Geotechnical Report
For
Retail Store at Dover Village
Alternative Location Phase I
Dover Plains, New York

File No. 2247

Prepared For:

Southern Reality Development

Prepared By:

Daniel G Loucks, PE
NYSPE 068389

29 March 2011

INTRODUCTION:

The Phase I subsurface investigation for the proposed Retail Building at Dover Village, Dover Plains, New York has been completed. Soil & Material Testing Inc. of Castleton, New York has completed eight (8) soil borings at the new site to the northeast of the previous site. The logs of these borings, along with a location diagram, have been included in the appendix of this report.

It is my understanding that the proposed construction will include a single-story building located approximately as indicated on the boring location diagram. The building will have a block bearing wall and steel frame design.

The maximum column loadings will range from 75 to 125 kips. Bearing wall loads will range from 2 to 4 kips per foot of wall. The settlement tolerances are normal. Settlement tolerances are considered to include up to 1 inch of total settlement and 3/4 inch of differential settlement between column locations.

The first floor slab will be established at approximately elevation 387.5 ft msl.

The purpose of this report is to describe the investigation conducted and the results obtained; to analyze and interpret the data obtained; and to make recommendations for the design and construction of the feasible foundation types and earthworks for the project.

The scope of my services has been limited to coordinating the boring and laboratory investigation, analyzing the soils information, and providing a geotechnical report with preliminary foundation recommendations and seismic site classifications as per NYS Building Code. Environmental aspects of the project as well as grading, pavements and site design should be performed by qualified others. Additional borings or installation of test piles are recommended if this building site is chosen to better estimate the depth piles may need to be extended to provide adequate support.

FIELD INVESTIGATION PROCEDURES:

The borings were extended by means of 3.25 inch ID, hollow-stem, augers, by continuous sampling with a split-spoon sampler and by advancing a roller bit cutting tool.

Representative samples were obtained from the boring holes by means of the split-spoon sampling procedure performed in accordance with ASTM D 1586. The standard penetration values obtained from this procedure have been indicated on the soil boring logs.

Shear vane testing was also performed at the site. The results of these tests have been included on the soil boring logs.

Soil samples obtained from these procedures were examined in the field, sealed in containers, and shipped to the laboratory for further examination, classification and testing, as applicable.

During the investigation, water level readings were obtained at various times where water accumulated in the boring hole. The water level readings, along with an indication of the time of the reading relative to the boring procedure, have been indicated on the soil boring logs.

Three (3) vane shear tests were conducted in boring B-105. These test results provide an estimate of the undrained shear strength values of the soils in-situ. The vane used (SMT vane) has a diameter of 3 1/8 inch; a height of 7 1/4 inch and a blade thickness of 1/8 inch. This blade is slightly thicker than typical standard vane shear blades. The shearing was done with a torque wrench so that the rate of shearing was not strictly controlled. The vane shear values are given on the logs in psf units. The remolded test values were measured after 5 minutes or more from the time of measuring the peak shear values.

LABORATORY INVESTIGATION:

All samples were examined in the laboratory by the soil engineer and classified according to the Unified Soil Classification System. In this system, the soils are visually classified according to texture and plasticity. The appropriate group symbol is indicated on the soil boring logs.

Samples exhibiting significant percentages of fine-grained soils or organic materials were subjected to moisture content testing. This testing was performed in accordance with ASTM D 2216-71. The results of these tests have been included in the appendix of the report.

In addition to the moisture content testing samples of organic soil were tested for organic content in accordance with ASTM Specification D-2974. The results of these tests can be found in the appendix of this report.

SITE CONDITIONS:

At the time of my site visit the ground surface in the proposed building area was fairly level with a slight slope down to the north at the southern end of the proposed building. To the east of the proposed building, the ground surface slopes more steeply upward to a railroad line. At the proposed entrance the ground surface slopes up to Route 22. The parking lot area slopes very gently down towards the center of the proposed parking lot area.

SUBSURFACE CONDITIONS:

The specific subsurface conditions encountered at each boring and test pit location are indicated on the individual soil boring and logs. However, to aid in the evaluation of this data, I have prepared a generalized description of the soil conditions based on the boring data.

In general the borings in the building area indicate that the organic soils at the site are deepest to the northwestern and western portion of the proposed building. Borings 101 and 104 encountered buried organic soils to depths of between 30.0 and 80.0 feet below the existing ground surface. The organic soils are comprised of mostly peat with occasional thin layers of organic silt and sand. Borings 102 and 103 encountered relatively shallow uncontrolled fill soils that extended to between approximately 2.0 and 12.0 feet. No significant amounts of organic soils were encountered at these boring locations.

Below the uncontrolled fill and organic soils the borings typically encountered clayey silt/silt with occasional thin sand and clay layers. Borings 102, 103 and 104 were ended in this material at between 22.0 and 37.0 feet. This clayey silt/silt with the sand and clay layers is loose to medium dense.

Boring 101 encountered the loose to medium dense clayey silt/silt with sand and clay layers, below the organic soils, to approximately 83.0 feet. A layer of dense sand and gravel was encountered below this to a depth of approximately 88.0 feet. Underlying this dense sand and gravel is a layer of medium dense to dense clayey silt with occasional thin sand and clay layers. This material was sampled to a depth of 122.0 feet. The hole was then extended to a depth of 160.0 feet with a roller bit. The driller noted that the wash was similar clayey silt soil to the bottom of the boring.

The boring that was performed at the proposed entrance ramp area, B-105, encountered an upper layer of uncontrolled fill that extended to approximately 4.5 feet. Below the uncontrolled fill are similar clayey silt/silt soils with occasional thin layers of sand and clay. This clayey silt extended to approximately 25.0 feet and it is loose to medium dense. The driller noted at 25.0 feet sand and gravel pushed 3 feet into the augers and the boring was stopped.

Three borings were performed in the proposed parking lot area, borings 106, 107 and 108. These borings encountered an upper layer of uncontrolled fill that extended to between approximately 3.0 and 9.0 feet below the existing ground surface. This uncontrolled fill contains a mixture of sand, clayey silt, gravel and occasional cobbles. This uncontrolled fill is medium dense to dense. A layer of very dense cobbles was encountered in boring 108 at between approximately 7.0 and 9.5 feet. Beneath the uncontrolled fill, organic soils were encountered. The organic soils are predominately peat with occasional layers of organic silt and sand. In boring 107 the organic soil only extended to approximately 5 feet. In borings 106 and 108 the organic soils extended to between approximately 30.0 and 33.0 feet. Medium to dense gravel with some sand and a trace to some silt was encountered blow the organic soils at these locations to a depth of between 32.0 and 37.0 feet.

GROUNDWATER CONDITIONS:

Based on the groundwater levels observed during the boring and test pit investigation, the moisture condition of the samples recovered from the boring holes and coloration of the soil samples, I judge that the groundwater level was located below depth of 1.0 feet.

