Appendix III/IV.C Geotechnical Report

GEOTECHNICAL REPORT

Fjord Breakneck Connector Trail Cold Spring, New York

Prepared for:

D & B Engineers & Architects, P.C. 4 West Red Oak Lane West Harrison, New York 10604

> Issued October 17, 2016 MEG Project No. 150769



Prepared by: McLaren Engineering Group 100 Snake Hill Road West Nyack, NY 10994 (845) 353-6400

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1.0 INTRODUCTION

1.1 General

At the request of D & B Engineers & Architects, P.C., McLaren Engineering Group, Inc. (McLaren) has developed and implemented a Geotechnical Investigation to evaluate the underlying ground conditions at the site along Route 9D, North of the Breakneck tunnel in Cold Spring, New York. This geotechnical program consisted of soil borings, rock corings, and identification and classification of soil stratigraphy.

The proposed project is located along Route 9D in Cold Spring, New York. It will consist of a pedestrian walkway connecting the Metro North Railroad Breakneck Stop Platform to the Breakneck Ridge Trailhead in Hudson Highlands State Park Preserve. To the Southeast is the Town of Cold Spring and to the West is the Hudson River (see Site Location Map, Appendix A).

1.2 Proposed Development

The project proposes the construction of a half mile multi-use trail segment between the most northerly Metro North Railroad Breakneck Whistle Stop Platform and the Breakneck Ridge Trailhead on the west side of Route 9D in Hudson Highlands State Park. The trail will consist of an elevated platform offset from the roadway when the slope of the roadway will not allow a trail on grade.

1.3 Scope of Work

The Scope of the Preliminary Geotechnical Investigation for the project site included the following tasks:

- i) Establish an investigative program to determine the depth of rock and soil properties, which included exploratory soil borings and rock corings.
- ii) Evaluate the findings of the borings to define the characteristics of the underlying soil strata and bedrock.
- iii) Evaluate geotechnical information to determine site-specific needs.
- iv) Perform a site-specific seismic evaluation utilizing on site boring data, rock core data, and soil properties obtained throughout the site.
- v) Coordinate with New York State Department of Transportation and Metro North Railroad to perform work.

2.0 FIELD INVESTIGATION

MEG retained the services of Soiltesting Inc. (90 Donovan Rd, Oxford CT 06478) to perform soil borings. The soil borings were initiated on September 6, 2016 and concluded on September 23, 2016. The borings were advanced to end depths between 5' and 73' (see Boring Location Plan, Appendix B). Soil samples were taken at either five (5) foot intervals or ten (10) foot intervals when possible. Due to the nature of the fill soils, sampling was difficult and several samples were skipped. Soil samples were obtained using the Standard Penetration Test (ASTM D-1586-84) using a split spoon sampler with a 2-inch O.D., 1³/₈-inch I.D. driven into the soil with a 140-pound hammer falling freely from a height of 30-inches (see Boring Logs, Appendix C).

The soil borings were performed under the supervision of a representative of McLaren.

3.0 EXISTING CONDITIONS

3.1 Surface Conditions

The existing site runs along Route 9D in Cold Spring, NY from mile marker 1001 to 1006. The roadway slopes to the northwest at about 3%. To the southwest of the roadway is a slope containing trees and brush which continues down to the railroad. This area has about a 30% slope and drops in elevation about 15'. At the bottom of the slope is an overgrown drainage swale.

3.2 Subsurface Conditions

The primary subsurface strata encountered are shown on the Soil Profiles in Appendix D and are described as follows:

- Asphalt/Concrete Pavement Borings 1-4 encountered an asphalt/concrete layer from grade to approximately 17" below grade. The thickness of the asphalt pavement was between 3 and 5 inches. Underneath the asphalt was about 8 to 12 inches of concrete.
- Fill Borings 1-4 along the roadway encountered a fill layer below the concrete pavement which extended to a depth of 5-15 feet below grade. It consisted of coarse to medium gray gravel, little brown sand, and some gray/brown silt. Borings 5-11 encountered a fill layer at surface grade that extended to a depth of 5-10 feet below grade. This consisted of black and brown silt, asphalt, medium gravel, and medium brown sand.

- **Silt/Gravel** Below the fill layer, Boring 2 encountered a dense silt layer that extended from a depth of approximately 15 to 20 feet below grade. This layer consisted of brown/gray silt and some medium to coarse gray gravel.
- **Clay** Borings 5-11 encountered a clay layer beneath the fill layer. This layer extended to a depth of 11 to 65 feet below grade. It consisted of black silty clay, black clay, some brown clay, trace peat, some wood, and some fine to medium gravel. This layer is classified as a clay.
- **Sand** Boring 9 encountered a sand layer at a depth of 20' to 35' below grade. This layer consisted of black very fine sand, some black and brown silt, and little wood.
- **Rock** All borings were performed to weathered rock. The weathered rock in Borings 1-4 was encountered at approximately 5 to 20 feet below surface grade. The weathered rock in Borings 5-11 was encountered at approximately 9 to 73 feet below surface grade.

The boring and bedrock elevations are shown in Table 1 below.

	Boring Elevations	with Depth to Weath	nered Bedrock	
Boring	Boring Top	Depth to	Depth to	Bedrock
Location	Elevation (1)	Groundwater (ft)	Bedrock (ft)	Elevation (1)
B-1	18.1	-	5.0	13.1
B-2	23.7	-	20.0	3.7
B-3	31.5	-	7.0	24.5
B-4	36.9	-	5.0	31.9
B-5	9.5	17.0	73.0	-63.5
B-6	9.4	-	11.3	-1.9
B-7	5.2	10.0	30.0	-24.8
B-8	9.7	10.0	20.0	-10.3
B-9	6.8	7.0	49.0	-42.2
B-10	5.9	6.0	9.0	-3.1
B-11	5.9	7.0	30.0	-24.1

Table 1 ring Elevations with Denth to Weathered Bodrock

(1) Datum: NAVD88 (estimated by a reference to the drawing Topographic Survey created by Badey and Watson Surveying & Engineering dated April 10, 2016.)

3.3 Groundwater

Groundwater was encountered in Borings B-5, B-7, B-8, B-9, B-10, and B-11. In these borings it was encountered at a depth between 6'-17' below surface grade. Groundwater can be expected to fluctuate due to seasonal rainfalls and tidal influence of the adjacent Hudson River.

3.4 Depth of Fill

The fill soils were encountered directly below the asphalt/concrete and extended to a depth of approximately 5 to 15 feet below grade for the borings along Route 9D. The fill is a mix of soil and large stones that may have been residual material from the tunnel and road construction.

3.5 Possible Stream Bed

At Boring B-2 the rock depth increases and there is a layer of silt above the bedrock. This could be the remnants of the historical Hudson River.

4.0 ANALYSIS AND RECOMMENDATIONS

4.1 Foundation Support

For the elevated walkway foundation, McLaren recommends deep foundations that would derive their strength from drilled piles grouted into the weathered rock in the sloped areas where the path will be an elevated platform. In the area when the pathway is able to be placed at the grade level, a loading of 1 kip per square foot should be used for design bearing strength.

4.1.1 Foundation Recommendations

Based on the investigation, McLaren recommends that drilled mini piles will be required for the elevated trail sections. Sizing will be designed on final loading. The preliminary design is 9 5/8" diameter, 0.434 inch thick mini piles that are drilled 15 feet into the weathered rock.

The preliminary design loads for the piles are an axial load of 40 tons and a shear load of 2 kips.

4.1.2 Pile Lateral Load

The safe working lateral load will be one (1) ton for the mini piles.

4.1.3 Inspection and Reporting Procedures for Pile Installation

Several near-surface obstructions are present and may need to be either excavated or pre-augered prior to installation of piles. Any subsurface utilities must be relocated prior to the start of construction.

It is recommended that a qualified inspector be on site at all times to monitor pile installation. This inspector must report size, length, number of splices, and depth for each pile. If lateral movement is observed during pile installation, testing should be used to verify capacity.

4.2 Settlement

Due to the presence of the clay, the walkway will likely have some settlement. An approach slab to account for this differential settlement is recommended.

5.0 SEISMIC DESIGN CONSIDERATIONS

The new structures shall be designed to resist stress produced by lateral forces in accordance with Section 1613 of the 2010 New York State Building Code. The material conforms to the properties that define Site Class D.

Accordingly, the following values should be used for the project:

Mapped Spectral Response Acceleration for Short Periods [Section 1613.5.1]	$S_{s} = 0.223g$
Mapped Spectral Response Acceleration for 1-Second Period [Section 1613.5.1]	$S_1 = 0.068g$
Site Coefficient [Table 1613.5.3(1)]	$F_a = 1.60$
Site Coefficient [Table 1613.5.3(2)]	$F_v = 2.40$
Max. Considered Earthquake Spectral Response for Short Periods [Eq. 16-47]	$S_{MS} = 0.356g$
Max. Considered Earthquake Spectral Response for 1-Second Period [Eq. 16-48]	$S_{M1} = 0.163g$
Design Spectral Response Acceleration for Short Periods [Eq. 16-49]	$S_{DS} = 0.238g$
Design Spectral Response Acceleration for 1-Second Period [Eq. 16-50]	$S_{D1} = 0.109g$

This structure is an Occupancy Category II (see Table 1604.5). Based on the above values and the 2010 New York State Building Code Tables 1613.5.6(1) and 1613.5.6(2), all structures shall be designed to Seismic Design Category "B". The

Seismic Design Category and values for design must be confirmed by the project structural engineer.

6.0 CONSTRUCTION RECOMMENDATIONS

6.1 Site Preparation

The initial site preparation should commence with removal and offsite disposal of the asphalt pavement and loose fills. All existing utilities within the proposed building footprint should be relocated prior to construction.

The Contractor shall be responsible at all times for conducting all earthwork operations in a safe and prudent manner such that all workmen and the general public will be protected from hazards. The Contractor shall observe all applicable local, State and/or Federal requirements.

6.2 Re-use of Excavated Material

In general, the in situ clay material below the fill is unsuitable to be reused as general backfill. Reused fill materials should conform to the sieve and compaction standards of Sections 6.3 and 6.4 of this report. Sand soils are suitable to be reused.

6.3 Borrow Fill

All borrow fill soil should consist of soils which are predominately sand and gravel with no more than 10% passing the 200 sieve, and have no particle greater than 4 inches, containing no deleterious material or environmental contaminants.

6.4 Compaction

Fill sections shall be constructed of acceptable material and deposited in successive lifts with a loose thickness of each lift not to be more than twelve (12) inches before compaction. The soil shall be compacted to the maximum dry density obtained in the lab (ASTM D-1557) as follows:

	PERCENT OF MAXIMUM
	LABORATORY DENSITY
LOCATION	<u>ASTM D698</u>
Subgrade & Fill below Pavement	95
Subgrade & Fill in All other Areas	92

We recommend for the sections that are to be built on grade that a 10 ton foot roller be used to proof roll the subsurface after the organics layer is stripped.

6.5 Excavation & Temporary Soil Support

It may be necessary to perform the required foundation excavations via earth support provisions such as sheeting and bracing. Areas which are not restricted by space constraints, may, in all likelihood, be performed within open excavations in conformance with applicable local, state and federal OSHA safety regulations.

For excavations that are required to be sheeted and shored, the contractor shall submit working drawings and calculations for the design of the sheeting and shoring. The drawings and calculations shall be certified by an Engineer registered in the State of New York.

6.6 Dewatering

Groundwater was encountered at an elevation of 5'-7' in all borings. Should any dewatering be necessary, The Contractor is responsible for means and methods for dewatering.

This report has been respectfully submitted in accordance with the request of D & B Engineers & Architects, P.C., and is, to the best of our knowledge, accurate and complete. Any questions regarding its content should be addressed to: McLaren Engineering Group, 100 Snake Hill Road, West Nyack, New York 10994.

Respectfully submitted,

The Office of McLaren Engineering Group M.G. McLAREN, P.C.

