



MEMORANDUM

Missouri Department of Transportation Construction - Materials Central Laboratory

TO: Richard Bennett-co/mt

CC/ATT: Bret Davidson-nw/cm

FROM: Alan Miller
Geotechnical Engineer

DATE: January 13, 2016

SUBJECT: Materials
Geotechnical Section
Foundation Investigation for
Structure No. Lt2362
Harris Radio Tower
Job No. R35G
Route KK, Sullivan County

Attached are logs of geotechnical borings performed for the above referenced structure located on Route KK in Sullivan County, Missouri. Also included are aerial photos of boring locations as Figures 1 and 2.

The values in the following table may be used for the design of the radio tower foundations.

Table 1

Boring	Elev., ft. From - To	LPile Soil Class.	Effective Unit Wt., pcf	Allowable Skin Friction, tsf	Allowable End Bearing, tsf	Internal Friction Angle, ϕ°	Undrained Shear Strength S_u , psf	Strain ϵ_{50}	Lateral Subgrade Modulus, k_f
B-15-41	1120.3 – 1117.0	Ignore ¹	--	--	--	--	--	--	--
	1117.0 – 1114.0	Stiff Clay	124	0.2	1.5	--	1500	0.007	500
	1114.0 – 980.0	Hard Clay	137	0.3	3.0	--	3000	0.005	1000

¹ The fill material (the upper 3 feet) is ignored due to frost depth

cs
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Attachments

**Missouri Department of Transportation
Construction and Materials**

BORING NO. B-15-41
Page 1 of 1

Job No.: R35G Lt2362
 Design: Lt2362
 Bent: _____
 Station: _____
 Offset: _____
 Elevation: 1020.3
 Requested Station: _____
 Requested Offset: _____
 Requested Elevation: _____
 Drill No.: G-8690

County: Sullivan
 Skew: _____
 Logged By: Kevin Moore
 Northing: 1643206.8
 Easting: 1413834.5
 Requested Northing: _____
 Requested Easting: _____
 Equipment: Simco 4000 ,Split-Spoon Sampler
 Location Note: _____
 Hammer Efficiency: 71%

Route: KK
 Location: 17 miles N of Milan
 Operator: Rick Fredrick
 Date of Work: 12/15/15-12/15/15
 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			1020							
0.0-7.0'		0.0-7.0' Olive brown and brown, LEAN CLAY, stiff to very stiff, moist		⊗	73	2-3-4 (7)		PP = 2.00 tsf	MC = 25.5% γ _{sat} = 124 pcf ⁽¹⁾	
				⊗	100	2-2-4 (6)		PP = 1.50 tsf	LL = 34 PL = 15 MC = 17.9% γ _{sat} = 133 pcf ⁽¹⁾	
7.0-12.0'			7.0-12.0' Brown, LEAN CLAY trace fine and coarse sand, and gravel, stiff, moist		⊗	100	1-3-7 (11)		PP = 3.00 tsf	MC = 27.2% γ _{sat} = 123 pcf ⁽¹⁾
				⊗	87	1-5-9 (15)		PP = 4.00 tsf	LL = 33 PL = 14 MC = 15.1% γ _{sat} = 137 pcf ⁽¹⁾	
12.0-41.5'		12.0-41.5' Olive brown, LEAN CLAY trace gravel, trace sand, stiff to very stiff, moist			⊗	87	4-8-18 (27)		PP = 5.00 tsf	MC = 13.9% γ _{sat} = 138 pcf ⁽¹⁾
				⊗	87	5-9-19 (29)		PP = 4.75 tsf	LL = 34 PL = 16 MC = 15.7% γ _{sat} = 136 pcf ⁽¹⁾	
				⊗	100	3-6-9 (16)		PP = 5.00 tsf	MC = 13.7% γ _{sat} = 139 pcf ⁽¹⁾	
				⊗	100	4-7-10 (18)		PP = 5.00 tsf	MC = 14.2% γ _{sat} = 138 pcf ⁽¹⁾	
				⊗	100	4-6-11 (18)		PP = 6.50 tsf	MC = 13.8% γ _{sat} = 139 pcf ⁽¹⁾	
				⊗	100	4-7-10 (18)		PP = 5.50 tsf	MC = 15.1% γ _{sat} = 137 pcf ⁽¹⁾	
				⊗	100	3-6-9 (16)		PP = 5.50 tsf	MC = 14.9% γ _{sat} = 137 pcf ⁽¹⁾	
				⊗	100	4-9-11 (21)		PP = 5.50 tsf	MC = 15.3% γ _{sat} = 137 pcf ⁽¹⁾	
			⊗	100	4-6-8 (15)		PP = 3.00 tsf	MC = 15.7% γ _{sat} = 136 pcf ⁽¹⁾		
40				980	⊗	50	5-7-10 (18)		PP = 3.25 tsf	MC = 16.5% γ _{sat} = 135 pcf ⁽¹⁾
			Bottom of borehole at 41.5 feet.							

