PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **101** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **9.0 '**

▽ AT END OF BORING **9.0 '**

▼ 24 HOURS

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Dark brown clayey TOPSOIL (OL)
	1	SS	10	28.0	1.25*		1.0		Tough brown silty CLAY, some sand, very moist (CL/CH)
	2	SS	11	14.7	3.25*		3.0		Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
	3	SS	12	14.8	2.5*				
	A			13.5	1.5*		8.0		Tough gray silty CLAY, some sand, trace gravel, occasional sand seams, very moist (CL)
	4	SS	17				9.0		Firm gray SAND, trace gravel, trace clay, wet (SP)
	B			16.6					End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 3/6/09

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **102** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Dark brown clayey TOPSOIL (OL)
							1.0		
1	SS		6	16.0	1.5*				Tough brown silty CLAY, little to some sand and gravel, moist (CL)
2	SS		6	15.6	1.5*				
3	SS		7	16.0	1.5*				
4	SS		15	14.3	1.75*				
							10		End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **103** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.5'**

▽ AT END OF BORING **8.5'**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Black clayey TOPSOIL, very moist (OL)
A				26.1					
1	SS		8				1.5		Tough dark brown silty CLAY, little sand, trace gravel, very moist (CL)
B				24.9	1.0*				
							3.0		
2	SS		9	17.3	2.0*				Very tough to tough brown silty CLAY, little to some sand and gravel, moist (CL)
3	SS		9	15.4	1.5*				
							8.0		▼ Tough brown silty CLAY, some sand, trace gravel, occasional sand seams, moist (CL)
4	SS		9	14.1	1.5*				
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 3/6/09

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **104** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **18" Standing Water/Ice**

▽ AT END OF BORING **18" Standing Water/Ice**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Black clayey Topsoil/Muck
1	SS		WOH	117	<0.25*		1.2		Very soft ORGANIC CLAY, very moist (OH)
2	SS		2	19.2	<0.25*		3.0		Very soft gray very silty CLAY, trace to little sand, very moist (CL)
3	SS		WOH	26.4	<0.25*				
4	SS		WOH	22.9	<0.25*				
5	SS		12	23.8	3.0*		10.5		Very tough gray silty CLAY, trace sand, occasional gravel, moist (CL)
									End of Boring at 12.5'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

WOH = Weight of Hammer

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 3/6/09

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **105** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **8.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Dark brown clayey TOPSOIL (OL)
							1.1		
1	SS		6	16.0	1.0*				Tough brown silty CLAY, some sand, trace organic, very moist (CL)
							3.0		
2	SS		8	16.7	1.5*				Tough brown silty CLAY, little to some sand and gravel, moist (CL)
3	SS		8	16.5	1.5*				
							8.0		▼ Firm brown fine SAND, wet (SP)
A				32.2					
4	SS		13				9.0		Firm gray sandy SILT, trace gravel, very moist (ML)
B				14.5					

End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 3/6/09

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **106** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Dark brown clayey TOPSOIL (OL)
							0.6		
1	SS		12	14.1	4.5+*				Hard brown silty CLAY, little sand, trace gravel, moist (CL)
							3.0		
2	SS		10	15.0					Firm brown medium to fine SAND and GRAVEL, trace clay, moist (SP/GP)
							5.5		
3	SS		14	13.1	4.0*				Very tough to hard brown silty CLAY, little sand, trace gravel, moist (CL)
							8.0		
4	SS		10	10.6	2.0*				Very tough gray silty CLAY, some sand, trace gravel, moist (CL)
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **107** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS _____

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS		9	68.2			2.5		Black clayey TOPSOIL, very moist (OH)
2	SS		7	17.1	1.5*				Tough brown silty CLAY, some sand, trace gravel, occasional sand seams, moist (CL)
3	SS		10	15.3	1.75*		8.0		
4	SS		20	19.5	4.5+*				Hard brown silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0, 5, 10, 15, 20, 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 3/6/09

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **108** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS _____

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS		4	24.4			2.5		Dark brown clayey TOPSOIL, little sand, little to some shells, very moist (OL)
2	SS		6	22.9	1.5		5.5		Tough brown silty CLAY, little sand, trace organic, moist (CL)
3	SS		9	17.6	1.75*		8.0		Tough brown silty CLAY, little sand, trace gravel, moist (CL)
4	SS		11	15.9	2.75*				Very tough brown silty CLAY, little sand and gravel, little silt seams, moist (CL)

End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 3/6/09

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **109** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS _____

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Black clayey TOPSOIL (OL)
	1	SS	8	16.3	1.0*		1.0		Tough brown silty CLAY, little sand, trace gravel, very moist (CL)
	2	SS	4	16.8	1.0*				
	3	SS	13	15.7	2.25*		5.5		Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
	4	SS	12	13.2	3.25*		8.0		Very tough gray silty CLAY, some sand, trace gravel, moist (CL)
							10		End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 3/6/09

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **110** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **9.0'**

▽ AT END OF BORING **9.0'**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET	LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
0								0.8		Dark brown clayey TOPSOIL (OL)
		1	SS	8	30.5	2.0*		3.0		Tough to very tough brown silty CLAY, little sand, trace organic, moist (CL/CH)
5		2	SS	10	15.2	1.75*				Tough brown silty CLAY, little to some sand and gravel, moist to very moist (CL)
		3	SS	10	16.4	1.5*		8.0		
		A			23.8	2.25*				Very tough brown silty CLAY, trace sand and gravel, moist (CL)
10		4	SS	11				9.0		Firm brown SAND and GRAVEL, wet (SP/GP)
		B			17.4					
										End of Boring at 10.0'
15										* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
										SPT Hammer = Mobile Automatic
20										
25										

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **111** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10" Standing Water/Ice**

▽ AT END OF BORING **10" Standing Water/Ice**

▼ 24 HOURS _____

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	A			43.1					Black clayey TOPSOIL, very moist (OL)
	1	SS	2						
	B			27.8					
							3.0		Soft brown and gray silty CLAY, little sand, trace gravel, trace organic, very moist (CL)
	2	SS	WOH	26.5	0.5*				
							5.5		Tough to very tough brown and gray silty CLAY, little sand, trace gravel, moist (CL)
	3	SS	18	20.9	1.75*				
	4	SS	13	17.8	3.0*				
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

WOH = Weight of Hammer

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 3/6/09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **201** DATE STARTED **10-9-09** DATE COMPLETED **10-9-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **703.0**

END OF BORING **673.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **3.0 '**

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
							1.0	702.0	Black clayey TOPSOIL (OL)
1	SS		1	41.6	0.25*				Very soft dark brown ORGANIC CLAY, very moist (OL/OH)
							3.0	700.0	▼
2	SS		2	33.3	0.5*				Soft dark brown silty CLAY, trace sand, trace organic, very moist (CL/CH)
							6.0	697.0	
3	SS		6	19.0	0.5*				Soft brown and dark brown silty CLAY, some sand, trace gravel, trace organic, very moist (CL)
							8.0	695.0	
4	SS		10	15.7	2.75*				Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
							10.5	692.5	▼
5	SS		11	14.8	1.5*				Tough to very tough gray silty CLAY, some sand, trace gravel, moist (CL)
6	SS		13	15.5	2.0*				
							17.0	686.0	
7	SS		20	17.4	3.0*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
8	SS		18	18.7	3.67 3.5*				

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **201** DATE STARTED **10-9-09** DATE COMPLETED **10-9-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **703.0**

END OF BORING **673.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **3.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	9	SS	21	18.2	3.75*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 30.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **202** DATE STARTED **10-9-09** DATE COMPLETED **10-9-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **705.5**

END OF BORING **675.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **4.0 '**

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.5	705.0	FILL - Dark brown clayey TOPSOIL (OL)
1	SS		4	16.9	1.25*	112			FILL - Brown and dark brown silty CLAY, little sand, trace gravel, trace organic, moist (CL)
							3.0	702.5	
2	SS		6	17.1	1.62 2.0*				▼ Tough brown silty CLAY, little sand, trace gravel, moist (CL)
3	SS		7	15.6	1.89 1.5*				
							8.0	697.5	
4	SS		11	16.5	3.75*				Very tough brown silty CLAY, little sand, trace gravel, occasional silt seams, moist (CL)
							10.5	695.0	
5	SS		18	17.0	5.57 4.5+*				Hard gray gray silty CLAY, little sand, trace gravel, moist (CL)
							13.0	692.5	
6	SS		12	13.5	2.0*				Tough to very tough brownish-gray sandy CLAY, little gravel, moist (CL)
							17.0	688.5	
7	SS		11	16.2	1.95 1.5*				Tough to very tough gray silty CLAY, little sand, trace gravel, moist (CL)
8	SS		11	17.0	1.5*				

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **202** DATE STARTED **10-9-09** DATE COMPLETED **10-9-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **705.5**

END OF BORING **675.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **4.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	9	SS	15	17.5	2.15 2.0*				Tough to very tough gray silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 30.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **203** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **706.5**

END OF BORING **676.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **14.0 '**

▼ 24 HOURS **6.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3	706.2	Dark brown clayey TOPSOIL (OL)
	1	SS	11	11.5					Firm brown silty SAND, little gravel, moist (SM)
							3.0	703.5	
	2	SS	9	15.8	1.5*				Tough to very tough brown very silty CLAY, some sand, trace gravel, moist (CL)
	3	SS	15	16.2	3.08 3.75*				
							8.0	698.5	
	4	SS	12	11.6	2.0*				Tough to very tough gray silty CLAY, some sand, trace gravel, moist (CL)
							10.5	696.0	
	5	SS	12	14.3	3.47 4.0*				
	6	SS	13	13.5	3.75*				
	7	SS	17	14.5	2.48 3.0*				Very tough gray silty CLAY, little to some sand and gravel, occasional sand seams, moist (CL)
	8	SS	21	18.7	3.25*				

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **203** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **706.5**

END OF BORING **676.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **14.0 '**

▼ 24 HOURS **6.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
									Very tough gray silty CLAY, little to some sand and gravel, occasional sand seams, moist (CL)
	9	SS	22	16.9	3.47 3.0*				
									End of Boring at 30.0'
									* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
									SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10.20.09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **204** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **707.0**

END OF BORING **677.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **8.0 '**

▼ 24 HOURS **7.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.5	706.5	Dark brown clayey TOPSOIL (OL)
	1	SS	9	13.0					Loose brown silty SAND, some gravel, moist (SM)
							3.0	704.0	
	2	SS	8	15.5	1.75 1.5*				Tough brown very silty CLAY, some sand, trace gravel, moist to very moist (CL)
							5.5	701.5	
	3	SS	12	11.2	2.68 3.0*				▼ ▽
	4	SS	12	11.3	3.0*				Very tough gray very silty CLAY, some sand, trace gravel, moist (CL-ML)
	5	SS	14	11.1	3.08 3.0*				
							13.0	694.0	
	6	SS	20	15.2	2.5*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
							17.0	690.0	▼
	A								Firm gray SAND and GRAVEL, wet (SP/GP)
	7	SS	21				19.0	688.0	
	B			14.7	1.5*				Tough gray silty CLAY, some sand, trace gravel, moist (CL)
							22.0	685.0	
	8	SS	25	17.0	2.68 2.25*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 21 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **204** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **707.0**

END OF BORING **677.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **8.0 '**

▼ 24 HOURS **7.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	9	SS	21	16.0	2.75*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 30.0'
									* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
									SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **205** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **703.5**

END OF BORING **673.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **5.0 '**

▼ 24 HOURS **3.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									FILL - Dark brown clayey TOPSOIL (OL)
							1.0	702.5	
	1	SS	10	14.9	2.25*	120			FILL - Brown silty CLAY, little sand and gravel, trace organic, moist (CL)
							3.0	700.5	▼
	2	SS	14	27.5	1.5*	95			FILL - Dark brown silty CLAY, little sand, trace gravel, trace wood, very moist (CL) ▽
							5.5	698.0	
	3	SS	17	18.8	3.5*				Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
							8.0	695.5	
	4	SS	17	22.0	2.35 2.25*				▼ Very tough gray silty CLAY, little to some sand and gravel, moist (CL)
	5	SS	17	14.7	3.74 3.25*				
							13.0	690.5	
	A 6 B	SS	11	14.2	2.0*		14.0	689.5	Firm brown SAND and GRAVEL, wet (SP/GP)
									Tough to very tough gray silty CLAY, some sand, trace gravel, moist (CL)
							17.0	686.5	
	7	SS	22	15.6	4.25*				Hard to very tough gray silty CLAY, little sand, trace gravel, moist (CL)
	8	SS	25	16.0	4.5+*				

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **205** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **703.5**

END OF BORING **673.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **5.0 '**

▼ 24 HOURS **3.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	9	SS	22	19.7	2.5*				Hard to very tough gray silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 30.0'
									* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
									SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **206** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **705.0**

END OF BORING **675.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **22.0 '**

▼ 24 HOURS **6.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3	704.7	Dark brown clayey TOPSOIL (OL)
	1	SS	11	13.6	3.25*				Very tough brown silty CLAY, some sand, trace gravel, moist (CL)
							3.0	702.0	
	2	SS	10	16.1	1.29 1.25*				Tough brown sandy CLAY, trace gravel, very moist (CL)
							5.5	699.5	
	3	SS	13	15.3	3.5*				Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
							8.0	697.0	
	4	SS	11	23.9	2.0*				Tough to very tough gray silty CLAY, trace sand and gravel, moist (CL)
							10.5	694.5	
	5	SS	11	16.8	2.5*				Very tough gray silty CLAY, little sand and gravel, occasional sand seams, moist (CL)
	6	SS	14	15.9	3.25*				
							17.0	688.0	
	7	SS	10	24.7	0.96 1.0*				Stiff to tough gray silty CLAY, trace sand and gravel, occasional sand seams, very moist (CL)
							22.0	683.0	
	8	SS	17	18.7	2.0*				Very tough to tough gray silty CLAY, trace to little sand and gravel, moist (CL)

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **206** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **705.0**

END OF BORING **675.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **22.0 '**

▼ 24 HOURS **6.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
									Very tough to tough gray silty CLAY, trace to little sand and gravel, moist (CL)
	9	SS	19	18.4	1.49 1.5*				
									End of Boring at 30.0'
									* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
									SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **207** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **702.0**

END OF BORING **672.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **7.0 '**

▼ 24 HOURS **4.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
	A			31.5	1.5*	90	1.0	701.0	FILL - Black clayey TOPSOIL (OL)
	1	SS	13						FILL - Dark brown silty CLAY, little sand and gravel, trace organic, very moist (CL)
	B			28.9			2.0	700.0	
							3.0	699.0	Black clayey TOPSOIL, moist (OL)
	2	SS	11	17.0	2.15 2.0*				▼ Very tough to hard brown and gray silty CLAY, trace to little sand and gravel, moist (CL)
	3	SS	23	22.4	4.53 4.5+*				▽
							8.0	694.0	
	4	SS	17	17.1	3.5*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
							10.5	691.5	▼
	5	SS	17						Firm gray medium to fine SAND, little to some gravel, wet (SP)
	6	SS	18						
							17.0	685.0	
	7	SS	17	17.0	3.21 4.0*				Very tough gray silty CLAY, little sand and gravel, moist (CL)
	8	SS	17	19.9	2.5*				

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **207** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **702.0**

END OF BORING **672.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **7.0 '**

▼ 24 HOURS **4.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							27.0	675.0	Very tough gray silty CLAY, little sand and gravel, moist (CL)
	9	SS	10	23.7	1.23 1.0*				Tough gray silty CLAY, trace sand and gravel, very moist (CL)

End of Boring at 30.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **208** DATE STARTED **10-9-09** DATE COMPLETED **10-9-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **702.0**

END OF BORING **672.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **5.0 '**

▼ 24 HOURS **5.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.2	701.8	FILL - Dark brown clayey TOPSOIL (OL)
	1	SS	7	19.3	2.5*	111			FILL - Brown and dark brown silty CLAY, trace to little sand and gravel, trace organic, moist (CL)
	2	SS	4	24.4	2.5*	101			
							5.5	696.5	
	3	SS	12	17.3	3.25*				Very tough brown and gray silty CLAY, little sand, trace gravel, moist (CL)
							8.0	694.0	
	4	SS	13	21.3	3.60 4.0*				Very tough gray silty CLAY, trace sand and gravel, moist (CL)
							10.5	691.5	
	5	SS	11	18.9	1.49 1.5*				Tough gray silty CLAY, little sand, trace gravel, moist to very moist (CL)
	6	SS	13	19.4	2.0*				
	7	SS	10	20.7	1.89 1.5*				
	8	SS	13	21.3	1.5*				

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **209** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **722.0**

END OF BORING **692.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **26.0 '**

▽ AT END OF BORING **26.0 '**

▼ 24 HOURS **23.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	1	SS	14	11.5		122			FILL - Brown and dark brown silty CLAY, little sand and gravel, trace topsoil, moist (CL)
	2	SS	25	18.3		109			
							5.5	716.5	
	3	SS	9	25.2		98			FILL - Black and brown silty CLAY, little sand and gravel, little topsoil, moist (CL)
							8.0	714.0	
	4	SS	8	24.2		99			FILL - Black clayey TOPSOIL, trace sand and gravel, very moist (OL)
	5	SS	8	14.8		107			
							13.0	709.0	
	6	SS	11	13.4		124			FILL - Black and brown silty CLAY and TOPSOIL, trace sand and gravel, trace brick, moist (CL/OL)
							18.0	704.0	
	7	SS	26	29.5					Black clayey TOPSOIL, moist (OL)
							22.0	700.0	
	8	SS	7	16.6	1.5*				▼ Tough brown very silty CLAY, some sand, trace gravel, moist to very moist (CL)

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 21 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **209** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **722.0**

END OF BORING **692.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **26.0 '**

▽ AT END OF BORING **26.0 '**

▼ 24 HOURS **23.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							27.0	695.0	▼ Tough brown very silty CLAY, some sand, trace gravel, moist to very moist (CL)
	9	SS	13	21.9	2.15 1.75*				Tough to very tough gray silty CLAY, little sand, trace gravel, moist (CL)

End of Boring at 30.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **210** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **706.5**

END OF BORING **696.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **Dry**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.5	706.0	Dark brown clayey TOPSOIL (OL)
	1	SS	12	14.3	2.25*				Tough to very tough brown silty CLAY, some sand, trace gravel, moist (CL)
	2	SS	9	17.2	1.5*				
	3	SS	9	15.7	2.0*				
							8.0	698.5	
	4	SS	14	15.3	4.5*				Hard brown silty CLAY, little sand, trace gravel, moist (CL)

End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **211** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **702.5**

END OF BORING **692.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **Dry**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.6	701.9	Dark brown clayey TOPSOIL (OL)
	1	SS	10	19.0	2.5*		3.0	699.5	Very tough brown sandy CLAY, trace gravel, moist (CL)
	2	SS	8	15.5	3.5*				Very tough to tough brown silty CLAY, some sand, trace gravel, moist (CL)
	3	SS	10	15.8	1.75*		8.0	694.5	
	4	SS	20	13.1	4.5+*				Hard brown silty CLAY, little sand, trace gravel, moist (CL)

End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **212** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **703.0**

END OF BORING **693.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **8.0 '**

▼ 24 HOURS **5.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3	702.7	FILL - Black clayey TOPSOIL (OL)
	1	SS	7	20.8	2.75*	102			FILL - Brown little dark brown silty CLAY, little sand, trace gravel, trace organic, moist (CL)
							3.0	700.0	
	2	SS	4	24.1	0.5*	100			FILL - Dark brown silty CLAY, little sand, trace gravel, trace organic, very moist (CL)
							5.5	697.5	
	3	SS	10	17.0	3.5*				Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
							8.0	695.0	
	4	SS	15	19.2	3.5*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 7823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **213** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **706.5**

END OF BORING **696.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5 '**

▽ AT END OF BORING **4.0 '**

▼ 24 HOURS **3.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.8	705.7	Black clayey TOPSOIL (OL)
	1	SS	1	155	<0.25*				Very soft ORGANIC CLAY, very moist (OH)
							3.0	703.5	▼
	2	SS	8	30.4	1.5*				▽ Tough brown silty CLAY, little sand, trace organic, very moist (CL/CH)
							5.5	701.0	▼
	3	SS	1	21.0	0.75*				Stiff brown silty CLAY, some sand, trace gravel, very moist (CL)
							8.0	698.5	
	4	SS	10	13.2	2.75*				Very tough brown sandy CLAY, trace gravel, moist (CL)
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **214** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **706.5**

END OF BORING **696.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5 '**

▽ AT END OF BORING **7.0 '**

▼ 24 HOURS **4.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3	706.2	Dark brown clayey TOPSOIL (OL)
	1	SS	2	57.5					Very soft gray MARL, very moist (OL/OH)
	2	SS	2	46.9					▼
							5.5	701.0	▼
	3	SS	8	16.5	1.75*				▽ Tough to very tough brown silty CLAY, little sand, trace gravel, moist (CL)
	4	SS	16	15.9	2.75*				
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **215** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **706.5**

END OF BORING **696.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **8.0 '**

▼ 24 HOURS **5.0 '**

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS		13	30.9					Dark brown clayey TOPSOIL, moist (OL)
							3.0	703.5	
2	SS		9	28.7	2.75*				Very tough brown silty CLAY, little sand, moist (CL/CH)
							5.5	701.0	
3	SS		6	16.2	1.0*				Tough brown silty CLAY, some sand, trace gravel, very moist to moist (CL)
4	SS		10	14.2	1.5*				

End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **216** DATE STARTED **10-7-09** DATE COMPLETED **10-7-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **710.0**

END OF BORING **700.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **4.0 '**

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
							1.0	709.0	Dark brown clayey TOPSOIL (OL)
1	SS		17	22.1	4.5+*				Hard dark brown silty CLAY, trace sand and gravel, moist (CL)
							3.0	707.0	
2	SS		10	14.4	2.75*				▼ Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
3	SS		11	19.5	2.0*				
							8.0	702.0	
4	SS		18	16.4	4.5+*				Hard brown silty CLAY, little sand, trace gravel, moist (CL)
							10		End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W. Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT:

LAKE COUNTY

NO.	DATE	NATURE OF REVISION	CHKD.

DSGN.	
DWN.	
CHKD.	
SCALE:	100'
PLOT DATE:	4/16/2010
CAD USER:	NMOREL
MODEL:	Default

FILE NAME N:\LAKECO\080148\Civil\Exhibits\soilboring01_080148.exh

TITLE:

FIGURE 8.3:
LAKE COUNTY MASTER CAMPUS SOIL BORING PLAN

PROJ. NO.	080148
DATE:	1/11/10
SHEET	1 OF 3
DRAWING NO.	

EXHIBIT 1

SOIL AND MATERIAL CONSULTANTS, INC.

Office: 847-870-0544
Fax: 847-870-0661
us@soilandmaterialconsultants.com
www.soilandmaterialconsultants.com

August 15, 2019
File No. 24645

Mr. Kurt Schultz
Lake County Purchasing Division
18 N. County Street – 9th Floor
Waukegan, IL 60085

Re: Geotechnical Investigation
Lake County Consolidated
Public Safety Facility
Libertyville, Illinois

Dear Mr. Schultz:

The following is our report of findings for the geotechnical investigation completed for the above referenced project in the Village of Libertyville, Illinois.

The investigation was requested to determine current subsurface soil and water conditions at select boring locations. The findings of the field investigation and the results of laboratory testing are intended to assist in the planning, design and construction of proposed site improvements.

PROPOSED IMPROVEMENTS

We understand it is proposed to construct a Public Safety Facility consisting of 2 single-story buildings and two 75' radio towers. The buildings are expected to be supported on shallow depth foundations and have at-grade interior slabs supported on prepared subgrade soils. Finished floor elevations have not yet been determined for the structures. Improvements exterior to the buildings are expected to include pavement areas, sidewalks and related underground improvements.

SCOPE OF THE INVESTIGATION

The field investigation included obtaining 21 borings at the locations requested and as indicated on the enclosed location sketch. The boring locations were established using field taping methods and accuracy. Surface elevations were determined using the temporary benchmark indicated on the location sketch for the borings B-1 to B-3, B-11 to B-15, and B-21. The remaining borings elevations were estimated to the nearest 0.5 ft using data presented on the topographic survey.

We auger drilled the 11 structure borings to depths of 15.0 feet to 30.0 feet below existing surface elevations. Soil samples were obtained using a split barrel sampler advanced utilizing an automatic SPT hammer. The 10 pavement and detention area borings were drilled and sampled in a similar manner to depths of 10.0 feet. Soil profiles were determined in the field and soil samples returned to our laboratory for additional testing including determination of moisture content. Cohesive soils obtained by split barrel sampling were tested further to

determine dry unit weight and unconfined compressive strength. The results of all field determinations and laboratory testing are included in summary with this report.

RESULTS OF THE INVESTIGATION

Enclosed are boring logs indicating the soil conditions encountered at each location. The site consists of a farm field and a semi-weeded field which has a stockpile near the southeast corner of the property. Site surface conditions include vegetation, topsoil and fill soil conditions.

Fill soil conditions were encountered at borings B-2, B-3, B-6, B-7, B-9, B-10, B-11, B-14, B-15, B-17, B-19 and B-21. Composition of the fill includes the presence of topsoil, silt/clay/sand, sand/silt/gravel, silt/clay, silt/sand, and clay/silt mixtures extending to depths of 1.0 feet to 7.0 feet with the stockpile fill at boring B-10 extending to 18.5 feet. The limits of fill placement were not determined within the scope of this investigation. Larger debris may also be present within the fill but was not encountered during the investigation. The fill soil conditions are found to overlie the apparent natural topsoil at borings B-7, B-9, B-10, B-17, and B-21.

Significant deposits of organic silt were encountered at borings B-1, B-2, B-12, and B-13 extending to depths of 3.0 feet to 6.5 feet. These soils have very high moisture contents and low-strengths making them highly compressible. These conditions are likely present in other areas of the site but were not discovered within the scope of this investigation.

Underlying non-organic natural soil conditions include the presence of cohesive soils. These are classified as stiff to hard clay/silt mixtures with lesser portions of sand and gravel. Non-cohesive soils were also encountered. These include very loose to medium dense silt/sand, silt/clay, sand/gravel, sand, silt, and silt/sand/clay mixtures. The non-cohesive granular soils are often in a very damp to saturated condition. Cobbles and boulders may be present within the site soils at any elevation, although none were encountered while drilling.

