JONES & BEACH
ENGINEERS INC.
85 Portsmouth Avenue, PO Box 219, Stratham, NH 03885
603.772.4746 - JonesandBeach.com

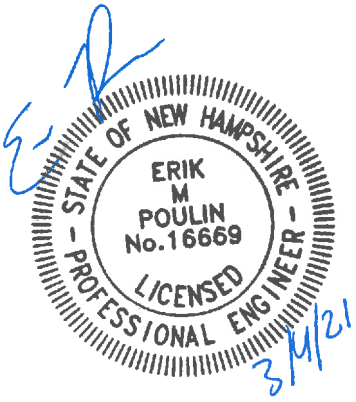
DRAINAGE ANALYSIS

SEDIMENT AND EROSION CONTROL PLAN

110 Holland Way, Exeter, NH
Tax Map 51 Lots 14-1 & 17
Exeter, NH 03833

Prepared for:

McFarland Ford Sales, Inc.
151 Portsmouth Ave
Exeter, NH 03833



January 14, 2021
Rev #1: March 3, 2021
JBE Project No. 19198

EXECUTIVE SUMMARY

McFarland Ford Sales, Inc. proposes to construct a 124 space vehicle storage lot on Tax Map 51 Lot 14-1 & 17. The lots are approximately 0.47 AC (Lot 14-1) and 21.0 AC (Lot 17) located at 110 Holland Way. A drainage analysis of the entire site and its offsite contributing watershed areas was conducted for the purpose of estimating the peak rate of stormwater runoff and to subsequently design adequate drainage structures. Two models were compiled, one for the area in its existing (pre-construction) condition, and a second for its proposed (post-construction) condition. The analysis was conducted using data for the 2 Year – 24 Hour (3.70"), 10 Year – 24 Hour (5.65"), 25 Year – 24 Hour (7.19"), and 50 Year – 24 Hour (8.63") storm events using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment. A summary of the existing and proposed conditions peak rates of runoff is as follows:

EXECUTIVE SUMMARY TABLE								
Analysis Point	2 Year		10 Year		25 Year		50 Year	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Analysis Point #1	2.09	1.61	5.43	4.01	8.45	6.15	11.46	8.25

The drainage design intent for this site is to maintain the post-development peak flow to the pre-development peak flow conditions to the extent practicable and to effectively treat stormwater from the development of this project. This has been accomplished through the use of porous pavement and a treatment swale to maintain the peak discharge and infiltrate stormwater to the extent practicable.

In addition, the potential for increased erosion and sedimentation is handled by way of, riprap outlet protection aprons, and rip rap inlet aprons. All land disturbed during construction will be stabilized within thirty days of groundbreaking, and existing wetlands and abutting property owners will suffer minimal adversity resultant of this development.

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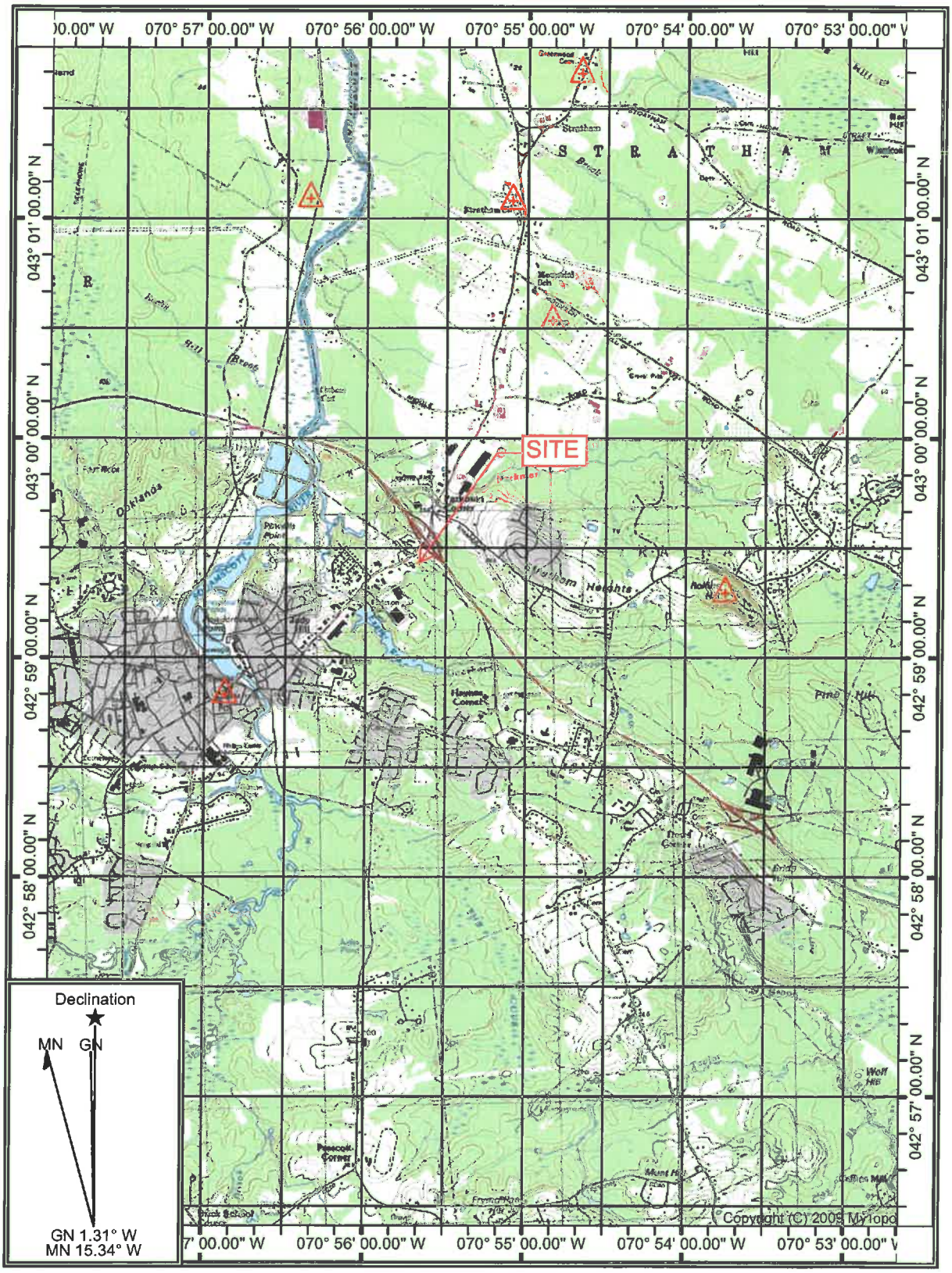

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1.0 RAINFALL CHARACTERISTICS

This drainage report includes an existing conditions analysis of the area involved in the proposed development, as well as a proposed condition, or post-construction analysis, of the same location. These analyses were accomplished using the USDA SCS TR-20 Method within the HydroCAD Stormwater Modeling System. The curve numbers were developed using the SCS TR-55 Runoff Curve numbers for Urban Areas. A Type III SCS 24-hour rainfall distribution was utilized in analyzing the data for 2 Year – 24 Hour (3.70"), 10 Year – 24 Hour (5.65"), 25 Year – 24 Hour (7.19"), and 50 Year – 24 Hour (8.63") storm events.

2.0 EXISTING CONDITIONS ANALYSIS

Classified through the use of the NRCS Web Soil Survey, the land of the site is composed of several soil types. The in-situ soils are categorized into Hydrologic Soil Groups (HSG) A & C (see appendix for soil types and HSG designations).

The existing topography is such that one sub catchment and one analysis point are required to analyze the existing hydrology. The watershed consists primarily of woodlands with some pockets of grass and portions of a gravel parking lot. Runoff from the entire subject area of the property flows North to the existing wetland onsite (Reach 1R). This wetland then discharges to an existing 30" RCP culvert under Holland Way (Analysis Point #1).

3.0 PROPOSED CONDITIONS ANALYSIS

The addition of the proposed impervious paved areas and structures causes an increase in the curve number (C_n) and a decrease in the time of concentration (T_c), the net result being a potential increase in peak rates of runoff from the site. The proposed site development consists of the aforementioned 124 space vehicle storage lot. The proposed project will add approximately 3,784 S.F. of impervious and 32,942 S.F. of porous pavement surface on-site. The proposed topography is such that the site runoff is divided into four sub catchments.

The entire storage lot and a large portion of the driveway are proposed to be porous pavement. The porous pavement is designed to allow filtration of direct runoff to its surface for treatment. Stormwater filters thought the sub-base materials and infiltrates into the underlying soils. Excess stormwater is collected in a subsurface underdrain system and discharges to the North of the storage lot. Discharged stormwater then travels though the existing wetland system (Reach 5R) and discharges to Analysis Point #1 via a 30" HDPE culvert (Reach 2R).

The remaining pavement is located on the west end of the proposed driveway. This pavement is designed to be standard impervious pavement from the existing McFarland Ford driveway to the wetland crossing on site. Stormwater sheet flows and is directed along a proposed curb line and into a 4' curb break. An inlet rip rap apron is proposed to collect heavy litter. Stormwater then discharges into a proposed treatment swale. Stormwater is then treated and discharges to Analysis Point #1.

In an effort to eliminate sedimentation and erosion, the proposed drainage system includes rip rap inlet aprons, and rip rap outlet aprons. Overall, the structures outlined in this proposal provide for adequate treatment of stormwater runoff for sediment and associated pollutants.

4.0 CONCLUSION

This proposed site development located at 110 Holland Way, and will have minimal adverse effect on abutting infrastructures or properties by way of stormwater runoff or siltation. The post-construction peak rate of runoff for the site will be lower than the existing conditions for all analyzed storm events. Appropriate steps will be taken to eliminate erosion and sedimentation; these will be accomplished through the construction of a drainage system consisting of site grading, curbing, Treatment Swale, Porous pavement, and riprap outlet protection aprons.

Respectfully Submitted,
JONES & BEACH ENGINEERS, INC.

Erik Poulin, P.E.
Project Manager

GROUNDWATER RECHARGE VOLULME (GRV) CALCULATION
(Env-Wq 1507.04)

0.07	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
0.82	ac	Area of HSG B soil that was replaced by impervious cover	0.25"
	ac	Area of HSG C soil that was replaced by impervious cover	0.10"
	ac	Area of HSG D soil or impervious cover that was replaced by impervious cover	0.0"
0.26	inches	Rd = Weighted groundwater recharge depth	
0.2331	ac-in	GRV = AI * Rd	
846	cf	GRV conversion (ac-in x 43,560 sf/ac x 1ft/12")	

Provide calculations below showing that the project meets the groundwater recharge requirements (Env-Wq 1507.04):

Use of check dams within porous pavement it is estimated that 50% of voids volume of pavement will be infiltrated.

Porous Pavement Void Volume: 17,413 cu.ft.

Vol. * 50% = 8,706 cu.ft.

GRV = 846 cu.ft.

Vol. > GRV (OK)

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

FILTRATION PRACTICE DESIGN CRITERIA
(Env-Wq 1508.07)

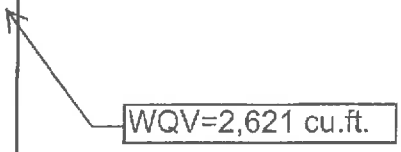
Type/Node Name: **Porous Pavement (Pond P1)**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable.

		Check if you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.07(a).	
0.76	ac	A = Area draining to the practice	
0.76	ac	A_I = Impervious area draining to the practice	
1.00	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.95	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.72	ac-in	WQV= 1" x Rv x A	
2,621	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
655	cf	25% x WQV (check calc for sediment forebay volume)	
1,966	cf	75% x WQV (check calc for surface sand filter volume)	
NA		Method of Pretreatment? (not required for clean or roof runoff)	
	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	≥ 25%WQV
Calculate time to drain if system IS NOT underdrained:			
	sf	A_{SA} = Surface area of the practice	
	iph	$Ksat_{DESIGN}$ = Design infiltration rate[1]	
		If Ksat (prior to factor of safety) is < 0.50 iph, has an underdrain been provided?	
	Yes/No	(Use the calculations below)	
-	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	≤ 72-hrs
Calculate time to drain if system IS underdrained:			
103.48	ft	E_{WQV} = Elevation of WQV (attach stage-storage table)	
2.64	cfs	Q_{WQV} = Discharge at the E_{WQV} (attach stage-discharge table)	
0.55	hours	T_{DRAIN} = Drain time = 2WQV/Q_{WQV}	≤ 72-hrs
104.33	feet	E_{FC} = Elevation of the bottom of the filter course material[2]	
103.42	feet	E_{UD} = Invert elevation of the underdrain (UD), if applicable	
102.25	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
98.10	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
0.91	feet	$D_{FC\ to\ UD}$ = Depth to UD from the bottom of the filter course	≥ 1'
6.23	feet	$D_{FC\ to\ ROCK}$ = Depth to bedrock from the bottom of the filter course	≥ 1'
2.08	feet	$D_{FC\ to\ SHWT}$ = Depth to SHWT from the bottom of the filter course	≥ 1'
103.25	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
106.00	ft	Elevation of the top of the practice	
YES		50 peak elevation ≤ Elevation of the top of the practice	← yes
If a surface sand filter or underground sand filter is proposed:			
YES	ac	Drainage Area check.	< 10 ac
	cf	V = Volume of storage[3] (attach a stage-storage table)	≥ 75%WQV
	inches	D_{FC} = Filter course thickness	18", or 24" if within GPA
Sheet		Note what sheet in the plan set contains the filter course specification.	
	Yes/No	Access grate provided?	← yes

Stage-Area-Storage for Pond P1: Porous Pave

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
103.25	29,327	0
103.30	29,386	587
103.35	29,444	1,175
103.40	29,503	1,765
103.45	29,561	2,356
103.50	29,620	2,947
103.55	29,679	3,540
103.60	29,738	4,135
103.65	29,797	4,730
103.70	29,856	5,326
103.75	29,915	5,924
103.80	29,974	6,523
103.85	30,033	7,123
103.90	30,092	7,724
103.95	30,152	8,327
104.00	30,211	8,930
104.05	30,270	9,535
104.10	30,332	9,990
104.15	30,397	10,217
104.20	30,463	10,446
104.25	30,528	10,674
104.30	30,594	10,903
104.35	30,653	11,072
104.40	30,702	11,149
104.45	30,750	11,225
104.50	30,800	11,302
104.55	30,849	11,379
104.60	30,898	11,457
104.65	30,947	11,534
104.70	30,996	11,611
104.75	31,045	11,689
104.80	31,094	11,767
104.85	31,144	11,844
104.90	31,193	11,922
104.95	31,242	12,000
105.00	31,292	12,078
105.05	31,341	12,157
105.10	31,391	12,235
105.15	31,440	12,314
105.20	31,490	12,392
105.25	31,540	12,471
105.30	31,589	12,550
105.35	31,659	12,787
105.40	31,758	13,263
105.45	31,858	13,740
105.50	31,958	14,219
105.55	32,058	14,699
105.60	32,158	15,180
105.65	32,259	15,664
105.70	32,310	15,954
105.75	32,349	16,197
105.80	32,388	16,439
105.85	32,428	16,682
105.90	32,467	16,926
105.95	32,506	17,169
106.00	**32,545**	**17,413**



