

Project: Mill Plaza Redevelopment  
 Location: Durham, NH  
 Client: Colonial Durham Associates, LP

Boring No. B-1  
 Page 1 of 2  
 File No. M-1529002-04  
 Checked by: D. Brogan

Drilling Co. New England Boring Contractors  
 Foreman: Walter H.  
 T&B Rep.: E. Doremus  
 Date Start: 04/20/18 End: 04/20/18  
 Location See Exploration Location Plan  
 GS. Elev. ± 35' Datum: NAVD88

Casing HW Sampler Split Spoon  
 Type HW Split Spoon  
 I.D./O.D. 4"/4.5" 1-3/8"/2"  
 Hammer Wt. 140#  
 Hammer Fall 30"  
 Hammer Type Auto Hammer

Groundwater Readings				
Date	Time	Depth	Casing	Sta. Time
See Note 1				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		S-1 / 6	0.3-2.3	3-3		Loose, brown, fine to coarse SAND, some Silt, little Gravel	0.3' ASPHALT	1	No Well Installed
				6-6			FILL		
		S-2 / 16	2.3-4.3	3-4		3" of brown, fine to coarse SAND, some Gravel, some Silt; over 13" of stiff, brown, Silty CLAY	2.6'		
				6-8					
		S-3 / 24	4.3-6.3	10-12		Very stiff, brown, Silty CLAY			
10				16-16			Silty CLAY		
		S-4 / 24	9-11	3-4		Stiff, brown, Silty CLAY			
				5-7					
15									
		S-5 / 20	14-16	1-1		Soft, gray, CLAY & SILT, little Gravel			
20				2-1					
		S-6 / 24	19-21	WOR-WOH		Very soft, gray, CLAY & SILT		2	
				WOR/12"					
25									
		S-7 / 24	24-26	WOR/24"		Very soft, gray, CLAY & SILT			
30		S-8 / 24	29-31	WOR/24"		Very soft, gray, CLAY & SILT			

Notes:  
 1. Groundwater observed at depth of +/- 0.5' based on sample wetness  
 2. WOR=Weight of Rod; WOH=Weight of Hammer

Proportions Used	
TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency		
VERY LOOSE	0-4	VERY SOFT <2
LOOSE	4-10	SOFT 2-4
MEDIUM DENSE	10-30	MEDIUM 4-8
DENSE	30-50	STIFF 8-15
VERY DENSE	>50	VERY STIFF 15-30
		STIFF >30

Project: Mill Plaza Redevelopment  
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Boring No. B-1

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File No. M-1529002-04

Checked by: D. Brogan

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-8 / 24	29-31	WOR/24'		Very soft, gray, CLAY & SILT, trace fine to medium Sand	CLAY & SILT		No Well Installed
35						Bottom of Exploration at 31'			
40									
45									
50									
55									
60									
65									

Notes:

Project: Mill Plaza Redevelopment  
 Location: Durham, NH  
 Client: Colonial Durham Associates, LP

Boring No. B-2

Page 1 of 2

File No. M-1529002-04

Checked by: D. Brogan

Drilling Co. New England Boring Contractors  
 Foreman: Walter H.  
 T&B Rep.: E. Doremus  
 Date Start: 04/20/18 End: 04/20/18  
 Location See Exploration Location Plan  
 GS. Elev. ± 36' Datum: NAVD88

Casing Sampler  
 Type HW Split Spoon  
 I.D./O.D. 4"/4.5" 1-3/8"/2"  
 Hammer Wt. 140#  
 Hammer Fall 30"  
 Hammer Type Auto Hammer

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
See Note 1				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		S-1 / 8	0.3-2.3	15-15		Medium dense, brown, fine to coarse SAND, some Gravel, little Silt	0.3' ASPHALT	1	
				14-13					
		S-2 / 12	2.3-4.3	5-14		6" of gray-brown CLAY & SILT, trace fine Sand, slight organic odor; over 6" of very dense, gray, fine to coarse SAND and GRAVEL trace Silt	FILL		
				30-27					
10		S-3 / 16	4.3-6.3	11-8		Medium dense, brown fine to coarse SAND and SILT & CLAY, little Gravel	8'		
				11-12					
15		S-4 / 0	9-11	2-1		No recovery			
				2-1					
20		U-1 / 7	12-14	PUSH		Shelby tube: gray CLAY & SILT		2	
25		U-2 / 0	14-16	PUSH		Shelby tube: no recovery		3	No Well Installed
30		S-5 / 22	19-21	WOH/18"		Very soft, gray, CLAY & SILT	CLAY & SILT	4	
				2/6"					
30		S-6 / 19	24-26	WOR/12"		Very soft, gray, CLAY & SILT		4	
				WOR/12"					
30		S-7 / 24	29-31	WOR/24"		Very soft, gray, CLAY & SILT			