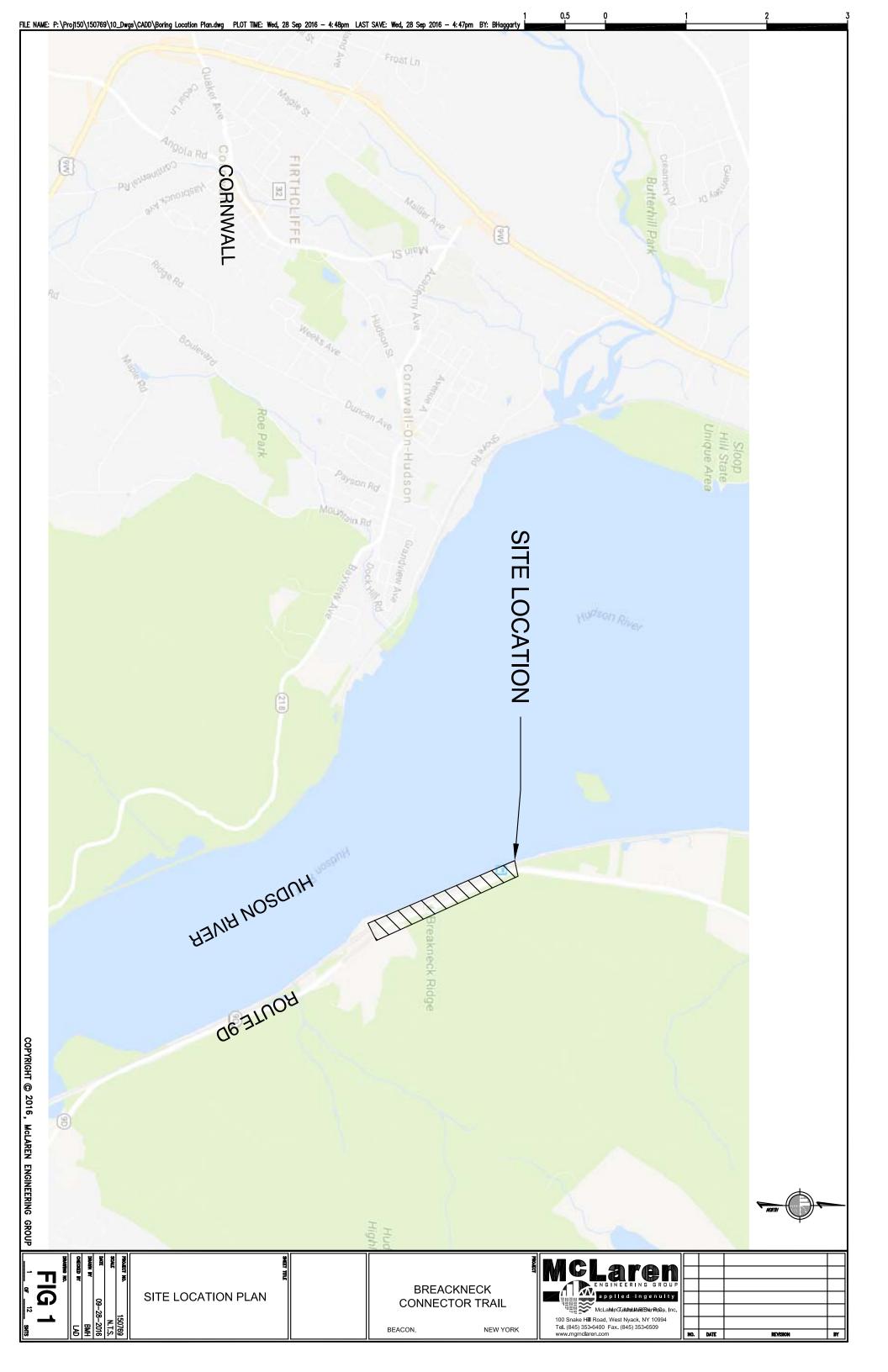
Luke Daur, P.E. Senior Project Engineer

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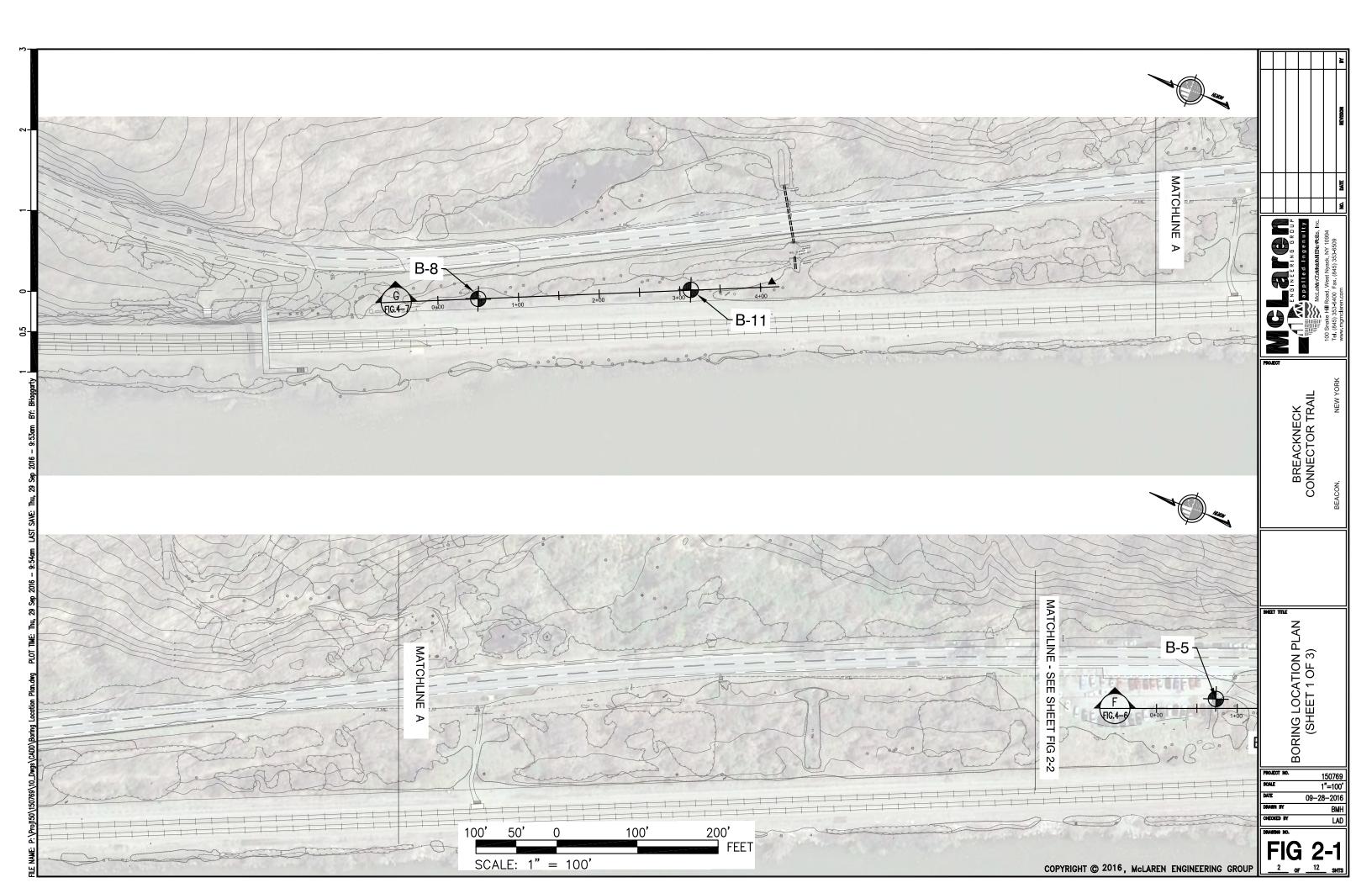
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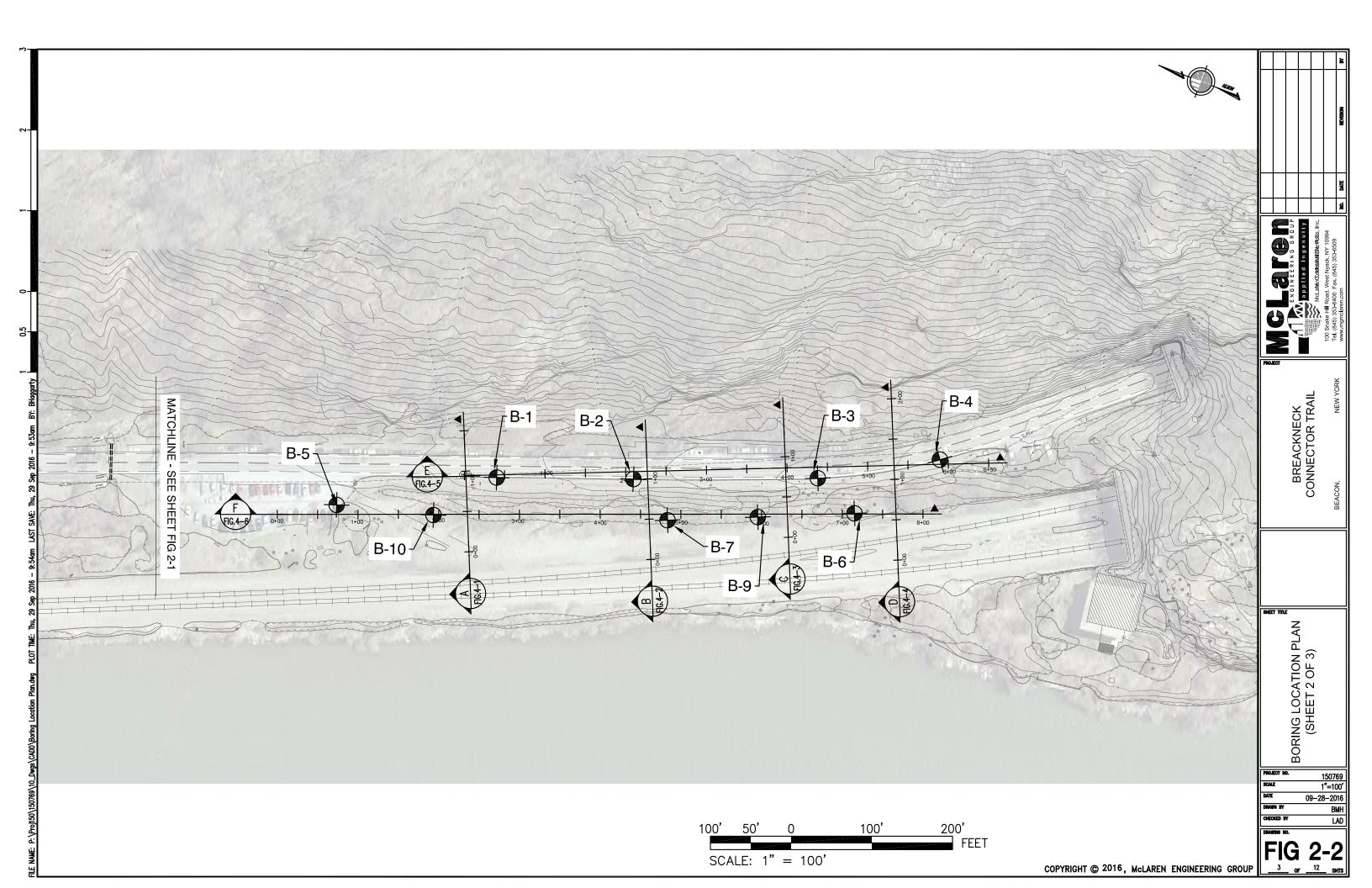
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Appendix A Site Location Map



