MEMORANDUM

Missouri Department of Transportation
Construction - Materials
Central Laboratory

TO: Matthew Moppin-nw/gs

CC/ATT: Kevin Griep-co/gs
Bret Davidson-nw/cm
David Belanger-co/gs

FROM: Ricardo N. Todd
Sr. Geotechnical Specialist

DATE: March 31, 2017

SUBJECT: Materials
Geotechnical Section
Foundation Investigation for
Structure No. FI2545
Mound City Maintenance Facility
Route 118, Holt County

As requested in a letter dated March 15, 2017, from Northwest District Facility Operations Supervisor Matthew Moppin, a foundation investigation has been conducted for a new maintenance building in Holt County. The layout of the bore holes for the proposed structure is shown in Figure 1.

Existing Conditions

The soil encountered at the four (4) borings primarily included base material that extended to a depth of approximately 0.5 feet. The soil beneath the base material consists of about 5.1 feet of silt, which classifies as ML by ASTM classification methods. The pocket penetrometer readings of the soil generally indicate a very soft to medium stiff soil.

Recommendation

The following recommendation is made based upon information provided regarding the proposed building and conditions observed during the foundation investigation.

- An allowable bearing pressure of 500 psf or less may be used for the design of shallow foundations constructed on properly compacted fill or natural soils at this site. Shallow foundations shall be embedded a minimum of 3 feet below finished grade for frost protection.

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Attachments


Figure -1 Aerial Map
Boring Location
Route 118
N
Outer Road 29
118
VEST RD
O-17-22 (NE)
O-17-23 (NW)
HOLT
O-17-20 (SE)
O-17-21 (SW)
1:600 = 1"=50'
R35G_FI2545
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Missouri Department of Transportation
Construction and Materials

BORING NO. O-17-20 (SE)

Job No.: R35G-FI2545 **County:** Holt **Route:** 118
Design: FI2545 **Skew:** **Location:** Mound City
Bent: **Logged By:** Ricardo Todd **Operator:** Ray Murray
Station: **Northing:** 1444398.34 **Date of Work:** 03/22/17-03/22/17
Offset: **Easting:** 2581352.87 **Depth to Water:**
Elevation: 871.1 **Requested Northing:** **Depth Hole Open:**
Requested Station: **Requested Easting:** **Time Change:**
Requested Offset: **Equipment:** Acker Soil XLS ,Split-Spoon Sampler
Requested Elevation: **Location Note:**
Drill No.: G-9462 **Hammer Efficiency:** 61% **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		0.0-5.1' Gray mottled, SILT scattered gravel, stiff, moist	870						
				X	67	5-5-4 (9)		PP = 1.75 tsf	MC = 26.0% γ_{sat} = 124 pcf(1) LL = 33 PL = 25
5		5.1-21.5' Gray mottled, LEAN CLAY trace sand, soft, moist	865	X	67	2-1-1 (2)		PP = 0.25 tsf	MC = 33.8% γ_{sat} = 117 pcf(1) LL = 32 PL = 24
				X	67	0-0-1 (1)			
10			860	X	67	0-0-0 (0)		PP = 0.25 tsf	MC = 35.7% γ_{sat} = 116 pcf(1)
				X	67	0-0-2 (2)		PP = 0.50 tsf	MC = 31.9% γ_{sat} = 119 pcf(1)
15		14.2' Hit Water	855	X	67	0-0-0 (0)		PP = 0.25 tsf	
20			850	X	67	0-1-3 (4)		PP = 1.00 tsf	MC = 31.9% γ_{sat} = 119 pcf(1)
		Bottom of borehole at 21.5 feet.							

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

Coordinate System: U.S. State Plane 1983 **Coordinate Zone:** Missouri West **Coordinate Proj. Factor:** 1.0000500025
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.

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Missouri Department of Transportation
Construction and Materials

BORING NO. O-17-21 (SW)