Perched groundwater tables may occur at higher elevations in the soil profile due to groundwater being retained by layers or lenses of silt or clay soils. Some fluctuation in hydrostatic groundwater levels and perched water conditions should be anticipated with variations in the seasonal rainfall and surface runoff.

It should be noted that the groundwater levels were obtained during the drilling procedure and test pit excavations. Actual water levels may vary at the time of construction. Some groundwater could be encountered in soil layers labeled moist to wet on the boring logs.

ANALYSIS AND RECOMMENDATIONS:

The borings for the proposed building encountered highly varying soil conditions within a relatively small area. Boring 101 encountered organic soils to a depth of approximately 80 feet and boring 102, which was performed approximately 150 feet away, encountered no organic soil. The presence of the deep organic soils will, in my opinion, require that the proposed building be supported on deep foundations such as pipe piles to prevent greater than normal settlements in the building. Because of this large variation in soil conditions it is my opinion that if the owner decides to build on this location that additional soil borings be performed or test piles be driven to better estimate the length piles would have to be driven. In my opinion test piles would provide the best information.

Building Foundations and Floor Slabs:

As noted because of the thickness of the organic soils encountered and the potential for greater than normal settlements of the proposed building and floor slab, it is my opinion that the building should be supported by deep foundations that extend into the dense clayey silt/silt layer and the floor slabs supported by grade beams which in turn are supported by deep foundations.

In my opinion driven piles would be more economical than drilled piers because of the potential difficulty installing drilled piers through the organic soils. The one deep boring performed in the building area never encountered bedrock or refusal to a depth of 160.0 feet. The soils encountered below the organic soils are generally clayey silt/silt soils. These soils became dense at approximately 105.0 feet and these dense soils extended to at least 122.0 feet. Cone penetration tests performed on the adjacent site encountered refusal at 95 feet. In my opinion pipe piles driven into these materials would achieve the required resistances more quickly than H piles.

I recommend that pipe piles be used to support the proposed structure. Pipe piles with a minimum diameter of 10.75 inches and driven to 5 blows per inch with an 18,000 ft-lbs hammer can be designed for 40 ton bearing pressure. I estimate that driven pipe piles could extend to depths of between 110 and 120 feet. Additional soil borings or test piles should be installed to better determine the depth required to achieve the required design bearing pressure. It is possible that the installation

and testing of test piles could allow for higher design bearing pressures. The test piles and a minimum of two production piles should be tested during installation with a pile driving analyzer to verify the design recommendations. All pile driving should be performed by an experienced contractor and the installation of the piles should be monitored by a licensed engineer or their representative.

The proposed floor slab should be supported by grade beams which in turn are supported by pile foundations. As noted the existing soils will experience greater than normal settlements. Utilities under the floor slab should be designed to be supported by the floor slab and utility connections into or out of the building should be flexible to allow for differential movements.

Parking Lots and Entrance Ramp:

The pavement design will be performed by the site engineer. I have included settlement estimates for the proposed area to aid in the pavement and utility design. It should be noted, that the parking lot area and portions of the sidewalk and/or building that area supported by pile foundations will experience greater than normal amounts of differential settlement. Some maintenance of these transition areas will be required as settlements occur.

Two of the three soil borings performed in the proposed parking lot area encountered significant organic deposits. This area will require filling to raise the grades for the parking lot. Depending on the final surface elevation it appears that between approximately 2 and 4 feet of fill will be required. Borings 106 and 108 encountered between approximately 18 and 23 feet of organic soils. Based on the loading, moisture content, and thickness of the organic soils; I have estimated that settlements of between approximately 3 and 9 inches could occur in these areas of the parking lot. Consolidation testing would be required to refine these estimates. In locations where the organic soils are thinner, near B-107, the settlement will be less.

Boring B-105 was performed near the location of the proposed entrance. I do not have proposed grading plan for this area, but the roadway elevation is approximately 402 and the existing ground surface near the bottom of the slope is approximately elevation 387. This would result in approximately 15 feet or less fill thickness near the roadway. Assuming that the roadway is approximately 40 feet wide, I have estimated that the settlement, due to the fill soils over the virgin clayey

silt/silt soils would be between approximately 0.75 and 1.25 inches. I would estimate that approximately ½ of this settlement would occur during construction.

Seismic Conditions:

The potential seismic conditions at the proposed site have been investigated using the information provided The NYS Building Code Section 1613 and 18 and the boring information obtained during my investigation.

Based on the boring data obtained during the boring investigation it is my opinion that the Site Classification (Table 1615.1.1) could be assumed to be F because of the thickness of the organic soils encountered. Because of the F site classification a site specific analysis will be required. This analysis can be performed a part of the Phase II work if requested by the client.

CONSTRUCTION PROCEDURES AND PROBLEMS:

The NYS Building Code Section 17 requires special inspections and follow up reports. These inspections should be performed to verify compliance with the recommendations contained in this report.

I recommend that a minimum of 4 test piles be installed to verify the design recommendations and to better determine the depths pile will be required to be driven to achieve the design requirements. Pile driving analyzer testing should be performed on each of these piles to verify the design loading.

The installation of all piles should monitored by a licensed engineer or their representative. Pile driving analyzer testing should be performed on a minimum of two production piles.

All excavations of more than a few feet should be sheeted and braced or laid back to prevent sloughing in of the sides.

Excavations should not extend below adjacent footings or structures unless properly designed sheeting and bracing or underpinning is installed.

Sump-pit and sump-pump-type dewatering may be required in excavations or low areas during wet weather or if groundwater is encountered. If large quantities of groundwater are encountered

vacuum wells maybe required to stabilize the subgrade soils. All dewatering programs should be designed to prevent bottom heave. Any dewatering program should be performed with properly designed filtration protection on all pumps to prevent loss of ground.

Subgrades should be kept from freezing during construction.

Water, snow, and ice should not be allowed to collect and stand in excavations or low areas of the subgrade.

Some obstacles, including possibly cobbles, may be encountered in excavations.

Design and construction procedures should include measures to limit the potential for slab curl and vapor transmission. The shrinkage properties of the concrete should be controlled and the curing of the concrete controlled. Differential shrinkage between the top and bottom of the slabs could otherwise result in curling of the slabs. The control of vapor transmission through the slab should also be addressed. These phenomena may be only indirectly related to soil conditions. The architect/engineer should address this aspect of the design.

Current American Concrete Institute recommendations for the design and construction of floor slabs and the control of shrinkage, slab curl and vapor transmission can be referred to.

Dover Village Retail Building
Alternative Location Phase I
Dover Plains, New York
File No. 2247

CONTENTS OF APPENDIX:

1. General Notes
2. Boring Diagram
3. Boring Logs
4. Laboratory Test Results
5. Unified Soil Classification System
6. Soil Use Chart
7. General Qualifications

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS

SS : Split-Spoon — 1¾ " I.D., 2" O.D., except where noted
S : Shelby Tube — 2" O.D., except where noted
PA : Power Auger Sample
DB : Diamond Bit — NX: BX: AX:
CB : Carboloy Bit — NX: BX: AX:
OS : Osterberg Sampler — 3" Shelby Tube
HS : Housel Sampler
WS : Wash Sample
FT : Fish Tail
RB : Rock Bit
WO : Wash Out

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon, except where noted

WATER LEVEL MEASUREMENT SYMBOLS

WL : Water Level
WCI : Wet Cave In
DCI : Dry Cave In
WS : While Sampling
WD : While Drilling
BCR : Before Casing Removal
ACR : After Casing Removal
AB : After Boring

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In impervious soils the accurate determination of ground water elevations is not possible in even several day's observation, and additional evidence on ground water elevations must be sought.

