ARCHITECTURE
+ DESIGN

ADDENDUM A

February 26, 2020

18-2084 Abbey Credit Union

Documents prepared by K4 Architecture, LLC, of Cincinnati, Ohio, e2m Engineering, GOP Limited Structural Engineers and Choice One Engineering

TO BIDDERS:

This Addendum is part of the contract documents. Changes shall be taken into account in preparing the proposal.

ADDITIONAL DOCUMENTS:

1. Geotech Report
   A. Alt & Witzig prepared a geotechnical report for the owner on March 27, 2019. It is now included as part of the bid documents.

END OF ADDENDUM A

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SUBSURFACE INVESTIGATION AND GEOTECHNICAL RECOMMENDATIONS

ABBEY CREDIT UNION
TROY BUSINESS PARK (LINK CIRCLE)
TROY, OHIO

Prepared for:

ABBEY CREDIT UNION
C/O K4 ARCHITECTURE & DESIGN
CINCINNATI, OHIO

Prepared by:

ALT & WITZIG ENGINEERING, INC.
COLUMBUS, OHIO

MARCH 27, 2019 **PROJECT NO.: 19CB0009**

Alt & Witzig Engineering, Inc.
1825 O'Brien Road • Columbus, Ohio 43228
Phone: (614) 274-7428 • www.altwitzig.com

March 27, 2019

Abbey Credit Union
c/o K4 Architecture & Design
555 Gest Street
Cincinnati, Ohio 45203
Attn: Mr. John Lucas

RE: Subsurface Investigation &
Geotechnical Recommendations
Abbey Credit Union
Troy Business Park (Link Circle)
Troy, Ohio
Alt & Witzig File #: 19CB0009

Dear Mr. Lucas,

This report presents the results of a subsurface investigation and provides geotechnical recommendations for a Abbey Credit Union to be constructed in Troy, Ohio. Our investigation was conducted for Abbey Credit Union c/o K4 Architecture & Design. The purpose of this subsurface investigation was to determine the various soils profile components, the engineering characteristics of the subsurface materials and to provide criteria for use by the design engineers and architects in preparing the foundation design for the proposed building and site improvements.

Field Investigations

Field investigations to determine the engineering characteristics of the subsurface materials included a reconnaissance of the project site and drilling 7 borings. Boring B-2 was inaccessible with our drill rig at the time of drilling operations and was eliminated. Borings are located as shown on Figure 1. The soil borings were performed with a drilling rig equipped with a rotary head. Conventional hollow-stem augers were used to advance the holes. Representative samples were obtained employing split-spoon sampling procedures in accordance with ASTM Procedure D-1586.

During the sampling procedure, Standard Penetration Tests were performed at regular intervals to obtain the Standard Penetration Test value of the soil. The Standard Penetration Test value is defined as the number of blows a 140-pound hammer, falling 30 inches, is required to advance the split-spoon sampler 1 foot into the soil. The results of the Standard Penetration Tests indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

During and upon completion of drilling, the groundwater table was measured. The exact location of the water table should be anticipated to fluctuate somewhat depending upon normal seasonal variations in precipitation and surface runoff. In addition, it generally requires several months of observation to estimate groundwater levels and the levels given on the enclosed boring logs are from the short observations made during our on-site observations.

