



**Abbreviated Structure Geotechnical Report**

Original Report Date: 10-25-2017 Proposed SN: 047-3182 Route: Collins Road  
 Revised Date: 07-09-2021 Existing SN: N/A Section: 16-00133-00-EG  
 Geotechnical Engineer: Terry McCleary(McE), Jeff Rothamer(CTL) County: Kendall  
 Structural Engineer: John Peradotti(WBK), Andy Underwager(HRG) Contract: \_\_\_\_\_

**Indicate the proposed structure type, substructure types, and foundation locations (attach plan and elevation drawing):** This is a new structure at a new location carrying the proposed Collins Road extension over Morgan Creek. The originally proposed structure was a single span structure (66.00 ft. back to back of abutments) on integral abutments.(see attached integral abutment analysis). The abutments were proposed to have H-piles bearing on limestone bedrock. The bridge width was originally proposed to be 51 ft. 2 in. (out to out) and will accommodate 2 twelve foot lanes, 2 eight ft. outside shoulders, and a 8 ft. median (54.85 ft. estimated foundation width). The factored loadings at the abutments is 1404.4 kips. The TSL showed a left hand forward skew of 18 degrees. The surrounding terrain is level.

The revised proposed structure based off the plans provided by HR Green (HRG) dated 3/5/21 is now a dual 12 ft x 7 ft cast-in-place box culvert with a headwall out to out width of 123 ft. 2 1/8 in. The horizontal cantilever wing walls will be located to the north and south of the culvert with widths of 11 ft. to 13 ft. The culvert width will be 27 ft and will accommodate two (2) 12 ft. lanes, two (2) 6 ft. outside shoulders, a 18 ft. median and a 10 ft. multi-use path.

**Discuss the existing boring data, existing plans foundation information, new subsurface exploration and need for any additional exploration to be provided with SGR Technical Memo (attach all data and subsurface profile plot):** Two borings were taken for this structure, one on each side of Morgan Creek on April 4 , 2016. Both borings hit the top of rock at about a 29 ft. depth. The top 5.5 ft. of both borings show Topsoils, Silty Clays and Clays. Beneath that, Boring SB-1 showed a medium dense layer of Coarse Sand (2.5 ft. thick) with a blow count of 13, not reflected at all in Boring SB-2, which instead has a matching thickness of Loose Silt and Fine Sand with a blow count of only 4. The next 2.5 ft. of SB-1 showed Loose Gray Silt with trace Sand; SB-2 showed the next 2.5 ft. to be Soft Dark Gray Clay Loam. Below this both borings show a 4 ft. layer of Soft Gray Silty Clay. SB-1 follows with 10 ft. of Medium Dense Sand & Gravel, 3.5 ft. of Fine to Medium Sand, and a foot of Weathered Rock. SB-2 follows with 4 ft. of coarse sand, then 3 ft. of Silty Till, on top of 8 ft. of Hard Silty Till with blow counts as high as 63. Only SB-1 encountered water at a 12 ft. depth. Rock cores were taken of the Limestone bedrock (the top of rock elevations were Elev. 602.54 and 599.70 for SB-1 and SB-2, respectively. Rock core strengths ranged from 95.8 to 278.8 tsf. Water was first encountered in SB-1 at Elev. 619.5, SB-2 was dry.

**Provide the location and maximum height of any new soil fill or magnitude of footing bearing pressure. Estimate the amount and time of the expected settlement. Indicate if further testing, analysis, and/or ground improvement/treatment is necessary:** Morgan Creek is a small creek with high banks (+/- 10ft. vertical) and the area in the immediate vicinity of the structure is flat. Fills will be minimal; we expect approximately 3 ft. between the proposed profile and the existing grade. Due to the soft soil layers shown in the borings we do expect settlement of the in situ materials. We estimate 0.59 inches of total settlement. Almost 90% of the settlement will occur in a 50 year time frame, the granular material settlement will occur almost immediately. No further testing is deemed necessary.

**Identify any new cuts or fill slope angles and heights. Estimate the factor of safety against slope failure. Indicate if further testing, analysis or ground improvement/treatment is necessary:** Based on the current TS&L, 1:4 slopes are proposed on top of the new culvert with less than 10 feet of new fill being placed. Therefore, a slope stability analysis will not be required for this structure.

