



MEMORANDUM

Missouri Department of Transportation Construction - Materials Central Laboratory

TO: Philip Hamilton-cd/gs

CC/ATT: Patricia Lemongelli-cd/cm
Coleen Welter-cd/gs
George Davis-ma

FROM: Thomas W. Fennessey
Geotechnical Engineer

DATE: May 11, 2015

SUBJECT: Materials
Geotechnical Section
Foundation Investigation for
Osage Beach Construction Building
Job No. R35G-FI2293
Miller County

General – It is understood that a single-story construction building is proposed to be constructed to the south of the existing maintenance building on the MoDOT maintenance lot at Osage Beach, MO. While no grading information has been provided, it is understood that the proposed building is to be constructed with minimal cut and fill. No foundations loads or additional information regarding this proposed building has been provided.

Four borings were drilled at the staked locations as indicated on Figure 1 - Boring Location Aerial. A subsurface diagram of these borings is included as Figure 2. Also attached are individual boring logs for each of the locations drilled.

Recommendations – The following recommendations are made based upon information provided regarding the proposed building and conditions observed at the site.

- Proof roll proposed building areas to receive fill with a fully loaded tandem axle dump truck prior to fill placement. Any areas exhibiting pumping or rutting should be undercut and backfilled with compacted granular fill. Prior to placement of any new fill, scarify the surface of any areas to be filled.
- It is recommended that any new fill material be lean clay or better. However, use of granular fill material is preferred if available. Fill should be compacted to 95% of standard Proctor maximum dry density. Non-granular fill material should be compacted at or within 3% of optimum moisture content. All fill and cut areas should be constructed to slope and drain away from the proposed building.
- An allowable bearing pressure of 3000 psf or less may be used for the design of shallow foundations constructed on or in properly compacted fill or natural soils at this site. Shallow foundations shall be embedded a minimum of 24 inches below finished grade for frost protection. Individual spread footings shall have a minimum width of 2.5 feet while strip footings shall have a minimum width of 1.5 feet.

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Attachments

**Missouri Department of Transportation
Construction and Materials**





BORING NO. B-1 T-15-31

Page 1 of 1

Job No.: R35G-FI2293
 Design: _____
 Bent: _____
 Station: _____
 Offset: _____
 Elevation: 906.2
 Requested Station: _____
 Requested Offset: _____
 Requested Elevation: _____
 Drill No.: G-9577

County: Miller
 Skew: _____
 Logged By: Thomas Fennessey
 Northing: 842848.2
 Easting: 1612298.1
 Requested Northing: _____
 Requested Easting: _____
 Equipment: CME 45 Split-Spoon Sampler
 Location Note: _____
 Hammer Efficiency: 84%

Route: N/A
 Location: Osage Beach
 Operator: Raymond Murray
 Date of Work: 04/30/15-04/30/15
 Depth to Water: _____
 Depth Hole Open: _____
 Time Change: _____
 Drilling Method: Hollow Stem Auger

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N ₆₀)	Shear Data	Field Tests	Index Tests
0									
		0-2.2' Brown, LEAN CLAY, stiff to very stiff, moist	905						
		2.2-10.5' Reddish brown mottled gray, FAT CLAY trace gravel, trace sand, hard, moist		X	67	3-5-8 (18)		PP = 4.00 tsf	
5									
			900	X	87	3-4-7 (15)		PP = 4.00 tsf	
		8.2-8.5' Gray chert		X	100	5-16-15 (43)		PP = 4.50 tsf	
10									
		10.5-11.9' Dolomite, light gray, medium hard, highly weathered to moderately weathered	895	X	100	10-36/0.3'		PP = 4.50 tsf	
		11.9-12.5' Dolomite, light gray, medium hard to moderately hard, moderately weathered to slightly weathered							
		Bottom of borehole at 12.5 feet.							