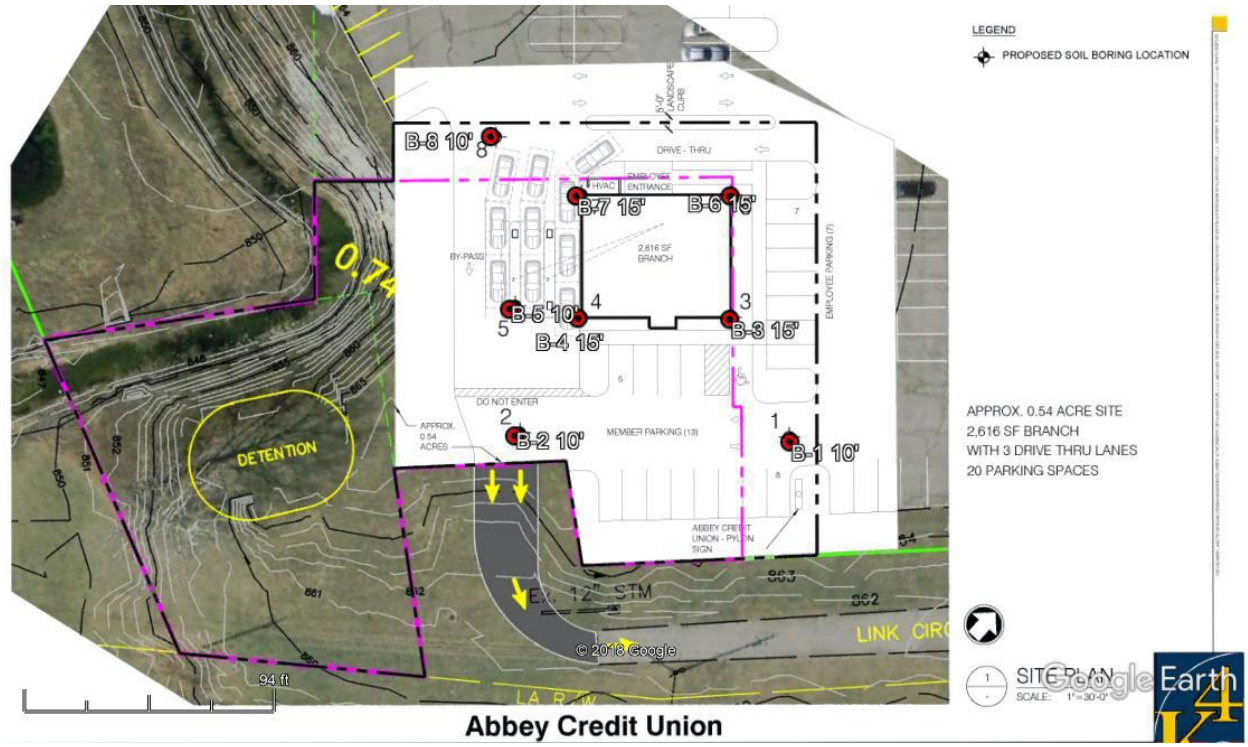


Figure 1: Borings Locations for Abbey Credit Union

Laboratory Investigations

In addition to the field investigations, a supplemental laboratory investigation was conducted to ascertain additional pertinent engineering characteristics of the subsurface materials necessary in analyzing the behavior of the new building. All phases of the laboratory investigation were conducted in general accordance with applicable ASTM Specifications. The laboratory-testing program included:

- Visual classification in accordance with ASTM D 2488.
- Moisture content tests in accordance with ASTM D 2216.

Samples of the cohesive soil from the split-spoon-sampling device were frequently tested in unconfined compression by use of a calibrated spring testing machine. In addition, a calibrated soil penetrometer was used as an aid in determining the strength of the soil. The values of the unconfined compressive strength as determined on soil samples from the split-spoon sampling must be considered, recognizing the manner in which they were obtained since the split-spoon sampling techniques provide a representative but somewhat disturbed soil sample.

Description of Site

The site of the new credit union is in the Troy Business Park at the dead end of Link Circle in Troy, Ohio. The approximate location of the site is shown on the enclosed *Site Location Map* presented in the Appendix of this report.

The site currently consists of asphalt pavement for the Troy Business Park and greenspace. The site is relatively flat with elevations varying from approximately 865 ft to 863 ft according to Google Earth.

For our analysis, the structure will be a 2,616-sf single-story structure with a slab-on-grade. We anticipate the building will be steel framed with a masonry façade. Finished floor elevations have not been provided, however, we anticipate that the finished floor elevation will be at or near current site elevations. We anticipate maximum wall loads will be 6-kips per foot and maximum column loads will be 75-kips.

Subsurface Conditions

A total of 7 borings were performed to obtain the subsurface conditions of the Abbey Credit Union. Boring B-2 was inaccessible with our drill rig at the time of drilling operations and was eliminated. The borings drilled in the pavement consisted of 4 to 6 inches of asphalt underlain by 7 to 8 inches of stone. The borings drilled in the greenspace consisted of 1 to 2 inches of topsoil underlain by 2 to 6 inches of sand and gravel. Beneath the surface materials, the native soils consisting of sandy clay with varying amounts of gravel and limestone were encountered to termination depth. The soils were generally very stiff to hard in consistency with the Standard Penetration Test values ranging from 9 to 51 with an average of 26. Boring B-7 encountered a fine sand layer between 10.0 and 12.0 feet.

