



May 7, 2013

CBLH Design, Inc.  
7850 Freeway Circle  
Cleveland, OH 44130

Attention: Mr. Tim Hunsicker

Reference: Subsurface Exploration  
Proposed Building Addition  
Chalmers P. Wylie VA Ambulatory Care Center  
420 N. James Road  
Columbus, Ohio  
CTL Project No. 13050029COL

Dear Mr. Hunsicker:

In accordance with your authorization to proceed, CTL Engineering, Inc. has completed the subsurface investigation at the above referenced site. Enclosed is a PDF copy of the report.

Thank you for the opportunity to be of service to you on this project. If you have any questions, please contact our office.

Respectfully Submitted,

CTL ENGINEERING, INC.

A handwritten signature in black ink that reads 'Roger Evans'. The signature is written in a cursive, flowing style.

Roger Evans, P.E.  
Project Engineer

# **SUBSURFACE EXPLORATION**

**SUBSURFACE EXPLORATION  
PROPOSED BUILDING ADDITION  
CHALMERS P. WYLIE VA AMBULATORY CARE CENTER  
420 N. JAMES RD, COLUMBUS, OHIO  
CTL PROJECT NO. 13050029COL**

**PREPARED FOR:**

**CBLH DESIGN, INC.  
7850 FREEWAY CIRCLE  
CLEVELAND, OHIO 44130**

**PREPARED BY:**

**CTL ENGINEERING, INC.  
2860 FISHER ROAD  
COLUMBUS, OHIO 43204  
(614)-276-8123-Phone  
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**May 7, 2013**



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## **I. PROJECT LOCATION AND DESCRIPTION**

The project involves the construction of an addition to the existing VA Care Center building. The proposed addition will be 5 stories above grade with no basement. According to the structural engineer, the individual column foundation loads will be about 710 kips.

Existing building construction drawings were provided to us. Based on the drawings, the existing building is supported on drilled piers (Caissons) founded below a depth of 20.0 feet.

## **II. SUBSURFACE INVESTIGATION**

Five (5) soil test borings, designated as B-1 through B-5, were drilled at the approximate locations shown on the enclosed Boring Location Plan sheet. Borings were drilled in the area of the proposed additions to depths of 25.0 to 50.0 feet.

The test borings were originally drilled to depths of 25 feet each, utilizing hollow stem augers (HSA), on March 21 and 22, 2013. On May 1, 2013 the drill rig returned to the site, and borings B-3 and B-4 were extended to depths of 50.0 feet each. Standard penetration tests were conducted in the test borings using a 140-pound hammer, falling 30 inches to drive a 2-inch O.D. split barrel sampler for 18 inches.

Soil samples obtained from the drilling operations were preserved in glass jars, visually classified in the field and laboratory, and tested for natural moisture content. Representative soil samples were tested for grain size analysis, Atterberg limits, loss on ignition and hand penetrometer.

The ground surface elevations at the test boring locations were referenced to a benchmark being the finished floor of the existing building. The elevation of this benchmark was taken as 795.0 feet from the existing building drawings provided to us.

## **III. FINDINGS**

### **A. Visual Observations**

The proposed addition area is generally grass covered. The existing grade across the site is relatively flat, gently sloping down to the east. A pond is located east of the proposed addition. At the time of drilling, no signs of surface water retention were noted across the site.



**B. Subsurface Conditions**

The borings exhibited 2 to 14 inches of topsoil at the surface. The topsoil was mixed with gravel in borings B-1, B-2, and B-3.

Below the topsoil, the borings exhibited fill and/or possible fill described as lean clay or sandy lean clay (CL) soils to depths ranging from 8.5 to 9.5 feet below grade. Brick fragments, slag and organics were encountered within the fill encountered in borings B-4 and B-5. These soils exhibited standard penetration  $N_{60}$  values ranging from 7 to 32 blows per foot (bpf), with natural moisture content values ranging from 1 to 38 percent.

Below the fill or possible fill, the test borings exhibited brown and gray sandy silt (ML), lean clay or lean clay with sand (CL) to the drilled depth of 25.0 feet in borings B-1, B-2 and B-5, and to depths of 25.0 to 26.0 feet in borings B-3 and B-4. These soils were further classified as glacial till deposits. These soils exhibited penetration  $N_{60}$  values ranging from 3 to 50 bpf, with natural moisture content values ranging from 8 to 50 percent. Cobbles were encountered within this layer in borings B-1 and B-2.

Borings B-3 and B-4 then encountered alternating layers of granular and cohesive soils, described as well graded gravel (GW), well graded sand (SW), clayey sand (SC), lean clay with gravel (CL), and sandy silty clay (CL-ML), extending downwards to the drilled depths of 50.0 feet. These soils exhibited standard penetration  $N_{60}$  values ranging from 19 to 51 bpf, with natural moisture content values ranging from 2 to 19 percent.

Groundwater and soil cave-in was measured in borings B-1 through B-5 as tabulated below.

Boring No.	Groundwater Depth (feet)		Soil Cave-In Depth (feet)
	During Drilling	At Completion	
B-1	18.5	Dry	14.5
B-2	8.5	14.0	14.5
B-3	18.5	39.2	41.8
B-4	23.5	11.8	12.9
B-5	18.5	15.0	23.0

#### IV. DISCUSSION

It is understood that the proposed building will be 5 stories above grade with no basement. According to the structural engineer, the individual column foundation loads will be about 710 kips.

Fill or possible fill materials were encountered to depths ranging from 8.5 to 9.5 below grade in the test borings. Fill soils encountered in borings B-1, B-2 and B-3 were relatively clean. Fill soils encountered in borings B-4 and B-5 had brick fragments, slag and organics. Organic content test performed on boring B-4, sample 4, from depths of 8.5 to 10.0 feet, indicated a high loss on ignition (LOI) value of 9.1 percent.

Relatively weak native soils were also encountered below the fill, to depths of up to about 20.0 feet in borings B-3, B-4 and B-5. The soils encountered in boring B-4 between depths 7.0 to 7.5 feet, exhibited a natural moisture content value of 50 percent and an LOI value of 4.0 percent. The fill soils encountered in borings B-4 and B-5 and the weak native soils encountered in borings B-4 and B-5 are not suitable to support the foundations or floor slabs.

The use of shallow foundations for this project would require mass excavation of unsuitable materials and replacement with properly compacted engineered fill. This is likely not feasible at this site. Therefore, it is recommended that the proposed structure, be supported on deep foundations, extending through the unsuitable soils into strong native soils below.