Stage-Discharge for Pond P1: Porous Pave

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
103.25	0.00	0.00	0.00
103.30	2.13	2.13	0.00
103.35	2.22	2.22	0.00
103.40	2.32	2.32	0.00
103.45	2.47	2.41	0.06
103.50	2.80	2.50	0.29
103.55	3.28	2.59	0.69
103.60	3.91	2.69	1.22
103.65	4.65	2.78	1.86
103.70	5.47	2.88	2.60
103.75	6.36	2.97	3.39
103.80	7.26	3.06	4.19
103.85	8.12	3.16	4.96
103.90	8.84	3.25	5.59
103.95	9.46	3.35	6.11
104.00	10.06	3.44	6.62
104.05	10.62	3.54	7.08
104.10	11.16	3.63	7.53
104.15	11.67	3.73	7.94
104.20	12.16	3.82	8.34
104.25	12.63	3.92	8.71
104.30	13.09	4.01	9.08
104.35	13.53	4.11	9.42
104.40	13.96	4.20	9.76
104.45	14.38	4.30	10.08
104.50	14.79	4.39	10.40
104.55	15.19	4.49	10.70
104.60	15.58	4.58	11.00
104.65	15.97	4.68	11.29
104.70	16.34	4.77	11.57
104.75	16.71	4.87	11.84
104.80	17.08	4.96	12.11
104.85	17.44	5.06	12.38
104.90	17.79	5.16	12.63
104.95	18.14	5.25	12.89
105.00	18.48	5.35	13.13
105.05	18.82	5.44	13.38
105.10	19.15	5.54	13.61
105.15	19.48	5.63	13.85
105.20	19.81	5.73	14.08
105.25	20.13	5.83	14.31
105.30	20.45	5.92	14.53
105.35	20.77	6.02	14.75
105.40	21.08	6.12	14.97
105.45	21.40	6.22	15.18
105.50	21.71	6.32	15.39
105.55	22.01	6.42	15.60
105.60	22.32	6.52	15.80
105.65	22.62	6.62	16.00
105.70	22.92	6.71	16.20
105.75	23.21	6.81	16.40
105.80	23.50	6.91	16.60
105.85	23.79	7.00	16.79
105.90	24.08	7.10	16.98
105.95	24.36	7.19	17.17
106.00	**24.65**	**7.29**	**17.35**

WQV Elev.=103.48
Flow rate=2.64 cfs

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

TREATMENT SWALE DESIGN CRITERIA
(Env-Wq 1508.08)

Node Name: Treatment Swale (Reach 3R)

Enter the node name in the drainage analysis (e.g., reach TS 5), if applicable.

yes	Yes/No	Have you reviewed the restrictions on unlined swales outlined in Env-Wq 1508.08(a)?	
yes	Yes/No	Is the system lined? (required if not treated or if above SHWT)	
0.15	ac	A = Area draining to the practice	
0.09	ac	A_I = Impervious area draining to the practice	
22.4	minutes	T_c = Time of Concentration	
0.56	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.56	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.08	ac-in	WQV= 1" x Rv x A	
306	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
1	inches	P = Amount of rainfall. For WQF in NH, P = 1".	
0.56	inches	D_{WQ} = Water quality depth. D_{WQ} = WQV/A	
95	unitless	CN = Unit peak discharge curve number. $CN = 1000/(10+5P+10Q-10*[Q^2 + 1.25*Q*P]^{0.5})$	
0.54	inches	S = Potential maximum retention. S = (1000/CN) - 10	
0.107	inches	Ia = initial abstraction. Ia = 0.2S	
425	$cfs/mi^2/in$	q_u = Unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III	
0.06	cfs	WQF = q_u x WQV. Conversion: to convert "$cfs/mi^2/in$ * ac-in" to "cfs" multiply by $1mi^2/640ac$	
123.00	feet	L = Swale length [1]	≥ 100'
1.00	feet	w = Bottom of the swale width [2]	0 - 8 feet
97.30	feet	E_{SHWT} = Elevation of SHWT. If none found, use the lowest elev. of test pit.	
9.29	feet	E_{BTM} = Elevation of the bottom of the practice	≥ E_{SHWT}
3.0	:1	SS_{RIGHT} = Right side slope	≥3:1
3.0	:1	SS_{LEFT} = Left side slope	≥3:1
0.009	ft/ft	S = Slope of swale in decimal form [3]	0.005 - .05
2.0	inches	d = Flow depth in swale at WQF (attach stage-discharge table)	≤ 4"
0.15	unitless	d must be < 4", therefore Manning's n = 0.15	
0.26	ft^2	Cross-sectional area check (assume trapezoidal channel)	
2.08	feet	Check wetted perimeter	
0.06	cfs	WQF_{check} [4]	WQF_{check} = WQF?
7%		Percent difference between WQF_{check} and WQF [4]	+/- 10%
9	minutes	HRT = hydraulic residence time during the WQF	≥ 10 min
99.69	ft	Peak elevation of the 10-year storm event [5]	
100.10	ft	Elevation of the top of the swale	
YES	yes/no	10 peak elevation ≤ the top of swale	← yes

1. Any portion of the swale that is in a roadside ditch shall not count towards the swale length.
2. Widths up to 16' allowed if a dividing berm or structure is used such that neither width is more than 8'.
3. If > 0.02 (2%) then check dams are required. No additional detention time is credited for check dams.
4. The WQF_{check} & WQF should be near equal (within 10%) if you have selected the correct depth off the stage-
5. If the swale does not discharge the 50-year storm without overtopping, hydrologic routing of secondary discharge

Designer's Notes:

Stage-Discharge for Reach 3R: Treat Swale

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)	Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
99.60	0.00	0.00	100.13	0.43	0.60
99.61	0.04	0.00	100.14	0.44	0.62
99.62	0.07	0.00	100.15	0.44	0.65
99.63	0.09	0.00	100.16	0.45	0.67
99.64	0.10	0.00	100.17	0.45	0.70
99.65	0.12	0.01	100.18	0.46	0.73
99.66	0.13	0.01	100.19	0.46	0.75
99.67	0.14	0.01	100.20	0.47	0.78
99.68	0.15	0.02	100.21	0.47	0.81
99.69	0.16	0.02	100.22	0.47	0.84
99.70	0.17	0.02	100.23	0.48	0.87
99.71	0.18	0.03	100.24	0.48	0.90
99.72	0.19	0.03	100.25	0.49	0.93
99.73	0.20	0.04	100.26	0.49	0.97
99.74	0.21	0.04	100.27	0.50	1.00
99.75	0.22	0.05	100.28	0.50	1.03
99.76	0.23	0.05	100.29	0.50	1.07
99.77	0.23	0.06	100.30	0.51	1.10
99.78	0.24	0.07	100.31	0.51	1.14
99.79	0.25	0.07	100.32	0.52	1.18
99.80	0.25	0.08	100.33	0.52	1.21
99.81	0.26	0.09	100.34	0.52	1.25
99.82	0.27	0.10	100.35	0.53	1.29
99.83	0.27	0.11	100.36	0.53	1.33
99.84	0.28	0.12	100.37	0.54	1.37
99.85	0.29	0.13	100.38	0.54	1.41
99.86	0.29	0.14	100.39	0.55	1.45
99.87	0.30	0.15	100.40	0.55	1.49
99.88	0.31	0.16	100.41	0.55	1.54
99.89	0.31	0.17	100.42	0.56	1.58
99.90	0.32	0.18	100.43	0.56	1.63
99.91	0.32	0.19	100.44	0.57	1.67
99.92	0.33	0.21	100.45	0.57	1.72
99.93	0.33	0.22	100.46	0.57	1.76
99.94	0.34	0.23	100.47	0.58	1.81
99.95	0.34	0.25	100.48	0.58	1.86
99.96	0.35	0.26	100.49	0.58	1.91
99.97	0.36	0.28	100.50	0.59	1.96
99.98	0.36	0.29	100.51	0.59	2.01
99.99	0.37	0.31	100.52	0.60	2.06
100.00	0.37	0.33	100.53	0.60	2.11
100.01	0.38	0.34	100.54	0.60	2.17
100.02	0.38	0.36	100.55	0.61	2.22
100.03	0.39	0.38	100.56	0.61	2.28
100.04	0.39	0.40	100.57	0.61	2.33
100.05	0.40	0.42	100.58	0.62	2.39
100.06	0.40	0.44	100.59	0.62	2.45
100.07	0.41	0.46	100.60	0.63	2.50
100.08	0.41	0.48			
100.09	0.42	0.50			
100.10	0.42	0.53			
100.11	0.42	0.55			
100.12	0.43	0.57			

WQF=0.6 CFS
Depth at
WQF=0.17' (2")

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New Hampshire
Location	
Longitude	70.926 degrees West
Latitude	42.988 degrees North
Elevation	0 feet
Date/Time	Thu, 17 Dec 2020 10:40:58 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.66	0.82	1.04	**1yr**	0.71	0.99	1.22	1.57	2.05	2.68	2.91	**1yr**	2.38	2.80	3.21	3.92	4.55	**1yr**
2yr	0.32	0.50	0.62	0.81	1.02	1.30	**2yr**	0.88	1.18	1.52	1.94	2.50	3.22	3.57	**2yr**	2.85	3.44	3.95	4.69	5.34	**2yr**
5yr	0.37	0.58	0.73	0.98	1.25	1.62	**5yr**	1.08	1.47	1.90	2.45	3.16	4.10	4.60	**5yr**	3.63	4.42	5.06	5.98	6.75	**5yr**
10yr	0.41	0.65	0.82	1.12	1.46	1.90	**10yr**	1.26	1.73	2.25	2.92	3.78	4.91	5.56	**10yr**	4.35	5.35	6.10	7.19	8.07	**10yr**
25yr	0.48	0.77	0.98	1.35	1.79	2.36	**25yr**	1.55	2.15	2.80	3.67	4.79	6.25	7.16	**25yr**	5.53	6.88	7.82	9.18	10.22	**25yr**
50yr	0.54	0.87	1.11	1.56	2.10	2.79	**50yr**	1.81	2.54	3.33	4.38	5.74	7.50	8.67	**50yr**	6.64	8.34	9.44	11.06	12.23	**50yr**
100yr	0.60	0.98	1.26	1.80	2.45	3.30	**100yr**	2.12	3.00	3.96	5.24	6.88	9.00	10.51	**100yr**	7.97	10.10	11.40	13.32	14.63	**100yr**
200yr	0.69	1.12	1.45	2.08	2.87	3.90	**200yr**	2.48	3.55	4.70	6.24	8.23	10.82	12.73	**200yr**	9.57	12.24	13.77	16.05	17.52	**200yr**
500yr	0.82	1.34	1.75	2.54	3.55	4.86	**500yr**	3.06	4.43	5.88	7.86	10.44	13.78	16.41	**500yr**	12.20	15.78	17.68	20.55	22.25	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.37	0.45	0.60	0.74	0.89	1yr	0.64	0.87	0.94	1.26	1.56	2.28	2.54	1yr	2.02	2.44	2.89	3.39	4.00	1yr
2yr	0.32	0.49	0.60	0.81	1.00	1.19	2yr	0.87	1.16	1.37	1.82	2.33	3.11	3.51	2yr	2.75	3.37	3.86	4.58	5.14	2yr
5yr	0.36	0.55	0.68	0.93	1.19	1.42	5yr	1.03	1.39	1.62	2.12	2.74	3.84	4.29	5yr	3.40	4.13	4.74	5.63	6.35	5yr
10yr	0.39	0.61	0.75	1.05	1.35	1.62	10yr	1.17	1.59	1.82	2.40	3.07	4.43	5.00	10yr	3.92	4.81	5.52	6.53	7.32	10yr
25yr	0.45	0.69	0.86	1.23	1.61	1.94	25yr	1.39	1.90	2.12	2.78	3.58	4.90	6.10	25yr	4.34	5.87	6.74	7.92	8.87	25yr
50yr	0.50	0.76	0.95	1.37	1.84	2.23	50yr	1.59	2.18	2.36	3.12	4.01	5.55	7.09	50yr	4.91	6.81	7.83	9.19	10.24	50yr
100yr	0.56	0.85	1.07	1.54	2.12	2.56	100yr	1.83	2.51	2.65	3.48	4.47	6.25	8.21	100yr	5.53	7.90	9.10	10.62	11.78	100yr
200yr	0.63	0.95	1.20	1.74	2.43	2.94	200yr	2.10	2.87	2.95	3.87	4.98	7.02	9.63	200yr	6.21	9.26	10.58	12.27	13.58	200yr
500yr	0.74	1.10	1.42	2.06	2.93	3.55	500yr	2.53	3.47	3.42	4.46	5.78	8.15	11.73	500yr	7.21	11.28	12.90	14.79	16.36	500yr

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.44	0.54	0.72	0.89	1.08	1yr	0.76	1.06	1.26	1.72	2.18	2.98	3.10	1yr	2.63	2.98	3.58	4.31	5.01	1yr
2yr	0.33	0.51	0.63	0.86	1.06	1.26	2yr	0.91	1.23	1.48	1.95	2.49	3.41	3.66	2yr	3.01	3.52	4.05	4.84	5.64	2yr
5yr	0.40	0.62	0.77	1.05	1.34	1.62	5yr	1.16	1.58	1.87	2.49	3.18	4.37	4.91	5yr	3.87	4.72	5.40	6.35	7.17	5yr
10yr	0.47	0.73	0.90	1.26	1.63	1.97	10yr	1.40	1.93	2.26	3.03	3.83	5.43	6.14	10yr	4.81	5.90	6.75	7.89	8.81	10yr
25yr	0.58	0.89	1.11	1.58	2.08	2.56	25yr	1.79	2.50	2.93	3.94	4.91	7.68	8.28	25yr	6.79	7.96	9.04	10.52	11.55	25yr
50yr	0.68	1.04	1.30	1.86	2.51	3.11	50yr	2.16	3.04	3.56	4.81	5.96	9.62	10.39	50yr	8.52	9.99	11.32	13.10	14.21	50yr
100yr	0.81	1.22	1.52	2.20	3.02	3.78	100yr	2.61	3.70	4.33	5.88	7.24	12.07	13.04	100yr	10.68	12.54	14.15	16.36	17.50	100yr
200yr	0.94	1.42	1.80	2.61	3.64	4.61	200yr	3.14	4.51	5.29	7.19	8.78	15.18	16.24	200yr	13.43	15.62	17.73	20.42	21.56	200yr
500yr	1.17	1.75	2.25	3.26	4.64	5.97	500yr	4.00	5.83	6.86	9.42	11.35	20.58	21.94	500yr	18.21	21.09	23.84	27.40	28.47	500yr

Powered by ACIS
Northeast Regional Climate Center

TEST PITS
FOR
110 HOLLAND WAY
EXETER, NEW HAMPSHIRE
JANUARY 11, 2021
JBE Project No. 19198

Performed by: Wayne Morrill, Jones & Beach Engineers, Inc., SSD #1358
Witnessed by: James Gove, Gove Environmental Services, Inc.