CLASSIFICATION

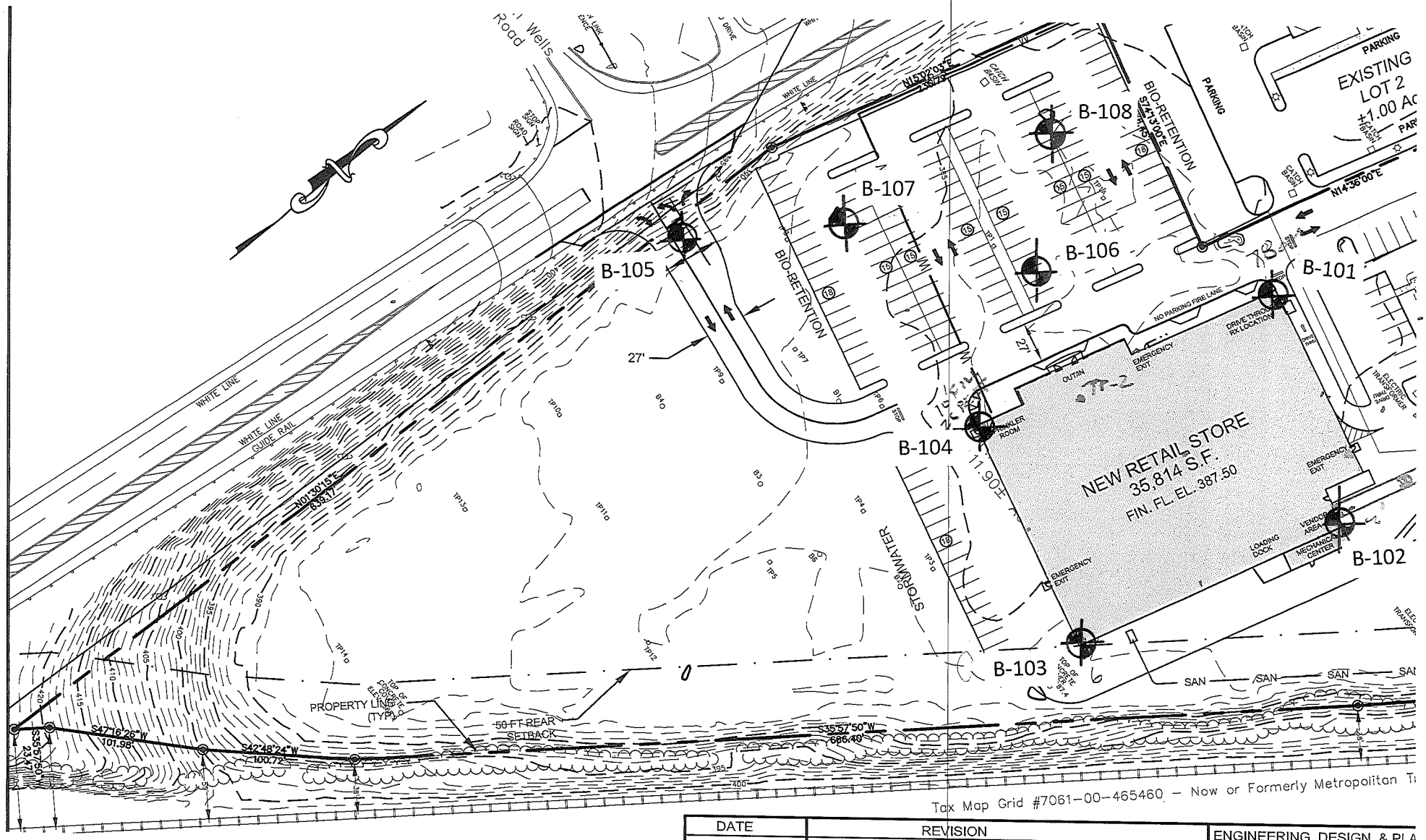
COHESIONLESS SOILS

"Trace"	: 1% to 10%	
"Trace to some"	: 10% to 20%	
"Some"	: 20% to 35%	
"And"	: 35% to 50%	
Loose	: 0 to 9 Blows	or equivalent
Medium Dense	: 10 to 29 Blows	
Dense	: 30 to 59 Blows	
Very Dense	: ≥60 Blows	

COHESIVE SOILS

If clay content is sufficient so that clay dominates soil properties, then clay becomes the principle noun with the other major soil constituent as modifiers: i.e., silty clay. Other minor soil constituents may be added according to classification breakdown for cohesionless soils; i.e., silty clay, trace to some sand, trace gravel.

Soft	: 0.00 — 0.59 tons/ft^2
Medium	: 0.60 — 0.99 tons/ft^2
Stiff	: 1.00 — 1.99 tons/ft^2
Very Stiff	: 2.00 — 3.99 tons/ft^2
Hard	: ≥ 4.00 tons/ft^2


B-101
B-102
B-103
B-104
B-105
B-106
B-107
B-108
NEW RETAIL STORE
35,814 S.F.
F/N. FL. EL. 387.50
EXISTING
LOT 2
+1.00 Ac
PARKING
BIO-RETENTION
STORMWATER
WHITE LINE
WHITE LINE GUIDE RAIL
NO PARKING FIRE LANE
EMERGENCY EXIT
DRIVE-THROUGH RX LOCATION
SPRINKLER ROOM
LOADING DOCK
MECHANICAL CENTER
VENDOR AREA
CATCH BASIN
ELECTRIC TRANSFORMER
PROPERTY LINE (TYP.)
50 FT REAR SETBACK
N15°02'03"E
239.73'
S74°37'00"E
N14°38'00"E
N01°30'15"E
839.17'
S47°16'26"W
101.98'
S42°48'24"W
100.72'
S35°57'50"W
686.49'
27'
11.90±
Tax Map Grid #7061-00-465460 - Now or Formerly Metropolitan T
DATE
REVISION
ENGINEERING, DESIGN, & PLA

