

1) GEOTECH INFORMATION (SITE CLASS)

Per NEAS Email (Recommended Site Class: D)

Fred,

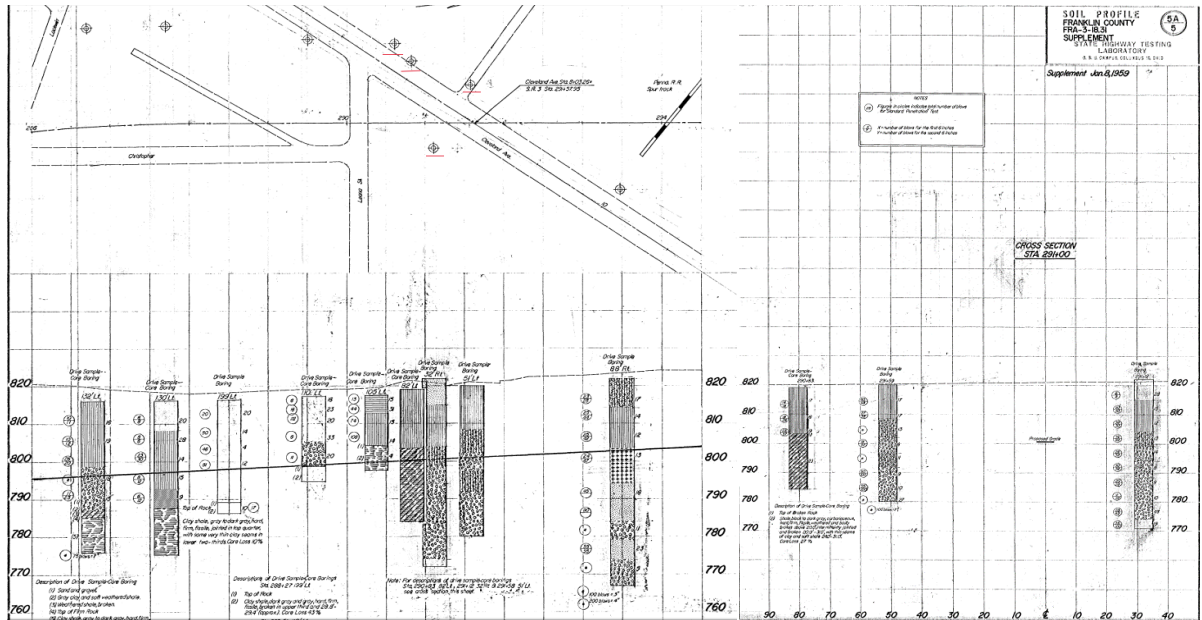
I did a historic record research on the bridge carrying Cleveland Avenue or IR 71. The IR 71 roadway was built in a cut section in this area. The soils encountered at the bridge site is highly variable. Bedrock (shale) was encountered at the south corner of the rear abutment at the elevation of approximately 802 ft asl. At the forward abutment, bedrock was NOT encountered within the terminated depth of the boring (approximate elevation 771 ft). I suggest a **Seismic Site Class of D - Stiff Soil**, with 3 borings with 15<N<50 blows/ft and one boring with N >50 blows/ft, in accordance with Section 3.10.3.1, Method B, of the LRFD BDS. I have attached the boring profile for your reference.

Thanks!

Chunmei (Melinda) Ho, Ph.D., P.E.
Project Manager



Per Historical Boring Logs Information Attached by Geotechnical Engineer (Recommended Site Class: D)



2) SEISMIC RISK CATEGORY

Per Ohio Bridge Design Manual (BDM 2020) (Recommended Risk Category: 1)

303.1.4 SEISMIC

All bridges in the State of Ohio are located within Seismic Performance Zone 1.

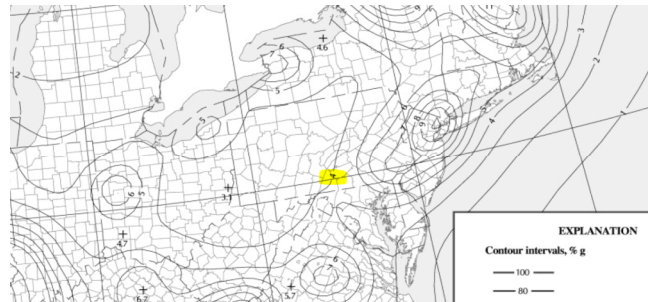
Refer to BDM Section 305.1.5 for Seismic Geotechnical requirements.

303.1.4.1 SEISMIC PERFORMANCE ZONE 1

Seismic analysis is not required except as noted in BDM Sections 303.1.4.1.a and 0.

3) PEAK GROUND ACCELERATION (PGA)

Per AASHTO LRFD (9th Ed.) Seismic Maps (Figure 3.10.2.1-1, Horizontal PGA Coefficients with 7% Probability of Exceedance in 75 Years) (Recommended PGA: 0.04 or 4%)



4) SITE FACTOR (F_{PGA})

Per AASHTO LRFD (9th Ed.) Table 3.10.3.2-1 (Recommended Site Factor, $F_{PGA} = 1.6$)

Table 3.10.3.2-1—Values of Site Factor, F_{PGA} , at Zero-Period on Acceleration Spectrum

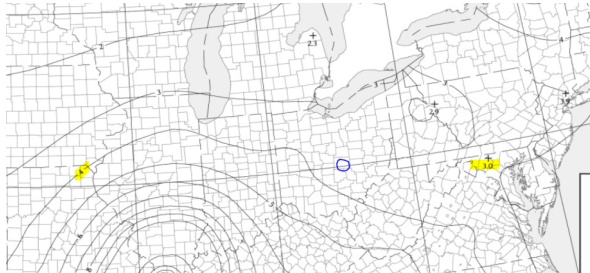
Site Class	Peak Ground Acceleration Coefficient (PGA) ¹				
	$PGA < 0.10$	$PGA = 0.20$	$PGA = 0.30$	$PGA = 0.40$	$PGA > 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F ²	*	*	*	*	*

5) ACCELERATION COEFFICIENT (A_s)

$$A_s = F_{PGA} \times PGA = 1.6 \times 0.04 = 0.064$$

6) HORIZONTAL SPECTRAL ACCELERATION COEFFICIENT AT PERIOD OF 1.0 SEC (S_1)

Per AASHTO LRFD (9th Ed.) Table 3.10.2.1-3 ($S_1 = 0.037$ VIA LINEAR INTERPOLATION)



7) APPLY 25% OF DEAD LOADS AS EQ FORCES (REFERENCE)

Per Ohio BDM (2020)

The magnitude of the connection force shall be 0.15 or 0.25 times the tributary permanent load at the location of the restraint as determined in *LRFD 3.10.9.2*. If sufficient geotechnical information is not available to determine Site Class, assume the magnitude of the connection force is 0.25 times the tributary permanent load.

Per AASHTO LRFD (9TH ED.) (ARTICLE 3.10.9.2)

3.10.9.2—Seismic Zone 1

For bridges in Zone 1 where the acceleration coefficient, A_s , as specified in Eq. 3.10.4.2-2, is less than 0.05, the horizontal design connection force in the restrained directions shall not be less than 0.15 times the vertical reaction due to the tributary permanent load and the tributary live loads assumed to exist during an earthquake.

For all other sites in Zone 1, the horizontal design connection force in the restrained directions shall not be less than 0.25 times the vertical reaction due to the tributary permanent load and the tributary live loads assumed to exist during an earthquake.