Test Pit #1

0" - 6"	topsoil
6" - 62"	loamy sand

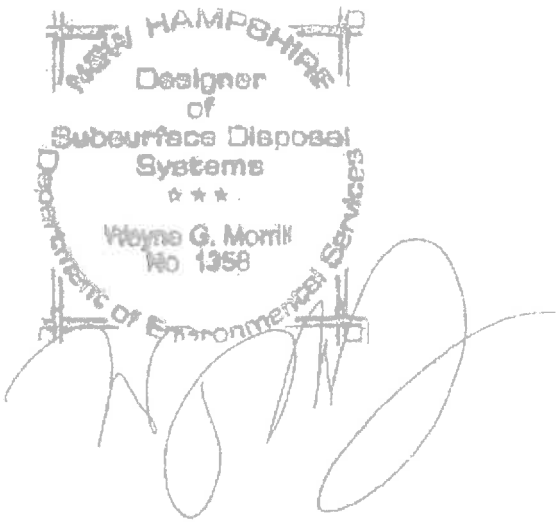
SHWT = 38"
Restrictive = 62"
Bottom = 85"

Test Pit #2

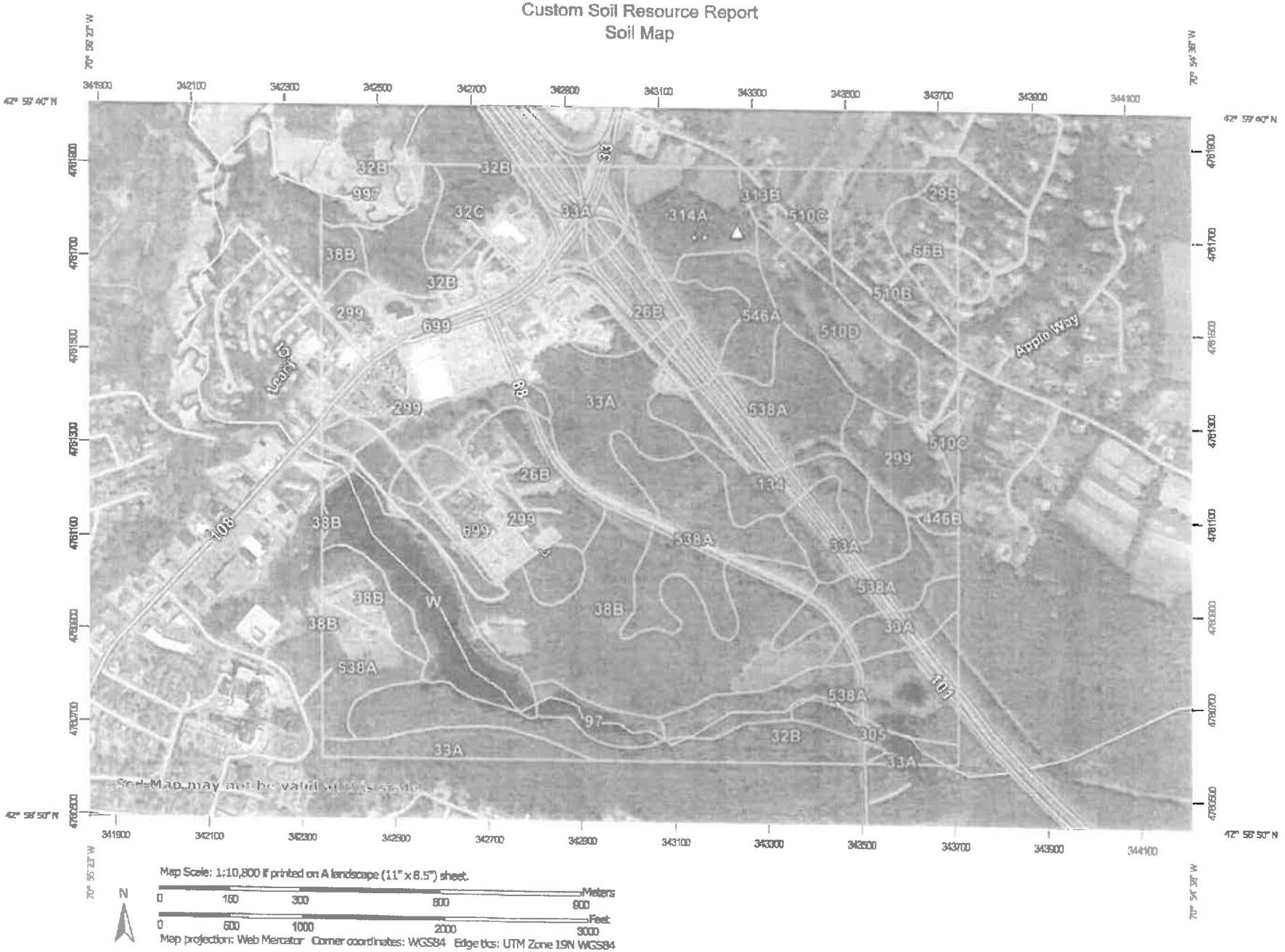
0" - 6"	topsoil
20" - 32"	clay

SHWT = 20"
Bottom = 72"

Test Pit #3
SHWT = 30"
Roots = 48"
Bottom = 60"



Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rockingham County, New Hampshire
Survey Area Data: Version 22, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Jun 14, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

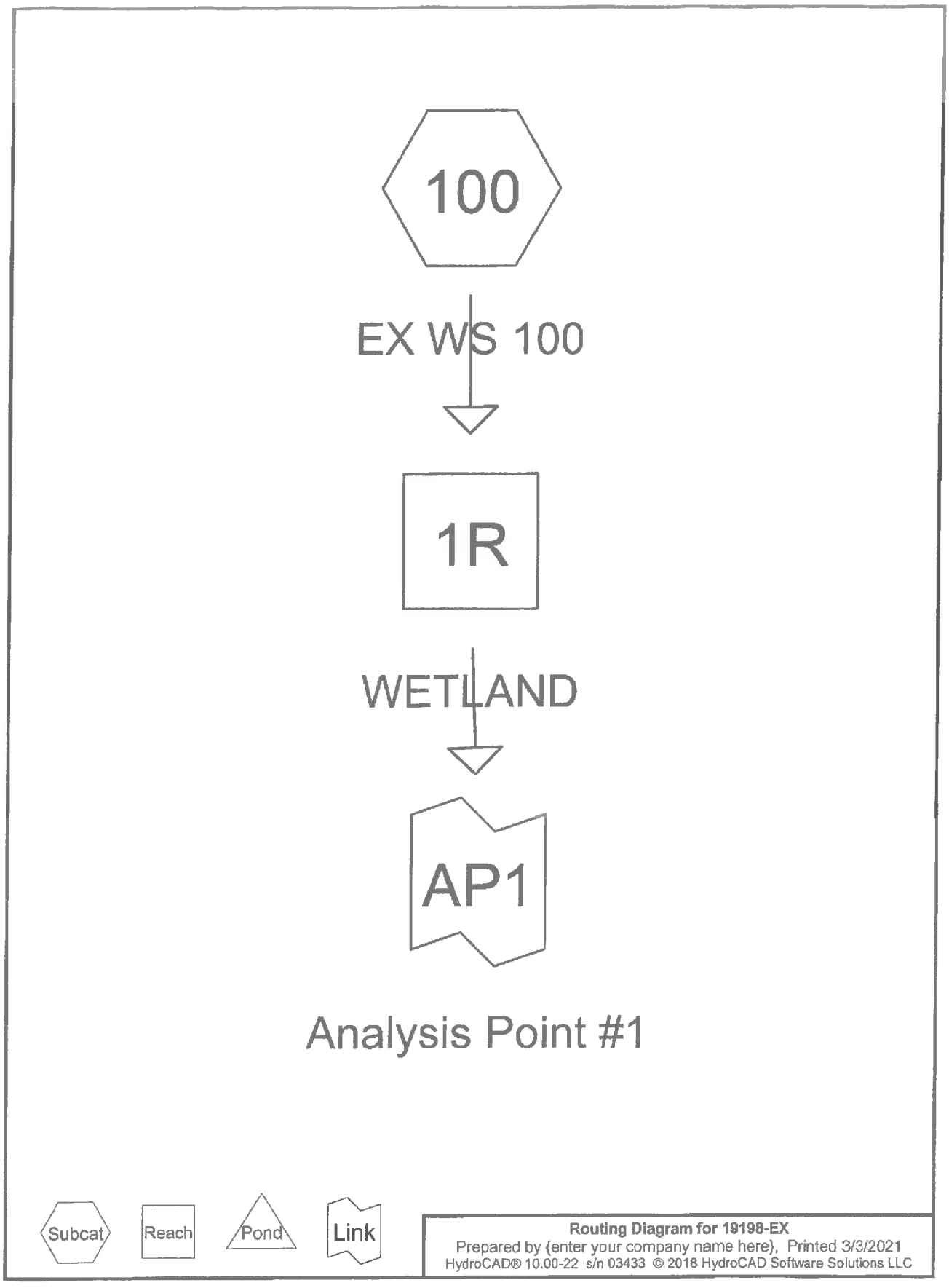
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
26B	Windsor loamy sand, 3 to 8 percent slopes	28.9	6.7%
29B	Woodbridge fine sandy loam, 3 to 8 percent slopes	1.3	0.3%
32B	Boxford silt loam, 3 to 8 percent slopes	30.4	7.0%
32C	Boxford silt loam, 8 to 15 percent slopes	7.8	1.8%
33A	Scitico silt loam, 0 to 5 percent slopes	54.5	12.6%
38B	Eldridge fine sandy loam, 3 to 8 percent slopes	65.3	15.1%
66B	Paxton fine sandy loam, 3 to 8 percent slopes	6.9	1.6%
97	Freetown and Natchaug mucky peats, ponded, 0 to 2 percent slopes	4.8	1.1%
134	Maybid silt loam	8.3	1.9%
299	Udorthents, smoothed	31.3	7.2%
305	Lim-Pootatuck complex	4.5	1.1%
313B	Deerfield loamy fine sand, 3 to 8 percent slopes	2.0	0.5%
314A	Pipestone sand, 0 to 5 percent slopes	12.4	2.9%
446B	Scituate-Newfields complex, 3 to 8 percent slopes	1.1	0.3%
510B	Hoosic gravelly fine sandy loam, 3 to 8 percent slopes	17.9	4.2%
510C	Hoosic gravelly fine sandy loam, 8 to 15 percent slopes	7.7	1.8%
510D	Hoosic gravelly fine sandy loam, 15 to 35 percent slopes	13.6	3.1%
538A	Squamscott fine sandy loam, 0 to 5 percent slopes	74.4	17.2%
546A	Walpole very fine sandy loam, 0 to 5 percent slopes	7.6	1.8%
699	Urban land	26.1	6.0%
997	Ipswich mucky peat, low salt	6.3	1.4%
W	Water	18.7	4.3%
Totals for Area of Interest		432.0	100.0%

APPENDIX I

EXISTING CONDITIONS DRAINAGE ANALYSIS

Summary 2 YEAR
Complete 10 YEAR
Summary 25 YEAR
Summary 50 YEAR


100
EX WS 100
1R
WETLAND
AP1
Analysis Point #1
Subcat
Reach
Pond
Link
Routing Diagram for 19198-EX
Prepared by {enter your company name here}, Printed 3/3/2021
HydroCAD® 10.00-22 s/n 03433 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.005	39	>75% Grass cover, Good, HSG A (100)
0.200	74	>75% Grass cover, Good, HSG C (100)
0.134	89	Gravel roads, HSG C (100)
0.153	30	Woods, Good, HSG A (100)
2.922	70	Woods, Good, HSG C (100)
3.415	**69**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.159	HSG A	100
0.000	HSG B	
3.256	HSG C	100
0.000	HSG D	
0.000	Other	
3.415		**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: EX WS 100 Runoff Area=148,737 sf 0.00% Impervious Runoff Depth>0.97"
Flow Length=356' Tc=23.1 min CN=69 Runoff=2.51 cfs 0.276 af

Reach 1R: WETLAND Avg. Flow Depth=0.18' Max Vel=0.83 fps Inflow=2.51 cfs 0.276 af
n=0.030 L=645.0' S=0.0048 '/' Capacity=87.15 cfs Outflow=2.09 cfs 0.271 af

Link AP1: Analysis Point #1 Inflow=2.09 cfs 0.271 af
Primary=2.09 cfs 0.271 af

Total Runoff Area = 3.415 ac Runoff Volume = 0.276 af Average Runoff Depth = 0.97"
100.00% Pervious = 3.415 ac 0.00% Impervious = 0.000 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: EX WS 100 Runoff Area=148,737 sf 0.00% Impervious Runoff Depth>2.24"
Flow Length=356' Tc=23.1 min CN=69 Runoff=6.09 cfs 0.637 af

Reach 1R: WETLAND Avg. Flow Depth=0.28' Max Vel=1.11 fps Inflow=6.09 cfs 0.637 af
n=0.030 L=645.0' S=0.0048 '/' Capacity=87.15 cfs Outflow=5.43 cfs 0.630 af