**Indicate at each substructure, the 100-year and 200-year total scour depths in the Hydraulics report, the non-granular scour depth reduction, the proposed ground surface, and the recommended foundation design scour elevations:** Per the IDOT Bridge Manual Section 2.3.6.3.2, box culverts do not mandate a calculation or elevation of scour. For box culverts, the design scour should be taken into consideration and be taken at the bottom of the cutoff wall. Concrete wing walls will protect the soil slopes adjacent to the culvert from being eroded by scour. It is recommended that riprap be placed at open ends of the culvert to protect from the effects of scour on the soils within the flow route.

**Determining the seismic soil site class, the seismic performance zone, the 0.2 and 1.0 second design spectral accelerations and indicate if that the soils are liquefiable:** This site is in a seismic performance zone, SPZ = 1 and has a seismic soil site class of "C", an SDs = 0.125 and an SD1 = 0.066. A liquefaction analysis was not performed because the SPZ is 1.

**Confirm feasibility of the proposed foundation or wall type and provide design parameters. Attach a pile design table indicating feasible pile types, various nominal required bearings, factored resistances available and corresponding estimated lengths at locations where piles will be used. Provide factored bearing resistance and unit sliding resistance at various elevations and confirm no ground improvement/treatment is necessary where spread footings are proposed. Estimated top of rock elevations as well as preliminary factored unit side and tip resistance values shall be indicated when drilled shafts are proposed:** Two borings, SB-1 and SB-2, were used to design the foundations of the proposed structure. Based on the soft soil layers encountered, undercuts up to 4 feet below the proposed culvert could be needed in order to reach the suitable medium dense sand and gravel soils encountered at an approximate elevation of 617 ft. The undercut areas should be replaced with granular structural fill in accordance with IDOT standard construction requirements.

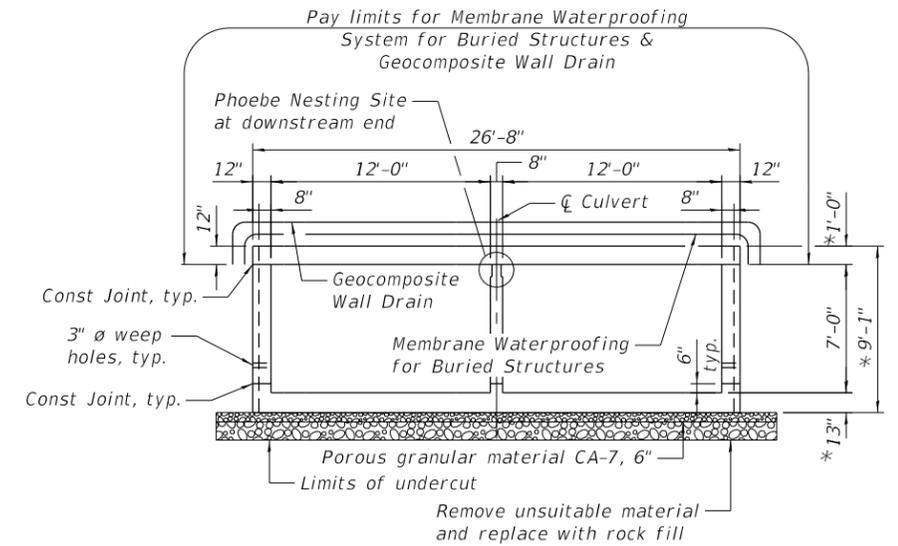
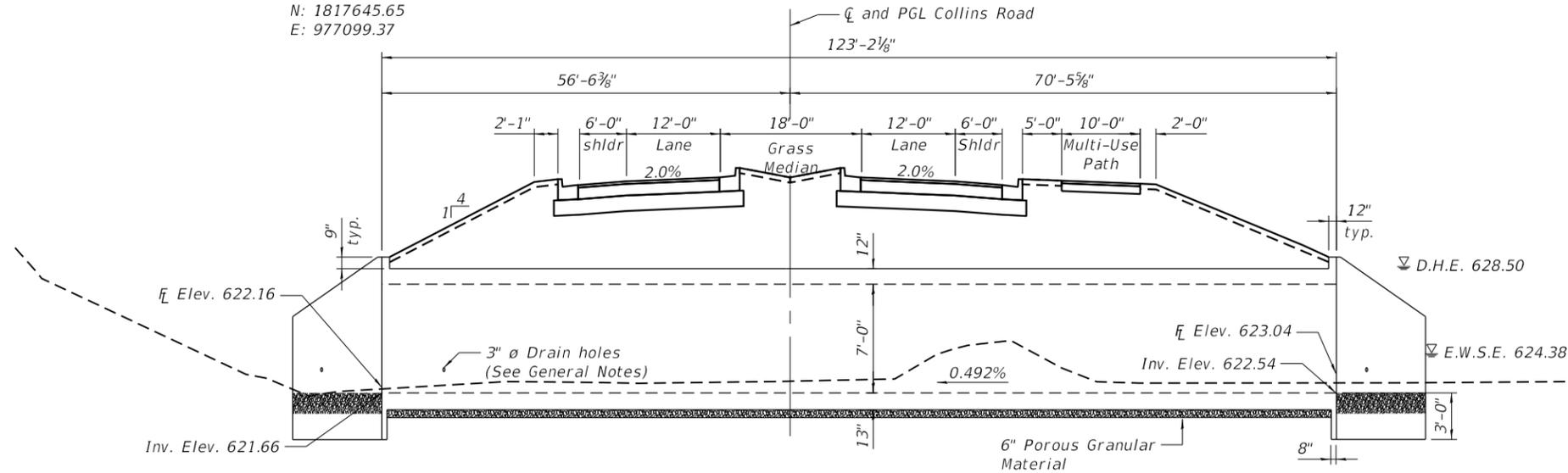
**Calculate the estimated water surface elevation and determine the need for cofferdams (type 1 or 2), and seal coat:** The EWSE is 624.38. Based on the proposed plans and the anticipated undercuts below the structure, cofferdams (type 1 or 2) may be needed if the creek is not diverted during construction.

