

INTEROFFICE COMMUNICATION

TO: Cody Notz, P.E., District Geotechnical Engineer, District 11
COPY: Brian Logston, P.E., Office of Geotechnical Engineering
FROM: Andrew Jalbrzikowski, Office of Geotechnical Engineering
Paul Painter, Office of Geotechnical Engineering
DATE: February 15, 2024
SUBJECT: BEL-250-8.15 PID 118151 Geophysical Exploration Summary

Pursuant to your request, the Office of Geotechnical Engineering (OGE) has completed an electrical resistivity (ER) survey and induced polarization (IP) survey for the subject project.

This section of US 250 traverses steep terrain and has historically been prone to landslides. It is understood the current retaining wall has reached its end of service life and is scheduled to be replaced. The current retaining wall consists of driven h-piles with walers supporting steel sheet piling.

On May 3, 2023, a retaining wall boring was completed by Terracon. Overburden soil consisting of gravel and stone fragments with sand (A-1-b) was encountered to the top of rock. Sandstone bedrock underlain by shale was encountered at elevation 1017.6. The sandstone was described as severely weathered and weak. The shale was described as weak to slightly strong. From elevation 1010.9 to 1005.6, a "void" was encountered but no notes of tool drop were shown on the boring log. The void is near the elevation coal was encountered at historic boring B-001-0-16, completed approximately 210 feet south. Historic boring B-001-0-16 completed 75 feet north did not encounter coal, but it was only extended to a depth of 16.9 feet or an approximate elevation of 1018.9. Elevations of the historic borings were determined using the provided coordinates and digital elevation models from the Ohio Statewide Imagery Program (OSIP) and the USGS 3DEP map service. An exploration plan and the boring logs are attached.

In August 2023, district personnel requested geophysical testing to determine if the void extends below the proposed wall alignment. The following is a discussion of the field exploration and results of the geophysical exploration. The latitude, longitude, and elevation values used to create the ER and IP profiles are from a Trimble R6 Receiver and TSC3 data collector utilizing the ODOT VRS network. The geophysical field work was completed on February 5, 2024.

The ER and IP data was collected with an Advanced Geosciences Inc. (AGI) SuperSting R8 control unit. For both surveys, thirty-three electrodes were spaced approximately 5 feet apart as close as possible to the proposed wall alignment. This was the only suitable location on site. The proximity of the existing steel wall did cause some interference. The electrodes were used to measure the potential field with Dipole-Dipole and Strong Gradient Arrays. For the IP survey, chargeability was measured for three seconds after the measurement of the potential field. The data was processed, and surface elevation corrected using AGI's EarthImager 2D software. Inverted resistivity sections and the induced potential section are attached.

The ER section shows a contrast slightly above the top of rock as encountered in B-001-0-23. A high resistivity zone is indicated to the south of B-001-0-23, but it is in the normal range of earth materials and not considered to be an anomaly. This is confirmed by positive chargeability values in the same area of the IP section. A faint localized resistivity contrast is present in the area noted as a void on

the boring log. The IP section shows a faint negative chargeability zone in the same contrast area. This could indicate the presence of clay minerals, but it is unlikely an indication of an air-filled void.

Attached are an exploration plan, boring logs, resistivity section and IP section.

If you have any questions, please feel free to contact me at 614-275-1305.

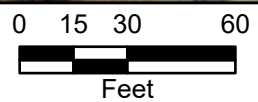
Thank you,

AMJ

Attachments: Site plan, boring logs & geophysical exploration results.



BEL-250-8.15
Exploration Plan



PROJECT: BEL-250-08.11	DRILLING FIRM / OPERATOR: TERRACON / C.K.	DRILL RIG: CME 55 TERRACON	STATION / OFFSET:	EXPLORATION ID BEL-001-0-16
TYPE: RETAINING WALL	SAMPLING FIRM / LOGGER: STANTEC / CICHOCKI	HAMMER: CME AUTOMATIC	ALIGNMENT:	
PID: 103405 SFN:	DRILLING METHOD: 4.25" HSA / NQ	CALIBRATION DATE: 3/6/15	ELEVATION: 1035.8 EOB: 16.9 ft.	PAGE 1 OF 1
START: 7/12/16 END: 7/12/16	SAMPLING METHOD: SPT / NQ	ENERGY RATIO (%): 79.7	LAT / LONG: 40.087063, -80.751305	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1035.8	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	HOLE SEALED
								GR	CS	FS	SI	CL	LL	PL	PI			
ASPHALT PAVEMENT	1034.6	1																
STIFF, BROWN, SILTY CLAY , SOME SAND, DAMP		2	1	7	16	87	SPT-1	1.5	11	22	11	26	30	36	20	16	18	A-6b (7)
	1032.3	3	5															
MEDIUM DENSE, LIGHT BROWN, GRAVEL AND STONE FRAGMENTS WITH SAND , LITTLE SILT, TRACE CLAY, DAMP Possible cobble/boulders encountered from 3.5' to 5.0'		4	17	15	39	67	SPT-2	-	41	16	21	15	7	NP	NP	NP	8	A-1-b (0)
		5	14															
	1028.9	6	50	-	100		SPT-3	-	-	-	-	-	-	-	-	-	7	A-1-b (V)
SANDSTONE , LIGHT GRAY, SLIGHTLY WEATHERED, STRONG, THIN BEDDED, CRYSTALLINE, IRON STAINING.		7																
	1026.7	8	54		100		NQ-RC-1											CORE
		9																
SHALE , GRAY, HIGHLY WEATHERED, WEAK, THINLY LAMINATED, FRIABLE, FRACTURED TO HIGHLY FRACTURED ZONES.		10																
		11																
Highly fractured from 14.2' to 15.5'		12	78		100		NQ-RC-2											CORE
		13																
UNCONFINED COMPRESSIVE STRENGTH 13.7' - 14.2' = 54 PSI		14																
		15																
	1018.9	16	53		8		NQ-RC-3											CORE
		EOB																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 1 BAG ASPHALT PATCH; PUMPED 1.5 BAGS CEMENT