Groundwater was encountered in boring B-4 and B-7 at a depth of 10.0 feet and 9.5 feet, respectively. Note that the groundwater readings were taken over a short observation period. The actual depth of the water table should be expected to fluctuate.

Seismic Site Class

An evaluation of the seismic site class has been performed for this site. The Ohio Building Code indicates that the seismic site class is determined by averaging soil conditions within the top 100 feet with respect to the shear wave velocity. This evaluation is based on data obtained on soil to termination of the borings and our knowledge of soils in the area. Based on the field and laboratory tests performed on the encountered subsurface materials to boring termination, this site should be considered a Site Class C in accordance with the current Ohio Building Code. Seismic acceleration parameters of S_s=0.200g and S_1=0.073g can be utilized for design, assuming the building has risk category of 1, 2, or 3.

Site Preparation/Reuse of On-Site Soils

We assume the building will be constructed at or near current site elevations. However, once a grading plan is generated it should be provided to Alt & Witzig Engineering to confirm our recommendations.

Prior to placing any fill material across the building and parking areas, the asphalt, stone, and topsoil should be stripped. The exposed subgrade should then undergo a proof-roll inspection with approved equipment to determine if any pockets of soft unsuitable materials exist beneath the proposed building and parking areas. Any soft or yielding areas found in the proof-roll should be excavated and replaced as structural fill.

Proper compaction techniques should be followed in raising the site to design subgrade elevation. The following table illustrates the recommended compaction percentage in several areas of the site:

Area	Min. Percentage of Compaction ASTM D 698	Acceptable Material	Typical Maximum Lift Thickness
Roads, Drives, & Parking Areas	98%	Any besides ML, MH, CH, OL, OH	8"
Under Foundations and Footings	98%	Any besides ML, MH, CH, OL, OH	8"
Sub grade Below Slab-On-Grade	98%	ODOT#304 or other coarse-grained material approved by the geotechnical engineer	8"
Green Space	85%	Any	12"
Landscaped Areas (Upper 1ft)	Maximum 90%	Any	12"
Utility Trench Backfill	95%	SW,SP,GW,GP	12"

Laboratory testing indicates the shallow soils (upper 6 feet) to have moisture contents between 7.8% and 11.6%. Based on our experience with similar soils, we estimate optimum moisture content of the shallow clay soils to be in the range of 9% to 13%. Generally, a moisture range of 2% below and 3% above optimum moisture content is desired for these soils to achieve proper compaction. Therefore, all of the soils encountered in the borings appear to near optimum moisture content and will not require any drying. If drying is required, the soils can be spread in a thin lift during favorable weather conditions to allow the soils to aerate and dry.

Foundation Discussion and Recommendations

Spread footings and continuous wall footings can be used to support the building. A net allowable bearing pressure of 5,000 psf is recommended to design all conventional spread footings and continuous wall footings. The above-recommended bearing pressure assumes the footings will be founded on suitable structural fill or very stiff natural sandy clay soils.

The above recommended bearing pressure is a "net allowable soil pressure". In utilizing this net allowable pressure for dimensioning footings, it is necessary to consider only those loads applied above the finished floor elevations.

We recommend that all foundation excavations be inspected by Alt & Witzig Engineering to verify that adequate bearing soils exist in the base of all footings. At the time of footing inspections, Housel Penetration Tests or other approved tests can be performed on these foundation soils.

Floor Slab Recommendations

The ground floor for the proposed structure can be constructed as a slab-on-grade supported by existing soils and/or well-compacted fill materials, provided they can pass a proof-roll inspection. Fill materials can consist of the on-site soils or approved import material.

As mentioned in the Site Preparation Section, before any fill is placed the exposed subgrade should be proof-rolled with equipment approved Alt & Witzig Engineering. This proof-rolling will expose any soft, compressible soil. Areas that fail the proof-roll should be undercut to a depth determined at the time of the proof-roll inspection and remediated as determined by Alt & Witzig Engineering, the contractor, and the owner.