Deep foundations such as drilled piers, auger cast piles, driven piles could be considered for this project. However, it is expected that drilled piers or auger cast piles are best suited for this project. Driven piles would likely not be suitable, because of the percussion noises associated with pile driving. Therefore only recommendations for drilled piers and auger cast piles are provided in this report. Recommendations for driven piles will be provided upon request, if needed.

With deep foundations, the building floor could be constructed as a structural slab, also supported on the deep foundations. However, if the owner is willing to accept some on-going maintenance, then a three foot layer of engineered fill may be used to support the floor slab. This will require excavating all existing soils to a uniform depth of three feet below the finished subgrade, and placed new engineered fill. Prior to new fill placement, the exposed surface should be proofrolled and areas indicating excessive deflection or rutting should be treated as recommended by the site Soils engineer.

V. **ANALYSIS AND RECOMMENDATIONS**

Based upon the preceding Discussion as well as soil data obtained from the field and laboratory testing the following recommendations are provided.

A. **General Site Preparation and Earthwork**

1. Any vegetation, topsoil or organic soils encountered within the proposed building limits should be removed. Topsoil may be stockpiled for future landscaping purposes.
2. Special care should be taken when excavating near the existing structure so as not to undermine support of the existing structure
3. During earthwork operations, care should be taken to provide adequate drainage on the surface of exposed soils. Absorption of heavy rainfall, accumulations of water and heavy construction traffic may result in softening of these soils, hence, severely weakening the strength of subgrade soils.
4. Exposed surfaces should be compacted and/or proofrolled until a relatively unyielding surface is achieved. Soft or loose soils, if encountered, should be disked, dried and recompactd, or undercut and replaced with compacted engineered fill, or otherwise as directed by the Soils Engineer.
5. Some of the on-site excavated materials could be reused as engineered fill provided that they are clean and free of organic materials, and provided that proper moisture content is maintained during placement.
6. Engineered fill should be placed in layers not to exceed 8 inches in loose thickness, with each layer compacted to 100 percent of the maximum dry density as determined by ASTM D-698 standard method (AASHTO T-99), or as otherwise directed by the Soils Engineer.
7. Where new fill will be placed on existing slopes, slopes that are steeper than 8:1 Horizontal to Vertical (H:V) should be continuously benched over those areas. Benching should be of sufficient width to permit operation of placing and compacting equipment.

8. Fill placement should extend beyond the perimeter of the proposed building addition or pavement a minimum horizontal distance equal to the height of the fill or 5 feet, whichever is greater. Otherwise, the fill should be contained in a retaining wall system.
9. Groundwater/seepage is expected during site preparation or the excavation and construction of shallow foundation units. Sump pumps are considered suitable to maintain the excavations in a relatively dry condition

**B. Foundation Support**

**Drilled Piers (Caissons)**

1. The structure can be supported on drilled Piers (Caissons) extending into the underlying strong native soils, generally encountered at and below depths of about 20 to 25 feet.
2. Drilled piers, when founded at or below 25 feet, can be designed using an allowable end bearing value of 12 kips per square feet. In addition, a skin friction value of 0.75 kips per square foot could be used for the portion of the shaft extending below an embedment depth of 25 feet.
3. Existing fill, sand, gravel and groundwater were encountered in our borings. Therefore it is recommended that the drilled shaft excavations be cased during installation to prevent cave in and to provide for inspection and cleaning of the hole.
4. Cobbles and possibly boulders should be expected during drilled pier excavations.

**Auger Cast Concrete Piles**

1. Structural loads could be supported at this site onto auger cast piles extending below 25 feet. Several different pile diameters may be selected. However, for the purpose of performing a cost analysis, 18-inch diameter piles extended to a total depth of about 35 to 40 feet, could be designed using an allowable axial design load of about 40 tons per pile.

2. Sand and gravel deposits were encountered across the site. Special care would be required to assure that excess soils are not removed during drilling, causing bulging of the piles (an unexpected increase in the pile diameter) or that these soils types do not cave during auger extraction, causing necking (an unexpected decrease in the pile diameter). Pile Integrity Testing (PIT) could be performed on some or all of the auger cast piles, to help evaluate the overall integrity of the piles.
3. The piles should be installed at center to center spacing no closer than 3 times the pile diameter. Pile load tests could be performed on selected auger cast piles to verify the load capacity. The Soils Engineer and Structural Engineer should determine the number and location of any pile load tests, once the plans have been prepared.

## **VI. CHANGED CONDITIONS**

The evaluations, conclusions, and recommendations in this report are based on our interpretation of the field and laboratory data obtained during the exploration, our understanding of the project and our experience with similar sites and subsurface conditions using generally accepted geotechnical engineering practices. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates drilled, they are not necessarily representative of the subsurface conditions between boring locations or subsurface conditions during other seasons of the year.

In the event that changes in the project are proposed, additional information becomes available, or if it is apparent that subsurface conditions are different from those provided in this report, CTL Engineering should be notified so that our recommendations can be modified, if required.

## **VII. TESTING AND OBSERVATION**

During the design process, it is recommended that CTL Engineering work with the project designers to confirm that the geotechnical recommendations are properly incorporated into the final plans and specifications, and to assist with establishing criteria for the construction observation and testing.



CTL Engineering is not responsible for independent conclusions, opinions and recommendations made by others based on the data and recommendations provided in this report. It is recommended that CTL be retained to provide construction quality control services on this project. If CTL Engineering is not retained for these services, CTL shall assume no responsibility for compliance with the design concepts or recommendations provided.

### VIII. CLOSING

This report has been prepared for the exclusive use by the client for use only on this project. Our services have been performed in accordance with generally accepted Geotechnical Engineering principles and practices. No warranty is either expressed or implied.

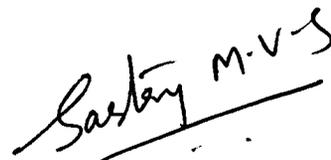
This report addresses only the geotechnical aspects of this project and does not include any environmental issues.

Specific design and construction recommendations have been provided in this report. Therefore, the report should be used in its entirety.

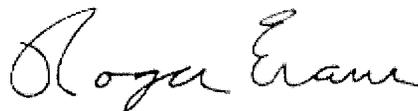
Soil samples will be retained in our laboratory for a period of 60 days, after which they will be discarded unless instructions are received from you as to their disposal.

Respectfully Submitted,

**CTL ENGINEERING, INC.**



Sastry Malladi  
Staff Engineer



Roger Evans, P.E.  
Project Engineer



**APPENDIX A**  
**TEST BORING RECORDS**



## SOIL DESCRIPTION

Descriptors for soil consistency used in this report are based upon the Standard Penetration Test (SPT), ASTM D 1587, with the penetration (N) values corrected to  $N_{60}$ , based upon the efficiency of the SPT Hammer used for the soil sampling.

