APPENDIX G

McMahon & Mann Consulting Engineering and Geology, P.C.

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Michael J. Mann, P.E.
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Andrew J. Klettke, P.E.
Kaitlyn M. Murray, P.E.

August 25, 2021
File: 19-018
Sent Via Email

Mr. Herbert K. Guenther
T.Y. Lin International
77 Broadway Street, Suite 208
Buffalo, New York 14203

RE: Supplemental Foundation Design Recommendations,
North Aud Block Development - Building #2,
Buffalo, New York

Dear Mr. Guenther:

The Erie Canal Harbor Development Corporation plans to construct a new building (designated as Building #2) along Commercial Street, east of the intersection of Perry Boulevard with Commercial Street and has engaged T.Y. Lin International (T.Y. Lin) to design it. McMahon & Mann Consulting Engineering and Geology, P.C. (McMahon & Mann) has prepared this letter to supplement a report we prepared in 2019[1], which presented preliminary foundation design recommendations for project planning purposes. The 2019 report was based on test boring information collected from previous studies.

PROJECT DESCRIPTION

The building site is located along Commercial Street between Upper Terrace and Marine Drive near the intersection of Perry Boulevard. The building site is approximately 800 feet northeast of the edge of the Buffalo River. The new building plan shows a three-story structure with a basement. It is trapezoidal-shaped in plan with a width along Commercial Street of about 50 feet and an average length of about 70 feet (perpendicular to Commercial Street). The proposed basement floor is at Elevation (El.) 580.

[1] "Preliminary Foundation Design Recommendations, North Aud Block Development, Buffalo, New York," prepared by McMahon & Mann Consulting, Engineering, and Geology P.C., dated December 12, 2019.

T.Y. Lin has estimated that the maximum column load will be about 150 tons and there will be no uplift loads on the columns.

SUPPLEMENTAL SUBSURFACE EXPLORATIONS and CONDITIONS

We engaged Earth Dimensions, Inc. (EDI) to make two test borings within the approximate building site limits. The information collected was used to develop foundation design recommendations and to confirm the conditions reported in previous studies. Refer to Figure 1 for the boring locations.

EDI used hollow stem augers to advance the borings through the overburden and into the underlying rock. EDI collected split spoon samples of the overburden soils following ASTM D1586 and collected 10-foot long core samples of the rock following ASTM D2113. The test boring logs are included as Attachment 1.

EDI encountered fill in both borings that extends from the ground surface to about El. 572 to 575. Boring B-1-21 appears to have structural fill consisting of dense crushed gravel and extending to about El. 577. The remaining fill in both borings appears to be loosely placed sand and gravel.

The native soils between the bottom of the fill and top of rock is silty sand and, based on the Standard Penetration Test N-values, is generally loose to medium dense. These soils do not appear to be corrosive.

EDI encountered top of rock at El. 542.7 and El. 543.2. The rock is limestone of the Onondaga Formation and a photograph of the cores are included in Attachment 2. The unconfined compressive strength, measured by Geotechnics following ASTM D4543, ranges from 16,960 to 27,110 pounds per square inch (psi) with an average of 21,330 psi. Attachment 3 provides the results of the unconfined compression tests.

During drilling, EDI measured the depth to groundwater in the borings and recorded it about El. 571 to El. 573. The approximate mean water elevation in the Buffalo River is El. 572.

Existing Pile Evaluation

In September 2009, two piles from the 1939 construction of the building that previously occupied the property, the City of Buffalo Memorial Auditorium, were extracted and observed by Empire Geo-Services, Inc. (Empire). Based on field measurements, the piles were assumed to be HP 8x36 sections and appeared to be coated with an apparent corrosion protection material. Empire checked the piles for indication of possible corrosion and diminished integrity but found no indications of significant corrosion or section loss, rating the piles as good to very good considering their approximate 70-year life.

FOUNDATION DESIGN RECOMMENDATIONS

We recommend supporting the new building on H-piles driven to top of rock because the test boring data suggest that the silty sand deposit may be susceptible to future densification that would result in subsidence of the building. This densification could be caused by nearby ground vibrations from construction activities, such as pile driving, soil compaction, etc.

The pile capacity is determined by the structural strength of the pile, 25 percent of the pile section structural yield strength. Suitable sections and estimated capacities as shown in the table below, assuming a minimum yield strength of 50 kips per square inch.

Pile Section	Capacity, kips
HP 12x53	190
HP 14x73	260

We recommend equipping the piles with tips to limit damage that would occur during driving. The estimate settlement of the foundations supported with the piles driven to rock is limited to the elastic compression of the pile.