N₆₀ = (Em/60)Nm N₆₀ - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
 (1) = Assumed, (2) = Actual

Coordinate System: Modified U.S. State Plane 1983 Coordinate Zone: Missouri Central Coordinate Proj. Factor: 1.0001040
 Coordinate Datum: NAD 83 (CONUS) Coordinate Units: U.S. Survey Feet

* Persons using this information are cautioned that the materials shown are determined by the equipment noted and accuracy of the "log of materials" is limited thereby and by judgement of the operator. THIS INFORMATION IS FOR DESIGN PURPOSES ONLY.

LETTER BOREHOLE - R35G-S2109.GPJ - 5/6/15 10:13 - J:\SG\GINT\PROJECT FILES\R35G-FI2293.GPJ

**Missouri Department of Transportation
Construction and Materials**

BORING NO. B-2 T-15-30

Page 1 of 1

Job No.: R35G-FI2293
 Design: _____
 Bent: _____
 Station: _____
 Offset: _____
 Elevation: 908.1
 Requested Station: _____
 Requested Offset: _____
 Requested Elevation: _____
 Drill No.: G-9577

County: Miller
 Skew: _____
 Logged By: Thomas Fennessey
 Northing: 842865.6
 Easting: 1612333.8
 Requested Northing: _____
 Requested Easting: _____
 Equipment: CME 45 Split-Spoon Sampler
 Location Note: _____
 Hammer Efficiency: 84%

Route: N/A
 Location: Osage Beach
 Operator: Raymond Murray
 Date of Work: 04/30/15-04/30/15
 Depth to Water: _____
 Depth Hole Open: _____
 Time Change: _____
 Drilling Method: Hollow Stem Auger

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N ₆₀)	Shear Data	Field Tests	Index Tests
0		0-2.1' ASPHALT							
		2.1-4.8' Grayish brown, LEAN CLAY with gravel, hard, moist	905	X	93	5-18-25 (60)		PP = 4.00 tsf	
5		4.8-7' Reddish brown mottled gray, FAT CLAY trace gravel, trace sand, hard, moist		X	87	3-7-9 (22)		PP = 4.50 tsf	
		7-9' Reddish brown mottled gray, FAT CLAY with gravel, scattered sand, hard, moist	900	X	100	7-12-17 (41)		PP = 4.50 tsf	
10		9-15.8' Reddish brown mottled gray, FAT CLAY trace gravel, trace sand, very stiff, moist		X	87	3-6-9 (21)		PP = 2.00 tsf	
			895						
15		15.8-16.3' Dolomite, light gray, medium hard, moderately weathered		X	100	2-14-36/0.3'		PP = 2.25 tsf	
		Bottom of borehole at 16.3 feet.							

N₆₀ = (Em/60)Nm N₆₀ - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; Nm - Observed N-value
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**Missouri Department of Transportation
Construction and Materials**

BORING NO. B-3 T-15-32

Page 1 of 1

Job No.: R35G-FI2293
 Design: _____
 Bent: _____
 Station: _____
 Offset: _____
 Elevation: 907.4
 Requested Station: _____
 Requested Offset: _____
 Requested Elevation: _____
 Drill No.: G-9577

County: Miller
 Skew: _____
 Logged By: Thomas Fennessey
 Northing: 842928.5
 Easting: 1612258.1
 Requested Northing: _____
 Requested Easting: _____
 Equipment: CME 45 Split-Spoon Sampler
 Location Note: _____
 Hammer Efficiency: 84%

Route: N/A
 Location: Osage Beach
 Operator: Raymond Murray
 Date of Work: 04/30/15-04/30/15
 Depth to Water: _____
 Depth Hole Open: _____
 Time Change: _____
 Drilling Method: Hollow Stem Auger

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N ₆₀)	Shear Data	Field Tests	Index Tests
0									
		0-1.9' Brown, LEAN CLAY with gravel, stiff to very stiff, moist							
		1.9-4.7' Brown, GRAVELLY LEAN CLAY trace sand, hard	905						
				X	60	11-18-17 (49)			
5		4.7-13.1' Reddish brown mottled gray, FAT CLAY trace gravel, trace sand, very stiff, moist		X	93	3-8-7 (21)		PP = 1.50 tsf	
			900						
				X	100	3-5-6 (15)		PP = 2.00 tsf	
10		11.1-11.4' Gray chert		X	93	3-5-28 (46)		PP = 2.00 tsf	
			895						
		13.1-14.2' Dolomite, medium hard, highly weathered to moderately weathered, and sandstone							
15		14.2-16.5' Reddish brown mottled gray, FAT CLAY trace gravel, trace sand, very stiff, moist		X	80	4-3-4 (10)		PP = 2.50 tsf	
		Bottom of borehole at 16.5 feet.							