Notes:  
 1. Groundwater observed at depth of +/- 0.5' based on sample wetness  
 2. Shelby tube was blown over by wind and rolled across the ground; sample likely disturbed  
 3. Hydraulic piston sampler did not fully extend.  
 4. WOH=Weight of Hammer; WOR=Weight of Rod

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		STIFF	>30

Project: Mill Plaza Redevelopment  
 Location: Durham, NH  
 Client: Colonial Durham Associates, LP

Boring No. B-2

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File No. M-1529002-04

Checked by: D. Brogan

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
		S-7 / 24	29-31	WOR/24"		Very soft, gray, CLAY & SILT	CLAY & SILT		No Well Installed
						Bottom of Exploration at 31'			
35									
40									
45									
50									
55									
60									
65									

Notes:

Project: Mill Plaza Redevelopment  
 Location: Durham, NH  
 Client: Colonial Durham Associates, LP

Boring No. B-3

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File No. M-1529002-04

Checked by: D. Brogan

Drilling Co. New England Boring Contractors  
 Foreman: Walter H.  
 T&B Rep.: E. Doremus  
 Date Start: 04/19/18 End: 04/19/18  
 Location See Exploration Location Plan  
 GS. Elev. ± 36' Datum: NAVD88

	Casing	Sampler
Type	HW	Split Spoon
I.D./O.D.	4"/4.5"	1-3/8"/2"
Hammer Wt.		140#
Hammer Fall		30"
Hammer Type		Auto Hammer

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
4/19/18	12:30	9.5'		0

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		S-1 / 15	0.5-2.5	5-5		4" of brown, GRAVEL and fine to coarse SAND, little Silt; over 11" of medium dense, brown, fine to coarse SAND, some Gravel, trace Silt	0.3' ASPHALT	1	No Well Installed
				6-5			FILL		
		S-2 / 15	2.5-4.5	9-7		5" of dark brown, fine to coarse SAND, some Silt, little Gravel; over 10" of stiff, gray, CLAY & SILT, trace fine Sand			
				7-8					
		S-3 / 13	4.5-6.5	6-5		7" of brown, fine to coarse SAND, some Silt, little Gravel; over 6" of stiff, gray, Silty CLAY, trace fine to coarse Sand, trace Gravel, trace Glass			
				4-3					
10							8'		
		S-4 / 20	9-11	5-7		Very stiff, gray-brown, Silty CLAY	Silty CLAY		
				11-15					
15							13'		
		S-5 / 12	14-16	2-3		Medium, gray, CLAY & SILT			
				3-4					
20							CLAY & SILT		
		S-6 / 24	19-21	WOH/24"		Very soft, gray, CLAY & SILT			
		U-1 / 0	21-23	PUSH		Shelby tube: no recovery			
25							1		
		U-2 / 0	24-25	PUSH		Shelby tube: no recovery			
		S7 / 24	25-27	WOH/24"		Very soft, gray, CLAY & SILT			
30							2		
		S-8 / 24	29-31	WOR/24"		Very soft, gray, CLAY & SILT			

Notes:  
 1. WOH=Weight of Hammer  
 2. WOR=Weight of Rod

Proportions Used	
TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency		
VERY LOOSE	0-4	VERY SOFT <2
LOOSE	4-10	SOFT 2-4
MEDIUM DENSE	10-30	MEDIUM 4-8
DENSE	30-50	STIFF 8-15
VERY DENSE	>50	VERY STIFF 15-30
		STIFF >30

Project: Mill Plaza Redevelopment  
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Boring No. B-3

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File No. M-1529002-04

Checked by: D. Brogan

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
35		S-8 / 24	29-31	WOR/24'		Very soft, gray, CLAY & SILT	CLAY & SILT	3	No Well Installed
40						Dense, tan, fine to medium SAND, some Silt, some Gravel	GLACIAL TILL	4	
45		S-9 / 14	44-46	35-17		Bottom of Exploration at 46'			
50									
55									
60									
65									

Notes:  
 3. Probe with roller bit to 44'  
 4. Strata change interpreted from change in drilling resistance

Project: Mill Plaza Redevelopment  
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Boring No. B-4

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Checked by: D. Brogan

Drilling Co. New England Boring Contractors  
 Foreman: Walter H.  
 T&B Rep.: E. Doremus  
 Date Start: 04/19/18 End: 04/20/18  
 Location See Exploration Location Plan  
 GS. Elev. ± 40' Datum: NAVD88

Casing HW Sampler Split Spoon  
 Type HW Split Spoon  
 I.D./O.D. 4"/4.5" 1-3/8"/2"  
 Hammer Wt. 140#  
 Hammer Fall 30"  
 Hammer Type Auto Hammer