If the final column design results in uplift loads being applied to the foundations, we will need to re-evaluate these pile foundation recommendations. The tensile capacity for piles is small and an alternate foundation, such as drilled shafts or ground anchors (micro-piles) extending into rock, may be appropriate.

To resist uplift loads, drilled shafts into rock will rely on the skin friction between the rock and the concrete. Alternatively, ground anchors extended into the rock could be used and would rely on the bond between the rock and the anchor grout.

CONSTRUCTION CONSIDERATIONS

Before pile installation begins we should review the pile driving contractor's proposed equipment and run a Wave Equation Analysis of Piles (WEAP) to check the compatibility of the equipment with the proposed pile section and develop preliminary pile driving criteria. We recommend testing the piles during construction using a pile driving analyzer to confirm the pile capacity and to check for pile damage during driving.

The owner should retain a pile testing sub-contractor to provide this service and we should observe the testing and results. We also recommend McMahon & Mann visit the site during construction to observe any other geotechnical activities.

The excavation for the basement along Commercial Street will need to be supported to protect the street and the buried utilities. The height of the excavation support is expected to be about 13 to 14 feet, given that the ground surface is about El. 590 and the bottom of the pile caps might be about El. 577. We recommend using soldier piles and wood lagging to construct this retaining wall. We expect that a lateral support will be

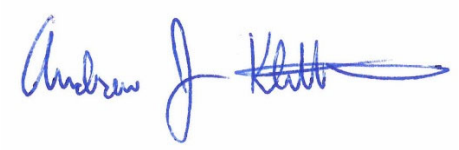
necessary for retaining for this height, in which grouted tiebacks would be a suitable means for providing lateral support.

The bottom of excavation expected to be about El. 577, which is above groundwater elevation. However, the contractor should expect seepage into the excavation from leaking utilities, based on observations made elsewhere in the City of Buffalo.

Please call us if you have any questions or concerns.

Sincerely yours,

McMAHON & MANN CONSULTING ENGINEERING AND GEOLOGY, P.C.