Descriptors for both non-cohesive and cohesive soils are presented below, with the corresponding range of corrected penetration values.

<u>NON-COHESIVE SOIL DESCRIPTION</u>	<u>CORRECTED PENETRATION VALUES BLOWS PER FOOT (BPF)</u>
Very Loose.....	0 – 4
Loose.....	5 – 10
Medium Dense.....	11- 30
Dense.....	31 – 50
Very Dense.....	Over 50

<u>COHESIVE SOIL DESCRIPTION</u>	<u>CORRECTED PENETRATION VALUES BLOWS PER FOOT (BPF)</u>
Very Soft.....	0 – 1
Soft.....	2 – 4
Medium Stiff.....	5 – 8
Stiff.....	9 – 15
Very Stiff.....	16 – 30
Hard.....	Over 30

Moisture term descriptors for both non-cohesive and cohesive soils are presented below.

<u>NON-COHESIVE SOIL DESCRIPTION</u>	<u>MOISTURE TERMS</u>	<u>COHESIVE SOIL DESCRIPTION</u>
Powdery.....	Dry.....	Powdery
Some Moisture.....	Damp.....	Below Plastic Limit
Damp to the Touch.....	Moist.....	Above Plastic, Below Liquid Limit
Free Water.....	Wet.....	Above Liquid Limit



# TEST BORING RECORD

**CLIENT** : CBLH Design, Inc.  
**PROJECT** : Chalmers P. Wylie VA Ambulatory Care Center  
**LOCATION** : 420 N. James Road, Franklin Co., Ohio  
**PROJECT NO.** : 13050029COL

**BORING NO.:** **B-1**  
**SHEET** 1 OF 2  
**DATE STARTED** : 03-22-13  
**DATE COMPLETED** : 03-22-13

<b>BORING ELEVATION</b> : 794.8 Feet <b>STATION</b> : <b>OFFSET</b> : <b>DEPTH</b> : 25.0 Feet <b>BORING METHOD:</b> HSA	<b>RIG TYPE</b> : CME 55 <b>CASING DIA.</b> : 3.25" <b>CORE SIZE</b> : <b>HAMMER</b> : Auto <b>ENERGY RATIO</b> : 81.2	<b>DRILLER</b> : BK <b>TEMPERATURE</b> : 30° <b>WEATHER</b> : Sunny
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**GROUNDWATER:** Encountered at 18.5'  Caved in at 14.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
793.6		TOPSOIL AND GRAVEL (14")	1.2											
		Stiff, Dark Brown <b>SANDY LEAN CLAY (CL)</b> , Moist (FILL)		SS-1	4									
					5	15	28	17			5.0*			
					6									
789.8	5	Stiff, Gray <b>LEAN CLAY With SAND(CL)</b> , Damp (FILL)	5.0	SS-2	3									
					5	15	100	20			5.0*			
					6									
786.3		Stiff, Gray <b>SANDY LEAN CLAY (CL)</b> , Damp (TILL)	8.5	SS-3	5									
					7	20	100	15			7.0*			
					8									
781.3	10	Stiff, Gray <b>SANDY LEAN CLAY (CL)</b> , Damp (TILL)		SS-4	2									
					3	15	100	13			5.0*			
					8									
	15	Very Stiff to Hard, Gray <b>SANDY SILT (ML)</b> , with Cobbles, Moist (TILL)	13.5	SS-5	9									
					11	35	100	10			1.0*			
					15									
	20			SS-6	16									
					13	50	100	8			2.0*			
					24									

*Continued on next page*

TEST BORING/PIIT RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

# TEST BORING RECORD

CLIENT : CBLH Design, Inc.  
 PROJECT : Chalmers P. Wylie VA Ambulatory Care Center

BORING NO.: **B-1**  
 SHEET 2 OF 2

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS		
											LL	PL	PI
769.8	25	Very Stiff to Hard, Gray <b>SANDY SILT (ML)</b> , with Cobbles, Moist <b>(TILL)</b>	25.0	SS-7	12 15 17	43	100	11		3.0*			
		<b>BOTTOM OF BORING</b>											

TEST BORING/PIT RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13



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WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

# TEST BORING RECORD

CLIENT : CBLH Design, Inc.  
 PROJECT : Chalmers P. Wylie VA Ambulatory Care Center  
 LOCATION : 420 N. James Road, Franklin Co., Ohio  
 PROJECT NO. : 13050029COL

BORING NO.: **B-2**  
 SHEET 1 OF 2  
 DATE STARTED : 03-22-13  
 DATE COMPLETED : 03-22-13

BORING ELEVATION : 795.0 Feet	RIG TYPE : CME 55	DRILLER : BK
STATION :	CASING DIA. : 3.25"	TEMPERATURE : 30°
OFFSET :	CORE SIZE :	WEATHER : Sunny
DEPTH : 25.0 Feet	HAMMER : Auto	
BORING METHOD: HSA	ENERGY RATIO : 81.2	

GROUNDWATER: ▼ Encountered at 8.5'    ▼ At completion 14.0'    ☒ Caved in at 14.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
794.2		TOPSOIL AND GRAVEL (10")	0.8											
	5	Very Stiff, Dark Brown and Black <b>SANDY LEAN CLAY (CL)</b> , Moist (FILL)		SS-1	4 7 7	19	100	18		6.0*				
				SS-2	7 8 9	23	100	28		4.0*				
				SS-3	4 6 7	18	100	26		5.0*				
786.5	10	Stiff, Brown <b>LEAN CLAY with SAND (CL)</b> , Moist (TILL)	8.5	SS-4	4 5 5	14	100	11		5.0*				
					SS-5	3 4 5	12	100	14		1.0*			
781.5	15	Stiff to Very Stiff, Gray <b>SANDY SILT (ML)</b> , with Cobbles, Moist	13.5											
					SS-6	7 9 13	30	100	11		2.0*			
	20													

*Continued on next page*



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TEST BORING/PIIT RECORD 13050029COL.GPJ\_CTL\_CORPORATE.GDT 5/3/13

# TEST BORING RECORD

CLIENT : CBLH Design, Inc.  
 PROJECT : Chalmers P. Wylie VA Ambulatory Care Center

BORING NO.: **B-2**  
 SHEET 2 OF 2

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS		
											LL	PL	PI
770.0	25	Stiff to Very Stiff, Gray <b>SANDY SILT (ML)</b> , with Cobbles, Moist	25.0	SS-7	15 15 12	37	100	9		5.0*			
		<b>BOTTOM OF BORING</b>											