Link AP1: Analysis Point #1 Inflow=5.43 cfs 0.630 af
Primary=5.43 cfs 0.630 af

Total Runoff Area = 3.415 ac Runoff Volume = 0.637 af Average Runoff Depth = 2.24"
100.00% Pervious = 3.415 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 100: EX WS 100

Runoff = 6.09 cfs @ 12.33 hrs, Volume= 0.637 af, Depth> 2.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.65"

Area (sf)	CN	Description
230	39	>75% Grass cover, Good, HSG A
6,680	30	Woods, Good, HSG A
5,849	89	Gravel roads, HSG C
127,284	70	Woods, Good, HSG C
8,694	74	>75% Grass cover, Good, HSG C
148,737	69	Weighted Average
148,737		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	75	0.0220	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
6.7	281	0.0196	0.70		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.1	356	Total			

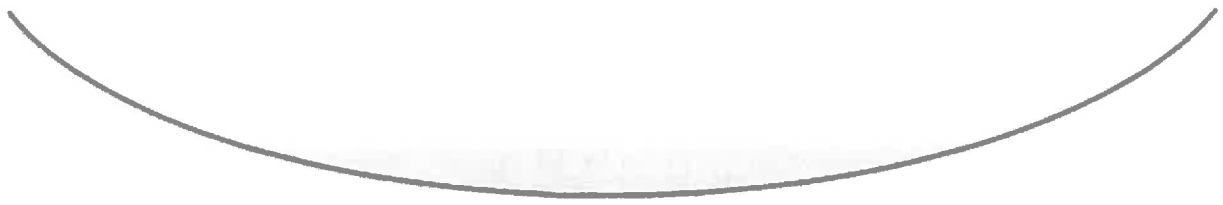
Summary for Reach 1R: WETLAND

Inflow Area = 3.415 ac, 0.00% Impervious, Inflow Depth > 2.24" for 10-YR event
Inflow = 6.09 cfs @ 12.33 hrs, Volume= 0.637 af
Outflow = 5.43 cfs @ 12.46 hrs, Volume= 0.630 af, Atten= 11%, Lag= 7.3 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.11 fps, Min. Travel Time= 9.7 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 21.0 min

Peak Storage= 3,147 cf @ 12.46 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.00' Flow Area= 33.3 sf, Capacity= 87.15 cfs

50.00' x 1.00' deep Parabolic Channel, n= 0.030 Stream, clean & straight
Length= 645.0' Slope= 0.0048 '/'
Inlet Invert= 99.38', Outlet Invert= 96.29'



‡

Summary for Link AP1: Analysis Point #1

Inflow Area = 3.415 ac, 0.00% Impervious, Inflow Depth > 2.21" for 10-YR event
Inflow = 5.43 cfs @ 12.46 hrs, Volume= 0.630 af
Primary = 5.43 cfs @ 12.46 hrs, Volume= 0.630 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: EX WS 100 Runoff Area=148,737 sf 0.00% Impervious Runoff Depth>3.39"
Flow Length=356' Tc=23.1 min CN=69 Runoff=9.28 cfs 0.965 af

Reach 1R: WETLAND Avg. Flow Depth=0.34' Max Vel=1.27 fps Inflow=9.28 cfs 0.965 af
n=0.030 L=645.0' S=0.0048 '/' Capacity=87.15 cfs Outflow=8.45 cfs 0.955 af

Link AP1: Analysis Point #1 Inflow=8.45 cfs 0.955 af
Primary=8.45 cfs 0.955 af

Total Runoff Area = 3.415 ac Runoff Volume = 0.965 af Average Runoff Depth = 3.39"
100.00% Pervious = 3.415 ac 0.00% Impervious = 0.000 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 100: EX WS 100 Runoff Area=148,737 sf 0.00% Impervious Runoff Depth>4.54"
Flow Length=356' Tc=23.1 min CN=69 Runoff=12.40 cfs 1.291 af

Reach 1R: WETLAND Avg. Flow Depth=0.39' Max Vel=1.40 fps Inflow=12.40 cfs 1.291 af
n=0.030 L=645.0' S=0.0048 '/' Capacity=87.15 cfs Outflow=11.46 cfs 1.280 af

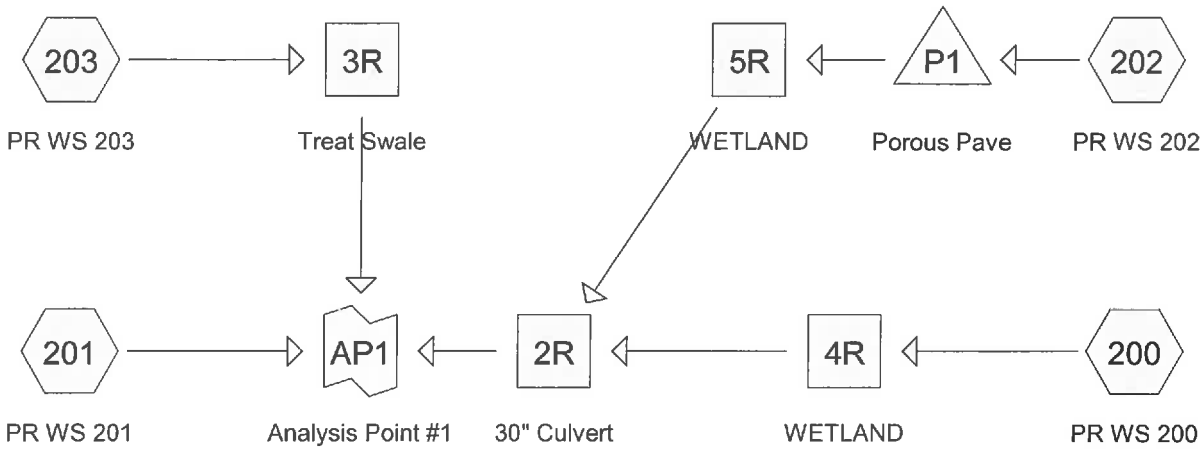
Link AP1: Analysis Point #1 Inflow=11.46 cfs 1.280 af
Primary=11.46 cfs 1.280 af

Total Runoff Area = 3.415 ac Runoff Volume = 1.291 af Average Runoff Depth = 4.54"
100.00% Pervious = 3.415 ac 0.00% Impervious = 0.000 ac

APPENDIX II

PROPOSED CONDITIONS DRAINAGE ANALYSIS

Summary 2 YEAR
Complete 10 YEAR
Summary 25 YEAR
Summary 50 YEAR



Subcat Reach Pond Link

Routing Diagram for 19198-PR

Prepared by {enter your company name here}, Printed 3/4/2021

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.014	39	>75% Grass cover, Good, HSG A (200, 201)
0.578	74	>75% Grass cover, Good, HSG C (200, 201, 203)
0.048	89	Gravel roads, HSG C (200, 203)
0.072	98	Paved parking, HSG A (202)
0.769	98	Paved parking, HSG C (202, 203)
0.073	30	Woods, Good, HSG A (200, 201)
1.862	70	Woods, Good, HSG C (200, 201)
3.414	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.159	HSG A	200, 201, 202
0.000	HSG B	
3.256	HSG C	200, 201, 202, 203
0.000	HSG D	
0.000	Other	
3.414		**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 200: PR WS 200 Runoff Area=91,604 sf 0.00% Impervious Runoff Depth>1.08"
Flow Length=348' Tc=22.8 min CN=71 Runoff=1.76 cfs 0.189 af

Subcatchment 201: PR WS 201 Runoff Area=17,645 sf 0.00% Impervious Runoff Depth>0.82"
Tc=5.0 min CN=66 Runoff=0.39 cfs 0.028 af

Subcatchment 202: PR WS 202 Runoff Area=32,909 sf 100.00% Impervious Runoff Depth>1.30"
Tc=640.0 min CN=98 Runoff=0.22 cfs 0.082 af

Subcatchment 203: PR WS 203 Runoff Area=6,577 sf 56.53% Impervious Runoff Depth>2.39"
Tc=5.0 min CN=89 Runoff=0.45 cfs 0.030 af

Reach 2R: 30" Culvert Avg. Flow Depth=0.26' Max Vel=5.09 fps Inflow=1.38 cfs 0.185 af
30.0" Round Pipe n=0.010 L=31.0' S=0.0129 '/' Capacity=60.57 cfs Outflow=1.38 cfs 0.185 af

Reach 3R: Treat Swale Avg. Flow Depth=0.43' Max Vel=0.38 fps Inflow=0.45 cfs 0.030 af
n=0.150 L=123.0' S=0.0089 '/' Capacity=2.50 cfs Outflow=0.37 cfs 0.030 af

Reach 4R: WETLAND Avg. Flow Depth=0.17' Max Vel=0.61 fps Inflow=1.76 cfs 0.189 af
n=0.030 L=589.0' S=0.0029 '/' Capacity=67.25 cfs Outflow=1.38 cfs 0.185 af

Reach 5R: WETLAND Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=85.0' S=0.0053 '/' Capacity=91.62 cfs Outflow=0.00 cfs 0.000 af

Pond P1: Porous Pave Peak Elev=103.25' Storage=0 cf Inflow=0.22 cfs 0.082 af
Discarded=0.22 cfs 0.082 af Primary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.082 af

Link AP1: Analysis Point #1 Inflow=1.61 cfs 0.243 af
Primary=1.61 cfs 0.243 af

Total Runoff Area = 3.414 ac Runoff Volume = 0.329 af Average Runoff Depth = 1.16"
75.37% Pervious = 2.574 ac 24.63% Impervious = 0.841 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 200: PR WS 200 Runoff Area=91,604 sf 0.00% Impervious Runoff Depth>2.41"
Flow Length=348' Tc=22.8 min CN=71 Runoff=4.08 cfs 0.422 af

Subcatchment 201: PR WS 201 Runoff Area=17,645 sf 0.00% Impervious Runoff Depth>2.01"
Tc=5.0 min CN=66 Runoff=1.02 cfs 0.068 af

Subcatchment 202: PR WS 202 Runoff Area=32,909 sf 100.00% Impervious Runoff Depth>2.07"
Tc=640.0 min CN=98 Runoff=0.34 cfs 0.130 af

Subcatchment 203: PR WS 203 Runoff Area=6,577 sf 56.53% Impervious Runoff Depth>4.16"
Tc=5.0 min CN=89 Runoff=0.75 cfs 0.052 af

Reach 2R: 30" Culvert Avg. Flow Depth=0.41' Max Vel=6.69 fps Inflow=3.47 cfs 0.416 af
30.0" Round Pipe n=0.010 L=31.0' S=0.0129 '/' Capacity=60.57 cfs Outflow=3.47 cfs 0.416 af

Reach 3R: Treat Swale Avg. Flow Depth=0.55' Max Vel=0.44 fps Inflow=0.75 cfs 0.052 af
n=0.150 L=123.0' S=0.0089 '/' Capacity=2.50 cfs Outflow=0.65 cfs 0.052 af

Reach 4R: WETLAND Avg. Flow Depth=0.25' Max Vel=0.81 fps Inflow=4.08 cfs 0.422 af
n=0.030 L=589.0' S=0.0029 '/' Capacity=67.25 cfs Outflow=3.47 cfs 0.416 af

Reach 5R: WETLAND Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=85.0' S=0.0053 '/' Capacity=91.62 cfs Outflow=0.00 cfs 0.000 af

Pond P1: Porous Pave Peak Elev=103.25' Storage=0 cf Inflow=0.34 cfs 0.130 af
Discarded=0.34 cfs 0.130 af Primary=0.00 cfs 0.000 af Outflow=0.34 cfs 0.130 af

Link AP1: Analysis Point #1 Inflow=4.01 cfs 0.536 af
Primary=4.01 cfs 0.536 af

Total Runoff Area = 3.414 ac Runoff Volume = 0.673 af Average Runoff Depth = 2.36"
75.37% Pervious = 2.574 ac 24.63% Impervious = 0.841 ac

Summary for Subcatchment 200: PR WS 200

Runoff = 4.08 cfs @ 12.32 hrs, Volume= 0.422 af, Depth> 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.65"

Area (sf)	CN	Description
200	39	>75% Grass cover, Good, HSG A
707	30	Woods, Good, HSG A
1,235	89	Gravel roads, HSG C
74,859	70	Woods, Good, HSG C
14,603	74	>75% Grass cover, Good, HSG C
91,604	71	Weighted Average
91,604		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	75	0.0220	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.22"
6.4	273	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.8	348	Total			

Summary for Subcatchment 201: PR WS 201

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.02 cfs @ 12.08 hrs, Volume= 0.068 af, Depth> 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.65"

Area (sf)	CN	Description
400	39	>75% Grass cover, Good, HSG A
2,472	30	Woods, Good, HSG A
6,242	70	Woods, Good, HSG C
8,531	74	>75% Grass cover, Good, HSG C
17,645	66	Weighted Average
17,645		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment 202: PR WS 202

Per UNH Stormwater Center Porous Pavement Specifications, lag time through a 41" porous pavement base = 790 minutes. Porous Section #1 = 33", therefore, lag time = 635 min.