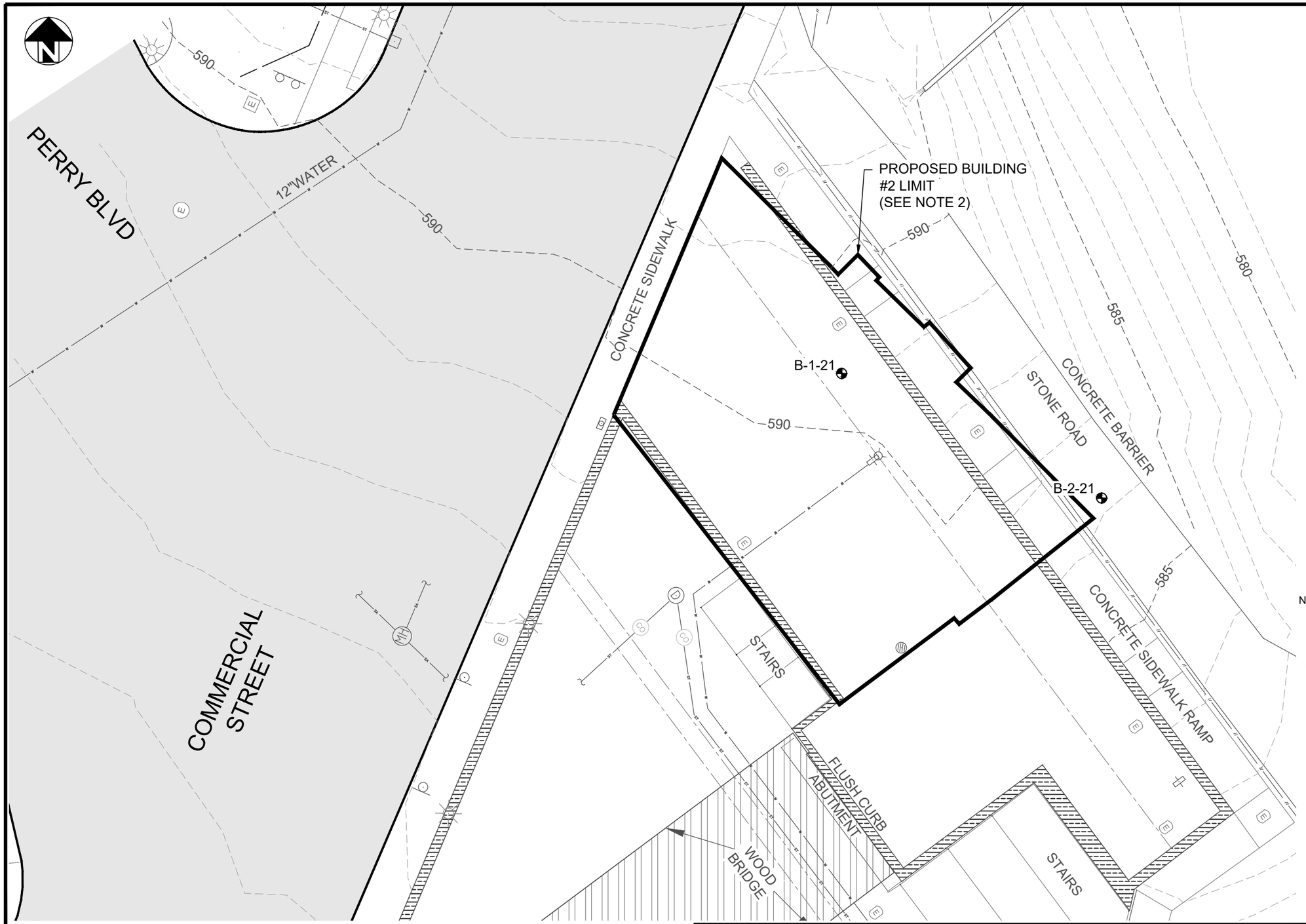


Andrew J. Klettke, P.E.

Donald R. McMahon, P.E.

Enclosures: Figure 1 - Boring Location Plan
Attachment 1 – Test Boring Logs
Attachment 2 – Rock Core Photograph
Attachment 3 – Laboratory Testing Data

FIGURES



LEGEND

- 590 EXISTING GROUND CONTOURS (SEE NOTE 1)
- PROPOSED STRUCTURE
- CONCRETE WALL
- EXISTING PAVEMENT LIMIT
- GUIDERAIL
- CONCRETE PAVERS
- CHAIN LINK FENCE
- W WATER LINE
- ST STORMWATER LINE
- SA SANITARY LINE
- SIGN
- LIGHT POLE
- E ELECTRICAL VAULT
- CO SANITARY CLEANOUT
- MH SANITARY MANHOLE
- D STORMWATER MANHOLE
- STORMWATER DRAIN
- WATER UTILITY BOX
- WATER VALVE
- B-1-21 BORE HOLE LOCATION AND DESIGNATION

NOTES:

1. Base map adapted from topographic survey completed by Frandina Engineering and Land Surveying, PC dated June 25, 2019.
2. Proposed Building #2 limit adapted from drawing titled, "First Floor Plan", Dwg No. A-101, provided by TY Lin International sent July 2021. Actual building limit is subject to change.
3. Test bore holes were completed by Earth Dimensions, Inc. in July 2021. Bore hole locations are based upon McMahon & Mann field representative measurements.

15' 0 7.5' 15'

SCALE: 1" = 15'

McMahon & Mann
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2495 Main Street, Suite 432
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(716) 834-8932
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TY LIN - NORTH AUD BLOCK
BUILDING #2
ERIE COUNTY NEW YORK

BORING LOCATION PLAN

DWG. NO. 19018-003a

FIGURE 1

August 2021

ATTACHMENT 1

TEST BORING LOGS

EARTH DIMENSIONS, INC.

Soil and Hydrogeologic Investigations • Wetland Delineations

1091 Jamison Road • Elma, NY 14059

(716) 655-1717 • EDI@earthdimensions.com

18F21 HOLE NO. B-1-21 SURF. ELEVATION 590.3

PROJECT North Aud Block LOCATION SBL# 111.17-14-1.1

City of Buffalo, Erie County, NY

CLIENT McMahon & Mann Consulting Engineering & Geolgoy PC DATE STARTED 07/12/21 COMPLETED 07/12/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	4						Moist dark brown (SILTY-SAND) topsoil fill with 0 to 3% gravel, little to some silt, trace to little organic matter, loose, massive soil structure, (SM).	Sandy topsoil fill with little to some silt, trace to little organic matter, trace gravel to 0.5 feet over mostly crushed stone fill to 13.0 feet over sandy soil fill with little to some gravel, trace to little silt, trace brick fragments to 18.0 feet over water sorted and deposited sand with little silt, trace organic matter to 23.0 feet over water sorted and deposited sand with little gravel, trace to little silt to 28.0 feet over water sorted and deposited sand with trace silt and gravel to 33.0 feet over water sorted and deposited sand with trace silt to 47.6 feet over limestone bedrock to end of coring.
	20		10			27			
				17					
					17				
	2	6							
	20		21			47			
				26					
					38				
	3	12							
5	22		25			47			
				22					
					21				
	4	11							
	20		23			46			
				23					
					20				
	5	6							
	20		15			34			
				19					
10					28				
								13.0	
	6	5						Dry to moist brownish gray gravelly (SILTY-SAND) fill with 20 to 40% gravel, trace to little silt, trace brick fragments, loose, massive soil structure, (SM).	Note: Driller noted change at approximately 12.8 feet below ground surface, drilling became smoother.
	6		4			7			
				3					
15					2				
								grades downward to 18.0	Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with continuous split spoon sampling to 10.0 feet and 5.0-foot interval sampling to auger refusal at 47.6 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 57.6 feet. Bore hole was backfilled with cuttings and crushed stone fill to ground surface upon completion.
	7	5							
	18		4			6			
				2					
20					1			See next sheet	