TEST BORING/PIT RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13

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SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

# TEST BORING RECORD

CLIENT : CBLH Design, Inc.  
 PROJECT : Chalmers P. Wylie VA Ambulatory Care Center  
 LOCATION : 420 N. James Road, Franklin Co., Ohio  
 PROJECT NO. : 13050029COL

BORING NO.: **B-3**  
 SHEET 1 OF 3  
 DATE STARTED : 03-22-13  
 DATE COMPLETED : 05-01-13

BORING ELEVATION : 794.9 Feet	RIG TYPE : CME 55	DRILLER : BK
STATION :	CASING DIA. : 3.25"	TEMPERATURE : 40°
OFFSET :	CORE SIZE :	WEATHER : Sunny
DEPTH : 25.0 Feet	HAMMER : Auto	
BORING METHOD: HSA	ENERGY RATIO : 81.2	

GROUNDWATER: Encountered at 18.5'  Caved in at 15.5'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
793.9		TOPSOIL AND GRAVEL (12")	1.0											
				SS-1	4 4 5	12	100	15		3.0*				
	5	Stiff to Medium Stiff, Brown and Gray LEAN CLAY (CL), Moist (FILL)		SS-2	8 7 9	22	100	24		3.0*				
				SS-3	3 3 3	8	100	13		2.5*				
				ST-1							47	25	22	
785.4	10		9.5	SS-4	1 1 1	3	100	35						
				SS-5	1 1 1	3	100	15						
	15	Very Soft to Stiff, Gray LEAN CLAY (CL), Moist (TILL)		SS-6	3 2 4	8	100	12		4.0*				

*Continued on next page*

2860 Fisher Road Columbus, Ohio 43204 Telephone: 614-276-8123 Fax: 614-276-6377 Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a>	<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;">BORING METHOD</th> <th style="text-align: left;">SAMPLING METHOD</th> <th style="text-align: left;">ABBREVIATIONS</th> </tr> <tr> <td>HSA - Hollow Stem Auger</td> <td>SS - Split Spoon Sample</td> <td>* - Hand Penetrometer</td> </tr> <tr> <td>SFA - Solid Flight Auger</td> <td>ST - Shelby Tube Sample</td> <td>LL - Liquid Limit</td> </tr> <tr> <td>RC - Rock Coring</td> <td>CR - Rock Core Sample</td> <td>PL - Plastic Limit</td> </tr> <tr> <td>MD - Mud Drilling</td> <td>BS - Bag Sample</td> <td>PI - Plasticity Index</td> </tr> <tr> <td>WD - Wash Drilling</td> <td></td> <td>SPT - Standard Penetration Test</td> </tr> <tr> <td>HA - Hand Auger</td> <td></td> <td>N<sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER</td> </tr> </table>	BORING METHOD	SAMPLING METHOD	ABBREVIATIONS	HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer	SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit	RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit	MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index	WD - Wash Drilling		SPT - Standard Penetration Test	HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER	
BORING METHOD	SAMPLING METHOD	ABBREVIATIONS																					
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TEST BORING/PIT RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13

# TEST BORING RECORD

CLIENT : CBLH Design, Inc.  
 PROJECT : Chalmers P. Wylie VA Ambulatory Care Center

BORING NO.: **B-3**  
 SHEET 2 OF 3

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
769.9	25	Very Soft to Stiff, Gray <b>LEAN CLAY (CL)</b> , Moist (TILL)	25.0	SS-7	3 6 9	20	100	9		7.0*				
				SS-8A	4	31	28	16						
				SS-8B	15				14					
	30	Dense to Medium Dense, Gray <b>CLAYEY SAND(SC)</b> , with Cobbles, Moist		SS-9	4 6 9	20	0							
761.4	35		Very Stiff, Gray <b>SANDY SILTY CLAY (CL-ML)</b> , Damp (TILL)	33.5	SS-10	2 6 8	19	11	11		3.0*			
756.4	40	Medium Dense to Dense <b>WELL GRADED GRAVEL (GW)</b> , Wet to Moist	38.5	SS-11	4 7 7	19	17	19						
	45				SS-12	10 14 19	45	11	16					

*Continued on next page*

TEST BORING/PIT RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13



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 Columbus, Ohio 43204  
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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

# TEST BORING RECORD

CLIENT : CBLH Design, Inc.  
 PROJECT : Chalmers P. Wylie VA Ambulatory Care Center

BORING NO.: **B-3**  
 SHEET 3 OF 3

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
744.9	50	Medium Dense to Dense <b>WELL GRADED GRAVEL (GW)</b> , Wet to Moist	50.0	SS-13	14 18	43	44	14						
		<b>BOTTOM OF BORING</b>												
	55													
	60													
	65													
	70													

TEST BORING/PIT RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13



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WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

# TEST BORING RECORD

**CLIENT** : CBLH Design, Inc.  
**PROJECT** : Chalmers P. Wylie VA Ambulatory Care Center  
**LOCATION** : 420 N. James Road, Franklin Co., Ohio  
**PROJECT NO.** : 13050029COL

**BORING NO.:** **B-4**  
**SHEET** 1 OF 3  
**DATE STARTED** : 03-21-13  
**DATE COMPLETED** : 05-01-13

<b>BORING ELEVATION</b> : 794.3 Feet <b>STATION</b> : <b>OFFSET</b> : <b>DEPTH</b> : 25.0 Feet <b>BORING METHOD:</b> HSA	<b>RIG TYPE</b> : CME 55 <b>CASING DIA.</b> : 3.25" <b>CORE SIZE</b> : <b>HAMMER</b> : Auto <b>ENERGY RATIO</b> : 81.2	<b>DRILLER</b> : BK <b>TEMPERATURE</b> : 30° <b>WEATHER</b> : Cloudy
--	--	--

**GROUNDWATER:** ▼ Encountered at 23.5' : ▽ At completion 11.0' ☒ Caved in at 18.3'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
793.7		(TOPSOIL) (7")	0.6											
	5	Stiff to Very Stiff, Brown LEAN CLAY with SAND (CL), Damp (FILL)		SS-1	5 6 5	15	100	16		8.0*				
				SS-2	4 5 8	18								
788.3		Medium Stiff, Black LEAN CLAY (CL), with Organics, Moist (FILL)	6.0											
787.3		Stiff to Soft, Gray LEAN CLAY (CL), Moist		SS-3A	2	9	100	38		2.0*				
				SS-3B	3 4				50	2.0*				
	10			SS-4	1 1 1	3	100	26			36	20	16	
780.8		Medum Stiff, Gray LEAN CLAY With SAND (CL), Damp (TILL)	13.5											
	15			SS-5	1 2 2	5	100	15		3.0*				
	20			SS-6	1 2 4	8	100	15		3.0*				