[73] Warning: Peak may fall outside time span

Runoff = 0.34 cfs @ 19.95 hrs, Volume= 0.130 af, Depth> 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.65"

Area (sf)	CN	Description
29,780	98	Paved parking, HSG C
3,129	98	Paved parking, HSG A
32,909	98	Weighted Average
32,909		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Sheet Flow**
635.0					**Direct Entry, Porous Pave**
640.0	0	Total			

Summary for Subcatchment 203: PR WS 203

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.75 cfs @ 12.07 hrs, Volume= 0.052 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.65"

Area (sf)	CN	Description
3,718	98	Paved parking, HSG C
836	89	Gravel roads, HSG C
2,023	74	>75% Grass cover, Good, HSG C
6,577	89	Weighted Average
2,859		43.47% Pervious Area
3,718		56.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Reach 2R: 30" Culvert

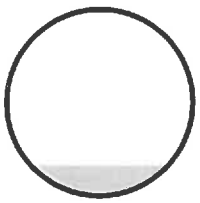
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 4R OUTLET depth by 0.15' @ 12.45 hrs
[62] Hint: Exceeded Reach 5R OUTLET depth by 0.41' @ 12.45 hrs

Inflow Area = 2.858 ac, 26.43% Impervious, Inflow Depth > 1.75" for 10-YR event
Inflow = 3.47 cfs @ 12.47 hrs, Volume= 0.416 af
Outflow = 3.47 cfs @ 12.47 hrs, Volume= 0.416 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.69 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.15 fps, Avg. Travel Time= 0.2 min

Peak Storage= 16 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.41'
Bank-Full Depth= 2.50' Flow Area= 4.9 sf, Capacity= 60.57 cfs

30.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 31.0' Slope= 0.0129 '/'
Inlet Invert= 97.70', Outlet Invert= 97.30'



Summary for Reach 3R: Treat Swale

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.151 ac, 56.53% Impervious, Inflow Depth > 4.16" for 10-YR event
Inflow = 0.75 cfs @ 12.07 hrs, Volume= 0.052 af
Outflow = 0.65 cfs @ 12.12 hrs, Volume= 0.052 af, Atten= 14%, Lag= 3.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.44 fps, Min. Travel Time= 4.6 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 11.9 min

Peak Storage= 181 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.55'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 2.50 cfs

1.00' x 1.00' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 3.0 '/' Top Width= 7.00'
Length= 123.0' Slope= 0.0089 '/'
Inlet Invert= 99.60', Outlet Invert= 98.50'

Summary for Reach 4R: WETLAND

Inflow Area = 2.103 ac, 0.00% Impervious, Inflow Depth > 2.41" for 10-YR event
Inflow = 4.08 cfs @ 12.32 hrs, Volume= 0.422 af
Outflow = 3.47 cfs @ 12.47 hrs, Volume= 0.416 af, Atten= 15%, Lag= 8.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.81 fps, Min. Travel Time= 12.1 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 26.5 min

Peak Storage= 2,520 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 1.00' Flow Area= 33.3 sf, Capacity= 67.25 cfs

50.00' x 1.00' deep Parabolic Channel, n= 0.030 Stream, clean & straight
Length= 589.0' Slope= 0.0029 '/'
Inlet Invert= 99.38', Outlet Invert= 97.70'

‡

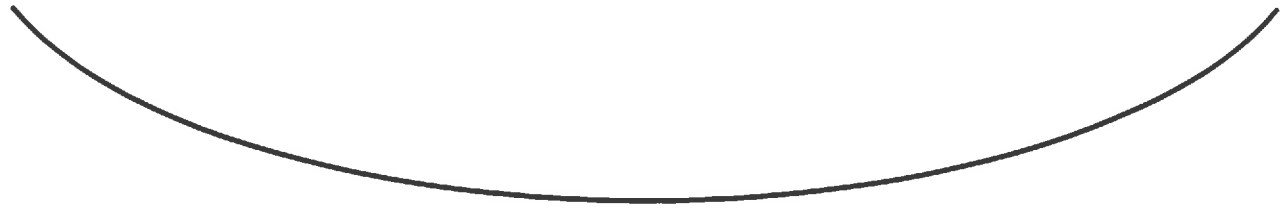
Summary for Reach 5R: WETLAND

Inflow Area = 0.755 ac,100.00% Impervious, Inflow Depth = 0.00" for 10-YR event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 33.3 sf, Capacity= 91.62 cfs

50.00' x 1.00' deep Parabolic Channel, n= 0.030 Short grass
Length= 85.0' Slope= 0.0053 '/'
Inlet Invert= 98.15', Outlet Invert= 97.70'



‡

Summary for Pond P1: Porous Pave

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.755 ac,100.00% Impervious, Inflow Depth > 2.07" for 10-YR event
Inflow = 0.34 cfs @ 19.95 hrs, Volume= 0.130 af
Outflow = 0.34 cfs @ 19.95 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.34 cfs @ 19.95 hrs, Volume= 0.130 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 103.25' @ 5.00 hrs Surf.Area= 29,327 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	103.25'	17,413 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
103.25	29,327	1,218.0	0.0	0	0	29,327
104.08	30,306	1,226.0	40.0	9,899	9,899	31,184
104.33	30,633	1,234.0	15.0	1,143	11,041	32,780
105.33	31,619	1,242.0	5.0	1,556	12,597	34,785
105.66	32,279	1,250.0	30.0	3,163	15,760	36,423
106.00	32,545	1,258.0	15.0	1,653	17,413	38,076

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.25'	**3.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 102.10'
#2	Primary	103.41'	**6.0" Round Culvert X 12.00** L= 11.0' Ke= 0.500 Inlet / Outlet Invert= 103.41' / 103.06' S= 0.0318 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Discarded OutFlow Max=0.00 cfs @ 19.95 hrs HW=103.25' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 2.04 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=103.25' TW=98.15' (Dynamic Tailwater)
↑—**2=Culvert** (Controls 0.00 cfs)

Summary for Link AP1: Analysis Point #1

Inflow Area = 3.414 ac, 24.63% Impervious, Inflow Depth > 1.88" for 10-YR event
Inflow = 4.01 cfs @ 12.44 hrs, Volume= 0.536 af
Primary = 4.01 cfs @ 12.44 hrs, Volume= 0.536 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 200: PR WS 200 Runoff Area=91,604 sf 0.00% Impervious Runoff Depth>3.60"
Flow Length=348' Tc=22.8 min CN=71 Runoff=6.10 cfs 0.630 af

Subcatchment 201: PR WS 201 Runoff Area=17,645 sf 0.00% Impervious Runoff Depth>3.11"
Tc=5.0 min CN=66 Runoff=1.59 cfs 0.105 af

Subcatchment 202: PR WS 202 Runoff Area=32,909 sf 100.00% Impervious Runoff Depth>2.69"
Tc=640.0 min CN=98 Runoff=0.43 cfs 0.169 af

Subcatchment 203: PR WS 203 Runoff Area=6,577 sf 56.53% Impervious Runoff Depth>5.57"
Tc=5.0 min CN=89 Runoff=1.00 cfs 0.070 af

Reach 2R: 30" Culvert Avg. Flow Depth=0.50' Max Vel=7.60 fps Inflow=5.33 cfs 0.623 af
30.0" Round Pipe n=0.010 L=31.0' S=0.0129 '/' Capacity=60.57 cfs Outflow=5.33 cfs 0.623 af

Reach 3R: Treat Swale Avg. Flow Depth=0.63' Max Vel=0.48 fps Inflow=1.00 cfs 0.070 af
n=0.150 L=123.0' S=0.0089 '/' Capacity=2.50 cfs Outflow=0.87 cfs 0.070 af

Reach 4R: WETLAND Avg. Flow Depth=0.31' Max Vel=0.93 fps Inflow=6.10 cfs 0.630 af
n=0.030 L=589.0' S=0.0029 '/' Capacity=67.25 cfs Outflow=5.33 cfs 0.623 af

Reach 5R: WETLAND Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=85.0' S=0.0053 '/' Capacity=91.62 cfs Outflow=0.00 cfs 0.000 af

Pond P1: Porous Pave Peak Elev=103.25' Storage=0 cf Inflow=0.43 cfs 0.169 af
Discarded=0.43 cfs 0.169 af Primary=0.00 cfs 0.000 af Outflow=0.43 cfs 0.169 af

Link AP1: Analysis Point #1 Inflow=6.15 cfs 0.798 af
Primary=6.15 cfs 0.798 af

Total Runoff Area = 3.414 ac Runoff Volume = 0.974 af Average Runoff Depth = 3.42"
75.37% Pervious = 2.574 ac 24.63% Impervious = 0.841 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 200: PR WS 200 Runoff Area=91,604 sf 0.00% Impervious Runoff Depth>4.77"
Flow Length=348' Tc=22.8 min CN=71 Runoff=8.06 cfs 0.836 af

Subcatchment 201: PR WS 201 Runoff Area=17,645 sf 0.00% Impervious Runoff Depth>4.22"
Tc=5.0 min CN=66 Runoff=2.15 cfs 0.142 af

Subcatchment 202: PR WS 202 Runoff Area=32,909 sf 100.00% Impervious Runoff Depth>3.26"
Tc=640.0 min CN=98 Runoff=0.52 cfs 0.205 af

Subcatchment 203: PR WS 203 Runoff Area=6,577 sf 56.53% Impervious Runoff Depth>6.90"
Tc=5.0 min CN=89 Runoff=1.22 cfs 0.087 af

Reach 2R: 30" Culvert Avg. Flow Depth=0.58' Max Vel=8.28 fps Inflow=7.17 cfs 0.828 af
30.0" Round Pipe n=0.010 L=31.0' S=0.0129 '/' Capacity=60.57 cfs Outflow=7.17 cfs 0.828 af

Reach 3R: Treat Swale Avg. Flow Depth=0.69' Max Vel=0.50 fps Inflow=1.22 cfs 0.087 af
n=0.150 L=123.0' S=0.0089 '/' Capacity=2.50 cfs Outflow=1.08 cfs 0.087 af

Reach 4R: WETLAND Avg. Flow Depth=0.36' Max Vel=1.01 fps Inflow=8.06 cfs 0.836 af
n=0.030 L=589.0' S=0.0029 '/' Capacity=67.25 cfs Outflow=7.17 cfs 0.828 af

Reach 5R: WETLAND Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=85.0' S=0.0053 '/' Capacity=91.62 cfs Outflow=0.00 cfs 0.000 af

Pond P1: Porous Pave Peak Elev=103.25' Storage=0 cf Inflow=0.52 cfs 0.205 af
Discarded=0.52 cfs 0.205 af Primary=0.00 cfs 0.000 af Outflow=0.52 cfs 0.205 af

Link AP1: Analysis Point #1 Inflow=8.25 cfs 1.056 af
Primary=8.25 cfs 1.056 af

Total Runoff Area = 3.414 ac Runoff Volume = 1.271 af Average Runoff Depth = 4.47"
75.37% Pervious = 2.574 ac 24.63% Impervious = 0.841 ac

STORMWATER MANAGEMENT OPERATION AND MAINTENANCE MANUAL

110 Holland Way, Exeter, NH
Tax Map 51 Lots 14-1 & 17
Exeter, NH 03833

Prepared for:

McFarland Ford Sales, Inc.
151 Portsmouth Ave
Exeter, NH 03833

Prepared by:
Jones & Beach Engineers, Inc.
85 Portsmouth Avenue
P.O. Box 219
Stratham, NH 03885
(603) 772-4746
March 01, 2021
JBE Project No. 19198

Inspection and Maintenance of Facilities and Property

A. Maintenance of Common Facilities or Property

1. McFarland Ford Sales Inc., future owners and assigns is responsible to perform the maintenance. The owner shall keep receipts and records of all maintenance companies hired throughout the year. Should ownership of the property change, McFarland Ford Sales Inc. shall continue to remain responsible until it notifies the Town that said succeeding owner(s) has assumed such responsibility. Upon subsequent transfers, the responsibility shall continue to be that of the transferring owner until the transferee owner notifies the Town of the assumption of responsibility, along with contact information of the new responsible party(ies).

B. General Inspection and Maintenance Requirements

1. The Owner shall perform all inspections and maintenance with greater than annual frequency as required by this report.

2. Permanent stormwater and sediment and erosion control facilities to be maintained on the site include, but are not limited to, the following:

    a. Erosion
    b. Vegetation and landscaping
    c. Riprap inlet and outlet protection aprons
    d. Swale
    e. Porous Pavement
    f. Culverts

2. Maintenance of permanent measures shall follow the following schedule:

a. **Erosion: Annual inspection** of the site for erosion, destabilization, settling, and sloughing. Any needed repairs are to be conducted immediately.

b. **Vegetation and Landscaping: Annual inspection** of site's vegetation and landscaping. Any areas that are bare shall be reseeded and mulched with hay or, if the case is extreme, loamed and seeded or sodded to ensure adequate vegetative cover. Landscape specimens shall be replaced in kind, if they are found to be dead or dying.

c. **Riprap**: Rock riprap should be **inspected annually** and after every major storm event in order to ensure that it has not been displaced, undermined, or otherwise damaged. Displaced rock should be replaced, or additional rock added in order to maintain the structure(s) in their undamaged state. Woody vegetation should not be allowed to become established in riprap areas, and/or any debris removed from the void spaces between the rocks. If the riprap is adjacent to a stream or other waterbody, the water should be kept clear of obstructions, debris, and sediment deposits.

d. **Swales**: Inspect annually for erosion, sediment accumulation, vegetation loss, and presence of invasive species. Perform periodic mowing; frequency depends on location and type of grass. Remove debris and accumulated sediment, based on inspection. Repair eroded areas, remove invasive species and dead vegetation, and reseed with applicable grass mix as warranted by inspection.

e. Porous Asphalt Parking Lots:

The following recommendations will help assure that the pavement is maintained to preserve its hydrologic effectiveness.

Winter maintenance:

- Sanding for winter traction is prohibited. Deicing is permitted (NaCl, $MgCl_2$, or equivalent). Reduced salt application to 50% over traditional pavement application rates. Nontoxic, organic deicers, applied either as blended, magnesium chloride-based liquid products or as pretreated salt, are preferable.
- Plowing is allowed, blade should be set approximately 1" above road surface. Ice and light snow accumulation are generally not as problematic as for standard asphalt. Snow will accumulate during heavier storms and should be plowed. (more than usual, about an inch).

- Snow shall not be plowed or stored in 50' wetland buffer.

Routine maintenance:

- Asphalt seal coating is absolutely forbidden. Surface seal coating is not reversible.
- The pavement surface should be vacuumed 2 or 4 times per year, and at any additional times sediment is spilled, eroded, or tracked onto the surface.
- Planted areas adjacent to pervious pavement should be well maintained to prevent soil washout onto the pavement. If any bare spots or eroded areas are observed within the planted areas, they should be replanted and/or stabilized at once.
- Immediately clean any soil deposited on pavement. Superficial dirt does not necessarily clog the pavement voids. However, dirt that is ground in repeatedly by tires can lead to clogging. Therefore, trucks or other heavy vehicles should be prevented from tracking or spilling dirt onto the pavement.
- Do not allow construction staging, soil/mulch storage, etc. on unprotected pavement surface. Contractor to laydown tarps, plywood or removable item and take care not to track material onto unprotected pavement.
- Repairs: potholes of less than 50 square feet can be patched by any means suitable with standard pavement or a pervious mix is preferred. For areas greater than 50 sq. ft. is in need of repair, approval of patch type should be sought from a qualified engineer. Any required repair of drainage structures should be done promptly to ensure continued proper functioning of the system.
- Written and verbal communication to the porous pavement's future owner should make clear the pavement's special purpose and special maintenance requirements such as those listed here.
- A permanent sign shall be added and maintained at the entrance and end of the porous asphalt area to inform residents and maintenance staff of the special nature and purpose of the pavement, and its special maintenance requirements.

