CME Associates, Inc.

6035 Corporate Drive
East Syracuse, New York 13057
(315) 701-0522
(315) 701-0526 (Fax)

www.cmeassociates.com

Transmittal

September 7, 2018

UniFirst Corporation
c/o William Taylor Architects
103 Luther Ave
Liverpool, New York 13088

Attn: Mr. William Taylor, AIA, President

Re: New Building for UniFirst Corporation
Liverpool, New York
CME Project No.: 27413-05

Gentlepeople:

Enclosed you will find….

Number of Copies	Report Number/Description
3	27413B-02-0818/Subsurface Exploration & Foundation Report

This report was emailed to Mr. William Taylor at Bill.Taylor@taylor-architects.com on 09/07/18.

Respectfully submitted,
CME Associates, Inc.

Anas N. Anasthas, P.E.
Geotechnical Engineer

AA.cw

Subsurface Exploration and Foundation Report

New Building for UniFirst Corporation
104 Luther Ave.
Liverpool, New York

Prepared For: (Client)

UniFirst Corporation
c/o William Taylor Architects
Attn: Mr. William Taylor, AIA, President
103 Luther Avenue
Liverpool, New York 13088
Phone: 315.472.6247
Email: bill.taylor@taylor-architects.com

Prepared By: (Geotechnical Engineer)

CME Associates, Inc.
Attn: Anas N. Anasthas, P.E.
6035 Corporate Drive
East Syracuse, New York 13057
Phone: 315.701.0522 Ext. 124
Fax: 315.701.0526
Email: an@cmeassociates.com

CME Report No.: 27413B-02-0918
September 7, 2018

CME Associates, Inc.

Table of Contents
Report No. 27413B-02-0918

Attachment Listing:

Subsurface Exploration and Foundation Report
New Building for UniFirst Corporation
104 Luther Ave.
Liverpool, New York

1.0 INTRODUCTION

CME Associates, Inc. (CME) is pleased to submit this Subsurface Exploration & Foundation Report for the site of a proposed new building at 104 Luther Avenue, Liverpool, New York.

CME has executed a limited subsurface investigation and laboratory test program and is presenting the results of CME's geotechnical engineering evaluation in this Report, which is provided pursuant to CME Proposal/Agreement No.: 05.5501 between UniFirst Corporation c/o William Taylor Architects (WTA) and CME, executed on 07/17/18 by Mr. Benjamin W. Brown, Project Manager for UniFirst Corporation.

CME advanced six Test Borings, labeled B-1 to B-6, at the site of the proposed new building and selected several samples for index testing. This report presents a summary of subsurface conditions, a seismic site classification, engineering evaluation of subsurface conditions and preliminary foundation recommendations for three different foundation options. After a foundation option has been elected by WTA, CME will provide detailed foundation recommendations for one elected option.

2.0 PROPOSED DEVELOPMENT

CME understands that a new Uniform Services building is proposed to replace five existing buildings which have become obsolete. According to William Taylor, R.A., the proposed 55,700 square feet building will be constructed in two phases. Please refer to the attached *"Site Plan Drawing L001"*, dated 07/11/18, for location of existing and proposed buildings.

The first phase will include demolition of four existing structures along Luther Avenue, followed by construction of about half of the new uniform services building footprint, to house the process, production and logistics portions of the business. Once the first phase building is up and running, then the existing process, production and logistics structure will be demolished and the balance of the new structure footprint will be constructed.

CME understands that the First Floor Elevation is preliminarily planned to be established at about elevation 376, which is two feet above the 100-year flood elevation. Existing grade at the site appears to vary from about elevation 372 to about elevation 375.

It is important to note that at least six pre-existing or existing buildings occupied portions of the proposed new building footprint. It is CME's understanding that one building recently demolished (in 2018) had the superstructure and grade floor slab removed. Existing foundations were reported to remain below a layer of sand and gravel installed at grade. Please see attached map, *"Lands of UniFirst"*, dated 03/28/2016, for existing conditions. The existing buildings appear to have been constructed 40 to 50 years ago. The stress history (on subsurface soils) due to the former and existing buildings is not uniform under the proposed new building footprint. Therefore, the geotechnical reaction of subsoils to the new building loadings from foundations and grade floor slabs is dissimilar and essentially unpredictable from point to point within the new footprint.

According to Palucci Engineering, P.C. (the Structural Engineer of Record or SER), maximum column loading will be about 200 kips, assuming the floor slab will be supported on grade, as reported by WTA. Based on CME's observation of the existing facility, it is apparent that floor slab loading will be significant and will vary greatly. See the attached Floor Plan by WTA, dated 06/21/2018. According to the SER, floor slab loading (live + dead loads) is estimated to be about 200 psf, with point loads of about 2000 lbs under equipment to be supported on floor slabs.

Based on MEP, Structural and Architectural Plans for an Austin, Texas Facility reported by WTA to be similar (but mirror image) to that planned here, CME notes that there are significant subslab utilities and structures. The presence of existing utilities, foundations and substurctures from former and existing buildings also complicates the geotechniques on this project.

3.0 EXPLORATION METHODOLOGY

CME selected and staked six test boring locations in and around the proposed building footprint based on a site meeting with William Taylor and Shawn Musachio, Branch Manager - UniFirst on 07/24/18. Mr. Musachio was present during stakeout to clear any private subsurface utilities. Following stakeout, CME contacted DSNY to clear public utilities. Please refer to the attached *"CME Exploration Location Plan"* for the as-drilled boring locations.

GPS coordinates and elevation at grade at each boring location were obtained by CME using a hand-held Spectra Precision Ranger 3 GPS unit. GPS data is provided on the attached *"GPS Coordinates and Elevations Table"*.

Six Test Borings (labeled B-1 through B-6) were advanced over the period of 07/31/18 to 08/07/18 using a Diedrich Model D-120, truck-mounted, rotary exploration drill rig, equipped with 4-¼" I.D. hollow stem augers and drive sampling tools. Soil sampling and Standard Penetration Testing (SPT) were conducted using an automatic 140-pound automatic hammer dropping through a distance of 30 inches to drive a 2" O.D. split barrel sampler in general conformance with ASTM Standard Practice D1586.

Each borehole was backfilled with auger cuttings upon completion to nearly match existing grade. Boreholes in pavement areas were patched with cold patch or concrete at grade. Boreholes may subside and the area around borings must be periodically checked by UniFirst Corporation staff and repaired as-needed.

Samples were logged and visually classified in the field by CME's drillers, and a portion of each soil sample was placed and sealed in a glass jar. The soil classifications were later reviewed by CME Senior Geologist, Mark J. Schumacher, P.G. The visual soil classifications were made using a modified Burmister Classification System, as practiced by CME, and as generally described in the attached document entitled, *"General Information & Key to the Test Boring Logs"*. The CME Subsurface Exploration – Test Boring Logs, labeled B-1 through B-6, are attached.

The CME geotechnical engineer selected a few samples for laboratory index testing. The laboratory analyses were conducted in CME's AASHTO re:source accredited East Syracuse Laboratory. Please refer to the attached *"Laboratory Test Summary – CME Report No.: 27413L-01-0918"* for standard methods used and results.

4.0 SUBSURFACE CONDITIONS

The subsurface conditions presented herein have been generalized for simplicity and brevity by CME from the actual data presented in the attached Test Boring Logs. Please refer to said logs for actual conditions encountered at the time, location and elevation of each sample obtained. It is possible for the subsurface conditions between sampling intervals and between exploration locations to vary from those expressed in this section or on the Test Boring Logs.

4.1 Subsurface Profile

The subject project site occupied several buildings during CME's exploration, as shown on the attached Drawing L001. Two former buildings that occupied the site near the southwest end of the site had already been demolished prior to CME's exploration. Test Boring B-1 was advanced within the footprint of a demolished building. All other Test Borings were advanced outside the existing buildings, as close as practical to and within the proposed building footprint.

Asphalt pavement was noted at Test Borings B-3 through B-6. Test Borings B-1 and B-2 identified Existing Fill. Below surfacings or from grade, the explorations penetrated a subsurface profile consisting of Existing Fill (Man-placed Fill), underlain by a Buried Organic Layer, underlain by Lacustrine Deposits (Clay, Silt and Sand), underlain by Glacial Till. A brief description of each stratum is given below in the approximate order of encounter in the explorations.

Existing Fill: Below Asphalt or from grade all Test Borings penetrated Man-placed Fill consisting of a random and variable mixture of Sand, Gravel, Silt, Clay, Concrete, Wood, Asphalt, Brick, etc. The Fill appears to have been placed in an unprepared manner (i.e., not placed in controlled, compacted lifts). The Existing Fill was penetrated to about 2 to 8 feet below existing grade.

Please note, it is difficult to accurately characterize the makeup and condition of Man-placed Miscellaneous Fill present at this site, using the relatively small split-spoon (1⅜" inside diameter) samples retrieved from the Test Borings. Test Pits excavated using a backhoe/excavator bucket are more appropriate to better characterize Existing Fill at this site.

Buried Organic Layer: Below Existing Fill, a Buried Organic Layer was penetrated in all Test Borings, except in Borings B-3 and B-4. The thickness of this layer, where encountered, is about 1 to 4 feet. Laboratory index soil testing conducted on a couple samples retrieved from this layer revealed Natural Moisture Contents of 25.2% and 24.8%, and Organic Contents of 5.3% and 1.4%. Based on Standard Penetration Testing (SPT), this layer is soft to medium stiff in consistency. This stratum appears to have resulted from buried remnant topsoil or swamp bottom.