*Continued on next page*

TEST BORING/PIT RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13



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 Columbus, Ohio 43204  
 Telephone: 614-276-8123  
 Fax: 614-276-6377  
 Email: [ctl@ctleng.com](mailto:ctl@ctleng.com)

BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

# TEST BORING RECORD

CLIENT : CBLH Design, Inc.  
 PROJECT : Chalmers P. Wylie VA Ambulatory Care Center

BORING NO.: **B-4**  
 SHEET 2 OF 3

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
769.3	25	Medum Stiff, Gray <b>LEAN CLAY With SAND (CL)</b> , Damp ( <b>TILL</b> )	25.0	SS-7	5 15 16	42	100	12						
				SS-8	9 10 11	28	22	11						
	30	Dense to Very Dense <b>WELL GRADED GRAVEL (GW)</b> , Wet to Moist		SS-9	8 20 18	51	50	2						
760.8			33.5	SS-10	4 8 12	27	67	11		4.5*				
	35	Very Stiff, Gray <b>LEAN CLAY with GRAVEL (CL)</b> , Moist ( <b>TILL</b> )												
755.3			39.0	SS-11A	4	30	67	13		2.5*				
	40			SS-11B	10 12			19						
	45	Medium Dense to Dense, Gray <b>WELL GRADED SAND (SW)</b> , Wet		SS-12	16 17 14	42	67	8						

*Continued on next page*

TEST BORING/PIT RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13

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WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

# TEST BORING RECORD

CLIENT : CBLH Design, Inc.  
 PROJECT : Chalmers P. Wylie VA Ambulatory Care Center

BORING NO.: **B-4**  
 SHEET 3 OF 3

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
745.8		Medium Dense to Dense, Gray <b>WELL GRADED SAND (SW)</b> , Wet	48.5											
744.3	50	Very Stiff <b>LEAN CLAY with GRAVEL (CL)</b> , Moist ( <b>TILL</b> )	50.0	SS-13	4 8 10	24	78	15		2.0*				
		<b>BOTTOM OF BORING</b>												
	55													
	60													
	65													
	70													

TEST BORING/PI RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/23/13

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 2860 Fisher Road  
 Columbus, Ohio 43204  
 Telephone: 614-276-8123  
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 Email: [ctl@ctleng.com](mailto:ctl@ctleng.com)

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HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
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# TEST BORING RECORD

**CLIENT** : CBLH Design, Inc.  
**PROJECT** : Chalmers P. Wylie VA Ambulatory Care Center  
**LOCATION** : 420 N. James Road, Franklin Co., Ohio  
**PROJECT NO.** : 13050029COL

**BORING NO.:** **B-5**  
**SHEET** 1 OF 2  
**DATE STARTED** : 03-21-13  
**DATE COMPLETED** : 03-21-13

<b>BORING ELEVATION</b> : 794.4 Feet <b>STATION</b> : <b>OFFSET</b> : <b>DEPTH</b> : 25.0 Feet <b>BORING METHOD:</b> HSA	<b>RIG TYPE</b> : CME 55 <b>CASING DIA.</b> : 3.25" <b>CORE SIZE</b> : <b>HAMMER</b> : Auto <b>ENERGY RATIO</b> : 81.2	<b>DRILLER</b> : BK <b>TEMPERATURE</b> : 30° <b>WEATHER</b> : Windy
--	--	---

**GROUNDWATER:** ▼ Encountered at 18.5'    ▼ At completion 15.0'    ☒ Caved in at 23.0'

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS			
											LL	PL	PI	
794.2		TOPSOIL (2")	0.2											
	5	Stiff, Brown LEAN CLAY (CL), with Brick fragments, Cinders and Slag, Damp (FILL)		SS-1	4 6 7	18	100	19		9.0*				
				SS-2	54 17 7	32	6	1						
788.4				SS-3	3 2 3	7	100	25		2.0*				
		Medium Stiff, Gray LEAN CLAY (CL), Moist (POSSIBLE FILL)	6.0											
785.9				SS-4	1 2 3	7	100	20		2.0*				
	10			SS-5	2 3 4	9	100	16		5.0*				
	15		Medium Stiff to Very Stiff, Gray LEAN CLAY with SAND (CL), with Shale fragments, (TILL)	8.5										
	20			SS-6	2 2 4	8	100	15		9.0*				

Continued on next page

 <p>                 2860 Fisher Road                  Columbus, Ohio 43204                  Telephone: 614-276-8123                  Fax: 614-276-6377                  Email: <a href="mailto:ctl@ctleng.com">ctl@ctleng.com</a> </p>	<table border="0"> <tr> <th style="text-align: left;">BORING METHOD</th> <th style="text-align: left;">SAMPLING METHOD</th> <th style="text-align: left;">ABBREVIATIONS</th> </tr> <tr> <td>HSA - Hollow Stem Auger</td> <td>SS - Split Spoon Sample</td> <td>* - Hand Penetrometer</td> </tr> <tr> <td>SFA - Solid Flight Auger</td> <td>ST - Shelby Tube Sample</td> <td>LL - Liquid Limit</td> </tr> <tr> <td>RC - Rock Coring</td> <td>CR - Rock Core Sample</td> <td>PL - Plastic Limit</td> </tr> <tr> <td>MD - Mud Drilling</td> <td>BS - Bag Sample</td> <td>PI - Plasticity Index</td> </tr> <tr> <td>WD - Wash Drilling</td> <td></td> <td>SPT - Standard Penetration Test</td> </tr> <tr> <td>HA - Hand Auger</td> <td></td> <td>N<sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER</td> </tr> </table>	BORING METHOD	SAMPLING METHOD	ABBREVIATIONS	HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer	SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit	RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit	MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index	WD - Wash Drilling		SPT - Standard Penetration Test	HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER	
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TEST BORING/PIT RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13

# TEST BORING RECORD

CLIENT : CBLH Design, Inc.  
 PROJECT : Chalmers P. Wylie VA Ambulatory Care Center

BORING NO.: **B-5**  
 SHEET 2 OF 2

STRATUM ELEVATION	SAMPLE DEPTH	SOIL/MATERIAL DESCRIPTION	STRATUM DEPTH	SAMPLE NUMBER	SPT per 6"	N <sub>60</sub>	RECOVERY (%)	MOISTURE CONTENT	TOTAL UNIT WEIGHT pcf	UNCONF. COMP., ksf	ATTERBERG LIMITS		
											LL	PL	PI
769.4	25	Medium Stiff to Very Stiff, Gray <b>LEAN CLAY with SAND (CL)</b> , with Shale fragments, (TILL)	25.0	SS-7	5 6 8	19	100	12		9.0*			
		<b>BOTTOM OF BORING</b>											