**Assess the need for sheeting or soil retention or temporary construction slope and provide recommendation for other construction concerns:** There are no stage construction concerns for this structure as there is no existing structure or roadway to contend with.

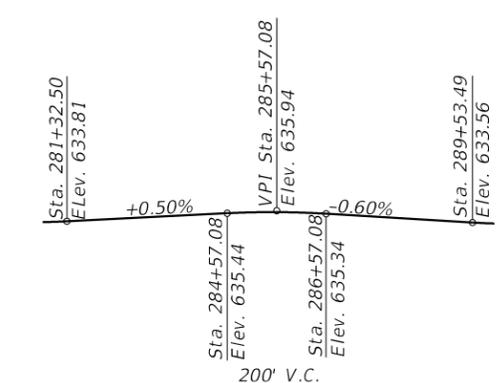
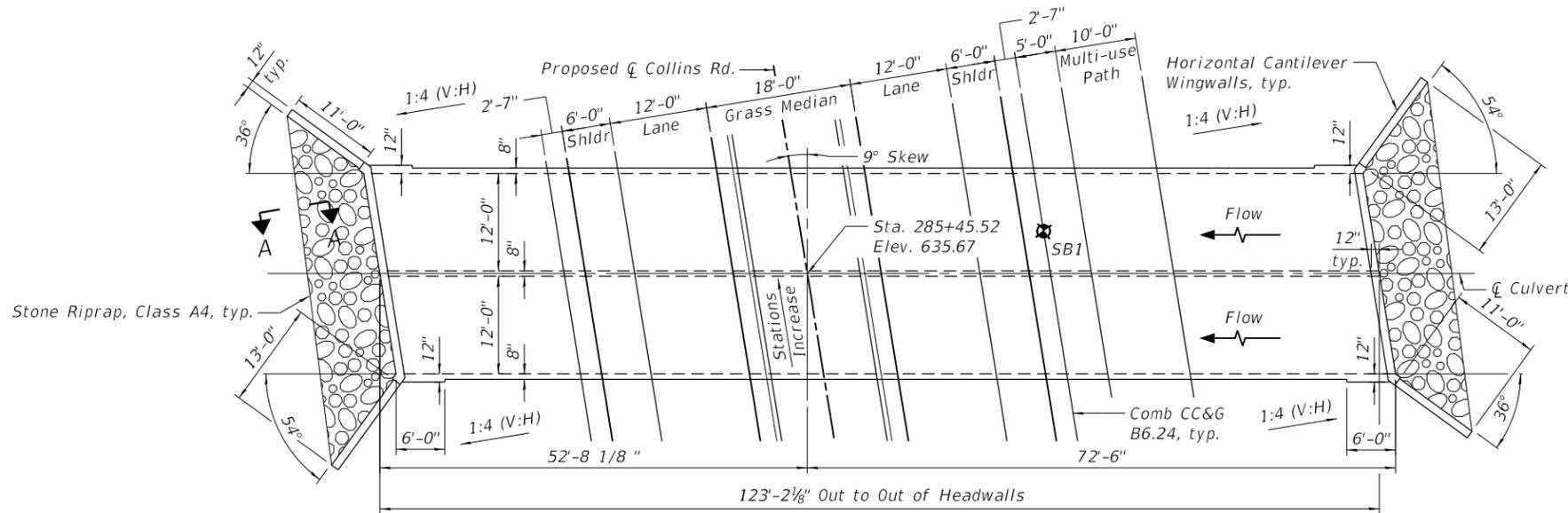
**Benchmarks:**  
 Source Benchmark:  
 Oswego 0003 - Arbor Gate  
 Bernstein Monumnet  
 Elevation: 645.01 (NAVD88)