Appendix B Boring Location Plan





Appendix C Soil Profiles

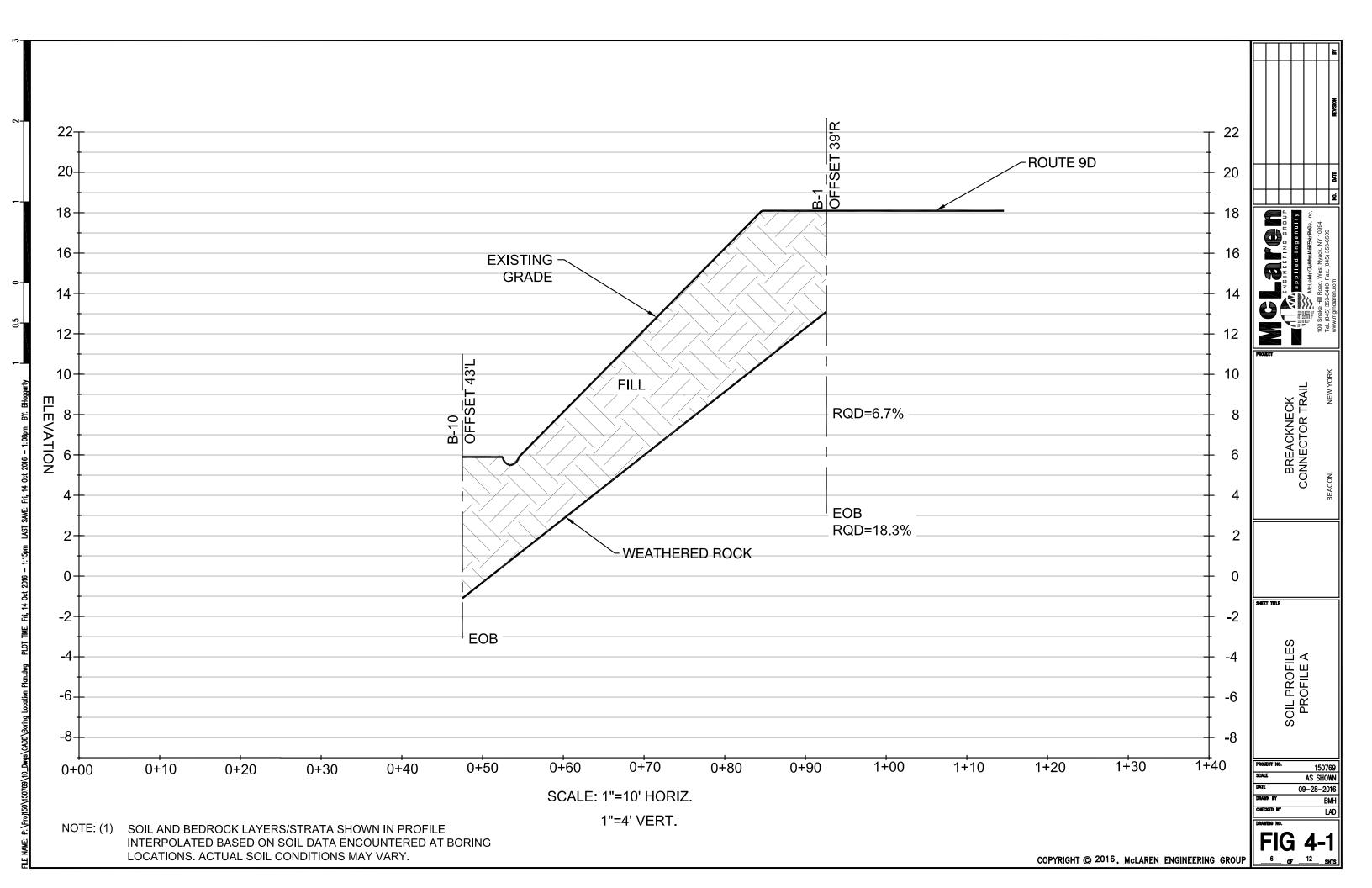
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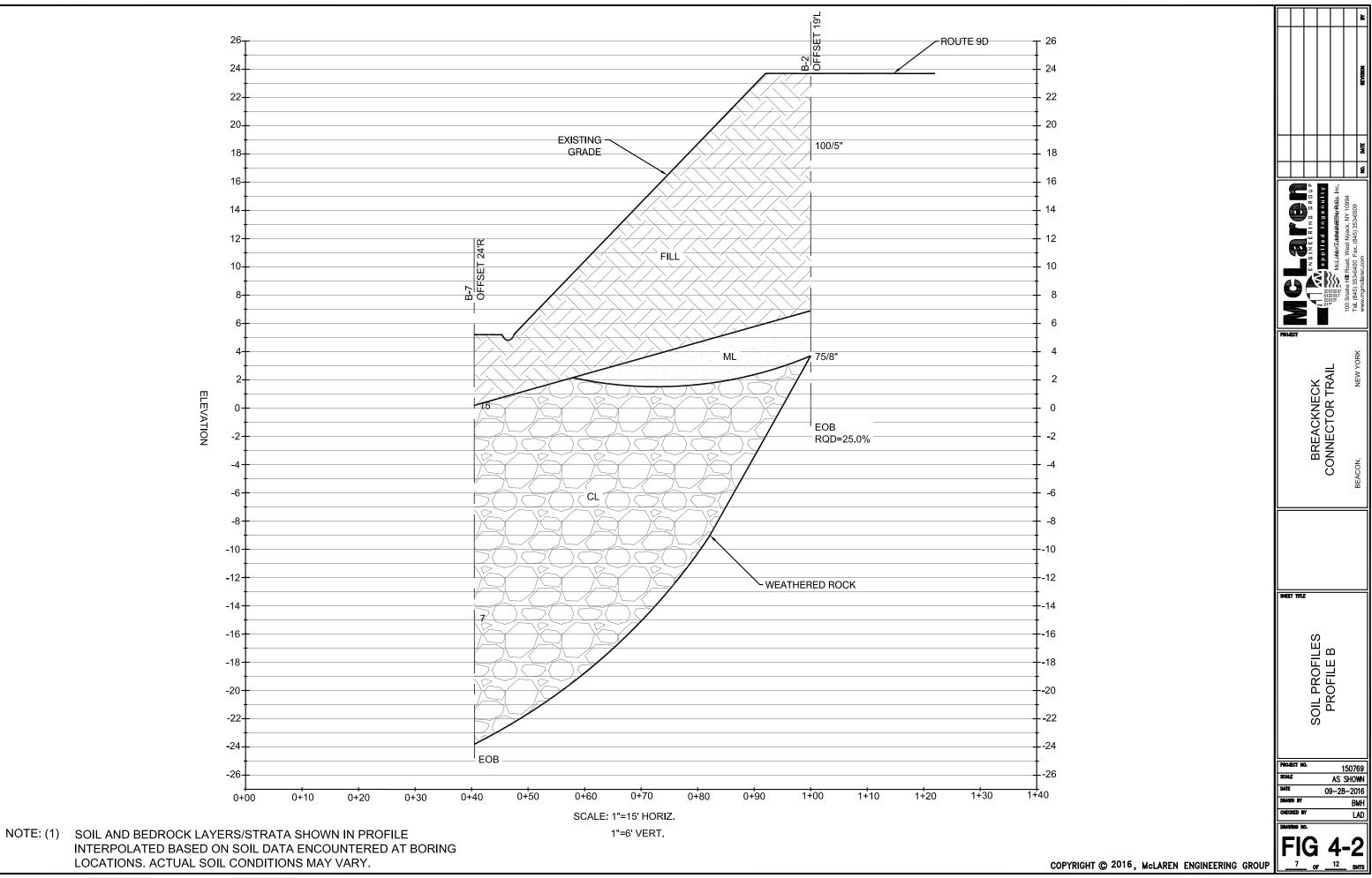
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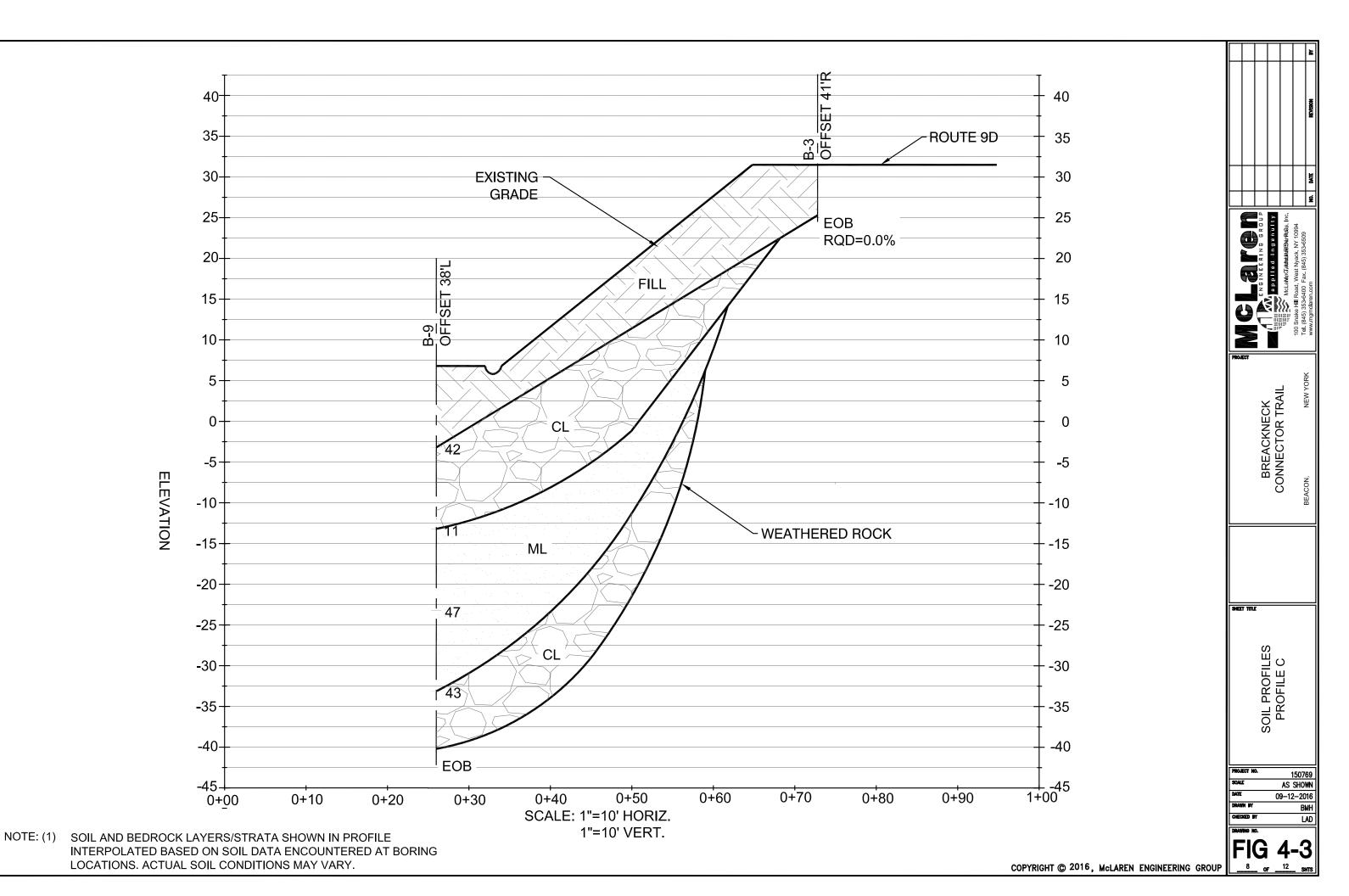
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GP	POORLY GRADED GRA MIXTURES, LITTLE OR)		1a		SOUND ROCK	60
GM	SILTY GRAVELS, GRAV MIXTURES	VEL-SAND-CLAY			1b 1c		M HARD ROCK	40 20
GC	CLAYEY GRAVELS, GR MIXTURES	RAVEL AND SILT			1d	SOFT	ROCK	8
SW	WELL GRADED SANDS LITTLE OR NO FINES	S, GRAVELLY SANDS,			2		EL AND GRAVEL SOILS GROUPS GW, GP GM & GC AND	6-10
SP	POORLY GRADED SAN LITTLE OR NO FINES	NDS, GRAVELLY SANI	DS,			ĠROUF	PS SW, SP, & SM CONTAINING THAN 10% GRAVEL)	
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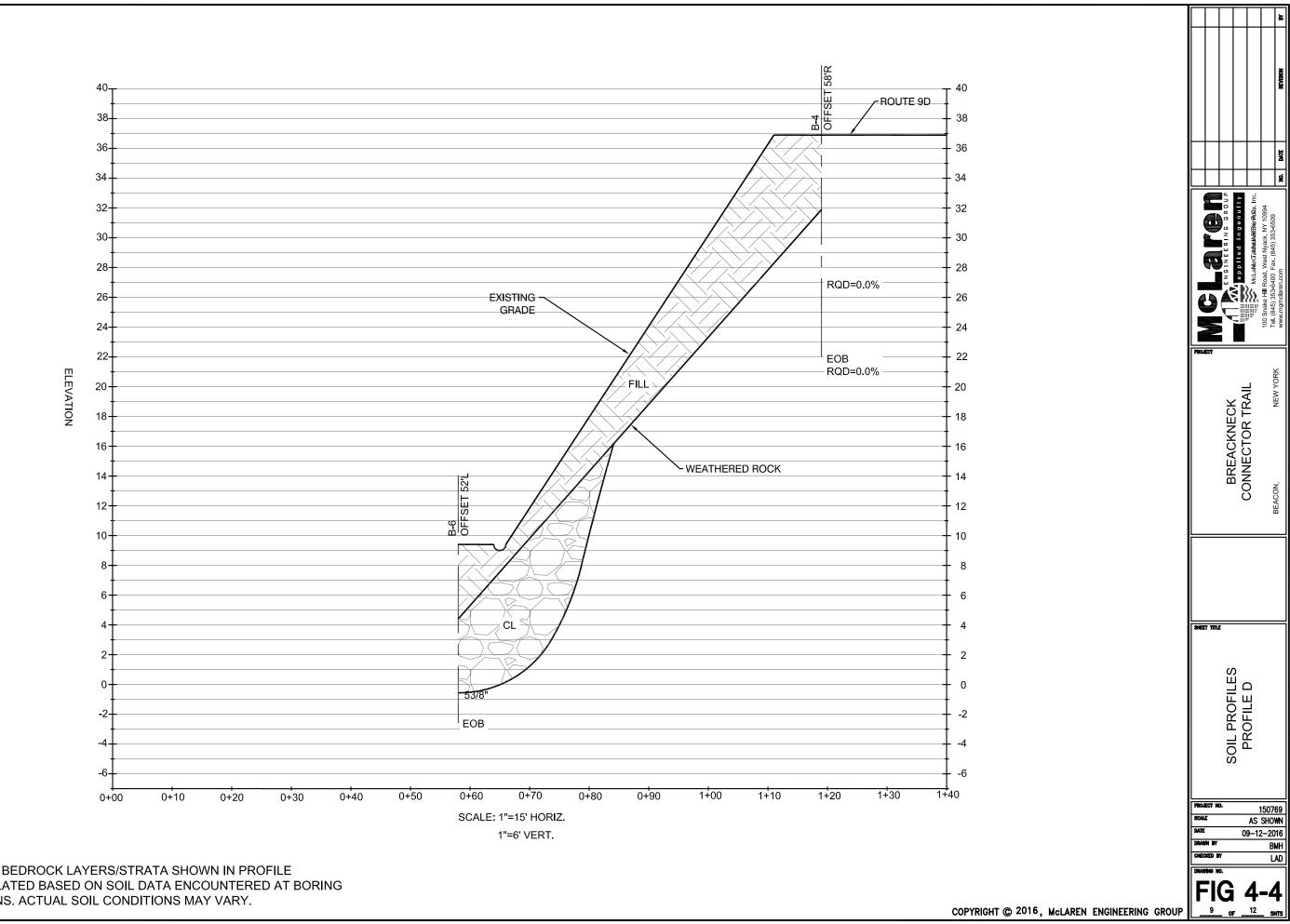
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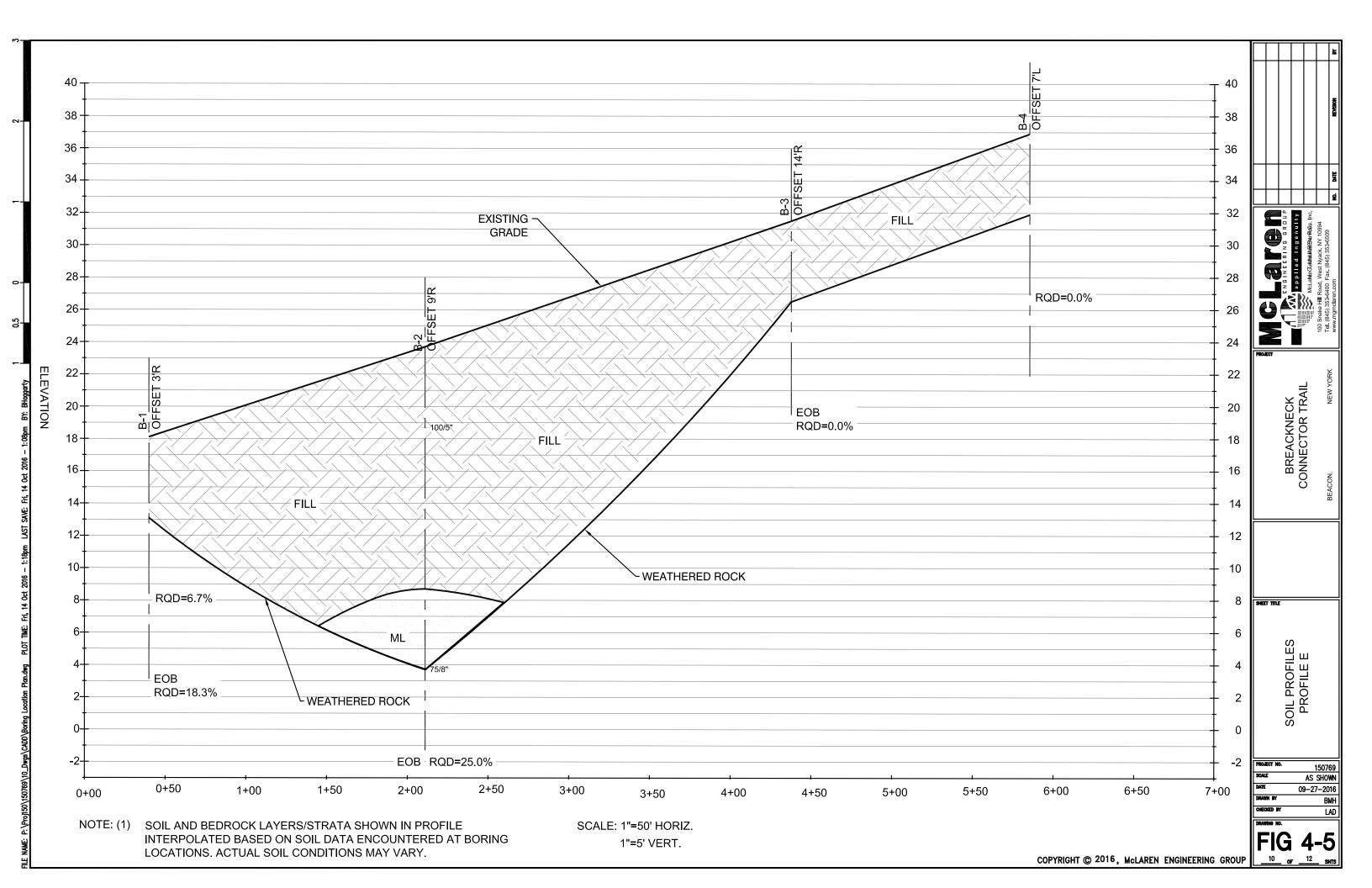