Signage should read as follows:

POROUS ASPHALT PAVEMENT
FOR STORM WATER MANAGEMENT

MAINTENANCE REQUIREMENTS:

PLOW WITH SLIGHTLY RAISED BLADE ONLY
SANDING OF SURFACE PROHIBITED
DEICING PERMITTED ($NaCl$, $MgCl_2$ OR EQUIVALENT)

SEAL-COATING PROHIBITED
CLEANING BY PRESSURIZED AIR OR WATER PROHIBITED
DRY VACUUM SEMIANNUALLY

f. **Culverts: Inspection** of culvert inlets and outlets at least **once per month** during the rainy season (March to November). Any debris is to be removed and disposed of properly.

C. Salt Management:

1. It is recommended that the NHDES Green Snow Pro Certification program maintenance guidance be followed on site. It is preferable that the contractor responsible for Snow removal and the application of salt/sand on site be Snow Pro Certified.
2. Please refer to the porous pavement section of this manual for additional winter salt reduction information.

See attached sample forms as a guideline.

Any inquiries in regards to the design, function, and/or maintenance of any one of the above mentioned facilities or tasks shall be directed to the project engineer:

Jones & Beach Engineers, Inc.
85 Portsmouth Avenue
P.O. Box 219
Stratham, NH 03885

T#: (603) 772-4746
F#: (603) 772-0227

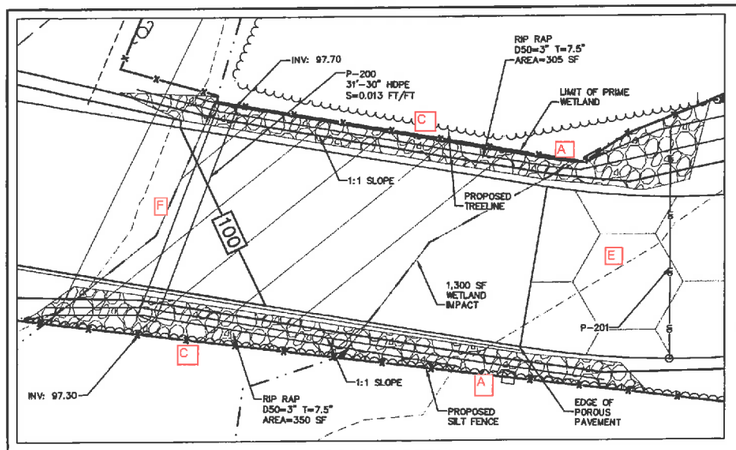
STORM WATER POLLUTION PREVENTION PLAN
INSPECTION PERIOD AND CRITERIA
Tax Map 51 Lots 14-1 & 17
110 Holland Way
Exeter, NH

Stormwater Component	Inspection Period	Inspection Criteria/Methods
Erosion	Annually	Repair site erosion.
Vegetation	Annually	Repair bare unvegetated areas.
Riprap	Annually	Relocate displaced rocks, remove woody vegetation and debris.
Swale	Bi-annually	Inspection for sediment/debris, inspect for erosion, inspection for invasives, mow.
Porous Pavement	Bi-annually	Inspection for sediment/debris, inspect for damage to the porous pavement surface.
Culvert	Bi-annually	Inspection for sediment/debris

STORM WATER OPERATIONS AND MAINTENANCE PLAN
INSPECTION REPORT

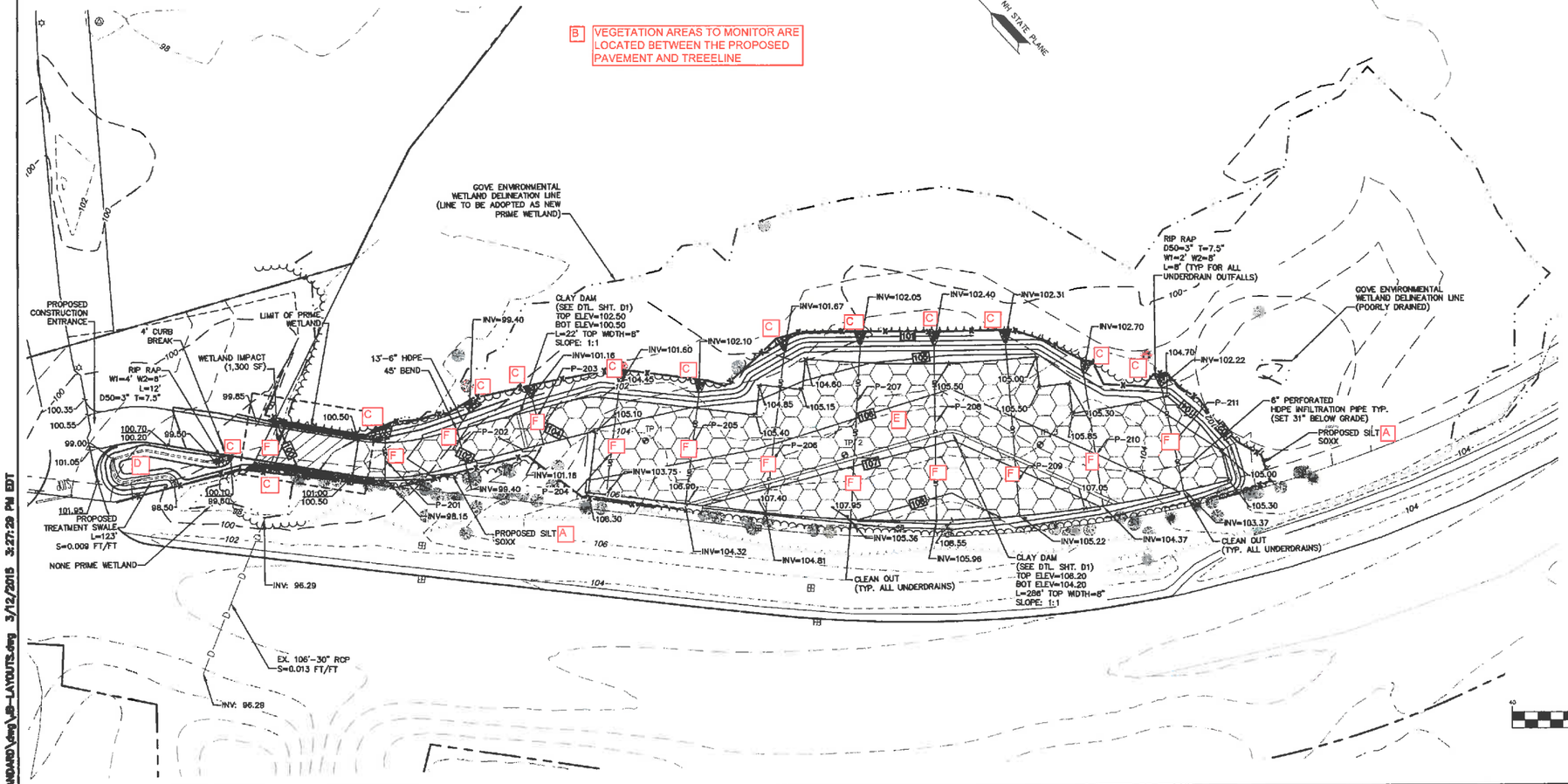
Tax Map 51 Lots 14-1 & 17
110 Holland Way, Exeter, NH
Exeter, NH 03833

Yearly Inspection Form			
Inspected Component	**Date of Inspection**	**Inspector**	**Issue Detected / Action Taken**
Erosion			
Vegetation			
Riprap			
Culvert			
Porous Pavement			
Swale			



WETLAND CROSSING DETAIL
SCALE: 1" = 10'

B VEGETATION AREAS TO MONITOR ARE LOCATED BETWEEN THE PROPOSED PAVEMENT AND TREEELINE



DRAINAGE STRUCTURE TABLE

P-201 31' – 6" PERF. HDPE (SET LEVEL)	P-207 109' – 6" PERF. HDPE S=0.032 FT/FT
P-202 22' – 6" PERF. HDPE (SET LEVEL)	P-208 110' – 6" PERF. HDPE S=0.033 FT/FT
P-203 30' – 6" PERF. HDPE (SET LEVEL)	P-209 109' – 6" PERF. HDPE S=0.027 FT/FT
P-204 69' – 6" PERF. HDPE S=0.032 FT/FT	P-210 84' – 6" PERF. HDPE S=0.020 FT/FT
P-205 70' – 6" PERF. HDPE S=0.032 FT/FT	P-211 67' – 6" PERF. HDPE S=0.017 FT/FT
P-206 100' – 6" PERF. HDPE S=0.032 FT/FT	

NOTES: ALL PIPES LISTED TO BE PERFORATED*

*=SOLID PIPE TO BE USED AT CLAY DAM CROSSINGS (SEE DTL. SHT. D1)

GRADING AND DRAINAGE NOTES:

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2. VERTICAL DATUM: ASSUMED. HORIZONTAL DATUM: NH STATE PLANE.
3. ALL BENCHMARKS AND TOPOGRAPHY SHOULD BE FIELD VERIFIED BY THE CONTRACTOR.
4. SITE GRADING SHALL NOT PROCEED UNTIL EROSION CONTROL MEASURES HAVE BEEN INSTALLED. SEE CONSTRUCTION SEQUENCE ON SHEET E1.
5. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR IS REQUIRED TO HAVE THE PROJECT'S LAND SURVEYOR STAKE OR FLAG CLEARING LIMITS. A MINIMUM OF 48 HOURS NOTICE IS REQUIRED.
6. ALL SWALES AND DETENTION PONDS ARE TO BE STABILIZED PRIOR TO DIRECTING RUNOFF TO THEM.
7. ALL SWALES AND ANY SLOPES GREATER THAN 3:1 SHALL BE STABILIZED WITH NORTH AMERICAN GREEN S75 EROSION CONTROL BLANKETS (OR AN EQUIVALENT APPROVED IN WRITING BY THE ENGINEER), UNLESS OTHERWISE SPECIFIED.
8. ALL DRAINAGE STRUCTURES AND STORM SEWER PIPES SHALL MEET HEAVY DUTY TRAFFIC H20 LOADING AND SHALL BE INSTALLED ACCORDINGLY.
9. IMMEDIATELY APPLY AND COMPACT STONE BASE FOR BUILDING PAD TO +/-½" PRIOR TO EXCAVATING INTERIOR AND PERIMETER FOOTINGS.
10. IN AREAS WHERE CONSTRUCTION IS PROPOSED ADJACENT TO ABUTTING PROPERTIES, THE CONTRACTOR SHALL INSTALL ORANGE CONSTRUCTION FENCING ALONG PROPERTY LINES IN ALL AREAS WHERE SILT FENCING IS NOT REQUIRED.
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14. NO LAND CLEARING OR GRADING SHALL BEGIN UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
15. ALL EXPOSED AREAS SHALL BE SEEDED AS SPECIFIED WITHIN 3 DAYS OF FINAL GRADING.
16. SHOULD CONSTRUCTION STOP FOR LONGER THAN 3 DAYS, THE SITE SHALL BE SEEDED AS SPECIFIED.
17. MAINTAIN EROSION CONTROL MEASURES AFTER EACH RAIN EVENT OF 0.5" OR GREATER IN A 24 HOUR PERIOD AND AT LEAST ONCE A WEEK.
18. THIS PLAN SHALL NOT BE CONSIDERED ALL INCLUSIVE, AS THE GENERAL CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT SEDIMENT FROM LEAVING THE SITE.
19. CONSTRUCTION VEHICLES SHALL UTILIZE THE STABILIZED CONSTRUCTION ENTRANCE TO THE EXTENT POSSIBLE THROUGHOUT CONSTRUCTION.
20. IF INSTALLATION OF STORM DRAINAGE SYSTEM SHOULD BE INTERRUPTED BY WEATHER OR NIGHTFALL, THE PIPE ENDS SHALL BE COVERED WITH FILTER FABRIC.
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22. SEDIMENT SHALL BE REMOVED FROM ALL SEDIMENT BASINS BEFORE THEY ARE 25% FULL.
23. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH PROJECT SPECIFICATIONS.
24. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED, IF DEEMED NECESSARY BY ON-SITE INSPECTION BY ENGINEER AND/OR REGULATORY OFFICIALS.
25. SEE ALSO EROSION AND SEDIMENT CONTROL SPECIFICATIONS ON SHEET E1.

TEST PIT DATA:

TEST PIT #1: GROUND ELEV.=104.10, SHWT ELEV.=100.93, BEDROCK= N/A, BOT. TESTPIT=97.02

TEST PIT #2: GROUND ELEV.=103.75, SHWT ELEV.=102.10, BEDROCK= N/A, BOT. TESTPIT=97.75

TEST PIT #3: GROUND ELEV.=104.00, SHWT ELEV.=101.50, BEDROCK= N/A, BOT. TESTPIT=99.00

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft

PROJECT PARCEL
TOWN OF EXETER
TAX MAP 51, LOTS 14-1 & 17

APPLICANT
McFARLAND FORD SALES, INC
151 PORTSMOUTH AVE
EXETER, NH 03833

TOTAL LOT AREA
939,154 SQ. FT.
21.56 ACRES

F:\CADD\MASTER STANDARD\dwg\JB-LAYOUTS.dwg 3/12/2015 3:27:29 PM EDT

Design: EMP	Draft: GDR	Date: 12/01/2020
Checked: WGM	Scale: AS SHOWN	Project No.: 19196
Drawing Name: 19196-PLAN.dwg		

STATE OF NEW HAMPSHIRE – ERIK M POULIN No.16689 – LICENSED PROFESSIONAL ENGINEER

REV.	DATE	REVISION	BY
1	03/03/21	REVISED PER TRC COMMENTS	EMP
0	01/14/21	ISSUED FOR REVIEW	EMP

Designed and Produced in NH
J/B Jones & Beach Engineers, Inc.
85 Portsmouth Ave. Civil Engineering Services 603-772-4746
PO Box 219 FAX: 603-772-0227
Stratham, NH 03885 E-MAIL: JBE@JONESANDBEACH.COM

Plan Name:	GRADING AND DRAINAGE PLAN
Project:	STORAGE LOT 110 HOLLAND WAY, EXETER, NH
Owner of Record:	McFARLAND FORD SALES, INC 151 PORTSMOUTH AVE, EXETER, NH

DRAWING No.
C3
SHEET 5 OF 8
JBE PROJECT NO. 19196

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

REGISTRATION AND NOTIFICATION FORM FOR STORM WATER INFILTRATION TO GROUNDWATER (5H1)

Groundwater Discharge Program

RSA/Rule: RSA 485-A:6, VII; 485:3, X; Env-Wq 402

Applicant Information

Name: McFarland Ford Sales, Inc. Daytime Phone: (____)____-_____

Mailing Address: 151 Portsmouth Ave

City: Exeter State: NH Zip: 038433

Contact Person Name: chris Lane Email: clane@mcfarlandford.com

Contact Person: Phone Number 800-639-3673 Fax Number: _____

Facility Information

Facility Name: McFarland Ford Sales, Inc.