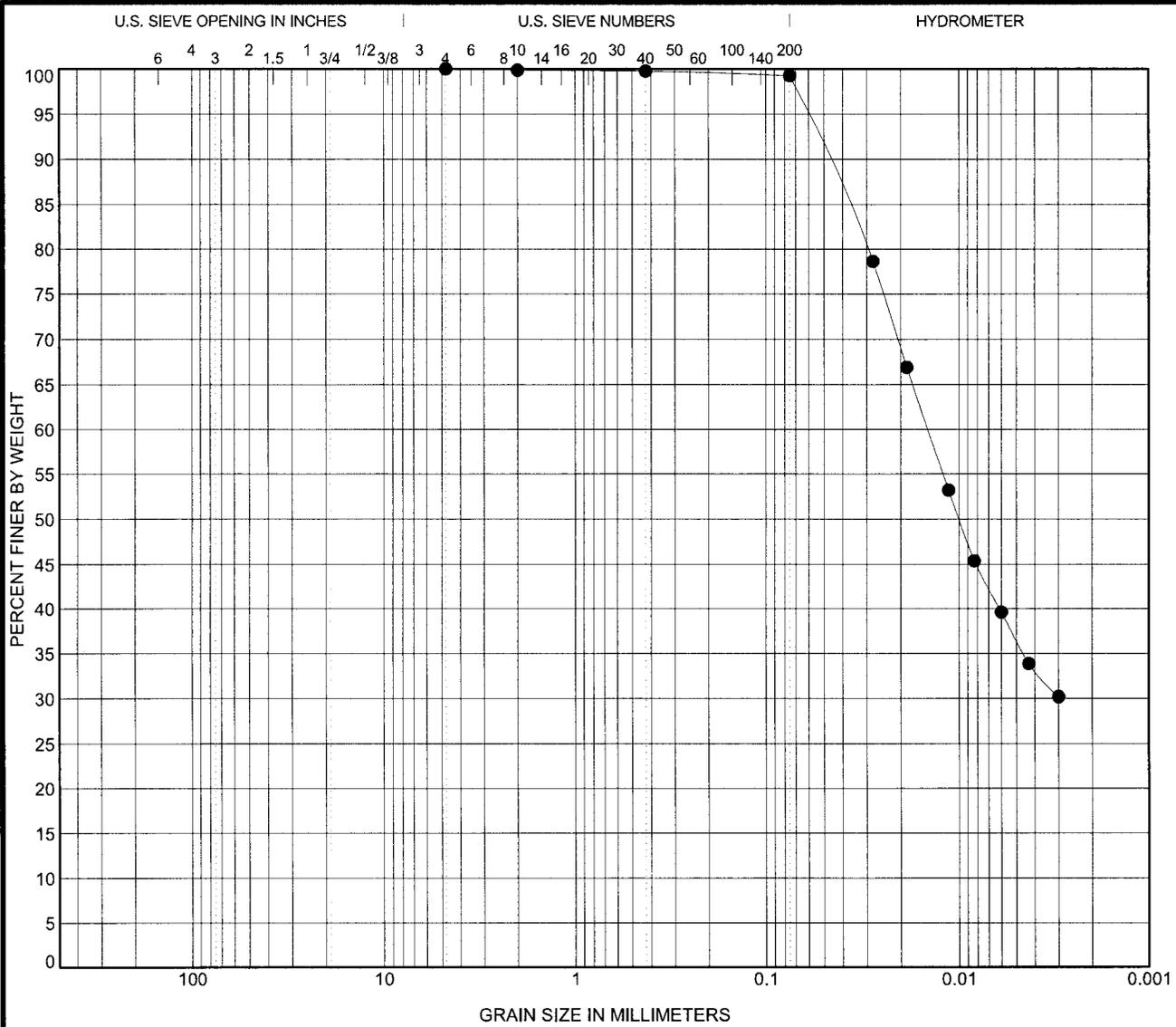
TEST BORING/PIT RECORD 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13



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WD - Wash Drilling		SPT - Standard Penetration Test
HA - Hand Auger		N <sub>60</sub> - Standard Penetration Normalized to 60% Drill Rod ER

**APPENDIX B**  
**LAB TEST RESULTS**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Sample	Depth	Classification	%MC	LL	PL	PI	Cc	Cu
● B-3	ST-1	7.5	LEAN CLAY(CL)		47	25	22		

Boring No.	Sample	Depth	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-3	ST-1	7.5	4.75	0.014	0.01			0	1	63	36