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
See Note 1				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		S-1 / 3	0.5-2.5	5-5		Loose, brown, fine to coarse SAND, some Gravel, little Silt	0.3' ASPHALT	1	No Well Installed
				5-4					
		S-2 / 14	2.5-4.5	3-5		5" of brown, fine to coarse SAND, some Gravel, little Silt; over 9" of stiff, gray-brown, CLAY & SILT and fine to coarse SAND, little Gravel	FILL		
				3-2					
		S-3 / 24	4.5-6.5	2-2					
			3-5		10" of loose, gray-brown, fine to coarse SAND, some Silt, some Gravel; over 14" of medium, dark gray-brown, CLAY & SILT, trace fine Sand, trace Gravel, trace Wood, trace Roots, slight organic odor	8'			
10		S-4 / 17	9-11	7-8		Very stiff, brown, Silty CLAY, trace Gravel	Silty CLAY	2	
				8-13					
15		S-5 / 8	14-14.2	50/2"		Very dense, brown, fine to coarse SAND, some Silt, little Gravel	13.0' GLACIAL TILL 15.2'	2	
									Possible BEDROCK
20						Bottom of Exploration at 17.2'			
25									
30									

Notes:  
 1. Groundwater observed at depth of +/- 0.5' based on sample wetness  
 2. Possible bedrock at 15.2'; advance roller bit to 17.2'

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		STIFF	>30

Project: Mill Plaza Redevelopment  
 Location: Durham, NH  
 Client: Colonial Durham Associates, LP

Boring No. B-5

Page 1 of 1

File No. M-1529002-04

Checked by: D. Brogan

Drilling Co. New England Boring Contractors  
 Foreman: Walter H.  
 T&B Rep.: E. Doremus  
 Date Start: 04/20/18 End: 04/20/18  
 Location See Exploration Location Plan  
 GS. Elev. ± 31' Datum: NAVD88

	Casing	Sampler
Type	HW	Split Spoon
I.D./O.D.	4"/4.5"	1-3/8"/2"
Hammer Wt.		140#
Hammer Fall		30"
Hammer Type		Auto Hammer

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
See Note 1				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		S-1 / 6	0.5-2.5	7-4		3" of brown, fine to coarse SAND, some Gravel, little Silt; over 3" of medium, gray, CLAY & SILT, little fine to coarse Sand, trace Gravel Medium, gray, CLAY & SILT, trace fine Sand, trace Gravel Very soft, gray-brown, CLAY & SILT, trace Wood, trace Roots	0.3' ASPHALT  FILL	1  2 3	No Well Installed
		S-2 / 7	2.5-4.5	4-4					
		S-3 / 2	4.5-6.5	WOH-1 WOH/12"					
10		S-4 / 24	9-11	WOH-1		11" of soft, dark gray, CLAY & SILT, trace Roots, trace fine to coarse Sand; over 13" of stiff, gray-brown, Silty CLAY, trace Roots	10' Silty CLAY		
						Bottom of Exploration at 11'			
15									
20									
25									
30									

- Notes:
- Groundwater observed at depth of +/- 0.5' based on sample wetness
  - Wood stuck in tip of split spoon sampler
  - WOH=Weight of Hammer

Proportions Used

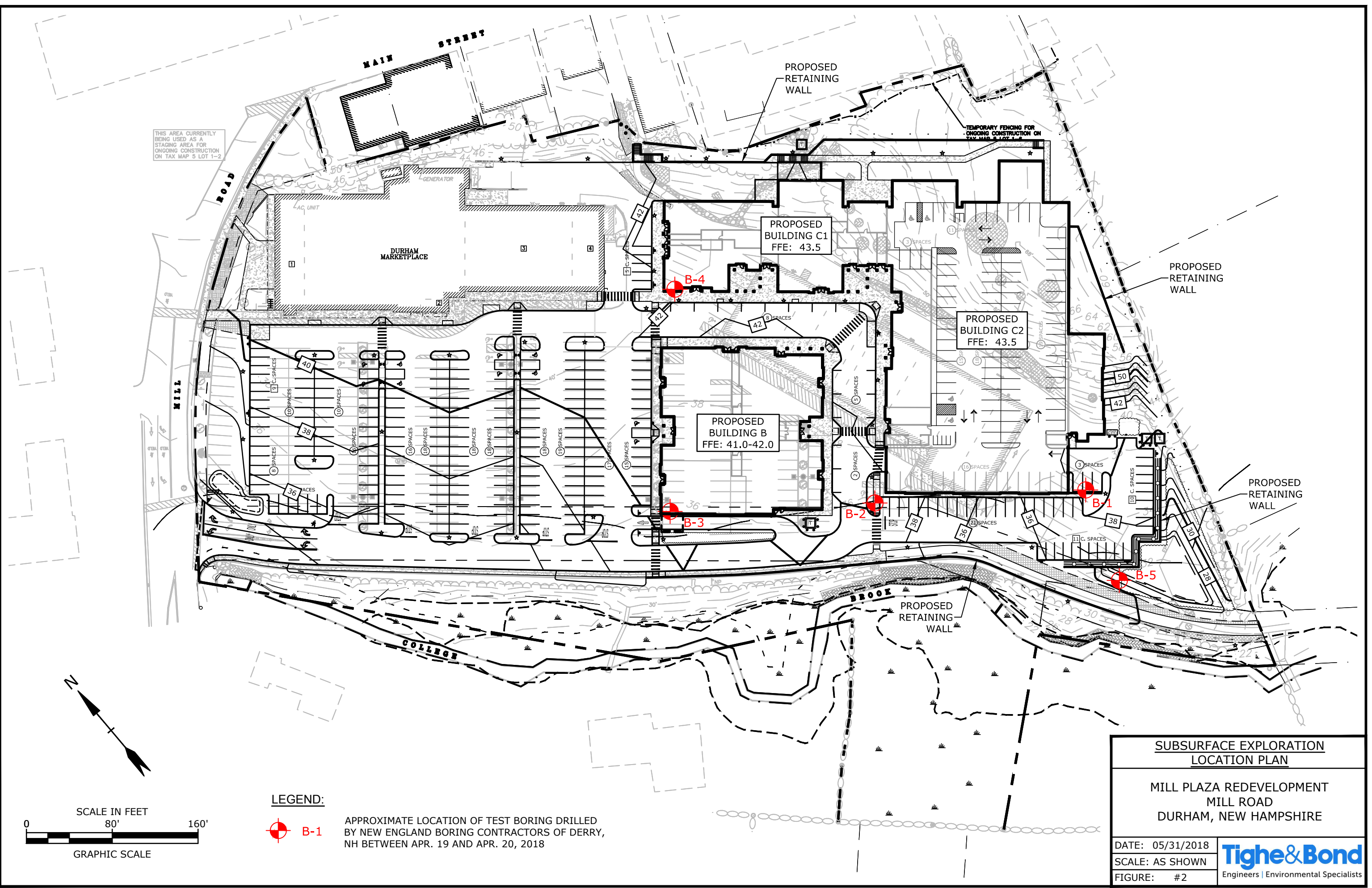
TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