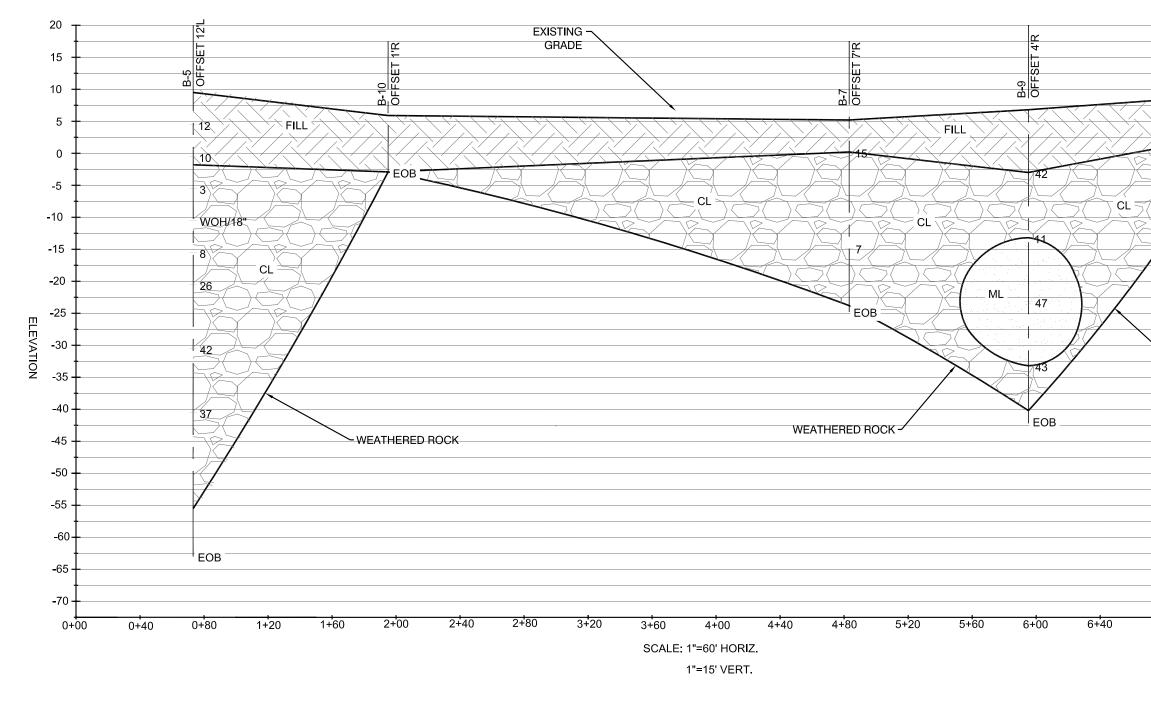
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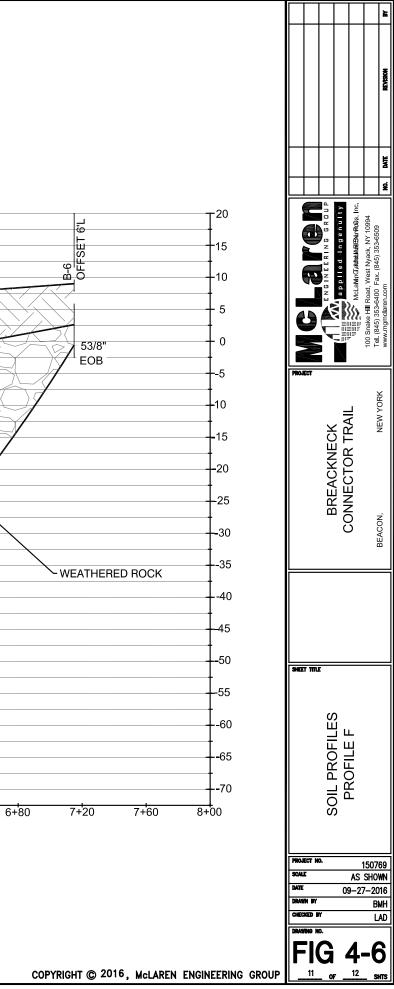
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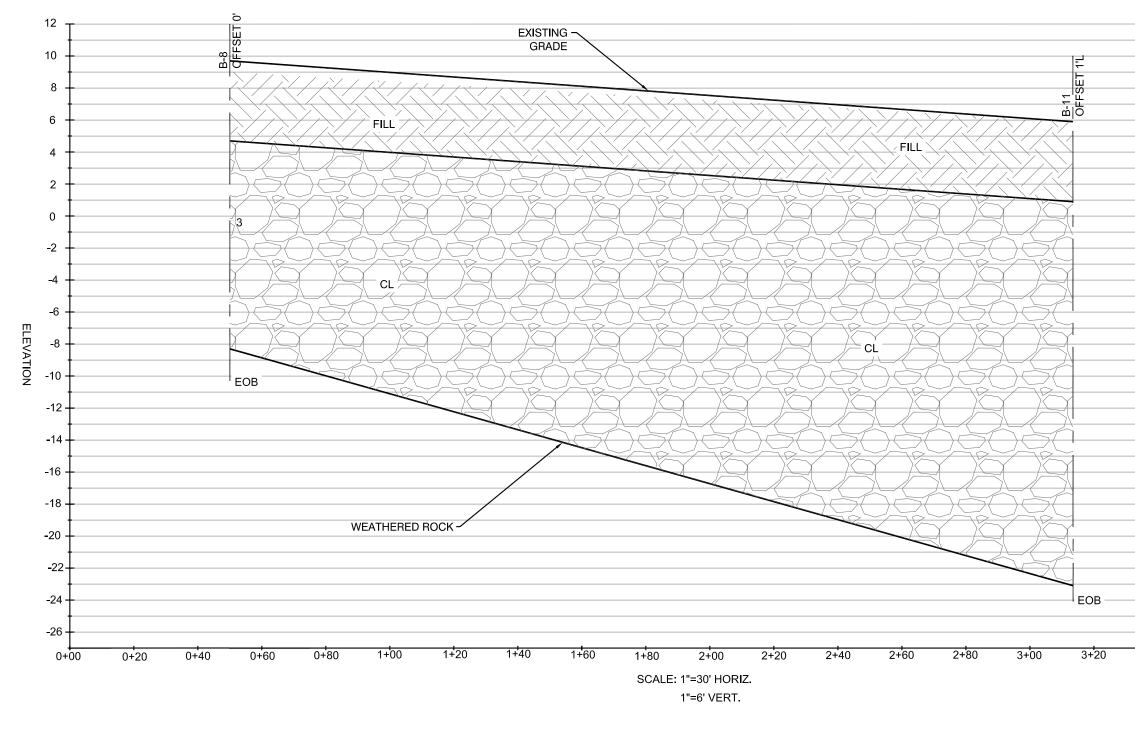
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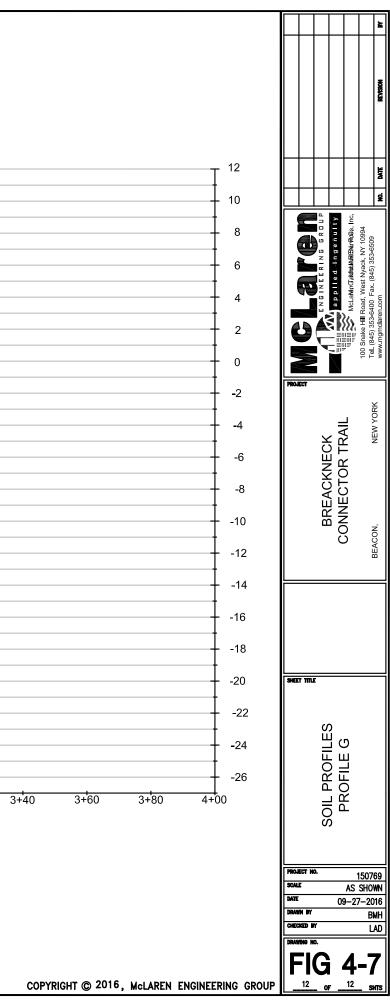
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Appendix D Boring Logs

