-1

Kaw Valley Engineering, Inc.
14700 W 114th Terrace
Lenexa, Kansas 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: ENVIROBUSINESS, INC.
PROJECT: New Bank
NUMBER: C21G1105
LOCATION: NW Pryor Rd & Lowenstein Dr - Lee's Summit, MO
DATE(S) DRILLED: 11/5/21 - 11/5/21

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 45C
DRILL RIG OPERATOR: Jeff Weaver
LOGGED BY: Dominic Madrid

GROUNDWATER INFORMATION:
Water level while boring - Dry
Water level after boring - Dry

SURFACE ELEVATION: 989.7'

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT (LL)	ATTERBERG LIMITS PLASTIC LIMIT (PL)	ATTERBERG LIMITS PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
	1												FILL: Lean to fat clay; brown; firm; moist; with iron nodules and silt
	2			11	21.6	48	18	30	105.2				
	3												
	4		T = 8/10/12		22.1								985.2'
	5												SHALE: Olive to brown; with iron nodules; highly to moderately weathered
	6												
	7												
	8												
	9		T = 12/19/27		18.2								
	10												
	11												
	12												977.0'
													976.8'
	13												LIMESTONE: Gray; hard
	14		**BORING TERMINATED AT 12.9'**										Auger refusal at 12.9'
	15												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial condition - Grass

LOG OF BORING B-2

Kaw Valley Engineering, Inc.
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Lenexa, Kansas 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: ENVIROBUSINESS, INC.
PROJECT: New Bank
NUMBER: C21G1105
LOCATION: NW Pryor Rd & Lowenstein Dr - Lee's Summit, MO
DATE(S) DRILLED: 11/5/21 - 11/5/21

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 45C
DRILL RIG OPERATOR: Jeff Weaver
LOGGED BY: Dominic Madrid

GROUNDWATER INFORMATION:
Water level while boring - Dry
Water level after boring - Dry

SURFACE ELEVATION: 990.7'

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
	1												FILL: Fat clay; brown; firm to stiff; moist; with iron nodules and silt
	2			12	25.5	65	20	45	99.8	6,116			
	3												
	4		T = 7/7/7		23.3								986.2'
	5												SHALE: Olive to brown; with iron nodules; highly to moderately weathered
	6												
	7												
	8												
	9		T = 14/24/38		17.4								
	10												
	11												
	12												978.1'
													977.9' LIMESTONE: Gray; hard
	13		**BORING TERMINATED AT 12.8'**										Auger refusal at 12.8'
	14												
	15												

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REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial condition - Grass

LOG OF BORING B-3

Kaw Valley Engineering, Inc.
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Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: ENVIROBUSINESS, INC.
PROJECT: New Bank
NUMBER: C21G1105
LOCATION: NW Pryor Rd & Lowenstein Dr - Lee's Summit, MO
DATE(S) DRILLED: 11/5/21 - 11/5/21

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 45C
DRILL RIG OPERATOR: Jeff Weaver
LOGGED BY: Dominic Madrid

GROUNDWATER INFORMATION:
Water level while boring - Dry
Water level after boring - Dry

SURFACE ELEVATION: 990.7'

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT (LL)	ATTERBERG LIMITS PLASTIC LIMIT (PL)	ATTERBERG LIMITS PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													FILL: Fat clay; brown; firm to stiff; moist; with shale fragments
	1												
	2			18	23.7				101.6				
													987.7'
	3												SHALE: Brown to olive; with iron nodules; highly to moderately weathered
	4		T = 5/6/8		22.1								
	5												
	6												
	7												
	8												
	9		T = 16/24/42		16.4								
	10												
	11												
													979.1'
													978.9' LIMESTONE: Gray; hard
	12												
			BORING TERMINATED AT 11.8'										Auger refusal at 11.8'
	13												
	14												
	15												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial condition - Grass

LOG OF BORING B-4

Kaw Valley Engineering, Inc.
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Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: ENVIROBUSINESS, INC.
PROJECT: New Bank
NUMBER: C21G1105
LOCATION: NW Pryor Rd & Lowenstein Dr - Lee's Summit, MO
DATE(S) DRILLED: 11/5/21 - 11/5/21

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 45C
DRILL RIG OPERATOR: Jeff Weaver
LOGGED BY: Dominic Madrid

GROUNDWATER INFORMATION:
Water level while boring - Dry
Water level after boring - Dry

SURFACE ELEVATION: 991.2'

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT (LL)	ATTERBERG LIMITS PLASTIC LIMIT (PL)	ATTERBERG LIMITS PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
	1												FILL: Fat clay; brown; stiff; moist; with shale fragments
	2			16	22.7	52	17	35	98.7	7,068			
	3												987.7'
	4		T = 4/6/10		20.8	53	26	27					SHALE: Brown; with iron nodules; highly weathered
	5												
	6												
	7												
	8												982.7'
	9		T = 12/24/30		17.2								SHALE: Light brown to olive; with iron nodules; moderately weathered
	10												
	11												
	12												979.1' 978.9' LIMESTONE: Gray; hard
	13		**BORING TERMINATED AT 12.3'**										Auger refusal at 12.3'
	14												
	15												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial condition - Grass

LOG OF BORING B-5

Kaw Valley Engineering, Inc.
14700 W 114th Terrace
Lenexa, Kansas 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: ENVIROBUSINESS, INC.
PROJECT: New Bank
NUMBER: C21G1105
LOCATION: NW Pryor Rd & Lowenstein Dr - Lee's Summit, MO
DATE(S) DRILLED: 11/5/21 - 11/5/21

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 45C
DRILL RIG OPERATOR: Jeff Weaver
LOGGED BY: Dominic Madrid