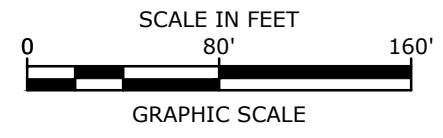
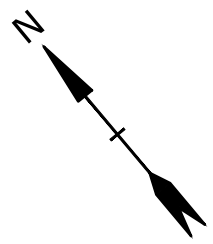
VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		STIFF	>30



Jun 25, 2018-10:23am Plotted By: B1  
Tighe & Bond, Inc. J:\MM1529\Drawings\_Figures\AutoCAD\Sheet\W1529-002\_C-GEOT.dwg



THIS AREA CURRENTLY BEING USED AS A STAGING AREA FOR ONGOING CONSTRUCTION ON TAX MAP 5 LOT 1-2



**LEGEND:**  
B-1

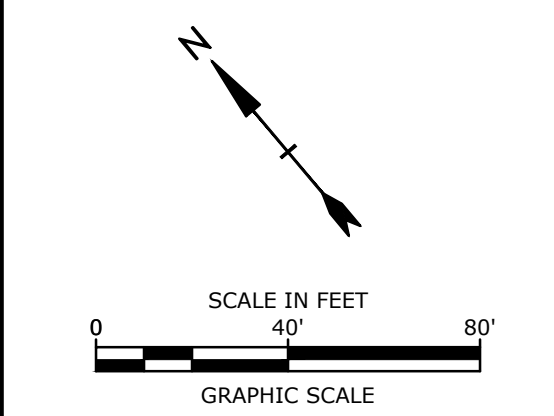
APPROXIMATE LOCATION OF TEST BORING DRILLED BY NEW ENGLAND BORING CONTRACTORS OF DERRY, NH BETWEEN APR. 19 AND APR. 20, 2018

<b>SUBSURFACE EXPLORATION LOCATION PLAN</b>	
MILL PLAZA REDEVELOPMENT MILL ROAD DURHAM, NEW HAMPSHIRE	
DATE: 05/31/2018	<b>Tighe &amp; Bond</b> Engineers   Environmental Specialists
SCALE: AS SHOWN	
FIGURE: #2	