BORING LOG

BORING NO: 101

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inchID

WATER LEVEL DEPTH: 7.0 ft **TIME:** WS

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Soil & Material Testing Inc

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
		PA				Topsoil
1						Fine to Coarse Sand, trace to some Gravel, Silt, Brown/Gray, Moist, Medium Dense (SM) FILL
2	1	SS	6-8-12-15	20		
3						Fine to Coarse Sand, some Gravel, trace to some Clayey Silt, Brown/Gray, Moist, Medium Dense (SM) FILL Driller Notes Cobbles
4	2	SS	7-9-11-13	20		
5						
6	3	SS	5-6-9-13	15		
7						Fine to Coarse Sand, some Clayey Silt, trace Gravel, Brown/Gray, Wet, Medium Dense (SM) FILL
8	4	SS	11-12-6-6	18		
9		PA				No Recovery
10						
11	5	SS	2-12-17-2	29		
12						Peat, Black, Wet, Loose (Pt)
13	6	SS	WRH-2-2	2		
14		PA				
15						
16	7	SS	WRH-1-1	1		
17						
18		PA				
19						
20						
21	8	SS	1-WRH-1-1	1		Peat, trace to some Sand, Black/Gray, Wet, Loose (Pt)(SM) Occasional Thin Sand Layers
22						
23		PA				
24						Fine to Medium Sand, trace to some Silt, trace Peat, Gray, Wet, Loose (SM)
25						
26	9	SS	2-2-3-4	5		Peat and Sand, trace Wood, Gray/Black, Loose (Pt)(SM) Layered
27						

BORING LOG

BORING NO: 101

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inchID

WATER LEVEL DEPTH: 7.0 ft **TIME:** WS

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Soil & Material Testing Inc

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Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28, 29, 30		PA				Peat and Sand, trace Wood, Gray/Black, Loose (Pt)(SM) Layered
31, 32	10	SS	5-2-2-3	4		
33, 34, 35		PA				
36, 37	11	SS	5-3-2-2	5		
38, 39, 40		PA				Peat, trace to some Organic Silt, trace Sand, Black, Wet, Loose (Pt)(OL)(SM) Occasional Organic Silt layers and Thin Sand Layers
41, 42	12	SS	3-2-2-3	4		
43, 44, 45		PA				
46, 47	13	SS	2-3-3-3	6		
48, 49, 50		PA				
51, 52	14	SS	3-3-3-3	6		
53, 54		PA				

BORING LOG

BORING NO: 101

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inchID

WATER LEVEL DEPTH: 7.0 ft **TIME:** WS

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Soil & Material Testing Inc

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Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
55						Organic Silt, trace to some Peat, trace Sand, Black, Moist to Wet, Loose (OL)
56	15	SS	2-2-2-2	4		
57						
58		PA				Peat, trace to some Organic Silt, Black, Wet, Loose (Pt)
59						
60						
61	16	SS	WRH-2-2	2		
62						
63		PA				Clayey Silt, trace to some Organic Silt, Dark Gray, Wet, Loose (ML)(OL) Occasional Organic Silt Layers
64						
65						
66	17	SS	WRH-2-2-3	4		
67						
68		PA				Organic Silt and Clayey Silt, Dark Gray, Wet, Loose (OL)(ML) Layered
69						
70						
71	18	SS	2-2-2-3	4		
72						
73		PA				Organic Silt and Clayey Silt, trace Peat, Dark Gray, Wet, Loose (OL)(ML) Layered
74						
75						
76	19	SS	2-3-3-3	6		
77						
78		PA				
79						
80						
81	20	SS	7-8-9-15	17		

BORING LOG

BORING NO: 101

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inchID

WATER LEVEL DEPTH: 7.0 ft **TIME:** WS

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Soil & Material Testing Inc

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DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
	20			17		Fine to Coarse Sand, some Clayey Silt, trace Gravel, Gray, Wet, Medium Dense (SM)
82						
83		PA				Fine to Coarse Sand and Gravel, trace to some Silt, Dark Gray, Wet, Dense (SM-GM)
84						
85						
86	21	SS	12-15-17-19	32		
87						
88		PA				
89						
90						
91	22	SS	8-9-14-18	23		Clayey Silt, trace to some Fine Sand, Dark Gray, Wet, Medium Dense to Dense (ML) Occasional Thin Sand Layers
92						
93		PA				
94						
95						
96	23	SS	12-14-15-17	29		
97						
98		PA				
99						
100						
101	24	SS	18-18-29-30	47		
102						
103		PA				
104						
105						
106	25	SS	13-16-19-22	35		
107						
108						

BORING LOG

BORING NO: 101

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

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HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inchID

WATER LEVEL DEPTH: 7.0 ft **TIME:** WS

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Soil & Material Testing Inc

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Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
109		PA				Clayey Silt, trace to some Fine Sand, Dark Gray, Wet, Medium Dense to Dense (ML) Occasional Thin Sand Layers
110						
111	26	SS	15-18-21-25	39		
112						
113		PA				
114						
115						
116	27	SS	15-17-22-24	39		
117						
118		PA				Clayey Silt, trace to some Sand, trace Clay, Dark Gray, Wet, Dense (ML)(SM)(CL) Occasional Sand Layers and Thin Clay Layers
119						
120						
121	28	SS	18-22-25-27	47		
122						Driller Notes Clayey Silt with Fine Sand Layers
123						
124						
125						
126						
127						
128		RB				
129						
130						
131						
132						
133						
134						
135						

BORING LOG

BORING NO: 101

PROJECT NAME: Dover Village Store

FILE NUMBER: 2247

LOCATION: Dover Plains, New York

OFFSET: None

DATE STARTED/COMPLETED: March 2011

SURFACE ELEV.: N/A

ENGINEER/ARCHITECT: Rennia Engineering

DRILL CONTRACTOR: Soil & Material Testing Inc

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inchID

WATER LEVEL DEPTH: 7.0 ft **TIME:** WS

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DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
136						
137						
138						
139						
140						
141						
142						
143						
144						
145						
146						
147						
148		RB				
149						Driller Notes Clayey Silt with Fine Sand Layers
150						
151						
152						
153						
154						
155						
156						
157						
158						
159						
160						End of Boring at 160.0 Feet
161						
162						

BORING LOG

BORING NO: 102

SHEET 1 of 1

PROJECT NAME: Dover Village Store

FILE NUMBER: 2247

LOCATION: Dover Plains, New York

OFFSET: None

DATE STARTED/COMPLETED: March 2011

SURFACE ELEV.: N/A

ENGINEER/ARCHITECT: Rennia Engineering

DRILL CONTRACTOR: Soil & Material Testing Inc

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inchID

WATER LEVEL DEPTH: 5.0 ft **TIME:** WS

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DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
						Topsoil
1–2	1	SS	12-11-10-10	21		Fine to Coarse Sand, trace to some Gravel, Silt, Brown, Moist, Medium Dense (SM-SP) Possible Fill
3–4	2	SS	9-11-7-9	18		Clayey Silt, trace to some Fine Sand,Brown/Gray, Moist to Wet, Medium Dense (ML)
5–6	3	SS	5-5-7-8	12		Silt, trace to some Fine Sand, Brown/Gray, Moist to Wet, Medium Dense (ML)(SM) Occasional Sand Layers
7–8	4	SS	6-7-8-8	15		Silt, trace Fine Sand, Gray, Wet, Medium Dense (ML)
9–10		PA				
11–12	5	SS	2-2-3-4	5		Silt, trace to some Clay, trace Sand, Gray, Wet, Loose/Soft (ML) (CL) Occasional Thin Clay and Sand Layers
13–14–15		PA				
16–17	6	SS	2-2-2-2	4		
18–19–20		PA				
21–22	7	SS	1-3-3-4	6		
23–24–25–26–27						End of Boring at 22.0 Feet