The following table summarizes depth ranges below existing grade, the magnitude of soil strength within these ranges and other information:

Boring	Surface Elevation (feet)	Depth Range Below Existing Surface (feet)	Soil Strength (lbs./sq.ft.)	Recorded Water Levels, W.D./A.D. (feet)
Proposed Structures				
1	704.1	0.0 to 5.5	*none	4.5/10/0
		5.5 to 11.0	3,000	
		11.0 to 12.0	5,000	
2	703.2	0.0 to 7.0	*none	10.5/11.5
		7.0 to 12.0	5,000	
3	705.3	1.5 to 5.0	*500	8.5/8.5
		5.0 to 6.0	3,000	
		6.0 to 12.0	4,000	
4	705.5	1.5 to 8.5	3,000	13.0/13.0
		8.5 to 10.0	5,000	
		10.0 to 12.0	4,000	
5	706.0	1.5 to 6.5	2,000	11.5/7.5
		6.5 to 10.0	4,000	
		10.0 to 12.0	3,000	
6	705.5	1.5 to 4.5	2,000	12.5/6.0
		4.5 to 7.0	3,000	
		7.0 to 12.0	5,000	
7	708.0	4.0 to 12.0	3,000	dry/dry
8	706.0	1.5 to 8.5	3,000	12.5/13.5
		8.5 to 12.0	6,000	
9	706.5	5.5 to 8.5	2,000	11.0/13.0
		8.5 to 12.0	3,000	
10	721.0	21.0 to 26.5	2,000	28.5/22.0
		26.5 to 27.0	4,000	
11	702.3	6.0 to 9.0	4,000	12.0/6.0
		9.0 to 17.0	3,000	

Boring	Surface Elevation (feet)	Depth Range Below Existing Surface (feet)	Soil Strength (lbs./sq.ft.)	Recorded Water Levels, W.D./A.D. (feet)
Proposed Pavement / Detention Pond Areas				
12	705.6	0.0 to 3.5	*none	5.0/5.0
		3.5 to 7.0	*1,500	
13	702.0	0.0 to 4.5	*none	3.0/3.0
		4.5 to 7.0	*500	
		7.0 to 7.5	5,000	
14	701.7	1.5 to 3.5	*500	7.5/5.0
		3.5 to 4.0	3,000	
		4.0 to 7.0	2,000	
15	703.5	0.5 to 7.0	*2,000	dry/dry
		7.0 to 7.5	3,000	
16	704.0	1.5 to 7.0	3,000	dry/dry
17	708.0	0.5 to 7.0	*2,000	dry/dry
18	708.0	0.5 to 7.0	3,000	dry/dry
19	703.0	0.5 to 4.0	*2,000	dry/dry
		4.0 to 7.0	3,000	
20	698.5	2.5 to 4.0	*500	7.5/7.0
		4.0 to 6.5	*1,000	
		6.5 to 7.0	2,000	
21	696.9	1.5 to 6.5	*500	dry/dry
		6.5 to 7.0	2,000	

* Not recommended for support of foundations. Deeper foundation depths or foundations supported on structural fill will be needed to reduce the magnitude of long-term total and differential settlement.

It is expected that foundations can be supported on undisturbed natural soils located at any elevation within the depth ranges indicated in the above table, except as noted. Above these depth ranges the soils are not considered able to support foundations, even at reduced design bearing values, due to long-term settlement considerations.

SUBSURFACE WATER

The boring logs and the above table indicate the depth at which subsurface water was encountered in the bore holes at the time of the drilling operations and during the period of these readings. It is expected that fluctuations from the water levels recorded will occur over a period of time due to variations in rainfall, temperature, subsurface soil conditions, soil permeability and other factors not evident at the time of the water level measurements.

DEWATERING

Excavations may require dewatering due to subsurface water seepage and/or surface precipitation. This water can likely be removed to depths of several feet by standard sump and pump operations. Soils exposed at foundation, slab or undercut elevations should not be permitted to become saturated. Loss of bearing strength and stability may occur, requiring additional soil excavation.

Fill soils, organic soils, non-cohesive soils and others can be unstable when saturated. These soils tend to cave or run when submerged or disturbed. The stability of exposed embankments is minimal to non-existent as confining soil pressures are removed. Proper drainage within excavations is necessary at all times, particularly when excavations extend below anticipated water levels and below saturated soils.

The contractor should be made responsible for designing and constructing stable temporary excavations. Also, the contractor should shore, slope, bench or restrain the sides of the excavations as required to maintain stability of both the excavation sides and bottom. In no case, should the slope, slope heights, or excavation depth exceed those in the local, state, and federal safety regulations.

BUILDING PAD

The site topography and soil conditions encountered on this site indicate building pads must be constructed prior to foundation excavation. This site preparation is necessary to establish adequate support for the foundations and floor slabs. The procedure should include the full-depth removal of unsuitable conditions including vegetation, topsoil, fill soils, buried topsoil, organic silts, soft or unstable soils, and other deleterious conditions. Generally, excavations should extend to the depth at which at least 2,000 lbs./sq.ft. soil strength is encountered. The above table provide a general indication of the anticipated undercut depths from existing grade. Variations in the depth of removal can be expected due to filled and naturally changing soil conditions. Soil removal should extend beyond the outside edge of the exterior foundation wall footings to a distance at least equal to the depth of fill that will be present beneath the footings. The exposed subgrade soil should then be proof-rolled in the presence of the Soil Engineer. Proof-rolling is expected to reveal some areas of unstable soil, requiring additional removal.

Structural fill should be placed on the prepared subgrade and in lifts not to exceed 8.0 inches when uncompacted. Each lift should exceed the minimum compaction requirement prior to placement of the next lift. We recommend a minimum of 95% compaction based on the modified proctor test, ASTM D-1557. If high soil moisture content prevents achieving minimum

compaction requirements then it will be necessary to disc and aerate the soil. Compaction requirements also apply to backfill placement around foundations and within trench excavations located below subgrade supported improvements.

FOUNDATIONS

Based on the results of this investigation it is our opinion that continuous and isolated footing foundations may be considered for support of building loads. These foundations can be supported on newly placed structural fill and/or undisturbed natural soils located below all topsoil, organic silt, debris, unsuitable fill soils, low strength soils and other unsuitable conditions which may be encountered. Soil strength values and the depths at which they are expected to be encountered at these boring locations are indicated in the above table. Foundations can be constructed at shallower depths than those indicated in the above table when building pads are constructed as described above.

A net allowable bearing value of 2,000 lbs./sq.ft. is available for design. This value can be used to size foundations for support of structure dead and live loads. Increased bearing values may be available at some locations and elevations. The feasibility of using a higher value is best determined after our review of proposed foundation details and elevations.
All exterior building foundations should extend at least 42.0 inches below exposed surface elevations to provide adequate protection against uplift due to freezing of the supporting soils. Foundations for unprotected improvements should extend at least 48.0 inches below exposed surface elevations. We recommend providing adequate reinforcing steel in foundation walls and piers to minimize the effects of long-term differential settlement.

Weak soil conditions may be discovered locally at design foundation elevations and may require extending the foundation to a deeper elevation. Alternately, removal of the weak soil followed by replacement with properly compacted coarse crushed granular fill (CA01) may be feasible. When removal is approved by the Soil Engineer, the removal of the weak soil should also extend beyond the face of footings and/or piers to a distance at least equal to the depth of fill that will be present beneath the footings and/or piers. A capping layer of finer crushed granular fill (CA06) can be utilized to establish a working surface.

FLOOR SLABS

Floor slabs planned for support on the existing soil conditions are expected to undergo some degree of long-term settlement as the soils consolidate under loading and as they shrink due to desiccation. Slabs may be considered for support on suitable natural soils or on properly placed and compacted fill soils and a subgrade modulus of 125 psi/in. can be used for design. This is feasible when the soils supporting the slabs are prepared in accordance with the Building Pad recommendations.

SUBGRADE SOIL PREPARATION – PAVEMENT AREAS

The procedure in all areas of subgrade supported improvements should include the removal of unsuitable surface conditions including vegetation, topsoil, unsuitable fill soils, significant debris, organic silt, weak or unstable soils, and other deleterious conditions which may be encountered. Above grade areas should be cut to design subgrade elevations. Exposed subgrade soils should be leveled, compacted and proof-rolled in the presence of the Soil Engineer.

Proof-rolling is expected to reveal areas of unstable soil conditions, especially in areas of uncontrolled fill and organic silts, which may require additional removal. Discing and aeration of high moisture content non-organic soils can be effective to depths of up to 1.0 foot, depending upon the equipment utilized. Removal of unstable soils may be necessary if high moisture content conditions extend to depths greater than the effective depth of discing.

Soft or unstable soil conditions in pavement areas can often be bridged by use of an effective depth of crushed granular material. The placement of the crushed granular bridging material, possibly in conjunction with the use of an appropriate geotextile fabric, should only proceed after review of the proof-roll conditions by the Soil Engineer. Long-term settlement of pavement surfaces may occur locally as the bridged soils desiccate.

Structural fill can be placed on soils prepared to the satisfaction of the Soil Engineer. The fill should be placed in lifts not to exceed 8.0 inches when uncompacted. Each lift should exceed minimum compaction requirements prior to placement of the next lift. We recommend a minimum of 95% compaction based on the modified Proctor test, ASTM D-1557, be achieved. Compaction requirements also apply to backfill placement around foundations and within trench excavations located below subgrade supported improvements.

FILL SOURCES

The onsite non-organic soils are generally suitable for reuse as fill. Offsite sources may also be used provided they are approved in advance by the Soil Engineer. Aeration may be necessary to reduce soil moisture content prior to compaction. Soil borrowed from near the surface where seasonal fluctuations in soil moisture content occur may require particular attention. The moisture content of fill soils should be within approximately 3.0% of optimum moisture content as determined by the modified Proctor test for the soils to meet or exceed minimum compaction requirements.

SETTLEMENT CONSIDERATIONS

The magnitude of settlement is dependent upon a combination of factors which include design foundation elevation, magnitude of load applied to the soil at that elevation, underlying soil type, soil strength and condition, subsurface water condition and other considerations.

In the absence of specific design factors the magnitude of total and differential settlement cannot be determined at this time. A preliminary estimate based upon initial design information suggests that post-construction total and differential settlement of foundations could be in the

range of 0.75 inches and 0.50 inches respectively. Variations in supporting soil strength will likely increase the magnitude of total and differential settlement

SOIL INFILTRATION RATES

Grain-size analysis testing was performed on selected samples of naturals soils encountered in borings B-12, B-16, B-18 and B-21 to determine USDA soil classifications and estimated infiltration rates. The grain size analysis determinations and estimated infiltration rates are shown in the below table:

Boring	Depth	USDA Soil Classification	Estimated Design Infiltration Rate
B-12	3.5' to 5.0'	Silty Clay Loam	0.19 inches per hour
B-16	15" to 2.5'	Loam	0.24 inches per hour
B-18	1.0' to 2.5'	Loam	0.24 inches per hour
B-21	6.0' to 7.5'	Silt Loam	0.13 inches per hour

Estimated design infiltration rates were taken from
Table 3-1 of City of Chicago Stormwater Ordinance Manual.

CONCLUSION

The information within this report is intended to provide initial information concerning subsurface soil and water conditions on the site. Variations in subsurface conditions are expected to be present between boring locations due to naturally changing and filled soil conditions.

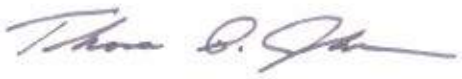
Our understanding of the proposed improvements is based on limited information available to us at the writing of this report. The findings of the investigation and the recommendations presented are not considered applicable to significant changes in the scope of the improvements or applicable to alternate site uses. We recommend that proposed foundation, pavement and grading plans be reviewed by our office to determine if additional considerations are necessary to address anticipated subsurface conditions. Obtaining additional soil borings may be warranted to further define the depth and limits of restrictive subsurface conditions.

The soils exposed in soil undercut areas should be evaluated for suitability prior to placement of structural fill, as previously indicated in this report. Soils and aggregates placed as structural fill should be tested as the work progresses to verify that minimum compaction requirements have been met. We recommend that soil conditions encountered at foundation elevations be tested to verify the presence of design soil strength prior to concrete placement.

If you have any questions concerning the findings or recommendations presented in this report, please let me know.

Very truly yours,

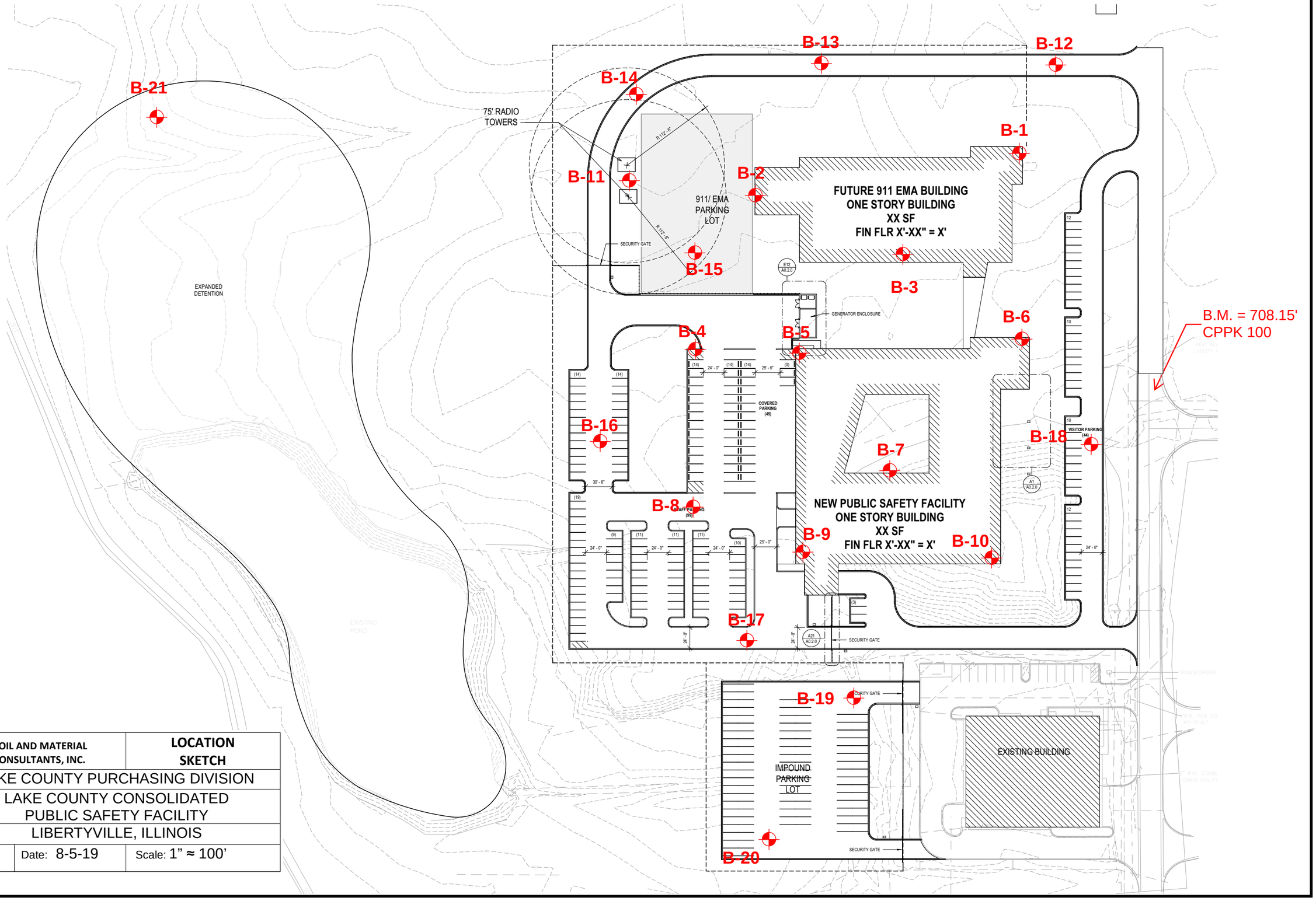
SOIL AND MATERIAL CONSULTANTS, INC.



Thomas P. Johnson, P.E.
President

TPJ:ek
Enc.

cc: Mr. Mark Price, AIA, LEED AP BD+C – FGM Architects



SMC	SOIL AND MATERIAL CONSULTANTS, INC.	LOCATION SKETCH
Client:	LAKE COUNTY PURCHASING DIVISION	
Project:	LAKE COUNTY CONSOLIDATED PUBLIC SAFETY FACILITY	
Location:	LIBERTYVILLE, ILLINOIS	
File No. 24645	Date: 8-5-19	Scale: 1" ≈ 100'

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 1

Logged By: CS **Page:** 1 of 1

File No. 24645 **Date Drilled:** 8/2/19

Client: Lake County Purchasing Division

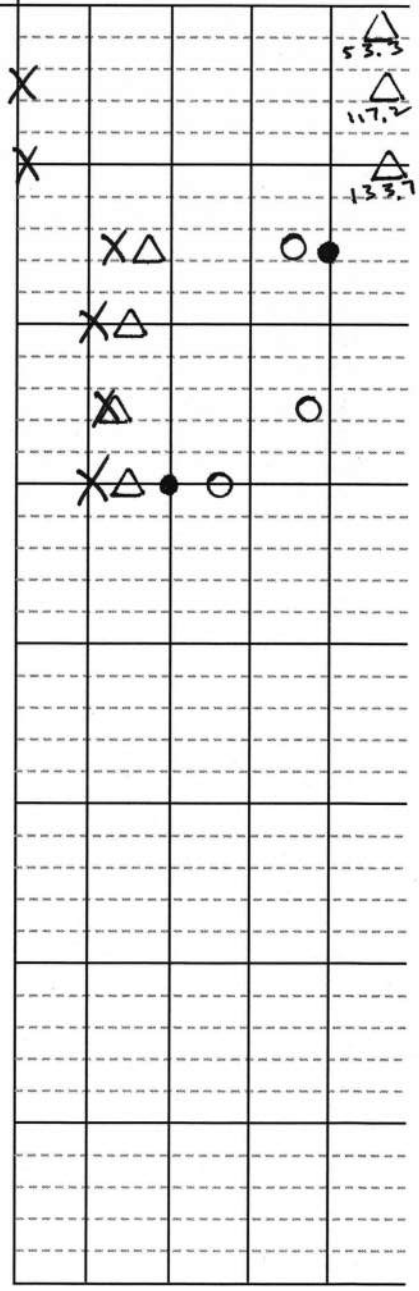
Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 704.1' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strengh ○
	(a) see below		53.3		
	Dark brown-dark gray organic silt,trace shells,damp-very damp-saturated,very loose ▽	1	117.2		
5	Brown-gray to gray clay,some silt,trace sand & gravel,damp,very tough	1	133.7		
		13	18.2	113.2	3.6
	Gray silt & fine sand,trace medium-coarse sand,clay & gravel,saturated, medium dense	11	15.3		
10	Gray clay,some silt,trace sand & gravel, damp,very tough	12	14.2	131.5	3.8
15		10	14.8	127.5	2.7
	End of Boring				
	(a) Dark brown silt,trace clay,organic matter & fine sand,damp (topsoil)				
20					
25					
30					
35					
40					

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0
× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at 4.5 feet during drilling operations (W.D.)
Water recorded at 10.0 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 2

Logged By: CS **Page:** 1 of 1

File No. 24645 **Date Drilled:** 8/2/19

Client: Lake County Purchasing Division

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

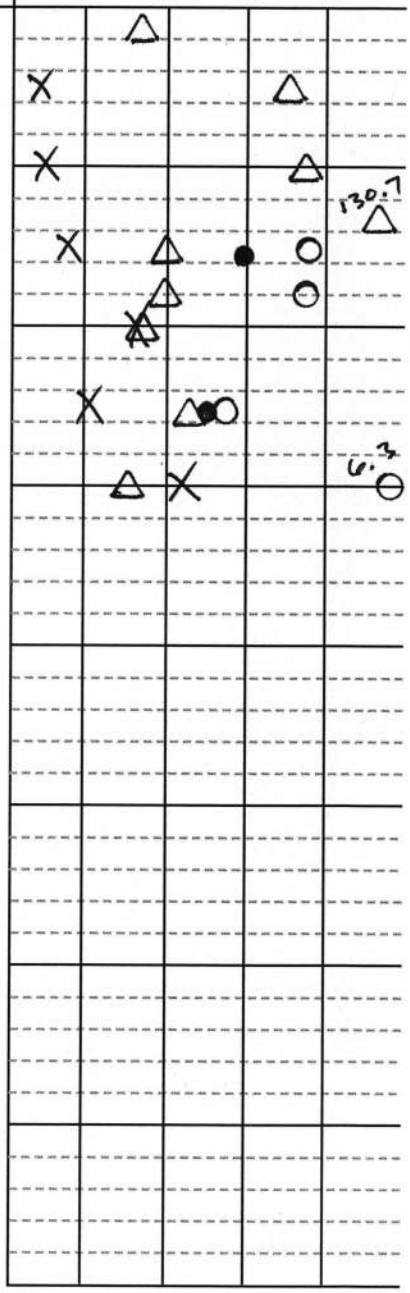
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 703.2' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strengh ○
	(a) see below		16.4		
	Dark brown-black-brown silt,some clay & sand,trace gravel,damp,very loose - Fill	3	35.2		
5	Dark brown-dark gray organic silt,damp, very loose	4	39.3		
			130.7		
	Brown clay,some silt,trace sand & gravel damp,very tough	8	19.9	103.8	3.9
			20.1	105.7	3.8
10	Gray clay,some silt,trace sand & gravel, damp,very tough to hard	16	17.7		
		11	23.0	105.8	2.8
15		22	14.8	118.6	6.3
	End of Boring				
	(a) Dark brown silt,some sand & clay, trace roots,damp (topsoil) - Fill - 10.0"				
20					
25					
30					
35					
40					

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at 10.5 feet during drilling operations (W.D.)
Water recorded at 11.5 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 3

Logged By: CS **Page:** 1 of 1

File No. 24645 **Date Drilled:** 8/2/19

Client: Lake County Purchasing Division

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

Comments:

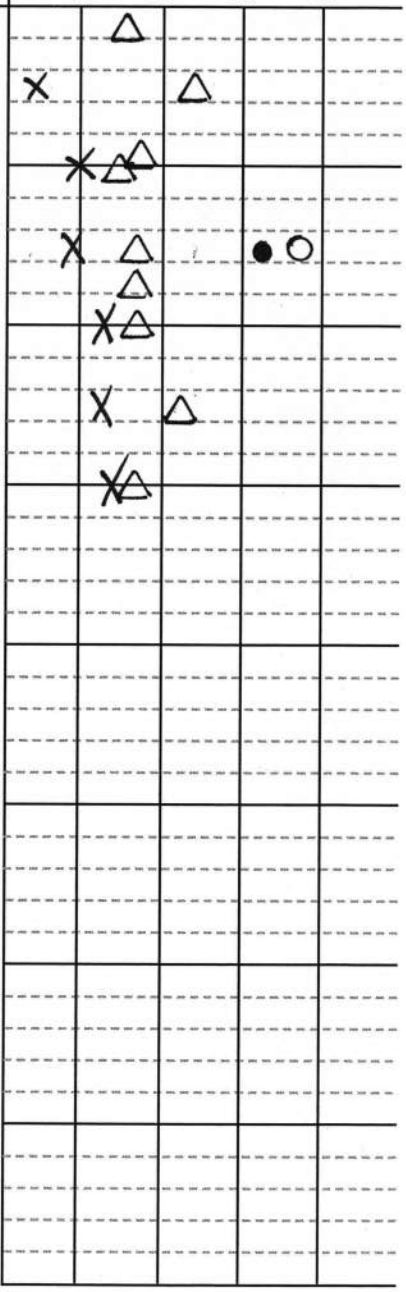
Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 705.3' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strengh ○
	(a) see below		15.2		
	Dark brown-black-brown silt,some clay & sand,trace gravel,damp,very loose - Fill	4	24.2		
5	(b) see below	10	18.3 14.4		
	Brown clay,some silt,trace sand & gravel damp,very tough	9	17.0	113.7	3.8
	(c) see below		16.4		
	(d) see below				
10		14	16.1		
	Gray clay,some silt,trace sand & gravel, damp,tough	13	21.9		
	Gray silt,some clay,trace sand & gravel, damp,medium dense				
15		14	17.0		
	End of Boring				

(a) Dark brown silt,some clay,trace sand & roots,damp (topsoil) - Fill
(b) Brown silt,some clay,trace sand & gravel,damp,medium dense
(c) Brown silt,some fine sand,trace medium-coarse sand & gravel,damp-very damp
(d) Brown coarse sand & gravel,some medium sand,trace fine sand,saturated,medium dense

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at 8.5 feet during drilling operations (W.D.)
Water recorded at 8.5 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 4

Logged By: CS **Page:** 1 of 11

File No. 24645 **Date Drilled:** 8/2/19

Client: Lake County Purchasing Division

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

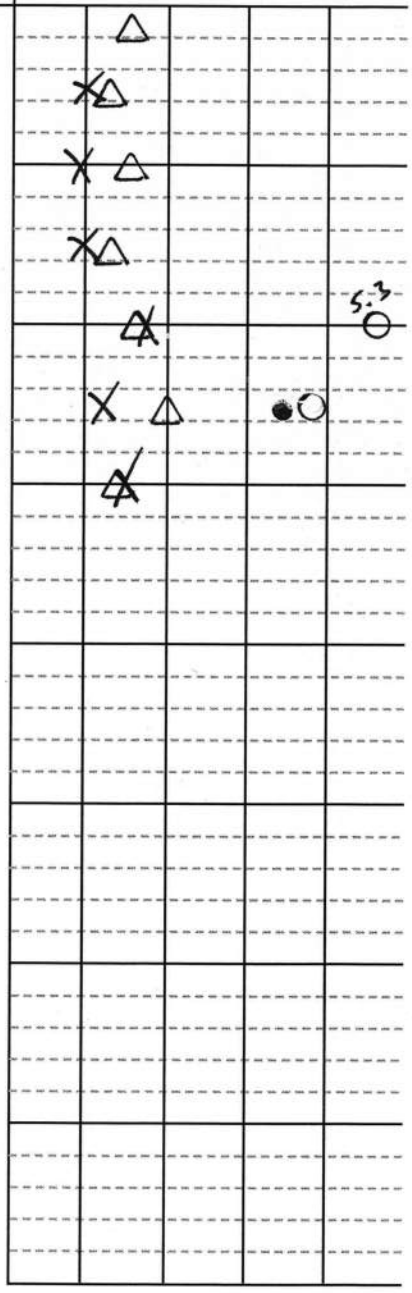
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 705.5' Existing Surface	standard penetration ×	moisture content Δ	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	(a) see below		14.5		
	Brown to brown-gray silt,some clay, trace sand & gravel,damp,medium dense	10	12.9		
5	Brown to brown-gray silt,some clay, trace sand & gravel,damp,loose to medium dense	9	15.4		
		10	13.9		
10	Brown clay,some silt,trace sand & gravel damp,hard	17	16.0	110.2	5.3
	Gray clay,some silt,trace sand & gravel, damp,very tough	12	20.1	105.1	3.9
15	Brown coarse sand & gravel,trace fine-medium sand,saturated,med.dense	15	14.1		
	End of Boring				
	(a) Dark brown silt,some clay,trace sand & roots,damp (topsoil)				
20					
25					
30					
35					
40					

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
Δ moisture content, %
10 20 30 40



Water encountered at 13.0 feet during drilling operations (W.D.)
Water recorded at 13.0 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

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SOIL BORING LOG 5

Logged By: CS Page: 1 of 1

File No. 24645 Date Drilled: 8/2/19

Client: Lake County Purchasing Division

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

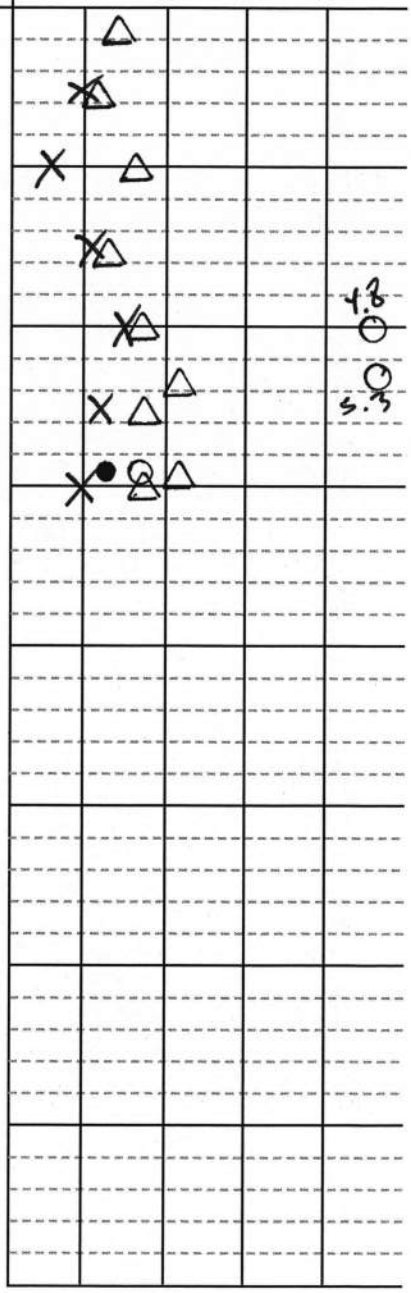
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 706.0' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strengh ○
	(a) see below		14.1		
	Brown silt,some clay,trace sand & gravel damp,medium dense	10	10.6		
5	Brown silt,some clay,trace sand & gravel damp,loose to medium dense	6	16.3		
		11	13.0		
10	Brown clay,some silt,trace sand & gravel damp,hard	15	17.8	102.5	4.8
	(b) see below	12	20.7 18.2	100.4	5.3
	Gray clay,some silt,trace sand & gravel, damp,tough (c) see below	10	20.9 18.2	114.0	1.7
15	End of Boring				
20	(a) Dark brown silt,some clay,trace sand & roots,damp (topsoil) - 10.0"				
	(b) Brown-gray medium-coarse sand, trace fine sand & gravel,saturated, medium dense				
25	(c) Gray fine sand,some medium-coarse sand,trace clay & gravel,saturated, medium dense				
30					
35					
40					