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Kyle Shearing, (cns)

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City of Buffalo, Erie County, NY

CLIENT McMahon & Mann Consulting Engineering & Geolgoy PC DATE STARTED 07/12/21 COMPLETED 07/12/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
								Moist to wet gray to dark gray (SILTY-SAND) with mostly fine to medium size sand, little silt, trace organic matter, loose, weakly thinly bedded, (SM).	Water level first encountered at 18.0 feet below ground surface.
								grades downward to 23.0	Note: Added water prior to taking sample number 7 from 18.0 to 20.0 feet below ground surface to assist with cuttings removal and to combat possible running sand conditions.
	8 20	6	10	7	7	17		Wet grayish brown (SILTY-SAND) with 10 to 20% gravel, trace to little silt, compact, stratified, (SM).	Water level at 19.0 feet below ground surface prior to coring.
25									Note: Lost all water to formation during coring.
								grades downward to 28.0	Water level at 16.1 feet below ground surface at coring completion.
	9 18	9	9	11	13	20		Wet grayish brown (SAND) with 0 to 5% gravel, mostly fine size sand, trace silt, compact, thinly bedded, (SM).	
30									
								grades downward to 33.0	
	10 18	8	11	13	13	24		Wet grayish brown (SAND) with mostly fine size sand, trace silt, compact, thinly bedded, (SM).	
35									
	11 16	4	10	13	16	23			
40									

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

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PROJECT North Aud Block LOCATION SBL# 111.17-14-1.1
City of Buffalo, Erie County, NY

CLIENT McMahon & Mann Consulting Engineering & Geolgoy PC DATE STARTED 07/12/21 COMPLETED 07/12/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
								Wet grayish brown (SAND) with mostly fine size sand, trace silt, compact, thinly bedded, (SM).	
	12 18	6	15	20	20	35			
45									
								47.6	
		Run	#1					Gray limestone bedrock, effervesces without etching, moderately hard, medium to thickly bedded, moderately to slightly fractured horizontally along bedding planes, occasional fossil, core breaks appear fresh, core lengths range from (0.5-1.7').	
50									
		Run	#2						
55									
								57.6	
								Coring completed at 57.6 feet.	
60									

Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	47.6 to 48.3	0.7	0.6	86	0
2	48.3 to 57.6	9.3	9.2	99	84

EDI Bedrock Hardness Classification

Moderately Hard: Cannot be peeled or scraped with knife. Can be distinctly scratched with a steel nail.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

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18F21 HOLE NO. B-2-21 SURF. ELEVATION 586.2

PROJECT North Aud Block LOCATION SBL# 111.17-14-1.1
City of Buffalo, Erie County, NY