BORING LOG

BORING NO: 103

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inch ID

WATER LEVEL DEPTH: 3.0 ft **TIME:** ACR

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.:

DRILL CONTRACTOR: Soil & Material Testing Inc

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
						Topsoil
1–2	1	SS	5-7-11-12	18		Fine to Coarse Silt, some Gravel, trace to some Silt, trace Ash, Brown, Moist, Medium Dense, (SM) FILL
3–4	2	SS	6-5-2-2	7		Fine to Coarse Sand, trace to some Silt and Ash, trace Gravel, Coal, Brown/Gray, Moist, Loose (SM) FILL
5–6	3	SS	2-2-5-9	7		
7–8	4	SS	11-9-8-6	17		Fine to Coarse Sand, some Gravel, trace to some Clayey Silt, Gray, Moist, Medium Dense (SM) FILL Fine to Medium Gravel and Sand, trace to some Clayey Silt, Brown/Gray, Moist to Wet, Medium Dense (GM-SM) Possible Fill
9–10		PA				
11–12	5	SS	8-12-11-13	23		Medium to Coarse Gravel, some Sand, trace to some Silt, Brown, Wet, Medium Dense (GM-GP) Possible Fill Driller Note Cobbles
13–14–15		PA				Clayey Silt, trace Fine Sand, Clay, Brown/Gray, Moist to Wet, Medium Dense (ML)(SM)(CL) Occasional Thin Sand and Clay Layers
16–17	6	SS	5-6-6-5	12		
18–19–20		PA				Silt, some Sand, Brown, Wet, Medium Dense (ML)(SM) Silt with Sand Layers
21–22	7	SS	4-5-5-5	10		
23–24–25		PA				Silt, some Sand, trace Gravel, Gray, Wet, Medium Dense (ML) Occasional Sand Layers
26–27	8	SS	3-5-8-8	13		

BORING LOG

BORING NO: 103

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inch ID

WATER LEVEL DEPTH: 3.0 ft **TIME:** ACR

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.:

DRILL CONTRACTOR: Soil & Material Testing Inc

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28, 29, 30		PA				Clayey Silt, trace to some Fine Sand, trace Clay, Brown, Wet, Medium Dense (ML)(SM)(CL) Occasional Thin Sand and Clay Layers
31, 32	9	SS	5-7-8-9	15		
33, 34, 35		PA				Clayey Silt, trace to some Fine Sand, trace Clay, Gray, Wet, Medium Dense (ML)(SM)(CL) Occasional Thin Sand and Clay Layers
36, 37	10	SS	5-6-6-6	12		
38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54						End of Boring at 37.0 Feet

BORING LOG

BORING NO: 104

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inch ID

WATER LEVEL DEPTH: 3.0 ft **TIME:** ACR

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.:

DRILL CONTRACTOR: Soil & Material Testing Inc

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1	1	SS	3-5-6-8	11		Topsoil
2						Fine to Coarse Sand, some Gravel, trace to some Silt, Brown, Moist to Wet, Medium Dense (SM) FILL
3	2	SS	5-4-20-11	24		Driller Notes Cobbles Fine to Coarse Sand, some Clayey Silt, trace to some Gravel, Brown/Gray, Moist to Wet, Medium Dense (SM) FILL
4						
5	3	SS	7-12-4-5	16		Clayey Silt, trace to some Fine Sand, trace Wood, Brown, Moist, Loose (ML) FILL
6						
7	4	SS	3-2-2-3	4		Fine to Coarse Sand, trace to some Cinders, Brick, Glass, Dark Brown/Gray, Wet, Loose (SM) FILL
8						
9		PA				
10						
11	5	SS	4-3-3-3	6		Fine to Medium Sand and Peat, Black, Wet, Loose (SM-Pt)
12						
13		PA				Peat, trace to some Organic Silt, trace Fine Sand, Black, Wet, Loose (Pt)(OL) Occasional Layers of Organic Silt
14						
15						
16	6	SS	1-2-1-2	3		Peat, Black, Wet, Loose (Pt)
17						
18		PA				
19						
20						
21	7	SS	1-1-1-1	2		
22						
23		PA				Organic Silt, trace to some Silty Clay, Gray, Wet, Loose (OL)(CL) Occasional Thin Clay Layers
24						
25						
26	8	SS	WRH-2-2	2		
27						

BORING LOG

BORING NO: 104

SHEET 2 of 2

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inch ID

WATER LEVEL DEPTH: 3.0 ft **TIME:** ACR

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.:

DRILL CONTRACTOR: Soil & Material Testing Inc

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28, 29, 30		PA				Organic Silt, trace to some Silty Clay, Gray, Wet, Loose (OL)(CL) Occasional Thin Clay Layers
31, 32	9	SS	7-7-8-10	15		Fine to Coarse Sand, some Gravel, Clayey Silt, Brown/Gray, Wet, Medium Dense (SM)
33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54						End of Boring at 32.0 Feet

BORING LOG

BORING NO: 105

SHEET 1 of 1

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inch ID

WATER LEVEL DEPTH: 3.5 ft **TIME:** WS

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.:

DRILL CONTRACTOR: Soil & Material Testing Inc

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
						Topsoil
1–2	1	SS	5-11-7-7	18		Clayey Silt and Gravel, trace to some Sand, Brown, Moist, Medium Dense (ML-GM) FILL
3–4	2	SS	11-11-11-6	22		Fine to Coarse Sand, some Gravel, trace Silt, Dark Brown, Wet, Medium Dense (SM) FILL
5–6	3	SS	6-9-9-9	18		Clayey Silt, trace Sand, Brown/Gray, Wet, Medium Dense (ML)
7–8	4	SS	6-6-6-5	12		Clayey Silt, trace Clay, Fine Sand, Brown/Gray, Wet, Medium Dense (ML)(CL)(SM) Occasional Thin Clay and Sand Layers
9–13		PA				Clayey Silt, trace to some Clay, trace Fine Sand, Dark Gray, Wet, Loose (ML)(CL)(SM) Occasional Clay and Thin Sand Layers Vane Shear at 10 Feet = 1426 psf Remolded = 584 psf
14–15	5	SS	1-2-2-2	4		
16–20		PA				Vane Shear at 16.5 feet = 1154 psf Remolded 408 psf Vane Shear at 19 feet = 1223 psf Remolded 475 psf
21–22	6	SS	6-4-5-5	9		Clayey Silt, trace to some Sand, trace Clay, Gray, Wet, Loose (ML)(SM)(CL) Occasional Thin Sand and Clay Layers
23–25		PA				Medium to Coarse Sand, trace Silt Gravel Driller Notes Sand Pushed 3 feet up into Augers.
26–27						End of Boring at 25.0 Feet