After the building area has been cut/raised to the proper elevation, a minimum of 4-inch compacted granular fill should be placed immediately beneath the floor slab. This compacted granular fill will provide a uniform surface for construction of the slab. A vapor barrier should be placed immediately below the floor slab in any areas of the building where floor coverings such as carpet, vinyl tile, ceramic tile, etc. will be placed. Where floor loads due to building structure will be necessary a modulus of subgrade reaction of 125-pci should be used to dimension the slab thickness.

Proposed Parking Area and Pavement Design Recommendations

We recommend that the parking lot subgrade be prepared in a similar method to that of the floor slab. Based upon our laboratory tests and on past experience with soils having a similar consistency, a design CBR value of 3.0 is recommended for the pavement design of a properly prepared subgrade.

All paved areas should be designed to prevent water from collecting or ponding immediately beneath the pavement. It is suggested that underdrains be installed in the pavement area to minimize potential saturation of these soils. The soils engineer, owner, and site design engineer should discuss the design and placement of these drains prior to construction. For underdrains to be effective, minimum installation depths of 18-inches is suggested. The drains should consist of a 4-inch perforated plastic pipe encased in a clean granular backfill such as a washed No. 57 stone or pea gravel.

Although no specific traffic information was provided, it is anticipated that light-duty pavements will be primarily subjected to several hundred cars per week. It is anticipated that the heavy-duty pavements will be primarily subjected to the occasional delivery truck and up to 1 trash truck per week. The following pavement sections were determined based on these assumed traffic conditions, utilizing a 20 year design life and a CBR value of 3.0 and the American Association of State Highway Officials (AASHTO) design method. It must be noted that the design conditions have been estimated. If actual traffic conditions differ greatly than mentioned above, we should be contacted so that appropriate changes in the design can be made.

Proposed Pavement Sections

Traffic Type	Pavement Type	Surface Course	Binder Course	ODOT #304
Light Duty Pavement (Car Parking)	Asphalt	1.5”	2.0”	6.0”
Heavy Duty Pavement (Delivery and Trash Truck)	Asphalt	1.5”	3.0”	8.0”

The area designed for placement of the trash container should be constructed with a concrete pad. These concrete aprons will support the heavy twisting loads often imparted to the pavement section during pick-up of these containers. It is suggested that 7 inches of ODOT #304 stone and 8 inches of unreinforced concrete be used to construct the dumpster pad. The concrete pad should be of sufficient size to accommodate the entire truck during loading and unloading conditions.

Utility Excavations

With construction of the new building, placement of numerous underground structures will likely be required. The onsite soils classify as OSHA type B soils. Thus, temporary slopes on the order of 1H:1V or flatter should be maintained within the onsite soils. All excavation slopes should be monitored for changes due to weather conditions and water seepage. Flattening of the slopes should be performed as necessary for safety purposes.

These soils are very sensitive to moisture so, all excavation slopes should be monitored for changes due to weather conditions and water seepage. Should excessive seepage of the groundwater be encountered, flattening of the slopes should be performed as necessary for safety purposes. In addition, if any utility excavation greater than 20-feet below the existing grade is required; it must be designed by a registered engineer.

The trenches in pavement and building areas should be backfilled with a granular material compacted with a vibratory plate compactor. All trench compaction methods should be reviewed with Alt & Witzig Engineering before proceeding. Proper compaction techniques and densities should be followed as recommended in the site preparation section of this report.

The recommendations provided herein were based on our understanding of the project and the results of field and laboratory testing. If we can give further service in these matters, please contact us at your convenience.

Respectfully Submitted,
ALT & WITZIG ENGINEERING, INC.