CLIENT McMahon & Mann Consulting Engineering & Geolgoy PC DATE STARTED 07/13/21 COMPLETED 07/13/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
	1	11						Moist to dry gray mostly angular gravel fill with little sand, trace to little silt, trace brick fragments, compact, massive soil structure, (GM).	Mostly crushed stone fill with trace brick fragments to 3.0 feet over sandy soil fill with little to some silt and gravel, trace brick fragments and cinders to 8.0 feet over coarse silty soil fill with some sand, trace to little gravel, trace brick fragments and cinders to 9.0 feet over sandy soil fill with trace to little silt, trace gravel and brick fragments to 10.0 feet over water sorted and deposited sand with little silt, trave gravel to 11.0 feet over water sorted and deposited sand with little silt to 11.7 feet over silty slackwater sediment with little organic matter, trace sand to 13.0 feet over water sorted and deposited sand with trace silt and organic matter to 18.0 feet over water sorted and deposited sand with trace silt and gravel to 24.5 feet over water sorted and deposited sand with little to some silt to 33.0 feet over water sorted and deposited sand with trace silt to 39.7 feet over water sorted and deposited sand and gravel with trace silt to 43.0 feet over limestone bedrock to end of coring.
	20		10			20			
				10					
					10				
								3.0	
	2	4						Moist grayish brown gravelly (SILTY-SAND) fill with 20 to 40% gravel, little to some silt, trace brick fragments and cinders, compact, massive soil structure, (SM).	
	17		7			11			
				4					
5					3				
								8.0	
	3	5						Moist dark grayish brown (SANDY-SILT) fill with 5 to 15% gravel, some sand, trace brick fragments and cinders, compact, massive soil structure, (ML).	
	24		7			18			
				11					
10					10				
								9.0	
	4	4						Moist brownish gray (SILTY-SAND) fill with 0 to 5% gravel, trace to little silt, trace brick fragments, compact, massive soil structure, (SM).	
	22		4			8			
				4					
					3				
								grades downward to 10.0	
	5	4						Moist grayish brown (SILTY-SAND) with 0 to 3% gravel, mostly fine size sand, little silt, loose, thinly bedded, (SM).	
	24		5			9			
				4					
15					2				
								grades downward to 11.0	
								Moist olive gray (SANDY-SILT) with mostly fine size sand, little silt, loose, thinly bedded, (SM).	
								grades downward to 11.7	
	6	3							
	24		3			8			
				5					
20					5			See next sheet	

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Kyle Shearing, (cns)

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(716) 655-1717 • EDI@earthdimensions.com

18F21 HOLE NO. B-2-21 SURF. ELEVATION 586.2

PROJECT North Aud Block LOCATION SBL# 111.17-14-1.1
City of Buffalo, Erie County, NY

CLIENT McMahon & Mann Consulting Engineering & Geolgoy PC DATE STARTED 07/13/21 COMPLETED 07/13/21

DEPTH IN FT	SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION
								Moist dark gray to black (SILT) with little organic matter, trace sand, very loose, weakly thinly bedded, (OL).
								grades downward to 13.0
								Moist to wet grayish brown (SILTY-SAND) with mostly fine size sand, trace silt and organic matter, loose, weakly thinly bedded, (SM).
	7	4						
	14		5			13		
				8				18.0
25					10			Wet grayish brown (SAND) with 5 to 10% mostly small rounded gravel, trace silt, very loose, stratified, (SM).
								grades downward to 24.5
								Wet grayish brown (SILTY-SAND) with mosIty fine size sand, little to some silt, compact, thinly bedded, (SM).
	8	7						
	18		8			19		
				11				
30					10			
								grades downward to 33.0
	9	5						Wet grayish brown (SAND) mostly fine size, trace silt, compact, weakly thinly bedded, (SM).
	22		6			15		
				9				
35					11			
								grades downward to 39.7
	10	6						
	20		14			33		
				19				
40					20			

WATER TABLE AND REMARKS

Note: Advanced bore hole with 3 1/4" ID x 7" OD hollow stem auger casing with 5.0-foot interval sampling to 8.0 feet and continuous split spoon sampling to 12.0 feet. Continued below with 5.0-foot interval sampling to auger refusal at 43.0 feet. Removed rods and installed a bentonite seal. Continued below with a NQ-2 size double tubed wireline core barrel with diamond bit to end of coring at 53.0 feet. Bore hole was backfilled with cuttings and crushed stone to ground surface upon completion.

Note: Started adding water below sample number 5 from 13.0 to 15.0 feet to combat possible running sand conditions.

Water first encountered at 13.0 feet below ground surface.

Water level at 13.8 feet below ground surface prior to coring.

Note: Lost all water to formation during coring.

Water level at 12.1 feet below ground surface at coring completion.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

LOGGED BY Kyle Shearing, (cns)

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18F21 HOLE NO. B-2-21 SURF. ELEVATION 586.2

PROJECT North Aud Block LOCATION SBL# 111.17-14-1.1
City of Buffalo, Erie County, NY

CLIENT McMahon & Mann Consulting Engineering & Geolgoy PC DATE STARTED 07/13/21 COMPLETED 07/13/21

DEPTH IN FT | BLOWS ON SAMPLER

SN REC	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	WATER TABLE AND REMARKS
							Wet grayish brown very gravelly (SAND) with 40 to 60% mostly subrounded to rounded gravel, trace silt, dense, stratified, (SM), (GM).	
							43.0	
							Gray limestone bedrock, effervesces without etching, moderately hard, medium to thickly bedded, moderately to slightly fractured horizontally along bedding planes with an occasional high angle fracture, possible void from 44.9 to 45.3 feet, occasional fossil, core breaks appear fresh, core lengths range from (0.1-2.5').	
45	Run	#1						
50	Run	#2						
							53.0	
							Coring completed at 53.0 feet.	
55								
60								

Run #	Depth (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	43.0 to 47.1	4.1	3.7	90	73
2	47.1 to 53.0	5.9	5.8	98	95

EDI Bedrock Hardness Classification

Moderately Hard: Cannot be peeled or scraped with knife. Can be distinctly scratched with a steel nail.