N₆₀ = (Em/60)N_m N₆₀ - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; N_m - Observed N-value
 (1) = Assumed, (2) = Actual

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**Missouri Department of Transportation
Construction and Materials**



BORING NO. B-4 T-15-33

Page 1 of 1

Job No.: R35G-FI2293
 Design: _____
 Bent: _____
 Station: _____
 Offset: _____
 Elevation: 906.4
 Requested Station: _____
 Requested Offset: _____
 Requested Elevation: _____
 Drill No.: G-9577

County: Miller
 Skew: _____
 Logged By: Thomas Fennessey
 Northing: 842948.8
 Easting: 1612292.4
 Requested Northing: _____
 Requested Easting: _____
 Equipment: CME 45 Split-Spoon Sampler
 Location Note: _____
 Hammer Efficiency: 84%

Route: N/A
 Location: Osage Beach
 Operator: Raymond Murray
 Date of Work: 04/30/15-04/30/15
 Depth to Water: _____
 Depth Hole Open: _____
 Time Change: _____
 Drilling Method: Hollow Stem Auger

Depth (ft)	Graphic	Description	Elevation (ft)	Sample Type	REC % (RQD %)	Blow Counts (N ₆₀)	Shear Data	Field Tests	Index Tests
0									
		0-4.1' Brown, GRAVELLY LEAN CLAY, hard, moist	905						
				X	47	15-25-15 (56)			
5		4.1-16.5' Reddish brown mottled gray, FAT CLAY trace gravel, trace sand, very stiff, moist	900	X	100	3-5-8 (18)		PP = 2.75 tsf	
				X	100	3-6-7 (18)		PP = 3.25 tsf	
10		10.3-10.5' Gray chert	895	X	100	9-7-10 (24)		PP = 3.25 tsf	
15				X	100	3-3-10 (18)		PP = 2.75 tsf	
		16.4-16.5' Gray chert Bottom of borehole at 16.5 feet.	890						

N₆₀ = (Em/60)N_m N₆₀ - Corrected N value for standard 60% SPT efficiency; Em - Measured hammer efficiency in percent; N_m - Observed N-value
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MoDOT - Geotechnical Section
1617 Missouri Boulevard
Jefferson City, Missouri 65109

KEY TO SYMBOLS

CLIENT MoDOT General Services

PROJECT NAME Osage Beach Construction Bldg.

PROJECT NUMBER R35G-FI2293

PROJECT LOCATION Osage Beach

LITHOLOGIC SYMBOLS (Unified Soil Classification System)



ASPHALT: Asphalt



CH: USCS High Plasticity Clay



CHG: USCS High Plasticity Gravelly Clay



CL: USCS Low Plasticity Clay



CLG: USCS Low Plasticity Gravelly Clay



DOLOMITE: Dolomite

SAMPLER SYMBOLS



Split-Spoon Sampler

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▽ Water Level after Drilling


Figure 1 - Boring Location Aerial







CLIENT MoDOT General Services
PROJECT NUMBER R35G-FI2293


PROJECT NAME Osage Beach Construction Bldg.
PROJECT LOCATION Osage Beach

FIGURE 2
SUBSURFACE DIAGRAM

- USCS Low Plasticity Clay

Asphalt
- USCS High Plasticity Clay

USCS Low Plasticity Gravelly Clay
- Dolomite

USCS High Plasticity Gravelly Clay

STRATIGRAPHY & GW - B SIZE - MISSOURI DOT.GDT - 5/6/15 10:16 - J:\SG\GINT\PROJECT FILES\R35G-FI2293.GPJ