Harriman Project No. 16117

**PERMIT DRAWINGS  
NOT FOR CONSTRUCTION**



**Mill Plaza  
Redevelopment**

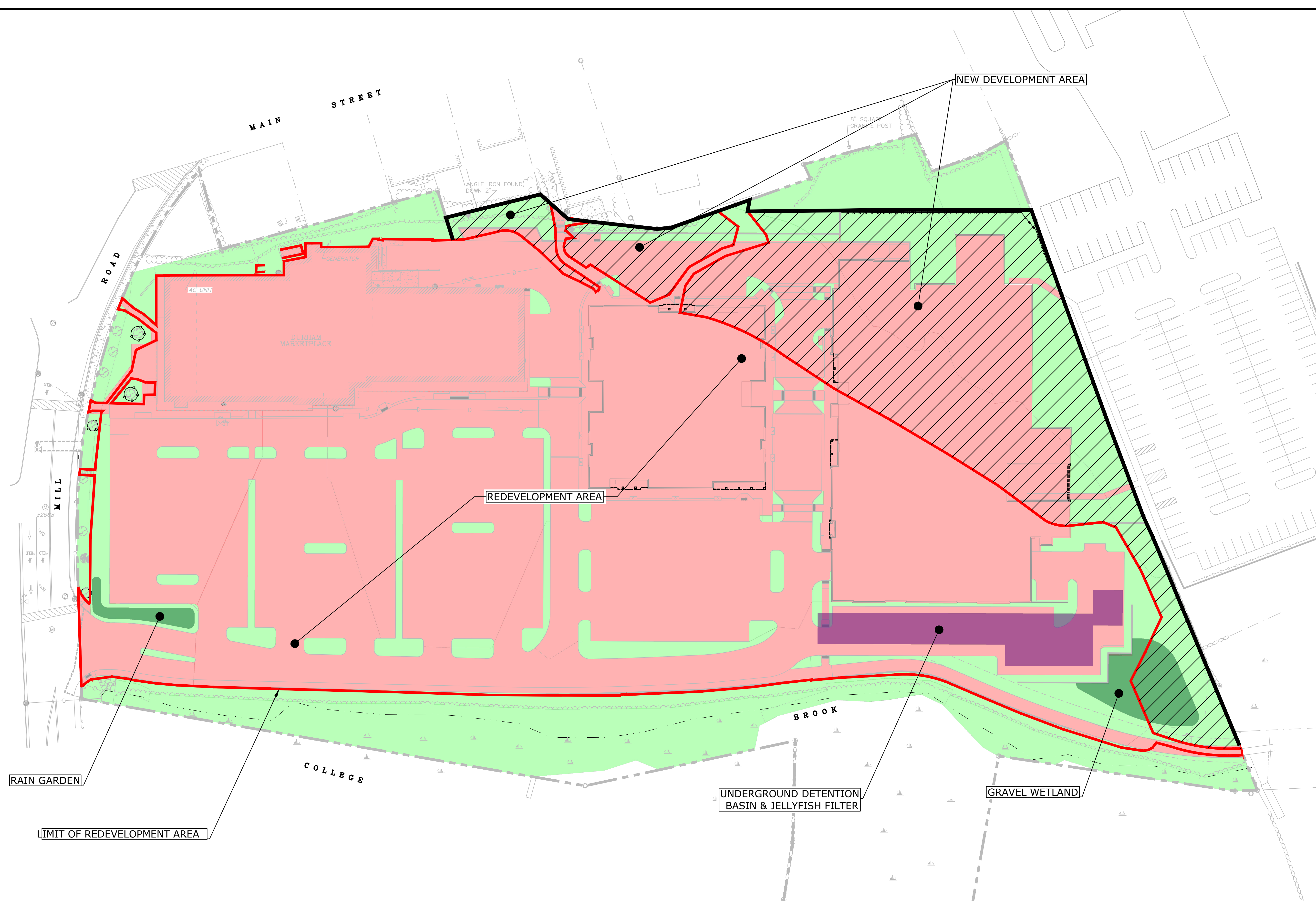
Colonial Durham  
Associates, LP

7 Mill Road, Unit L  
Durham,  
New Hampshire 03824

MARK	DATE	DESCRIPTION
2	5/20/2020	RESPONSE TO COMMENTS
1	1/2/2020	GENERAL REVISIONS

PROJECT NO: M1529-002  
DATE: 5/23/2018  
FILE: M1529-002\_C-POST.dwg  
DRAWN BY: EGD  
CHECKED: JMP  
APPROVED: BLM

SURFACE AREA TREATMENT PLAN  
SCALE: AS SHOWN



**LEGEND**

- REDEVELOPED IMPERVIOUS SURFACE
- NEW DEVELOPMENT AREA
- GREEN SPACE
- LIMIT OF REDEVELOPMENT AREA

REDEVELOPMENT AREA	
% IMPERVIOUS TREATED PRE-DEVELOPMENT	0.0%
% IMPERVIOUS TREATED POST-DEVELOPMENT	98.0%

NEW DEVELOPMENT AREA	
% IMPERVIOUS TREATED PRE-DEVELOPMENT	0.0%
% IMPERVIOUS TREATED POST-DEVELOPMENT	100.0%

Plot Scale: 5/23/2018 5:47pm By: EGD  
 Plotted On: May 20, 2020 5:47pm By: EGD  
 Title & Band: M1529-002\_C-POST.dwg  
 Figures: AutoCAD/Drawings - Figures/AutoCAD/Sheet/M1529-002\_C-POST.dwg

**Project:** Mill Plaza Redevelopment  
**Location:** Durham, NH  
**Job Number:** M1529-002  
**Calculation By:** EGD  
**Checked By:** JMP  
**Date:** 5/19/2020