Benchmark "G":  
 Chisled "x" on east side  
 of water valve vault rim  
 Elevation: 630.58 (NAVD88)  
 N: 1817645.65  
 E: 977099.37

**Existing Structure:**  
 None  
 Precast Alternative is not allowed.



SECTION THROUGH BARREL  
 \* Subject to refinement during Final Design



PROFILE GRADE  
 (Along Centerline Proposed Collins Rd Extension)

**HIGHWAY CLASSIFICATION**  
 FAU 2514 (Collins Road)  
 Functional Class: Major Collector  
 ADT: 0 (2021); 11,000 (2040)  
 ADTT: 0 (2021); 550 (2040)  
 DHV: 1,100  
 Design Speed: 45 m.p.h.  
 Posted Speed: 40 m.p.h.  
 2-Way Traffic  
 Directional Distribution: 50/50

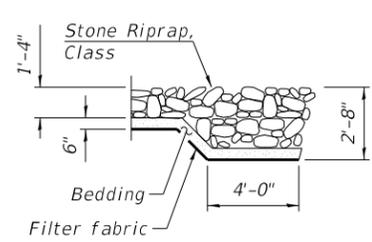
**DESIGN SPECIFICATIONS**  
 2020 AASHTO LRFD Bridge Design Specifications, 9th Edition  
**LOADING HL-93**  
 Allow 50#/sq. ft. for future wearing surface.

**DESIGN STRESSES**  
 FIELD UNITS  
 f'c = 3,500 psi  
 fy = 60,000 psi (Reinforcement)

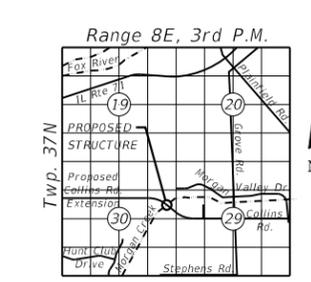
**WATERWAY INFORMATION**

Drainage Area = 6.0 Ac. Low Grade Elev. = 633.31 @ Sta. 290+33

Flood	Freq. Yr.	Q C.F.S.	Opening Ft <sup>2</sup>		Head - Ft.		Headwater El.	
			Exist.	Prop.	Exist.	Prop.	Exist.	Prop.
10	407	115.2	N/A	N/A	627.7	0.0	627.7	627.7
Design	30	564	N/A	135.4	628.5	0.0	628.5	628.5
Base	100	741	N/A	151.7	629.2	0.0	629.2	629.2
Overtopping	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Max Calc.	500	1,020	N/A	156	629.9	0.0	629.9	629.9



SECTION A-A



LOCATION SKETCH

**GENERAL PLAN AND ELEVATION**  
 COLLINS ROAD OVER MORGAN CREEK  
 SEC. 16-00133-00-EG  
 KENDALL COUNTY  
 STATION 285+45.52  
 S.N. 047-3182