LETTER BOREHOLE - MODOT 20150728.GDT - 1/13/16 12:34 - J:\SG\GINT\PROJECT FILES\R35G_LT2362.GPJ

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
Coordinate System: U.S. State Plane 1983 **Coordinate Zone:** Missouri Central **Coordinate Proj. Factor:** 1.00000
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.



Missouri Department of Transportation
1617 Mo. Blvd.
Jefferson City, Mo. 65109

KEY TO SYMBOLS

CLIENT _____ PROJECT NAME Harris Radio Tower
PROJECT NUMBER R35G Lt2362 PROJECT LOCATION 17 miles N of Milan

LITHOLOGIC SYMBOLS (Unified Soil Classification System)



CL: USCS Low Plasticity Clay

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)

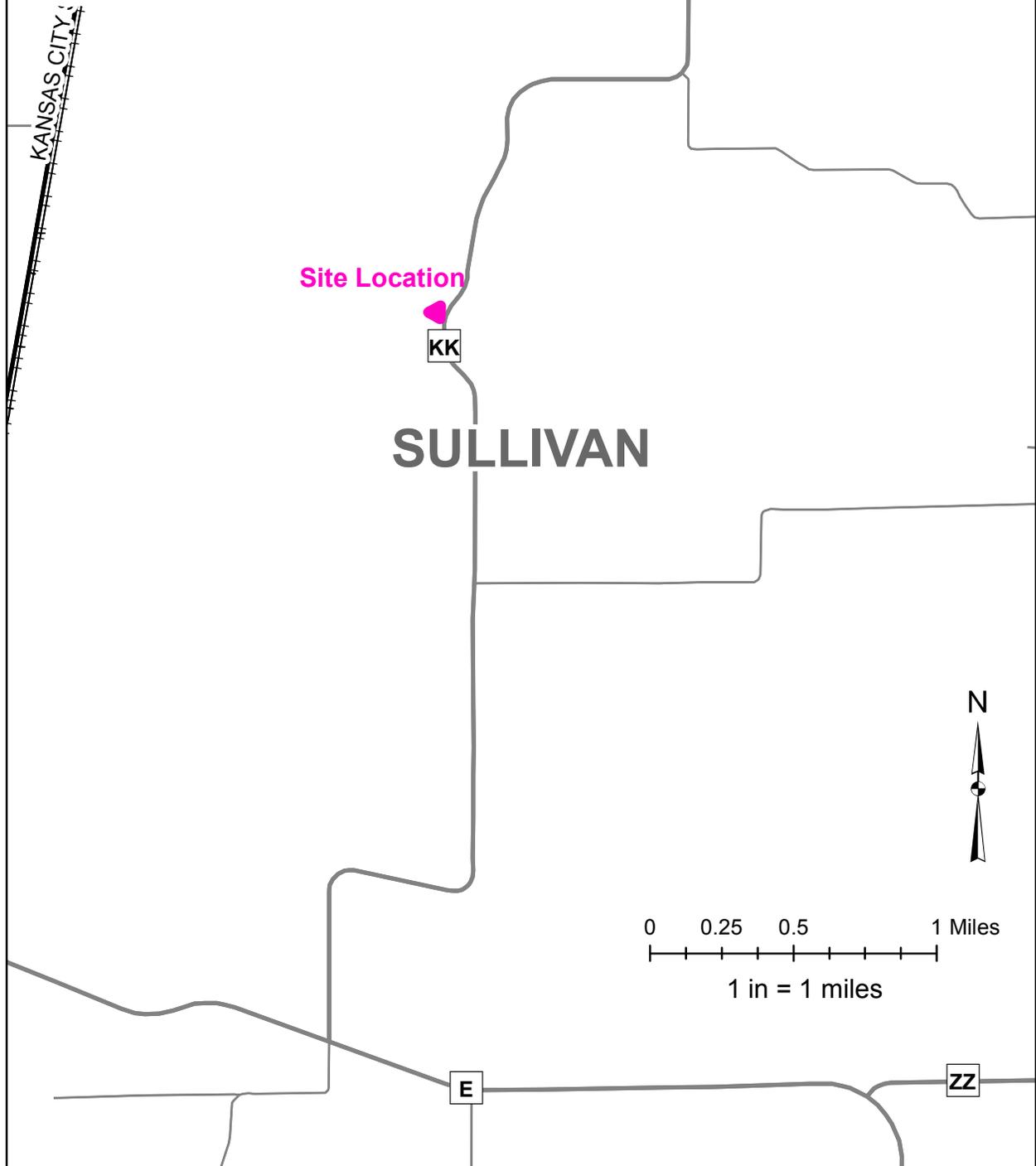
TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▽ Water Level after Drilling

Figure 1: Tower Site Location
Job No. R35G
Structure No. Lt2362
Harris Radio Tower
Sullivan County, Missouri



**Figure 2: Boring Location
Job No. R35G
Structure No. Lt2362
Harris Radio Tower
Sullivan County, Missouri**



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community