GROUNDWATER INFORMATION:
Water level while boring - Dry
Water level after boring - Dry

SURFACE ELEVATION: 989.4'

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
	1												FILL: Crushed limestone and gravel
	2												
	3												986.4' SHALE: Olive; with iron staining; highly weathered
	4		T = 8/12/17		18.2								
	5												
	6												
	7												981.9' SHALE: Gray; with iron staining; moderately weathered
	8												
	9		T = 21/50=5"		12.7								
	10												979.4'
	11		**BORING TERMINATED AT 10.0'**										
	12												
	13												
	14												
	15												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial condition - Gravel

LOG OF BORING B-6

Kaw Valley Engineering, Inc.
14700 W 114th Terrace
Lenexa, Kansas 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: ENVIROBUSINESS, INC.
PROJECT: New Bank
NUMBER: C21G1105
LOCATION: NW Pryor Rd & Lowenstein Dr - Lee's Summit, MO
DATE(S) DRILLED: 11/5/21 - 11/5/21

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 45C
DRILL RIG OPERATOR: Jeff Weaver
LOGGED BY: Dominic Madrid

GROUNDWATER INFORMATION:
Water level while boring - Dry
Water level after boring - Dry

SURFACE ELEVATION: 989.4'

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT (LL)	ATTERBERG LIMITS PLASTIC LIMIT (PL)	ATTERBERG LIMITS PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													TOPSOIL (6") 988.9'
	1												LEAN CLAY: Brown; firm to stiff; moist; with iron nodules and shale fragments
	2												
	3												
	4			22	22.0				101.5	6,851			
	5												
	6												
	7												981.9'
	8												SHALE: Olive to brown; with iron nodules; moderately weathered
	9		T = 13/21/30		16.3								
	10												979.4'
	11		**BORING TERMINATED AT 10.0'**										
	12												
	13												
	14												
	15												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial condition - Grass

LOG OF BORING B-7

Kaw Valley Engineering, Inc.
14700 W 114th Terrace
Lenexa, Kansas 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: ENVIROBUSINESS, INC.
PROJECT: New Bank
NUMBER: C21G1105
LOCATION: NW Pryor Rd & Lowenstein Dr - Lee's Summit, MO
DATE(S) DRILLED: 11/5/21 - 11/5/21

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 45C
DRILL RIG OPERATOR: Jeff Weaver
LOGGED BY: Dominic Madrid

GROUNDWATER INFORMATION:
Water level while boring - Dry
Water level after boring - Dry

SURFACE ELEVATION: 988.9'

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													FILL: Fat clay; brown; stiff; moist; with shale fragments
	1												
	2												
	3												985.9'
	4		T = 12/19/32		17.5								SHALE: Olive to brown; with iron nodules; highly to moderately weathered
	5												
	6												
	7												
	8												
	9		T = 14/33/50=5"		14.0								979.0'
	10												
	11		**BORING TERMINATED AT 9.9'**										
	12												
	13												
	14												
	15												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial condition - Grass

BORING LOG REFERENCE LEGEND

DESCRIPTIVE SOIL CLASSIFICATION

Soil description is based on the Unified Soil Classification System as outlined in ASTM Designation D-2487. The Unified Soil Classification group symbol for soil descriptions shown on the boring logs corresponds with the group names listed below. The description includes soil constituents, consistency, relative density, color and any other appropriate descriptive terms. Geologic description of bedrock, when encountered, is also shown in the description column. Refer to the appropriate notes for bedrock classification.

Group Symbol	Group Name	Group Symbol	Group Name	Group Symbol	Group Name	Group Symbol	Group Name
GW	Well graded gravel	SW	Well graded sand	CL	Lean clay	CH	Fat clay
GP	Poorly graded gravel	SP	Poorly graded sand	ML	Silt	MH	Elastic silt
GM	Silty gravel	SM	Silty sand	OL	Organic clay Organic silt	OH	Organic clay Organic silt
GC	Clayey gravel	SC	Clayey sand			PT	Peat

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf

< 500	Very Soft
500 – 1,000	Soft
1,001 – 2,000	Firm
2,001 – 4,000	Stiff
4,001 – 8,000	Very Stiff
8,001 – 16,000	Hard
> 16,000	Very Hard

RELATIVE PROPORTIONS

Descriptive Term(s) (Components also Percent in Sample)	Sand & Gravel Percent of Dry Wt.	Fines Percent of Dry Wt.
Trace	< 15	<5
Some	15 – 29	5 - 12
Modifier	> 30	> 12

RELATIVE DENSITY OF COARSE-GRAINED SOILS

N - (blows/ft)	Relative Density
0 – 3	Very Loose
4 – 9	Loose
10 – 29	Medium Dense
30 – 49	Dense
50+	Very Dense

GRAIN SIZE TERMINOLOGY

Major Component	Size Range
Cobbles	12 in to 3 in
Gravel	3 in to #4 sieve
Sand	#4 to #200 sieve
Silt or Clay	Passing #200 sieve

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. In pervious soil the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels is not possible with only short-term observation.

DEFINITIONS OF ABBREVIATIONS

CR – Core recovery, length of core recovered in each run compared to the length drilled expressed as percent
LL – Liquid limit of specimen
N – Number of blows to penetrate last 12 inches with 140-pound hammer in standard penetration test
Blow count reported for each 6-inch interval on logs
PL – Plastic limit of specimen
RQD – Rock quality designation, aggregate length of core pieces greater than 4 inches long, expressed as percent of length drilled
TW – Thin walled tube
SS – Standard penetration test
NQ2 – 2 inches diameter core
CFA – Continuous flight augers
HSA – Hollow stem augers
EOB – End of boring

KAW VALLEY ENGINEERING