HRG PROJECT NO.: 19182  
 HRG PROJ. CONTACT:  
 FILE NAME: 19182\_Str\_TSI\_Cast\_in\_place.dgn  
 PLOT DRIVER: IL\_Pdf.dwg/ptcfg  
 PEN TABLE: plotlabel.tbl



HRGreen.com  
 Illinois Professional Design Firm  
 #184-001322  
 USER NAME = whood  
 DESIGNED - SLS  
 CHECKED - AEU  
 PLOT SCALE =  
 PLOT DATE = 3/5/2021

DESIGNED - SLS  
 CHECKED - AEU  
 DRAWN - WJH  
 CHECKED - AEU  
 REVISED -  
 REVISED -  
 REVISED -  
 REVISED -

**STATE OF ILLINOIS**  
**DEPARTMENT OF TRANSPORTATION**

SHEET NO. 1 OF 1 SHEETS

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-00133-00-EG	KENDALL	1	1

CONTRACT NO. ILLINOIS FED. AID PROJECT





3705 Progress Blvd  
Peru, IL 61354  
815 780-8486

# ROCK CORE LOG

Solutions You Can Build On

Date 4/4/16

ROUTE Collins Rd DESCRIPTION West Abutment over Morgan Creek LOGGED BY TLM

SECTION \_\_\_\_\_ LOCATION NW 1/4, SEC. 30, TWP. 37N, RNG. 8E, 3<sup>rd</sup> PM,  
Latitude , Longitude

COUNTY Kendall CORING METHOD Wireline

STRUCT. NO. \_\_\_\_\_ CORING BARREL TYPE & SIZE NQ  
Station \_\_\_\_\_

BORING NO. SB-1  
Station 285+20  
Offset 17.0 ft Lt.  
Ground Surface Elev. 631.54 ft

Core Diameter 2 in  
Top of Rock Elev. 602.54 ft  
Begin Core Elev. 602.54 ft

DEPTH (ft)	CORE #	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
602.54 -30	1	99	52	1.69	114.2
599.24	2	99	52	1.3	297.2
-35					
596.04					
-40					
592.54					
-45					

Gray/green Limestone

Gray/green/red Limestone

Gray/green Limestone

End of Boring

ROCK CORE COLLINS ROAD EXTENTION.GPJ IL\_DOT.GDT 8/29/16

Color pictures of the cores \_\_\_\_\_

Cores will be stored for examination until \_\_\_\_\_

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)





3705 Progress Blvd  
Peru, IL 61354  
815 780-8486

# ROCK CORE LOG

Date 4/4/16

Solutions You Can Build On

ROUTE Collins Rd DESCRIPTION East Abutment over Morgan Creek LOGGED BY TLM

SECTION \_\_\_\_\_ LOCATION NW 1/4, SEC. 30, TWP. 37N, RNG. 8E, 3<sup>rd</sup> PM,  
Latitude , Longitude

COUNTY Kendall CORING METHOD Wireline

STRUCT. NO. \_\_\_\_\_ CORING BARREL TYPE & SIZE NQ  
Station \_\_\_\_\_  
Core Diameter 2 in  
BORING NO. SB-2 Top of Rock Elev. 599.70 ft  
Station 286+27 Begin Core Elev. 599.70 ft  
Offset 40.0 ft Lt.  
Ground Surface Elev. 632.70 ft

	DEPTH (ft)	CORE #	RECOVERY (%)	R·Q·D (%)	CORE TIME (min/ft)	STRENGTH (tsf)
Gray/red/green Limestone	599.70	1	100	65	2.4	124.7
	-35					
Gray/green Limestone	595.70					
	-40					95.8
						278.8
		2	100	77	1.8	98.6
	-45					
End of Boring	583.45					105.0
	-50					

ROCK CORE COLLINS ROAD EXTENSION.GPJ IL\_DOT.GDT 8/29/16

Color pictures of the cores \_\_\_\_\_

Cores will be stored for examination until \_\_\_\_\_

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)



McCleary Engineering  
3705 Progress Blvd  
Peru, IL 61354  
Telephone: 815 780-8486

ROUTE Collins Rd  
SECTION 16-00133-00-EG  
COUNTY Kendall  
PROJECT LOCATION South of IL-71