	BOTTOM Elev.	TOP Elev.	Surface Area (sf)	Volume (cf)	Density (pcf)	Weight (lb)
78" CMP	27.5	34.0	-	28,537.3	-	-
3/4" Crushed Stone	27.5	34.0	7577.5	20,716.5	100.0	2,071,645.0
Compacted Granular Fill	34.0	38.0	7577.5	30,310.0	125.0	3,788,750.0
78" CMP+Stone+Fill	-	-	7577.5	79,563.8	73.7	5,860,395.0
Water Displaced	27.5	36	7577.5	64,408.8	62.4	4,019,106.0

**WEIGHT OF BASIN AND GRANULAR FILL IS GREATER THAN WATER DISPLACED, THEREFORE BASIN WILL NOT FLOAT**

Assumptions:

1. Average of 4.0' of compacted granular fill above basin
2. Water elevation at 2' below finish grade

**M1529-002 POST Pond-1 Hydrograph Table**

Time (hours)	Inflow (cfs)	Storage		Primary (cfs)
		(cubic- feet)	Elevation (feet)	
0	0	0	30	0
2.5	0	3	30.01	0
5	0.04	194	30.71	0
7.5	0.09	256	31	0.08
10	0.24	424	31.25	0.16
<b>12.5</b>	1.36	1,807	<b>33.16</b>	1.47
15	0.23	1,686	33.02	0.23
17.5	0.11	1,533	32.84	0.16
20	0.08	905	31.95	0.16
<b>22.5</b>	0.06	256	<b>31</b>	0.08
25	0	256	31	0
27.5	0	256	31	0
30	0	256	31	0
32.5	0	256	31	0
35	0	256	31	0
37.5	0	256	31	0
40	0	256	31	0
42.5	0	256	31	0
45	0	256	31	0
47.5	0	256	31	0
50	0	256	31	0
52.5	0	256	31	0
55	0	256	31	0
57.5	0	256	31	0
60	0	256	31	0
62.5	0	256	31	0
65	0	256	31	0
67.5	0	256	31	0
70	0	256	31	0

# Tighe & Bond

Consulting Engineers  
Environmental Specialists

Project: Mill Plaza  
Location: Durham, NH  
T&B #: M-1529-002  
Calculations By: EGD  
Checked By: JMP  
Date: 5/20/2020

## APRON DESIGN

**Terms:** RR1 into Gravel Wetland

length of apron (ft.)	$L_a$	
discharge from pipe (cfs)	$Q$	(10 YR STORM EVENT)
pipe dia. or channel width (ft.)	$Do$	
tailwater depth (ft.)	$T_w$	
width of apron (at outlet)(ft)	$W1$	
width of apron (downstream)(ft)	$W2$	
median stone diameter (ft.)	$d_{50}$	

### Equations Used:

Length of Apron ( $L_a$ )			
when $T_w < .5 * Do$	$L_a =$	$\frac{1.8(Q)}{Do^{(3/2)}}$	+ 7Do
when $T_w \geq .5 * Do$	$L_a =$	$\frac{3(Q)}{Do^{(3/2)}}$	+ 7Do
Width of Apron ( $W1$ )	$W1 =$	$3Do$	
Width of Apron ( $W2$ )			
when $T_w < .5 * Do$	$W2 =$	$3Do + La$	
when $T_w \geq .5 * Do$	$W2 =$	$3Do + 0.4La$	
Median Diameter	$d_{50} =$	$\frac{0.02 * Q^{(1.3)}}{(T_w * Do)}$	

<b>Input:</b>			
Q (cfs)		9.37	cfs
Do (ft.)		1.50	ft
$T_w$ (ft.)		0.60	ft
<b>Output:</b>			
Width of Apron ( $W1$ )		5	ft.
Width of Apron ( $W2$ )		24	ft.
Length of Apron ( $L_a$ )		20	ft.
Median Diameter		0.50	ft.
Riprap min. depth		1.13	ft.

# Tighe & Bond

Consulting Engineers  
Environmental Specialists

Project: Mill Plaza  
Location: Durham, NH  
T&B #: M-1529-002  
Calculations By: EGD  
Checked By: JMP  
Date: 5/20/2020

## APRON DESIGN

**Terms:** RR2 into College Brook

length of apron (ft.)	$L_a$	
discharge from pipe (cfs)	$Q$	(10 YR STORM EVENT)
pipe dia. or channel width (ft.)	$Do$	
tailwater depth (ft.)	$T_w$	
width of apron (at outlet)(ft)	$W1$	
width of apron (downstream)(ft)	$W2$	
median stone diameter (ft.)	$d_{50}$	

### **Equations Used:**

Length of Apron ( $L_a$ )			
when $T_w < .5 * Do$	$L_a =$	$\frac{1.8(Q)}{Do^{(3/2)}}$	+ 7Do
when $T_w \geq .5 * Do$	$L_a =$	$\frac{3(Q)}{Do^{(3/2)}}$	+ 7Do
Width of Apron ( $W1$ )	$W1 =$	$3Do$	
Width of Apron ( $W2$ )			
when $T_w < .5 * Do$	$W2 =$	$3Do + La$	
when $T_w \geq .5 * Do$	$W2 =$	$3Do + 0.4La$	
Median Diameter	$d_{50} =$	$\frac{0.02 * Q^{(1.3)}}{(T_w * Do)}$	

<b>Input:</b>			
Q (cfs)		19.30	cfs
Do (ft.)		3.00	ft
$T_w$ (ft.)		1.20	ft
<b>Output:</b>			
Width of Apron ( $W1$ )		9	ft.
Width of Apron ( $W2$ )		37	ft.
Length of Apron ( $L_a$ )		28	ft.
Median Diameter		0.50	ft.
Riprap min. depth		1.13	ft.