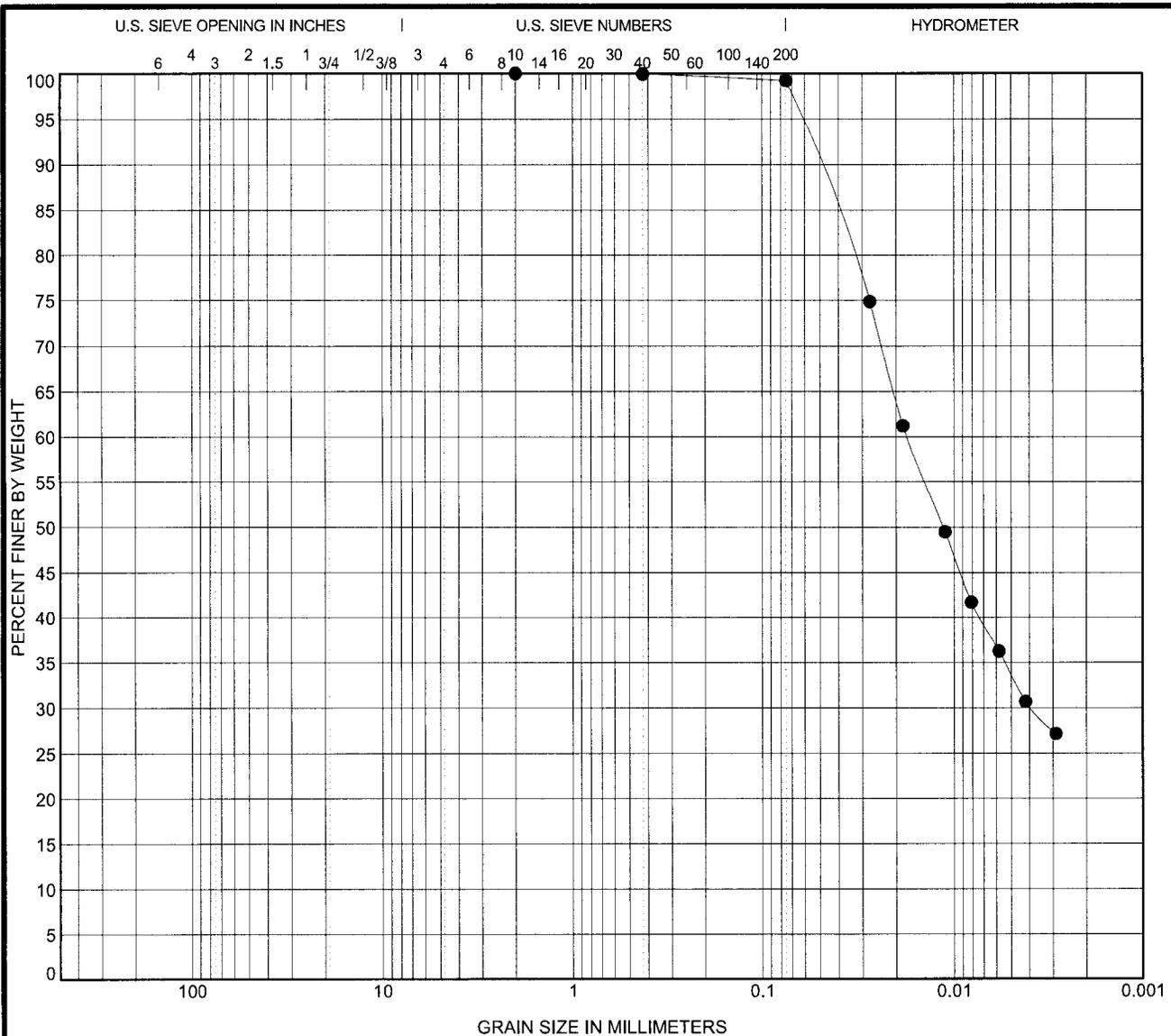
**GRAIN SIZE DISTRIBUTION**



CTL Engineering  
 2860 Fisher Rd.  
 Columbus, Ohio 43204  
 Telephone: 614-276-8123  
 Fax: 614-276-8123

Project: Chalmers P. Wylie VA Ambulatory Care Center  
 Location: 420 N. James Road, Franklin Co., Ohio  
 CTL Project Number: 13050029COL

USCS 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Sample	Depth	Classification	%MC	LL	PL	PI	Cc	Cu
● B-4	SS-4	8.5	LEAN CLAY(CL)	26	36	20	16		

Boring No.	Sample	Depth	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-4	SS-4	8.5	2	0.017	0.011	0.004		0	1	65	34



CTL Engineering  
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### GRAIN SIZE DISTRIBUTION

Project: Chalmers P. Wylie VA Ambulatory Care Center  
 Location: 420 N. James Road, Franklin Co., Ohio  
 CTL Project Number: 13050029COL

USCS 13050029COL.GPJ CTL CORPORATE.GDT 5/3/13

**CTL Engineering, Inc.**  
**Organic Content in Soils by Loss of Ignition**  
**ASTM D 2974**

Client: CBLH Design  
Location:  
Project No.: 13050029COL  
Date: 04/10/13

Tech: JD  
Reviewed by: JG

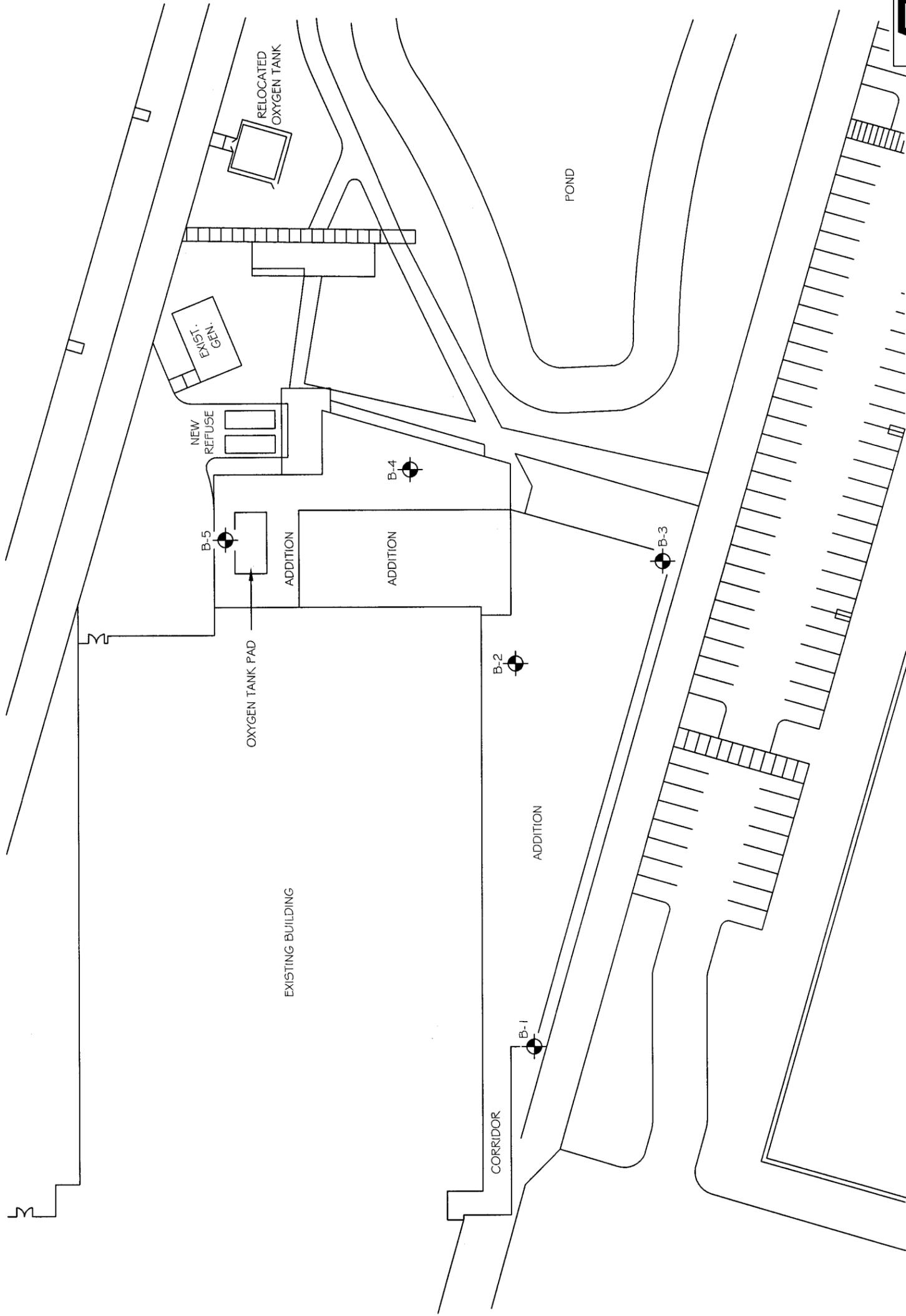
Boring No.	Sample No.	Loss on Ignition (%)
B-4	SS-3	9.1
B-4	SS-4	4.0