Lacustrine Deposits: Below Buried Organic Layer or Existing Fill, all Test Borings penetrated Lacustrine Deposits consisting of Clays, underlain by Silts, underlain by Sands to about 50 to 60 feet below grade, where Glacial Till was encountered.

<u>The Clay Stratum</u> was penetrated to about 8 to 13 feet below grade, and consists predominately of Clay with lesser Silt content. Based on SPT, the Clay is medium stiff to stiff in consistency. The Clays sampled from this stratum are represented by USCS (Unified Soil Classification System) group symbols CL (Lean Clay) and CL-ML (Silty Clay), which are moderately plastic to slightly-plastic soils.

<u>The Silt Stratum</u> was penetrated to about 23 to 29 feet below grade, and consists predominately of Silt with lesser Sand and/or Clay content. Based on SPT, this stratum is very soft to medium stiff in consistency. Silts in this layer are represented by USCS group symbol ML (Silt), slightly plastic to non-plastic soils.

The Sand Stratum was penetrated to about 50 to 60 feet below grade, and consists predominately of fine Sand with lesser Silt and/or Gravel content. Based on SPT, this Sand has a relative density ranging from loose to very compact, and became denser with depth. The Sands in this stratum are represented by USCS group symbols SM (Silty Sand) and SP-SM (poorly-graded Sand with Silt), which are non-plastic soils.

Glacial Till: Below Lacustrine Deposits, all Test Borings penetrated a dense stratum consisting of a heterogeneous mixture of Sand, Gravel and Silt with occasional rock fragments (possible Cobbles/Boulders). This stratum may have resulted from a pre-historic glacier moving through this region, and is referred to as Glacial Till. This stratum was penetrated to Boring termination depth (i.e., 54.4' to 60.0').

4.2 Groundwater Observations
Groundwater level observations and measurements are made by the CME field crew when groundwater accumulates in the Borehole. CME notes water level inside the borehole during advancement and following casing (auger) removal. CME also notes the visual appearance of the moisture condition of the samples as retrieved. The condition and time of groundwater level observations are unique to each Boring, time and date, and are recorded on the individual Test Boring Log.

Groundwater was observed in all Test Borings at depths ranging from 8.7 feet to 21.2 feet below grade, corresponding to about elevations 351 to 366. Please note, the Clay stratum present at this site is relatively impervious and groundwater movement through this stratum is relatively slow. Groundwater may not have accumulated and stabilized in the boreholes during the short time the boreholes were open during the exploration.

Groundwater fluctuations at this site will occur depending on several factors, such as rainfall, seasonal changes, prevailing climate, and adjacent construction operations, among other factors.

4.3 Expansive Soils
Based on CME's visual naked-eye classification of the soil samples retrieved from the explorations and the definition of "Expansive Soil" given in Section 1803.5.3 of the Building Code, soils exhibiting potential expansive character were not sampled by this exploration program.

4.4 Seismic Site Class
Based on a computational analysis using CME Test Borings and the Building Code Section 1613, which references Chapter 20 of ASCE 7, the subject site is defined as a "Soft Clay Soil," representative of a Seismic Site Class "E". The Test Borings did not sample soils vulnerable to liquefaction, sudden collapse or failure under seismic loading conditions. Please refer to the attached USGS Design Summary and Detailed Reports for Design Spectral Response Curves for Risk Category I/II/III, Non-essential Structures.

Please note, the above referenced USGS Reports assign Seismic Design Category "C" for Risk Category I/II/III structures at this site. The Seismic Design Category may be upgraded to "B" if a Seismic Site Class upgrade from "E" to "D" is achieved. A site class upgrade at this site may be possible if Seismic Shear Wave Velocity measurements are taken at this site via a geophysical investigation. Please let us know if you desire CME to explore this possibility.

5.0 SITE CHARACTERIZATION AND ENGINEERING SIGNIFICANCE
Subsurface conditions at this site are not favorable to support the proposed Building utilizing a conventional shallow footing foundation and slab-on-grade system. The CME explorations within the

proposed building footprint identified Existing Fill to significant depths. The Fill is underlain by a Buried Organic Layer. The Existing Fill and Buried Organic Layer are not reliable bearing materials to support foundations and slab-on-grade. The Existing Fill does not appear to have been placed in a prepared manner (i.e., not placed in controlled, compacted lifts) and, in CME' opinion, meets the Building Code (2015 NYS Amended IBC) definition of Unprepared Fill. The Unprepared Fill and Buried Organic Layer are assigned a zero (0) bearing capacity by the Building Code.

Footing foundations shall not bear on or over Existing Fill or Buried Organic Layer present at this site. The slabs-on-grade are planned to support relatively large live loads including point loads. Slab-on-grade constructed to bear over the Existing Fill and Buried Organic Layer may settle excessively/unevenly and crack. The differential stress history of the subsurface soils and existing subsurface utilities and structures (as discussed in Report Section 2.0) further complicates the geotechiques at this site, posing increased risk of differential settlement and cracking of slabs-on-grade.

The undersigned engineer discussed the above geotechnical concerns with Mr. Taylor of WTA. Mr. Taylor requested CME to provide preliminary foundation options for review by the Owner.

6.0 PRELIMINARY FOUNDATION OPTIONS

CME recommends that the following foundation options be considered for this project. Out of the three options given below, Option 1 will yield the least risk for foundation and floor slab settlement, while Option 3 will yield the highest risk for foundation and floor slab settlement.

6.1 Option 1: Deep Foundations and Structurally Supported Floor Slab

Under this option, the superstructure and the floor slab will be supported utilizing a driven pile foundation system. Driven piles consisting of preservative treated timber piles may be considered. For preliminary budgeting and planning purposes, 50 to 60-foot timber piles, driven to bear in the Glacial Till Stratum may be considered for 40-tons Axial Service Capacity per pile.

6.2 Option 2: Mass-Excavation and Replacement

Under this option, the Existing Fill and Buried Organic Layer will be completely removed from within the Building Pad (building footprint plus adjacent slabs and sidewalks plus a 5 foot nominal buffer all around). Please refer to Table 1 for anticipated removal depths in the CME Test Borings.

Table 1: Approximate Mass-Excavation Depth / Elevation to Achieve Inorganic Virgin Soil

Exploration ID	Elevation at Grade (ft)	Top of Firm Inorganic Virgin Soil	
		Depth (ft)	Elevation (ft)
B-1	374.1	3	371.1
B-2	373.8	6	367.8
B-3	375.5	8	367.5
B-4	372.5	2	370.5
B-5	374.7	8	366.7
B-6	374.6	8	366.6

Notes:
1. Elevation at grade determined using hand-held GPS Survey equipment, and are based on North American Vertical Datum of 1988 (NAVD 1988).
2. Depth/Elevation of top of inorganic virgin soil is approximate. Actual depth may vary, and shall be determined during excavation by the Inspecting Professional Geotechnical Engineer (IPGE).

The resulting excavation will be backfilled using controlled, engineered Structural Fill, in a quality-controlled manner. A conventional shallow footing foundation and slab-on-grade system may be utilized to support the proposed building, after mass-excavation and replacement. For planning and budgeting purposes, a Presumptive Soil Bearing Pressure of 2,500 psf may be considered to proportion footing foundations bearing on Structural Fill placed under this program or on firm virgin, inorganic Clay Soil. A modulus of Subgrade Reaction, ks, of 250 pci, may be used to estimate slab on grade thickness.

6.3 Option 3: Partial Removal and Replacement

A partial removal and replacement option may be considered if the Owner understands the slab-on-grade settlement risks associated with leaving the Existing Fill and Buried Organic Layer in-place under the slab-on-grade, and if the Owner assumes this risk.

Under this option, Existing Fill will be partially removed and replaced to accommodate a relatively thick subbase course layer under the floor slab. At footing foundation locations, the bearing grades will be undercut and replaced with CLSM (Controlled Low Strength Material, 150 psi minimum unconfined compressive strength), such that complete removal of Existing Fill and Buried Organic Layer is achieved under all footings.

For planning purposes slab-on-grade subbase consisting of 3 feet of compacted NYSDOT Type 2 or Type 4 Subbase Course Material, placed over densified subgrade (via a heavy proof-roll) may be considered. A Subgrade Reaction Modulus (ks) of 150 pci may be considered for preliminary slab-on-grade design.

Footings (interior and exterior) may be planned to bear at 5 feet below finish floor elevation, on CLSM or on firm inorganic Clay Soils. Footing bearing grade undercuts will be required to remove Existing Fill and Buried Organic Layer. Please see Table 1 under Option 2 for removal depths. For planning purposes, footing foundations may be proportioned using a Presumptive Soil Bearing Pressure of 2,500 psf.

Please note, to provide detailed recommendations for this Option 3, additional explorations consisting of backhoe excavated test pits and subsequent engineering analysis are required for CME to finalize its recommendations.

7.0 STANDARD OF CARE AND WARRANTY

CME has endeavored to conduct the services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the geotechnical engineering profession currently practicing in the same locality and under similar conditions as this project. No warranty, either express or implied, is made or intended by CME's proposal, contract, and written and oral reports, all of which warranties are hereby expressly disclaimed. CME shall not be responsible for the acts or omissions of Client, its contractors, agents and consultants. CME has relied upon information supplied by Client, its contractors, agents and consultants, or information available from generally accepted reputable sources, without independent verification, and CME assumes no responsibility for the accuracy thereof.

CME Associates, Inc.

8.0 CLOSING COMMENTS

Please do not hesitate to contact our office if you have any questions regarding this report, its conclusions, its recommendations, or its application to actual field conditions revealed during construction.

Respectfully Submitted,
CME Associates, Inc.

Anas N. Anasthas, P.E.
Geotechnical Engineer

Reviewed By,
CME Associates, Inc.