- CDS Unit Maintenance
- Jellyfish Unit Maintenance
- Rain Guardian Turret Maintenance

<b>Overall Site Operation and Maintenance Schedule</b>	
Maintenance Item	Frequency of Maintenance
Litter/Debris Removal	Weekly
Pavement Sweeping - Sweep impervious areas to remove sand and litter.	- 2 – 4 times annually
Rip Rap Aprons - Trash and debris to be removed. - Any required maintenance shall be addressed.	- Annually
Catch Basin (CB) Cleaning - CB to be cleaned of solids and oils.	- Annually
Landscaping - Landscaped areas to be maintained and mulched.	- Maintained as required - and mulched each Spring
Underground Detention Basin - Visual observation of sediment levels within system	- Twice annually
CDS and Jellyfish Units -See Appendix A	- In accordance with manufacturer’s recommendations (See Appendix A for individual O&M Manuals)
Rain Guardian Turret -Trash and debris to be removed.	- 6 times annually

<b>Rain Garden &amp; Gravel Wetland Inspection/Maintenance Requirements</b>		
Inspection/Maintenance	Frequency	Action
Monitor to ensure that Rain Garden & Gravel Wetland function effectively after storms.	Four (4) times annually (quarterly) and after any rainfall event exceeding 2.5” in a 24-hr period.	- Trash and debris to be removed. - Any required maintenance shall be addressed.
Inspect Vegetation	Annually	- Inspect the condition of all Rain Garden and Gravel Wetland vegetation. - Prune back overgrowth. - Replace dead vegetation. - Remove any invasive species.

Inspect Drawdown Time - The system shall drawdown within 48-hours following a rainfall event.	Annually	- Assess the condition of the facility to determine measures required to restore the filtration function, including but not limited to removal of accumulated sediments or reconstruction of the filter.
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<b>Rip Rap Inspection/Maintenance Requirements</b>		
<b>Inspection/Maintenance</b>	<b>Frequency</b>	<b>Action</b>
Visual Inspection	Annually	- Visually inspect for damage and deterioration. - Repair damages immediately.

**6.2.3 Disposal Requirements**

Disposal of debris, trash, sediment and other waste material should be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations.

**6.2.4 Snow & Ice Management for Standard Asphalt and Walkways**

Snow storage areas shall be located such that no direct untreated discharges are possible to receiving waters from the storage site (snow storage areas have been shown on the Site Plan). Salt storage areas shall be covered or located such that no direct untreated discharges are possible to receiving waters from the storage site. Salt and sand shall be used to the minimum extent practical (refer to the NHDES AOT Stormwater Management Manual, Volume 2, for de-icing application rate guidelines).

**6.2.5 Annual Updates and Log Requirements**

The Owner and/or Contact/Responsible Party shall review this Operation and Maintenance Plan once per year for its effectiveness and adjust the plan as necessary.

A log of all preventative and corrective measures for the stormwater system shall be kept on-site and be made available upon request by any public entity with administrative, health environmental or safety authority over the site.



# **NEW ENGLAND WETLAND PLANTS, INC**

820 WEST STREET, AMHERST, MA 01002

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EMAIL: INFO@NEWP.COM WEB ADDRESS: WWW.NEWP.COM

## **New England Wetmix (Wetland Seed Mix)**

<b>Botanical Name</b>	<b>Common Name</b>	<b>Indicator</b>
<i>Carex vulpinoidea</i>	Fox Sedge	OBL
<i>Carex scoparia</i>	Blunt Broom Sedge	FACW
<i>Carex lurida</i>	Lurid Sedge	OBL
<i>Carex lupulina</i>	Hop Sedge	OBL
<i>Poa palustris</i>	Fowl Bluegrass	FACW
<i>Bidens frondosa</i>	Beggar Ticks	FACW
<i>Scirpus atrovirens</i>	Green Bulrush	OBL
<i>Asclepias incarnata</i>	Swamp Milkweed	OBL
<i>Carex crinita</i>	Fringed Sedge	OBL
<i>Vernonia noveboracensis</i>	New York Ironweed	FACW+
<i>Juncus effusus</i>	Soft Rush	FACW+
<i>Aster lateriflorus (Symphyotrichum lateriflorum)</i>	Starved/Calico Aster	FACW
<i>Iris versicolor</i>	Blue Flag	OBL
<i>Glyceria grandis</i>	American Mannagrass	OBL
<i>Mimulus ringens</i>	Square Stemmed Monkey Flower	OBL
<i>Eupatorium maculatum (Eutrochium maculatum)</i>	Spotted Joe Pye Weed	OBL