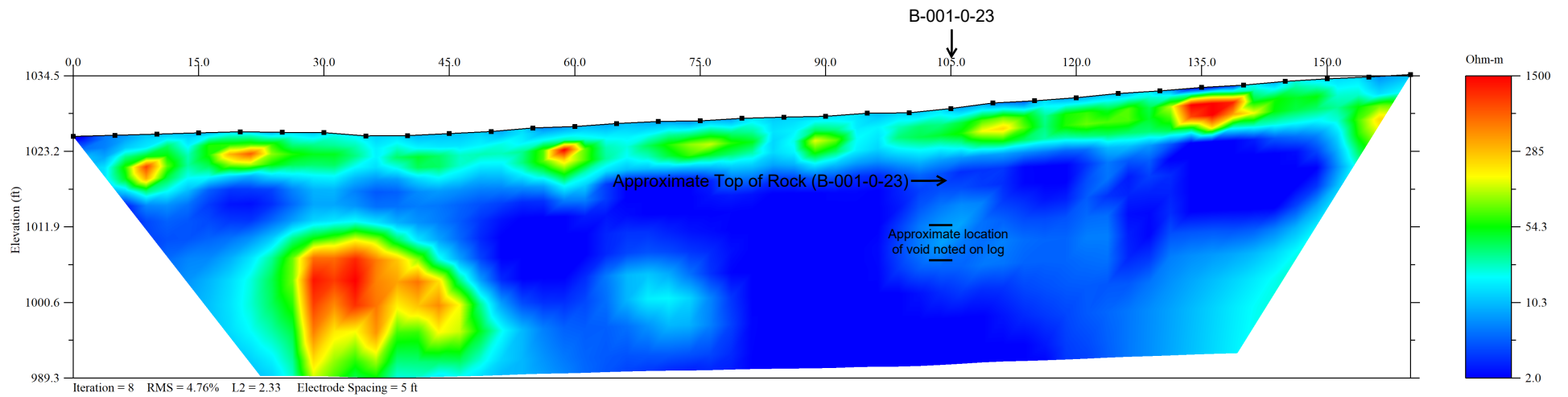
PROJECT: BEL-250-8.15		DRILLING FIRM / OPERATOR: TERRACON / FAY		DRILL RIG: MOBILE B-57		STATION / OFFSET: BEL - 250				EXPLORATION ID: B-001-0-23								
TYPE: RETAINING WALL		SAMPLING FIRM / LOGGER: TERRACON / SWYCK		HAMMER: CME AUTOMATIC		ALIGNMENT: BEL - 250				PAGE 1 OF 1								
PID: 118151 SFN:		DRILLING METHOD: 3.25" HSA / NQ2		CALIBRATION DATE: 1/16/23		ELEVATION: 1032.6 (MSL) EOB: 32.0 ft.												
START: 5/3/23 END: 5/3/23		SAMPLING METHOD: SPT / NQ2		ENERGY RATIO (%): 90		LAT / LONG: 40.086953, -80.751085												
MATERIAL DESCRIPTION AND NOTES		ELEV.	DEPTHS	SPT/RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)		ATTERBERG			WC	ODOT CLASS (GI)	HOLE SEALED		
ASPHALT (20")		1032.6							GR	CS	FS	SI	CL	LL	PL	PI		
AGGREGATE BASE (4")		1031.0	1															
VERY DENSE, LIGHT AND DARK GRAY, GRAVEL AND STONE FRAGMENTS WITH SAND, TRACE CLAY, MODERATELY ORGANIC, DAMP (POSSIBLE FILL)		1030.6	2	11 50/3"	-	89	SS-1	-	-	-	-	-	-	-	-	-	12	A-1-b (V)
VERY DENSE, BROWN, GRAVEL AND STONE FRAGMENTS WITH SAND, LITTLE SILT, TRACE CLAY, DAMP		1028.6	3															
			4	53 25 50/1"	-	92	SS-2	-	52	10	22	13	3	NP	NP	NP	7	A-1-b (0)
			5															
			6															
			7	55 38 50/2"	-	86	SS-3	-	55	13	20	10	2	NP	NP	NP	8	A-1-b (0)
			8															
			9	10 50/1"	-	86	SS-4	-	-	-	-	-	-	-	-	-	9	A-1-b (V)
			10															
			11															
			12	4 22 14	54	100	SS-5	-	50	13	21	13	3	NP	NP	NP	9	A-1-b (0)
			13															
		1017.6	14	9 50/4"	-	60	SS-6	-	-	-	-	-	-	-	-	-	6	A-1-b (V)
SANDSTONE, BROWN, SEVERELY WEATHERED, WEAK.			15															
@16.5'; GRAY		1015.6	16	50/2"	-	100	SS-7	-	-	-	-	-	-	-	-	-	-	Rock (V)
SHALE, GRAY AND BROWN, MODERATELY TO HIGHLY WEATHERED, WEAK TO SLIGHTLY STRONG, FINE GRAINED, VERY THIN TO THIN BEDDED, ARGILLACEOUS, VERTICAL CRACKS BETWEEN 17' TO 18'; RQD 46%, REC 96%.		1010.9	17															
			18															
			19	46		96	NQ2-1											CORE
			20															
			21	83		83	NQ2-2											CORE
VOID		1005.6	22															
			23															
			24															
			25															
			26															
SHALE, GRAY AND BROWN, MODERATELY TO HIGHLY WEATHERED, SLIGHTLY STRONG, FINE GRAINED, VERY THIN TO THIN BEDDED, ARGILLACEOUS; RQD 47%, REC 83%. @28.5' TO 28.8'; UC = 1,750 PSI; UNIT WEIGHT = 164 PCF		1000.6	27															
			28	47		83	NQ2-3											CORE
			29															
			30	52		52	NQ2-4											CORE
			31															
			32															
NOTES: SOIL BORING WAS BACKFILLED WITH CEMENT BENTONITE UPON COMPLETION. ELEVATION FROM OSIP DATA.																		
ABANDONMENT METHODS, MATERIALS, QUANTITIES: TREMIED BENTONITE GROUT																		