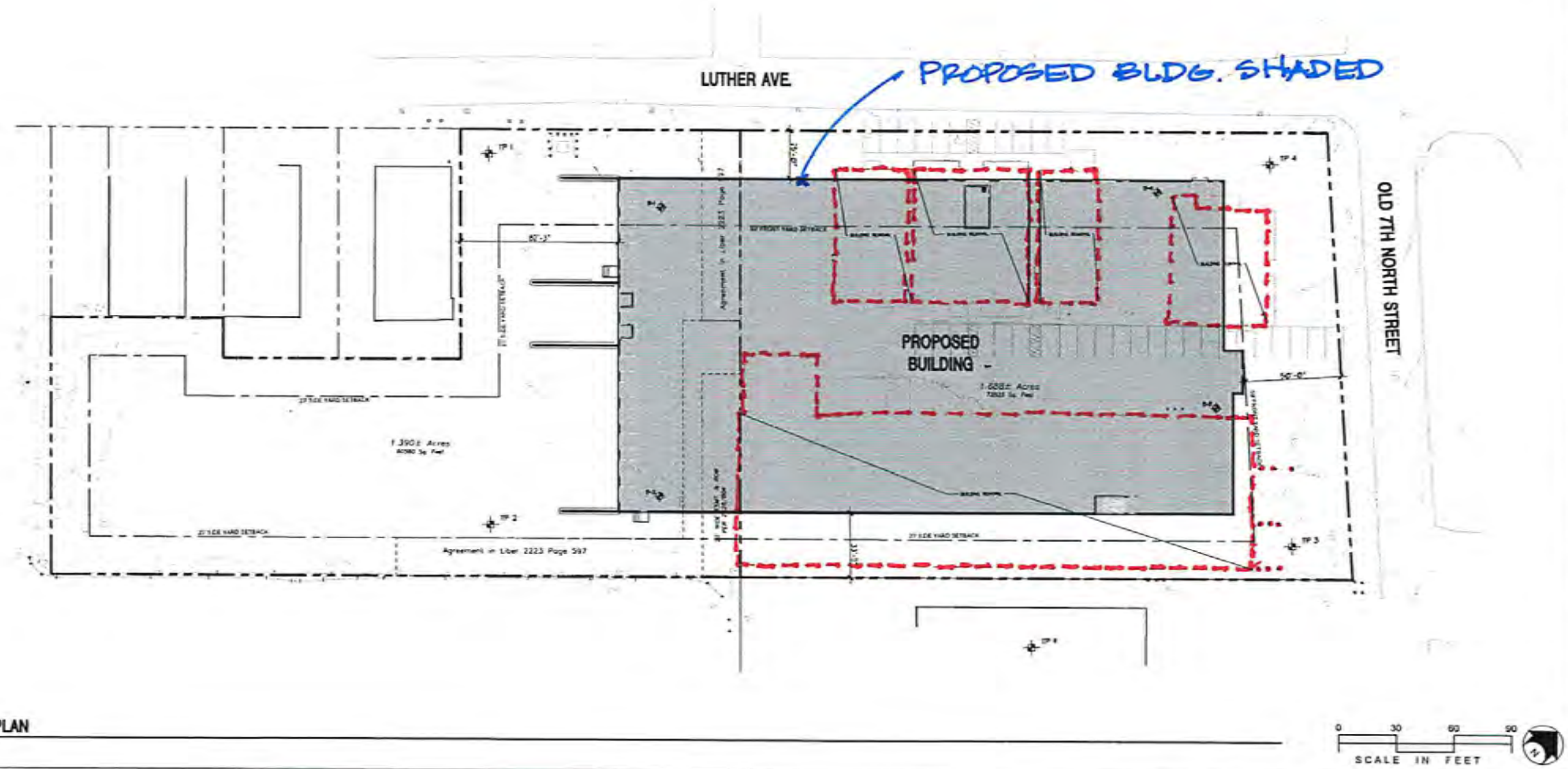
Marcus A. Rotundo, P.E.
Senior Principal Engineer

AA.cw

ATTACHMENT TO CME REPORT No. 27413B-02-0918

ZONE DATA CHART - TOWN OF SALINA		
ZONING: O-2 DISTRICTS- OFFICE AND LIGHT INDUSTRIAL PARK DISTRICT	REQUIRED	PROPOSED
MINIMUM LOT AREA	20,000 SF	56,254.5 SF
MINIMUM LOT WIDTH	100 FT	234.9 FT
MAXIMUM % OF LOT COVERAGE	50%	13.6%
MINIMUM YARD SETBACKS		
-FRONT YARD- LUTHER	50 FT	25 FT*
-FRONT YARD- OLD 7TH	50 FT	50 FT
-REAR	20 FT	476.9 FT
-SIDE YARD	20 FT	33.9 FT
MAXIMUM BUILDING HEIGHT	30 FT	xx FT MAX

*AREA VARIANCE: FRONT YARD SETBACK REQUIRED. RELIEF FROM 50' SETBACK ALONG LUTHER TO 25'.



SITE PLAN

KEPLINGER FREEMAN ASSOCIATES
LANDSCAPE ARCHITECTURE & LAND PLANNING
RZ Engineering, PLLC

Client: WTA
Contact:

UNIFIRST-UNIFORM SERVICES
LUTHER AVE, TOWN OF SALINA, NY

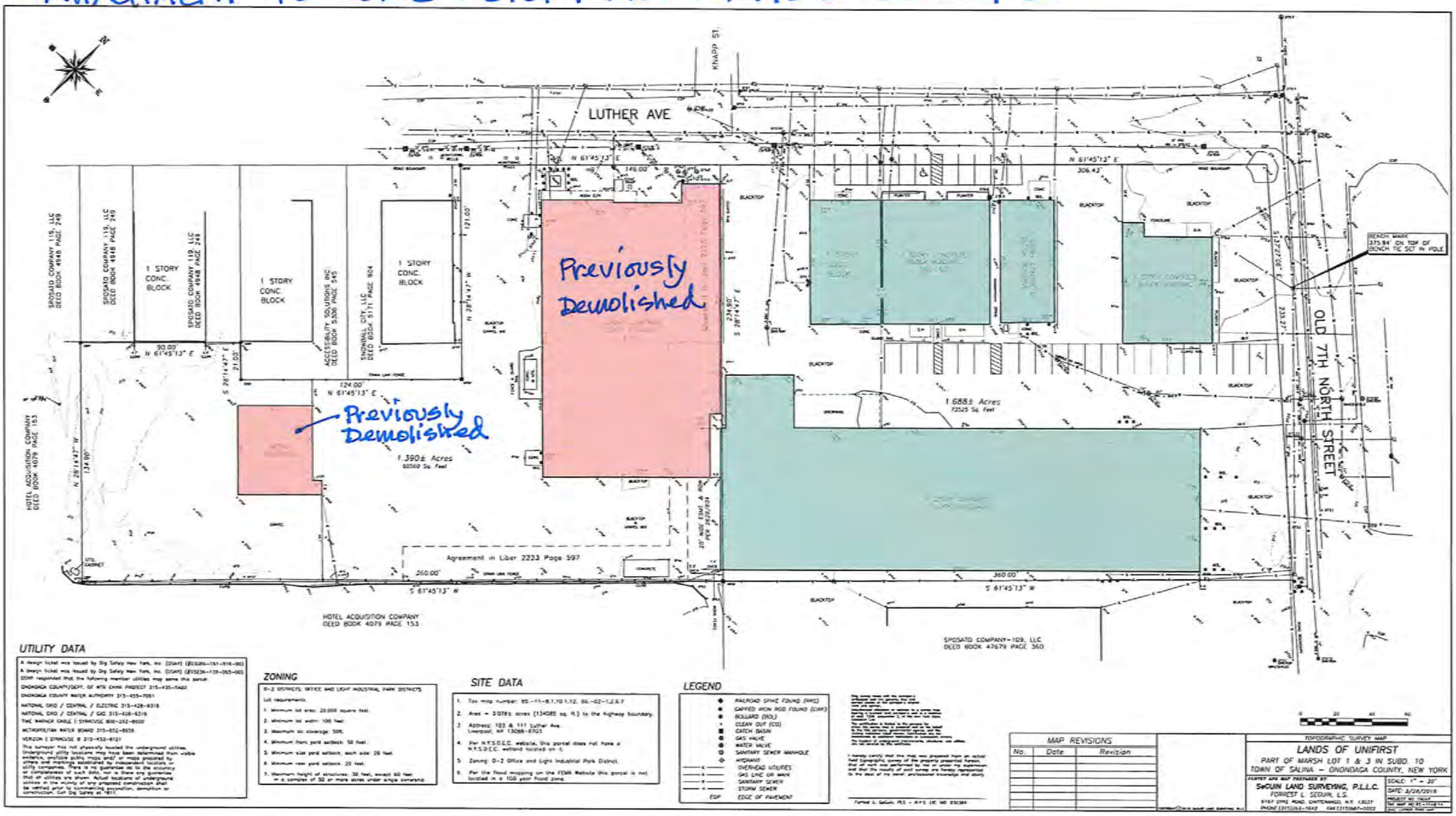
REVISIONS

Drawn By	VEA
Checked By	SLF
KFA Proj. No.	35134
Date	JULY 11, 2018
Scale	AS NOTED
Title	