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at 11.5 feet during drilling operations (W.D.)
Water recorded at 7.5 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

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SOIL BORING LOG 6

Logged By: CS **Page:** 1 of 1

Client: Lake County Purchasing Division

File No. 24645 **Date Drilled:** 8/5/19

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

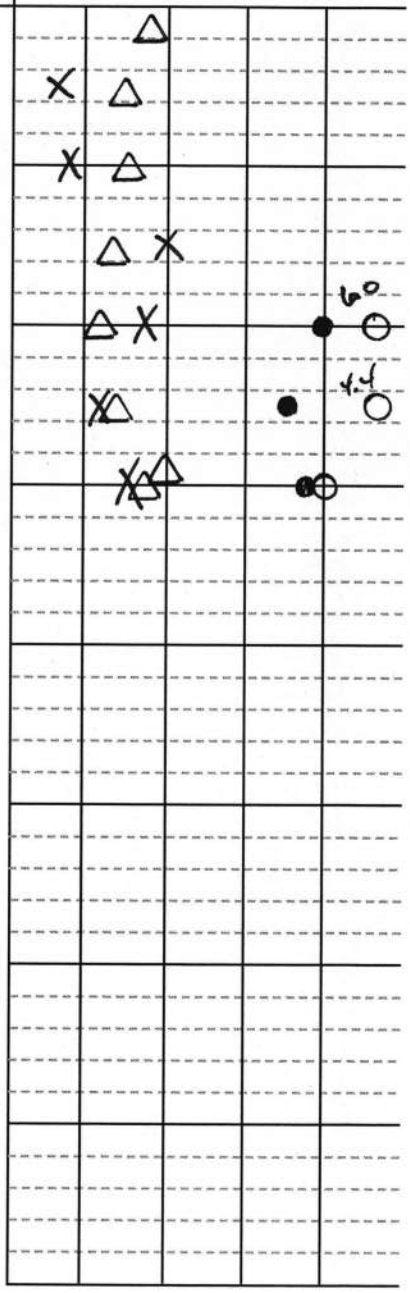
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 705.5' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	(a) see below		19.3		
	Brown-gray to brown silt,some clay,trace sand & gravel,damp,loose to medium dense	6	13.9		
5		8	14.8		
		20	13.6		
	Gray clay,some silt,trace sand & gravel,				
10	damp,hard	17	11.3	122.9	6.0
	Gray fine sand,saturated,medium dense	12	14.1	119.6	4.4
15	(b) see below	15	20.1 17.5	111.9	4.0
	End of Boring				
	(a) Dark brown-black silt,some clay, trace sand & roots (topsoil) - Fill				
20	(b) Gray clay,some silt,trace sand & gravel,damp,hard				
25					
30					
35					
40					

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at 12.5 feet during drilling operations (W.D.)
Water recorded at 6.0 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 7

Logged By: CS **Page:** 1 of 1

Client: Lake County Purchasing Division

File No. 24645 **Date Drilled:** 8/5/19

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

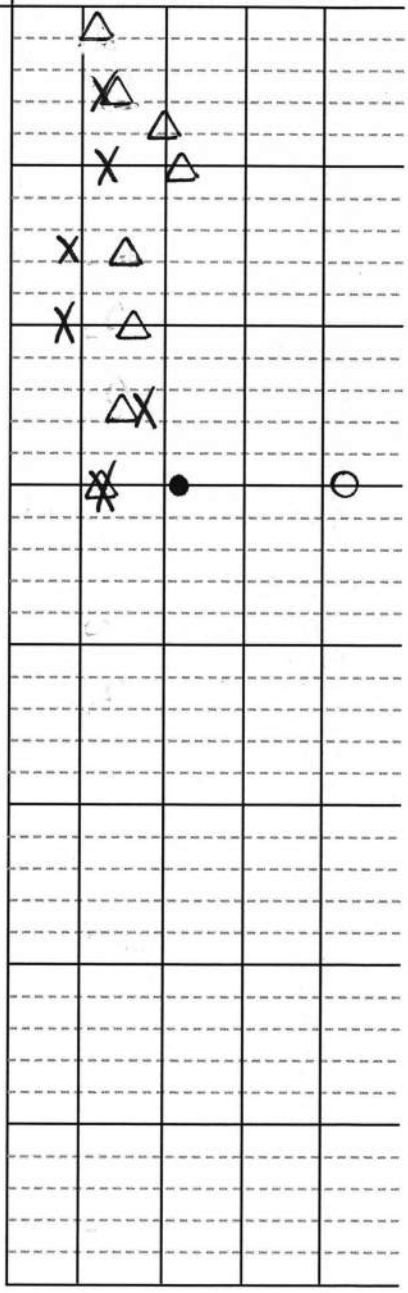
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 708.0' Existing Surface	standard penetration ×	moisture content Δ	dry unit weight lbs./cu.ft. ϑ	unconfined compressive strengh ○
	(a) see below		11.4		
	(b) see below	13	13.5		
	(c) see below		19.5		
5	Brown silt,trace fine sand,damp,medium dense	13	21.7		
	Brown to brown-gray silt,some clay,trace sand & gravel,damp,loose to medium dense	8	14.5		
10		7	15.8		
		17	14.8		
	Gray clay,some silt,trace sand & gravel, damp,hard	13	12.6	122.4	4.3
15	End of Boring				
	(a) Brown fine sand,some silt & gravel, trace medium-coarse sand,damp - Fill 10.0"				
20	(b) Brown-dark brown-gray silt,some clay,trace sand & gravel,damp,medium dense - Fill				
	(c) Black silt,some clay,trace sand & roots,damp (topsoil)				
25					
30					
35					
40					

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
Δ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 8

Logged By: CS **Page:** 1 of 1

Client: Lake County Purchasing Division

File No. 24645 **Date Drilled:** 8/5/19

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

Comments:

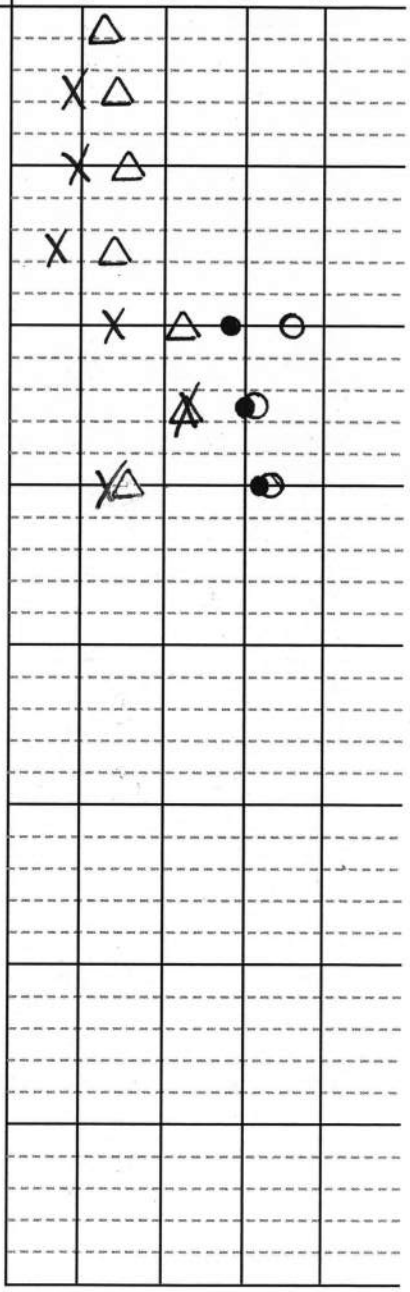
Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

Elevation 706.0' **Existing Surface**

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strengh ○
	(a) see below		13.1		
	Brown silt,some clay,trace sand & gravel, damp,loose	9	14.0		
5		9	14.9		
		7	14.2		
	Brown clay,some silt,trace sand & gravel damp,very tough				
10		14	22.3	104.2	3.6
	Brown to gray-gray clay,some silt,trace sand & gravel,damp,very tough ▽	24	22.3	106.8	3.1
15		14	15.4	118.8	3.4
	End of Boring				
	(a) Dark brown silt,some sand & clay, trace roots,damp (topsoil) - 15.0"				
20					
25					
30					
35					
40					

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at 12.5 feet during drilling operations (W.D.)
Water recorded at 13.5 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 9

Logged By: CS **Page:** 1 of 1

File No. 24645 **Date Drilled:** 8/5/19

Client: Lake County Purchasing Division

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

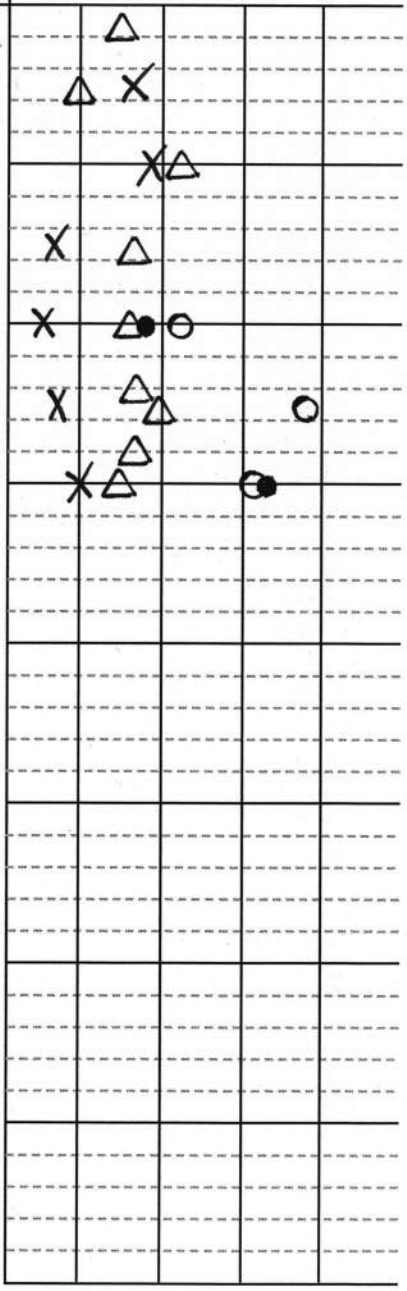
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 706.5' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
	(a) see below		15.1		
	(b) see below	16	10.0		
	Black silt,some clay,trace sand & roots, damp,medium dense (topsoil)				
5	Brown to brown-gray silt,some clay,trace sand & gravel,damp,loose	19	23.3		
		7	17.6		
	Brown-gray clay & silt,trace sand & gravel,damp,very tough				
10		5	16.3	119.5	2.3
	(c) see below ▽		18.0		
	Brown to gray clay & silt,trace sand & gravel,damp,very tough	7	19.7	109.3	3.9
	(d) see below		16.1		
15	(e) see below	10	14.3	130.9	3.1
	End of Boring				
20					
25					
30					
35					
40					

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



(a) Dark brown silt,some fine sand, trace clay,roots & gravel,damp - Fill
(b) Dark brown-black-gray silt,some clay trace sand & gravel,damp,medium dense - Fill
(c) Brown-gray medium-coarse sand,some silt,trace gravel & fine sand,very damp-saturated,loose
(d) Brown fine sand,some medium-coarse sand & gravel,saturated,medium dense
(e) Gray clay,some silt,trace sand & gravel,damp,very tough

Water encountered at 11.0 feet during drilling operations (W.D.)
Water recorded at 13.0 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 10

Logged By: CS Page: 1 of 1

File No. 24645 Date Drilled: 8/5/19

Client: Lake County Purchasing Division

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

Comments:

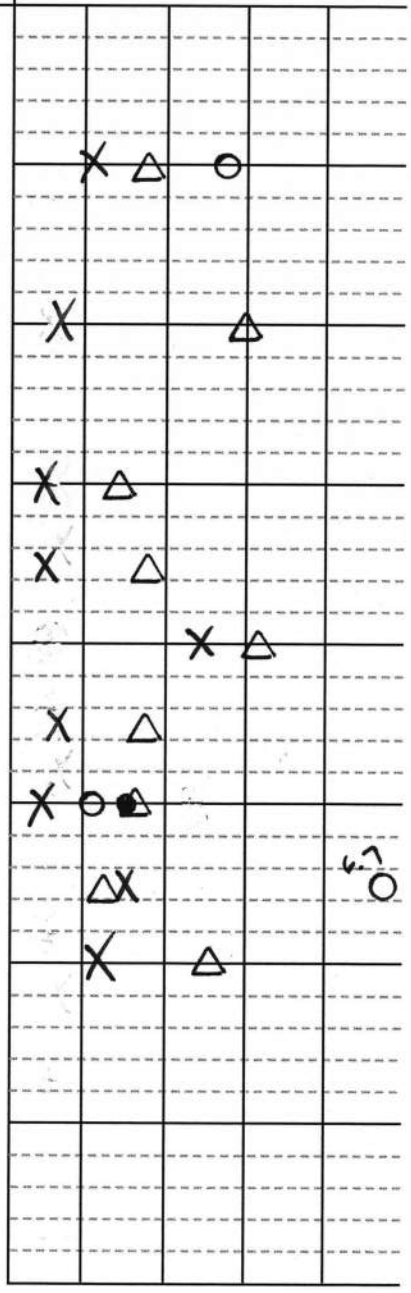
Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

Elevation 721.0' Existing Surface

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϑ	unconfined compressive strengh ○
0	Dark brown-black-brown clay & silt,trace sand & gravel,damp,very tough - Fill				
5		11	18.9	105.8	2.8
	Black silt,some clay,trace sand & gravel damp,loose - Fill				
10		6	30.4		
15	Black-dark brown silt,some clay & sand, trace gravel,damp-very damp,loose - Fill	5	14.1		
		5	19.2		
20	Black silt,some clay,trace sand & roots, damp,medium dense (topsoil)	24	31.2		
	Dark brown-gray to brown-gray silt,some clay,trace sand & gravel,damp,loose ▽	7	18.5		
25	Brown clay & silt,trace sand & gravel, damp-very damp,tough to hard	5	17.0	123.8	1.1
	▽	15	12.9	123.9	6.7
	Brown-gray to gray clay,some silt,trace sand & gravel,damp,tough				
30	End of Boring	12	25.9		
35					
40					

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at 28.5 feet during drilling operations (W.D.)
Water recorded at 22.0 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

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SOIL BORING LOG 11

Logged By: CS Page: 1 of 1

Client: Lake County Purchasing Division

File No. 24645 Date Drilled: 8/2/19

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

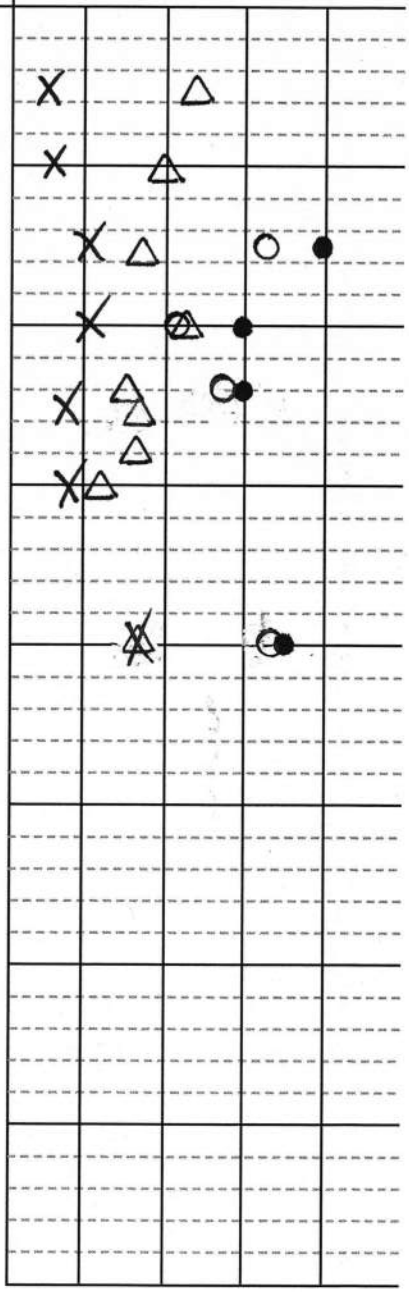
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 702.3' Existing Surface	standard penetration ×	moisture content Δ	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strengh ○
	Dark brown-black-brown silt,some sand & clay,trace gravel & roots,damp,loose - Fill	5	24.3		
5		6	19.8		
	Brown clay & silt,trace sand & gravel, damp,very tough	11	18.0	104.1	3.3
	Gray clay,some silt,trace sand & gravel, damp,very tough	11	23.0	102.5	2.2
10			14.5	118.4	2.8
	Gray fine-medium sand,some coarse sand, trace gravel,saturated,loose	8	15.9		
			16.4		
15	Gray silt,some clay,trace sand & gravel, damp,loose	8	12.3		
	Gray clay,some silt,trace sand & gravel, damp,very tough	17	17.0	116.4	3.3
20	End of Boring				
25					
30					
35					
40					

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
Δ moisture content, %
10 20 30 40



Water encountered at 12.0 feet during drilling operations (W.D.)
Water recorded at 6.0 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 12

Logged By: CS **Page:** 1 of 1

Client: Lake County Purchasing Division

File No. 24645 **Date Drilled:** 8/2/19

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

Comments:

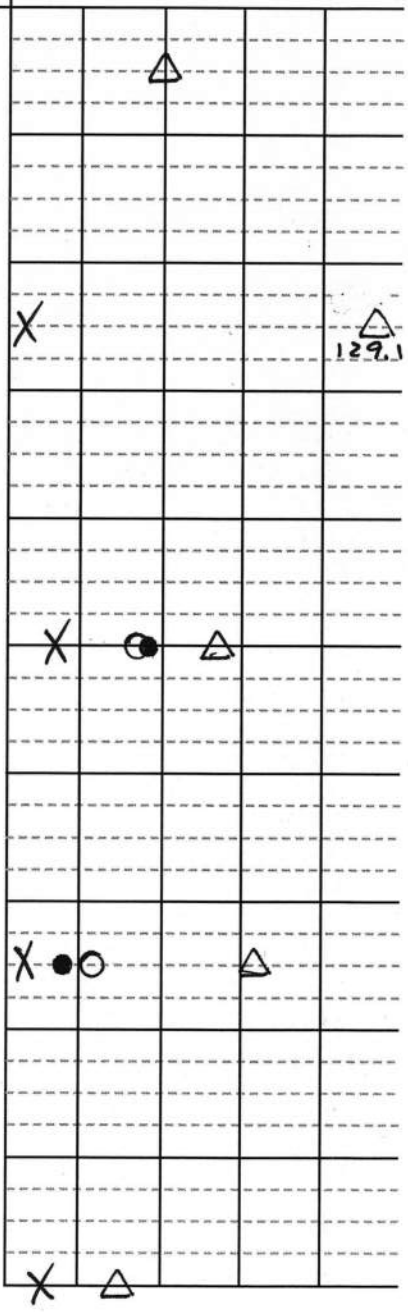
Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

Elevation 705.6' **Existing Surface**

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strengh ○
1	Dark brown silt,some clay,trace sand & roots,damp (topsoil)		19.5		
2	Dark brown-black silt,trace fine sand & organic matter,very loose	3	129.1		
3					
4	Dark brown-dark gray to brown-gray-dark-gray clay,some silt,trace sand & gravel,damp,tough				
5	▼	6	27.2	94.5	1.7
6					
7		3	30.9	92.4	1.2
8					
9	Brown-gray silt,some clay,trace sand & gravel,damp,very loose				
10	End of Boring	4	14.6		

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at 5.0 feet during drilling operations (W.D.)
Water recorded at 5.0 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

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SOIL BORING LOG 13

Logged By: CS **Page:** 1 of 1

Client: Lake County Purchasing Division

File No. 24645 **Date Drilled:** 8/2/19

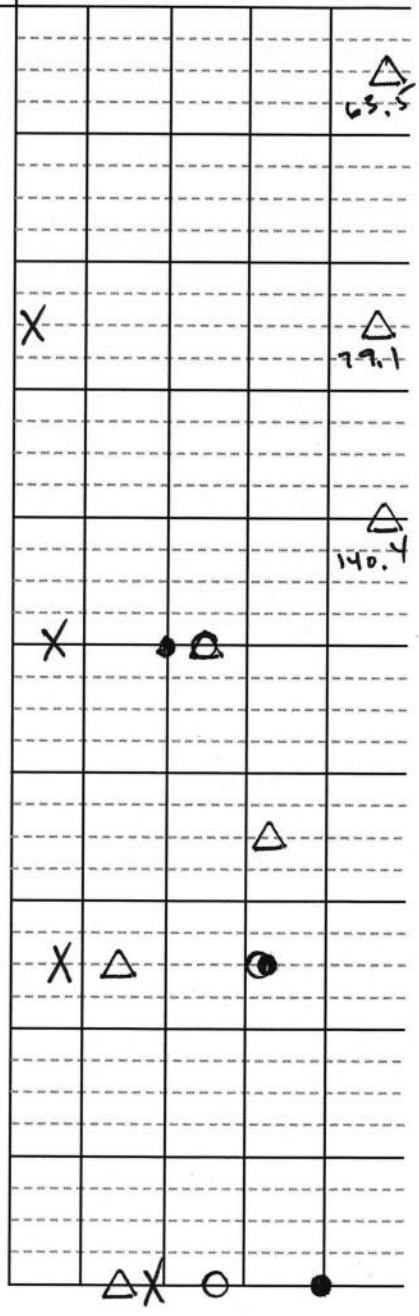
Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

Elevation 702.0' **Existing Surface**

depth, ft.	CLASSIFICATION	standard penetration (×)	moisture content (△)	dry unit weight lbs./cu.ft. (ɣ)	unconfined compressive strength (○)
1	Dark brown-black silt,trace fine sand, organic matter & shells,damp-very damp, very loose		63.5		
2					
3		3	79.1		
4			140.4		
5	Brown-gray clay,some silt,trace sand & gravel,damp,very tough	5	24.9	103.4	2.5
6	Brown-gray silt,some fine-medium sand & clay,trace coarse sand & gravel,very damp loose		32.8		
7	Gray clay,some silt,trace sand & gravel, damp,very tough	7	14.3	132.0	3.2
8					
9					
10	End of Boring	18	14.7	124.6	2.7



Water encountered at 3.0 feet during drilling operations (W.D.)

Water recorded at 3.0 feet on completion of drilling operations (A.D.)

Water recorded at feet hours after completion of drilling operations (A.D.)

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8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 14

Logged By: CS **Page:** 1 of 1

File No. 24645 **Date Drilled:** 8/2/19

Client: Lake County Purchasing Division

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

Comments:

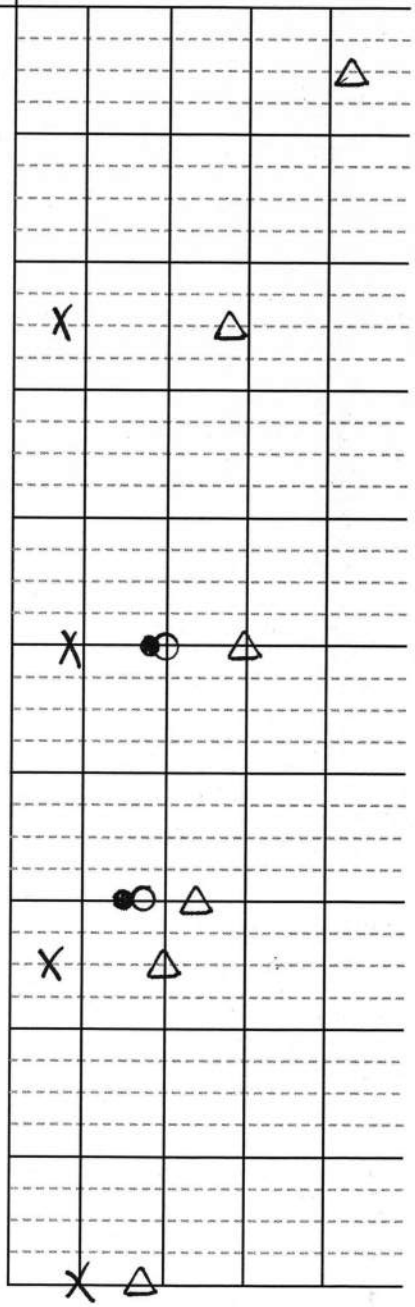
Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

Elevation 701.7' **Existing Surface**

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
1	Dark brown silt,some clay,trace sand & roots,damp (topsoil) - Fill		42.4		
2	Dark brown-black-brown silt,some clay, trace sand & gravel,damp,loose - Fill	7	28.7		
3					
4	Dark brown-dark gray to brown-gray clay, some silt,trace sand & gravel,damp,very tough				
5		8	29.9	91.0	2.0
6	Dark brown-dark gray to brown-gray clay, some silt,trace sand & gravel,damp, tough				
7			24.0	97.0	1.7
8	Brown-gray medium-coarse sand,some fine sand & silt,trace gravel,very damp-saturated,loose	5	19.7		
9	Gray silt,some clay,trace sand & gravel, damp,medium dense				
10	End of Boring	10	18.0		

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at 7.5 feet during drilling operations (W.D.)
Water recorded at 5.0 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

G-303d

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 15

Logged By: CS **Page:** 1 of 1

Client: Lake County Purchasing Division

File No. 24645 **Date Drilled:** 8/2/19

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

Comments:

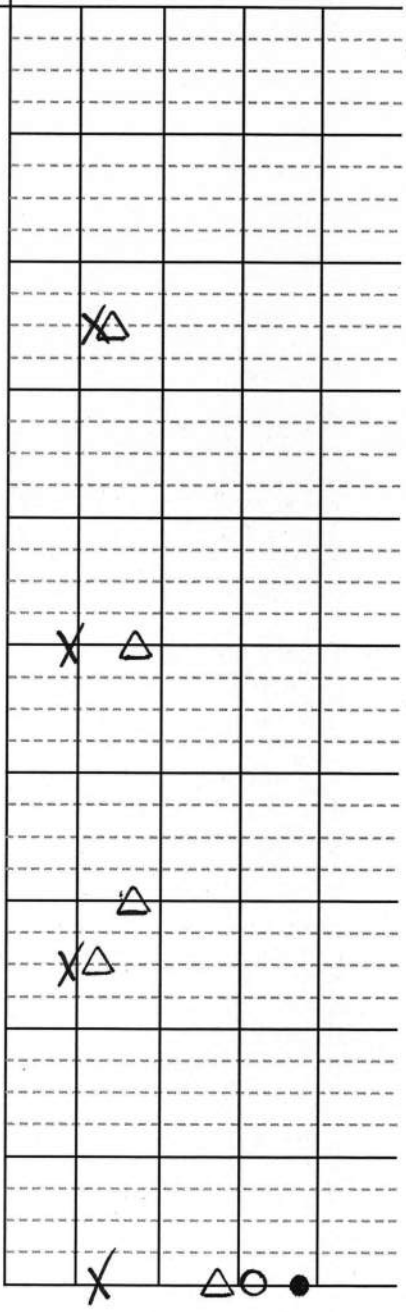
Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 703.5' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϑ	unconfined compressive strengh ○
1	Brown-dark brown-black silt,some clay, trace sand & gravel,damp,medium dense - Fill				
2					
3		12	14.1		
4	Brown-dark brown-black silt,some clay, trace sand & gravel,damp,loose - Fill				
5		9	17.2		
6					
7			17.3		
	Brown silt,some clay,trace sand & gravel damp,loose	9	13.1		
8	Brown clay,some silt,trace sand & gravel damp,very tough				
9					
10		13	26.9	97.0	3.2