N=NUMBER OF BLOWS TO DRIVE 2 " SPOON 12 " WITH 140 lb. WT. FALLING 30 " PER BLOW

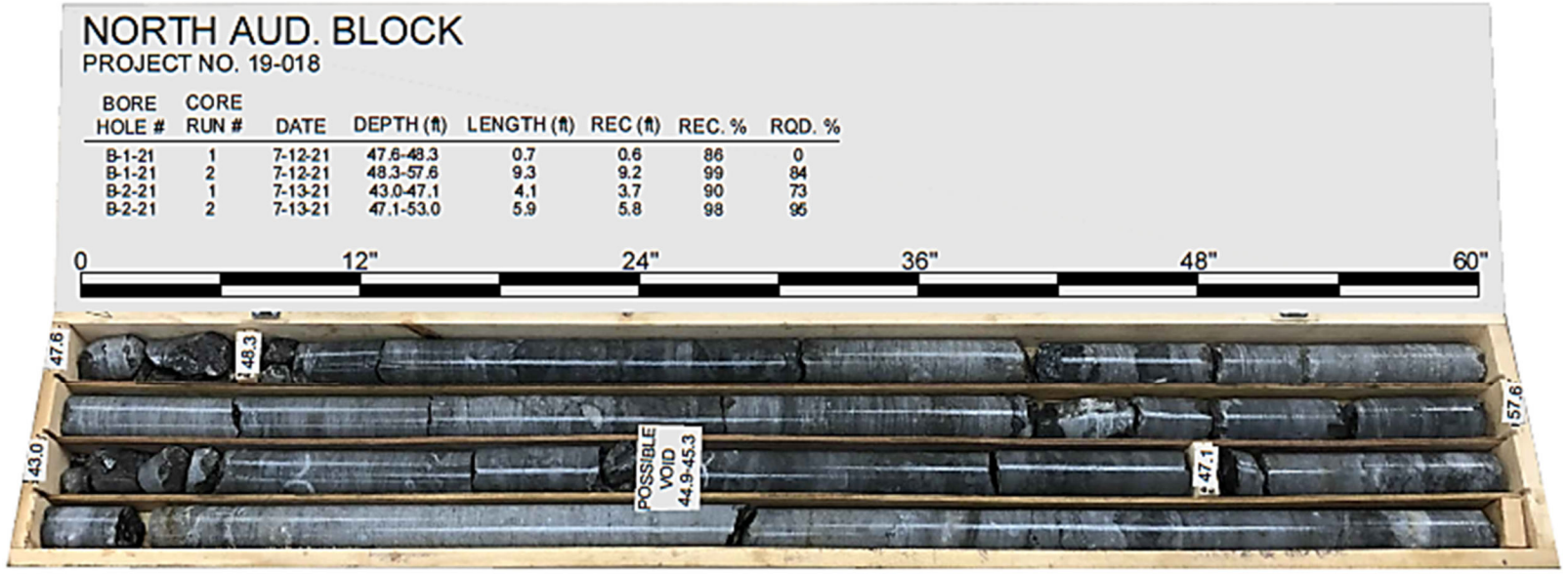
LOGGED BY Kyle Shearing, (cns)

ATTACHMENT 2

ROCK CORE PHOTOGRAPH

ATTACHMENT 2

ROCK CORE PHOTOGRAPH
NORTH AUD BLOCK
BUFFALO, NEW YORK



Core Box 1 of 1

ATTACHMENT 3

LABORATORY TESTING DATA

UNCONFINED COMPRESSION STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C
This method does not report strain rate or deformation.
Sample Prep and Conformance Verification: ASTM D 4543-08

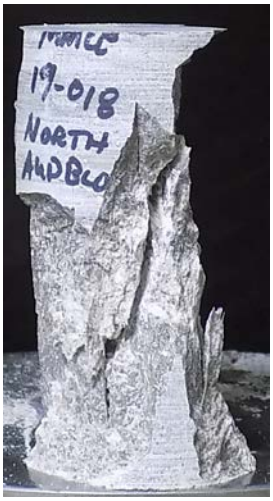
Client:	McMahon & Mann Consulting Engineers, P.C.	Boring No.:	BH-1-21
Client Project:	North Aud Block 19-018	Depth (ft):	543.9-543.2
Project No.:	2021-472-001	Sample ID:	Rock Core
Lab ID No.:	2021-472-001-001	Moisture Condition:	As Received-Unpreserved