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DEPT	CASING BLOWS PER	NO	Туре	PEN	REC	DEPTH	ON (FOR	NS PER SAMP CE ON 6 - 12	LER TUBE)	CORE TIME PER FT	DENSITY OR CONSIST	STRATA CHANGE DEPTH		FIELD IDENTIFICATION OF SOIL REMARK CL. COLOR, LOSS OF WASH WATER, SEA IN ROCK, ETC.			
-	FOOT	(mb	-	-		@ BOT			1 10	(MIN)	MOIST	ELEV		(10) 001/00575			
		-		-					-	-	1.0.7.	1'4"	4 ASPHALT	ASPHALT / 12" CONCRETE			
													BOULDERS 8	COBBLES			
5		-		-		-			-		1	5'0" AUGER RE		1041			
3	-	1	SS	5"	2"	5'5"	100/5"		-	2	dry v dense	50		JSAL & COBBLES (fill)			
		1	C	60"	20"	10'0"				3							
		-				1.00			-	2							
10							-		-	3							
		2	С	60"	18"	15'0"	RQD =	0%		1							
		-	-			-			-	2							
		-		-			-		-	1 2			0				
15					1.0					1		15'0"					
		3	C	60"	18"	20'0"	RQD =	0%	1	2							
						-				2							
				-						1			al contra				
20		2	-	8"	1"	20'8"	25	50/2"	-	2	moint	20'8"	Bro EMO CAL	ID lit E aroual			
		4	SS C	60"	45"		RQD =		-	2	moist	208"	BEDROCK	ID, lit F gravel			
			Ĺ				025			3							
25		-		-		-	-	-	-	3	4						
20				-	-	-			-	2		25'8"					
					1	-	-					200	1	E.O.B. 25'8"			
		1		-							1		-				
30		-	-	-			-	-	-	-							
2											1						
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35											1						
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4.2							-						1				
40											· · · · · · · ·	-	-				
NC	cor	nditic	ons a	t sp	ecifi	eveale c location	ions a	nd ma	ay not	ation repre	represen sent	ţ					
	DUND SU	IRFAC	CE TO	-		-T. U	SED_			CASIN			ASING TO	FT. HOLE NO. B-2			
	ALICED	LIP =	UND	ISTUR	RED	PISTON		T = T F	INWAI	(P-1 +	V = VANE	TEST	CONTRACTOR OF STREET				

SOILTESTING, INC. 90 DONOVAN RD.						CLIEN	T:	McLa	aren E	ngineerin	SHEET 1 OF 1 HOLE NO. B-3				
	XFOR					PROJE	CT NC).	G190	-0492-16			Bro Bro		
	CT (20	3) 26	2-93	28		PROJE							BORING LOCATIONS		
	IY (9'		6-48	50				1.1	Rout				per Plan		
OREMAN BD/bl		LER				LOCAT	TION		Cold	Spring, N	Ŷ				
NSPECTO	_				-					CASING	SAMPLER	CORE BAR	OFFSET		
11.7.2.1	100				1		TYPE			HSA/FW		NWD4	DATE START 9/7/16		
GROUND					5	1	SIZE I			3¾"/3"	1 3/8"	21⁄8"	DATE FINISH 9/8/16		
AT ET				URS			1	IER WI	()		140#	BIT	SURFACE ELEV.		
AT_FT	TER				_	_	HAMN	IER FA		-	30"	dia	GROUND WATER ELEV.		
1.1	-		SAM	T	-					DENSITY	CTDATA	FIELD I			
HL CASIN BLOW		NO Type PEN REC. (FORCE ON TUBE) PER CONSIST		STRATA FIELD IDENTIFICATION OF SOIL REMARKS CHANGE INCL. COLOR, LOSS OF WASH WATER, SEAL DEPTH IN ROCK, ETC.											
FOOT			0.		@ BOT	0-6	6 - 12	12- 18	FT (MIN)	MOIST	ELEV				
							-				TIME	4" ASPHALT	/ 12" CONCRETE		
	-	-	-						-	dry/moist	1'4"	COBBLES & I	BOULDERS		
			1							diymoist		SODDLES &	DOULDEND		
5	-					-	1		-		5'0"	AUGER REFI			
	-	-	-	-				-	-		5'6" 7'0"		BOULDERS (fill) decomposed BEDROCK		
	1	C	60"	22"	12'0"	RQD =	7%	-	2		10	BEDROCK	decomposed DEDROOK		
	-	-		1	111102				3			and the second second			
10	-	-	-	-	-	-	-	-	2	-					
									2		12'0"		2.5.4		
					-					() ·			E.O.B. 12'0"		
15	-	-	-			-		-	-	-	le al s				
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	SOIL 90		VOV				CLIEN				ngineerin	a ala		SHEET 1 HOLE NO.	B-4		
			D, C				PROJE	CT NC).	G190	-0492-16	_			71		
			3) 26 4) 94				PROJE	CT NA	ME	Rout	e 9D		BORING LOCATIONS per Plar				
FOR	REMAN - I		_				LOCAT	ION			Spring, N	Y	porria				
_	BD/bk				-		1.4			100	200,000	1					
NSI	PECTOR							-			CASING	SAMPLER	CORE BAR	OFFSET			
0.00		TED	0.000		TIONIC		1.11	TYPE			HSA/FW	SS	NWD4	DATE START	9/8/16		
	DUND WA					5		SIZE I	.D. IER WT	e í	3¾"/3"	<u>1 3/8"</u> 140#	2%" BIT	DATE FINISH SURFACE ELEV.	9/8/16		
	FT AF		1000						IER FA			30"	dia	GROUND WATER ELE	V.		
			5	SAM	PLE	_			_	1	1						
		1.1.1				1	BLO	NS PE	RAIN	CORE	DENSITY	STRATA		ENTIFICATION OF S			
d		NO	Туре	PEN	REC		BLOWS PER 6 IN ON SAMPLER (FORCE ON TUBE)		CORE TIME PER	OR CONSIST	CHANGE	INCL. COL	NCL. COLOR, LOSS OF WASH WATER, SE IN ROCK, ETC.				
	PER FOOT				1.2	DEPTH @ BOT	0-6	6 - 12	12- 18	FT (MIN)	MOIST	ELEV					
		1	_	_	-		-	_		(500.57		2'0"	6" ASPHALT /	18" CONCRETE			
ł				-			-				dry/moist	20	COBBLES, BO	OULDERS and/or fractured	BEDROCK (pos		
												4'0"	1.2.				
5		1	с	60"	15"	10'0"	RQD =	0%	-	2		5'0"	BEDROCK or BEDROCK (f		AUGER REF		
				00	10	100	TIGD -	1		3			DEDINOUN	factured y			
		-							-	2							
10		-	-		-					3							
-		2	с	60"	18"	15'0"	RQD =	- 7%		3							
		-					1.000	-	1	2							
	-			-	-	-		-	-	3							
15									-	3		15'0"		Dill			
					-						-			E.O.B. 15'0"			
		-		-	-				-	-	-						
2			-	1		-	-		-		1						
20		-		-	2	-	-	-	-	-							
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NU						c locati					represen sent						
0.5	cor	nditio	ons a	t oth	her lo	ocation	s or ti	mes.	1.1.1			_					
	OUND SU AUGER					FT. U PISTON		T = T	HINWAL	_CASIN	IG THEN V = VANE		ASING TO	FT. HOLE	NO. B-		
wo	R = WEIG	SHT C	FRO	DS		WOH =	WEIGH	TOF	AMME	R&RC		1201		C = COARSE			
	- CDI IT T	TIDE	CAME	DIED		H.S.A. =	HOLL	OW ST	TEM AL	GER				M = MEDIUM			