BORING LOG

BORING NO: 106

SHEET 1 of 2

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inch ID

WATER LEVEL DEPTH: 1.0 ft **TIME:** BCR

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.:

DRILL CONTRACTOR: Soil & Material Testing Inc

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
						Topsoil
1–2	1	SS	3-5-6-9	11		Fine to Coarse Sand and Gravel, trace to some Clayey Silt, Brown, Wet, Medium Dense (SM-GM) FILL
3–4	2	SS	12-22-16-21	38		Fine to Coarse Sand, some Clayey Silt, trace to some Gravel, Brown/Gray, Moist, Dense (SM) FILL
5–6	3	SS	7-8-8-21	16		
7–8	4	SS	11-6-6-6	12		Fine to Coarse Sand, some Clayey Silt, trace to some Gravel, Brown/Gray, Moist, Dense (SM) FILL Fine to Medium Sand, some Gravel, trace to some Silt, Light Brown, Moist to Wet, Medium Dense (SM) FILL Driller Notes Cobbles
9–10		PA				
11–12	5	SS	11-5-5-4	10		
13–14–15		PA				Peat, trace Sand, Wood, Black, Wet, Loose (Pt)
16–17	6	SS	2-2-2-2	4		
18–19–20		PA				
21–22	7	SS	21-2-2-2	4		
23–24–25		PA				
26–27	8	SS	WRH-2-2	2		

BORING LOG

BORING NO: 106

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inch ID

WATER LEVEL DEPTH: 1.0 ft **TIME:** BCR

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.:

DRILL CONTRACTOR: Soil & Material Testing Inc

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28, 29		PA				Peat, trace Sand, Wood, Black, Wet, Loose (Pt)
30, 31	9	SS	WRH-1-2	3		Organic Silt, trace to some Peat, trace Sand, Gray, Wet, Loose (OL)
32						Clayey Silt, trace to some Organic Silt, Gray, Wet, Loose (ML)
33, 34		PA				Medium Gravel, some Sand, trace to some Clayey Silt, Gray, Wet, Dense (GM) Driller Notes Cobbles
35, 36	10	SS	13-16-17-19	33		
37						End of Boring at 37.0 Feet
38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54						

BORING LOG

BORING NO: 107

SHEET 1 of 1

PROJECT NAME: Dover Village Store

FILE NUMBER: 2247

LOCATION: Dover Plains, New York

OFFSET: None

DATE STARTED/COMPLETED: March 2011

SURFACE ELEV.:

ENGINEER/ARCHITECT: Rennia Engineering

DRILL CONTRACTOR: Soil & Material Testing Inc

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inch ID

WATER LEVEL DEPTH: 4.0 ft **TIME:** ACR

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1	1	SS	2-3-7-6	10		Topsoil Fine to Coarse Sand, some Gravel, trace to some Clayey Silt, Brown, Moist, Medium Dense (SM) FILL
2						
3		PA				Driller Notes Peat
4						
5						
6	2	SS	3-5-5-8	10		Fine to Coarse Sand, trace to some Clayey Silt, Gravel, Brown, Wet, Medium Dense (SM)
7						
8		PA				Silt and Fine Sand, trace Clay, Dark Brown, Wet, Loose (ML-SM) (CL) Occasional Thin Clay Layers
9						
10						
11	3	SS	3-3-4-7	7		
12						
13		PA				Clayey Silt, trace Clay, Fine Sand, Dark GRay, Wet, Loose (ML) (SM)(CL) Occasional Thin Sand and Clay Layers
14						
15						
16	6	SS	3-5-6-5	11		
17						
18		PA				Clayey Silt, trace to some Clay, trace Sand, Dark Gray, Wet, Loose/Soft (ML)(CL) Occasional Thin Clay Layers
19						
20						
21	7	SS	4-2-2-2	4		
22						End of Boring at 22.0 Feet
23						
24						
25						
26						
27						

BORING LOG

BORING NO: 108

SHEET 1 of 2

PROJECT NAME: Dover Village Store

LOCATION: Dover Plains, New York

DATE STARTED/COMPLETED: March 2011

ENGINEER/ARCHITECT: Rennia Engineering

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inch ID

WATER LEVEL DEPTH: 1.0 ft **TIME:** ACR

FILE NUMBER: 2247

OFFSET: None

SURFACE ELEV.: N/A

DRILL CONTRACTOR: Soil & Material Testing Inc

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
1	1	SS	4-8-8-21	16		Topsoil
2						Fine to Coarse Sand, some Gravel, trace to some Clayey Silt, Brown/Gray, Moist, Medium Dense (SM) FILL Driller Notes Cobbles
3	2	SS	17-14-15-19	29		Medium to Coarse Gravel, some Sand, trace to some Clayey Silt, Brown/Gray, Medium Dense to Dense (GM) FILL Driller Notes Cobbles
4						
5	3	SS	11-24-15-33	39		
6						
7	4	SS	34-60	94		Fine to Coarse Sand, some Gravel, Clayey Silt, Brown, Moist to Wet, Very Dense (SM) FILL
8		PA				Boulder or Cobbles FILL
9						Fine to Coarse Sand, some Clayey Silt, Peat, trace Gravel, Brown/Black, Wet, Medium Dense (SM)
10						
11	5	SS	11-10-5-5	15		
12						
13		PA				Peat, trace Sand, Wood, Black, Wet, Loose (Pt)
14						
15						
16	6	SS	5-4-3-3	7		
17						
18		PA				
19						
20						
21	7	SS	2-2-2-2	4		
22						
23		PA				
24						
25						
26	8	SS	2-2-2-2	4		
27						

BORING LOG

BORING NO: 108

PROJECT NAME: Dover Village Store

FILE NUMBER: 2247

LOCATION: Dover Plains, New York

OFFSET: None

DATE STARTED/COMPLETED: March 2011

SURFACE ELEV.: N/A

ENGINEER/ARCHITECT: Rennia Engineering

DRILL CONTRACTOR: Soil & Material Testing Inc

DRILLING METHOD: Hollow Steam Auger

DRILL RIG TYPE: Truck Mount

HAMMER WEIGHT: 140 Lbs

DROP: 30 Inches

CASING DIAMETER: OD/ID: 3.25 inch ID

WATER LEVEL DEPTH: 1.0 ft **TIME:** ACR

Daniel G Loucks PE
PO Box 163
Ballston Spa, New York 12020
Phone: 518-371-7622
Fax: 518-383-2069

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value	Recovery	DESCRIPTION
28 29 30		PA				Peat, trace Sand, Wood, Black, Wet, Loose (Pt)
31	9	SS	7-9-9-10	18		Medium Gravel, some Sand, trace to some Clayey Silt, Gray, Moist to Wet, Medium Dense (GM)
32						End of Boring at 32.0 Feet
33						
34						
35						
36						
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CONSTRUCTION TECHNOLOGY

INSPECTION & TESTING DIVISION, P.D.& T.S., INC.
4 William Street, Ballston Lake, New York 12019
Phone: (518) 399-1848 Fax: (518) 399-1913