End of Boring

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 16

Logged By: CS **Page:** 1 of 1

File No. 24645 **Date Drilled:** 8/5/19

Client: Lake County Purchasing Division

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

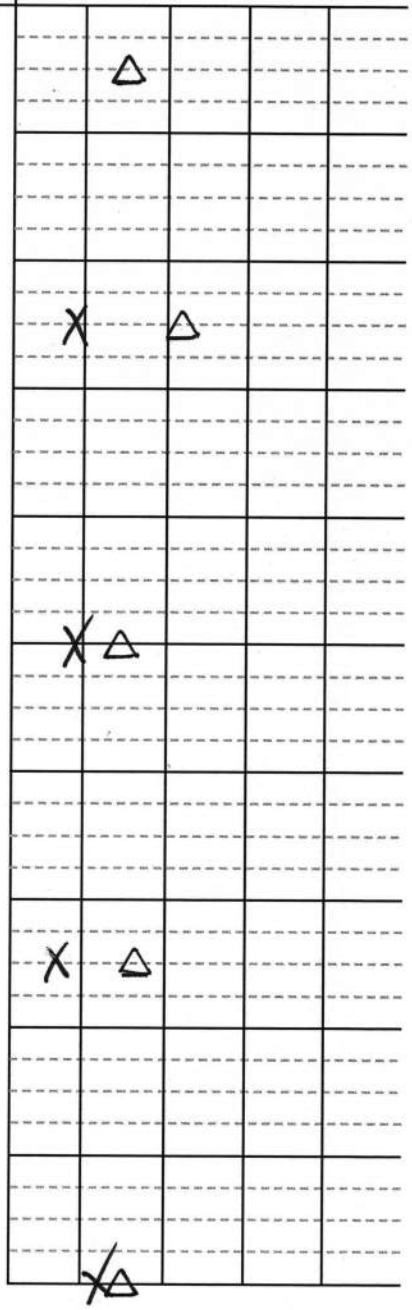
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 704.0' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strengh ○
1	Dark brown silt,some clay,trace sand & roots,damp (topsoil)		15.4		
2	Brown silt,some clay & sand,trace gravel damp,loose to medium dense	9	21.5		
5		9	14.3		
8		7	16.4		
10	End of Boring	12	14.8		

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 17

Logged By: CS **Page:** 1 of 1

Client: Lake County Purchasing Division

File No. 24645 **Date Drilled:** 8/5/19

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

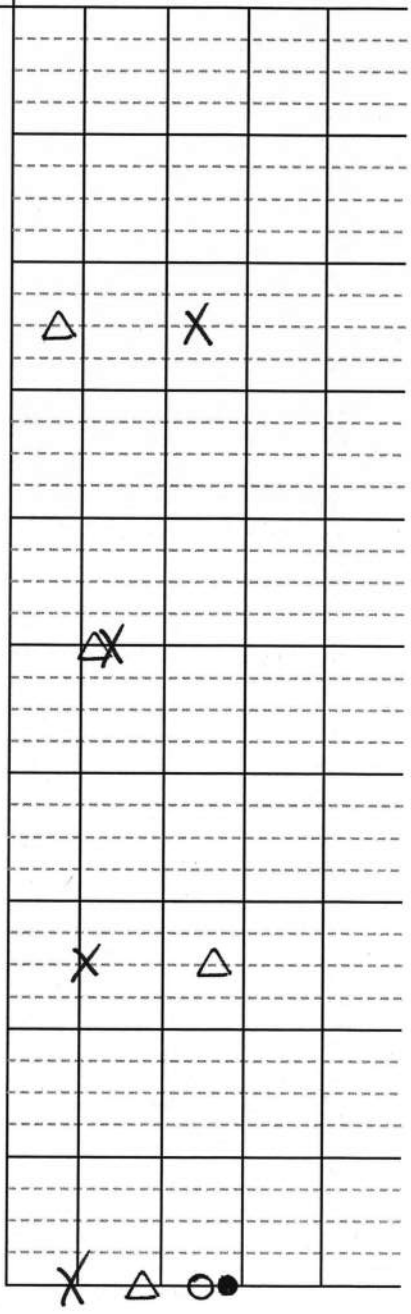
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 708.0' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϒ	unconfined compressive strength ○
1–2–3	Brown-dark brown-gray fine sand,some silt & gravel,trace medium-coarse sand, damp,medium dense - Fill	24	7.9		
4–5–6	Brown silt,some fine-medium sand,trace coarse sand,gravel & clay,damp,medium dense - Fill	14	11.2		
7–8	Black silt,some clay,trace sand & roots damp,medium dense (topsoil)	11	27.0		
9–10	Brown-gray clay & silt,trace sand & gravel,damp,very tough End of Boring	9	19.1	110.0	2.5

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 18

Logged By: CS Page: 1 of 1

Client: Lake County Purchasing Division

File No. 24645 Date Drilled: 8/5/19

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

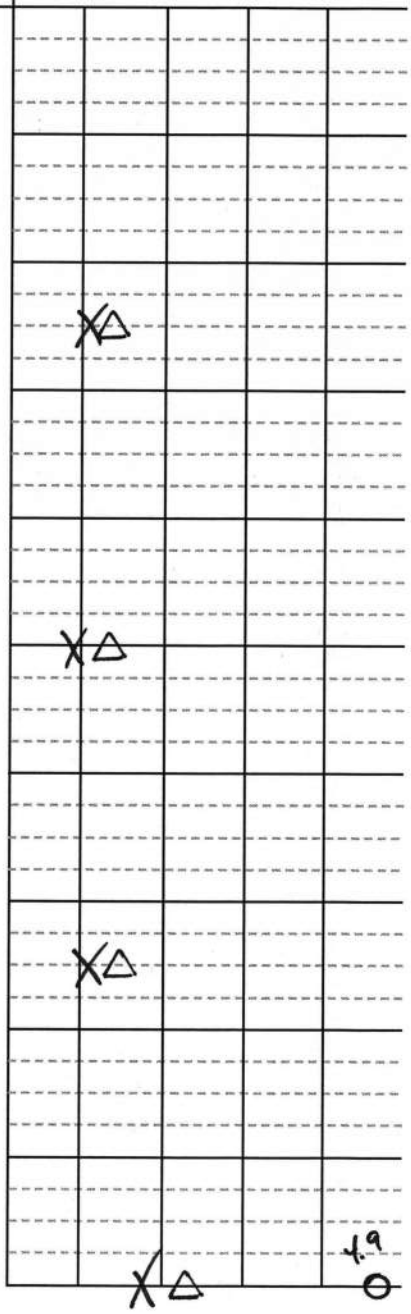
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 708.0' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ϑ	unconfined compressive strengh ○
1	Dark brown to brown silt,some fine sand, trace clay,medium-coarse sand & gravel, damp,medium dense				
2					
3		11	14.2		
4	Brown to brown-gray silt,some clay,trace sand & gravel,damp,loose to medium dense				
5		9	14.2		
6					
7					
8		11	14.8		
9	Brown clay,some silt,trace sand & gravel damp,hard				
10	End of Boring	17	23.3	105.1	4.9

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 19

Logged By: CS **Page:** 1 of 1

Client: Lake County Purchasing Division

File No. 24645 **Date Drilled:** 8/5/19

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

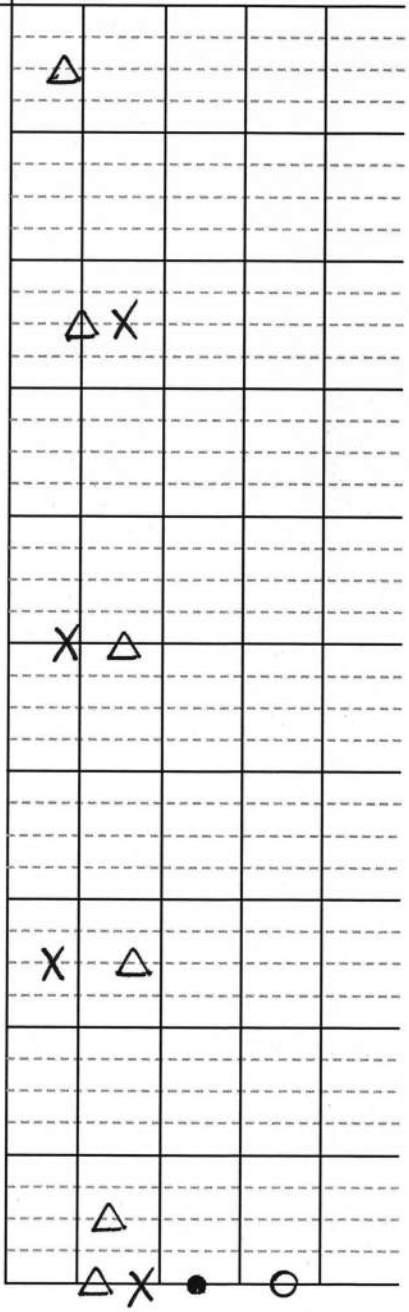
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 703.0' Existing Surface	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strengh ○
	Brown fine sand,some silt,trace medium-coarse sand & gravel,damp - Fill - 8.0"		8.9		
1	Brown-dark brown-black silt,some clay & sand,trace gravel,damp,medium dense - Fill				
2		15	9.5		
3					
4	Brown-gray silt,some clay,trace sand & gravel,damp,loose				
5		8	15.3		
6					
7		7	16.5		
8					
9					
10	Gray clay,some silt,trace sand & gravel, damp,very tough		14.4		
	End of Boring	17	13.1	123.5	3.6

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.
8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 20

Logged By: CS Page: 1 of 1

File No. 24645 Date Drilled: 8/5/19

Client: Lake County Purchasing Division

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

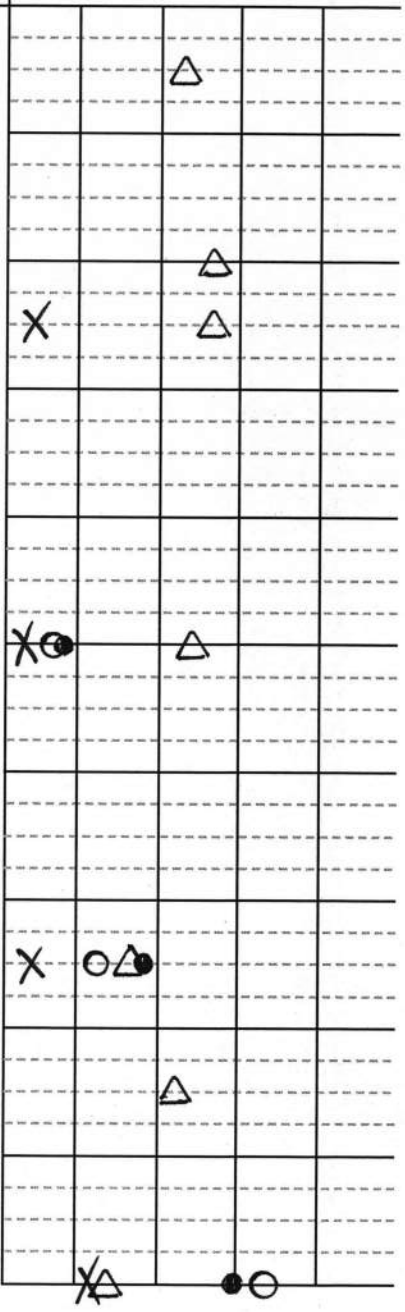
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

Elevation 698.5' Existing Surface

depth, ft.	CLASSIFICATION	standard penetration ×	moisture content △	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strengh ○
0	Black silt,some clay,trace sand & roots, damp (topsoil)		22.9		
2	Dark brown-dark gray to brown-gray clay & silt,trace sand & gravel,damp,soft	4	27.0 27.1		
4	Brown-gray-dark gray clay,some silt, trace sand & gravel,very damp,stiff	3	24.4	103.9	0.7
6	Brown-gray clay,some silt,trace sand, gravel & root matter,damp,tough	4	17.0	116.5	1.3
8	Brown fine-medium sand,trace coarse sand,gravel & silt,saturated		21.7		
9	Gray clay,some silt,trace sand & gravel, damp,very tough				
10	End of Boring	12	14.9	124.8	3.4

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0
× standard penetration "N", blows/ft.
△ moisture content, %
10 20 30 40



Water encountered at 7.5 feet during drilling operations (W.D.)
Water recorded at 7.0 feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.

8 W. COLLEGE DR. • SUITE C • ARLINGTON HEIGHTS, IL 60004

SOIL BORING LOG 21

Logged By: CS **Page:** 1 of 1

Client: Lake County Purchasing Division

File No. 24645 **Date Drilled:** 8/2/19

Reference: Lake County Consolidated Public Safety Facility - Libertyville,IL

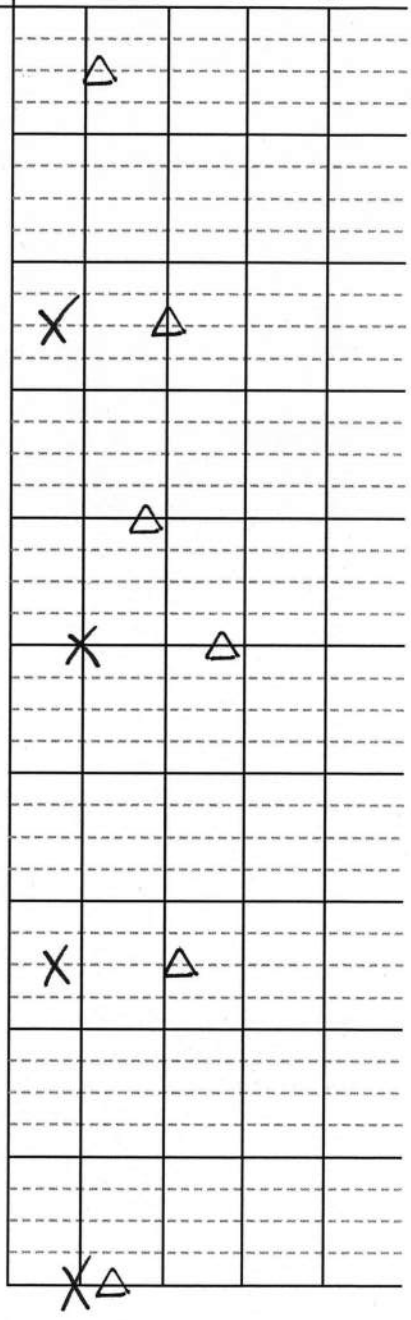
Comments:

Equipment: ☒CME 45B ☐CME 55 ☐Hand Auger ☐Other

depth, ft.	CLASSIFICATION Elevation 696.9' Existing Surface	standard penetration ×	moisture content Δ	dry unit weight lbs./cu.ft. ɣ	unconfined compressive strength ○
0	Dark brown silt,some clay,trace sand & roots,damp (topsoil) - Fill - 10.0"		10.9		
1	Brown-black-dark brown silt,some clay & sand,trace gravel,damp,loose - Fill				
2					
3		6	20.0		
4			18.8		
5	Black silt,some clay,trace sand & roots, damp,medium dense (topsoil)	10	28.4		
6					
7	Brown-gray silt,some clay,trace sand & gravel,damp,loose				
8		6	21.8		
9					
10	End of Boring	9	14.0		

○ unconfined compressive strength, tons/sq. ft.
● penetrometer reading, tons/sq. ft.
1.0 2.0 3.0 4.0

× standard penetration "N", blows/ft.
Δ moisture content, %
10 20 30 40



Water encountered at dry feet during drilling operations (W.D.)
Water recorded at dry feet on completion of drilling operations (A.D.)
Water recorded at feet hours after completion of drilling operations (A.D.)

SOIL AND MATERIAL CONSULTANTS, INC.
8 W. COLLEGE DR. • ARLINGTON HEIGHTS, IL 60004 • 847-870-0544 • FAX 847-870-0661

GENERAL NOTES

SAMPLE CLASSIFICATION

Soil sample classification is based on the Unified Soil Classification System, the Standard Practice for Description and Identification Soils (Visual-Manual Procedure), ASTM D-2488, the Standard Test Method for Classification of Soils for Engineering Purposes, ASTM D-2487 (when applicable), and the modifiers noted below.

CONSISTENCY OF COHESIVE SOILS

Term	Qu-tons.sq.ft.	N (unreliable)
Very soft	0.00 – 0.25	0 – 2
Soft	0.26 – 0.49	3 – 4
Stiff	0.50 – 0.99	5 – 8
Tough	1.00 – 1.99	9 –15
Very Tough	2.00 – 3.99	16 – 30
Hard	4.00 – 7.99	30 +
Very Hard	8.00 +	

RELATIVE DENSITY OF GRANULAR SOILS

Term	N – blows/foot
Very Loose	0 – 4
Loose	5 – 9
Medium Dense	10 – 29
Dense	30 – 49
Very Dense	50 +

IDENTIFICATION AND TERMINOLOGY

Term	Size Range
Boulder	over 8 in.
Cobble	3 in. to 8 in.
Gravel - coarse	1 in. to 3 in.
- medium	3/8 in. to 1 in.
- fine	#4 sieve to 3/8 in.
Sand - coarse	#10 sieve to #4 sieve
- medium	#40 sieve to #10 sieve
- fine	#200 sieve to #40 sieve
Silt	0.002 mm to #200 sieve
Clay	smaller than 0.002mm

Modifying Term	Percent by Weight
Trace	1 – 10
Little	11 – 20
Some	21 – 35
And	36 – 50

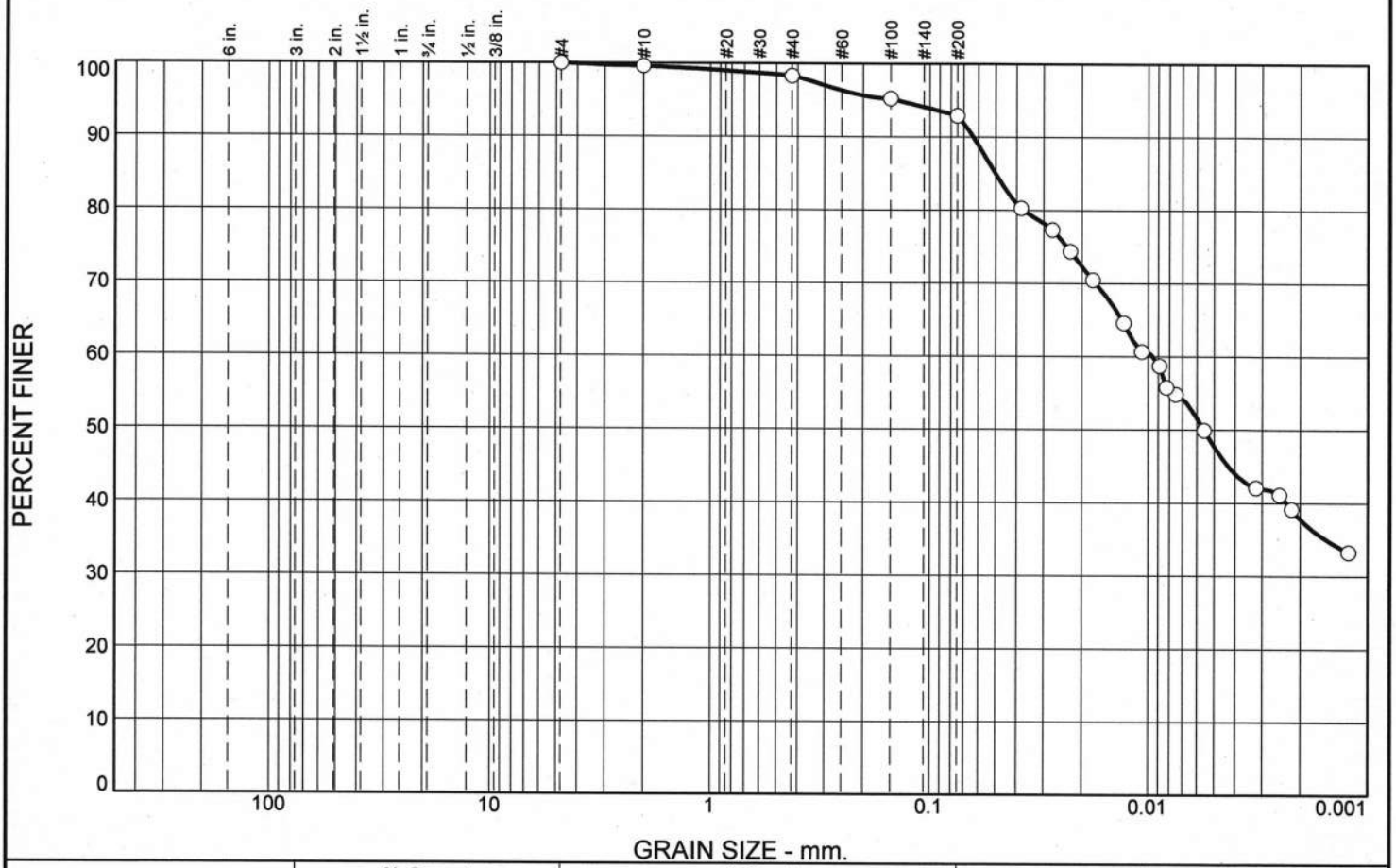
Moisture Content

Dry
Damp
Very Damp
Saturated

DRILLING, SAMPLING & SOIL PROPERY SYMBOLS

CF	-	Continuous Flight Auger
HS	-	Hollow Stem Auger
HA	-	Hand Auger
RD	-	Rotary Drilling
AX	-	Rock Core, 1-3/16 in. diameter
BX	-	Rock Core, 1-5/8 in. diameter
NX	-	Rock Core, 2-1/8 in. diameter
S	-	Sample Number
T	-	Type of Sample
J	-	Jar
AS	-	Auger Sample
SS	-	Split Spoon (2 in. O.D. with 1-3/8 in. I.D.)
ST	-	Shelby Tube (2 in. O.D. w/ith1-7/8 in. I. D.)
R	-	Recovery Length, in.
B	-	Blows/6 in. interval, Standard Penetration Test (SPT)
N	-	Blows/foot to drive 2 in. O.D. split-spoon sampler with 140 lb. hammer falling 30 in., (STP)
Pen.	-	Pocket Penetrometer readings, tons/sq.ft.
W	-	Water Content, % dry weight
Uw	-	Dry Unit Weight of soil, lbs./cu.ft.
Qu	-	Unconfined Compressive Strength, tons/sq.ft.
Str	-	% Strain at Qu.
WL	-	Water Level
WD	-	While Drilling
AD	-	After Drilling
DCI	-	Dry Cave-in.
WCI	-	Wet Cave-in.
LL	-	Liquid Limit, %
PL	-	Plastic Limit, %
PI	-	Plasticity Index (LL-PL)
LI	-	Liquidity Index [(W-PL)/PI]

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	1.3	5.4	55.1	37.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.6		
#40	98.3		
#100	95.2		
#200	92.9		

* (no specification provided)

Material Description

Silty Clay Loam

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.0633 D_{85}= 0.0501 D_{60}= 0.0094
D_{50}= 0.0056 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

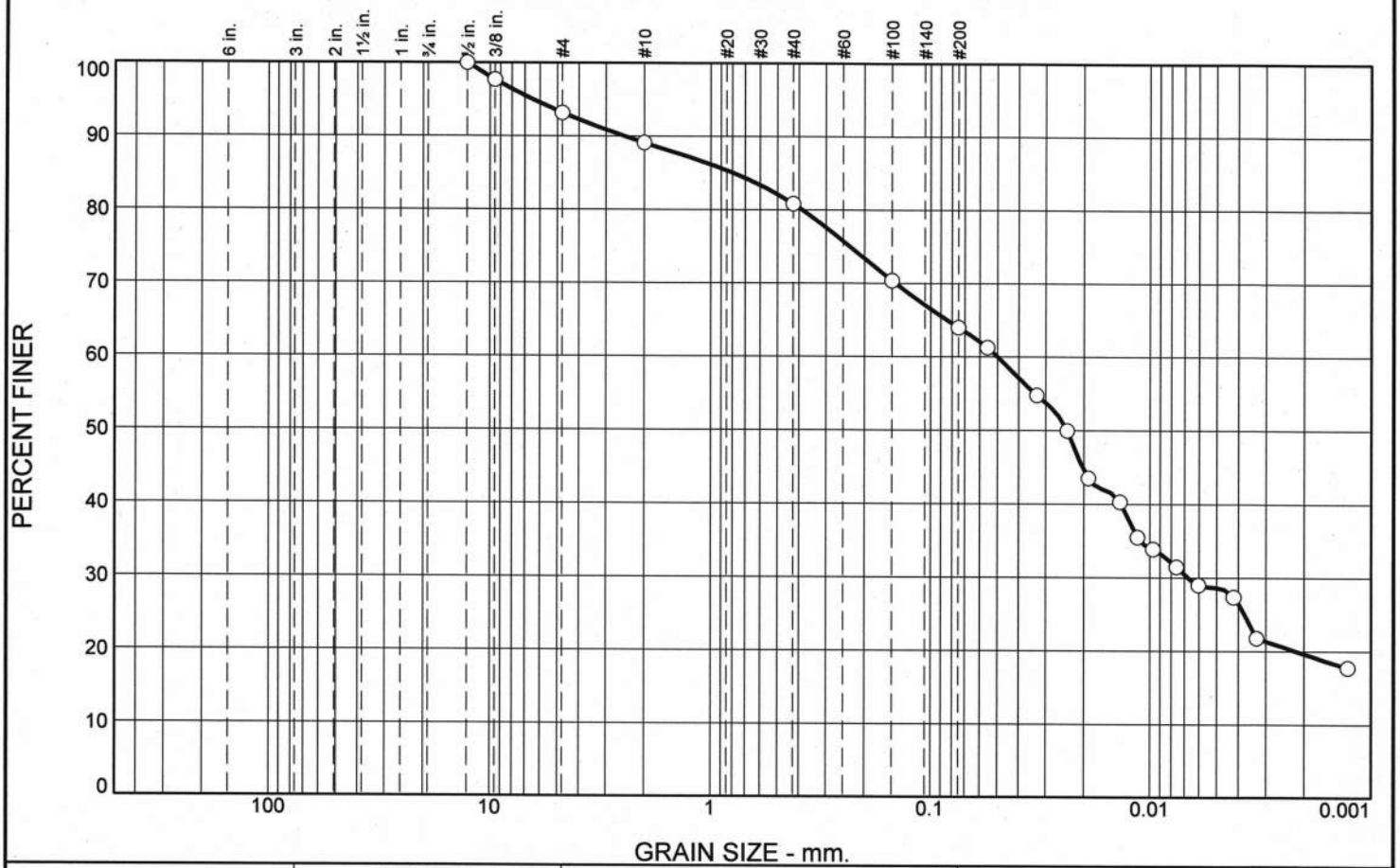
Remarks

Location: Boring 12
Sample Number: 3 **Depth:** 3.5' - 5.0' **Date:**

SOIL AND MATERIAL CONSULTANTS, INC.