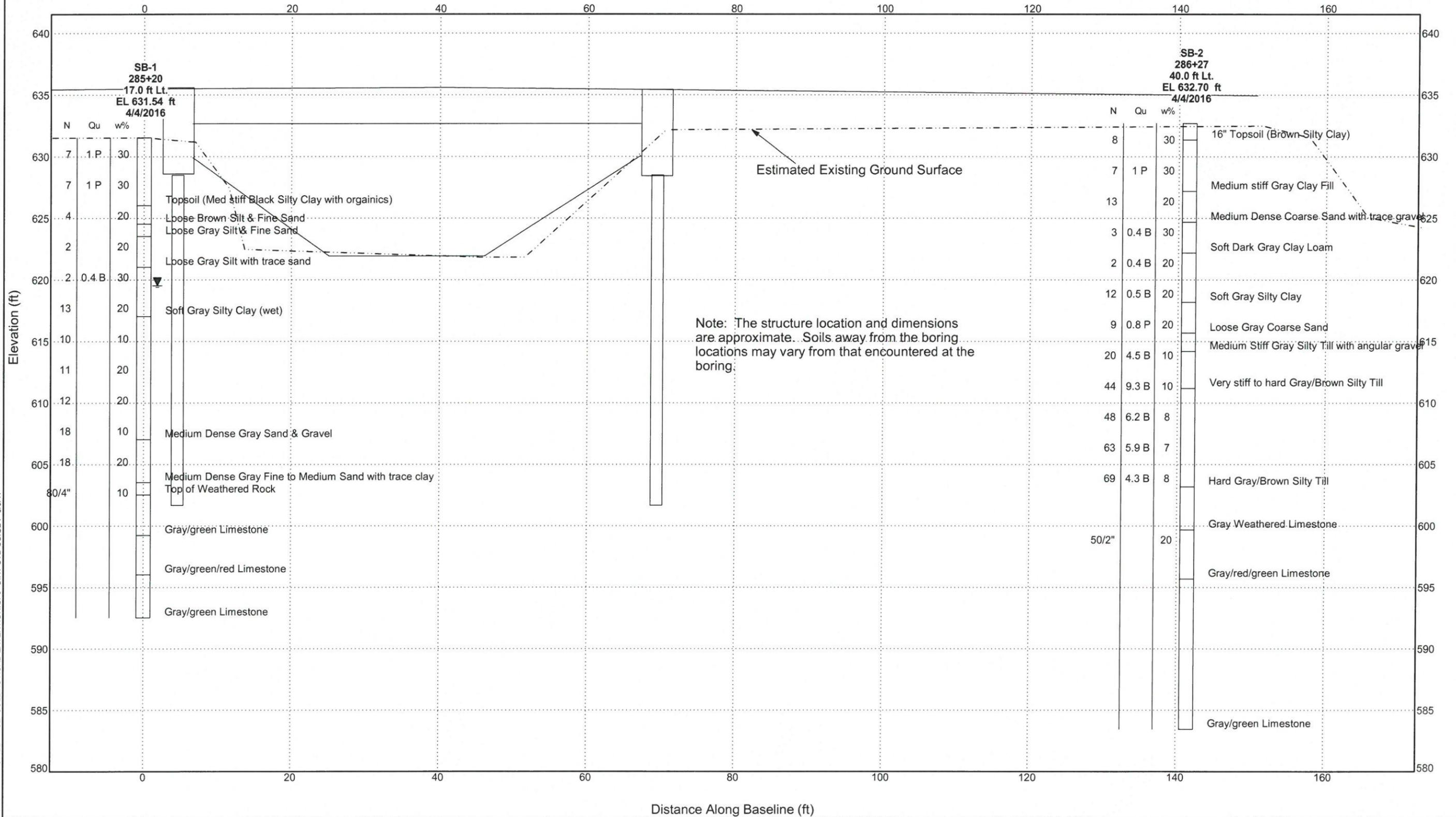
## SUBSURFACE PROFILE Collins Road over Morgan Creek

### LEGEND

EL = Elevation (ft)  
D = Depth Below Existing Ground Surface (ft)  
N = SPT N-Value (AASHTO T206)  
Qu = Unconfined compressive Strength (tsf)  
Failure Mode (B= Bulge, S= shear, P= penetrometer)  
w% = Moisture Content Percentage