			NOVA			1				0100	0400 40			HOLE NO. B-5			
			D, C			1.14	PROJE			G190	-0492-16			BORING LOCATIONS			
			3) 26 4) 94			-	PROJE	GENA	ME	Route	9D		-	per Plan			
OF	REMAN - I			• ••			LOCAT	ION		11220 24 27	Spring, N	Y		por rient			
	BD/ms	-								1.1.1.1	40 2.00	1					
NS	PECTOR							100			CASING	SAMPLER	CORE BAR	OFFSET			
		-						TYPE			HSA	SS 1 3/8"		DATE START 9/21/16 DATE FINISH 9/21/16			
	DUND WA					,	1.00	SIZE I	.D. IER WI	τ.	3¾"	140#	BIT	DATE FINISH 9/21/16 SURFACE ELEV.			
	_FT AF						· · · · · · · · · · · · · · · · · · ·		IER FA		C	30"		GROUND WATER ELEV.			
-		1	S	SAM	PLE					<u> </u>	[
a	CASING BLOWS PER	NO	Туре	PEN	REC	DEPTH	ON (FORC		LER TUBE)	CORE TIME PER FT	DENSITY OR CONSIST	STRATA CHANGE DEPTH	the second se	DENTIFICATION OF SOIL REMARKS OR, LOSS OF WASH WATER, SEAM IN ROCK, ETC.			
	FOOT					@ BOT	0-6	6 - 12	12-18	(MIN)	MOIST	ELEV					
		_			-			-					Brn FMC SAN	ID & FC GRAVEL, COBBLES, RUBBLE			
										10 ¹				- H			
												-					
5		1	SS	24"	6"	7'0"	5	5	-	-	moist	5'0"	Blk SILT, tr as	sohalt			
			00	-1			6	21			stiff		Sin Sicili 6 03	1			
10		-		-		-				-			C				
	-	2	SS	24"	10"	12'0"	3	5			moist		Lt Brn SILTY	CLAY, sm F gravel, C sand			
		1.11					5	7		_	stiff						
		-		-	-			3		1							
15		1							-		1000		a land				
	-	3	SS	24"	20"	17'0"	1.	1		-	moist soft		Gry SILTY CL	AY, tr peat (organics)			
				-	-		2	4			SUIL		11.1				
	1																
20		4	SS	24"	24"	22'0"	WOH /	19"	-	-	wet		SAME				
		-4	55	24	24	220		2			v soft		JOANIE .				
				1			1.00	-			1.						
25	-				-				-	-	-		13.2				
-0	1	5	SS	24"	24"	27'0"	3	2			wet	~	SAME; lit woo				
						1.2.2.2	6	8	-	-	stiff		Gry SILTY CL	.AY, tr peat (organics)			
		-		-	-		-	-	-				1.1.1.1				
30	1000	-	1										2. Interior				
		6	SS	24"	18"	32'0"	5	10			wet		Gry SILTY CL	AY			
				-	-		10	20	-	-	v stiff						
35		-	-	-	-	-	-		-	-							
	-	-					-		1								
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40		-	-	-	_	-		-	-	-	-						
		bsoi	l cor	diti	ons	eveale	d by t	his in	vesti	ation	represen	t		4			
	CO	nditi	ons	at sp	ecif	ic loca	tions a	and m	nay no			-					
GP	COND SL	nditi	ONS	at ot	her	ocatio	ns or	times		CASIN	IG THEN		ASING TO	FT. HOLE NO. B-5			
	AUGER								HINWA		V = VANE						
WC	R = WEI	GHT (DE RO	DS		WOH =	WEIGH	T OF	HAMME	R & R	200			C = COARSE			

	SOIL 90		NOV			2 - 1	CLIEN	T:	McLa	aren E	ngineerin	g Group		SHEET_2_OF_2 HOLE NO. B-5
			D, C				PROJE	CT NC		G190	-0492-16			
			3) 26				-	ECT NA		2.00			~~~~	BORING LOCATIONS
			4) 94			1000	, NOUL	01144		Route	e 9D		× .	per Plan
OR	EMAN - I		_	- 10	-		LOCAT	TION			Spring, N	IY		Post 1-19411
1	BD/ms						2.00			<u></u>		N 100		
NSF	PECTOR										CASING	SAMPLER	CORE BAR	OFFSET
	_							TYPE			HSA	SS		DATE START 9/21/16
	DUND WA					5		SIZE I			3¾"	1 3/8"		DATE FINISH 9/21/16
	17_FT							HAMM				140#	BIT	SURFACE ELEV.
<u> </u>	_FT_AF	TER_						HAMN	IER FA			30"		GROUND WATER ELEV.
		1.7		SAM	PLE		there is				1.11	N. S. Dallar		
DEPT	CASING BLOWS PER	NO	Туре	PEN	REC	DEPTH	ON (FOR	NS PEI SAMP CE ON 6 - 12	LER TUBE)	CORE TIME PER FT	DENSITY OR CONSIST	STRATA CHANGE DEPTH		DENTIFICATION OF SOIL REMARKS OR, LOSS OF WASH WATER, SEAN IN ROCK, ETC.
	FOOT	_			1.00	@ BOT		(11) · · ·	12- 10	(MIN)	MOIST	ELEV		
-		7	SS	24"	18"	42'0"	9 23	19			wet hard		Gry SILTY CL	AY, tr F gravel
		-	1		-	-	20	24	1	-	nard			14
		1					6		1]			
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ł		1	· · · · ·											
50							17.00		S				Sec. 1	
ļ		8	SS	24"	18"	52'0"	14	20		1	wet		Gry Brn SILT,	
ł				-		-	17	23	-		hard		(50' switched	to tri cone roller bit & water)
ł				-	-				-		1			
55						-	-]			
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		-	-	1	-		×	-	-	-		6.1		
65												65'0"	125.000	
					-						1	1	poss weather	ed BEDROCK
	1	-		1 1	-		-	-		-	1			
		-	-		-									
70		-												
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- (-					-						mainte	in the local	
ŀ			-	-	-					-		73'0"	AUGER REFL	JSAL E.O.B. 73'0"
		-	-	-	-			1000		-		1.1		E.O.D. 130
75			-	-										
75			-			1								
75				· *				-						
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	SOIL		STIN			•	CLIEN'	г:	McLa	iren Ei	ngineerin	g Group	S	SHEET_1_OF_1 HOLE NO. B-6
			D, C				PROJE	CT NO		G190-	-0492-16			
			3) 26			1.1	PROJE							BORING LOCATIONS
			4) 94					of a Mari		Route	and the second se		_	per Plan
	REMAN - I	DRILL	ER				LOCAT	TION	$m \sim 1$	Cold	Spring, N	Y		
_	BD/ms			_				_	-		CASING	SAMPLER	CORE BAR	OFFSET
NS	PECTOR					1.1		TYPE			HSA	SAMPLER	CORE BAR	DATE START 9/22/16
GR		ATER	OBSE	RVA	TIONS			SIZE I	D		33/4"	1 3/8"		DATE FINISH 9/22/16
	none_FT								IER WT	τ.		140#	BIT	SURFACE ELEV.
AT_	_FT_AF	TER_	_HOI	JRS			_	HAMM	IER FA			30"		GROUND WATER ELEV.
	-		5	SAMI	PLE					-			1	A DERIVAN STRANDCOTT
ä	CASING BLOWS PER	NO	Туре	PEN	REC	DEPTH	ON (FOR	NS PER SAMP CE ON 6 - 12	LER TUBE)	CORE TIME PER FT	DENSITY OR CONSIST	STRATA CHANGE DEPTH	1.1.1.217725.217	DENTIFICATION OF SOIL REMARKS OR, LOSS OF WASH WATER, SEAM IN ROCK, ETC.
	FOOT	-	-	_	100	@ BOT				(MIN)	MOIST	ELEV	DIL OU T and	The stands
			-	-		-	_			-	moist		Blk SILT, sm F	TVI Sano
	-													
	-	-			-	-				-	an other			
5					-	-	-	-	-	-	moist	1	Brn SILT, sm	FM sand, tr F gravel
1	_													
		-									1			
10	-	-												
10	-	1	SS	11"	4"	10'11"	3	50/5"	-	-	moist	10'9"	Gry/Brn SILT	(CLAY
			00					0010			hard	C 4750	weathered BE	
					-	-					1.1.1.1.1.1	11'4"	AUGER REFL	
15		-		-	-	-	-		-				10.00	E.O.B. 11'4"
		1						1						
		-		-	-		_							
20		-	-									1		
15														
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40	DOM: NOT THE OWNER	1		1	1	1	1	1	-	1				
	co co	nditi	ions ions	at sp at of	becif	ic loca locatio	tions ns or	and n	nay no	ot repr	1.00000000			
	OUND SU							T = 7	HINWA	_CASIN	IG THEN V = VANE		ASING TO	FT. HOLE NO. B-6
	AUGER						4	$1 \equiv 1$	AVVAIIN	LL	V = VANE	ESI		

	201												HOLE NO.	B-7
OX	FOR	D, C	AN R			PROJE	CT NO).	G190	-0492-16				
		100.001							14.25	50 ()			BORING LOCATIONS	
NY	(91	4) 94				1.1.1.1.1.1							per Plan	_
	ORILL	ER				LOCAT	ION		Cold	Spring, N	Y		the second second	
			_	_						CASING	SAMPI ER	CORE BAR	OFESET	
LOTON							TYPE					oone onn	a poly the could be a set of the	/22/16
UND WA	TER	OBSE	RVA	TIONS	S			.D.			1 3/8"			/22/16
						1	HAMM	IER WI	r.		140#	BIT	SURFACE ELEV.	
FT AF	TER_	_HOU	JRS			-	HAMM	IER FA	LL		30"		GROUND WATER ELEV.	
		5	SAMI	PLE				1			Carlo Carlo	1 Section	C. L. N. L. D. R. L. Marked Sci.	
	NO	Туре	PEN	REC		ON (FORC	SAMP CE ON	LER TUBE)	CORE TIME PER	DENSITY OR CONSIST	STRATA CHANGE DEPTH	100000000000000000000000000000000000000		
FOOT				1.1	@ BOT	0-6	6 - 12	12-18	(MIN)	MOIST	ELEV			
- 12					1	1				1.2.2	1'0"	C GRAVEL		
								-		moist		Blk SILT, sm I	FM sand, F gravel	
			-	-		-		-						
							-							
	-		-	-				1	1					
		1.1					-	-						
												Ser as said	50	
	1	SS	24"	14"	12'0"	4	6	-		moist		Brn SILTY CL	AY	
	-	-		-	-	9	10			Suff				
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	-		-	-	-			-		-				
								1						
		1							-	-				
	2	ce	24"	24"	22'0"	WOH	3	-	-	moist		Gry SILTY CI	AY, troeat	
_	L	33	24	24	22.0	4	8			stiff		in the second		
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	-	-	-	-	-	-	-							
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2						1								
	1	-		-	-		-				20101			
		-			-	-			1		30'0"	poss weather	ed BEDROCK AUG	ER REFUS
								-					E.O.B. 30'0"	
		-	-	-		12.93			-			11.		
	-		-	-		-		-	-	-				
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								1.00						
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											t			
co	nditi	ons	at of	ther	locatio	ns or							and a second	
DUND SU	JRFA	CE TO)(FT. U	JSED _						ASING TO _	FT. HOLE NO.	B-7
											IES!		C = COARSE	
= SPLIT	TUBE	SAM	PLER		H.S.A.	= HOLL	ows	TEM A	UGER				M = MEDIUM	
	NY EMAN - I 3D/ms ECTOR UND W/ 0_FT / FT AF CASING 3LOWS PER FOOT	NY (91. 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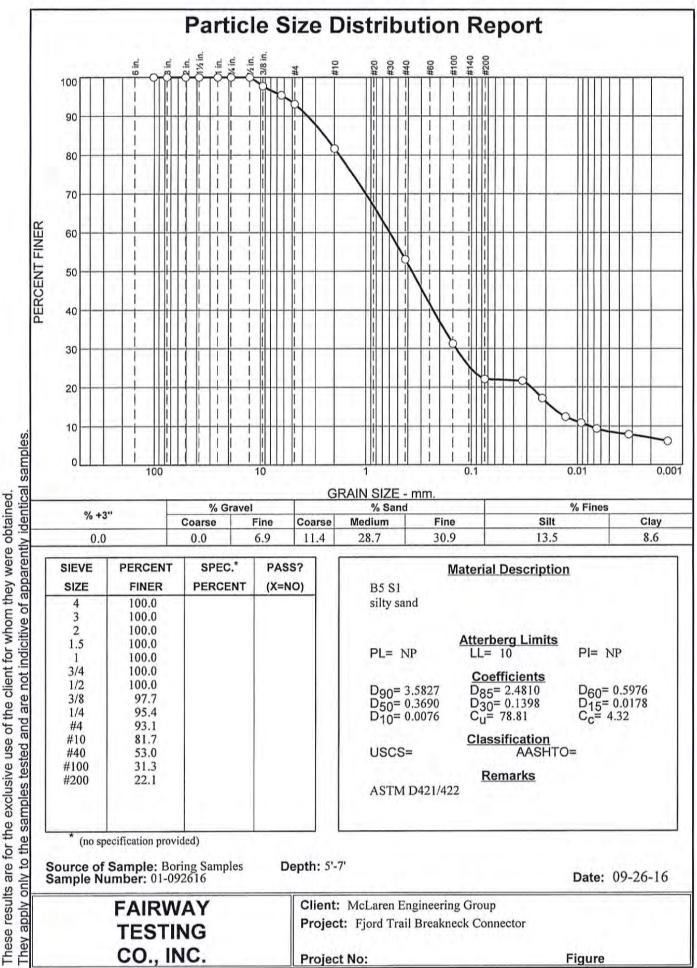
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AFTER	Type	JRS	-						33/4"	1 3/8"		DATE FINISH 9/23/16
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1	co	ndit	ions	at o	ther	locatio	ns or			1.11	- territet			11151	E NO. 5 10
	ROUND SI						JSED _	T - 7	LUNDAVA	_CASI			ASING TO _	FT. HOL	E NO. B-10
	AUGER					WOH =			HINWA	100 Aug. 100	V = VANE ODS	EST		C = COARSE	
ss	= SPLIT	TUBE	ESAM	PLER	2	H.S.A.	= HOL	LOWS	TEM A	UGER				M = MEDIUM	
10 07	= SPLIT	TUBE	SAM	TRA	CE =	H.S.A.	= HOL	LOW S F = 10	- 20%	SOME	= 20 - 35%	AND =35 -	50%	M = MEDIUM F = FINE	