Client: Lake County Purchasing Division
Project: Lake County Consolidated Public Safety Facility Libertyville, IL
Project No: 24645 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.8	4.1	8.3	16.8	44.4	19.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2	100.0		
3/8	97.7		
#4	93.2		
#10	89.1		
#40	80.8		
#100	70.4		
#200	64.0		

* (no specification provided)

Material Description

Loam

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.4676 D_{85}= 0.7964 D_{60}= 0.0498
D_{50}= 0.0239 D_{30}= 0.0068 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

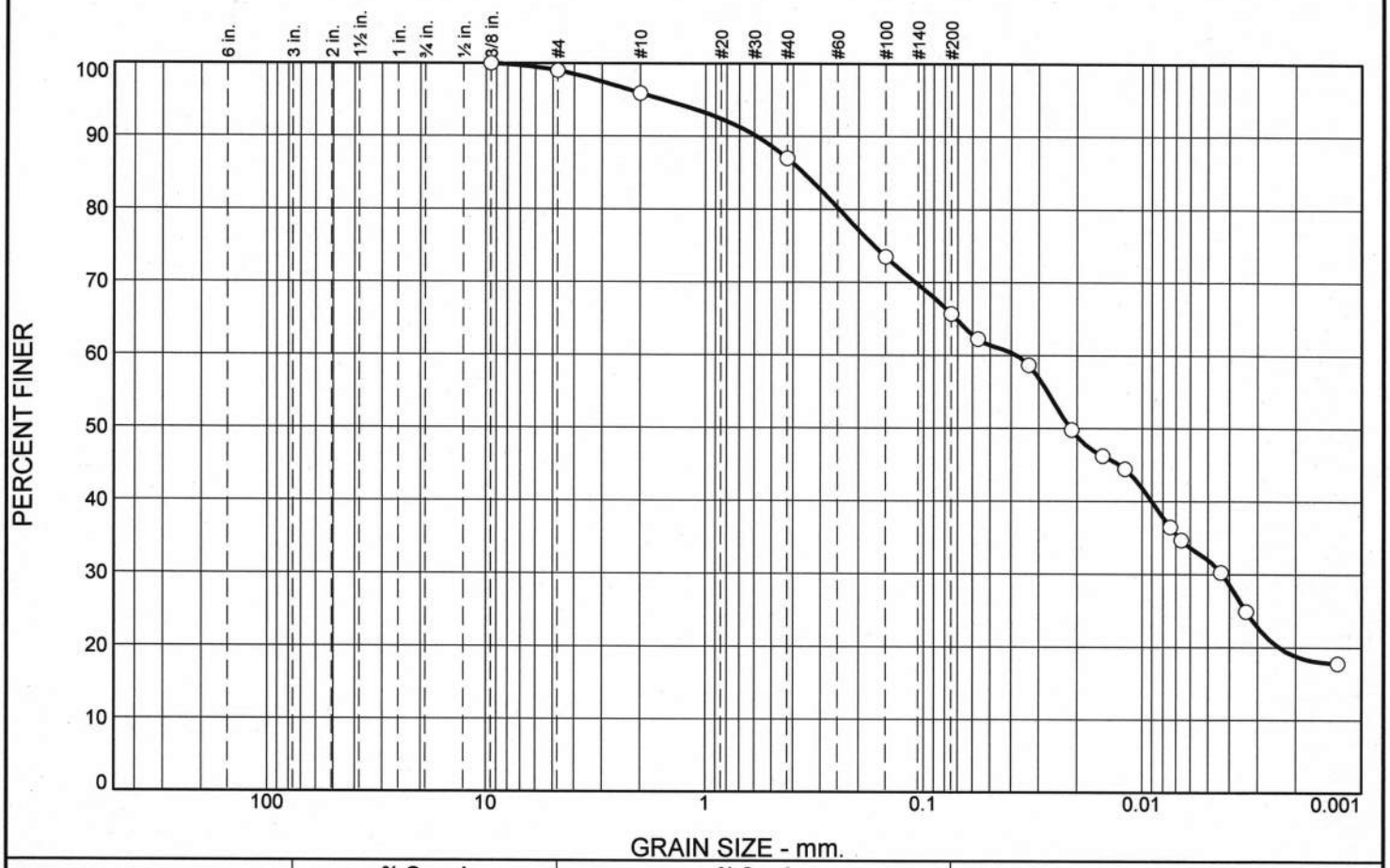
Remarks

Location: Boring 18
Sample Number: 1 **Depth:** 1.0' - 2.5' **Date:**

SOIL AND MATERIAL CONSULTANTS, INC.

Client: Lake County Purchasing Division
Project: Lake County Consolidated Public Safety Facility Libertyville, IL
Project No: 24645 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.0	3.1	8.9	21.3	46.9	18.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.0		
#10	95.9		
#40	87.0		
#100	73.5		
#200	65.7		

* (no specification provided)

Material Description

Loam

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5882 D_{85}= 0.3578 D_{60}= 0.0377
D_{50}= 0.0214 D_{30}= 0.0043 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

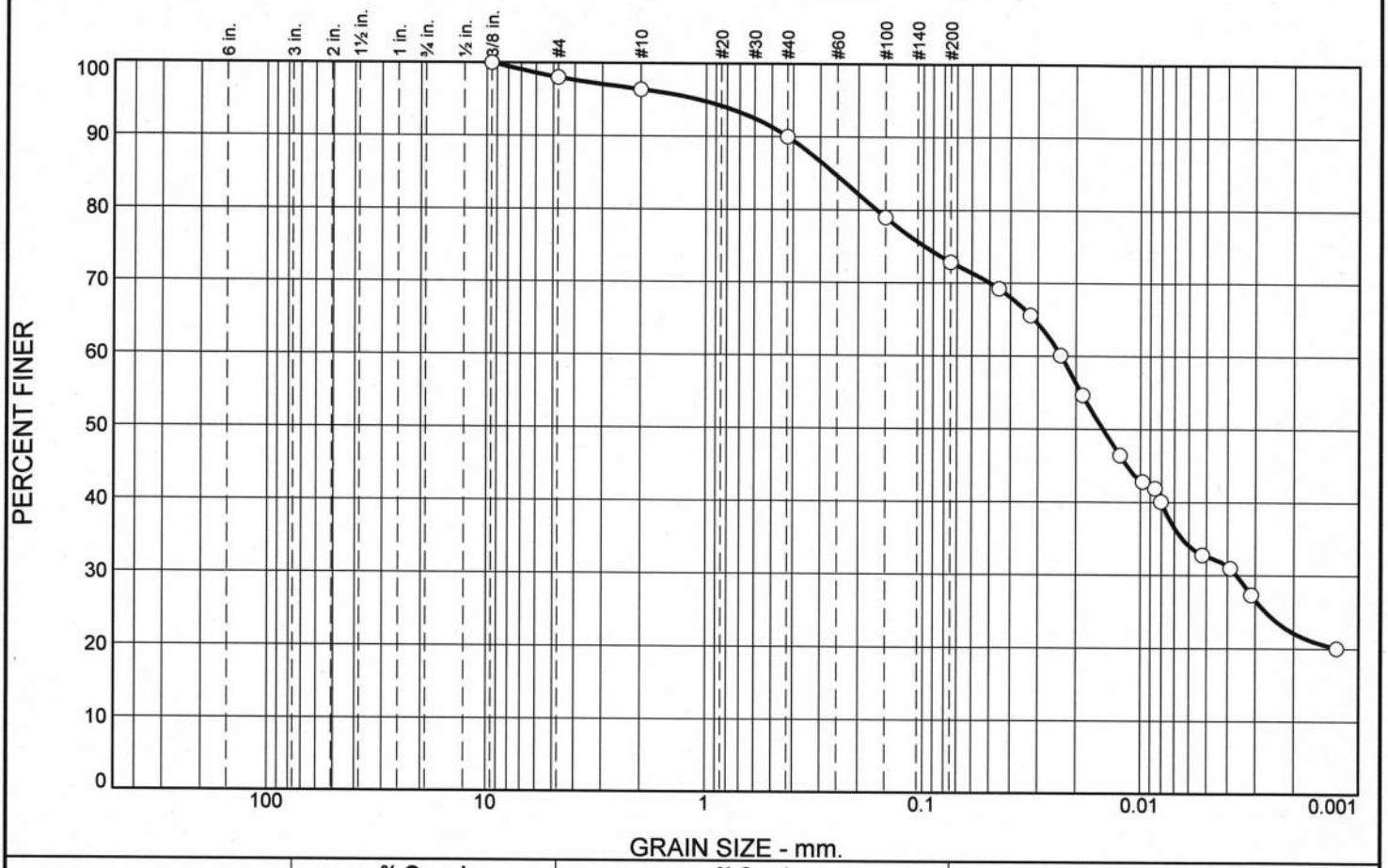
Remarks

Location: Boring 16
Sample Number: 2 **Depth:** 15" - 2.5' **Date:**

SOIL AND MATERIAL CONSULTANTS, INC.

Client: Lake County Purchasing Division
Project: Lake County Consolidated Public Safety Facility Libertyville, IL
Project No: 24645 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.0	1.6	6.4	17.1	50.8	22.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	98.0		
#10	96.4		
#40	90.0		
#100	79.0		
#200	72.9		

* (no specification provided)

Material Description

Silt Loam

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4250 D_{85}= 0.2583 D_{60}= 0.0234
D_{50}= 0.0149 D_{30}= 0.0036 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: Boring 21
Sample Number: 5 **Depth:** 6.0' - 7.0' **Date:**

SOIL AND MATERIAL CONSULTANTS, INC.

Client: Lake County Purchasing Division
Project: Lake County Consolidated Public Safety Facility Libertyville, IL
Project No: 24645 **Figure**

GEI Consultants

Consulting
Engineers and
Scientists

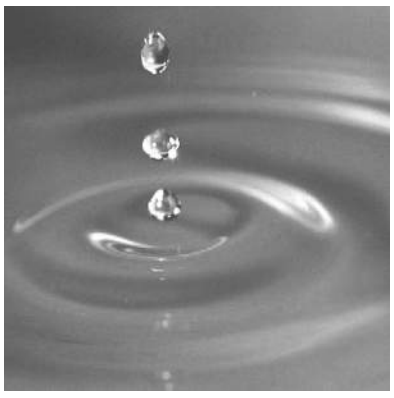
Subsurface Exploration and Geotechnical Engineering Report
Regional Operations and Communication Facility
Libertyville, Illinois

Submitted to:
Mr. Matt Bickel
Wold Architects and Engineers
220 North Smith Street, Suite 310
Palatine, Illinois 60067

Submitted by:
GEI Consultants, Inc.
8615 W. Bryn Mawr, Suite 406
Chicago, IL 60631

July 28, 2022

Project 2202656



Darren S. Diehm, P.E., D.GE.
Senior Professional

GEI Consultants

Consulting
Engineers and
Scientists

July 28, 2022
GEI Project No. 2202656

VIA EMAIL: mbickel@woldae.com

Mr. Matt Bickel
Wold Architects and Engineers
220 North Smith Street, Suite 310
Palatine, Illinois 60067

RE: Subsurface Exploration and Geotechnical Engineering Report for the Lake County Regional Operations & Communications Facility in Libertyville, IL

Dear Mr. Bickel:

GEI Consultants, Inc. has completed our subsurface exploration and geotechnical analyses for the Lake County Regional Operations & Communications Facility in Libertyville, IL.

The very stiff clay and silty clay encountered at frost depth in the borings should be suitable for foundation support of the planned structure. The on-site clay should also be suitable for reuse as site fill, although some moisture conditioning may be required. Spread footing foundations bearing on the natural soils or properly placed and compacted fill, may be designed using a maximum net allowable bearing pressure of 3,500 psf. Continuous strip footings should be designed for a net allowable bearing pressure of 3,000 psf.

We appreciate the opportunity to provide our services for this project. Please do not hesitate to call with any questions regarding our report.

Sincerely,

GEI CONSULTANTS, INC.

Ati Fathi, P.E.
Senior Professional

Darren S. Diehm, P.E., D.GE.
Senior Professional

Table of Contents

Appendix B

Seismic Design Parameters

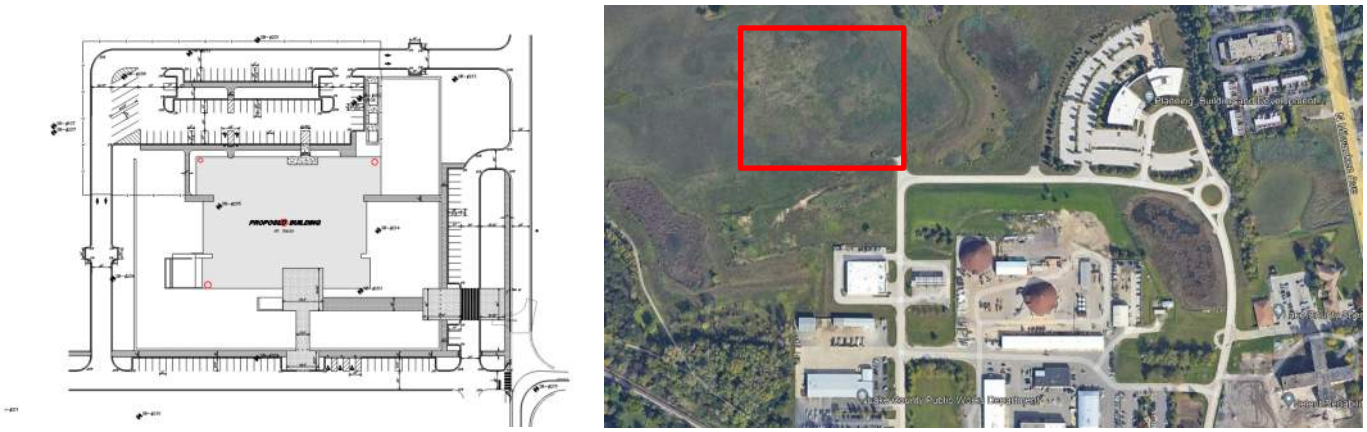
Appendix C

Site Topography

1. Introduction

GEI Consultants, Inc. (GEI) has prepared this report for Wold Architects and Engineers in accordance with our proposal dated June 30, 2022. The purposes of this report are to summarize the field and laboratory test data and to provide recommendations regarding the design and construction of foundations for the project.

We understand that a new single-story residential building is planned for the Regional Operations & Communications Facility near the northwest intersection of West Winchester Road and Milwaukee Avenue in Libertyville, Illinois. A stormwater detention basin is also planned at the west side of the site.



1a: Building Plan **1b:** Project Site

Figure 1: Milwaukee Avenue and Winchester Road, Libertyville, IL (*rep. from Google Earth*)

The site is currently vacant and based on the proposed finished floor at elevation +709.5 NAVD 88, between 3 and 7 feet of new fill is required to reach the planned elevations. The maximum column loads are anticipated to be about 100 kips, and the maximum wall load will be less than about 6 kip per linear foot.

2. Exploration Procedures

2.1 Subsurface Exploration

TSC performed a subsurface exploration at this site in 2009. Six soil borings (B-1 to B-4 and C-1 to C-2) were completed at the approximate locations shown below by Geocon Professional Services under subcontract to GEI. The results of all borings were used in developing the recommendations presented in this report. A full-size boring location diagram is provided in the Appendix.

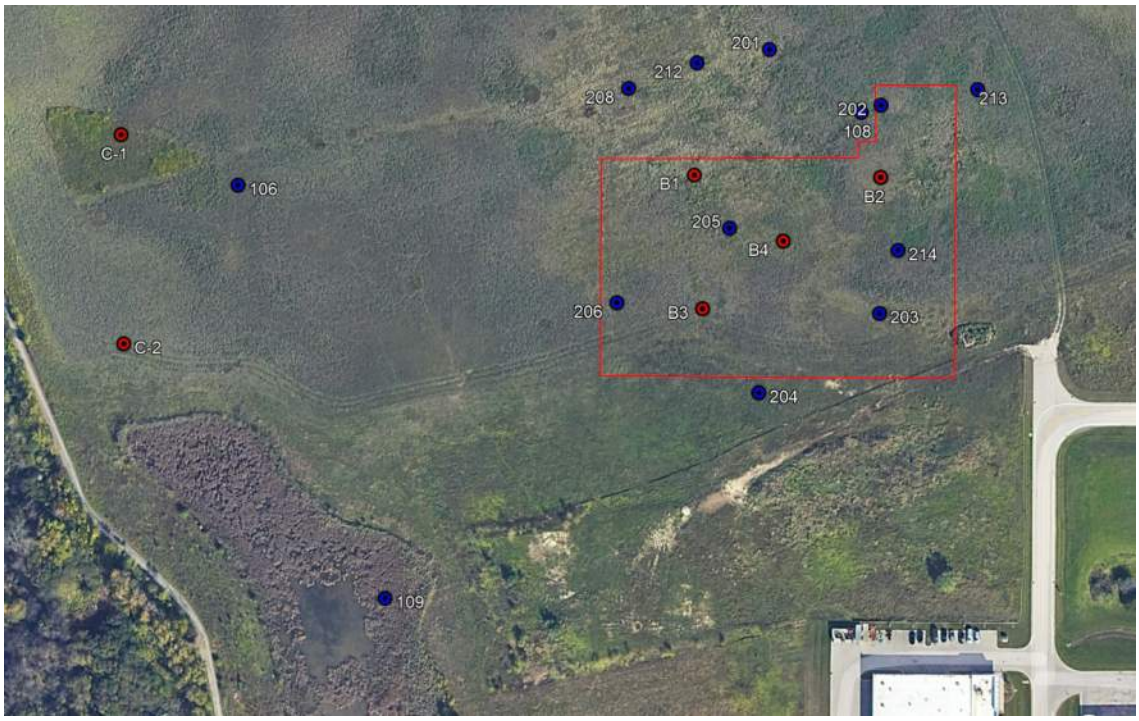


Figure 2: Soil boring locations

The 2022 boreholes were advanced through the soil using hollow stem augers. Representative soil samples were obtained in the soil borings in general accordance with split-barrel sampling procedures as outlined in ASTM Standard D 1586.

A field log for each boring was prepared by the drill crew. The log included visual classifications of the materials encountered during drilling, as well as the driller's interpretation of the subsurface conditions between samples. The depth at which groundwater was encountered while sampling or drilling was observed and noted on the field log. The groundwater observations are presented on the lower left corner of the soil boring logs included in Appendix A.

The soil samples were sealed in jars and transported to our geotechnical laboratory for further examination and testing. The borehole was grouted to existing grade upon completion of the drilling operations, and the pavement was patched. The final boring logs included with this report represent an interpretation of the field log and include modifications based on laboratory observation and results of tests of the samples.

2.2 Laboratory Procedures

Representative portions of the soil samples were observed by a geotechnical engineer to estimate the distribution of grain sizes, plasticity, organic content, moisture condition, color, presence of lenses and seams, and apparent geological origin. A calibrated hand penetrometer was used to estimate the approximate unconfined compressive strength of the cohesive soil samples. The soils were classified in accordance with our standard practice and assigned group symbols consistent with those recommended by the Unified Soil Classification System. A chart describing the classification system is included in the Appendix.

Results of the field and laboratory tests were plotted on the boring log which is included in the Appendix. Similar soils were grouped into strata on the log. Please note that the strata contact lines represent approximate boundaries between soil types. The actual transition between soil types in the field may be gradual in both the horizontal and vertical directions.

All soil samples recovered from the borings will be retained for a period of 30 days, after which time they will be discarded unless other specific instructions as to their disposition are received.

3. Subsurface Conditions

3.1 Soil Conditions

The soil layers encountered in the borings are described below, beginning at the ground surface.

Vegetation and Topsoil – The site is wooded with ground cover including tall grass and shrubs. Topsoil extended approximately 1-foot below the surface at GEI boring locations; TSC borings showed topsoil as deep as 5.5 feet in Boring SB-214.

Stiff to Hard Clay – Stiff to hard clay was encountered to boring termination depths of 10 to 20 feet below grade. The unconfined compressive strength of the clay was estimated between 1.25 and 4.5 tsf. The clay tends to be harder near the surface and decreases in stiffness with depth. A 2 to 5-foot thick layer of medium dense sand was present within the clay.

The above summary is intended to provide an indication only of the major soil units encountered during the subsurface exploration. Conditions between individual boring locations may vary.

3.2 Groundwater Conditions

Groundwater was observed in Borings B-1 and B-4 at about 14 and 10 feet below existing grade during drilling. Water was not observed in other borings. Based on change in soil color and the moisture content profile of recovered soil samples, the long-term shallow groundwater table is estimated to be located at a depth of 8 to10 feet below grade or elevation +694 NAVD 88.

The groundwater level measurements represent conditions at the times and locations indicated. Groundwater levels should be expected to vary throughout the year in response to changes in the amount of precipitation, leakage from utilities, evaporation, surface runoff, and drainage for nearby basement structures if any are present.

4. Analysis and Recommendations

4.1 Site Preparation and Earthwork

Earthwork including fills and cuts will be required to achieve the planned building and pavement subgrade elevations.

Based on the boring elevations, fills between 5 and 7 feet are required to reach the building finished floor elevation of +709.5 NAVD 88. In the pavement areas, cuts up to 2 feet and fill up to 4 feet should be expected.

Following clearing and any grubbing which may be necessary, all topsoil should be removed from proposed building footprints and pavement areas before site grading commences. Based on the boring information, a stripping depth of 6 to 12 inches should be adequate for this purpose over most of the site. Deeper topsoil removal near Boring SB-214 may be necessary. Tree roots and stumps should be removed to at least 2 feet below finished grade. The stripped topsoil may be stockpiled for later re-use in landscaping.

Following stripping and rough grading, the exposed subgrade in areas receiving fill should be proofrolled using a large piece of construction equipment such as a fully loaded tandem-axle dump truck or a smooth drum roller having a gross weight of 20 tons. Proofrolling should be observed by a geotechnical engineer or qualified representative from GEI. Any areas which are observed to be loose or disturbed, or have excessive deflection during the proofrolling operation, should be carefully trimmed and replaced with one of the fill options recommended below.

The existing natural cohesive soils that contain no organic material can be used as structural fill. However, it should be noted that the cohesive soils at the site will be sensitive to changes in moisture content, which could make them difficult to compact during wet weather conditions such as may occur in late Autumn and early Spring. Cohesive soils should be placed within -2 to +4 percent of the optimum moisture content as determined by the modified Proctor test (ASTM D 1557). The moisture contents of the boring samples indicate the clay and silty clay soils at the site may be below or near their optimum moisture content depending upon the depth of the borrow. Water added for moisture conditioning of the cohesive soils should be applied at a uniform sprayed rate, and then be allowed to soak for a period of time. The soils should then be thoroughly disced to achieve a uniform moisture content before placement and compaction.

Lime stabilization can be considered to improve the workability of the clay soils and to increase the resilient modulus value of pavement subgrades. Quicklime which is applied to dry wet soils will likely require pulverization and mixing, followed by a minimum 24-hour moist cure. Following a final mix, the treated material could then be compacted. Bench

testing would be required to determine the application rate of lime and to determine the engineering properties of the treated clay soil.

Cohesive fill placed within floor slab and foundation areas should be compacted to a minimum of 95% of their maximum dry density as determined by the modified Proctor test. In light duty pavement and general fill areas the compaction level can be reduced to 92%; fill placed below heavy-duty pavements should be compacted to 95% of modified Proctor. These materials should be placed in thin lifts, not exceeding 9 inches in loose thickness, and be compacted using a kneading-type operation such as can be accomplished using a self-propelled sheepsfoot roller. Compaction tests should be performed on each lift of fill placed to confirm that these soils have achieved an adequate degree of compaction. Lime stabilized backfill will not have the same properties as untreated cohesive fill obtained from on-site borrow sources.

Cohesive fill cannot be placed when frozen, and we do not recommend moisture conditioning or placement in Winter. Lime stabilization should not be performed if the ambient temperature is below 40° F or when conditions indicate that temperatures may fall below 40° F within 24 hours of application. Granular fill is recommended if the site fill is constructed in late Autumn, Winter, or early Spring.

Imported fill should consist of a well-graded granular material, containing less than 15% by weight passing the No. 200 (0.075 mm) sieve. This material should be placed in thin lifts not exceeding 9 to 12 inches in loose thickness and be compacted to a minimum of 95% of the maximum dry density as determined by the modified Proctor test (ASTM D 1557). Due to the difficulty of achieving adequate compaction in restricted areas, granular backfill should be expected around grade beams and in footing excavations.

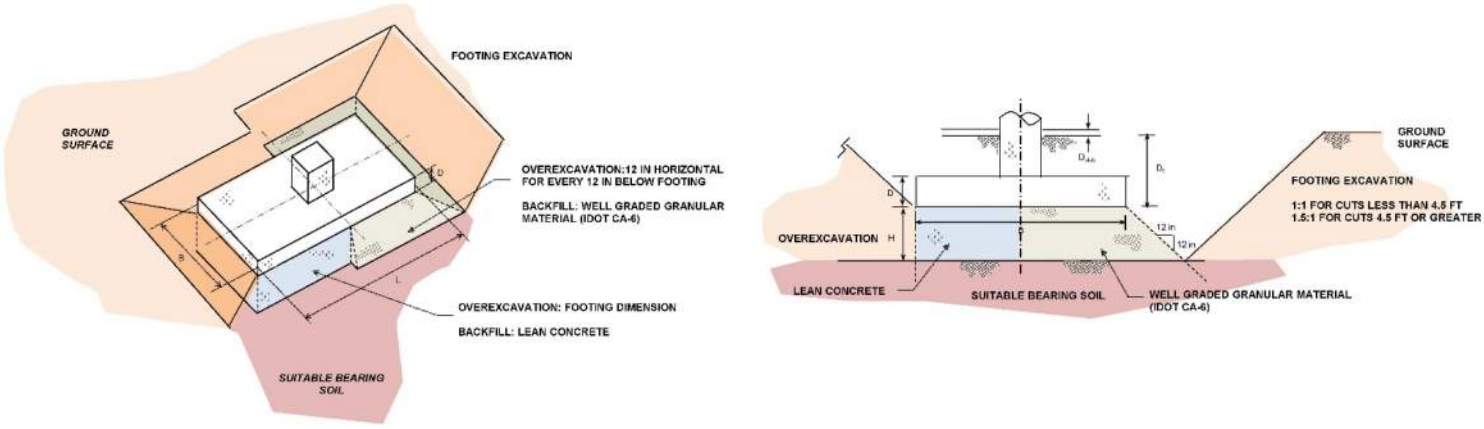
4.2 Spread Footing Foundations

4.2.1 Bearing Capacity and Settlement

New spread-type footings are anticipated to be supported at frost depth, at elevation +705.5 NAVD 88, bearing on natural soils or as much as 3½ feet of newly placed engineered fill. Since variations could occur across the site, the soils exposed in foundation excavations should be observed and tested by a GEI representative to check for the presence of unsuitable bearing soils.

If the unsuitable material is encountered at bearing elevation, they should be overexcavated and replaced with engineered fill. The overexcavation should extend outward 12 inches for every foot below the design bearing level. The foundations could then be extended to bear on the suitable soils at the deeper level, or the excavation could be backfilled back up to design footing elevation with engineered fill or lean concrete. If flowable fill or lean concrete is utilized as backfill, the footing excavation does not need to be extended beyond the edges of the footing.

Backfill placed beneath footings should consist of a well-graded granular material, containing less than 12% by weight passing the No. 200 (0.075 mm) sieve (preferably IDOT gradation CA-6). This material should be placed in thin lifts not exceeding 9 inches in loose thickness, and it should be compacted to a minimum of 95% of its maximum dry density as determined by the modified Proctor test (ASTM D 1557). Thinner lifts should be used where material is compacted with light or walk-behind equipment. If flowable fill or lean concrete is utilized as backfill, the footing excavation does not need to be extended beyond the edges of the footing.



3a: Footing excavation isometric **3b:** Section for lean concrete and granular backfill

Figure 3: Overexcavation for unsuitable bearing soil

New spread footings bearing on tested and approved soils, including natural clay or silty sand soils and engineered fill, may be designed using a maximum net allowable soil bearing pressure of 3,500 psf. Continuous wall footings should be designed using a net allowable bearing pressure of 3,000 psf. This is the maximum pressure that should be transmitted to the bearing soils in excess of the minimum surrounding overburden pressure.