Kyle Spoelker

Kyle Spoelker, E.I.
Project Engineer

Patrick A. Knoll, P.E.
Principal Engineer

APPENDIX

RECOMMENDED SPECIFICATIONS FOR COMPACTED FILLS AND BACKFILLS

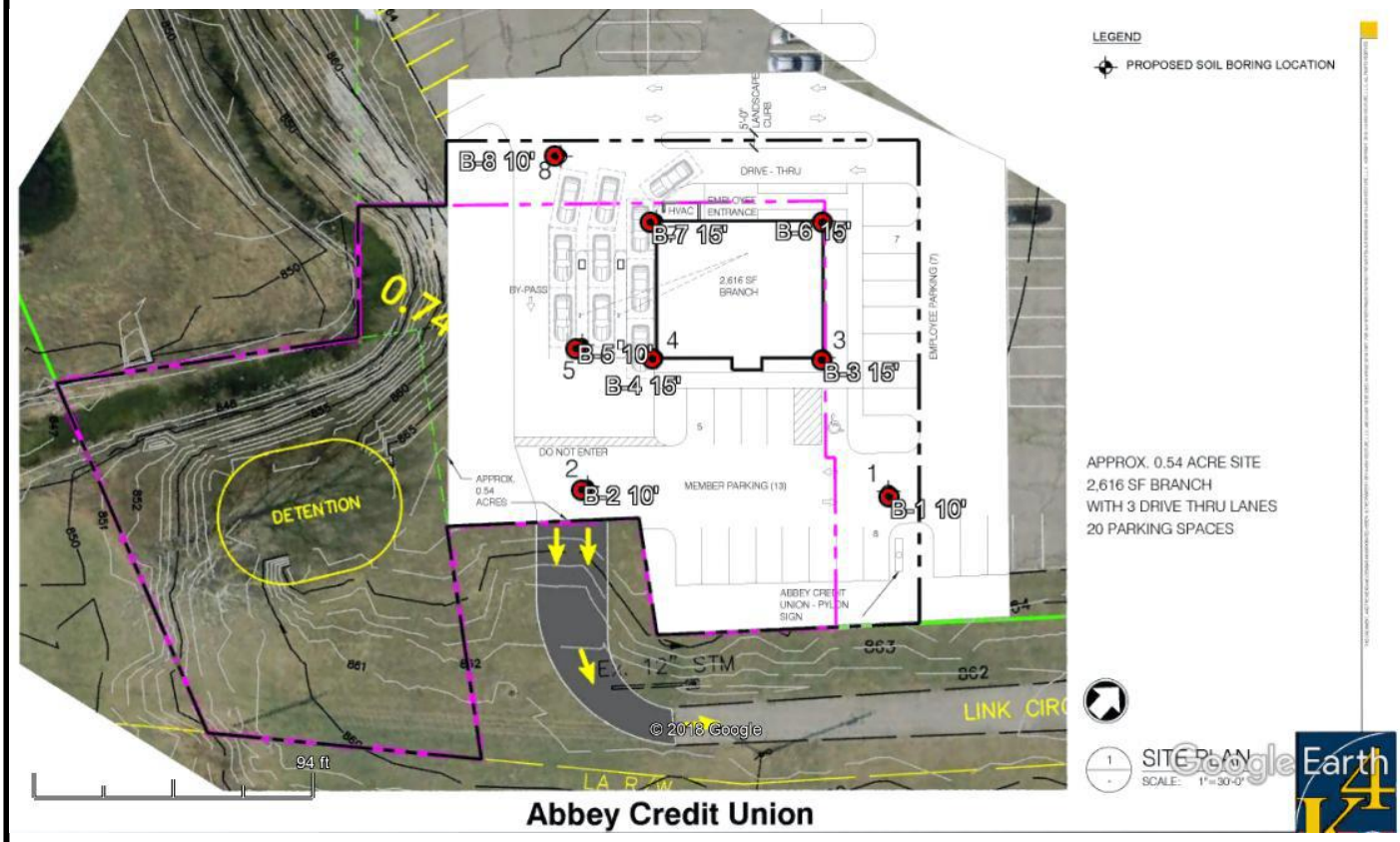
All fill shall be formed from material free of vegetable matter, rubbish, large rock, and other deleterious material. Prior to placement of fill, a sample of the proposed fill material should be submitted to the soil engineer for his approval. The fill material should be placed in layers not to exceed eight (8) inches in loose thickness and should be sprinkled with water as required to secure specified compactions. Each layer should be uniformly compacted by means of suitable equipment of the type required by the materials composing the fill. Under no circumstances should a bulldozer or similar tracked vehicles be used as compacting equipment. Material containing an excess of water so the specified compaction limits cannot be attained should be spread and dried to a moisture content that will permit proper compaction. All structural fill should be compacted to 98% of the maximum density obtained in accordance with ASTM density Test D-698. Should the results of the in-place density tests indicate that the specified compaction limits are not obtained, the areas represented by such tests should be reworked and retested as required until the specified limits are reached.