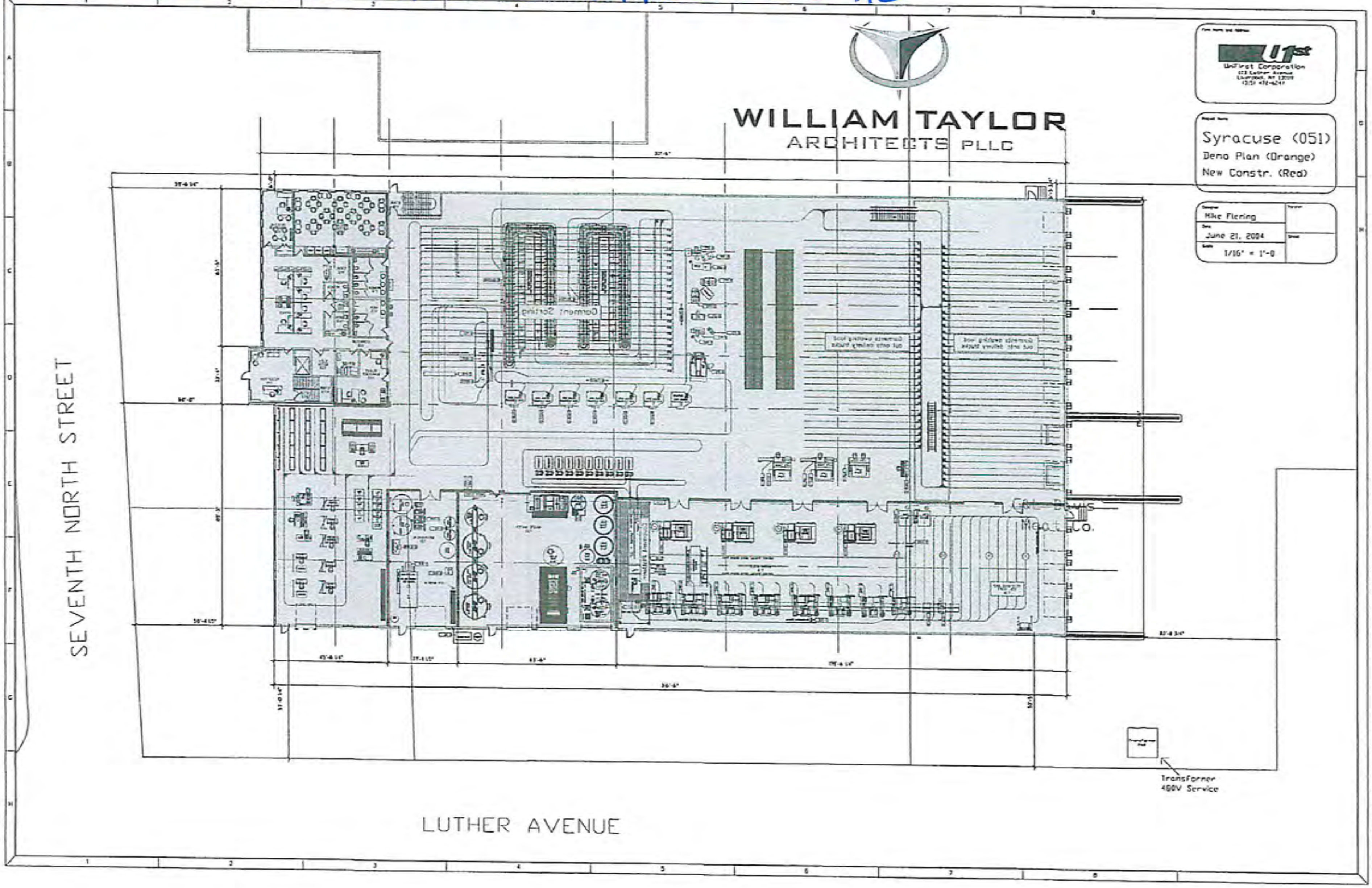
SITE PLAN

L001

ATTACHMENT TO CME REPORT NO. 27413B-02-0918

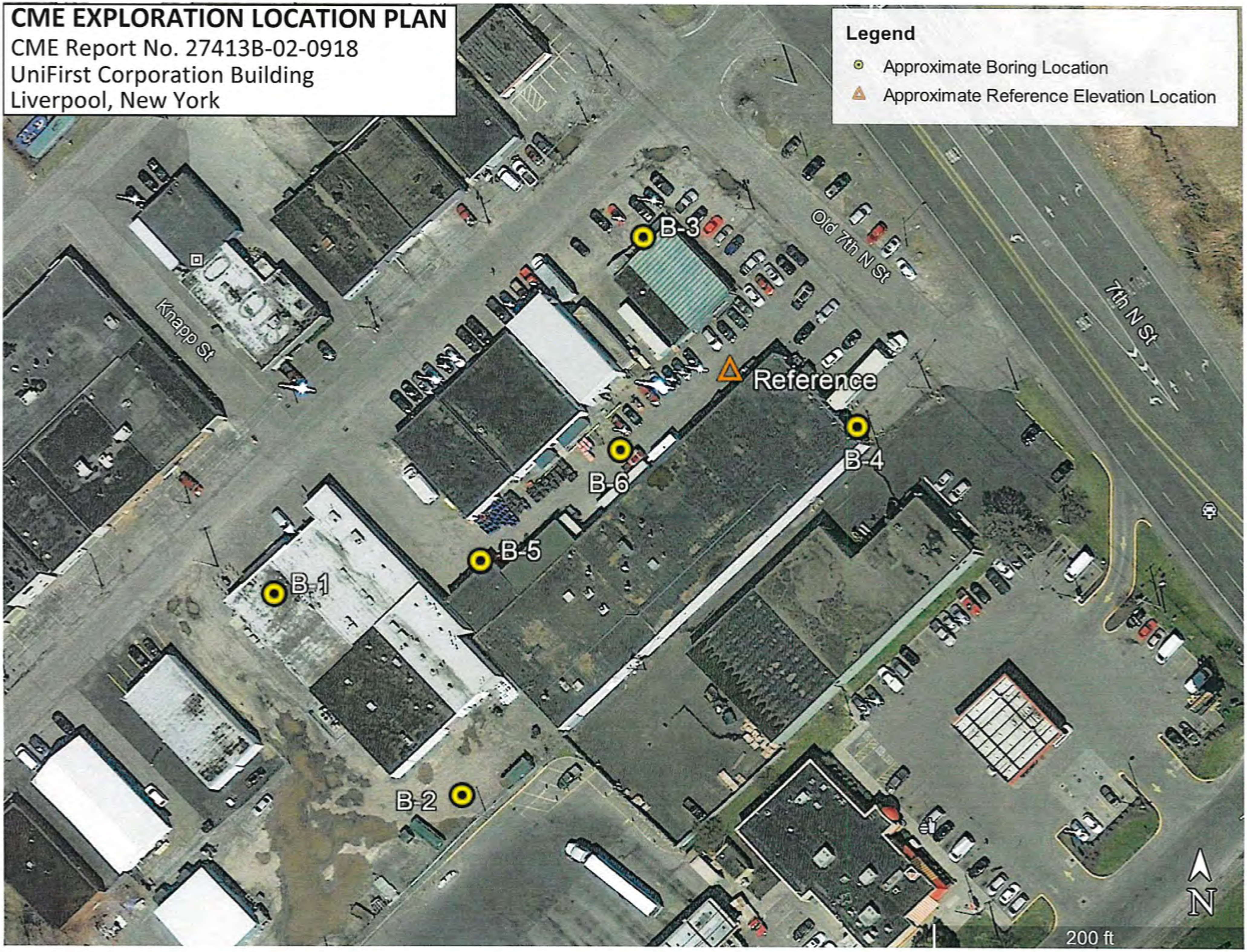


ATTACHMENT TO CME REPORT NO.: 27413B-02-0918



CME EXPLORATION LOCATION PLAN

CME Report No. 27413B-02-0918
UniFirst Corporation Building
Liverpool, New York



Attachment to CME Report No.: 27413B-02-0918

GPS Coordinates and Elevations
Unifirst Corporation Building, Liverpool, New York

TABLE 1			
Boring ID	**Latitude**	**Longitude**	**Elevation (FT. AMSL)**
B-1	43.087417410	-76.16662461	374.1
B-2	43.087060690	-76.16617077	373.8
B-3	43.088055230	-76.16573257	375.5
B-4	43.087719320	-76.16521443	372.5
B-5	43.087477870	-76.16612652	374.7
B-6	43.087675890	-76.16578734	374.6
Reference	43.087819110	-76.16552508	374.4

Notes:

AMSL: Above Mean Seal Level

1. GPS coordinates were obtained utilizing a Spectra Precision Ranger 3.
2. NYSDOT CORS positions are based on NAD 83 (2011).
3. Elevations are based on the North American Vertical Datum of 1988 (NAVD 1988).
4. Reference Elevation measured at Sanitary Sewer manhole shown on Lands of UniFirst Topographic Survey Map with an elevation of 374.34.