ORING LOCATIONS per Plan TFSET ATE START 9/23 ATE FINISH 9/23 JRFACE ELEV. ROUND WATER ELEV. ROUND WATER ELEV. TIFICATION OF SOIL REMA , LOSS OF WASH WATER, S IN ROCK, ETC.	3/16 ARKS
per Plan FFSET ATE START 9/23 ATE FINISH 9/23 JRFACE ELEV. ROUND WATER ELEV. ROUND WATER ELEV. ITIFICATION OF SOIL REMA , LOSS OF WASH WATER, S IN ROCK, ETC. AND	3/16 ARKS
FSET TE START 9/23 ATE FINISH 9/23 JRFACE ELEV. ROUND WATER ELEV. ROUND WATER ELEV. ITIFICATION OF SOIL REMA , LOSS OF WASH WATER, S IN ROCK, ETC. AND	3/16 ARKS
ATE START 9/23 ATE FINISH 9/23 JRFACE ELEV. ROUND WATER ELEV. ITIFICATION OF SOIL REMA , LOSS OF WASH WATER, S IN ROCK, ETC.	3/16 ARKS
ATE START 9/23 ATE FINISH 9/23 JRFACE ELEV. ROUND WATER ELEV. ITIFICATION OF SOIL REMA , LOSS OF WASH WATER, S IN ROCK, ETC.	3/16 ARKS
ATE START 9/23 ATE FINISH 9/23 JRFACE ELEV. ROUND WATER ELEV. ITIFICATION OF SOIL REMA , LOSS OF WASH WATER, S IN ROCK, ETC.	3/16 ARKS
ATE FINISH 9/23 JRFACE ELEV. ROUND WATER ELEV. ITIFICATION OF SOIL REMA , LOSS OF WASH WATER, S IN ROCK, ETC.	3/16 ARKS
ROUND WATER ELEV.	
ITIFICATION OF SOIL REMA , LOSS OF WASH WATER, S IN ROCK, ETC.	
, LOSS OF WASH WATER, S IN ROCK, ETC.	
, LOSS OF WASH WATER, S IN ROCK, ETC.	
2 sand	
C sand	
, sano	
L	
O.B. 30'0"	
	1.1
FT. [HOLE NO. 1	B-11

Appendix E Soil Laboratory Results



GRAIN SIZE DISTRIBUTION TEST DATA

Client: McLaren Engineering Group Project: Fjord Trail Breakneck Connector

Location: Boring Samples

Depth: 5'-7'

Material Description: B5 S1

silty sand

Sample Number: 01-092616

 Date: 09-26-16
 PL: NP

 Testing Remarks: ASTM D421/422

									and the second second	
Sieve Opening Size	Percent Finer									
4	100.0									
3	100.0									
2	100.0									
1.5	100.0									
1	100.0									
3/4	100.0									
1/2	100.0									
3/8	97.7									
1/4	95.4									
#4	93.1									
#10	81.7									
#40	53.0									
#100	31.3									
#100 #200	31.3 22.1									
#200 drometer te	22.1 st uses mater	ial passing #	10 ta sampla = 8	Hydrom	eter Tes	ni Data		y	352	
#200 drometer te rcent passin eight of hyd tomatic tem Composite eniscus corr ecific gravit drometer ty Hydrometer Elapsed	22.1 st uses matering #10 based for rometer samp operature correction (flu- rection only = ty of solids = 2 pe = 151H effective dept Temp.	upon comple le =87.3 ection id density an 0.0 2.65 th equation: 1 Actual	nte sample = 8 nd meniscus h L = 16.294964 Corrected	1.7 eight) at 20	deg. C =		Diameter (mm.)	Percent Finer		
#200 drometer te rcent passin eight of hydr tomatic tem Composite of miscus corr ecific gravit drometer ty Hydrometer Elapsed Time (min.)	22.1 st uses matering #10 based for rometer samp uperature correction (flu rection only = by of solids = 2 pe = 151H effective dept Temp. (deg. C.)	upon comple le =87.3 ection id density an 0.0 2.65 th equation: Actual Reading	nte sample = 8 nd meniscus h L = 16.294964 Corrected Reading	1.7 eight) at 20 - 0.2645 x K	deg. C = Rm Rm	0 Eff. Depth	(mm.)	Finer		
#200 drometer te rcent passi eight of hyd tomatic tem Composite of miscus corr ecific gravit drometer ty Hydrometer Elapsed Time (min.) 2.00	22.1 st uses matering #10 based of cometer samp operature corre- correction oflu- rection only = by of solids = 2 pe = 151H effective dept Temp. (deg. C.) 23.0	upon comple le =87.3 ection id density an 0.0 2.65 th equation: Actual Reading 1.0140	nte sample = 8 nd meniscus h L = 16.294964 Corrected Reading 1.0144	1.7 eight) at 20 - 0.2645 x K 0.0132	deg. C = Rm Rm 14.0	0 Eff. Depth 12.6	(mm.) 0.0330	Finer 21.7		
#200 drometer te rcent passie eight of hyd tomatic tem Composite ecific gravit drometer ty Hydrometer Elapsed Time (min.) 2.00 5.00	22.1 st uses matering #10 based of cometer samp perature correction (flu- ection only = ty of solids = 2 pe = 151H effective dept Temp. (deg. C.) 23.0 23.0	upon comple le =87.3 ection id density an 0.0 2.65 th equation: 1 Actual Reading 1.0140 1.0110	nte sample = 8 nd meniscus h L = 16.294964 Corrected Reading 1.0144 1.0114	1,7 eight) at 20 - 0.2645 x K 0.0132 0.0132	deg. C = Rm Rm 14.0 11.0	0 Eff. Depth 12.6 13.4	(mm.) 0.0330 0.0215	Finer		
#200 drometer te rcent passin eight of hydr tomatic tem Composite eniscus corr ecific gravit drometer ty Hydrometer Elapsed Time (min.) 2.00 5.00 15.00	22.1 st uses matering #10 based rometer samp operature corricorrection (flu rection only = by of solids = 2 pe = 151H effective dept Temp. (deg. C.) 23.0 23.0 22.0	upon comple le =87.3 ection id density an 0.0 2.65 th equation: 1 Actual Reading 1.0140 1.0110 1.0080	te sample = 8 d meniscus h L = 16.294964 Corrected Reading 1.0144 1.0114 1.0083	1,7 eight) at 20 - 0.2645 x K 0.0132 0.0132 0.0133	deg. C = Rm 14.0 11.0 8.0	0 Eff. Depth 12.6	(mm.) 0.0330	Finer 21.7 17.2		
#200 drometer te rcent passin eight of hydr tomatic term Composite of miscus corr recific gravit drometer ty Hydrometer Elapsed Time (min.) 2.00 5.00 15.00 30.00	22.1 st uses matering #10 based for rometer samp operature correction (flu rection only = by of solids = 2 pe = 151H effective dept Temp. (deg. C.) 23.0 23.0 22.0 22.0	upon comple le =87.3 ection id density an 0.0 2.65 th equation: 1 Actual Reading 1.0140 1.0110 1.0080 1.0070	te sample = 8 d meniscus h L = 16.294964 Corrected Reading 1.0144 1.0114 1.0083 1.0073	1,7 eight) at 20 - 0.2645 x K 0.0132 0.0132 0.0133 0.0133	deg. C = Rm 14.0 11.0 8.0 7.0	0 Eff. Depth 12.6 13.4 14.2 14.4	(mm.) 0.0330 0.0215 0.0129	Finer 21.7 17.2 12.4		
#200 drometer te rcent passin eight of hydr tomatic tem Composite eniscus corr ecific gravit drometer ty Hydrometer Elapsed Time (min.) 2.00 5.00 15.00	22.1 st uses matering #10 based rometer samp operature corricorrection (flu rection only = by of solids = 2 pe = 151H effective dept Temp. (deg. C.) 23.0 23.0 22.0	upon comple le =87.3 ection id density an 0.0 2.65 th equation: 1 Actual Reading 1.0140 1.0110 1.0080	te sample = 8 d meniscus h L = 16.294964 Corrected Reading 1.0144 1.0114 1.0083	1,7 eight) at 20 - 0.2645 x K 0.0132 0.0132 0.0133	deg. C = Rm 14.0 11.0 8.0	0 Eff. Depth 12.6 13.4 14.2	(mm.) 0.0330 0.0215 0.0129 0.0092	Finer 21.7 17.2 12.4 10.9		

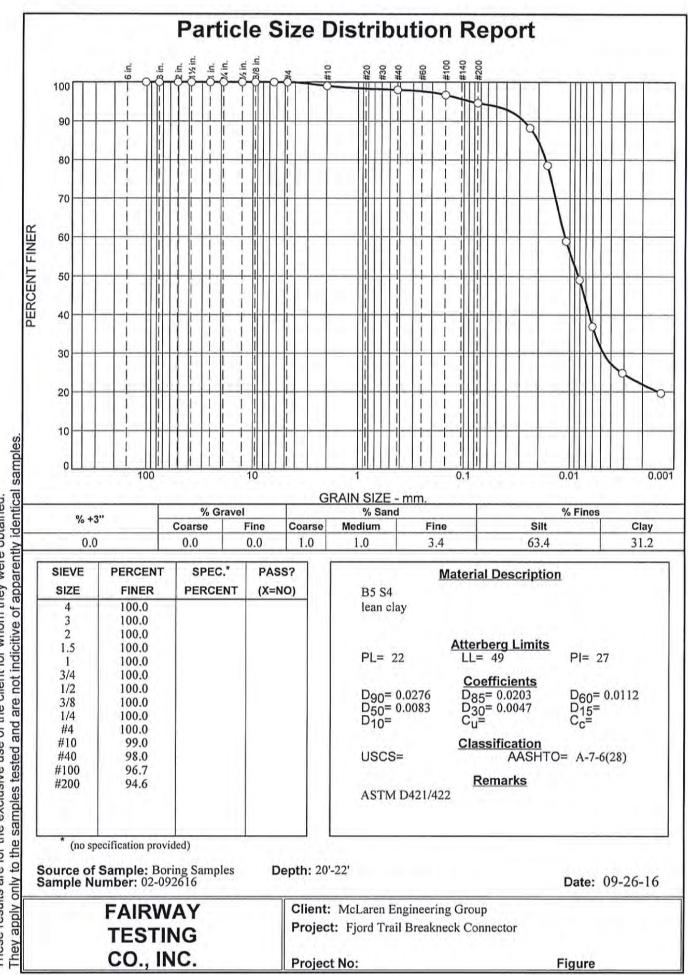
9/29/2016

Cabbles		Gravel			Sar	nd		Fines				
Cobbles	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total		
0.0	0.0	6.9	6.9	11.4	28.7	30.9	71.0	13.5	8.6	22.1		

D ₅	D ₁₀	D ₁₅	D ₂₀	D30	D40	D50	D ₆₀	D80	D85	D90	D95
	0.0076	0.0178	0.0273	0.1398	0.2313	0.3690	0.5976	1.7982	2.4810	3.5827	5.9692

Fineness Modulus	cu	С _с
2.15	78.81	4.32

_ FAIRWAY TESTING CO., INC. _



These results are for the exclusive use of the client for whom they were obtained.