Specimen Weight (g): 544.92

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):	
Reading 1:	4.03	Reading 1:	1.97
Reading 2:	4.03	Reading 2:	1.97
Reading 3:	4.03	Average:	**1.97**
Average:	**4.03**	Area (in^2):	3.06
		L/D:	2.04

MOISTURE CONTENT			
Tare Number:	2975	Total Load (lb):	54,950
Wt. of Tare & Wet Sample (g):	499.38	**Uniaxial Compressive Strength (psi):**	**17,970**
Wt. of Tare & Dry Sample (g):	499.06		
Weight of Tare (g):	8.00	Fracture Type:	**Cone & Split**
Weight of Wet Sample (g):	491.38		
Sample Volume (cm^3):	202.07	Rate of Loading (lb/sec):	207
Moisture Content (%):	0.07	Time to Break (min:sec):	4:25.78
Unit Wet Weight (g/cm^3):	2.697	Deviation From Straightness[3]:	
Unit Wet Weight (pcf):	168.3		
Unit Dry Weight (g/cm^3):	2.695	AXIAL: *Pass*	TOP: *Pass* BOTTOM: *Pass*
Unit Dry Weight (pcf):	168.2		

Physical Description: Rock Core



Notes:
1) Moisture conditions at time of the test are: As Received-Unpreserved
2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
3) Deviation from straightness, Procedure A of ASTM D 4543-08
   Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
4) Temperature is laboratory room temperature.
5) D4543 Prep and D7012 Testing Equipment Used:
6) Tool / Machine List:
   G788 Compression Machine
   G1661 Digital Calipers, G1380 Dial Gauge
   G1616 Straight Edge, G1571 Feeler Gauge
   G1633 V-Block, G1634 Rock Saw, G1635 Grinder

Tested By: JAC Date: 8/6/21 *Checked By:* NJM *Date:* 8/9/21

544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • Fax (412) 823-8999 • www.geotechnics.net

UNCONFINED COMPRESSION STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C
This method does not report strain rate or deformation.
Sample Prep and Conformance Verification: ASTM D 4543-08

Client:	McMahon & Mann Consulting Engineers, P.C.	Boring No.:	BH-1-21
Client Project:	North Aud Block 19-018	Depth (ft):	533.2-532.7
Project No.:	2021-472-001	Sample ID:	Rock Core
Lab ID No.:	2021-472-001-002	Moisture Condition:	As Received-Unpreserved

Specimen Weight (g): 537.78

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):	
Reading 1:	4.03	Reading 1:	1.97
Reading 2:	4.03	Reading 2:	1.97
Reading 3:	4.03	Average:	**1.97**
Average:	**4.03**	Area (in^2):	3.06
		L/D:	2.04

MOISTURE CONTENT			
Tare Number:	3229	Total Load (lb):	51,910
Wt. of Tare & Wet Sample (g):	545.66	**Uniaxial Compressive Strength (psi):**	**16,960**
Wt. of Tare & Dry Sample (g):	544.65		
Weight of Tare (g):	8.10	Fracture Type:	**Cone & Split**
Weight of Wet Sample (g):	537.56		
Sample Volume (cm^3):	202.18	Rate of Loading (lb/sec):	208
Moisture Content (%):	0.19	Time to Break (min:sec):	4:09.87
Unit Wet Weight (g/cm^3):	2.660	Deviation From Straightness[3]:	
Unit Wet Weight (pcf):	166.0		
Unit Dry Weight (g/cm^3):	2.655	AXIAL: *Pass*	TOP: *Pass* BOTTOM: *Pass*
Unit Dry Weight (pcf):	165.7		

Physical Description: Rock Core

Notes:
1) Moisture conditions at time of the test are: As Received-Unpreserved
2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
3) Deviation from straightness, Procedure A of ASTM D 4543-08
   Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
4) Temperature is laboratory room temperature.
5) D4543 Prep and D7012 Testing Equipment Used:
6) Tool / Machine List:
   G788 Compression Machine
   G1661 Digital Calipers, G1380 Dial Gauge
   G1616 Straight Edge, G1571 Feeler Gauge
   G1633 V-Block, G1634 Rock Saw, G1635 Grinder

Tested By: JAC Date: 8/6/21 *Checked By:* NJM *Date:* 8/9/21

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UNCONFINED COMPRESSION STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C
This method does not report strain rate or deformation.
Sample Prep and Conformance Verification: ASTM D 4543-08

