

October 10, 2007



Mr. Scott Cargill
LUTJEN, INC.
8350 North St. Clair Avenue, Suite 100
Kansas City, MO 64151

**Re: Boring Logs for Phase 1 and 2 of Richards Gebaur Redevelopment
Kansas City, Missouri
TSi Engineering Project No. 02007075**

Dear Mr. Cargill:

Please find the boring logs for our current work at the Richards Gebaur Redevelopment project enclosed here. We are currently working on the associated geotechnical report. That report will have more details on the geotechnical aspects of the project and site.

In summary, the subsurface conditions at the site consist of a thin mantle of clay soil overlying shallow limestone and shale bedrock. When developing grading plans and budgets for earthwork, we recommend you take these points into consideration:

1. The site has a well developed "B Horizon". This term means that the soil immediately below the topsoil is organic and is dark brown like topsoil. Most of our boring logs indicate this layer as a dark brown lean clay from a depth of 0.5 to approximately 1.5 feet. Laboratory tests on this "B Horizon" indicate that it has a relatively high organic content. The impact of this condition is that it will be necessary to strip more than the usual amount of organic soil from the ground surface when preparing the site. I recommend that grading plans be based on most of the site needing 15 inches of stripping.
2. The borings and laboratory testing indicate that there is some lean clay soil on the site. This lean clay could be used as select "low volume change" fill material beneath building floor slabs. However, this lean clay does not appear to be present at any consistent depth, elevation, or location. Separating it and stockpiling it would be difficult.
3. Our subsurface investigation encountered less existing uncontrolled fill than I anticipated. The only area with a significant amount of uncontrolled fill is just southeast of the Botts Road and Hwy 150 intersection (east of the Richie Brothers entrance). There is a large amount of rubble and some topsoil dumped in this area.
4. The concrete from the runways and taxiways can be crushed and used as pavement sub-base or low volume change fill below building floor slabs. It should be crushed down to a 3 inch minus material. It could also be used as backfill for modular retaining walls,

TSi Engineering, Inc.
1600 Genessee St, Suite 960
Kansas City, Missouri 64102
(816) 283-3838 fax: (816) 283-3938

Mr. Scott Cargill
LUTJEN, INC.
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provided the wall designed approved. It will likely have too any fines to be used as a clean crushed rock material such as a drain rock. It could be used as general structural fill if it was crushed to a 6 inch minus material.

5. At the north end of the site, the limestone outcrops that are visible appear to be the Argentine Limestone unit. Based on the borings and field observations, this unit appears to be present from the highest points of the site down to elevations 1021 to 1031 feet. Beneath the Argentine are thicker shale formations, the Lane Shale and Chanute Shale, with a thinner limestone unit (Raytown Limestone) between them. These shale formations appear to go from the bottom of the Argentine down to approximately elevation 980 feet. A thicker limestone formation, the Cement City, is present below that elevation. Based on this profile, the southeastern portion of the site where the ground surface is at a lower elevation would have less limestone removal for deep excavations.
6. Hunt Midwest has been drilling deep core-holes at the site to explore the Bethany Falls Limestone, which they intend to mine here. Obtaining their coring records could provide a more accurate indicate of the elevations of the various geologic units at the site.

Please contact us with any questions you may have.

Sincerely,

TSi ENGINEERING, INC.



Steve Wendland, PE
Area Manager

LOG OF BORING NO. BH-1

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 989.0 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
		SS-1		Brown, fat CLAY (CH)	17		5 5 6	4.50			14			
5		ST-2			96			1.75	0.42	97	26	64	19	45
		SS-3			67		3 3 3	1.75			25			
				Boring terminated at 9.0 ft.										
10														
15														
20														
25														

LOG WITH LAB BOTTS ROAD GEBAUJ 02007076.00.GPJ 10/10/07

Completion Depth: 9.00
Date Boring Started: 9/6/07
Date Boring Completed: 9/6/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. BH-2