Address: 110 Holland Way

City: Exeter State: NH Zip: 03833

Property Tax Map: 51 Lot # 14-1 & 17

Latitude & Longitude of discharge location(s): 42deg 59' 18.27" N 70deg 55' 37.36" W

Facility Owner Information (complete only if different than applicant)

Owner Name: _____ Daytime Phone : (___)___-_____

Mailing Address: _____

City: _____ State: _____ Zip: _____

Contact Person Name: _____ Email: _____

Contact Person: Phone Number _____ Fax Number: _____

Property Owner Information (complete only if different than applicant)

Owner Name: _____ Daytime Phone: (_____)_____-_____

Mailing Address: _____

City: _____ State: _____ Zip: _____

Contact Person Name: _____ Email: _____

Contact Person: Phone Number _____ Fax Number: _____

Facility Operator's Information (complete only if different than applicant)

Owner Name: _____ Daytime Phone: (_____)_____-_____

Mailing Address: _____

City: _____ State: _____ Zip: _____

Complete this form if you are using a drywell or other subsurface infiltration structures to recharge storm water to the ground or groundwater. If a completed UIC registration form was submitted to the Alteration of Terrain Program for this project, then one is not required to be sent directly to the GWB.

REGISTRATION AND NOTIFICATION FORM FOR STORM WATER INFILTRATION TO GROUNDWATER (attach additional sheets, as necessary, for responses to questions below)

Please provide a complete description of the facility including historic uses, any former contamination and/or on-going remedial action at the site:

Site is currently a woodland area. Project proposes to construct a vehicle storage lot for the storage a inventory for McFarland Ford.

Please provide information concerning the location of the infiltration activity, include Locus map (i.e. USGS map):

The proposed porous pavement practices are located on Tax Map 51 Lot 14-1&17.

(see USGS map included with this Report)

Please describe the pretreatment system, if any, and capacity of the system:

The treatment system is porous pavement, therefore there is no pretreatment.

Please describe the materials and products used for the subsurface infiltration structure (i.e., pipe and stone leachfield, plastic chamber units, concrete drywell, etc.):

Porous asphalt, bank run gravel, 3/4" crushed stone, pea stone

Please describe the disposal method and location. Include a site plan showing: the infiltration structure, any other on-site infiltration structures, dimensions, depth to groundwater (if known), adjacent septic system(s), and Drinking water source(s):

The attached grading and drainage plan shows the location of the porous pavement Test pits were preformed on-site are included with this report. The project proposes a vehicle storage lot only and no utilities or buildings are proposed.

Please provide information concerning methods and schedule for periodic inspection and/or maintenance:

A complete operation and maintenance manual has been compiled for this project and is included as an attachment.

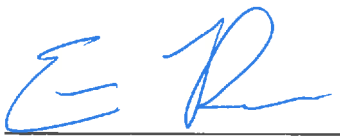
Applicant/Owner Certification Statement and Signature

By signing this application the signer certifies that the information contained in or otherwise submitted with this application is true, complete and not misleading to the best of the signer's knowledge and belief.

By signing this application the signer understands that submission of false, incomplete or misleading information is grounds for:

- Denying the application;
- Revoking any application that is granted based on the information; and
- If the signer is acting as or on behalf of a listed engineer as defined in Env-C 502.10, debarring the listed engineer from the roster.

By signing the application the signer and applicant agree to comply with all applicable rules and conditions of this permit and to not discharge to the holding tank(s) until written permission from the department has been received.



Signature of Facility Owner or Contact

3/4/21

Date

JONES & BEACH
ENGINEERS INC.
85 Portsmouth Avenue, PO Box 219, Stratham, NH 03885
603.772.4746 - JonesandBeach.com

SITE EVALUATION and INFILTRATION FEASIBILITY REPORT

110 Holland Way, Exeter, NH
Tax Map 51 Lots 14-1 & 17
Exeter, NH 03833

Prepared for:

McFarland Ford Sales, Inc.
151 Portsmouth Ave
Exeter, NH 03833

Prepared by:
Jones & Beach Engineers, Inc.
85 Portsmouth Avenue
P.O. Box 219
Stratham, NH 03885
(603) 772-4746
March 04, 2021
JBE Project No. 19198

TABLE OF CONTENTS

I. Project Summary

This project proposes to construct a 124-space vehicle storage lot in the Town of Exeter Tax Map 51, Lot 14-1 & 17.

The project site is located in the Hospital Institutional zone district (H Inst). Soil information for the site was gathered from Gove Environmental Services Inc. and on-site test pits. Soils were identified as:

Symbol	Soil Taxonomic Name	Hydrologic Soil Group
26	WINDSOR LOAMY SAND	C
33	SCITICO SILT LOAM	C
38	ELDRIDGE FINE SANDY LOAM	C

Groundwater recharge will be accomplished through the utilization of one (1) porous pavement lot.

II. Location of Practice(s)

Porous Pavement #1 - The proposed pavement section consists of the entire storage lot area and a portion of the driveway. The project is along Holland Way in Exeter, NH.

III. Existing Topography at the Location of the Practice(s)

Porous Pavement #1 - The topography within the area contributing to the proposed pond consist of moderate slopes and wooded areas.

III. Test Pit/Boring Location(s)

Porous Pavement #1 - The porous pavement practice is approximately 32,942 S.F. in area and 3 test pits were dug in the location of the practice. This test pits are identified as TP 1-3 on project plans. Test pit was done on January 11th, 2021. Test pit log information is included with this report.

See Section VII for Grading & Drainage detail plans for test pit locations.

V. Seasonal High Water Table (SHWT) and Bedrock Elevations

The following test pit data was collected on January 11, 2021.

Porous Pavement #1:

Bottom of System Elevation = 103.25

TP 1: Existing Surface Elevation of TP = 104.10
SHWT = 100.93 (38")
Bedrock = N/A
Deepest Elevation of TP = 97.02

TP 2: Existing Surface Elevation of TP = 103.75
SHWT = 102.10 (20")
Bedrock = N/A
Deepest Elevation of TP = 97.75

TP 3: Existing Surface Elevation of TP = 104.00
SHWT = 101.50 (30")
Bedrock = N/A
Deepest Elevation of TP = 99.00

VI. Profile Descriptions

Porous Pavement #1:

TP 1:

0"- 6"	Topsoil
6"-62"	Loamy Sand

TP 2:

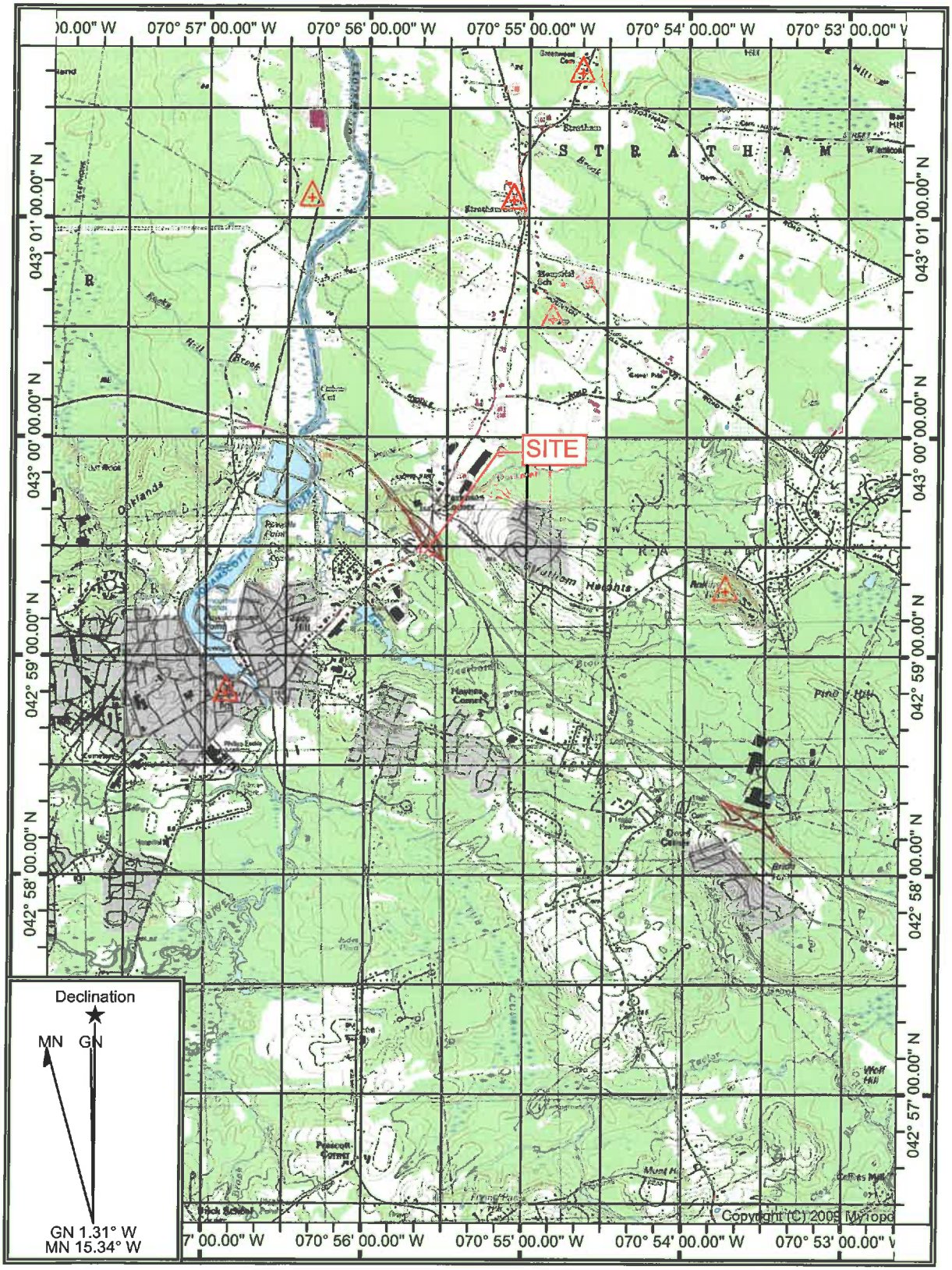
0"- 6"	Top soil
20"-32"	Clay

TP 3:

0"- 6"	Topsoil
6"-60"	Loamy Sand

VII. Soil Plans in the Area of the Proposed Practice(s)

See attached Grading & Drainage Detail Plans.



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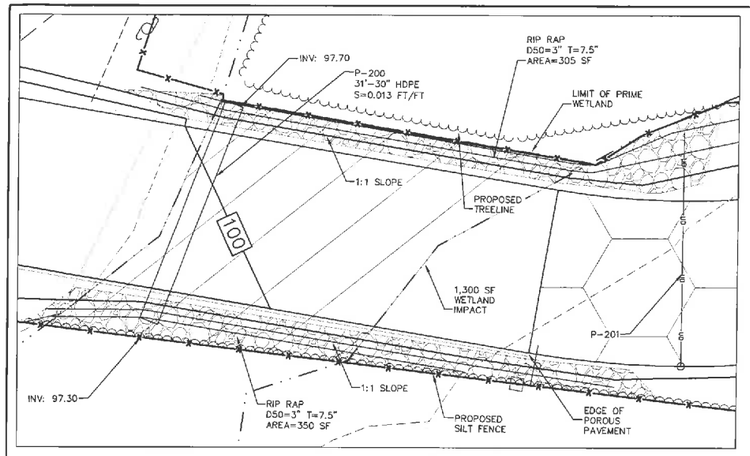
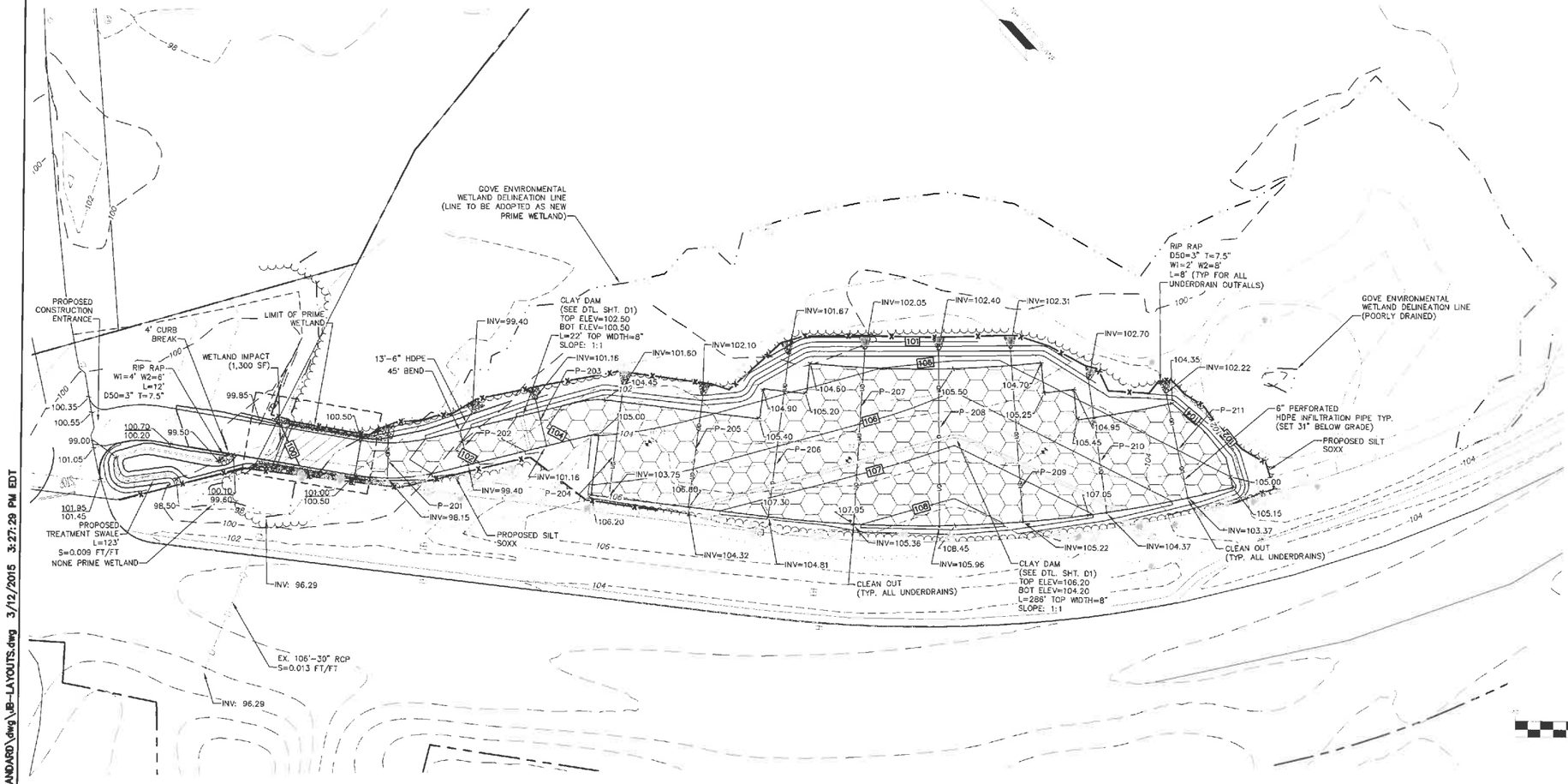