PRICE PER LB. \$135.00 MIN. QUANTITY 1 LBS. TOTAL: \$135.00

APPLY: 18 LBS/ACRE :2500 sq ft/lb

The New England Wetmix (Wetland Seed Mix) contains a wide variety of native seeds that are suitable for most wetland restoration sites that are not permanently flooded. All species are best suited to moist ground as found in most wet meadows, scrub shrub, or forested wetland restoration areas. The mix is well suited for detention basin borders and the bottom of detention basins not generally under standing water. The seeds will not germinate under inundated conditions. If planted during the fall months the seed mix will germinate the following spring. During the first season of growth several species will produce seeds while other species will produce seeds after the second growing season. Not all species will grow in all wetland situations. This mix is comprised of the wetland species most likely to grow in created/restored wetlands and should produce more than 75% ground cover in two full growing seasons.

The wetland seeds in this mix can be sown by hand, with a hand-held spreader, or hydro-seeded on large or hard to reach sites. Lightly rake to insure good seed-to-soil contact. Seeding can take place on frozen soil, as the freezing and thawing weather of late fall and late winter will work the seed into the soil. If spring conditions are drier than usual watering may be required. If sowing during the summer months supplemental watering will likely be required until germination. A light mulch of clean, weed free straw is recommended.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is \$/bulk pound, FOB warehouse, Plus SH and applicable taxes.

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## **New England Conservation/Wildlife Mix**

<b>Botanical Name</b>	<b>Common Name</b>	<b>Indicator</b>
<i>Elymus virginicus</i>	Virginia Wild Rye	FACW-
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Andropogon gerardii</i>	Big Bluestem	FAC
<i>Festuca rubra</i>	Red Fescue	FACU
<i>Sorghastrum nutans</i>	Indian Grass	UPL
<i>Panicum virgatum</i>	Switch Grass	FAC
<i>Chamaecrista fasciculata</i>	Partridge Pea	FACU
<i>Desmodium canadense</i>	Showy Tick Trefoil	FAC
<i>Asclepias tuberosa</i>	Butterfly Milkweed	NI
<i>Bidens frondosa</i>	Beggar Ticks	FACW
<i>Eupatorium purpureum (Eutrochium maculatum)</i>	Purple Joe Pye Weed	FAC
<i>Rudbeckia hirta</i>	Black Eyed Susan	FACU-
<i>Aster pilosus (Symphyotrichum pilosum)</i>	Heath (or Hairy) Aster	UPL
<i>Solidago juncea</i>	Early Goldenrod	

PRICE PER LB. \$39.50 MIN. QUANTITY 2 LBS. **TOTAL:** \$79.00

APPLY: 25 LBS/ACRE :1750 sq ft/lb

The New England Conservation/Wildlife Mix provides a permanent cover of grasses, wildflowers, and legumes for both good erosion control and wildlife habitat value. The mix is designed to be a no maintenance seeding, and is appropriate for cut and fill slopes, detention basin side slopes, and disturbed areas adjacent to commercial and residential projects.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is \$/bulk pound, FOB warehouse, Plus SH and applicable taxes.

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## **New England Erosion Control/Restoration Mix for Dry Sites**

<b>Botanical Name</b>	<b>Common Name</b>	<b>Indicator</b>
<i>Elymus canadensis</i>	Canada Wild Rye	FACU+
<i>Festuca rubra</i>	Red Fescue	FACU
<i>Lolium multiflorum</i>	Annual Ryegrass	
<i>Lolium perenne</i>	Perrenial Ryegrass	
<i>Schizachyrium scoparium</i>	Little Bluestem	FACU
<i>Panicum virgatum</i>	Switch Grass	FAC
<i>Sorghastrum nutans</i>	Indian Grass	UPL

PRICE PER LB. \$18.00 MIN. QUANTITY 5 LBS. **TOTAL:** \$90.00 APPLY: 35 LBS/ACRE :1250 sq ft/lb

The New England Erosion Control/Restoration Mix For Dry Sites provides an appropriate selection of native and naturalized grasses to ensure that dry and recently disturbed sites will be quickly revegetated and the soil surface stabilized. It is an appropriate seed mix for road cuts, pipelines, steeper slopes, and areas requiring quick cover during the ecological restoration process. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper soil-seed contact. Best results are obtained with a Spring or late Summer seeding. Late Spring through Mid-Summer seeding will benefit from a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering will be required. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free seed bed is necessary for optimal results.

New England Wetland Plants, Inc. may modify seed mixes at any time depending upon seed availability. The design criteria and ecological function of the mix will remain unchanged. Price is \$/bulk pound, FOB warehouse, Plus SH and applicable taxes.