Project Description: **Gebaur/ Botts Road**
Kansas City, MO

Geotechnical & Environmental Engineering
 59th & Arsenal, Two Campbell Plaza, Bldg. C
 St. Louis, Missouri 63139
 (314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1004.1 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL)										
				Brown, fat CLAY (CH)										
5	▲	SS-1			61		4 5 7	4.50			16			
	▲	SS-2		- trace limestone pieces above 6.0 ft. - 0.25" limestone lens at 7.0 ft.	100		2 4 6	3.00			27			
	■	ST-3			104			2.00			22			
10				Boring terminated at 8.8 ft.										
15														
20														
25														

LOG WITH LAB BOTTS ROAD GEBEUR 02007076.00.GPJ 9/28/07

Completion Depth: 8.80 Date Boring Started: 8/29/07 Date Boring Completed: 8/29/07 Engineer/Geologist: J. Schaeffer Project No.: 02007076.00	Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT. Groundwater not encountered during drilling. Sampler refusal at 8.8 ft. Auger refusal at 8.8 ft.
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The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-3

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1027.5 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
		SS-1		Brown, fat CLAY (CH), trace limestone pieces (FILL)	11		3 7 6	4.50						
5				- 4.5" piece of portland cement concrete below 4.5 ft.										
				Boring terminated at 8.0 ft.										
10														
15														
20														
25														

LOG WITH LAB: BOTTS ROAD GEBEUR 02007076.00.GPJ 10/10/07

Completion Depth: 8.00
Date Boring Started: 9/6/07
Date Boring Completed: 9/6/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Auger refusal at 4.5 ft. Boring continued to 8.0 ft. in depth using coring methods.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-4

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 1042.4 Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL)										
				Brown, fat CLAY (CH)										
5		SS-1			44		3 7 7	NA		19				
				Boring terminated at 6.0 ft.										

LOG WITH LAB. BOTTS ROAD, GEBEUR 02007076.00, GP J 9/28/07

Completion Depth: 6.00
Date Boring Started: 8/29/07
Date Boring Completed: 8/29/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Auger refusal at 6.0 ft.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-5

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1046.1 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
		SS-1		Brown, lean CLAY (CL)	42		12	NA						
				Brown, fat CLAY (CH), with limestone pieces			50/4"							
				Limestone, weathered										
				Boring terminated at 1.8 ft.										
5														
10														
15														
20														
25														

LOG WITH LAB. BOTTS ROAD, GEBEUR 02007076.00.GPJ 10/10/07

Completion Depth: 1.80
Date Boring Started: 9/4/07
Date Boring Completed: 9/4/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Sampler refusal at 1.8 ft.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-6

Project Description: **Gebaur/ Botts Road**
Kansas City, MO

Geotechnical & Environmental Engineering
 59th & Arsenal, Two Campbell Plaza, Bldg. C
 St. Louis, Missouri 63139
 (314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 1049.7 Location: See Site and Boring Location Plan	Recovery %	ROD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
				Brown, lean CLAY (CL), with grass roots										
		SS-1		Brown, lean CLAY (CL) Brown, fat CLAY (CH), with limestone pieces	17		4 6 6	4.00			17			
5				Boring terminated at 3.5 ft.										
10														
15														
20														
25														

LOG WITH LAB. BOTTS ROAD, GEBEUR 02007076.00.GPJ 9/28/07

Completion Depth: 3.50
 Date Boring Started: 9/4/07
 Date Boring Completed: 9/4/07
 Engineer/Geologist: J. Schaeffer
 Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
 Groundwater not encountered during drilling.
 Auger refusal at 3.5 ft.
 Offset 10 ft. East.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-7

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 1051.6 Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass roots										
		SS-1		Brown, lean CLAY (CL) Brown, fat CLAY (CH), with limestone pieces Boring terminated at 3.0 ft.	33		12 30 50/3"	NA						
5														
10														
15														
20														
25														

LOG WITH LAB. BOTTS ROAD GEBBUR 02007076.00.GPJ 9/28/07

Completion Depth: 3.00
Date Boring Started: 9/6/07
Date Boring Completed: 9/6/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Auger refusal at 3.0 ft.