WETLAND CROSSING DETAIL
SCALE: 1" = 10'



DRAINAGE STRUCTURE TABLE

P-201 31' – 6" PERF. HDPE (SET LEVEL)	P-207 109' – 6" PERF. HDPE S=0.032 FT/FT
P-202 22' – 6" PERF. HDPE (SET LEVEL)	P-208 110' – 6" PERF. HDPE S=0.033 FT/FT
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25. SEE ALSO EROSION AND SEDIMENT CONTROL SPECIFICATIONS ON SHEET E1.
26. THE CONTRACTOR MUST OBTAIN A VALID UTILITY PIPE INSTALLER'S LICENSE AND THE JOB SUPERVISOR OR FOREMAN MUST BE CERTIFIED BY THE TOWN PRIOR TO WORKING ON ANY WATER, SEWER, OR DRAINAGE PIPES THAT ARE IN A TOWN STREET OR RIGHT OF WAY, OR THAT WILL CONNECT OR MAY BE CONNECTED TO A TOWN WATER, SEWER, OR DRAINAGE SYSTEM. A LICENSED SUPERVISOR OR FOREMAN MUST BE PRESENT AT THE JOB SITE AT ALL TIMES DURING CONSTRUCTION OF THESE UTILITIES.
27. CONTRACTOR TO PROVIDE A 2' MINIMUM SHOULDER ALONG PERIMETER OF PROPOSED PAVEMENT PRIOR TO BEGINNING GRADING TO MATCH EXISTING GRADE.
28. CONTRACTOR TO FLAG OR MARK THE ENTIRE ROW LINE AND PROPOSED TREE LINE PRIOR TO TREE CLEARING.

TEST PIT DATA:

TEST PIT #1: GROUND ELEV.=104.10, SHWT ELEV.=100.93, BEDROCK= N/A, BOT. TESTPIT=97.02

TEST PIT #2: GROUND ELEV.=103.75, SHWT ELEV.=102.10, BEDROCK= N/A, BOT. TESTPIT=97.75

TEST PIT #3: GROUND ELEV.=104.00, SHWT ELEV.=101.50, BEDROCK= N/A, BOT. TESTPIT=99.00

GRAPHIC SCALE
(IN FEET)
1 inch = 40 ft

PROJECT PARCEL
TOWN OF EXETER
TAX MAP 51, LOTS 14-1 & 17

APPLICANT
McFARLAND FORD SALES, INC
151 PORTSMOUTH AVE
EXETER, NH 03833

TOTAL LOT AREA
939,154 SQ. FT.
21.56 ACRES

F:\CADD\MASTER STANDARD\dwg\JB-LAYOUTS.dwg 3/12/2015 3:27:29 PM EDT

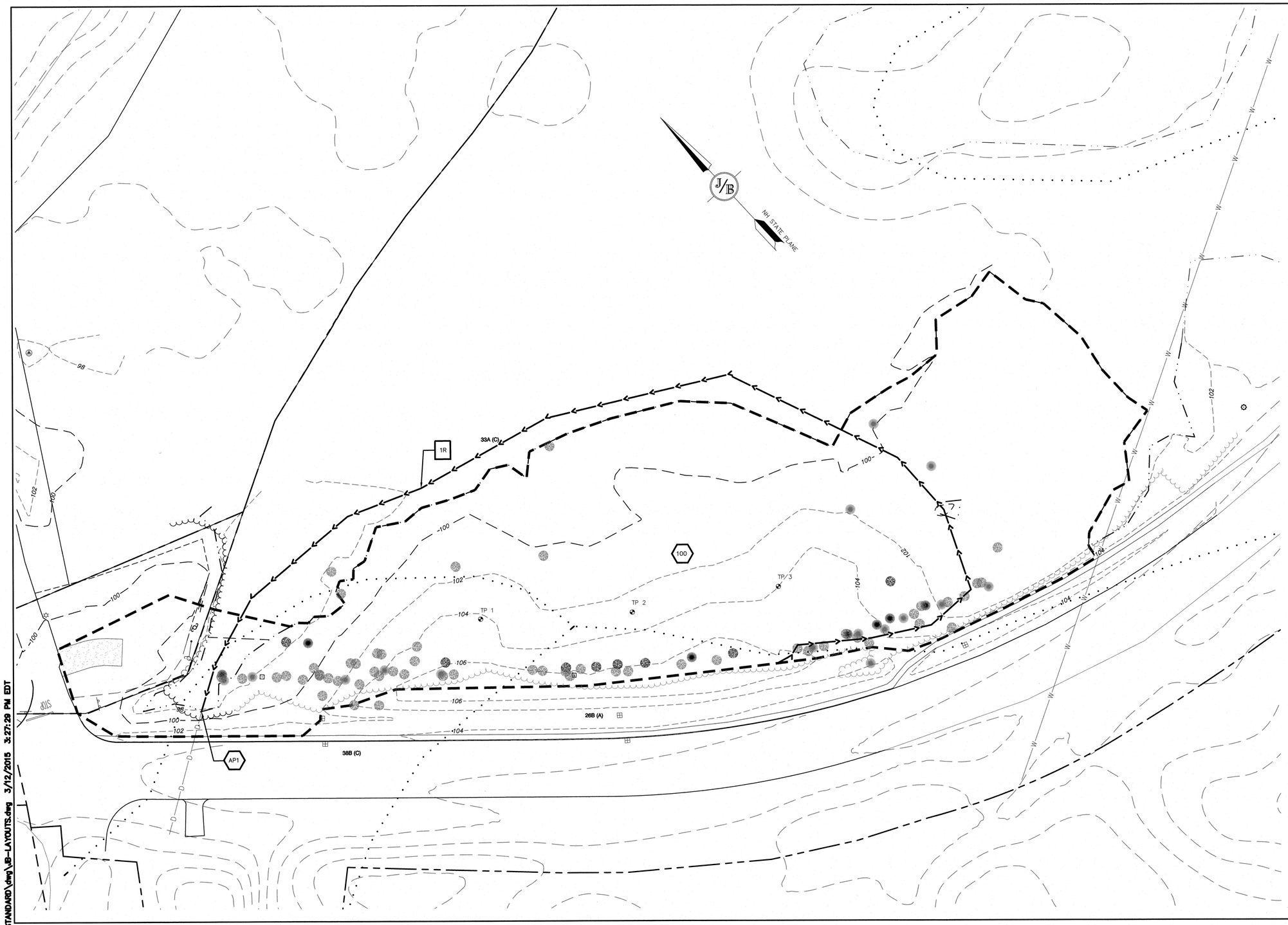
Design: EMP	Draft: GDR	Date: 12/01/2020
Checked: WGM	Scale: AS SHOWN	Project No.: 19198
Drawing Name: 19198-PLAN.dwg		

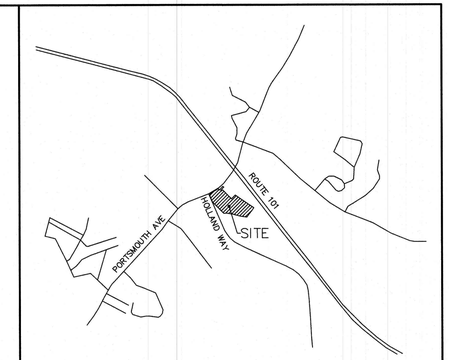
REV.	DATE	REVISION	BY
1	03/03/21	REVISED PER TRC COMMENTS	EMP
0	01/14/21	ISSUED FOR REVIEW	EMP

Designed and Produced in NH
J/B Jones & Beach Engineers, Inc.
85 Portsmouth Ave. PO Box 219 Stratham, NH 03885
Civil Engineering Services
603-772-4746 FAX: 603-772-0227
E-MAIL: JBE@JONESANDBEACH.COM

Plan Name:	GRADING AND DRAINAGE PLAN
Project:	STORAGE LOT 110 HOLLAND WAY, EXETER, NH
Owner of Record:	McFARLAND FORD SALES, INC 151 PORTSMOUTH AVE, EXETER, NH

DRAWING No.
C3
SHEET 5 OF 8
JBE PROJECT NO. 19198





LOCUS SCALE: 1"=2000'

LEGEND

- SUBCATCHMENT BOUNDARY
- SUBCATCHMENT (X)
- REACH (X)
- POND (X)
- TC PATH
- WETLANDS
- HISS SOILS
- FLOW ARROW

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

PROJECT PARCEL
TOWN OF EXETER
TAX MAP 51, LOTS 14-1 & 17

APPLICANT
McFARLAND FORD SALES, INC
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TOTAL LOT AREA
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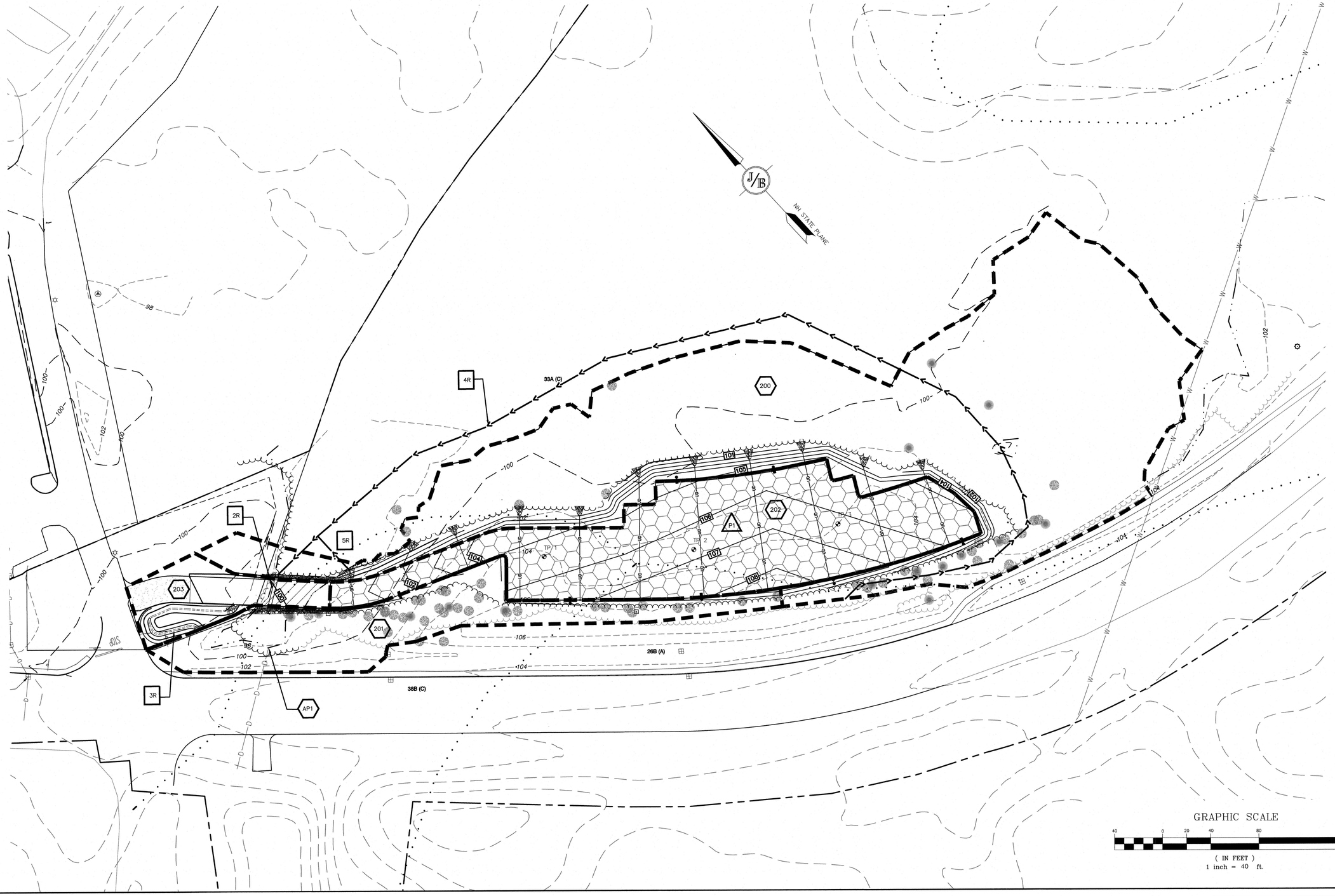
PO Box 219
Stratham, NH 03885
Civil Engineering Services
603-772-4746
FAX: 603-772-0227
E-MAIL: JBE@JONESANDBEACH.COM

Plan Name:	EXISTING WATERSHED PLAN
Project:	PARKING LOT EXPANSION 110 HOLLAND WAY, EXETER, NH
Owner of Record:	McFARLAND FORD SALES, INC 151 PORTSMOUTH AVE, EXETER, NH

DRAWING No.
W1
SHEET 1 OF 2
JBE PROJECT NO. 19198



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(IN FEET)
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Designed and Produced in NH
Jones & Beach Engineers, Inc.
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Plan Name: PROPOSED WATERSHED PLAN
Project: PARKING LOT EXPANSION
110 HOLLAND WAY, EXETER, NH
Owner of Record: McFARLAND FORD SALES, INC
151 PORTSMOUTH AVE, EXETER, NH

DRAWING No.
W2
SHEET 2 OF 2
JBE PROJECT NO. 19198