At the maximum bearing pressures, the total settlements of footing foundations designed and constructed as recommended above are estimated to be less than about 1 inch. Differential settlements due to varying foundation loads and support conditions are estimated to be less than about ½-inch.

Footings placed in heated areas should be embedded a minimum of 3½ feet below finished grade to provide for adequate frost protection. Footings in unheated areas should be embedded a minimum of 4 feet below grade. Individual column footings should have a minimum width of 30 inches, and continuous wall footings should have a minimum width of 18 inches to prevent disproportionately small footing sizes.

To provide uniform support, the edge of footings should be located at least 5 feet from the face of the fill slope. For the purposes of frost embedment, the cover should be calculated as

the minimum linear distance from the edge of footing to the finished ground surface which may be vertical or lateral.

4.2.2 Sliding Resistance

The resistance to sliding of footings can be evaluated using the earth pressure coefficients and interface friction value tabulated below. Backfill against footings should be placed in thin lifts, not exceeding 12 inches in loose thickness, and it should be compacted to 95% of the materials maximum dry density as determined by the modified Proctor test.

Table 1: Earth pressure coefficients and interface friction values

	Interface Friction Factor, tan δ	*Earth Pressure Coefficients*		
		Active, K_a	*Passive, K_p*	*At-Rest, K_0*
Granular Backfill				
(Sides of Footings)	0.45	0.25	3.85	0.40
Footings				
(Mass Concrete on Granular Fill)	0.55	-	-	-
(Mass Concrete on Clay)	0.45	-	-	-

In the equation below, a reduction factor of 2 is applied to passive pressure against mats and grade beams to account for reduced mobilization at small deflections. To fully develop passive resistance would require deflections of 2.5 to 4 inches. A unit weight of 125 pcf can be assumed for the granular backfill.

Passive Resistance: $P_p = [\frac{1}{2}(\frac{k_p}{2} - k_a)\gamma H^2]$ (per unit width in direction of loading)

Sliding resistance on the sides of grade beams and mats should be calculated as the resultant confining (normal) stress over the height of the element times the interface friction angle, times the length of the element in the direction of loading, or

Side Resistance on Mat: $P_s = \frac{\left[\frac{1}{2}k_a\gamma H_{mat}^2 \tan\delta L_{mat}\right]}{1.5}$ (per element parallel to loading)

The equation above includes a reduction factor of 1.5 to account for strain compatibility. Because of the limited confining stress, it is recommended that side resistance be ignored for grade beams and mats less than 3 feet deep.

The resistance to sliding of footing foundations is determined as the vertical normal stress times the area of contact, times the interface friction factor. In the values tabulated above, it is assumed that footing foundations are constructed on tested and approved backfill. A minimum factor of safety of 1.5 should be provided against sliding.

4.3 Slabs-on-Grade

Following foundation construction and fine grading, building slab-on-grade areas should be proofrolled as discussed above for site preparation. We recommend that at least 6 inches of granular fill having less than 5% passing the No. 200 sieve, such as IDOT Gradation CA-7, be placed beneath the floor slab in all areas for improved subgrade support and provide a capillary break. The leveling course should be compacted to 95% of the material's maximum dry density as determined by the modified Proctor test (ASTM D 1557).

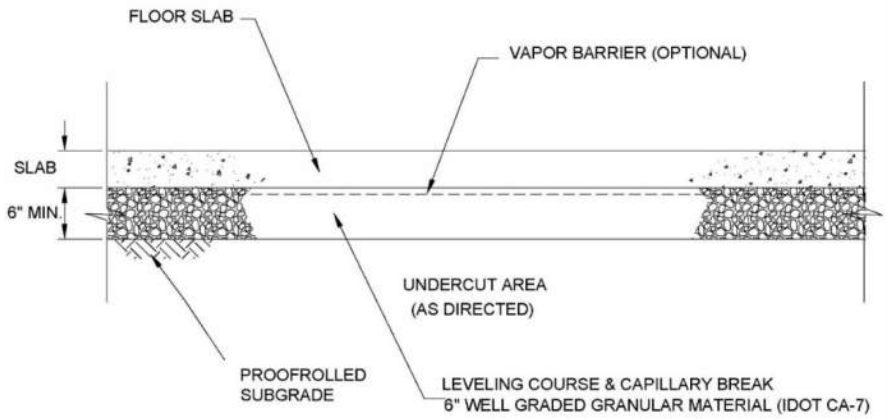


Figure 4: Slabs-on-grade detail

The modulus of subgrade reaction is dependent upon the nature of the soils supporting the slab and the provided thickness as tabulated below.

Table 2: Modulus of subgrade reaction for slab-on-grade

Subgrade Material	*Granular Thickness*	*Modulus, k*
Hard Clay	-	55 pci
Granular over Hard Clay	6 in	75 pci
	12 in	105 pci

The use of a vapor retarder should be considered beneath concrete slabs on grade that will be covered with wood, tile, carpet or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Floor slabs on grade should be isolated from foundations to permit relative displacement without cracking. Slabs should be sufficiently thick, and be provided with adequate reinforcing and jointing, to control minor slab cracking.

4.4 Permanent Below Grade Walls

Permanent reinforced concrete walls, such as basement walls, that extend below grade should be designed to support unbalanced earth, water, and lateral pressures due to exterior surcharges. The lateral pressure due to unbalanced soil and water can be approximated as:

Table 3: Equivalent fluid pressure for design of permanent below grade (non-yielding) walls

Elevation	*Mechanism*	*Equivalent Fluid Pressure*
Above Water Table	Soil	60 psf/ft
Below Water Table	Soil + Water	90 psf/ft

Any surcharge loads (due to adjacent roadways, crane pads, or floor slabs) or foundation pressures, within the area that projects upward from the base of the cut on a 45-degree angle should be included as additional lateral pressures on the retention system. A uniform surcharge of 250 psf (or an equivalent 2 feet of soil) should be applied to the ground surface to represent construction equipment or traffic loading. The lateral forces on the wall due to surcharges should be determined using an at-rest earth pressure coefficient, K_0, equal to 0.5.

Any shallow foundations adjacent to below grade walls should be included as localized surcharges. The stress beneath the footings should be assumed to extend outward and downward from the edges of the footings at a 2 vertical to 1 horizontal slope. The lateral pressure on the wall should be determined using an at-rest earth pressure coefficient, K_0 = 0.5, or:

$$p_{ftg} = K_0 q_{ftg} \frac{BL}{(B+z)(L+z)}$$

Where: K_0 = Coefficient of at-rest earth pressure (K_0 = 0.5)
q_{ftg} = Bearing pressure beneath footing
B = Width of footing
L = Length of footing
z = Depth below footing bearing level

Excavations which extend below the water table will require sump pumps with drainage trenches to provide a stable subgrade for construction. All formed walls should have external waterproofing. No exterior drainage is required for walls properly waterproofed and designed for the above-referenced earth pressures.

4.5 Pavement Subgrade Preparation

Prior to base course material placement, the pavement subgrades should be proofrolled as outlined above for site preparation. Areas that experience pumping or rutting under the proofroll should be undercut and replaced with granular fill.

Pavement subgrades should be positively drained. Sub-drainage should be provided at any low areas and along the edges of pavements where irrigated landscape areas slope toward the pavement to reduce the accumulation of free water within the aggregate base course, which results in subgrade softening, higher deflections under load and accelerated pavement deterioration. Around storm inlets or catch basins, we recommend installing subsurface finger drains to allow any water to drain out of the base course which may otherwise collect in low areas. Positive pavement base course and subgrade drainage will extend the useful life of the pavement.

4.6 Pavement Design Recommendation

Minimum pavement section thicknesses for bituminous concrete and Portland cement concrete pavements are shown in Table 4.

Aggregate base course should be a well graded crushed limestone material such as IDOT CA-6. The base course should be placed in maximum 9-inch thick loose lifts within ±2 points of optimum moisture content, and it should be compacted to a minimum of 95% of the maximum laboratory dry density determined in accordance with ASTM D1557. The prepared aggregate base course should be proofrolled as described above prior to prime coat application. If precipitation occurs between the proofroll and placement of the bituminous concrete binder, we recommend re-proofrolling the aggregate base course. Any areas exhibiting pumping or rutting should be stabilized prior to placement of bituminous concrete binder course.

A uniform coating of a prime coat material should be applied prior to placement of the first bituminous concrete lift in accordance with IDOT Standard Specifications for Road and Bridge Construction and per manufacturer's recommendations.

Table 4: Minimum pavement section thickness recommendation

Pavement Area		*Material Description*	*Minimum Thickness (in)*
Heavy Duty	Portland Cement Concrete	Reinforced Concrete Slab Well Graded Crushed Limestone Aggregate Base Course - IDOT CA-6	8.0 6.0
	Bituminous Concrete	AC Surface Course - IDOT Superpave 12.5 mm, N70 AC Binder Course - IDOT Superpave 25.0 mm, N70 Well Graded Crushed Limestone Aggregate Base Course - IDOT CA-6	2.0 4.0 12.0
Medium Duty	Bituminous Concrete	AC Surface Course - IDOT Superpave 12.5 mm, N70 AC Binder Course - IDOT Superpave 19.0 mm, N70 Well Graded Crushed Limestone Aggregate Base Course - IDOT CA-6	2.0 3.0 10.0
Light Duty	Bituminous Concrete	AC Surface Course - IDOT Superpave 9.5mm, N50 AC Binder Course - IDOT Superpave 19mm, N50 Well Graded Crushed Limestone Aggregate Base Course - IDOT CA-6	1.5 2.5 8.0

Notes: 1. Pavement area applies to untreated subgrade.

Table 4: Minimum pavement section thickness recommendation

Pavement Area		*Material Description*	*Minimum Thickness (in)*
Heavy Duty	Portland Cement Concrete	Reinforced Concrete Slab Well Graded Crushed Limestone Aggregate Base Course - IDOT CA-6	8.0 6.0
	Bituminous Concrete	AC Surface Course - IDOT Superpave 12.5 mm, N70 AC Binder Course - IDOT Superpave 25.0 mm, N70 Well Graded Crushed Limestone Aggregate Base Course - IDOT CA-6	2.0 4.0 12.0

2. Traffic Information (vehicle types, loads, frequency and distribution) was not provided to GEI. Our minimum pavement section thickness recommendations were developed based on minimum structural number (SN) = 2.5 for Light Duty Pavements and SN = 3.0 for main access drives and Heavy Duty Pavement Areas, quality of the subgrade and our local experience. When estimating pavement thicknesses without traffic, a design period cannot be established.
3. Estimated California Bearing ratio (CBR) = 3 for untreated and prepared subgrade cohesive soil subgrade
4. Estimated Modulus of Subgrade Reaction (k) = 150 psi/in for untreated and prepared subgrade
5. Subgrade is prepared prior to constructing the bituminous concrete and Portland cement concrete pavement.
6. Concrete shall be minimum compressive strength of 5,000 psi at 28 days, air entrained 5% to 8%, slump 2 to 4 inches and maximum water/cement ratio of 0.45. Concrete mix design properties, joint design, spacing and layout and reinforcing and dowels shall be provided by others.
7. Bituminous Concrete Binder and Surface Course mixes are to be Superpave Mixes as noted above.
8. All joints in the concrete pavement areas are to be sealed to reduce water in the aggregate base course/subgrade and debris in joints.

Bituminous concrete binder and surface courses should be placed and compacted to a minimum of 93% and 92.5%, respectively, of the maximum theoretical specific gravity of the bituminous concrete mixes in accordance with IDOT Standard Specifications for Road and Bridge Construction. An asphalt tack coat should be applied to the clean surfaces of all bituminous concrete layers prior to placement of the succeeding lift in accordance with IDOT Standard Specifications for Road and Bridge Construction and per manufacturer's recommendations.

Concrete for pavement areas should achieve a minimum compressive strength of 5,000 psi at 28 days, air entrained. At a minimum, we recommend concrete pavements be provided at truck loading dock areas, dumpster locations and at sharp turning radiuses frequented by truck traffic. Design of concrete reinforcement, dowels and joints, including joint spacing and layout, for the concrete pavement areas was not included in our scope of work and should be incorporated into the final concrete pavement design section if the concrete surface section is selected. Joints should be sealed with a polyurethane joint sealant material to reduce water infiltrating into the aggregate base course/subgrade and debris in joints.

4.7 Trench Backfill for Utility Lines

Utility trenches should be constructed to permit easy installation of the utility line without twisting, kinks or sharp bends. For utility pipes up to 24-inch I.D., the trench width should be the pipe width plus 20 inches to permit proper compaction around the pipe. For pipe

greater than 24-inch I.D., the trench width should be the pipe width plus 24 inches. Utility trenches should be excavated with vertical faces, and trench protection will be required for excavating greater than 5 feet deep. All loose or soft soil should be removed from the base of the utility trench prior to backfilling.

Utility pipe bedding in the trench should consist of a minimum of 4 inches of compacted granular fill such as IDOT CA-11 aggregate. The pipe should be centered in the trench and backfilled with the compacted bedding fill material to a minimum of 6 inches above the top of the pipe followed by a minimum of 18 inches of compacted granular fill such as IDOT CA-6 to the elevation of the pavement subgrade. In non-paved areas, the upper 18 inches of trench fill over the pipe may consist of the clean, excavated soil.

Backfill in the trench should be placed in uniform layers not exceeding 4-inch loose lifts. The fill should be placed on both sides of the pipe simultaneously. The material in each lift should be mechanically compacted by ramming or tamping with power tools in such a manner as not to disturb, kink, or crush the cables, conductor, duct or conduit. Trench backfill should be compacted to a minimum of 90% of the material's maximum dry density determined in accordance with ASTM D-1557, modified Proctor.

4.8 Site Classification

Design parameters for the project were determined in accordance with Standard 9 of ASCE 7: *Minimum Design Loads for Buildings and Other Structures* based on site specific SPT tests and the laboratory shear strength measurements of recovered soil samples. Because of the limited depth of exploration, the Site Classification defaults to Site Class D – Stiff Soil.

Table 5: Seismic parameters

Description	*Type*	*Value*
Site Classification	Stiff Soil	D
Risk Category		I-III
Seismic Design Category (SDC)	SDC	B
MCE_R Ground Motion (0.2 Sec Period)	S_S	0.104
MCE_R Ground Motion (1 Sec Period)	S_1	0.058
MCE_G Peak Ground Acceleration	PGA	0.052

A full list of seismic design parameters for generation of earthquake ground motion response spectrums is provided in the attachments.

5. Construction Considerations

We anticipate that excavation sideslopes will likely remain stable at slopes of 1H:1V for short periods of time. Excavation sideslopes remaining open for extended periods may require flatter sideslopes. Regardless, all excavations should be performed in accordance with pertinent local, state, federal, and OSHA regulations.

The base of each foundation excavation should be free of water and loose soil prior to placing concrete. Concrete should be placed as soon after excavating as possible to reduce bearing soil disturbance. If the soils at bearing level become disturbed, saturated, or frozen, the affected soil should be recompacted or removed prior to placing concrete. Placement of a lean concrete mud-mat over the bearing soils should be considered if the excavations must remain open overnight or for an extended period of time.

We recommend that all foundation and subgrade soils be observed by a representative of GEI prior to placement of concrete or fill to confirm that the subgrade conditions are consistent with the design assumptions and recommendations contained in this report. Periodic density testing should be performed on any fill to document that density requirements have been met.

6. Limitations

This report was prepared for the exclusive use of Wold Architects and Engineers for the new Lake County Regional Operations & Communications Facility in Libertyville, IL. This report may require modification if there are any changes in the nature, design, or location of the proposed structure. We cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to evaluate whether any changes in the project affect the validity of our recommendations and whether our recommendations have been properly implemented in the design.

The recommendations in this report are based in part on the data obtained from the subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations from the anticipated conditions are encountered, it may be necessary to revise the recommendations in this report. Therefore, we recommend that GEI be engaged on a full-time basis during construction to: a) check that the subsurface conditions exposed during construction are in general conformance with our design assumptions, and b) ascertain that, in general, the geotechnical aspects of the work are being performed in compliance with the contract documents.

It was not part of our scope to explore for or research the locations of buried utilities or other buried structures at the site. Before construction of foundations for the proposed structure, a diligent effort should be made to determine the presence and location of any buried structures including utilities. This effort should include a thorough review of available drawings and other records of the site use and facilities. If the presence of such structures is determined to be likely, GEI should be notified so that we may review and revise our recommendations, if appropriate.

Our professional services for this project have been performed in accordance with generally accepted engineering practices; no warranty, expressed or implied, is made.

Appendix A

Soil Boring Location Plan

Soil Boring Logs

General Notes and Sampling Procedures

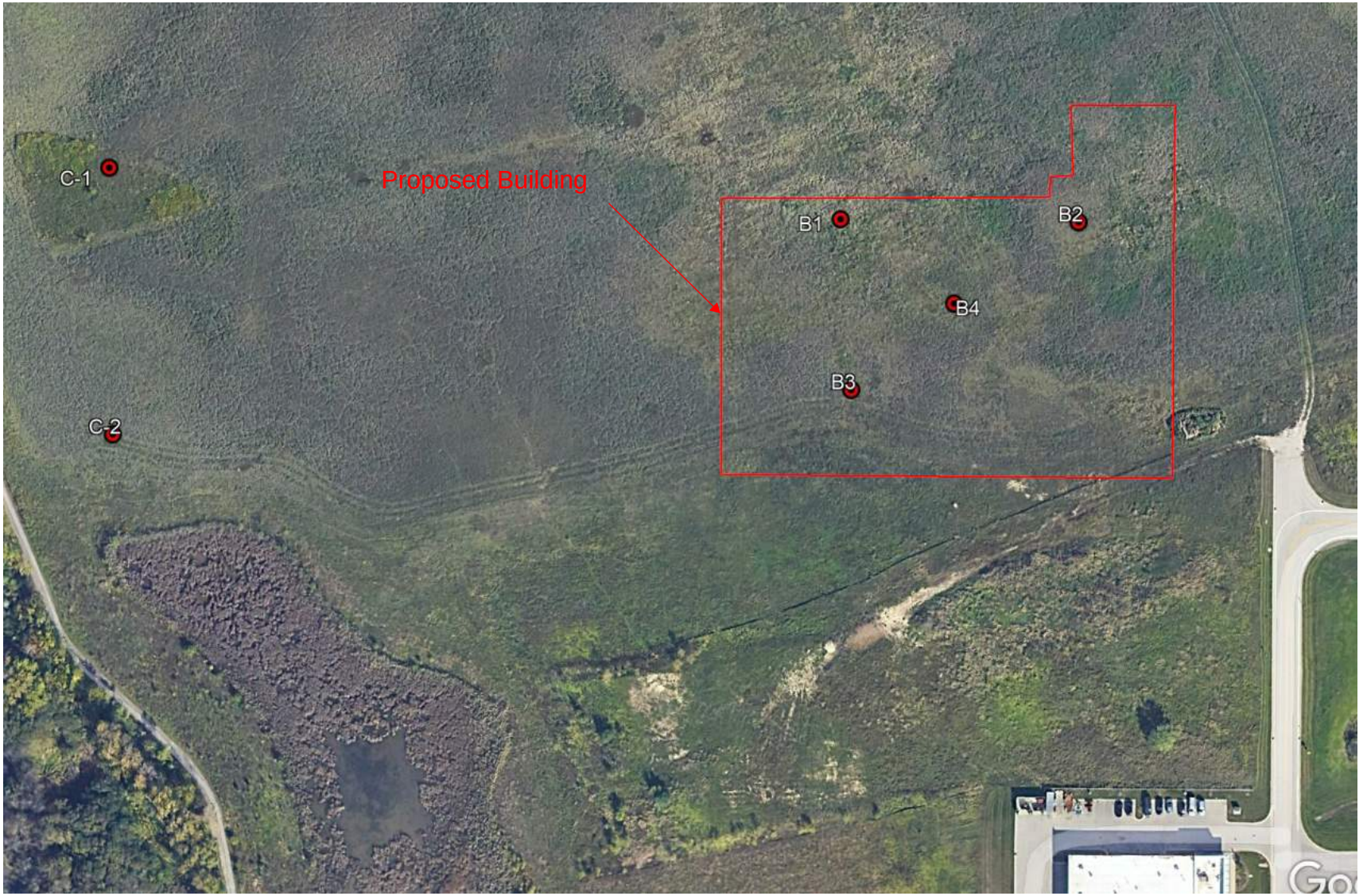
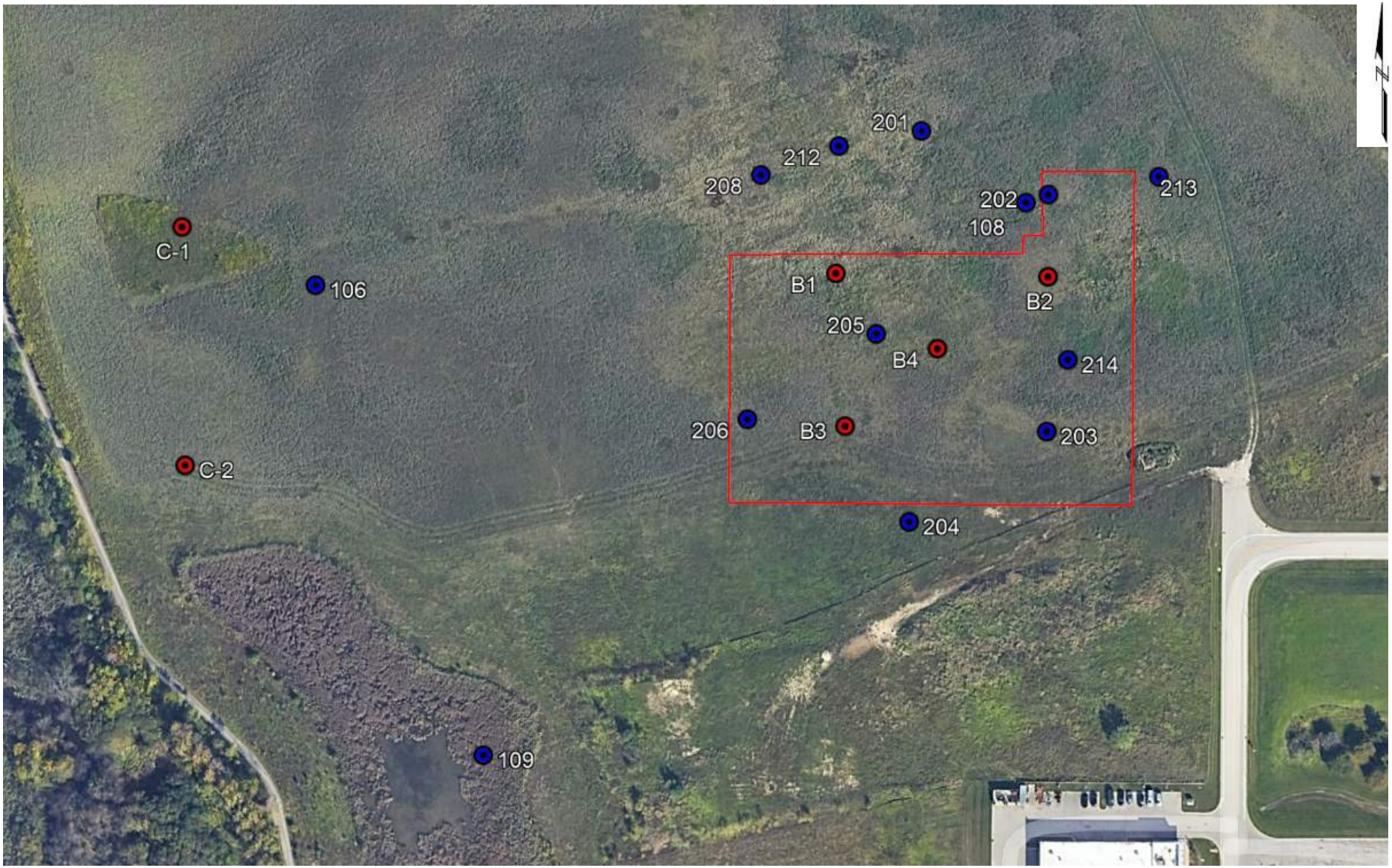


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Lake County Regional Operations & Communication Facility **Libertyville, IL**	GEI Consultants	**FIGURE 1** **BORING LOCATION DIAGRAM**
Wold Architects and Engineers **Palatine, IL**	Project No. 2202656	June 2022



GEI 2022 Borings

TSC 2009 Borings

Lake County Regional Operations & Communication Facility **Libertyville, IL** **Wold Architects and Engineers** **Palatine, IL**	GEI Consultants Project No. 2202656	**FIGURE 2** **BORING LOCATION DIAGRAM** June 2022

GEI Consultants

CLIENT: **Wold Architechts and Engineers**

LOG OF BORING NUMBER **B-1**

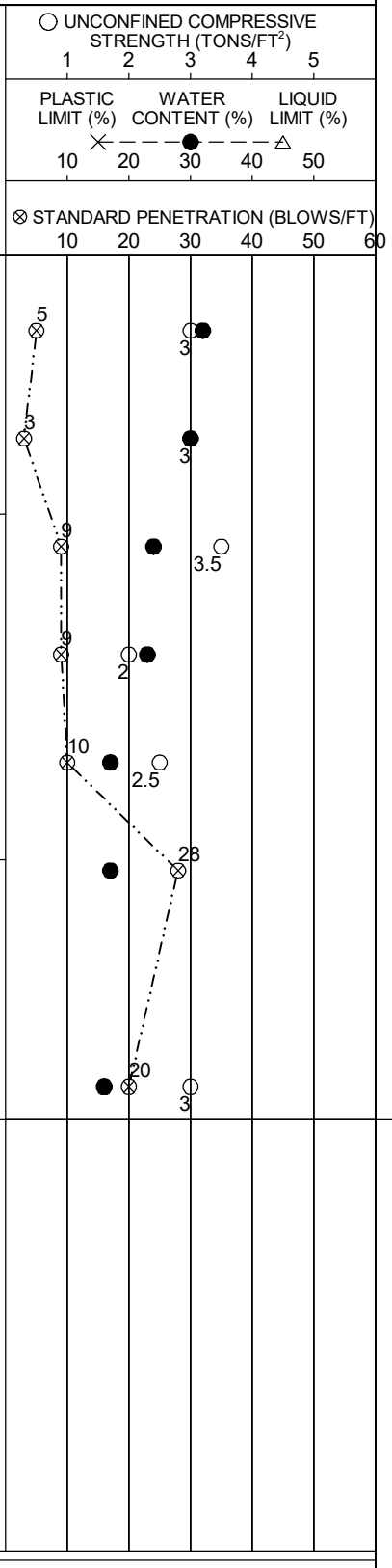
PROJECT NAME: **Regional Operations & Communications Facility**

ENGINEER

LOCATION: Libertyville, IL

SURFACE ELEVATION (ft.) 702.2

DEPTH (FT) / ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT^3
					*(0.0)*10" Topsoil	
	1	SS			*(1.0)*Silty Clay, trace sand and gravel, brown and gray, very stiff (CL)	
700						
	2	SS				
5						
	3	SS			*(6.0)*Silty Clay, trace sand and gravel, gray, very stiff (CL)	
	4	SS				
10						
	5	SS				
690						
▽	6	SS			*(14.0)*Medium to Coarse Sand, with gravel, medium dense, saturated (SP)	
15						
	7	SS				
20					*(19.5)*Silty Clay, trace sand and gravel, gray, very stiff (CL)	
					End of boring.	
680					Boring was advanced with hollow stem augers.	
					18.5 feet of 3.25 inch casing was used.	
25					Standard Penetration Tests performed with auto hammer.	
					Boring grouted upon completion.	