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. BH-8

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1034.5 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
				Brown, fat CLAY (CH), with limestone pieces										
5		SS-1			6		5 7 4	NA						
				Tan, shaley CLAY (CH), with intermixed shale lenses										
10		SS-2		LIMESTONE, gray, hard, with intermixed shale lenses	56		12 50/5"	3.50			15			
		RUN1		SHALE, gray, moderately hard, slightly weathered.	100	88								
				SANDSTONE, gray, hard, calcareous, with intermixed shale seams										
15		RUN2		LIMESTONE, gray, hard with intermixed shale seams	100	100								
				SANDSTONE, gray, hard, calcareous, with intermixed shale seams										
		RUN3			100	100								
20				Boring terminated at 19.0 ft.										
25														

LOG WITH L&E_BOTTTS ROAD_GEBAUR 02007076.00.GPJ 10/1/007

Completion Depth: 19.00
Date Boring Started: 9/5/07
Date Boring Completed: 9/5/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Auger refusal at 19.0 ft.

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. BH-9

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 1009.9 Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
0 - 5		SS-1		Brown, lean CLAY (CL), with grass roots Brown, fat CLAY (CH)	22		5 5 6	4.50						
5 - 8		ST-2			83			3.00	1.48	101	24	74	21	53
8 - 10		SS-3			83		4 6 10	4.50			20			
10 - 15		SS-4			100		3 3 7	2.25				57	30	27
15 - 25				Boring terminated at 15.0 ft.										

LOG WITH LAB BOTTS ROAD GEBEUR 02007076.00.GPJ 10/10/07

Completion Depth: 15.00
Date Boring Started: 9/6/07
Date Boring Completed: 9/6/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-10

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1001.8 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL) Brown, fat CLAY (CH)										
5		SS-1			33		3 2 3	1.75			20			
		ST-2		Brown, weathered, clayey SHALE	100			4.50	0.09	97	29			
		SS3			122		4 50/3"	4.50			22			
10				- 1/8" sandstone lens Boring terminated at 9.25 ft.										
15														
20														
25														

LOG WITH LAB BOTTS ROAD GEBBAUR 02007076.00.GPJ 10/10/07

Completion Depth: 9.25
Date Boring Started: 8/29/07
Date Boring Completed: 8/29/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Sampler refusal at 9.25 ft.

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. BH-11

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: Approx. 985.0 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL), trace aggregate top 1 ft. Grayish brown below 1 ft.										
5	▲▼	SS-1			100		2 3 4	1.50			19	39	23	16
	■	ST-2		Grayish brown, fat CLAY (CH)	88			3.00	0.97	97	28			
10	▲▼	SS-3		- limestone piece at 9.25 ft. - brown below 9.5 ft.	100		3 4 5	3.00			28			
				Boring terminated at 12.0 ft.										
15														
20														
25														

LOG WITH LAB BOTTS ROAD, GEBEUR 02007076.00.GPJ 10/10/07

Completion Depth: 12.00
Date Boring Started: 8/29/07
Date Boring Completed: 8/29/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Auger refusal at 12.0 ft.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-12

Project Description: **Gebaur/ Botts Road**
Kansas City, MO

Geotechnical & Environmental Engineering
 59th & Arsenal, Two Campbell Plaza, Bldg. C
 St. Louis, Missouri 63139
 (314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 1001.3 Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
				Brown, lean CLAY (CL), with grass roots										
				Brown, weathered, clayey SHALE										
5	▲	SS-1			78		5 8 11	4.50			18			
	▲	SS-2			100		5 10 11	4.50			22	60	30	30
	▲	SS-3			131		5 5	4.50			21			
10				- 1/8" sandstone lens at 9.1 ft. Boring terminated at 9.2 ft.										
15														
20														
25														
Completion Depth: 9.20 Date Boring Started: 8/29/07 Date Boring Completed: 8/29/07 Engineer/Geologist: J. Schaeffer Project No.: 02007076.00				Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT. Groundwater not encountered during drilling. Sampler refusal at 9.2 ft. Offset 7 ft. North										

LOG WITH LAB. BOTTS ROAD, GEBEUR, 02007076.00, G.P.J. 9/29/07.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-13