Sieve Opening Percent Sieve Opening Opening Percent Size Finent 4 100.0 2 100.0 1.5 100.0 3/4 100.0 1/2 100.0 3/4 100.0 1/2 100.0 1/4 100.0 1/2 100.0 1/4 100.0 1/2 100.0 1/4 100.0 1/2 100.0 1/4 100.0 1/4 100.0 1/2 100.0 1/4 100.0 #10 99.0 #40 98.0 #100 96.7 #200 94.0 Workmeter test uses Percent passing #10 Veight of hydrometer 100	ail Breakneck Connector Samples ion: B5 S4 lean clay PL: 22 cation: A-7-6(28) : ASTM D421/422 cent her 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	pr	Sieve	Sam; LL: 4 Teat D	9	er: 02-0926	16 PI: 27	
Project: Fjord Trail Location: Boring Sa Depth: 20'-22' Material Description Date: 09-26-16 AASHTO Classifica Festing Remarks: A Sieve Opening Percel Size Finel 4 100.0 2 100.0 1.5 100.0 1.5 100.0 1/2 100.0 3/4 100.0 1/2 100.0 1/4 100.0 #40 98.0 #100 96.7 #200 94.0	ail Breakneck Connector Samples ion: B5 S4 lean clay PL: 22 cation: A-7-6(28) : ASTM D421/422 cent her 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Dr	Sieve	LL: 4	9	er: 02-0926		
Sieve Opening Percent Sieve Opening Opening Percent Size Finent 4 100.0 2 100.0 1.5 100.0 3/4 100.0 1/2 100.0 3/4 100.0 1/2 100.0 1/4 100.0 1/2 100.0 1/4 100.0 1/2 100.0 1/4 100.0 1/2 100.0 1/4 100.0 1/4 100.0 1/2 100.0 1/4 100.0 #10 99.0 #40 98.0 #100 96.7 #200 94.0 Workmeter test uses Percent passing #10 Veight of hydrometer 100	Samples ion: B5 S4 lean clay PL: 22 cation: A-7-6(28) : ASTM D421/422 cent her 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.		Sieve	LL: 4	9	er: 02-0926		
Depth: 20'-22' Material Description Date: 09-26-16 ASHTO Classificat resting Remarks: A Sieve Opening Percel Size Finel 4 100.0 3 100.0 2 100.0 1.5 100.0 1.5 100.0 1.5 100.0 1.5 100.0 1.5 100.0 1.4 100.0 3/4 100.0 1/2 100.0 3/8 100.0 1/4 100.0 #4 0 98.0 #10 99.0 #40 98.0 #10 96.7 #200 94.0 Nydrometer test uses Vergent of hydrometer	ion: B5 S4 lean clay PL: 22 cation: A-7-6(28) : ASTM D421/422 cent her 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.		Sieve	LL: 4	9	er: 02-0926		
Material Description Date: 09-26-16 AASHTO Classification Testing Remarks: A Sieve Opening Percel Size Finer 4 100.0 2 1.5 1.5 1.5 1.6 1.72 1.72 1.74 1.74 1.74 1.74 1.74 1.74 1.74 1.74 1.74 1.74 1.75 1.74 1.75 1.74 1.75 1.74 1.75 1.74 1.74 1.74 1.74 1.74 1.74 1.74 1.74 1.74 1.74 1.74 1.75 1.74 1.74 1.75 1.74	lean clay PL: 22 cation: A-7-6(28) : ASTM D421/422 cent her 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.		Sieve	LL: 4	9	er. 02-0920		
Date: 09-26-16 AASHTO Classifica Testing Remarks: 7 Sieve Opening Percer Size Finer 4 100,0 3 100,0 2 100,0 1,5 100,0 1,7 100,0 3/8 100,0 1,4 100,0 4,4 098,0 4,100 96,5 4,200 94,0 Hydrometer test uses Percent passing #10 1 Veight of hydrometer	lean clay PL: 22 cation: A-7-6(28) : ASTM D421/422 cent her 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.		Sieve				PI: 27	
ASHTO Classifica resting Remarks: A Sieve Opening Percel Size Finel 4 100.0 3 100.0 2 100.0 1.5 100.0 1.4 100.0 #40 98.0 #100 96.7 #200 94.0 Veight of hydrometer	PL: 22 cation: A-7-6(28) : ASTM D421/422 cent her 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.		Sieve				PI: 27	
ASHTO Classifica resting Remarks: / Sieve Opening Percel Size Finel 4 100.0 3 100.0 2 100.0 1.5 100.0 1.5 100.0 1.5 100.0 1.5 100.0 1.5 100.0 1.5 100.0 1.5 100.0 1.4 100.0 3/8 100.0 1/4 100.0 #4 100.0 #4 098.0 #10 96.7 #200 94.0 Weight of hydrometer	cation: A-7-6(28) : ASTM D421/422 cent her 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.		Sieve				PI: 27	
Sieve Opening Percent Size Finer 4 100.0 3 100.0 2 100.0 1.5 100.0 1 100.0 3/4 100.0 1/2 100.0 1/2 100.0 1/4 100.0 1/4 100.0 #40 98.0 #100 96.7 #200 94.0 Wydrometer test uses Vergent of hydrometer	: ASTM D421/422 cent her 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.		Sieve	Test D	ata			
Sieve Opening Percersion Size Fine 4 100.0 3 100.0 2 100.0 1.5 100.0 1.5 100.0 3/4 100.0 1/2 100.0 3/4 100.0 1/2 100.0 3/8 100.0 1/4 100.0 #40 98.0 #100 96.7 #200 94.0 Hydrometer test uses Sercent passing #10 Veight of hydrometer Series	cent fer 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.		Sieve	Test D	a (Ma			
Opening Size Perce Fine 4 100.0 3 100.0 2 100.0 1.5 100.0 1.5 100.0 3/4 100.0 3/4 100.0 1/2 100.0 3/8 100.0 1/4 100.0 #40 98.0 #100 96.7 #200 94.0 Veight of hydrometer test uses	ner 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.		Sieve	119241 07	e i fe			
Opening Size Perce Fine 4 100.0 3 100.0 2 100.0 1.5 100.0 1.5 100.0 3/4 100.0 3/4 100.0 1/2 100.0 3/8 100.0 1/4 100.0 #40 98.0 #100 96.7 #200 94.0 Ydrometer test uses ercent passing #10 Veight of hydrometer fydrometer	ner 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.							
Size Fine 4 100.0 3 100.0 2 100.0 1.5 100.0 1.5 100.0 3/4 100.0 3/4 100.0 3/8 100.0 1/2 100.0 3/8 100.0 #4 100.0 #40 98.0 #100 96.7 #200 94.0 Wdrometer test uses ercent passing #10 Weight of hydrometer fight of hydrometer	ner 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.							
4 100.0 3 100.0 2 100.0 1.5 100.0 1.5 100.0 1 100.0 3/4 100.0 1/2 100.0 3/8 100.0 1/4 100.0 #4 100.0 #4 100.0 #40 98.0 #100 96.7 #200 94.0 Ydrometer test uses ercent passing #10 Veight of hydrometer	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0							
3 100.0 2 100.0 1.5 100.0 1.5 100.0 3/4 100.0 3/4 100.0 1/2 100.0 3/8 100.0 1/4 100.0 #40 98.0 #100 96.7 #200 94.0 ydrometer test uses ercent passing #10 /eight of hydrometer	0.0 0.0 0.0 0.0 0.0 0.0 0.0							
2 100.0 1.5 100.0 1 100.0 3/4 100.0 1/2 100.0 3/8 100.0 1/4 100.0 #4 100.0 #40 98.0 #10 99.0 #40 98.0 #10 96.7 #200 94.0 ydrometer test uses ercent passing #10 1 /eight of hydrometer	0.0 0.0 0.0 0.0 0.0 0.0 0.0							
1.5 100.0 1 100.0 3/4 100.0 1/2 100.0 3/8 100.0 1/4 100.0 #4 100.0 #40 98.0 #100 96.7 #200 94.0 ydrometer test uses secent passing #10.0 /eight of hydrometer fydrometer	0.0 0.0 0.0 0.0 0.0							
1 100.0 3/4 100.0 1/2 100.0 3/8 100.0 1/4 100.0 #40 98.0 #100 96.7 #200 94.0 ydrometer test uses ercent passing #10 /eight of hydrometer	0.0 0.0 0.0 0.0 0.0							
3/4 100.0 1/2 100.0 3/8 100.0 1/4 100.0 #4 100.0 #10 99.0 #40 98.0 #100 96.7 #200 94.0 ydrometer test uses ercent passing #10 1 /eight of hydrometer	0.0 0.0 0.0 0.0							
1/2 100.0 3/8 100.0 1/4 100.0 #4 100.0 #10 99.0 #40 98.0 #100 96.7 #200 94.0 ydrometer test uses ercent passing #10 /eight of hydrometer	0.0 0.0 0.0							
3/8 100.0 1/4 100.0 #4 100.0 #10 99.0 #40 98.0 #100 96.7 #200 94.0 ydrometer test uses ercent passing #10 feight of hydrometer	0.0 0.0							
1/4 100.0 #4 100.0 #10 99.0 #40 98.0 #100 96.7 #200 94.0 ydrometer test uses ercent passing #10 l eight of hydrometer	0.0							
#4 100.0 #10 99.0 #40 98.0 #100 96.7 #200 94.0 ydrometer test uses 98.0 ercent passing #10 96.1 /eight of hydrometer 98.0								
#10 99.0 #40 98.0 #100 96.7 #200 94.0 ydrometer test uses ercent passing #10 1 /eight of hydrometer).0							
#40 98.0 #100 96.7 #200 94.0 ydrometer test uses ercent passing #10 l /eight of hydrometer	2.0							
#100 96.7 #200 94.0 ydrometer test uses ercent passing #10 /eight of hydrometer								
#200 94.0 ydrometer test uses ercent passing #10 l /eight of hydrometer								
ydrometer test uses ercent passing #10 Veight of hydrometer								
ercent passing #10 leight of hydrometer	1.0	(8)	ydromet	ton Thom	6 Dista			
eight of hydrometer	es material passing #10		Wentermen	ter neet	C Pratta			
Composite correcti	ter sample =65.6 ture correction ction (fluid density and m		t) at 20 de	eg. C =	0			
eniscus correction pecific gravity of so								
ydrometer type = 15	151H							
	tive depth equation: L =		2645 x Ri	m				
		Corrected Reading	к	Rm	Eff. Depth	Diameter (mm.)	Percent Finer	
		1.0364 0.	.0132	36.0	6.8	0.0242	88.3	
			.0132	32.0	7.8	0.0165	78.6	
				24.0	9.9	0.0108	58.8	
				20.0	11.0	0.0081	49.1	
	Arrend 1		.0133	15.0	12.3	0.0060	37.0	
	22.0 1.0150		.0133	10.0	13.6	0.0031	24.8	
		1.0105 0.	.0135	8.0	14.2	0.0013	19.7	
1440.00 2				-30.02	and the second	100 0000	1011	

Cabbles	Gravel				1. A	Sand		Fines			
Cobbles	Coarse	Fine	Tota	l Coar	se Med	dium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.0		.0	3.4	5.4	63.4	31.2	94.6
010	0.0	0.0	0.0		<u> </u>					0110	2.110
	- 1		_			1				1	D ₉₅
D ₅	D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₄₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	_

Fineness Modulus 0.10