PROJECT: BEL-250-8.15		DRILLING FIRM / OPERATOR: TERRACON / K.HAYSLIP		DRILL RIG: CME 55 TERRACON		STATION / OFFSET: _____		EXPLORATION ID B-001-0-16	
TYPE: RETAINING WALL		SAMPLING FIRM / LOGGER: STANTEC / P.CICHOCKI		HAMMER: CME AUTOMATIC		ALIGNMENT: _____			
PID: 103642 SFN: _____		DRILLING METHOD: 3.25" HSA / NQ		CALIBRATION DATE: 3/6/15		ELEVATION: 1021.5 (MSL) EOB: 23.0 ft.		PAGE 1 OF 1	
START: 9/1/16 END: 9/1/16		SAMPLING METHOD: SPT		ENERGY RATIO (%): 79.7		LAT / LONG: 40.086584, -80.750510			

MATERIAL DESCRIPTION AND NOTES	ELEV. 1021.5	DEPTHS	SPT/ RQD	N ₆₀	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%)					ATTERBERG			WC	ODOT CLASS (GI)	HOLE SEALED
								GR	CS	FS	SI	CL	LL	PL	PI			
ASPHALT	1019.7	1																
CONCRETE	1019.4	2																
MEDIUM STIFF TO STIFF, BROWN, CLAY, LITTLE GRAVEL, SAND, AND SILT, DAMP		3	3	1	4	33	SS-1	-	-	-	-	-	-	-	-	-	21	A-7-6 (V)
		4																
		5	3	4	15	100	SS-2	-	10	6	3	14	67	61	25	36	25	A-7-6 (20)
		6																
SHALE, GRAY, SEVERELY WEATHERED, WEAK, (AUGERED).	1014.0	7																
		8	38	50/4"	-	100	SS-3	-	-	-	-	-	-	-	-	-	6	Rock (V)
		9																
		10																
		11	34	44	45	118	100	SS-4	-	-	-	-	-	-	-	-	6	Rock (V)
		12																
SHALE, GRAY TO BLACK, HIGHLY WEATHERED, WEAK, VERY THIN BEDDED, HIGHLY FRACTURED.	1008.5	13																
	1006.9	14	0		69		NQ-1											CORE
COAL, BLACK, HIGHLY WEATHERED, WEAK, THIN BEDDED, HIGHLY FRACTURED.		15																
	1004.2	16																
		17	12		82		NQ-2											CORE
SHALE, GRAY TO BLACK, HIGHLY WEATHERED, WEAK, VERY THIN BEDDED, HIGHLY FRACTURED.		18																
		19																
		20																
		21	89		100		NQ-3											CORE
		22																
	998.5	23																
EOB																		

NOTES: ELEVATION FROM OSIP DATA.																		
ABANDONMENT METHODS, MATERIALS, QUANTITIES: BACKFILLED WITH 4 BAGS BENTONITE GROUT																		

BEL-250-8.15 ER Survey Line Inverted Resistivity Section



BEL-250-8.15 Induced Polarization Section