CLIENT: **DANIEL LOUCKS, P.E.**
POST OFFICE BOX 163
BALLSTON SPA, NEW YORK 12020

REPORT NUMBER: 1 : PAGE: 1
REPORT DATE: 03/22/11
OUR FILE NUMBER: 750.001
LAB CONTROL NUMBER: 12295

ATT'N: MR. DANIEL LOUCKS, P.E.
PROJECT: **DOVER PLAINS SHOPPING CENTER**

A.S.T.M. D-2216: DETERMINATION OF WATER (MOISTURE) CONTENT IN SOILS

SAMPLE ID:	WET WEIGHT (g)	DRY WEIGHT (g)	MOISTURE CONTENT
B-101, S-7, 15-17'	178.7	61.4	**191.0%**
B-104, S-6, 15-17'	161.1	65.5	**146.0%**
B-104, S-8, 25-27'	261.3	158.0	**65.4%**
B-106, S-5, 10-12'	203.7	72.0	**182.9%**
B-106, S-7, 20-22'	149.0	57.2	**160.5%**
B-106, S-8, 25-27'	204.0	96.6	**111.2%**
B-108, S-6, 15-17'	189.2	70.3	**169.1%**
B-108, S-8, 25-27'	258.6	138.5	**86.7%**

REPORT DISTRIBUTION
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RESPECTFULLY,
CONSTRUCTION TECHNOLOGY

TOM JOSLIN, S.E.T. (NICET)
MANAGER TECHNICAL SERVICES

CONSTRUCTION TECHNOLOGY

INSPECTION & TESTING DIVISION, P.D.& T.S., INC.
4 William Street, Ballston Lake, New York 12019
Phone: (518) 399-1848 Fax: (518) 399-1913

CLIENT: **DANIEL LOUCKS, P.E.**
POST OFFICE BOX 163
BALLSTON SPA, NEW YORK 12020

ATT'N: MR. DANIEL LOUCKS, P.E.

PROJECT: **DOVER PLAINS SHOPPING CENTER**

REPORT NUMBER: 1 : PAGE: 1
REPORT DATE: 03/22/11
OUR FILE NUMBER: 750.001
LAB CONTROL NUMBER: 12295

A.S.T.M. D-2974: DETERMINATION OF ORGANIC CONTENT IN SOILS

SAMPLE ID:	INITIAL WEIGHT (g)	FINAL WEIGHT (g)	ORGANIC CONTENT
B-101, S-7, 15-17'	37.00	27.41	**25.9%**
B-104, S-6, 15-17'	30.32	23.91	**21.1%**
B-106, S-5, 10-12'	33.68	24.79	**26.4%**

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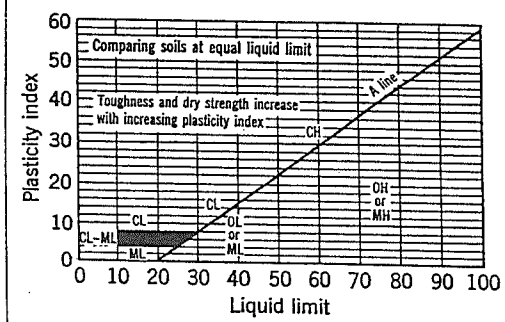
TOM JOSLIN, S.E.T. (NICET)
MANAGER TECHNICAL SERVICES

Table 3.5 Unified Soil Classification

Field Identification Procedures (Excluding particles larger than 3 in. and basing fractions on estimated weights)				Group Symbols [a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria	
Coarse-grained soils More than half of material is *larger* than No. 200 sieve size[b] (The No. 200 sieve size is about the smallest particle visible to naked eye)	Gravels More than half of coarse fraction is larger than No. 4 sieve size (For visual classification, the ¼ in. size may be used as equivalent to the No. 4 sieve size)	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand*, gravelly; about 20% hard, angular gravel particles ½-in. maximum size; rounded and subangular sand grains coarse to fine, about 15% nonplastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Use grain size curve in identifying the fractions as given under field identification Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than No. 200 sieve size) coarse grained soils are classified as follows: Less than 5% *GW, GP, SW, SP* More than 12% *GM, GC, SM, SC* 5% to 12% *Borderline* cases requiring use of dual symbols	$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			Predominantly one size or a range of sizes with some intermediate sizes missing	*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines			Not meeting all gradation requirements for *GW*
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see *ML* below)	*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures			Atterberg limits below "A" line, or *PI* less than 4 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)	*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures			Atterberg limits above "A" line, with *PI* greater than 7
	Sands More than half of coarse fraction is smaller than No. 4 sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes	*SW*	Well graded sands, gravelly sands, little or no fines			$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3
			Predominantly one size or a range of sizes with some intermediate sizes missing	*SP*	Poorly graded sands, gravelly sands, little or no fines			Not meeting all gradation requirements for *SW*
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)	*SM*	Silty sands, poorly graded sand-silt mixtures			Atterberg limits below "A" line or *PI* less than 5 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols
			Plastic fines (for identification procedures, see *CL* below)	*SC*	Clayey sands, poorly graded sand-clay mixtures			Atterberg limits below "A" line with *PI* greater than 7
Fine-grained soils More than half of material is *smaller* than No. 200 sieve size	Identification Procedures on Fraction Smaller than No. 40 Sieve Size							
		Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)				
	Silts and clays liquid limit less than 50	None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)	
		Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
		Slight to medium	Slow	Slight	*OL*	Organic silts and organic silt-clays of low plasticity		
	Silts and clays liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
		High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays		
		Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity		
Highly Organic Soils		Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils		



Plasticity chart for laboratory classification of fine grained soils

From Wagner, 1957.

[a] *Boundary classifications*. Soils possessing characteristics of two groups are designated by combinations of group symbols. For example *GW–GC*, well graded gravel-sand mixture with clay binder.

[b] All sieve sizes on this chart are U.S. standard.

Field Identification Procedure for Fine Grained Soils or Fractions

These procedures are to be performed on the minus No. 40 sieve size particles, approximately 1/64 in. For field classification purposes, screening is not intended, simply remove by hand the coarse particles that interfere with the tests.

Dilatancy (Reaction to shaking):

After removing particles larger than No. 40 sieve size, prepare a pat of moist soil with a volume of about one-half cubic inch. Add enough water if necessary to make the soil soft but not sticky.

Place the pat in the open palm of one hand and shake horizontally, striking vigorously against the other hand several times. A positive reaction consists of the appearance of water on the surface of the pat which changes to a livery consistency and becomes glossy. When the sample is squeezed between the fingers, the water and gloss disappear from the surface, the pat stiffens and finally it cracks or crumbles. The rapidity of appearance of water during shaking and of its disappearance during squeezing assist in identifying the character of the fines in a soil.

Very fine clean sands give the quickest and most distinct reaction whereas a plastic clay has no reaction. Inorganic silts, such as a typical rock flour, show a moderately quick reaction.