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 981.6 Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL)										
				Brown, fat CLAY (CH)										
5	SS-1				33		3 4 5	3.00			17			
				- trace limestone pieces from 8.0 to 10.0 ft.	79			3.50	0.47	113	17			
10	SS-3			Dark brown, clayey SHALE	67		4 5 10	4.50			19			
							7 15 25	4.50						
15	SS-4			Boring terminated at 15.0 ft.	100									
20														
25														

LOG WITH LAB. BOTTS ROAD GEBAUJ 02007076.00.GPJ 9/28/07

Completion Depth: 15.00
Date Boring Started: 8/30/07
Date Boring Completed: 8/30/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-14

Project Description: **Gebaur/ Botts Road**
Kansas City, MO

Geotechnical & Environmental Engineering
 59th & Arsenal, Two Campbell Plaza, Bldg. C
 St. Louis, Missouri 63139
 (314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 998.6 Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL)										
5		SS-1		Brown, fat CLAY (CH) - trace limestone pieces above 3.5 ft.	67		2 4 4	2.50			22			
		ST-2			71			2.50	1.51	107	22			
		SS-3		- trace gravel below 8.0 ft.	100		3 5 7	3.50			21			
10				Boring terminated at 10.0 ft.										

LOG WITH LAB BOTTS ROAD GEBEUR 02007076.00.GPJ 9/28/07

Completion Depth: 10.00
 Date Boring Started: 8/30/07
 Date Boring Completed: 8/30/07
 Engineer/Geologist: J. Schaeffer
 Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
 Groundwater not encountered during drilling.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-15

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 1014.2 Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
				Brown, lean CLAY (CL), with grass roots										
		SS-1		Brown, lean CLAY (CL)	17		3 4 5	4.50			18			
5		ST-2			50			4.00	99	20				
		SS-3			100		2 4 5	2.25			26	47	27	20
10														
		SS-4		Brown, clayey SHALE	83		4 9 11	4.50			16			
15														
		SS-5			100		10 22 27	4.50			15			
20				Boring terminated at 20.0 ft.										
25														

LOG WITH LAB. BOTTS ROAD, GESAUR 02007076.00.GPJ 10/1/007

Completion Depth: 20.00
Date Boring Started: 8/31/07
Date Boring Completed: 8/31/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. BH-16

Project Description: Gebaur/ Botts Road
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1030.7 Location: See Site and Boring Location Plan									
		SS-1		Brown, lean CLAY (CL), with grass roots	11		5 6 6	NA					
				Brown, lean CLAY (CL) Brown, fat CLAY (CH), trace limestone pieces									
5		SS-2			39		4 5 4	4.50		16			
				SANDSTONE, brown, moderately hard									
				LIMESTONE, gray, hard									
		RUN1		SHALE, gray, moderately hard, slightly weathered - with intermixed clay seams from 8.75 to 13.75 ft.	99	14							
				Calcareous, hard below 14.0 ft.									
		RUN2			95	95							
				Boring terminated at 18.0 ft.									

LOG WITH LAB. BOTTS ROAD, GEBBAUR_02007076.CO.GPJ, 10/10/07

Completion Depth: 18.00
Date Boring Started: 8/31/07
Date Boring Completed: 8/31/07
Engineer/Geologist: J. Schaeffer
Project No.: 02007076.00

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Auger refusal at 8.0 ft.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-17

Project Description: Richards Gebaur Redevelopment
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 1060.5 Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL)										
				Brown, fat CLAY (CH)										
5		ST-1			42			4.50		111	16			
10		SS-2			100		4 7 11	4.00			25			
				Brown, lean CLAY (CL)										
15		SS-3			100		3 5 6	3.00			30	42	26	16
				Boring terminated at 15.0 ft.										

LOG WITH LAB. RICHARDS GEBEUR REDEVELOPMENT 02007075.GPJ 10/10/07

Completion Depth: 15.00
Date Boring Started: 8/28/07
Date Boring Completed: 8/28/07
Engineer/Geologist: JAS
Project No.: 2007075

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-18

Project Description: Richards Gebaur Redevelopment
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 1058.7 Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
MATERIAL DESCRIPTION														
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL)										
				Brown, fat CLAY (CH)										
5		SS-1			22		3 3 5	NA		16				
10		SS-2			72		3 3 5	3.25		25				
				Boring terminated at 10.0 ft.										