### WATER TABLE LEGEND

▼ = First Encountered  
▽ = Upon Completion  
▽ = After \_\_\_ hours



ROADWAY PROFILE - MCE - COLLINS ROAD EXTENSION.GPJ\_GINT STD US.GDT\_8/9/17

# USGS Design Maps Summary Report

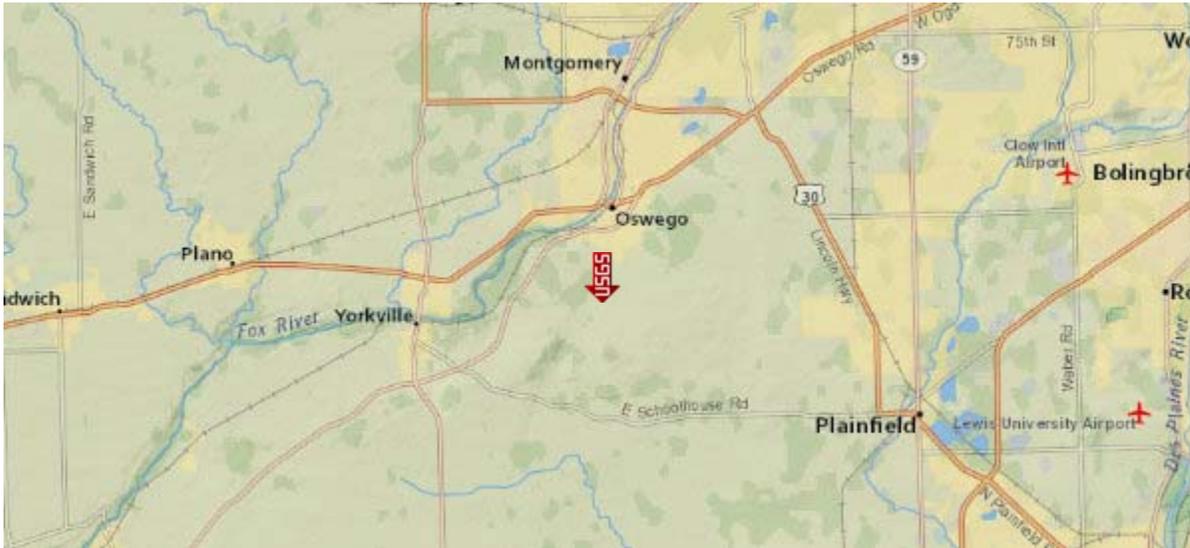
## User-Specified Input

**Report Title** Collins Road Structure over Morgan Creek  
Fri July 1, 2016 02:52:42 UTC

**Building Code Reference Document** 2009 AASHTO Guide Specifications for LRFD Seismic Bridge Design  
(which utilizes USGS hazard data available in 2002)

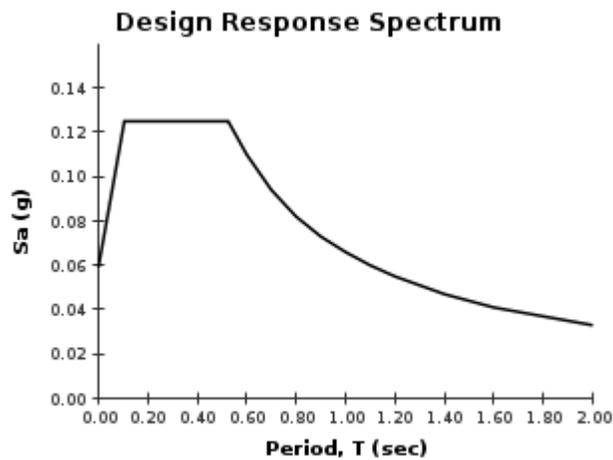
**Site Coordinates** 41.65834°N, 88.35754°W

**Site Soil Classification** Site Class C – “Very Dense Soil and Soft Rock”



## USGS-Provided Output

<b>PGA</b> = 0.050 g	<b>A<sub>s</sub></b> = 0.059 g
<b>S<sub>s</sub></b> = 0.104 g	<b>S<sub>DS</sub></b> = 0.125 g
<b>S<sub>1</sub></b> = 0.039 g	<b>S<sub>D1</sub></b> = 0.066 g



Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.