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

WATER LEVEL: 14', While Drilling	BORING STARTED **7/18/2022**	GEI OFFICE **Chicago Area**	
	BORING COMPLETED **7/18/2022**	ENTERED BY **AF**	APPROVED BY **DSD**
NORTHING EASTING	RIG/FOREMAN **D-50 (Geocon) / Tom**	GEI PROJECT NO. **2202656**	PAGE NO. **1** OF **1**

MIDWEST BORING LOG - OFFICIAL ROCF LIBERTYVILLE.GPJ TPL_GEI_MIDWEST_BETA.GDT 7/20/22

GEI Consultants

CLIENT: **Wold Architechts and Engineers**

LOG OF BORING NUMBER **B-2**

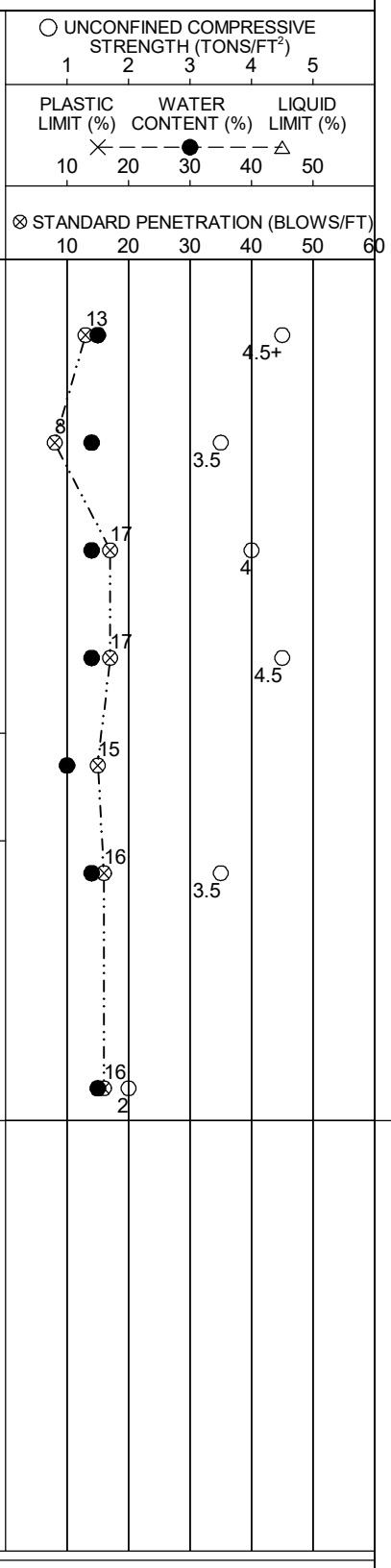
PROJECT NAME: **Regional Operations & Communications Facility**

ENGINEER

LOCATION: Libertyville, IL

SURFACE ELEVATION (ft.) 704.6

DEPTH (FT) / ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT^3
					*(0.0)*7" Topsoil	
	1	SS			*(0.5)*Silty Clay, trace sand and gravel, brown and gray, hard, desiccated (CL)	
	2	SS			*(3.5)*Silty Clay, trace sand and gravel, brown, very stiff (CL)	
700 / 5	3	SS				
	4	SS			turning gray	
10	5	SS			*(11.0)*Clayey Sand, trace to with gravel, gray, medium dense, moist (SC)	
	6	SS			*(13.5)*Silty Clay, trace sand and gravel, gray, very stiff (CL)	
690 / 15	7	SS				
20					End of boring. Boring was advanced with hollow stem augers. 18.5 feet of 3.25 inch casing was used. Standard Penetration Tests performed with auto hammer. Boring grouted upon completion.	
680 / 25						



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

WATER LEVEL: Not Encountered	BORING STARTED **7/18/2022**	GEI OFFICE **Chicago Area**	
	BORING COMPLETED **7/18/2022**	ENTERED BY **AF**	APPROVED BY **DSD**
NORTHING EASTING	RIG/FOREMAN **D-50 (Geocon) / Tom**	GEI PROJECT NO. **2202656**	PAGE NO. **1** OF **1**

MIDWEST BORING LOG - OFFICIAL ROCF LIBERTYVILLE.GPJ TPL_GEI_MIDWEST_BETA.GDT 7/20/22

GEI Consultants

CLIENT: **Wold Architechts and Engineers**

LOG OF BORING NUMBER **B-3**

PROJECT NAME: **Regional Operations & Communications Facility**

ENGINEER

LOCATION: Libertyville, IL

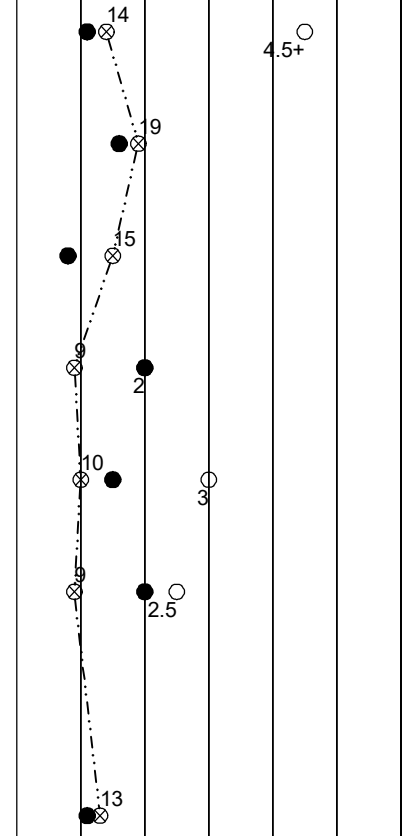
SURFACE ELEVATION (ft.) 704.4

DEPTH (FT) / ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT^3
					*(0.0)*7" Topsoil	
	1	SS			*(0.5)*Silty Clay, trace sand and gravel, brown and gray, hard, desiccated (CL)	
	2	SS				
700 / 5	3	SS				
					*(7.0)*Fine to Medium Sand, trace gravel, gray, medium dense, dry to moist (SP)	
	4	SS			*(9.0)*Silty Clay, trace sand and gravel, gray, very stiff (CL)	
10	5	SS				
	6	SS				
690 / 15						
	7	SS			*(19.0)*Clayey Sand, trace gravel, gray, medium dense, wet (SC)	
20					End of boring.	
					Boring was advanced with hollow stem augers. 18.5 feet of 3.25 inch casing was used. Standard Penetration Tests performed with auto hammer. Boring grouted upon completion.	
680 / 25						

○ UNCONFINED COMPRESSIVE STRENGTH (TONS/FT^2)
1 2 3 4 5

PLASTIC LIMIT (%) WATER CONTENT (%) LIQUID LIMIT (%)
10 20 30 40 50

⊗ STANDARD PENETRATION (BLOWS/FT)
10 20 30 40 50 60



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

WATER LEVEL: Not Encountered	BORING STARTED **7/18/2022**	GEI OFFICE **Chicago Area**	
	BORING COMPLETED **7/18/2022**	ENTERED BY **AF**	APPROVED BY **DSD**
NORTHING EASTING	RIG/FOREMAN **D-50 (Geocon) / Tom**	GEI PROJECT NO. **2202656**	PAGE NO. **1** OF **1**

MIDWEST BORING LOG - OFFICIAL ROCF LIBERTYVILLE.GPJ TPL_GEI_MIDWEST_BETA.GDT 7/20/22

GEI Consultants

CLIENT: **Wold Architechts and Engineers**

LOG OF BORING NUMBER **B-4**

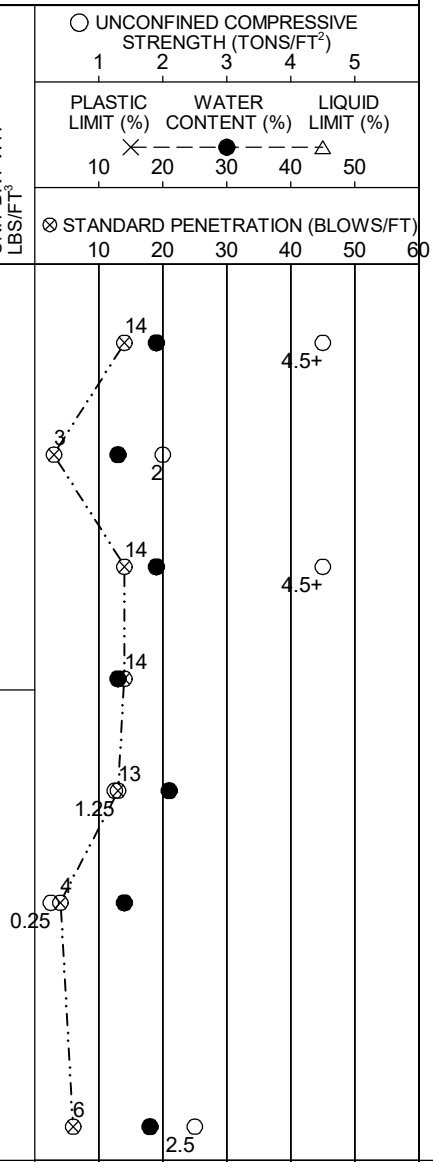
PROJECT NAME: **Regional Operations & Communications Facility**

ENGINEER

LOCATION: Libertyville, IL

SURFACE ELEVATION (ft.) 704.6

DEPTH (FT) / ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT^3
					*(0.0)*8" Topsoil	
	1	SS			*(0.7)*Silty Clay, trace sand and gravel, brown and gray, hard, desiccated (CL)	
	2	SS			*(3.5)*Silty Clay, trace sand and gravel, brown and gray, very stiff to hard (CL)	
700 / 5	3	SS				
	4	SS				
10					*(9.5)*Clayey Sand, with gravel, gray, medium dense, moist (SC)	
	5	SS				
					*(12.0)*Silty Clay, trace sand and gravel, gray, soft to very stiff (CL)	
690 / 15	6	SS				
	7	SS				
20					End of boring.	
					Boring was advanced with hollow stem augers.	
					18.5 feet of 3.25 inch casing was used.	
					Standard Penetration Tests performed with auto hammer.	
680 / 25					Boring grouted upon completion.	



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

WATER LEVEL: 10', While Drilling	BORING STARTED **7/18/2022**	GEI OFFICE **Chicago Area**	
	BORING COMPLETED **7/18/2022**	ENTERED BY **AF**	APPROVED BY **DSD**
NORTHING EASTING	RIG/FOREMAN **D-50 (Geocon) / Tom**	GEI PROJECT NO. **2202656**	PAGE NO. **1** OF **1**

MIDWEST BORING LOG - OFFICIAL ROCF LIBERTYVILLE.GPJ TPL_GEI_MIDWEST_BETA.GDT 7/20/22

GEI Consultants

CLIENT: **Wold Architechts and Engineers**

PROJECT NAME: **Regional Operations & Communications Facility**

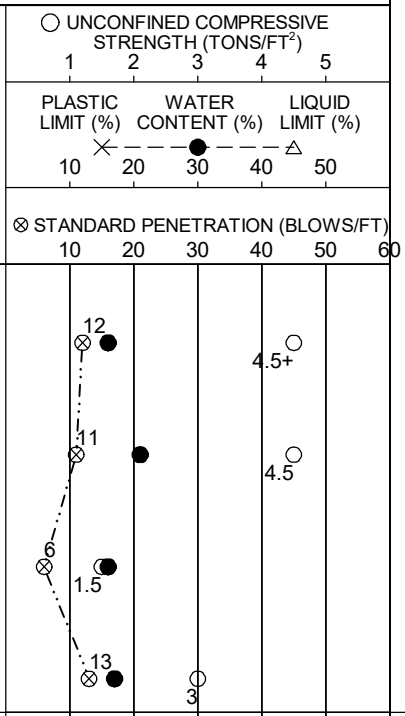
LOG OF BORING NUMBER **C-1**

ENGINEER

LOCATION: Libertyville, IL

SURFACE ELEVATION (ft.) 696.6

DEPTH (FT) / ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT^3
					*(0.0)*7" Topsoil	
	1	SS			*(0.7)*Silty Clay, trace sand and gravel, brown and gray, hard, desiccated (CL)	
	2	SS			sample mixed with topsoil	
5 / 690	3	SS			*(6.0)*Silty clay, trace sand and gravle, brown and gray, stiff to very stiff (CL)	
	4	SS			turning gray	
10					End of boring. Boring was advanced with hollow stem augers. Standard Penetration Tests performed with auto hammer. Boring grouted upon completion.	
15 / 680						
20						
25 / 670						



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

WATER LEVEL: Not Encountered	BORING STARTED **7/18/2022**	GEI OFFICE **Chicago Area**	
	BORING COMPLETED **7/18/2022**	ENTERED BY **AF**	APPROVED BY **DSD**
NORTHING EASTING	RIG/FOREMAN **D-50 (Geocon) / Tom**	GEI PROJECT NO. **2202656**	PAGE NO. **1** OF **1**

MIDWEST BORING LOG - OFFICIAL ROCF LIBERTYVILLE.GPJ TPL_GEI_MIDWEST_BETA.GDT 7/20/22

GEI Consultants

CLIENT: **Wold Architechts and Engineers**

PROJECT NAME: **Regional Operations & Communications Facility**

LOG OF BORING NUMBER **C-2**

ENGINEER

LOCATION: Libertyville, IL

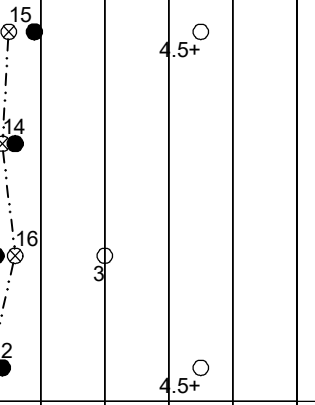
SURFACE ELEVATION (ft.) 696.1

DEPTH (FT) / ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS/FT^3
					*(0.0)*8" Topsoil	
	1	SS			*(0.7)*Silty Clay, trace sand and gravel, brown and gray, hard, desiccated (CL)	
	2	SS			*(4.0)*Clayey Silt. trce gravel, brown, medium dense, moist (CL-ML)	
5 / 690	3	SS			*(7.0)*Silty clay, trace sand and gravle, brown, very stiff to hard (CL)	
	4	SS			turning gray	
10					End of boring.	
					Boring was advanced with hollow stem augers.	
					Standard Penetration Tests performed with auto hammer.	
					Boring grouted upon completion.	
15 / 680						
20						
25 / 670						

○ UNCONFINED COMPRESSIVE STRENGTH (TONS/FT^2)
1 2 3 4 5

PLASTIC LIMIT (%) WATER CONTENT (%) LIQUID LIMIT (%)
10 20 30 40 50

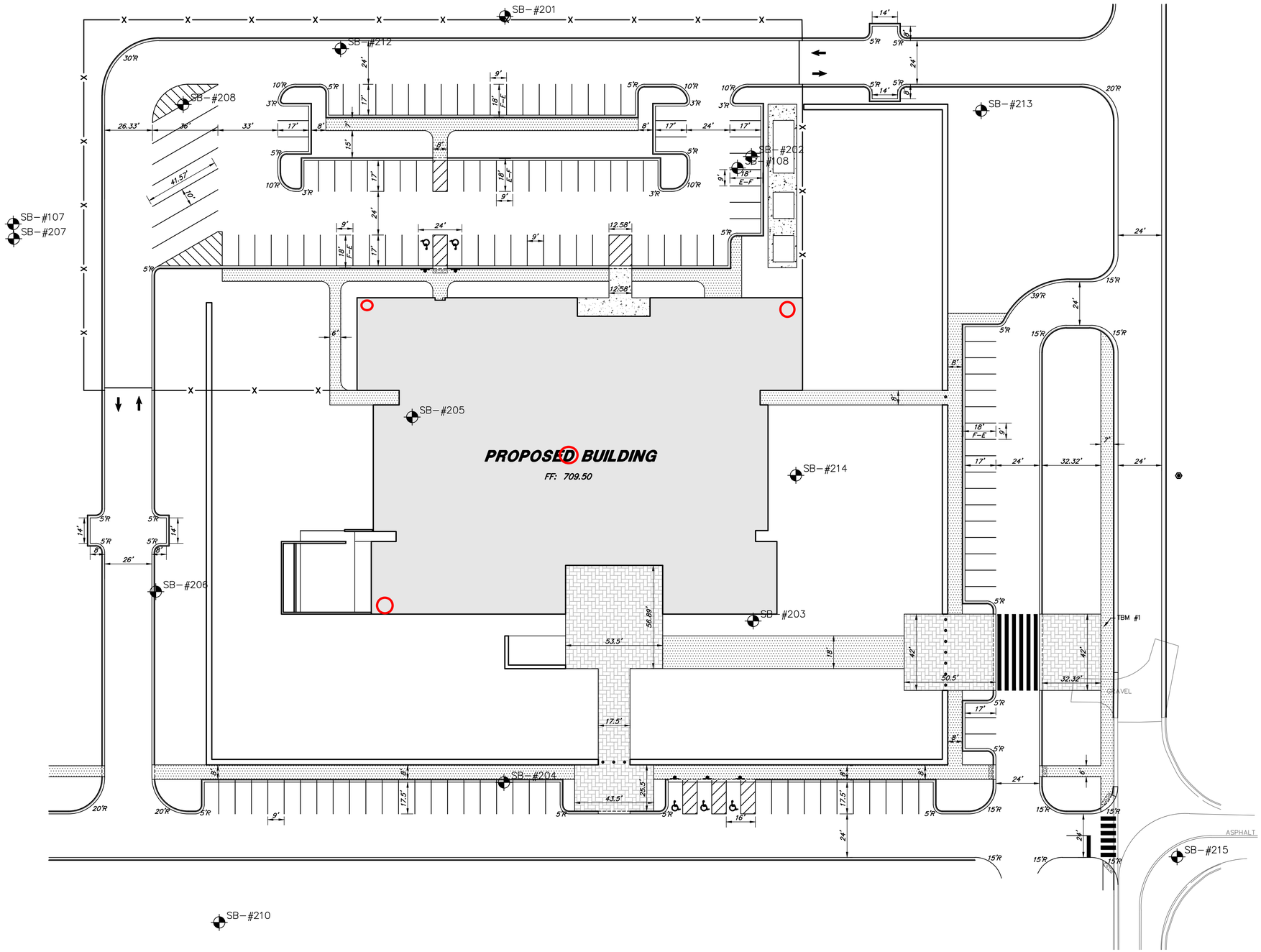
⊗ STANDARD PENETRATION (BLOWS/FT)
10 20 30 40 50 60



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

WATER LEVEL: Not Encountered	BORING STARTED **7/18/2022**	GEI OFFICE **Chicago Area**	
	BORING COMPLETED **7/18/2022**	ENTERED BY **AF**	APPROVED BY **DSD**
NORTHING EASTING	RIG/FOREMAN **D-50 (Geocon) / Tom**	GEI PROJECT NO. **2202656**	PAGE NO. **1** OF **1**

MIDWEST BORING LOG - OFFICIAL ROCF LIBERTYVILLE.GPJ TPL_GEI_MIDWEST_BETA.GDT 7/20/22



N

GRAPHIC SCALE

30 0 15 30

(IN FEET)

1 inch = 30 ft.

GHA GEWALT HAMILTON ASSOCIATES, INC.

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GEOMETRIC PLAN

LAKE COUNTY E.O.C.
LIBERTYVILLE CAMPUS
VILLAGE OF LIBERTYVILLE, ILLINOIS

NO.	BY	DATE	REVISION

NO.	BY	DATE	REVISION

FILE: 5873.000–PR.dwg

DRAWN BY: MTS DATE: 05–11–22

GHA PROJECT # 5873.000

CHECKED BY: MTS DATE: 05–11–22

SCALE: 1"=30'

SHEET NUMBER: 1 OF 1 SHEETS

N:\5800\5873.000 LAKE COUNTY E.O.C\5873.000–PR.DWG 5/12/2022 10:09 AM

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **106** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Dark brown clayey TOPSOIL (OL)
							0.6		
1	SS		12	14.1	4.5+*				Hard brown silty CLAY, little sand, trace gravel, moist (CL)
							3.0		
2	SS		10	15.0					Firm brown medium to fine SAND and GRAVEL, trace clay, moist (SP/GP)
							5.5		
3	SS		14	13.1	4.0*				Very tough to hard brown silty CLAY, little sand, trace gravel, moist (CL)
							8.0		
4	SS		10	10.6	2.0*				Very tough gray silty CLAY, some sand, trace gravel, moist (CL)
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **108** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS _____

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS		4	24.4			2.5		Dark brown clayey TOPSOIL, little sand, little to some shells, very moist (OL)
2	SS		6	22.9	1.5		5.5		Tough brown silty CLAY, little sand, trace organic, moist (CL)
3	SS		9	17.6	1.75*		8.0		Tough brown silty CLAY, little sand, trace gravel, moist (CL)
4	SS		11	15.9	2.75*				Very tough brown silty CLAY, little sand and gravel, little silt seams, moist (CL)

End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 3/6/09

PROJECT **Lake County Campus Master Plan, Winchester Road, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **109** DATE STARTED **2-25-09** DATE COMPLETED **2-25-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE _____

END OF BORING _____

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS _____

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Black clayey TOPSOIL (OL)
	1	SS	8	16.3	1.0*		1.0		Tough brown silty CLAY, little sand, trace gravel, very moist (CL)
	2	SS	4	16.8	1.0*				
	3	SS	13	15.7	2.25*		5.5		Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
	4	SS	12	13.2	3.25*		8.0		Very tough gray silty CLAY, some sand, trace gravel, moist (CL)
							10		End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 3/6/09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **201** DATE STARTED **10-9-09** DATE COMPLETED **10-9-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **703.0**

END OF BORING **673.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **3.0 '**

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
							1.0	702.0	Black clayey TOPSOIL (OL)
1	SS		1	41.6	0.25*				Very soft dark brown ORGANIC CLAY, very moist (OL/OH)
							3.0	700.0	▼
2	SS		2	33.3	0.5*				Soft dark brown silty CLAY, trace sand, trace organic, very moist (CL/CH)
							6.0	697.0	
3	SS		6	19.0	0.5*				Soft brown and dark brown silty CLAY, some sand, trace gravel, trace organic, very moist (CL)
							8.0	695.0	
4	SS		10	15.7	2.75*				Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
							10.5	692.5	▼
5	SS		11	14.8	1.5*				Tough to very tough gray silty CLAY, some sand, trace gravel, moist (CL)
6	SS		13	15.5	2.0*				
							17.0	686.0	
7	SS		20	17.4	3.0*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
8	SS		18	18.7	3.67 3.5*				

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **201** DATE STARTED **10-9-09** DATE COMPLETED **10-9-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **703.0**

END OF BORING **673.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **3.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	9	SS	21	18.2	3.75*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 30.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **202** DATE STARTED **10-9-09** DATE COMPLETED **10-9-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **705.5**

END OF BORING **675.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **4.0 '**

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.5	705.0	FILL - Dark brown clayey TOPSOIL (OL)
1	SS		4	16.9	1.25*	112			FILL - Brown and dark brown silty CLAY, little sand, trace gravel, trace organic, moist (CL)
							3.0	702.5	
2	SS		6	17.1	1.62 2.0*				▼ Tough brown silty CLAY, little sand, trace gravel, moist (CL)
3	SS		7	15.6	1.89 1.5*				
							8.0	697.5	
4	SS		11	16.5	3.75*				Very tough brown silty CLAY, little sand, trace gravel, occasional silt seams, moist (CL)
							10.5	695.0	
5	SS		18	17.0	5.57 4.5+*				Hard gray gray silty CLAY, little sand, trace gravel, moist (CL)
							13.0	692.5	
6	SS		12	13.5	2.0*				Tough to very tough brownish-gray sandy CLAY, little gravel, moist (CL)
							17.0	688.5	
7	SS		11	16.2	1.95 1.5*				Tough to very tough gray silty CLAY, little sand, trace gravel, moist (CL)
8	SS		11	17.0	1.5*				

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **202** DATE STARTED **10-9-09** DATE COMPLETED **10-9-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **705.5**

END OF BORING **675.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS **4.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	9	SS	15	17.5	2.15 2.0*				Tough to very tough gray silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 30.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **203** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **706.5**

END OF BORING **676.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **14.0 '**

▼ 24 HOURS **6.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3	706.2	Dark brown clayey TOPSOIL (OL)
	1	SS	11	11.5					Firm brown silty SAND, little gravel, moist (SM)
							3.0	703.5	
	2	SS	9	15.8	1.5*				Tough to very tough brown very silty CLAY, some sand, trace gravel, moist (CL)
	3	SS	15	16.2	3.08 3.75*				
							8.0	698.5	
	4	SS	12	11.6	2.0*				Tough to very tough gray silty CLAY, some sand, trace gravel, moist (CL)
							10.5	696.0	
	5	SS	12	14.3	3.47 4.0*				
	6	SS	13	13.5	3.75*				
	7	SS	17	14.5	2.48 3.0*				Very tough gray silty CLAY, little to some sand and gravel, occasional sand seams, moist (CL)
	8	SS	21	18.7	3.25*				

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **203** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **706.5**

END OF BORING **676.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **14.0 '**

▼ 24 HOURS **6.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
									Very tough gray silty CLAY, little to some sand and gravel, occasional sand seams, moist (CL)
	9	SS	22	16.9	3.47 3.0*				
									End of Boring at 30.0'
									* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
									SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10.20.09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **204** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **707.0**

END OF BORING **677.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **8.0 '**

▼ 24 HOURS **7.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.5	706.5	Dark brown clayey TOPSOIL (OL)
	1	SS	9	13.0					Loose brown silty SAND, some gravel, moist (SM)
							3.0	704.0	
	2	SS	8	15.5	1.75 1.5*				Tough brown very silty CLAY, some sand, trace gravel, moist to very moist (CL)
							5.5	701.5	
	3	SS	12	11.2	2.68 3.0*				▼ ▽
	4	SS	12	11.3	3.0*				Very tough gray very silty CLAY, some sand, trace gravel, moist (CL-ML)
	5	SS	14	11.1	3.08 3.0*				
							13.0	694.0	
	6	SS	20	15.2	2.5*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
							17.0	690.0	▼
	A								Firm gray SAND and GRAVEL, wet (SP/GP)
	7	SS	21				19.0	688.0	
	B			14.7	1.5*				Tough gray silty CLAY, some sand, trace gravel, moist (CL)
							22.0	685.0	
	8	SS	25	17.0	2.68 2.25*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 21 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **204** DATE STARTED **10-8-09** DATE COMPLETED **10-8-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **707.0**

END OF BORING **677.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **8.0 '**

▼ 24 HOURS **7.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	9	SS	21	16.0	2.75*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 30.0'
									* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
									SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **205** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **703.5**

END OF BORING **673.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **5.0 '**

▼ 24 HOURS **3.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									FILL - Dark brown clayey TOPSOIL (OL)
							1.0	702.5	
	1	SS	10	14.9	2.25*	120			FILL - Brown silty CLAY, little sand and gravel, trace organic, moist (CL)
							3.0	700.5	▼
	2	SS	14	27.5	1.5*	95			FILL - Dark brown silty CLAY, little sand, trace gravel, trace wood, very moist (CL) ▽
							5.5	698.0	
	3	SS	17	18.8	3.5*				Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
							8.0	695.5	
	4	SS	17	22.0	2.35 2.25*				▼ Very tough gray silty CLAY, little to some sand and gravel, moist (CL)
	5	SS	17	14.7	3.74 3.25*				
							13.0	690.5	
	A 6 B	SS	11	14.2	2.0*		14.0	689.5	Firm brown SAND and GRAVEL, wet (SP/GP)
									Tough to very tough gray silty CLAY, some sand, trace gravel, moist (CL)
							17.0	686.5	
	7	SS	22	15.6	4.25*				Hard to very tough gray silty CLAY, little sand, trace gravel, moist (CL)
	8	SS	25	16.0	4.5+*				

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **205** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **703.5**

END OF BORING **673.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **5.0 '**

▼ 24 HOURS **3.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	9	SS	22	19.7	2.5*				Hard to very tough gray silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 30.0'
									* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
									SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **206** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **705.0**

END OF BORING **675.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **22.0 '**

▼ 24 HOURS **6.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3	704.7	Dark brown clayey TOPSOIL (OL)
	1	SS	11	13.6	3.25*				Very tough brown silty CLAY, some sand, trace gravel, moist (CL)
							3.0	702.0	
	2	SS	10	16.1	1.29 1.25*				Tough brown sandy CLAY, trace gravel, very moist (CL)
							5.5	699.5	
	3	SS	13	15.3	3.5*				Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
							8.0	697.0	
	4	SS	11	23.9	2.0*				Tough to very tough gray silty CLAY, trace sand and gravel, moist (CL)
							10.5	694.5	
	5	SS	11	16.8	2.5*				Very tough gray silty CLAY, little sand and gravel, occasional sand seams, moist (CL)
	6	SS	14	15.9	3.25*				
							17.0	688.0	
	7	SS	10	24.7	0.96 1.0*				Stiff to tough gray silty CLAY, trace sand and gravel, occasional sand seams, very moist (CL)
							22.0	683.0	
	8	SS	17	18.7	2.0*				Very tough to tough gray silty CLAY, trace to little sand and gravel, moist (CL)

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **206** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **705.0**

END OF BORING **675.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **17.0 '**

▽ AT END OF BORING **22.0 '**

▼ 24 HOURS **6.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
									Very tough to tough gray silty CLAY, trace to little sand and gravel, moist (CL)
	9	SS	19	18.4	1.49 1.5*				
									End of Boring at 30.0'
									* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.
									SPT Hammer = Mobile Automatic

DISTANCE BELOW SURFACE IN FEET

25 30 35 40 45 50

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **208** DATE STARTED **10-9-09** DATE COMPLETED **10-9-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **702.0**

END OF BORING **672.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **5.0 '**

▼ 24 HOURS **5.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.2	701.8	FILL - Dark brown clayey TOPSOIL (OL)
	1	SS	7	19.3	2.5*	111			FILL - Brown and dark brown silty CLAY, trace to little sand and gravel, trace organic, moist (CL)
	2	SS	4	24.4	2.5*	101			
							5.5	696.5	
	3	SS	12	17.3	3.25*				Very tough brown and gray silty CLAY, little sand, trace gravel, moist (CL)
							8.0	694.0	
	4	SS	13	21.3	3.60 4.0*				Very tough gray silty CLAY, trace sand and gravel, moist (CL)
							10.5	691.5	
	5	SS	11	18.9	1.49 1.5*				Tough gray silty CLAY, little sand, trace gravel, moist to very moist (CL)
	6	SS	13	19.4	2.0*				
	7	SS	10	20.7	1.89 1.5*				
	8	SS	13	21.3	1.5*				

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **212** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **703.0**

END OF BORING **693.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **8.0 '**

▼ 24 HOURS **5.0 '**

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3	702.7	FILL - Black clayey TOPSOIL (OL)
	1	SS	7	20.8	2.75*	102			FILL - Brown little dark brown silty CLAY, little sand, trace gravel, trace organic, moist (CL)
							3.0	700.0	
	2	SS	4	24.1	0.5*	100			FILL - Dark brown silty CLAY, little sand, trace gravel, trace organic, very moist (CL)
							5.5	697.5	
	3	SS	10	17.0	3.5*				Very tough brown silty CLAY, little sand, trace gravel, moist (CL)
							8.0	695.0	
	4	SS	15	19.2	3.5*				Very tough gray silty CLAY, little sand, trace gravel, moist (CL)
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

SPT Hammer = Mobile Automatic

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 7823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **213** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **706.5**

END OF BORING **696.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5 '**

▽ AT END OF BORING **4.0 '**

▼ 24 HOURS **3.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.8	705.7	Black clayey TOPSOIL (OL)
	1	SS	1	155	<0.25*				Very soft ORGANIC CLAY, very moist (OH)
							3.0	703.5	▼
	2	SS	8	30.4	1.5*				▽ Tough brown silty CLAY, little sand, trace organic, very moist (CL/CH)
							5.5	701.0	▼
	3	SS	1	21.0	0.75*				Stiff brown silty CLAY, some sand, trace gravel, very moist (CL)
							8.0	698.5	
	4	SS	10	13.2	2.75*				Very tough brown sandy CLAY, trace gravel, moist (CL)
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

PROJECT **Assisted Living Center, Lake County Campus, Libertyville, Illinois**

CLIENT **Christopher B. Burke Engineering, Ltd., Rosemont, Illinois**

BORING **214** DATE STARTED **10-12-09** DATE COMPLETED **10-12-09** JOB **L-72,823A**

ELEVATIONS

GROUND SURFACE **706.5**

END OF BORING **696.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5 '**

▽ AT END OF BORING **7.0 '**

▼ 24 HOURS **4.0 '**

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3	706.2	Dark brown clayey TOPSOIL (OL)
	1	SS	2	57.5					Very soft gray MARL, very moist (OL/OH)
	2	SS	2	46.9					▼
							5.5	701.0	▼
	3	SS	8	16.5	1.75*				▽ Tough to very tough brown silty CLAY, little sand, trace gravel, moist (CL)
	4	SS	16	15.9	2.75*				
									End of Boring at 10.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

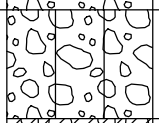
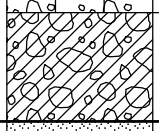
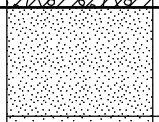
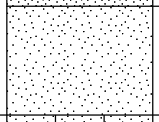
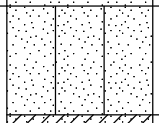
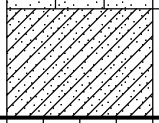
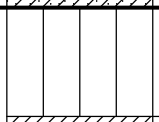
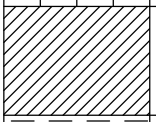
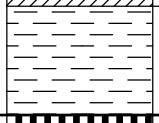
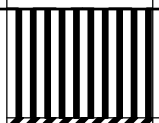
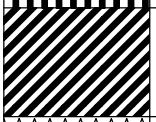
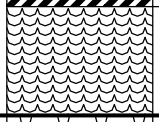
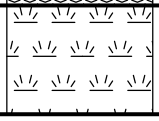
0 5 10 15 20 25

DRILL RIG NO. **314**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 72823A.GPJ TSC_ALL.GDT 10 20 09

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

COARSE-GRAINED SOILS

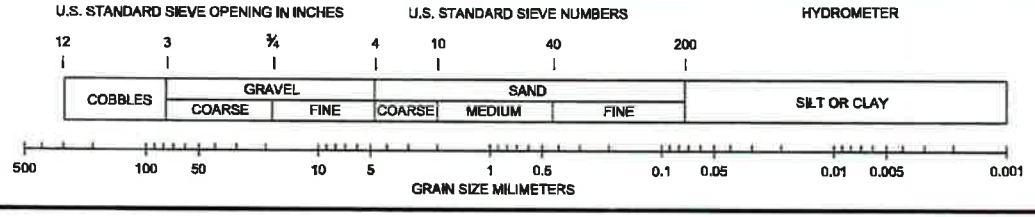
VISUAL-MANUAL DESCRIPTIONS

GEI Consultants

TYPICAL SOIL COLORS

- YELLOW
- OLIVE
- LIGHT BROWN
- BROWN
- REDDISH BROWN
- RED
- GRAY
- BLACK

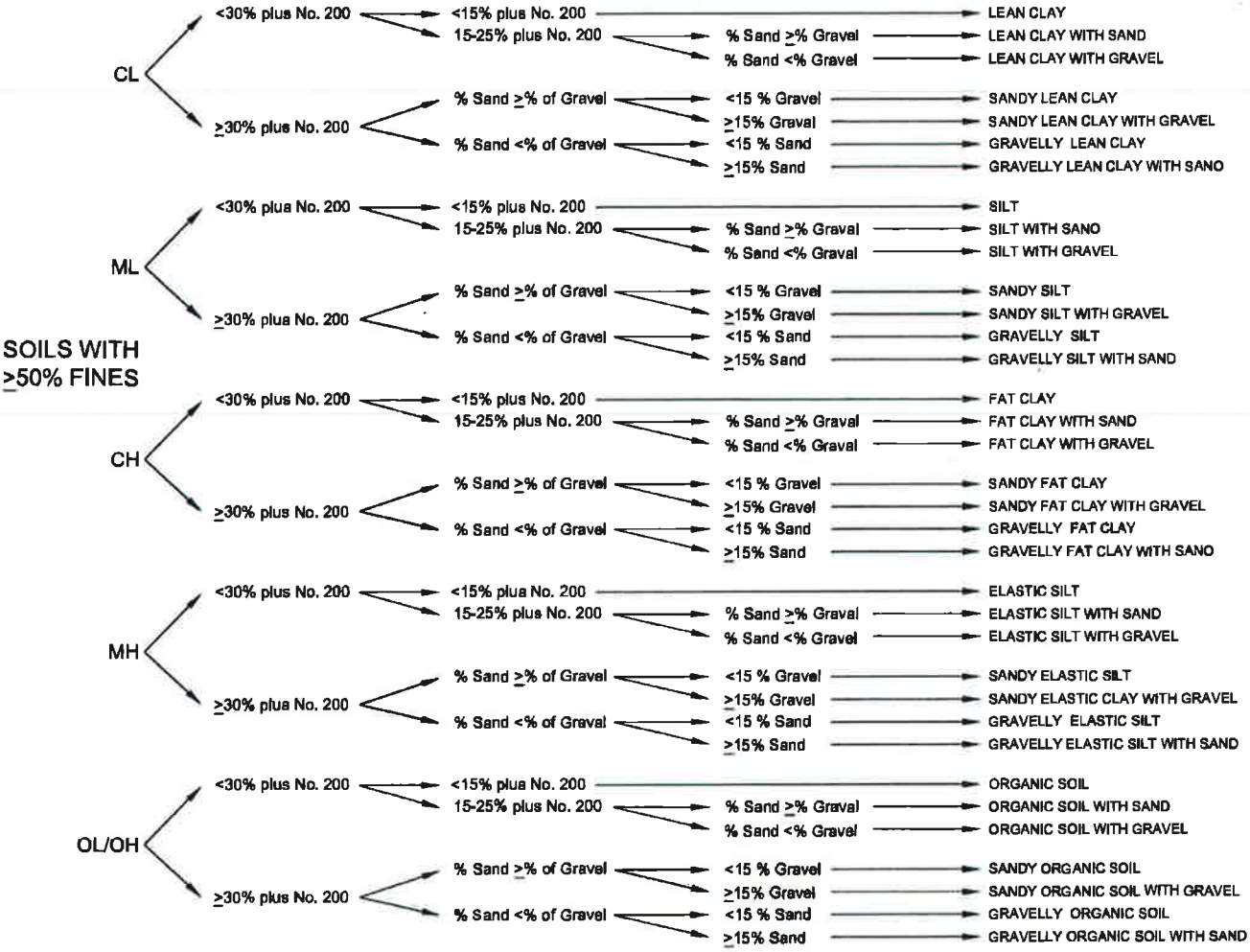
				GROUP SYMBOL	GROUP NAME
GRAVEL % Gravel > % Sand	≤5% Fines	WIDELY GRADED		GW	<15% Sand → WIDELY GRADED GRAVEL ≥15% Sand → WIDELY GRADED GRAVEL WITH SAND
		NARROWLY GRADED		GP	<15% Sand → NARROWLY GRADED GRAVEL ≥15% Sand → NARROWLY GRADED GRAVEL WITH SAND
	~10% Fines	WIDELY GRADED	Fines = ML or MH	GW-GM	<15% Sand → WIDELY GRADED GRAVEL WITH SILT ≥15% Sand → WIDELY GRADED GRAVEL WITH SILT AND SAND
			Fines = CL or CH	GW-GC	<15% Sand → WIDELY GRADED GRAVEL WITH CLAY ≥15% Sand → WIDELY GRADED GRAVEL WITH CLAY AND SAND
		NARROWLY GRADED	Fines = ML or MH	GP-GM	<15% Sand → NARROWLY GRADED GRAVEL WITH SILT ≥15% Sand → NARROWLY GRADED GRAVEL WITH SILT AND SAND
			Fines = CL or CH	GP-GC	<15% Sand → NARROWLY GRADED GRAVEL WITH CLAY ≥15% Sand → NARROWLY GRADED GRAVEL WITH CLAY AND SAND
	≥15% Fines		Fines = ML or MH	GM	<15% Sand → SILTY GRAVEL ≥15% Sand → SILTY GRAVEL WITH SAND
			Fines = CL or CH	GC	<15% Sand → CLAYEY GRAVEL ≥15% Sand → CLAYEY GRAVEL WITH SAND
SOILS WITH <50% FINES					
SAND % Sand ≥ % Gravel	≤5% Fines	WIDELY GRADED		SW	<15% Gravel → WIDELY GRADED SAND ≥15% Gravel → WIDELY GRADED SAND WITH GRAVEL
		NARROWLY GRADED		SP	<15% Gravel → NARROWLY GRADED SAND ≥15% Gravel → NARROWLY GRADED SAND WITH GRAVEL
	~10% Fines	WIDELY GRADED	Fines = ML or MH	SW-SM	<15% Gravel → WIDELY GRADED SAND WITH SILT ≥15% Gravel → WIDELY GRADED SAND WITH SILT AND GRAVEL
			Fines = CL or CH	SW-SC	<15% Gravel → WIDELY GRADED SAND WITH CLAY ≥15% Gravel → WIDELY GRADED SAND WITH CLAY AND GRAVEL
		NARROWLY GRADED	Fines = ML or MH	SP-SM	<15% Gravel → NARROWLY GRADED SAND WITH SILT ≥15% Gravel → NARROWLY GRADED SAND WITH SILT AND GRAVEL
			Fines = CL or CH	SP-SC	<15% Gravel → NARROWLY GRADED SAND WITH CLAY ≥15% Gravel → NARROWLY GRADED SAND WITH CLAY AND GRAVEL
	≥15% Fines		Fines = ML or MH	SM	<15% Gravel → SILTY SAND ≥15% Gravel → SILTY SAND WITH GRAVEL
			Fines = CL or CH	SC	<15% Gravel → CLAYEY SAND ≥15% Gravel → CLAYEY SAND WITH GRAVEL



1. GROUP NAME and (SYMBOL)
2. Structure , if any. (stratified layer thicknesses, lenses, varves, gradational changes)
3. Describe sand, gravel and fines components, with percentages, in order of predominance. Include max gravel size. For test pits give percent cobbles and boulders, by volume, and include max size.
4. Color
5. Sheen, odor, roots, ash, brick, cementation, reaction with HCL, etc.
6. "Fill," local name or geologic name, if known

GEI Consultants

FINE-GRAINED SOILS
VISUAL-MANUAL DESCRIPTIONS



ID OF INORGANIC FINE SOILS FROM MANUAL TESTS

Symbol	Name	Dry Strength	Dilatancy	Toughness*
ML	Silt	None to low	Slow to rapid	Low or thread cannot be formed
CL	Lean Clay	Medium to high	None to slow	Medium
MH	Elastic Silt	Low to medium	None to slow	Low to medium
CH	Fat Clay	High to very high	None	High

1. GROUP NAME and (SYMBOL)
2. Describe fines, sand, and gravel components, in order of predominance. Include plasticity of fines. Include percentages of sand and gravel.
3. Color
4. Sheen, odor, roots, ash, brick, cementation, torvane and penetrometer results, etc.
5. "Fill," local name or geologic name, if known

PEAT

Peat refers to a sample composed primarily of vegetable matter in varying stages of decomposition. The description should begin: PEAT (PT) and need not include percentages of sand, gravel or fines.

CRITERIA FOR DESCRIBING PLASTICITY

Description	Criteria
Nonplastic ML	A 1/8-in. (3 -mm) thread cannot be rolled at any water content
Low Plasticity ML, MH	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit *
Medium Plasticity MH, CL	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit
High Plasticity CH	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit

* Toughness refers to the strength of the thread near plastic limit. The lump refers to a lump of soil drier than the plastic, similar to dry strength.

GENERAL NOTES

Drilling and Sampling Symbols:

SS: Split-Spoon, 1 3/8-inch ID, 2-inch OD Unless otherwise noted
ST: Shelby Tube
PA: Power Auger
DB: Diamond Bit
AS: Auger Sample
JS: Jar Sample
VS: Vane Shear
WOH: Weight of Hammer
OS: Osterburg Sampler
HSA: Hollow Stem Auger
WS: Wash Sample
FT: Fish Tail
RB: Rock Bit
BS: Bulk Sample
PMT: Pressuremeter Test
GS: Giddings Sampler

Standard Penetration Test (STP) Value: Blows per foot of a 140-pound hammer falling 30 inches on a 2-inch OD split-spoon sampler, except where otherwise noted.

Water Level Measurement Symbols:

WL: Water Level
WS: While Sampling
WD: While Drilling
AB: After Boring
WCI: Wet Cave-in
DCI: Dry Cave-in
BCI: Before Casing Installation
BCR: Before Casing Removal
ACR: After Casing Removal

Water levels indicated on the boring logs are the levels measured in the boring at the time indicated. In permeable soils, the indicated elevations can be considered a reliable groundwater level. In impervious soils, the accurate determination of groundwater elevations may not be possible, even after several days of observations. In these cases, groundwater monitoring wells may need to be constructed and monitored for an extended period of time to determine the actual groundwater level.

Gradation Description and Terminology:

Coarse-grained or granular soils are defined as having more than 50% of their dry weight retained on the No. 200 sieve. Coarse grained soils include boulders, cobbles, gravel, and/or sand. Fine-grained soils are defined as having less than 50% of their dry weight retained on the No. 200 sieve. Fine grained soils include clay or clayey silt (cohesive), and silt (non-cohesive). In addition to gradation, granular soils are further defined based on their relative in-place density. Fine-grained soils are further defined based of their strength or consistency and plasticity. Additional information is provided below.

Major Component of Sample	Size Range	Other Components Present in Sample	Dry Weight, %
Boulders	Over 8 inches (200 mm)	Trace	1 to 5
Cobbles	8 inches to 3 inches (200 mm to 75 mm)	Trace to Some	5 to 12
Gravel	3 inches to No. 4 sieve	Some	12 to 34
Sand	Nos. 4 to 200 sieves (4.76 mm to 0.074 mm)	And	34 to 50
Silt	Passing No. 200 sieve (0.074 mm to 0.005 mm)		
Clay	Smaller than 0.005 mm		

Consistency of Cohesive Soils		Relative Density of Granular Soils	
Unconfined Compressive Strength, Qu, tsf	Consistency	N, blows per foot	Relative Density
<0.25	Very Soft	0 to 3	Very Loose
0.25 to 0.49	Soft	4 to 9	Loose
0.50 to 0.99	Medium (firm)	10 to 29	Medium Dense
1.0 to 1.99	Stiff	30 to 49	Dense
2.00 to 3.99	Very Stiff	50 – 80	Very Dense
4.00 to 8.00	Hard	>80	Extremely Dense
>8.00	Very Hard		

FIELD AND LABORATORY PROCEDURES

Field Sampling Procedures

Auger Sampling (AS)

In this procedure, soil samples are collected from cuttings off the auger flights as they are removed from the ground. Such samples provide a general indication of subsurface conditions; however, they do not provide undisturbed samples, nor do they provide samples from discrete depths.

Split-Barrel Sampling (SS) – (ASTM Standard D-1586-99)

In the split-barrel sampling procedures, a 2-inch O.D. split-barrel sampler is driven into the soil a distance of 18 inches by means of a 140-pound hammer falling 30 inches. The value of the Standard Penetration Resistance is obtained by counting the number of blows of the hammer over the final 12 inches of driving. The value provides a qualitative indication of the in-place relative density of cohesionless soils. The indication is only qualitative, however, since many factors can significantly affect the Standard Penetration Resistance Value, and direct correlation of results obtained by drill crews using different rigs, frilling procedures, and hammer-rod-spoon assemblies should not be made. A portion of the recovered sample is place in a sample jar and returned to the laboratory for further analysis and testing.

Shelby Tube Sampling Procedure (ST) - (ASTM D-1587-94)

In the Shelby tube sampling procedure, a thin-walled steel seamless tube with a sharp cutting edge is pushed hydraulically into the soil and a relatively undisturbed sample is obtained. This procedure is generally employed in cohesive soils. The tubes are identified, sealed, and carefully handled in the field to avoid excessive disturbance and are returned to the laboratory for extrusion and further analysis and testing.

Giddings Sampler (GS)

This type of sampling device consists of 5-foot sections of thin-wall tubing, which are capable of retrieving continuous columns of soil in 5-foot maximum increments. Because of a continuous slot in the sampling tubes, the sampler allows field determination of stratification boundaries and containerization of soil samples from any sampling depth within the 5-foot interval.

FIELD AND LABORATORY PROCEDURES

Subsurface Exploration Field Procedures

Hand-Auger Drilling (HA)

In this procedure, a sampling device is driven into the soil by repeated blows of a sledge hammer or a drop hammer. When the sampler is driven to the desired depth, the soil sample is retrieved. The hole is then advanced by manually turning the hand auger until the next sampling depth increment is reached. The hand auger drilling between sampling intervals also helps to clean and enlarge the borehole in preparation for obtaining the next sample.

Power Auger Drilling (PA)

In this type of drilling procedures, continuous flight augers are used to advance the boreholes. They are turned and hydraulically advanced by a truck, trainer, or track-mounted unit as site accessibility dictates. In auger drilling, casing and drilling mud are not required to maintain open boreholes.

Hollow-Stem Auger Drilling (HS)

In this drilling procedure, continuous flight augers (with open stems) are used to advance the boreholes. The open stem allows the sampling tool to be used without removing the augers from the borehole. Hollow-stem augers thus provide support to the sides of the borehole during the sampling operations.

Rotary Drilling (RD)

In employing rotary drilling methods, various cutting bits are used to advance the boreholes. In this process, surface casing and/or drilling fluids are used to maintain open boreholes.

Diamond Core Drilling (DB)

Diamond core drilling is used to sample cemented formations. In this procedure, a double tube (or triple tube) core barrel with a diamond bit cuts an annular space around a cylindrical prism of the material sampled. The sample is retrieved by a catcher just above the bit. Samples recovered by this procedure are placed in study containers in sequential order.

FIELD AND LABORATORY PROCEDURES

Laboratory Procedures

Water Content (Wc)

The water content of a soil is the ratio of the weight of water in a given soil mass to the weight of the dry soil. Water content is generally expressed as a percentage.

Hand Penetrometer (Qp)

In the hand penetrometer gtest, the unconfined compressive strength of a soil is determined to a maximum value of 4.5 tons per square foot (tsf) or 7.0 tsf, depending on the testing device utilized, by measuring the resistance of the soil sample to penetration by a small spring-calibrated cylinder. The hand penetrometer test has been carefully correlated with unconfined compressive strength tests and thereby provides a useful and a relative simple testing procedure in which soil strength can be quickly and easily estimated.

Unconfined Compression Tests (Qu)

In the unconfined compression strength test, an undisturbed prism of soil is loaded axially until failure or until 20% strain has been reached, whichever comes first.

Dry Density (γd)

The dry density is a measure of the amount of solids in a unit volume of soil. Use of this value is often made when measuring the degree of compaction of a soil.

Classification of Samples

In conjunction with the sample testing program, all soil samples are examined in our laboratory and visually classified on the basis of their texture and plasticity in general accordance with the Unified Soil Classification System. The soil descriptions on the boring logs are derived from this system, as well as the component gradation terminology, consistency of cohesive soils, and relative density of granular soils, as described on a separate sheet entitled General Notes. The estimated groups symbols, included in parentheses following the soil descriptions on the boring logs, are in general conformance with the Unified Soil Classification System (USCS).

FIELD AND LABORATORY PROCEDURES

Standard Boring Log Procedures

In the process of obtaining and testing samples and preparing this report, standard procedures are followed regarding field logs, laboratory data sheets, and samples.

Field logs are prepared during performance of the drilling and sampling operations and are intended to essentially portray field occurrences, sampling locations, and procedures.

Samples obtained in the field are frequently subjected to additional testing an re-classification in the laboratory by experienced Geotechnical Engineers; and therefore, differences between the field logs and the final logs may exist. The engineer preparing the report reviews the field logs, laboratory test data, and classifications and then, using judgement and experience in interpreting this data, may make further changes. It is common practice in the geotechnical engineering profession not to include field logs and laboratory data sheets in engineering reports, because they do not represent the engineer's final opinions as to appropriate descriptions for conditions encountered in the exploration and testing work. Results of laboratory tests are generally shown on the boring logs or are described in the text of the report, as appropriate.

Samples taken in the field, some of which are later subjected to laboratory tests, are retained in our laboratory for 60 days and then discarded, unless special disposition is requested by our client. Samples retained over a long period of time, even though in sealed jars, are subject to moisture loss, which changes the apparent strength of cohesive soil, generally increasing the strength from what was originally encountered in the field. Since they are then no longer representative of the moisture conditions initially encountered, observers of these samples need to recognize this factor.

Appendix B

Seismic Design Parameters

650 W Winchester Rd, Libertyville, IL 60048, USA

Latitude, Longitude: 42.2949707, -87.9639174

Date	7/19/2022, 3:08:36 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	0.104	MCE_R ground motion. (for 0.2 second period)
S_1	0.058	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.167	Site-modified spectral acceleration value
S_{M1}	0.138	Site-modified spectral acceleration value
S_{DS}	0.111	Numeric seismic design value at 0.2 second SA
S_{D1}	0.092	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	B	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.052	MCE_G peak ground acceleration
F_{PGA}	1.6	Site amplification factor at PGA
PGA_M	0.083	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	0.104	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.11	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.058	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.065	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.952	Mapped value of the risk coefficient at short periods
C_{R1}	0.885	Mapped value of the risk coefficient at a period of 1 s

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Appendix C

Site Topography

SOLAR PANELS

SOLAR PANELS

SOLAR PANELS

SOLAR PANELS

DETENTION BASIN EXPANSION

NWL: 691.92

HWL: 694.50

ADDED VOLUME: 8.7 AC.FT.

10'

10'

SB–#106

SB–#107

SB–#201

SB–#202

SB–#203

SB–#204

SB–#205

SB–#206

SB–#208

SB–#210

SB–#211

SB–#212

SB–#213

SB–#214

GEOTHERMAL TEST WELL

5/8" IR W/CAP TOPO

5/8" IR W/CAP SET

PROPOSED BUILDING

FF: 709.50

5 EV CHARGING STATIONS

15 MINUTE DELIVERY PARKING

TRASH ENCLOSURE 708

ELECTRICAL EQUIPMENT

RIM: 707.50

RIM: 709.83

RIM: 709.50

RIM: 707.82

INV: 700.4 (NE)

INV: 699.6 (S)

T.O.P.: 700.9

RIM: 708.01

T.O.P.: 700.9

RIM: 704.20

RIM: 705.50

RIM: 704.8

RIM: 705.5

RIM: 706.0

RIM: 705.8

RIM: 707.5

RIM: 708.00

RIM: 706.9

6" SANITARY

6" WATER SERVICE

8" WATERMAIN

4" WATERMAIN

6" WATERMAIN

T/W: 709.83

T/W: 708.83

T/W: 702.83

FH#1

FH#2

FH#3

FH#4

12" RCP FES
INV: 691.79 (NE)

6" DIAMETER STORM
SEWER STRUCTURE
INV: 691.8 (E)
INV: 691.6 (W)
4" HOLE IN 8" WALL
ELEV: 697.6

12" RCP FES
INV: 691.92 (SW)

12" RCP

12" RCP
RIM: 697.01
RIM: 697.01

ASPHALT