Calculations based on Dry Weight

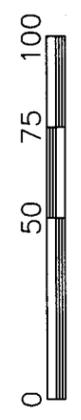


**APPENDIX C**  
**BORING LOCATION PLAN/SOIL PROFILE SHEETS**





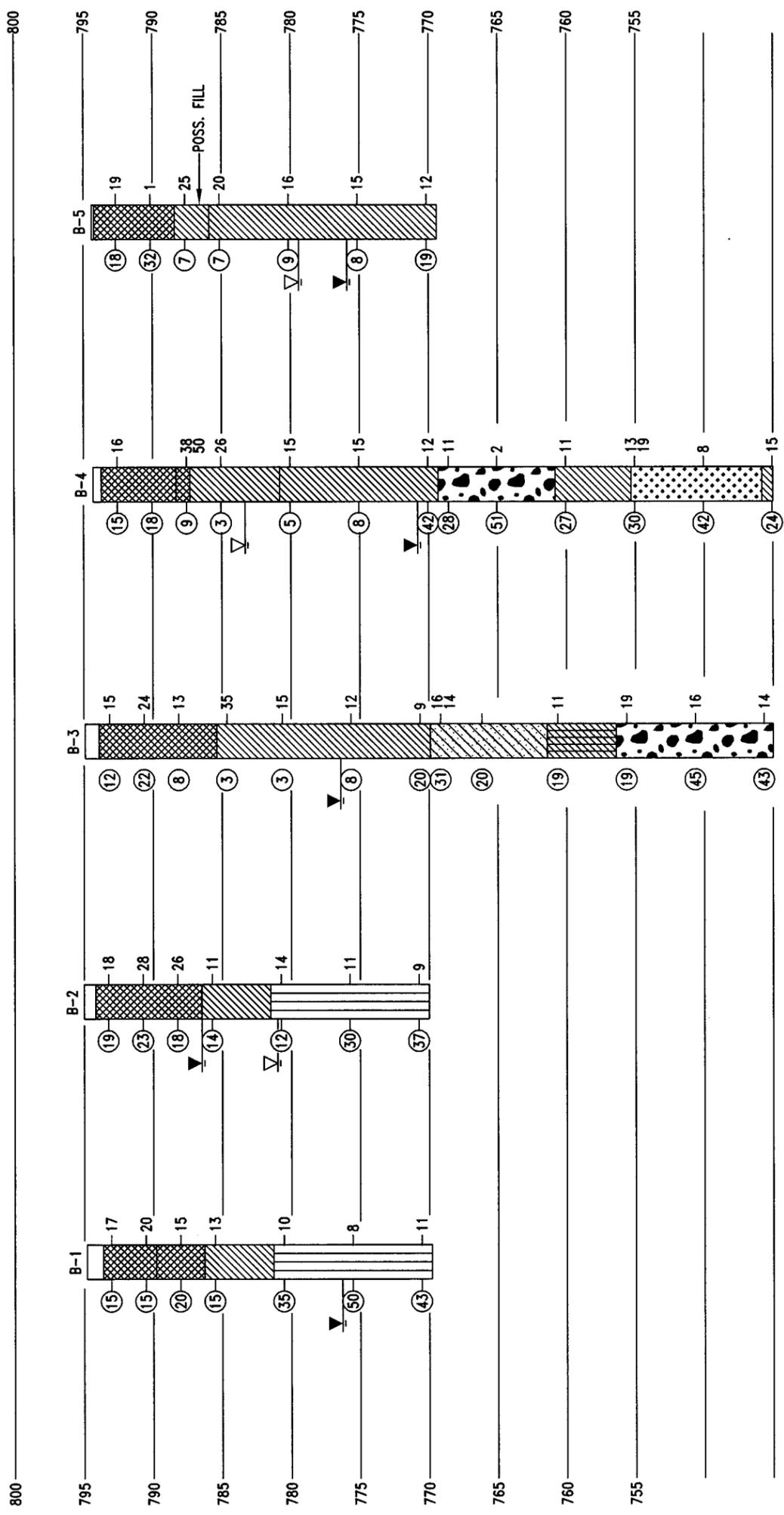
B-1  
 APPROXIMATE BORING LOCATION



CTL ENGINEERING INC.  
 CONSULTING ENGINEERS  
 TESTING \* INSPECTION  
 LABORATORY SERVICES

BORING LOCATION PLAN

DATE	04-08-13	DESIGN, INC.	PROJECT NO.
SCALE	AS SHOWN	CHALMERS P. WYLIE VA AMBULATORY-CARE CENTER	1 3050029COL
DRAWN BY	B.R.U.	420 N. JAMES ROAD, COLUMBUS, OHIO	
REVIEWED BY	SM	PAGE	1 OF 2



LEGEND

	TOPSOIL		CL
	ASPHALT		CL-ML
	CONCRETE		CH
	BASE COURSE		SW-SM
	FILL		SW-SC
	GW		SP-SM
			SC-SM
			SP-SC
			ML
			GC-GM
			GP-GC
			SW
			SP
			SM
			SC
			GW-GM
			GW-GC
			GP-GM

GROUND WATER AT "N" HOURS AFTER COMPLETION — W PERCENT (w)  
 GROUND WATER DURING DRILLING  
 GROUND WATER AT COMPLETION OF DRILLING  
 STANDARD PENETRATION RESISTANCE NORMALIZED TO

CTL ENGINEERING INC.  
 CONSULTING ENGINEERS  
 TESTING \* INSPECTION  
 LABORATORY SERVICES

SOIL PROFILE

DATE: 04-08-13  
SCALE: AS SHOWN

CHLH DESIGN, INC.  
 BUILDING ADDITION  
 CHALMERS F. WYLLIE VA AMBULATORY-  
 CARE CENTER  
 420 N. JAMES ROAD, COLUMBUS, OH

DRAWN BY: B.R.U.

REVIEWED BY: SM

PAGE: 2 OF 2

PROJECT NO.: 13050029COL