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: UniFirst Corporation Building, Liverpool, New York
Report No.: 27413B-01-0918
Client: Unifirst Corporation
Date Started: 07/31/18 **Finished:** 07/31/18
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: 374.1'

METHODS OF INVESTIGATION

Casing: 4-1/4" ID H. Stem Auger
Driller: Beau Fletcher
Casing Hammer:
Driller: Ryan Casatelli
Other:
Inspector: Bryan Reles
Soil Sampler: 2" OD Split Barrel
Rod Size: AWJ
Sampler Hammer: Wt. 140 lbs.
Fall: 30 in.
Make & Model of Drill Rig: Diedrich D-120 Truck Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
07/31/18	While drilling	13.7'	18.0'
07/31/18	Before casing removed	27.0'	58.5'
07/31/18	After casing removed	8.5'	out
07/31/18	After casing removed	caved @ 17.5'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	Classification of Material	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/12	12-13-6-5		Miscellaneous FILL; Brown silt, cmf sand, concrete, fine gravel (moist) *~Existing Fill~*	19
	H						2		
	O	2A	2.0	3.0	SS/17	3-5-5-8		Dark Grey CLAY, little SILT, trace ORGANIC MATERIAL (moist, stiff) ***~Buried Organic Layer~***	10
	L	2B	3.0	4.0				Grey/Brown SILT, little CLAY (moist)	
5	L	3	4.0	6.0	SS/15	3-3-3-5		Grey/Brown mottled CLAY, trace SILT (moist, medium stiff)	6
	O								
	W	4	6.0	8.0	SS/19	5-5-6-7		Grey/Brown CLAY, little SILT (moist, stiff)	11
	S	5	8.0	10.0	SS/19	2-3-4-4		Similar as above (moist, medium stiff)	7
10	T								
	E	6	10.0	12.0	SS/18	3-3-5-4		Similar as above (wet, stiff)	8
	M								
		7	12.0	14.0	SS/18	2-1-2-2		Grey SILT, trace CLAY (wet, soft)	3
15	A	8	14.0	16.0	SS/20	2-1-1-1		Similar as above (wet, soft)	2
	U								
	G	9	16.0	18.0	SS/17	1-1-2-2		Grey SILT, trace fine SAND (wet, soft)	3
	E								
	R	10	18.0	20.0	SS/20	WH-WH-WH-WH		Grey SILT, little CLAY, trace fine SAND (wet, very soft)	0
20								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
20								Continued from page 1	
	H	11	20.0	22.0	SS/21	2-2-3-4		Grey SILT, trace fine SAND (moist, medium stiff)	5
	O	12	22.0	24.0	SS/20	2-3-4-4		Grey SILT, some fine SAND (moist, medium Stiff)	7
	L								
25	L	13	24.0	26.0	SS/13	2-4-6-5		Similar as above (wet, medium compact)	10
	O								
	W	14	26.0	28.0	SS/20	5-4-5-6		Grey SILT, some fine SAND (wet, medium stiff)	9
	S	15A	28.0	29.1	SS/22	3-4-5-4	29.1	Grey SILT, little CLAY, little fine SAND (wet, medium stiff)	9
30	T	15B	29.1	30.0				Grey/Brown fine SAND, little SILT (wet)	
	E								
	M								
	A	16A	33.5	34.3	SS/15	3-2-3		Red/Brown SILT, trace fine SAND (wet, medium stiff) - *Grey CLAY lens @ 33.9'*	5
35	U	16B	34.3	35.0				Dark Grey fine SAND, trace SILT (wet)	
	G								
	E								
	R	17	38.5	40.0	SS/9	6-3-3		*Drills stiffer @ 38.0'* Brown/Grey SILT, little CLAY, little cmf SAND, trace mf GRAVEL (moist, medium stiff)	6
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	H O L	18	43.5	45.0	SS/16	5-4-4		Brown fine SAND, little SILT (wet, loose)	8
45	L O W								
	S	19	48.5	50.0	SS/18	6-3-5		Similar as above (wet, loose)	8
50	T E M								
		20A	53.5	54.7	SS/18	14-32-78		*Drills gravelly 53.0'* Similar as above (wet, very compact)	
	A						54.7		
55		20B	54.7	55.0				Black/Green/Red cmf GRAVEL, some cmf SAND, little SILT (moist)	110
	U G E R							*Drills very hard to 58.5'*	
		21	58.5	59.8	SS/6	36-62-100@3"		Red/Grey SILT, some cmf GRAVEL, little cmf SAND (moist, hard)	100+
60	XXX							Bottom of Boring @ 59.8'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: UniFirst Corporation Building, Liverpool, New York
Report No.: 27413B-01-0918
Client: Unifirst Corporation
Date Started: 07/31/18 **Finished:** 08/01/18
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring: 373.8'

METHODS OF INVESTIGATION

Casing: 4-1/4" ID H. Stem Auger **Driller:** Beau Fletcher
Casing Hammer: **Driller:** Ryan Casatelli
Other: **Inspector:** Bryan Reles
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: Diedrich D-120 Truck Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
07/31/18	While drilling	11.5'	13.5'
08/01/18	Before casing removed	10.2'	58.5'
08/01/18	After casing removed	8.0'	out
08/01/18	After casing removed	caved @ 8.8'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	Classification of Material	SPT "N" or RQD
0	XXX	1	0.0	2.0	SS/15	30-26-21-15		FILL; Brown silt, cmf gravel, cmf sand (moist)	47
	H							*~Existing Fill~*	
	O	2	2.0	4.0	SS/10	8-5-5-2	4	Miscellaneous FILL; Brown fine sand, silt, wood pieces (moist)	10
	L								
5	L	3	4.0	6.0	SS/16	2-2-3-5		Grey/Brown SILT, little CLAY, trace ORGANIC MATERIAL (moist, medium stiff) ***~Buried Organic Layer~***	5
	O								
	W	4	6.0	8.0	SS/18	5-7-7-7		Grey/Brown CLAY, some SILT (moist, stiff)	14
	S	5	8.0	10.0	SS/24	4-4-5-5		Brown/Grey CLAY, little SILT (moist, stiff)	9
10	T								
	E								
	M								
15	A	6	13.5	15.0	SS/9	WH-WH-WH		Grey/Brown SILT, some CLAY (wet, very soft)	0
	U								
	G								
	E								
20	R	7	18.5	20.0	SS/17	2-1-1		Grey SILT, trace fine SAND, trace CLAY (wet, soft)	2

Continued on page 2

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks: Spoon bouncing on flexible material @ 3.5'. Offset boring 4' toward Luther Ave.

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
20								Continued from page 1	
	H								
	O								
	L								
		8	23.5	25.0	SS/13	WH-WH-2		Grey SILT, some fine SAND (wet, soft)	2
	L								
25	O								
	W								
		9	28.5	30.0	SS/8	2-2-2		Dark Grey fine SAND, trace SILT (wet, loose)	4
	S								
30	T								
	E								
	M								
		10	33.5	35.0	SS/18	3-2-4		Similar as above (wet, loose)	6
	A								
35	U								
	G								
	E								
	R								
		11	38.5	40.0	SS/18	3-3-4		Similar as above (wet, loose)	7
								Flowing Sand entering auger	
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	H O L	12	43.5	45.0	SS/18	5-4-5		Similar as above (wet, loose)	9
45	L O W								
	S	13	48.5	50.0	SS/14	10-9-9		Dark Grey cmf SAND, some SILT, trace fine GRAVEL (wet, medium compact)	18
50	T E M								
		14	53.5	55.0	SS/18	6-6-10		Brown fine SAND, little SILT (wet, medium compact)	16
55	A U G E R								
		15A	58.5	59.7	SS/15	8-15-100@1"	59.7	Similar as above (wet, very compact)	100+
60		15B	59.7	59.8				Brown mf GRAVEL, some cmf SAND, little SILT (wet)	
	XXX							Bottom of Boring @ 59.8'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: UniFirst Corporation Building, Liverpool, New York **Report No.:** 27413B-01-0918
Client: Unifirst Corporation **Date Started:** 08/02/18 **Finished:** 08/02/18
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:** 375.5'

METHODS OF INVESTIGATION

Casing: 4-1/4" ID H. Stem Auger **Driller:** Beau Fletcher
Casing Hammer: **Driller:** Ryan Casatelli
Other: **Inspector:**
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: Diedrich D-120 Truck Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
08/02/18	While drilling	21.2'	23.5'
08/02/18	Before casing removed	21.9'	53.5'
08/02/18	After casing removed	None Noted	out
08/02/18	After casing removed	caved @ 10.6'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	Classification of Material	SPT "N" or RQD
0	XXX		0.0	0.3			0.3	Asphalt	
		1	0.5	2.0	SS/16	2-3-5		Miscellaneous FILL; Grey silt, cmf sand, mf gravel, brick, cinder (moist)	8
	H								
	O	2	2.0	4.0	SS/14	4-5-4-3		Miscellaneous FILL; Grey clay, cmf gravel, cmf sand, silt (moist)	9
	L							*~Existing Fill~*	
	L	3	4.0	6.0	SS/0	3-1-3-2		Miscellaneous FILL; Grey silt, clay, cmf sand, fine gravel (moist) *See remark 1*	4
5	O								
	W	4A	6.0	7.0	SS/12	2-4-4-2		Miscellaneous FILL; Grey silt, clay, cmf sand, fine gravel (moist)	8
		4B	7.0	8.0				Miscellaneous FILL; Grey clay, silt, fine gravel, cmf sand (moist)	
							8		
	S	5A	8.0	9.0	SS/14	1-1-2-2		Dark Grey CLAY, trace SILT (moist, soft)	3
							9		
10	T	5B	9.0	10.0				Brown/Grey SILT, little CLAY (moist)	
	E								
	M								
		6	13.5	15.0	SS/14	3-2-3		Brown/Grey SILT, trace CLAY (wet, medium stiff)	5
	A								
15									
	U								
	G								
	E								
	R								
		7	18.5	20.0	SS/18	2-1-1		Similar as above (wet, soft)	2
20								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks: 1. No recovery with a 2" split spoon, therefore a 3" split spoon was utilized.