LOG WITH LAB RICHARDS GEBEUR REDEVELOPMENT 02007075.GPJ 9/28/07

Completion Depth: 10.00
Date Boring Started: 8/28/07
Date Boring Completed: 8/28/07
Engineer/Geologist: JAS
Project No.: 2007075

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Offset 6 ft. South.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-19

Project Description: **Richards Gebaur Redevelopment**
Kansas City, MO

Geotechnical & Environmental Engineering
 59th & Arsenal, Two Campbell Plaza, Bldg. C
 St. Louis, Missouri 63139
 (314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 Inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1063.8 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL)										
				Brown, fat CLAY (CH)										
5	▲	SS-1			67		5 5 7	4.00			14			
10	■	ST-2			75			4.50	1.51	96	28			
15	▲	SS-3			100		2 2 9	2.25			29			
				- with limestone pieces below 14.8 ft.										
				Boring terminated at 15.5 ft.										

LOG WITH LAB. RICHARDS_GEBEUR_REDEVELOPMENT_02007075.GPJ 10/10/07

Completion Depth: 15.50
 Date Boring Started: 8/28/07
 Date Boring Completed: 8/28/07
 Engineer/Geologist: JAS
 Project No.: 2007075

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
 Groundwater not encountered during drilling.
 Auger refusal at 15.5 ft.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-20

Project Description: Richards Gebaur Redevelopment
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	Surface El.: 1058.5 Location: See Site and Boring Location Plan	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				MATERIAL DESCRIPTION										
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL)										
				Brown, fat CLAY (CH)										
5		ST-1			46			2.50	2.76	106	16			
10		SS-2			100		12 42 50/5	NA						
				Limestone pieces										
				Boring terminated at 9.75 ft.										

LOG WITH LAB. RICHARDS GEBEUR REDEVELOPMENT 02007075.GPJ 9/28/07

Completion Depth: 9.75
Date Boring Started: 8/28/07
Date Boring Completed: 8/28/07
Engineer/Geologist: JAS
Project No.: 2007075

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Sampler refusal at 9.75 ft.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-21

Project Description: **Richards Gebaur Redevelopment**
Kansas City, MO

Geotechnical & Environmental Engineering
 59th & Arsenal, Two Campbell Plaza, Bldg. C
 St. Louis, Missouri 63139
 (314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1048.7 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with gras roots										
				Brown, lean CLAY (CL)										
				Brown, fat CLAY (CH)										
5		SS-1			72		4 5 7	2.50			21			
10		ST-2		Brown, lean CLAY (CL)	79			1.00	0.43	64	61			
				-with limestone pieces below 10.0										
				Boring terminated at 11.0 ft.										
15														
20														
25														

LOG WITH LAB. RICHARDS GEBEUR REDEVELOPMENT 02007075.GPJ 9/28/07

Completion Depth: 11.00
 Date Boring Started: 8/27/07
 Date Boring Completed: 8/27/07
 Engineer/Geologist: JAS
 Project No.: 2007075

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
 Groundwater not encountered during drilling.
 Auger refusal at 11.0 ft.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-22

Project Description: Richards Gebaur Redevelopment
 Kansas City, MO

Geotechnical & Environmental Engineering
 59th & Arsenal, Two Campbell Plaza, Bldg. C
 St. Louis, Missouri 63139
 (314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1064.7 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL)										
				Brown, fat CLAY (CH)										
		SS-1			50		50/6"	NA						
5		RUN1		LIMESTONE, gray, hard - 3.25" clay seam below 4.6 ft., highly fractured limestone above 4.6 ft. - moderately fractured with intermixed clay seams below 4.8 ft. Core loss from 6.0 to 6.4 ft.	83	27								
10		RUN2		- near vertical fracture from 7.7 to 8.0 ft.	100	35								
		RUN3		- highly fractured with intermixed clay lenses from 9.0 to 9.5 ft.	93	67								
15				Boring terminated at 14.0 ft.										