Job No.: R35G-FI2545 **County:** Holt **Route:** 118
Design: FI2545 **Skew:** **Location:** Mound City
Bent: **Logged By:** Ricardo Todd **Operator:** Ray Murray
Station: **Northing:** 1444377.91 **Date of Work:** 03/22/17-03/22/17
Offset: **Easting:** 2581303.87 **Depth to Water:**
Elevation: 871.2 **Requested Northing:** **Depth Hole Open:**
Requested Station: **Requested Easting:** **Time Change:**
Requested Offset: **Equipment:** Acker Soil XLS ,Split-Spoon Sampler
Requested Elevation: **Location Note:**
Drill No.: G-9462 **Hammer Efficiency:** 61% **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		0.0-5.1' Gray mottled, SILT scattered gravel, stiff, moist	870						
				X	67	6-5-5 (10)		PP = 1.50 tsf	MC = 29.9% γ_{sat} = 120 pcf(1)
5									
		5.1-16.5' Gray mottled, LEAN CLAY trace sand, soft, moist	865	X	67	2-2-2 (4)		PP = 0.50 tsf	MC = 31.3% γ_{sat} = 119 pcf(1) LL = 33 PL = 25
				X	67	1-2-1 (3)		PP = 0.25 tsf	MC = 33.3% γ_{sat} = 118 pcf(1)
10									
		10.7' Hit Water	860	X	67	0-0-0 (0)		PP = 0.25 tsf	MC = 31.9% γ_{sat} = 119 pcf(1)
				X	67	0-2-2 (4)		PP = 0.50 tsf	MC = 30.4% γ_{sat} = 120 pcf(1) LL = 47 PL = 21
15									
			855	X	67	0-0-1 (1)		PP = 0.25 tsf	MC = 29.3% γ_{sat} = 121 pcf(1)
		Bottom of borehole at 16.5 feet.							

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

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Missouri Department of Transportation
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BORING NO. O-17-22 (NE)

Job No.: R35G-FI2545 **County:** Holt **Route:** 118
Design: FI2545 **Skew:** **Location:** Mound City
Bent: **Logged By:** Ricardo Todd **Operator:** Ray Murray
Station: **Northing:** 1444445.91 **Date of Work:** 03/22/17-03/22/17
Offset: **Easting:** 2581332.31 **Depth to Water:**
Elevation: 869.8 **Requested Northing:** **Depth Hole Open:**
Requested Station: **Requested Easting:** **Time Change:**
Requested Offset: **Equipment:** Acker Soil XLS ,Split-Spoon Sampler
Requested Elevation: **Location Note:**
Drill No.: G-9462 **Hammer Efficiency:** 61% **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		0.0-3.7' Gray mottled, SILT scattered gravel, stiff, moist							
				X	67	4-3-3 (6)		PP = 1.00 tsf	MC = 30.1% γ_{sat} = 120 pcf(1)
5		3.7-16.5' Gray mottled, LEAN CLAY trace sand, soft, moist	865						
				X	67	1-1-1 (2)			
				X	67	0-0-0 (0)			
10			860						
				X	67	0-0-1 (1)		PP = 0.25 tsf	MC = 31.2% γ_{sat} = 119 pcf(1)
				X	67	2-2-3 (5)		PP = 1.00 tsf	MC = 28.1% γ_{sat} = 122 pcf(1)
15			855						
				X	67	0-1-2 (3)		PP = 0.25 tsf	
		Bottom of borehole at 16.5 feet.							

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

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Missouri Department of Transportation
Construction and Materials

Job No.: R35G-FI2545 **County:** Holt **Route:** 118
Design: FI2545 **Skew:** **Location:** Mound City
Bent: **Logged By:** Ricardo Todd **Operator:** Ray Murray
Station: **Northing:** 1444420.25 **Date of Work:** 03/22/17-03/22/17
Offset: **Easting:** 2581285.89 **Depth to Water:**
Elevation: 873.9 **Requested Northing:** **Depth Hole Open:**
Requested Station: **Requested Easting:** **Time Change:**
Requested Offset: **Equipment:** Acker Soil XLS ,Split-Spoon Sampler
Requested Elevation: **Location Note:**
Drill No.: G-9462 **Hammer Efficiency:** 61% **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		0.0-5.1' Gray mottled, SILT scattered gravel, stiff, moist							
			870	X	67	4-6-6 (12)		PP = 2.00 tsf	
5		5.1-16.5' Gray mottled, LEAN CLAY trace sand, soft, moist		X	67	2-1-1 (2)		PP = 0.25 tsf	
			865	X	67	0-0-0 (0)		PP = 0.25 tsf	
10		8.9' Hit Water		X	67	0-0-0 (0)		PP = 0.25 tsf	
			860	X	67	0-0-2 (2)		PP = 0.25 tsf	
15				X	67	0-0-0 (0)		PP = 0.25 tsf	
		Bottom of borehole at 16.5 feet.							

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KEY TO SYMBOLS

Missouri Department of Transportation

CLIENT _____ **PROJECT NAME** Maintenance Building

PROJECT NUMBER R35G-FI2545 **PROJECT LOCATION** Mound City

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)

CL: USCS Low Plasticity Clay

ML: USCS Silt

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)
Qu - UNCONFINED COMPRESSIVE STRENGTH (PSF)

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

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