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
20	HOLLOW STEM AUGER							Continued from page 1	
		8	23.5	25.0	SS/18	2-3-3		Brown/Grey SILT, trace fine SAND, trace CLAY (wet, medium stiff)	6
25									
		9	28.5	30.0	SS/12	5-4-6		Brown/Red fine SAND, little SILT (wet, medium compact)	10
30									
		10	33.5	35.0	SS/18	1-2-3		Grey Similar as above (wet, loose)	5
35									
		11	38.5	40.0	SS/18	1-1-4		Brown Similar as above (wet, loose)	5
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	HOLLOW	12	43.5	45.0	SS/18	3-5-5		Similar as above (wet, medium compact)	10
45	STEM								
		13A	48.5	49.8	SS/18	13-15-23		Similar to above (wet, compact) *Augers harder @ 49.5'*	38
50	AUGER	13B	49.8	50.0				Red/Brown cmf GRAVEL, some SILT, some cmf SAND (moist, compact)	
		14	53.5	54.3	SS/10	52-100@4"		Red/Brown/Green SILT, some mf GRAVEL, little highly weathered ROCK FRAGMENTS, trace cmf SAND (moist, hard) *Spoon refusal @ 54.4'*	100+
55									
	XXX							Bottom of Boring @ 54.4'	
60									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: UniFirst Corporation Building, Liverpool, New York
Client: Unifirst Corporation
Location of Boring: See Exploration Location Plan
Report No.: 27413B-01-0918
Date Started: 08/07/18 **Finished:** 08/07/18
Elevation of Surface of Boring: 372.5'

METHODS OF INVESTIGATION

Casing: 4-1/4" ID H. Stem Auger
Casing Hammer:
Other:
Soil Sampler: 2" OD Split Barrel
Sampler Hammer: Wt. 140 lbs.
Make & Model of Drill Rig: Diedrich D-120 Truck Mounted
Driller: Beau Fletcher
Driller: Ryan Casatelli
Inspector:
Rod Size: AWJ
Fall: 30 in.

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
08/07/18	While drilling	11.5'	13.5'
08/07/18	Before casing removed	None Noted	57.0'
08/07/18	After casing removed	None Noted	out
08/07/18	After casing removed	caved @ 7.5'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	Classification of Material	SPT "N" or RQD
0	XXX		0.0	0.5			0.5	Asphalt	
	H	1	0.5	2.0	SS/11	6-5-4	2	FILL; Grey cmf gravel, cmf sand, clay, silt (moist) ***~Existing Fill~***	9
	O	2	2.0	4.0	SS/19	3-3-5-7		Grey/Brown SILT, little CLAY (moist, stiff)	8
	L								
5	L	3	4.0	6.0	SS/24	2-5-6-8		Similar as above (moist, stiff)	11
	O								
	W	4	6.0	8.0	SS/15	6-5-7-6		Brown/Grey CLAY, some SILT (moist, stiff)	12
	S	5	8.0	10.0	SS/19	3-3-6-4		Grey/Brown SILT, trace fine SAND (wet, stiff)	9
10	T								
	E								
	M								
15	A	6	13.5	15.0	SS/18	2-2-1		Grey/Brown SILT, little fine SAND, trace CLAY (wet, soft)	3
	U								
	G								
	E								
20	R	7	18.5	20.0	SS/18	3-5-2		Grey/Brown SILT, trace cmf SAND, trace fine GRAVEL (wet, medium stiff)	7

Continued on page 2

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
20	HOLLOW STEM AUGER							Continued from page 1	
		8A	23.5	24.0	SS/18	5-4-5		Brown/Grey SILT, some CLAY (wet) *May be blow from above in spoon*	9
25		8B	24.0	25.0				Brown/Grey fine SAND, trace SILT (wet, loose)	
		9	28.5	30.0	SS/18	4-3-3		Grey/Brown fine SAND, little SILT (wet, loose)	6
30									
		10	33.5	35.0	SS/18	4-5-6		Similar as above (wet, medium compact)	11
35									
		11	38.5	40.0	SS/18	1-2-3		Grey/Brown fine SAND, trace SILT (wet, loose)	5
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	HOLLOW	12	43.5	45.0	SS/18	6-6-9		Similar as above (wet, medium compact)	15
45	STEM								
		13	48.5	50.0	SS/18	9-9-8		Similar to above (wet, medium compact)	17
50	AUGER								
							54	*Augered gravelly @ 54.0'*	
		14	53.5	55.0	SS/4	16-34-27		Grey/Brown cmf GRAVEL, trace cmf SAND, trace SILT (moist, very compact)	61
55									
								Augered hard @ 57.0'	
	XXX							Bottom of Boring @ 57.0'	
60									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: UniFirst Corporation Building, Liverpool, New York **Report No.:** 27413B-01-0918
Client: Unifirst Corporation **Date Started:** 08/01/18 **Finished:** 08/01/18
Location of Boring: See Exploration Location Plan **Elevation of Surface of Boring:** 374.7'

METHODS OF INVESTIGATION

Casing: 4-1/4" ID H. Stem Auger **Driller:** Beau Fletcher
Casing Hammer: **Driller:** Ryan Casatelli
Other: **Inspector:** Bryan Reles
Soil Sampler: 2" OD Split Barrel **Rod Size:** AWJ
Sampler Hammer: Wt. 140 lbs. **Fall:** 30 in.
Make & Model of Drill Rig: Diedrich D-120 Truck Mounted

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
08/01/18	While drilling	13.3'	18.5'
08/01/18	Before casing removed	8.7'	53.5'
08/01/18	After casing removed	7.1'	out
08/01/18	After casing removed	caved @ 16.0'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	Classification of Material	SPT "N" or RQD
0	XXX		0.0	0.3			0.3	Asphalt	
	H	1	0.3	2.0	SS/15	9-7-8		Miscellaneous FILL; Brown silt, cmf gravel, cmf sand, asphalt, brick, wood (moist) *~Existing Fill~*	15
	O	2	2.0	4.0	SS/0	6-4-4-2	4	Miscellaneous FILL; Dark Grey silt, mf gravel, cmf sand, clay, wood (moist)	8
	L							*See remark 1*	
5	L	3	4.0	6.0	SS/8	2-1-2-1		Dark Grey/Brown SILT, trace CLAY, trace ORGANIC MATERIAL (moist, soft) ***~Buried Organic Layer~***	3
	O								
	W	4	6.0	8.0	SS/20	2-2-3-4		Grey/Brown CLAY, little SILT, trace woody ORGANIC MATERIAL (moist, medium stiff)	5
							8		
	S	5	8.0	10.0	SS/17	2-2-2-2		Grey/Brown CLAY, little SILT (moist, medium stiff)	4
10	T								
	E								
	M								
	A	6	13.5	15.0	SS/0	2-2-1		Brown/Grey SILT, little CLAY (wet, soft) *See remark 1*	3
15	U								
	G								
	E								
	R	7	18.5	20.0	SS/13	1-1-2		Brown/Grey SILT, trace fine SAND, trace CLAY (wet, soft)	3
20								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks: 1. No recovery with a 2" split spoon, therefore a 3" split spoon was utilized.

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
20								Continued from page 1	
	HOLLOW	8	23.5	25.0	SS/13	3-3-5		Brown SILT, little fine SAND (wet, stiff)	8
25									
		9	28.5	30.0	SS/9	4-4-5		Red/Brown fine SAND, little SILT (wet, loose)	9
30	STEM								
		10	33.5	35.0	SS/11	WH-WH-1		Similar as above (wet, medium compact)	1
35	AUGER								
		11	38.5	40.0	SS/10	2-2-3		Dark Grey Similar as above (wet, loose)	5
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	HOLLOW	12	43.5	45.0	SS/18	4-5-6		Similar as above (wet, medium compact)	11
45	STEM								
		13	48.5	50.0	SS/18	7-8-7		Brown, Similar as above (wet, medium compact)	15
50	AUGER								
								Drills gravelly @ 51.0'	
		14	53.5	53.7	SS/1	100@2"		Dark Grey SILT, some cmf SAND, trace mf GRAVEL (wet, hard)	100+
55	XXX							Bottom of Boring @ 53.7'	
60									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

SUBSURFACE EXPLORATION – TEST BORING LOG

Project: UniFirst Corporation Building, Liverpool, New York
Client: Unifirst Corporation
Location of Boring: See Exploration Location Plan
Report No.: 27413B-01-0918
Date Started: 08/07/18 **Finished:** 08/07/18
Elevation of Surface of Boring: 374.6'

METHODS OF INVESTIGATION

Casing: 4-1/4" ID H. Stem Auger
Casing Hammer:
Other:
Soil Sampler: 2" OD Split Barrel
Sampler Hammer: Wt. 140 lbs.
Make & Model of Drill Rig: Diedrich D-120 Truck Mounted
Driller: Beau Fletcher
Driller: Ryan Casatelli
Inspector:
Rod Size: AWJ
Fall: 30 in.