Dry Strength (Crushing characteristics):

After removing particles larger than No. 40 sieve size, mould a pat of soil to the consistency of putty, adding water if necessary. Allow the pat to dry completely by oven, sun or air drying, and then test its strength by breaking and crumbling between the fingers. This strength is a measure of the character and quantity of the colloidal fraction contained in the soil. The dry strength increases with increasing plasticity.

High dry strength is characteristic for clays of the CH group. A typical inorganic silt possesses only very slight dry strength. Silty fine sands and silts have about the same slight dry strength, but can be distinguished by the feel when powdering the dried specimen. Fine sand feels gritty whereas a typical silt has the smooth feel of flour.

Toughness (Consistency near plastic limit):

After removing particles larger than the No. 40 sieve size, a specimen of soil about one-half inch cube in size, is moulded to the consistency of putty. If too dry, water must be added and if sticky, the specimen should be spread out in a thin layer and allowed to lose some moisture by evaporation. Then the specimen is rolled out by hand on a smooth surface or between the palms into a thread about one-eight inch in diameter. The thread is then folded and re-rolled repeatedly. During this manipulation the moisture content is gradually reduced and the specimen stiffens, finally loses its plasticity, and crumbles when the plastic limit is reached.

After the thread crumbles, the pieces should be lumped together and a slight kneading action continued until the lump crumbles.

The tougher the thread near the plastic limit and the stiffer the lump when it finally crumbles, the more potent is the colloidal clay fraction in the soil. Weakness of the thread at the plastic limit and quick loss of coherence of the lump below the plastic limit indicate either inorganic clay of low plasticity, or materials such as kaolin-type clays and organic clays which occur below the A-line.

Highly organic clays have a very weak and spongy feel at the plastic limit.

Soil Characteristics Pertinent to Roads and Airfields

Major Divisions		Letter (1)	Name	Value as Subgrade When Not Subject to Frost Action	Value as Subbase When Not Subject to Frost Action	Value as Base When Not Subject to Frost Action	Potential Frost Action	Compressibility and Expansion	Drainage Characteristics	Compaction Equipment	Unit Dry Weight lb. per cu. ft.	Typical Design Values CBR (2)	Typical Design Values Subgrade Modulus k lb. per cu. in.
Coarse-Grained Soils	Gravel and Gravelly soils	GW	Well-graded gravels or gravel-sand mixtures, little or no fines	Excellent	Excellent	Good	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	125-140	40-80	300-500
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines	Good to excellent	Good	Fair to good	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller, steel-wheeled roller	110-140	30-60	300-500
		GM d	Silty gravels, gravel-sand-silt mixtures	Good to excellent	Good	Fair to good	Slight to medium	Very slight	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	125-145	40-60	300-500
		GM u		Good	Fair	Poor to not suitable	Slight to medium	Slight	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	115-135	20-30	200-500
		OC	Clayey gravels, gravel-sand-clay mixtures	Good	Fair	Poor to not suitable	Slight to medium	Slight	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	130-145	20-40	200-500
	Sand and Sandy soils	SW	Well-graded sands or gravelly sands, little or no fines	Good	Fair to good	Poor	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller	110-130	20-40	200-400
		SP	Poorly graded sands or gravelly sands, little or no fines	Fair to good	Fair	Poor to not suitable	None to very slight	Almost none	Excellent	Crawler-type tractor, rubber-tired roller	105-135	10-40	150-400
		SM d	Silty sands, sand-silt mixtures	Fair to good	Fair to good	Poor	Slight to high	Very slight	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	120-135	15-40	150-400
		SM u		Fair	Poor to fair	Not suitable	Slight to high	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	100-130	10-20	100-300
		SC	Clayey sands, sand-clay mixtures	Poor to fair	Poor	Not suitable	Slight to high	Slight to medium	Poor to practically impervious	Rubber-tired roller, sheepsfoot roller	100-135	5-20	100-300
Fine-Grained Soils	Silts and Clays LL is less than 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Poor to fair	Not suitable	Not suitable	Medium to very high	Slight to medium	Fair to poor	Rubber-tired roller, sheepsfoot roller; close control of moisture	90-130	15 or less	100-200
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Poor to fair	Not suitable	Not suitable	Medium to high	Medium	Practically impervious	Rubber-tired roller, sheepsfoot roller	90-130	15 or less	50-150
		OL	Organic silts and organic silt-clays of low plasticity	Poor	Not suitable	Not suitable	Medium to high	Medium to high	Poor	Rubber-tired roller, sheepsfoot roller	90-105	5 or less	50-100
	Silts and Clays LL is Greater than 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	Poor	Not suitable	Not suitable	Medium to very high	High	Fair to poor	Sheepsfoot roller, rubber-tired roller	80-105	10 or less	50-100
		CH	Inorganic clays of medium to high plasticity, organic silts	Poor to fair	Not suitable	Not suitable	Medium	High	Practically impervious	Sheepsfoot roller, rubber-tired roller	90-115	15 or less	50-150
		OH	Organic clays of high plasticity, fat clays	Poor to very poor	Not suitable	Not suitable	Medium	High	Practically impervious	Sheepsfoot roller, rubber-tired roller	80-110	5 or less	25-100
Highly Organic Soils		Pt	Peat and other highly organic soils	Not suitable	Not suitable	Not suitable	Slight	Very high	Fair to poor	Compaction not practical	—	—	—

Note:

(1) Unit Dry Weights are for compacted soil at optimum moisture content for modified AASHO compaction effort. Division of GM and SM groups into subdivision of d and u are for roads and airfields only. Subdivision is basis of Atterberg limits; suffix d (e.g., GMd) will be used when the liquid limit (LL) is 25 or less and the plasticity index is 6 or less; the suffix u will be used otherwise.

(2) The maximum value that can be used in design of airfields is, in some cases, limited by gradation and plasticity requirements.

GENERAL QUALIFICATIONS

This report has been prepared in order to aid in the evaluation of this property and to assist the architect and/or engineer in the design of this project. The scope of the project and location described herein, and my description of the project represents my understanding of the significant aspects relevant to soil and foundation characteristics. In the event that any changes in the design or location of the proposed facilities, as outlined in this report, are planned, I should be informed so the changes can be reviewed and the conclusions of this report modified or approved in writing by myself.

It is recommended that all construction operations dealing with earthwork and foundations be inspected by an experienced soil engineer to assure that the design requirements are fulfilled in the actual construction. If you wish, I would welcome the opportunity to review the plans and specifications when they have been prepared so that I may have the opportunity of commenting on the effect of soil conditions on the design and specifications.

The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings and/or test pits performed at the locations indicated on the location diagram and from any other information discussed in the report. This report does not reflect any variations which may occur between these boring and/or test pits. In the performance of subsurface investigations, specific information is obtained at specific locations at specific times. However, it is a well-known fact that variations in soil and rock conditions exist on most sites between boring locations and also such situations as groundwater conditions vary from time to time. The nature and extent of variations may may not become evident until the course of construction. If variations then appear evident, it will be necessary for a reevaluation of the recommendations of this report after performing on-site observations during the construction period and noting the characteristics of any variations.