LOG WITH LAB. RICHARDS GEBEUR REDEVELOPMENT 02007075.GPJ 9/28/07

Completion Depth: 14.00
 Date Boring Started: 8/28/07
 Date Boring Completed: 8/28/07
 Engineer/Geologist: JAS
 Project No.: 2007075

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
 Groundwater not encountered during drilling.
 Auger refusal at 4.0 ft.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-23

Project Description: Richards Gebaur Redevelopment
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1058.9 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
				Brown, lean CLAY (CL)										
				Brown, fat CLAY (CH)										
5		SS-1		- trace limestone pieces below 4.0 ft.	78		3 4 5	3.00		1057				
10		ST-2			50			4.00	1.87	102	24			
15		SS-3			100		3 4 6	2.00		28	61	31	30	
				Tan, lean CLAY (CL)										
20		SS-4		-1/8" sand lens at 19.0 ft. Poorly graded SAND (SP), with limestone pieces Boring terminated at 20.0 ft.	100		3 4 23	<0.25		63				

LOG WITH LAB RICHARDS GEBAUR REDEVELOPMENT 02007075.GPJ 9/28/07

Completion Depth: 20.00
Date Boring Started: 8/28/07
Date Boring Completed: 8/28/07
Engineer/Geologist: JAS
Project No.: 2007075

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater was encountered at 19.0 ft. during drilling.

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.

LOG OF BORING NO. BH-24

Project Description: Richards Gebaur Redevelopment
Kansas City, MO

Geotechnical & Environmental Engineering
59th & Arsenal, Two Campbell Plaza, Bldg. C
St. Louis, Missouri 63139
(314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches	Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1054.7 Location: See Site and Boring Location Plan										
				Brown, lean CLAY (CL), with grass roots										
		RUN1		Brown, lean CLAY (CL), with limestone pieces	70	38								
5		RUN2		LIMESTONE, Light gray, hard, moderately weathered - 1.2" clay seam from 1.2 to 1.3 ft. - core loss - highly fractured from 3.2 to 3.4 ft. - core loss from 4.2 to 7.1 ft.	56	15								
		RUN3		- core loss from 8.1 to 9.3 ft.	48	17								
10				- clay seam from 9.3 to 9.6 ft.										
				Boring terminated at 10.0 ft.										
15														
20														
25														

LOG WITH LAB RICHARDS GEBEUR REDEVELOPMENT 02007075.GPJ 9/28/07

Completion Depth: 10.00
Date Boring Started: 8/27/07
Date Boring Completed: 8/27/07
Engineer/Geologist: JAS
Project No.: 2007075

Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT.
Groundwater not encountered during drilling.
Auger refusal at 1.0 ft.

The stratification lines represent approximate strata boundaries.
In situations, the transition may be gradual.

LOG OF BORING NO. BH-25

Project Description: **Richards Gebaur Redevelopment**
Kansas City, MO

Geotechnical & Environmental Engineering
 59th & Arsenal, Two Campbell Plaza, Bldg. C
 St. Louis, Missouri 63139
 (314) 644-3134 (314) 644-3135 FAX



Depth, feet	Samples	Sample #	Graphic Log	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows Per 6 inches Hand Penetrometer TSF	Undrained Shear Strength, TSF	Unit Dry Weight, lb/cu ft.	Water Content, %	Liquid Limit	Plastic Limit	Plasticity Index
				Surface El.: 1069.1 Location: See Site and Boring Location Plan									
				Brown, lean CLAY (CL), with grass roots									
				Brown, lean CLAY (CL) - with limestone pieces below 2.0 ft.									
				Boring terminated at 3.0 ft.									
5													
10													
15													
20													
25													
Completion Depth: 3.00 Date Boring Started: 8/28/07 Date Boring Completed: 8/28/07 Engineer/Geologist: JAS Project No.: 2007075				Remarks: Boring drilled with CME 55 using solid stem fingerbit and auto SPT. Groundwater not encountered during drilling. Auger refusal at 3.0 ft.									

LOG WITH LAB, RICHARDS GEBAUR REDEVELOPMENT 02007075.GPJ 9/28/07

The stratification lines represent approximate strata boundaries. In situations, the transition may be gradual.