GROUND WATER OBSERVATIONS

Date	Time	Depth	Casing At
08/07/18	While drilling	12.5'	13.5'
08/07/18	Before casing removed	19.6'	57.0'
08/07/18	After casing removed	None Noted	out
08/07/18	After casing removed	caved @ 7.9'	out

LOG OF BORING SAMPLES / CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	Depth of Sample (Feet) To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; and – 35 to 50 %, some – 20 to 35 %, little – 10 to 20 %, trace – 0 to 10 %	SPT "N" or RQD
0	XXX		0.0	0.3			0.3	Asphalt	
	H	1	0.5	2.0	SS/8	6-8-4		Miscellaneous FILL; Grey cmf gravel, cmf sand, silt (moist)	12
	O	2	2.0	4.0	SS/8	3-4-4-6		Miscellaneous FILL; Dark Grey clay, silt (moist, stiff)	8
	L							*~Existing Fill~*	
5	L	3	4.0	6.0	SS/9	3-2-2-3	6	Miscellaneous FILL; Grey clay, cmf sand, mf gravel, silt (moist)	4
	O								
	W	4	6.0	8.0	SS/8	3-2-3-2	8	Grey/Brown CLAY, trace cmf SAND, trace woody ORGANIC MATERIAL, trace SILT (moist, medium stiff) *~Buried Organic Layer~*	5
	S	5	8.0	10.0	SS/15	2-3-3-3		Brown/Grey CLAY, some SILT (moist, medium stiff)	6
10	T								
	E								
	M								
	A	6	13.5	15.0	SS/10	2-2-1		Grey SILT, little CLAY (wet, soft)	3
15	U								
	G								
	E								
	R	7	18.5	20.0	SS/17	3-1-2		Grey SILT, trace fine SAND (wet, soft)	3
20								Continued on page 2	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod
Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
20								Continued from page 1	
	H O L L O W	8	23.5	25.0	SS/18	1-5-5		Grey/Brown fine SAND, some SILT (wet, medium compact)	10
25									
	S	9	28.5	30.0	SS/14	WH-1-1		Red/Brown Similar as above (wet, very loose)	2
30	T E M								
		10	33.5	35.0	SS/18	3-2-5		Grey fine SAND, trace SILT (wet, loose)	7
35	A U G E R								
		11	38.5	40.0	SS/18	WH-1-4		Similar as above (wet, loose)	5
40								Continued on page 3	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet) From	To	Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	c – coarse, m – medium, f – fine; **and** – 35 to 50 %, **some** – 20 to 35 %, **little** – 10 to 20 %, **trace** – 0 to 10 %	SPT "N" or RQD
40								Continued from page 2	
	H O L	12	43.5	45.0	SS/18	5-7-7		Similar as above (wet, medium compact)	14
45	L O W								
	S	13	48.5	50.0	SS/18	5-7-8		Similar as above (wet, medium compact)	15
50	T E M								
		14	53.5	55.0	SS/18	10-16-51		Grey/Brown fine SAND, some SILT (wet, very compact)	67
55	A U						56		
	G E R							*Augers harder @ 56.0'*	
		15	58.5	59.8	SS/6	14-87-100@4"		Red/Brown SILT and cmf GRAVEL, little cmf SAND (moist, hard) *Spoon refusal @ 59.8'*	100+
60								Bottom of Boring @ 59.8'	

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks:

CME Associates, Inc.
6035 Corporate Drive
East Syracuse, New York 13057
(315) 701-0522
(315) 701-0526 (Fax)
www.cmeassociates.com

LABORATORY TEST SUMMARY
UniFirst Corporation Building
CME Report No.: 27413L-01-0918
August 29, 2018

CME Representatives obtained soil samples from Test Borings advanced as part of the Subsurface Exploration Program conducted for the subject project. Selected samples were delivered to CME's East Syracuse facility, an AASHTO re:source[1] accredited laboratory for various laboratory testing. The results are presented below:

Sample ID Notations: B - Test Boring, S – Sample

I. Natural Moisture Content (ASTM D2216)

Sample ID	Natural Moisture (%)
B-1; S-2A	25.2
B-1; S-10	22.2
B-4; S-4	24.1
B-5; S-3	24.8
B-6; S-4	31.5

II. Atterberg Limits Testing (ASTM D4318)

Sample ID	Liquid Limit	Plastic Limit	Plasticity Index	Natural Moisture (%)
B-1; S-10	17	16	1	22.2
B-4; S-4	29	17	12	24.1

III. Organic Content (ASTM D2974)

Sample ID	Organic Content (%)
B-1; S-2A	5.3
B-5; S-3	1.4

IV. Burmister Classification

Sample ID	Classification
B-1; S-2A	Grey/Brown CLAY, little SILT, trace ORGANIC MATERIAL
B-1; S-10	Brown/Grey SILT, little CLAY, trace fine SAND
B-4; S-4	Brown CLAY, some SILT
B-5; S-3	Brown/Grey SILT, trace CLAY, trace ORGANIC MATERIAL
B-6; S-4	Brown/Grey CLAY, trace SILT, trace mf SAND, trace ORGANIC MATERIAL

If you have any questions regarding this report please contact our office.

AWhite for:

Yvonne Chu
Laboratory Supervisor

[1]**AASHTO re:source** – American Association of State Highway & Transportation Officials (AASHTO) Materials Reference Laboratory, a Federal Agency having jurisdiction to assess laboratory competency according to the Standards of the United States of America. CME East Syracuse accreditation includes testing of Portland Cement Concrete, Aggregate and Soil Materials. www.AASHTOresource.org.

Design Maps Summary Report USGS

User–Specified Input

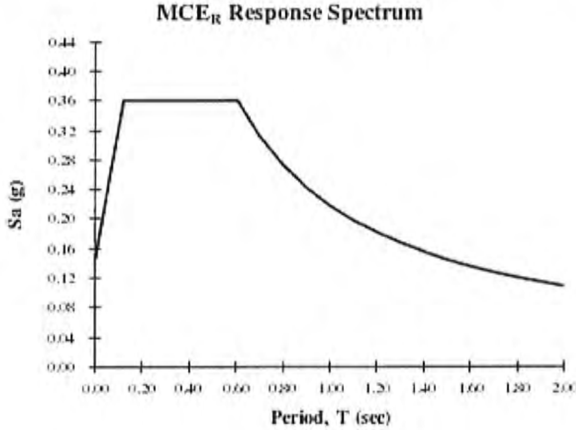
Report Title	UniFirst Corporation Building, Liverpool, NY Fri September 7, 2018 16:01:22 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	43.08796°N, 76.16626°W
Site Soil Classification	Site Class E – "Soft Clay Soil"
Risk Category	I/II/III

USGS–Provided Output

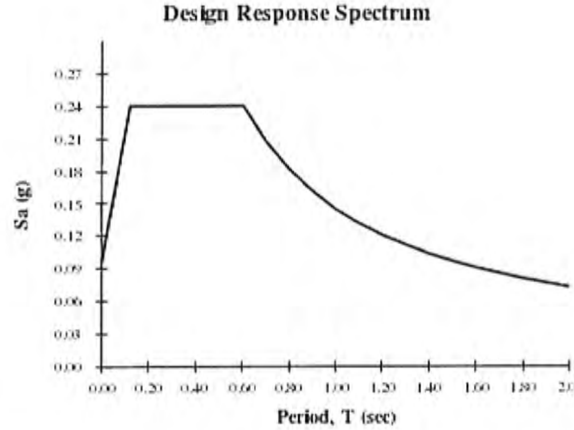
$S_S =$ 0.144 g	$S_{MS} =$ 0.360 g	$S_{DS} =$ 0.240 g
$S_1 =$ 0.062 g	$S_{M1} =$ 0.218 g	$S_{D1} =$ 0.145 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



Design Maps Detailed Report USGS

2012/2015 International Building Code (43.08796°N, 76.16626°W)

Site Class E – "Soft Clay Soil", Risk Category I/II/III

Section 1613.3.1 — Mapped acceleration parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2012/2015 International Building Code are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 1613.3.3.

From Figure 1613.3.1(1) [1] $S_S = 0.144$ g

From Figure 1613.3.1(2) [2] $S_1 = 0.062$ g

Section 1613.3.2 — Site class definitions

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class E, based on the site soil properties in accordance with Section 1613.

2010 ASCE-7 Standard – Table 20.3-1
SITE CLASS DEFINITIONS

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index $PI > 20$, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u < 500$ psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 1613.3.3 — Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters

TABLE 1613.3.3(1)
VALUES OF SITE COEFFICIENT F_a

Site Class	Mapped Spectral Response Acceleration at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
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	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = E and S_s = 0.144 g, F_a = 2.500

TABLE 1613.3.3(2)
VALUES OF SITE COEFFICIENT F_v

Site Class	Mapped Spectral Response Acceleration at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = E and S_1 = 0.062 g, F_v = 3.500

Equation (16-37): $S_{MS} = F_aS_S = 2.500 \times 0.144 = 0.360$ g

Equation (16-38): $S_{M1} = F_vS_1 = 3.500 \times 0.062 = 0.218$ g

Section 1613.3.4 — Design spectral response acceleration parameters

Equation (16-39): $S_{DS} = ⅔\, S_{MS} = ⅔ \times 0.360 = 0.240$ g

Equation (16-40): $S_{D1} = ⅔\, S_{M1} = ⅔ \times 0.218 = 0.145$ g

Section 1613.3.5 — Determination of seismic design category

TABLE 1613.3.5(1)
SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATION

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \leq S_{DS} < 0.33g$	B	B	C
$0.33g \leq S_{DS} < 0.50g$	C	C	D
$0.50g \leq S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.240 g, Seismic Design Category = B

TABLE 1613.3.5(2)
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \leq S_{D1} < 0.133g$	B	B	C
$0.133g \leq S_{D1} < 0.20g$	C	C	D
$0.20g \leq S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.145 g, Seismic Design Category = C

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 1613.3.5(1) or 1613.3.5(2)" = C

Note: See Section 1613.3.5.1 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 1613.3.1(1)*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(1).pdf
2. *Figure 1613.3.1(2)*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(2).pdf

GENERAL INFORMATION & KEY TO TEST BORING LOGS

The **Subsurface Exploration – Test Boring Logs produced by CME Associates, Inc**. present the observations and mechanical data collected by the driller while at the site, supplemented, at times, by classification of the materials removed from the borings determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed from the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface conditions between adjacent borings or between the sampled intervals. The data presented on the Exploration Logs together with the recovered samples will provide a basis for evaluating the character of the subsurface conditions relative to the proposed construction. The evaluation must consider all the recorded details and their significance relative to each other. Often, analyses of standard boring data indicate the need for additional testing and sampling procedures to more accurately evaluate the subsurface conditions. Any evaluations of the contents of CME's report and the recovered samples must be performed by Licensed Professionals having experience in Soil Mechanics and Foundation Engineering. The information presented in this Key defines some of the procedures and terms used on the CME Exploration Logs to describe the conditions encountered. Refer to the Log on page 4 for key number.