Client:	McMahon & Mann Consulting Engineers, P.C.	Boring No.:	BH-2-21
Client Project:	North Aud Block 19-018	Depth (ft):	542.6-541.8
Project No.:	2021-472-001	Sample ID:	Rock Core
Lab ID No.:	2021-472-001-003	Moisture Condition:	As Received-Unpreserved

Specimen Weight (g): 539.99

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):	
Reading 1:	4.01	Reading 1:	1.98
Reading 2:	4.01	Reading 2:	1.98
Reading 3:	4.01	Average:	**1.98**
Average:	**4.01**	Area (in^2):	3.07
		L/D:	2.03

MOISTURE CONTENT			
Tare Number:	3525	Total Load (lb):	83,190
Wt. of Tare & Wet Sample (g):	531.55	**Uniaxial Compressive Strength (psi):**	**27,110**
Wt. of Tare & Dry Sample (g):	530.66		
Weight of Tare (g):	8.35	Fracture Type:	**Shattered**
Weight of Wet Sample (g):	523.20		
Sample Volume (cm^3):	201.82	Rate of Loading (lb/sec):	239
Moisture Content (%):	0.17	Time to Break (min:sec):	5:48.16
Unit Wet Weight (g/cm^3):	2.676	Deviation From Straightness[3]:	
Unit Wet Weight (pcf):	167.0		
Unit Dry Weight (g/cm^3):	2.671	AXIAL: *Pass*	TOP: *Pass* BOTTOM: *Pass*
Unit Dry Weight (pcf):	166.7		

Physical Description: Rock Core

Notes:
1) Moisture conditions at time of the test are: As Received-Unpreserved
2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
3) Deviation from straightness, Procedure A of ASTM D 4543-08
   Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
4) Temperature is laboratory room temperature.
5) D4543 Prep and D7012 Testing Equipment Used:
6) Tool / Machine List:
   G788 Compression Machine
   G1661 Digital Calipers, G1380 Dial Gauge
   G1616 Straight Edge, G1571 Feeler Gauge
   G1633 V-Block, G1634 Rock Saw, G1635 Grinder

Tested By: JAC Date: 8/6/21 *Checked By:* NJM *Date:* 8/9/21

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UNCONFINED COMPRESSION STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C
This method does not report strain rate or deformation.
Sample Prep and Conformance Verification: ASTM D 4543-08

Client:	McMahon & Mann Consulting Engineers, P.C.	Boring No.:	BH-2-21
Client Project:	North Aud Block 19-018	Depth (ft):	539.8-539.1
Project No.:	2021-472-001	Sample ID:	Rock Core
Lab ID No.:	2021-472-001-004	Moisture Condition:	As Received-Unpreserved

Specimen Weight (g): 533.53

SPECIMEN LENGTH (in)		SPECIMEN DIAMETER (in):	
Reading 1:	4.00	Reading 1:	1.98
Reading 2:	4.00	Reading 2:	1.98
Reading 3:	4.00	Average:	**1.98**
Average:	**4.00**	Area (in^2):	3.07
		L/D:	2.03

MOISTURE CONTENT			
Tare Number:	3175	Total Load (lb):	71,310
Wt. of Tare & Wet Sample (g):	502.58	**Uniaxial Compressive Strength (psi):**	**23,270**
Wt. of Tare & Dry Sample (g):	501.77		
Weight of Tare (g):	7.94	Fracture Type:	**Shattered**
Weight of Wet Sample (g):	494.64		
Sample Volume (cm^3):	201.11	Rate of Loading (lb/sec):	230
Moisture Content (%):	0.16	Time to Break (min:sec):	5:10.06
Unit Wet Weight (g/cm^3):	2.653	Deviation From Straightness[3]:	
Unit Wet Weight (pcf):	165.5		
Unit Dry Weight (g/cm^3):	2.649	AXIAL: *Pass*	TOP: *Pass* BOTTOM: *Pass*
Unit Dry Weight (pcf):	165.3		

Physical Description: Rock Core

Notes:
1) Moisture conditions at time of the test are: As Received-Unpreserved
2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
3) Deviation from straightness, Procedure A of ASTM D 4543-08
   Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
4) Temperature is laboratory room temperature.
5) D4543 Prep and D7012 Testing Equipment Used:
6) Tool / Machine List:
   G788 Compression Machine
   G1661 Digital Calipers, G1380 Dial Gauge
   G1616 Straight Edge, G1571 Feeler Gauge
   G1633 V-Block, G1634 Rock Saw, G1635 Grinder

Tested By: JAC Date: 8/6/21 *Checked By:* NJM *Date:* 8/9/21

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