SITE LOCATION MAP

PROJECT: Abbey Credit Union
LOCATION: Troy, Ohio
CLIENT: Abbey Credit Union c/o K4 Architecture & Design
ALT & WITZIG ENGINEERING FILE No.: 19CB0009

Alt & Witzig Engineering, Inc.
1825 O'Brien Road
Columbus, Ohio 43228
TEL (614) 274-7428
www.altwitzig.com

BORING LOCATION PLAN



Abbey Credit Union

PROJECT: Abbey Credit Union
LOCATION: Troy, Ohio
CLIENT: Abbey Credit Union c/o K4 Architecture & Design
ALT & WITZIG ENGINEERING FILE No.: 19CB0009

Alt & Witzig Engineering, Inc.
1825 O'Brien Road
Columbus, Ohio 43228
TEL (614) 274-7428
www.altwitzig.com

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **K4 Architecture & Design**
PROJECT NAME **Abbey Credit Union**
PROJECT LOCATION **Troy, Ohio**

BORING # **B-1**
ALT & WITZIG FILE # **19CB0009**

DRILLING and SAMPLING INFORMATION

Date Started **3/19/19**
Date Completed **3/19/19**
Boring Method **HSA**
Driller **J. Roark**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Truck**

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
0	Asphalt (4")	0.3										
	Stone (7")	0.9										
				1	SS			28		3.3	7.8	
			5	2	SS			29		3.3	9.0	
	Brown Sandy CLAY with Trace Gravel and Limestone			3	SS			34		4.5	8.3	
			10	4	SS			15		4.0	11.4	
		11.0										
	End of Boring at 11 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **K4 Architecture & Design**
PROJECT NAME **Abbey Credit Union**
PROJECT LOCATION **Troy, Ohio**

BORING # **B-3**
ALT & WITZIG FILE # **19CB0009**

DRILLING and SAMPLING INFORMATION

Date Started **3/19/19**
Date Completed **3/19/19**
Boring Method **HSA**
Driller **J. Roark**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Truck**

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
	TOPSOIL (2")	0.2										
	SAND and GRAVEL (3")	0.4										
				1	SS			28		4.5	8.4	
			5	2	SS			21		2.5	10.8	
	Brown Sandy CLAY with Trace Gravel and Sand Seams			3	SS			33		4.5	10.4	
			10	4	SS			27		4.0	10.8	
		14.5										
	Brown CLAY with Sand Seams and Limestone		15	5	SS			51		2.0	9.3	
		16.0										
	End of Boring at 16 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **K4 Architecture & Design**
PROJECT NAME **Abbey Credit Union**
PROJECT LOCATION **Troy, Ohio**

BORING # **B-4**
ALT & WITZIG FILE # **19CB0009**

DRILLING and SAMPLING INFORMATION

Date Started **3/19/19**
Date Completed **3/19/19**
Boring Method **HSA**
Driller **J. Roark**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Truck**

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
	TOPSOIL (1")	0.1										
	Stone (6")	0.5										
				1	SS			27		4.5	8.8	
	Brown Sandy CLAY with Trace Gravel		5	2	SS			25		4.5	10.6	
				3	SS			51		4.5	9.2	
		9.5										
			10	4	SS		▽	17		2.3	11.4	
	Brown, Wet Sandy CLAY with Limestone											
		14.0										
	Brown Sandy CLAY with Trace Gravel		15	5	SS			50/5		4.0	7.0	
		16.0										
	End of Boring at 16 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *10 ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **K4 Architecture & Design**
PROJECT NAME **Abbey Credit Union**
PROJECT LOCATION **Troy, Ohio**

BORING # **B-5**
ALT & WITZIG FILE # **19CB0009**

DRILLING and SAMPLING INFORMATION

Date Started **3/19/19**
Date Completed **3/19/19**
Boring Method **HSA**
Driller **J. Roark**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Truck**

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
	TOPSOIL (1")	0.1										
	Stone (6")	0.5										
				1	SS			11		4.5	9.3	
	Brown Sandy CLAY with Trace Gravel		5	2	SS			16		4.5	9.9	
				3	SS			14		4.5	11.6	
		9.0										
	Brown, Wet Sandy CLAY		10	4	SS			9		0.3	19.4	
		11.0										
	End of Boring at 11 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **K4 Architecture & Design**
PROJECT NAME **Abbey Credit Union**
PROJECT LOCATION **Troy, Ohio**

BORING # **B-6**
ALT & WITZIG FILE # **19CB0009**

DRILLING and SAMPLING INFORMATION

Date Started **3/20/19**
Date Completed **3/20/19**
Boring Method **HSA**
Driller **J. Roark**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Truck**

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
0	Asphalt (4")	0.3										
	Stone (7")	0.9										
				1	SS			15		4.5	9.0	
			5	2	SS			24		4.5	9.4	
				3	SS			11		3.0	11.1	
	Brown Sandy CLAY with Trace Gravel and Limestone		10	4	SS			10		0.8	11.9	
			15	5	SS			29		4.5	10.0	
		16.0										
	End of Boring at 16 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **K4 Architecture & Design**
PROJECT NAME **Abbey Credit Union**
PROJECT LOCATION **Troy, Ohio**

BORING # **B-7**
ALT & WITZIG FILE # **19CB0009**

DRILLING and SAMPLING INFORMATION

Date Started **3/20/19**
Date Completed **3/20/19**
Boring Method **HSA**
Driller **J. Roark**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Truck**

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
0	Asphalt (6")	0.5										
	Stone (8")	1.1										
				1	SS			28		4.5	8.4	
	Brown Sandy CLAY with Trace Gravel		5	2	SS			24		4.5	9.5	
				3	SS			32		3.8	9.0	
		10.0	10	4	SS		○	45				
	Brown, Wet Fine to Medium SAND	12.0										
	Gray Sandy CLAY with Trace Gravel		15	5	SS			64		4.5	7.2	
		16.0										
	End of Boring at 16 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *9.5 ft.*
▽ At Completion *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **K4 Architecture & Design**
PROJECT NAME **Abbey Credit Union**
PROJECT LOCATION **Troy, Ohio**

BORING # **B-8**
ALT & WITZIG FILE # **19CB0009**

DRILLING and SAMPLING INFORMATION

Date Started **3/20/19**
Date Completed **3/20/19**
Boring Method **HSA**
Driller **J. Roark**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Truck**

TEST DATA

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics Recovery Graphics	Ground Water	Standard Penetration Test, N - blows/foot	Qu-tsf Unconfined Compressive Strength	PP-tsf Pocket Penetrometer	Moisture Content % *Dry Unit Weight (pcf)*	Remarks
0	Asphalt (5")	0.4										
	Stone (8")	1.1										
				1	SS			22		4.0	9.1	
			5	2	SS			20		4.5	10.6	
	Brown Sandy CLAY with Trace Gravel			3	SS			24		4.0	10.1	
			10	4	SS			25		3.0	9.2	
		11.0										
	End of Boring at 11 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split-spoon.

Qu: Unconfined compressive strength, TSF

Qp: Penetrometer value, unconfined compressive strength, TSF

Mc: Water content, %

LL: Liquid limit, %

PL: Plastic limit, %

Dd: Natural dry density, PCF

▼ : Apparent groundwater level at time noted after completion

DRILLING AND SAMPLING SYMBOLS

SS: Split-spoon - 1 3/8" I.D., 2" O.D., except where noted
ST: Shelby tube - 3" O.D., except where noted
AU: Auger sample
DB: Diamond bit
CB: Carbide bit
WS: Washed sample

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

TERM (NON-COHESIVE SOILS)	BLOWS PER FOOT
Very loose	0 - 4
Loose	5 - 10
Firm	11 - 30
Dense	31 - 50
Very Dense	Over 50

TERM (COHESIVE SOILS)	Qu (TSF)
Very soft	0 - 0.25
Soft	0.25 - 0.50
Medium	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.(+)	Coarse Sand	5 mm-0.6 mm	Silt	0.075 mm - 0.005 mm
Cobbles	8 in. - 3 in.	Medium Sand	0.6mm-0.2 mm	Clay	0.005mm(-)
Gravel	3 in. - 5 mm	Fine Sand	0.2mm-0.075 mm		