Key No. **Description**

1. The figures in the **DEPTH SCALE** column define the vertical scale of the Boring Log.

2. **CASING BLOWS/FOOT** – shows the number of blows required to advance the casing a distance of 12 inches. The casing size, the hammer weight and the length of drop are noted under the **Methods of Investigation**. If the casing is advanced by means other than driving, the method of advancement will be indicated under **Methods of Investigation** at the top of the Log. If Hollow Stem Augers or Coring is used, it will be so noted in this column.

3. The **SAMPLE I.D.** is used for identification on the sample containers and in the Laboratory Test Report or Summary.

4. The **DEPTH OF SAMPLE** column gives the exact depth range from which a sample was recovered.

5. The **SAMPLE TYPE/RECOVERY** column is used to signify the various type of sample attempt. "SS is Split Spoon, "P" is Piston tube, "U" is Undisturbed tube. For soil samples, the recovered length of the sample is also indicated, in inches. If a rock core sample is taken, the core bit size designation is given here.

6. **BLOWS ON SAMPLER** – shows the results of the "Standard Penetration Test (SPT) ASTM D1586", recording the number of blows required to drive a split spoon sampler into the soil beneath the casing. The number of blows required for each six inches of penetration is recorded. The total number of blows required for the 6 inch to 18 inch interval is summarized in the **SPT "N"** column and represents the "Standard Penetration Number". The outside diameter of the sampler, the hammer weight and the length of drop are noted in the **Methods of Investigation** portion of the log. A "WH" or "WR" in this column indicates that the sample spoon advanced the 6 inch interval under **W**eight of **H**ammer or **W**eight of **R**ods, respectively.

7. The **DEPTH OF CHANGE** column designates the depth (in feet) that the driller noted a compactness or stratum change. In soft materials or soil strata exhibiting a consistent relative density, it is difficult for the driller to determine the exact change from one stratum to the next. In addition, a grading or gradual change may exist. In such cases the depth noted is approximate or estimated only and may be represented by a dashed line.

8. **CLASSIFICATION OF MATERIAL** – **Soil materials** encountered and sampled are described by the driller on the original log. Notes of the driller observations are also placed in this column. Recovered samples may also be visually classified by a Soil Technician upon receipt in the Laboratory. Visual sample classification is by Burmister System and strata may be classified additionally by the Unified System. The Burmister System is a type of visual-manual textural classification estimated by the Driller or Technician on the basis of weight-fraction of the recovered soil. See Table 1 **"Classification of Materials"**. The description of the relative soil compactness or consistency is based upon the standard penetration number as defined in Table 2. The description of the soil moisture condition is described as dry, moist, wet, or saturated. Water used to advance the boring may have affected the in-situ moisture content of the sample. Special terms are used as required to describe materials in greater detail, such terms are listed in ASTM D653. When sampling gravelly soils with a standard two-inch O.D. Split Spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders, cobbles, and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and sampler blows or through the "action" of the drill rig as reported by the driller.

   The Description of **Rock** is based upon the recovered rock core. Terms frequently used in the description are included in Table 3. The length of core run is defined as length of penetration between retrievals of the core barrel from the bore hole, expressed in inches. The core recovery expressed the length of core recovered from the core barrel per core run, in percent. The size core barrel used is noted in **Column 5**. The more commonly used sizes of core barrels are denoted "AX" and "NX". An "NX" core, being larger in diameter than "AX" core, often produces better recovery, and is frequently utilized where accurate information regarding the geologic conditions and engineering properties is needed. A better estimate of in-situ rock quality is provided by a modified core recovery ratio known as the **"Rock Quality Designation" (RQD)**. This ratio is determined by considering only pieces of core that are at least 4 inches long and are hard and sound. Breaks obviously caused by drilling are ignored. The diameter of the core should preferably be not less than 2 inches (NX). The percentage ratio between the total length of such core recovered and the length of core drilled on a given run is the RQD. Table 4 gives the rock quality description as related to the **RQD**.

9. The **SPT "N"** or **RQD** is given in this column as applicable to the specific sample taken. In Very Compact coarse grained soils the N-value may be indicated as 50+, and in Hard fine-grained soils the N-value may be indicated as 30+. This typically means that the blow count was achieved prior to driving the sampler the entire 6 inch interval or the sampler refused further penetration. For the "NX" rock cores, the RQD is reported here, expressed in percent.

10. **GROUND WATER OBSERVATIONS** and timing noted by the driller are shown in this section. It is important to realize that the reliability of the water level observations depend upon the soil type (water does not readily stabilize in a hole through fine grained soils), and that drill water used to advance the borings may have influenced the observations. Ground water levels typically fluctuate seasonally so those noted on the log are only representative of that exhibited during the period of time noted on the log. One or more perched or trapped water levels may exist in the ground seasonally. All the available readings should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or ground water observation well installations.

TABLE 1 - VISUAL CLASSIFICATION OF MATERIALS (BURMISTER)	
GROUP	**TEXTURAL CLASSIFICATION SIZES**
BOULDERS	larger than 12" diameter
COBBLES	12" diameter to 3" sieve
GRAVEL	3" - coarse - 1" - medium - 1/2" - fine - #4 sieve
SAND	#4 - coarse - #10 - medium - #40 - fine - #200 sieve
SILT	#200 sieve (0.074mm) to 0.005mm size (see below *)
CLAY	0.005mm size to 0.001 mm size (see below *)

ABBREVIATIONS	**PERCENT OF TOTAL SAMPLE BY WEIGHT**	
f - fine	and	35 to 50%
m - medium	some	20 to 35%
c - coarse	little	10 to 20%
	trace	0 to 10%

***PLASTICITY DESCRIPTIONS**			
TERM	**PLASTICITY INDEX**	**DRY STRENGTH**	**FIELD TEST**
Non-plastic	0-3	Very low	falls apart easily
Slightly plastic	4 - 15	Slight	easily crushed by fingers
Plastic	15 - 30	Medium	difficult to crush
Highly plastic	31 or more	High	impossible to crush with fingers

*TABLE 2 - DESCRIPTION OF SOIL COMPACTNESS OR CONSISTENCY based on SPT "N"**		
Primary Soil Type	**Descriptive Term of Compactness**	**Range of Standard Penetration Resistance (N)**
COARSE GRAINED SOILS	Very loose	less than 4 blows per foot
(More than half of Material is larger than No. 200 sieve size.)	Loose	4 to 10
	Medium compact	10 to 30
	Compact	30 to 50
	Very compact	Greater than 50
FINE GRAINED SOILS	Descriptive Term of Consistency	Range of Standard Penetration Resistance (N)
(more than half of material is smaller that No. 200 sieve size)	Very soft	less than 2 blows per foot
	Soft	2 to 4
	Medium stiff	4 tp 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	Greater than 30
*The number of blows of 140 pound weight falling 30 inches to drive 2 inch O.D., 1-3/8 inch I.D. sampler 12 inches is defined as the Standard Penetration Resistance designated "N".		

TABLE 3 - ROCK CLASSIFICATION TERMS		
Rock Classification Terms		**Field Test or Meaning of Term**
Hardness	Soft	Scratched by fingernail
	Medium Hard	Scratched easily by penknife
	Hard	Scratched with difficulty by penknife
	Very Hard	Cannot be scratched by penknife
Weathering	Very Weathered Weathered Sound	Judged from the relative amounts of disintegration, iron staining, core recovery, clay seams, etc.
Bedding (Natural Breaks in Rock Layers)	Laminated Thinly bedded Bedded Thickly bedded Massive	less than 1 inch 1 inch to 4 inches 4 inches to 12 inches 12 inches to 36 inches greater than 36 inches

TABLE 4 **Relation OF Rock Quality Designation (RQD) and in-situ Rock Quality**	
RQD %	**Rock Quality Term Used**
90 to 100	Excellent
75 to 90	Good
50 to 75	Fair
25 to 50	Poor
0 to 25	Very Poor

SUBSURFACE EXPLORATION – TEST BORING LOG

Project:
Report No.:
Client:
Date Started: **Finished:**
Location of Boring: See Exploration Location Plan
Elevation of Surface of Boring:

METHODS OF INVESTIGATION			
Casing:	3-1/4” ID H. Stem Auger	**Driller:**	
Casing Hammer:		**Driller:**	
Other:		**Inspector:**	
Soil Sampler:	2” OD Split Barrel	**Rod Size:**	AWJ
Sampler Hammer: Wt.	140 lbs.	**Fall:**	30 in.
Make & Model of Drill Rig:			

GROUND WATER OBSERVATIONS			
Date	Time	Depth	Casing At
	While drilling		
	Before casing removed		
	After casing removed		
	After casing removed		

LOG OF BORING SAMPLES							CLASSIFICATION OF MATERIAL		
Depth Scale (Feet)	Casing Blows/ Foot	Sample I.D.	Depth of Sample (Feet)		Sample Type/ Recovery (Inches)	Blows On Sampler Per 6 inches	Depth Of Change (feet)	**c** – **c**oarse; **m** – **m**edium; **f** – **f**ine; **and** – 35 to 50 %; **some** – 20 to 35 %; **little** – 10 to 20 %; **trace** – 0 to 10 %	SPT “N” or RQD
			From	To					
1	**2**	**3**	**4**	**4**	**5**	**6**	**7**	**8**	**9**
5									
10									
15									
20									

SS – Split Spoon, U – Undisturbed Tube, C – Core, WH – Weight of Hammer, WR – Weight of Rod

Remarks: