

JONES & BEACH ENGINEERS INC.

DRAINAGE ANALYSIS

EROSION AND SEDIMENT CONTROL PLAN

ROCK IRON REPAIR

Project Tax Map 265 / Lot 11 & 12
Calef Highway
Barrington, NH

Prepared for:

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3/9/2022
Rev. 1: 5/2/2022
Rev. 2: 5/25/2022
Rev. 3: 6/13/2022
JBE Project No. 21206

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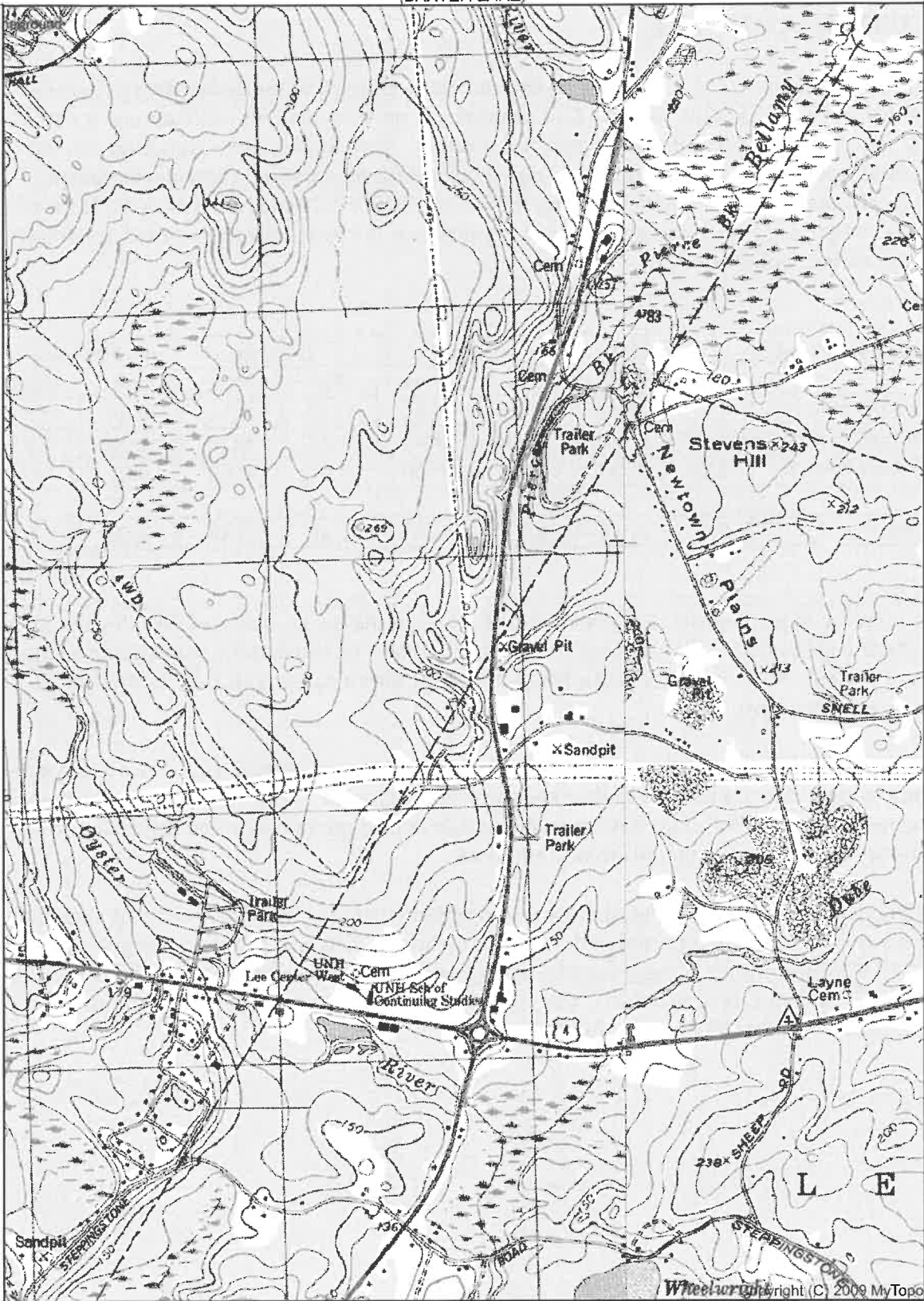
071° 01' 47.59" W
043° 11' 09.75" N

(BAXTER LAKE)

070° 59' 05.42" W
043° 11' 09.75" N

(NORTHWOOD)

(DOVER WEST)



043° 08' 22.18" N
071° 01' 47.59" W

043° 08' 22.18" N
070° 59' 05.42" W

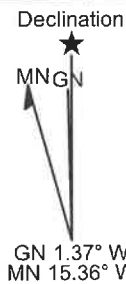
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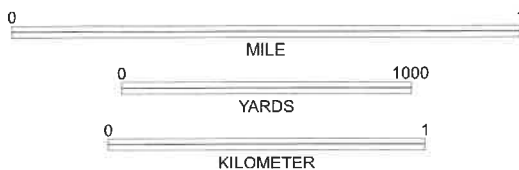
Produced by MyTopo Terrain Navigator
Topography based on USGS 1:24,000
Maps

North American 1983 Datum (NAD83)
Transverse Mercator Projection

To place on the predicted North American
1927 move the projection lines 9M N and
40M E



(EPPING)
SCALE 1:24000



CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM 1929

BARRINGTON, NH
1995

Printed: Wed Mar 02, 2002

Wheelwright (C) 2009 MyTopo

EXECUTIVE SUMMARY

The purpose of this project is to construct a commercial welding and repair facility on Town of Barrington Tax Map 265, Lots 11 and 12. The proposed development will contain one 3,480 sq.ft. building, with associated parking, drainage, and utilities. Two models were compiled, one for the area in its existing (pre-development) condition, and a second for its proposed (post-development) condition. The analysis was conducted 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:

Analysis Point	2-Year		10-Year		25-Year		50-Year	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Analysis Point #1	0.00	0.00	0.02	0.02	0.15	0.16	0.60	0.59
Analysis Point #2	0.13	0.15*	0.71	0.43	1.33	0.70	1.98	0.97
Analysis Point #3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Total	0.13	0.15	0.73	0.45	1.48	0.86	2.59	1.57

* Minor increase in post-construction peak rate of runoff is the result of stormwater downgrade of the proposed drainage system. All proposed development area is directed to the stormwater treatment and infiltration system. No stormwater is discharged from the stormwater treatment features at the 2, 10, and 25-year storm events.

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 an infiltration basin to maintain the peak discharge and infiltrate stormwater.

In addition, the potential for increased erosion and sedimentation is handled by way of vegetated treatment swales and riprap inlet and outlet protection aprons. The use of Best Management Practices per the NHDES Stormwater Manual have been applied to the design of this drainage system and will be observed during all stages of construction. Existing wetlands and abutting property owners will suffer minimal impact resultant from this development.

Surface Impairments Map



Legend

- Designated Rivers Quarter Mile Buffer
- Public Water Supply Wells
- Groundwater Classification / GA1
- Groundwater Classification / GA2
- Water Supply Intake Protect Areas
- Wellhead Protection Areas
- Class A Lakes with a Quarter Mile Buffer
- Class A - All Features
- All Lakes, with a Quarter Mile Buffer
- Outstanding Resource Water Watersheds
- Surface Waters with Impairment 2016 with Quarter Mile Buffer
- Watersheds with Chloride Impairments 2016

Map Scale

1: 12,988

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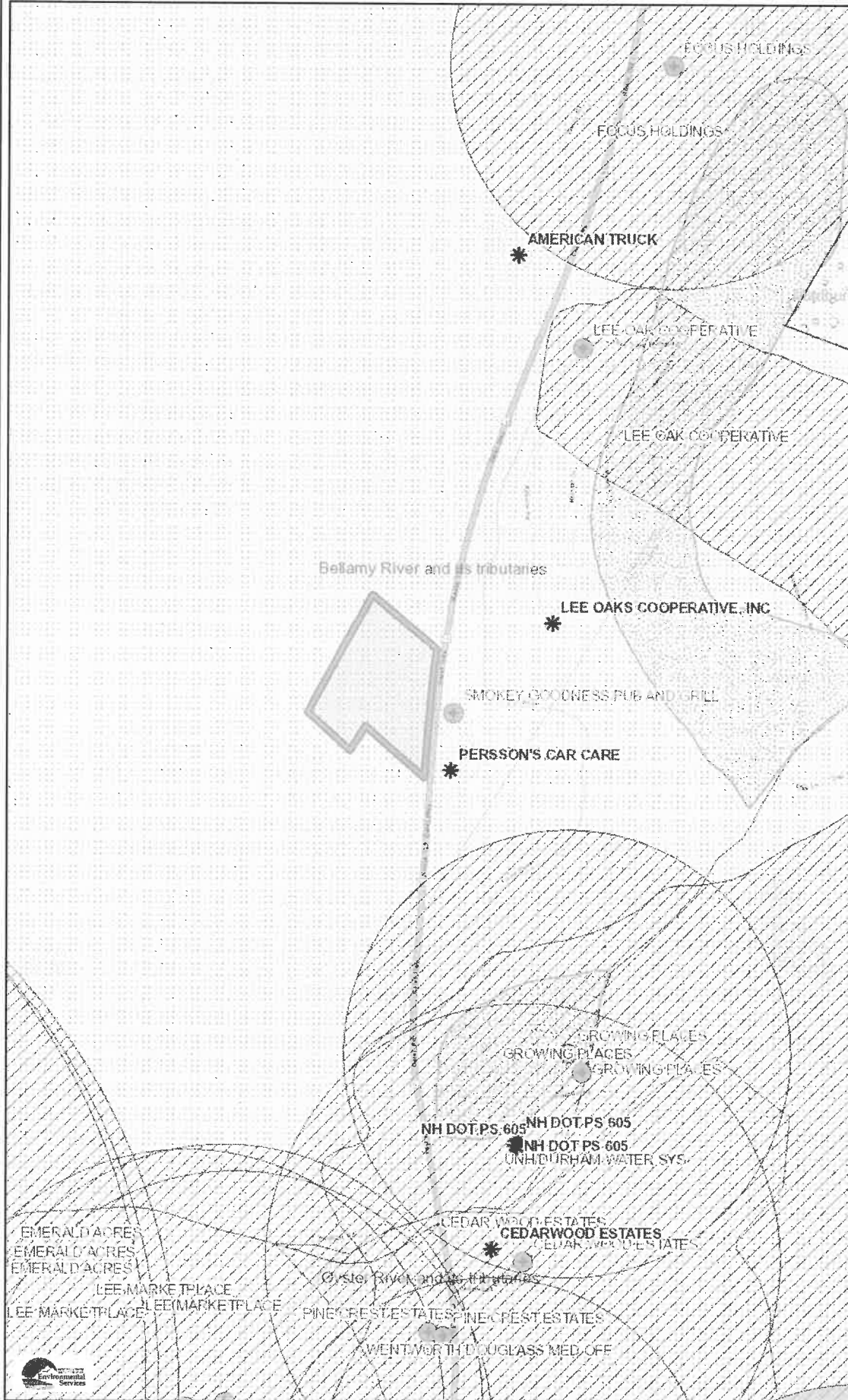
Map Generated: 3/2/2022



Notes



Aot Screening Layers



Legend

- * Remediation Sites
- ▨ Coastal and Great Bay Regional Communities
- ▨ Designated Rivers Quarter Mile Buffer
- Public Water Supply Wells
- ▨ Groundwater Classification / GA1
- ▨ Groundwater Classification / GA2
- ▨ Water Supply Intake Protect Areas
- ▨ Wellhead Protection Areas
- ▨ Class A Lakes with a Quarter Buffer
- ▨ Class A - All Features
- ▨ All Lakes, with a Quarter Mile Buffer
- ▨ Outstanding Resource Water Watersheds
- ▨ Surface Waters with Impairment 2016 with Quarter Mile Buffer
- ▨ Watersheds with Chloride Impairments 2016

Map Scale

1: 10,000

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Map Generated: 3/2/2022



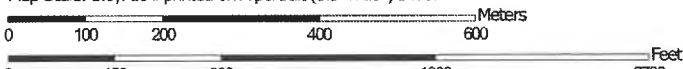
Notes



Soil Map—Strafford County, New Hampshire








































Map Scale: 1:9,710 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge ticks: UTM Zone 19N WGS84



MAP LEGEND

 Area of Interest (AOI)	 Spoil Area
 Area of Interest (AOI)	 Stony Spot
Soils	 Very Stony Spot
 Soil Map Unit Polygons	 Wet Spot
 Soil Map Unit Lines	 Other
 Soil Map Unit Points	 Special Line Features
Special Point Features	Water Features
 Blowout	 Streams and Canals
 Borrow Pit	Transportation
 Clay Spot	 Rails
 Closed Depression	 Interstate Highways
 Gravel Pit	 US Routes
 Gravelly Spot	 Major Roads
 Landfill	 Local Roads
 Lava Flow	Background
 Marsh or swamp	 Aerial Photography
 Mine or Quarry	
 Miscellaneous Water	
 Perennial Water	
 Rock Outcrop	
 Saline Spot	
 Sandy Spot	
 Severely Eroded Spot	
 Sinkhole	
 Slide or Slip	
 Sodic Spot	

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Stratford County, New Hampshire
 Survey Area Data: Version 22, Aug 31, 2021

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—Sep 9, 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
GIC	Gloucester fine sandy loam, 8 to 15 percent slopes	2.9	0.6%
GsB	Gloucester very stony fine sandy loam, 3 to 8 percent slopes	188.5	39.1%
GsC	Gloucester very stony fine sandy loam, 8 to 15 percent slopes	17.8	3.7%
GsD	Gloucester very stony fine sandy loam, 15 to 25 percent slopes	24.1	5.0%
Gv	Gravel and borrow pits	18.1	3.7%
HaA	Hinckley loamy sand, 0 to 3 percent slopes	40.1	8.3%
HaB	Hinckley loamy sand, 3 to 8 percent slopes	62.6	13.0%
HaC	Hinckley loamy sand, 8 to 15 percent slopes	11.6	2.4%
LeA	Leicester very stony fine sandy loam, 0 to 3 percent slopes	35.2	7.3%
Mp	Freetown and Swansea mucky peats, 0 to 2 percent slopes	33.8	7.0%
Sb	Saugatuck loamy sand	11.9	2.5%
WdA	Windsor loamy sand, 0 to 3 percent slopes	25.2	5.2%
WdC	Windsor loamy sand, 8 to 15 percent slopes	10.1	2.1%
Totals for Area of Interest		482.0	100.0%

Aerial Map



Legend

- Parcels**
- Parcel Polygons
 - Attributes for Additional Lines

Map Scale
1: 10,000



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Map Generated: 3/2/2022

Notes





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

0.82	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
	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"
0.40	inches	Rd = Weighted groundwater recharge depth	
0.3294	ac-in	GRV = AI * Rd	
1,196	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):

Infiltraton Basin #1: 4,236 CF provided

Total = 4,236 CF provided



INFILTRATION PRACTICE CRITERIA (Env-Wq 1508.06)

Type/Node Name: **1P- Infiltration Basin #1**

Enter the type of infiltration practice (e.g., basin, trench) and the node name in the drainage analysis, if applicable.

YES		Have you reviewed Env-Wq 1508.06(a) to ensure that infiltration is allowed?	← yes
2.13	ac	A = Area draining to the practice	
0.80	ac	A _i = Impervious area draining to the practice	
0.38	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.39	unitless	R _v = Runoff coefficient = 0.05 + (0.9 x I)	
0.83	ac-in	WQV = 1" x R _v x A	
3,015	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
754	cf	25% x WQV (check calc for sediment forebay volume)	
FOREBAY			
Method of pretreatment? (not required for clean or roof runoff)			
777	cf	V _{SED} = Sediment forebay volume, if used for pretreatment	≥ 25%WQV
4,236	cf	V = Volume ¹ (attach a stage-storage table)	≥ WQV
3,268	sf	A _{SA} = Surface area of the bottom of the pond	
3.00	iph	K _{sat} _{DESIGN} = Design infiltration rate ²	
3.7	hours	I _{DRAIN} = Drain time = V / (A _{SA} × I _{DESIGN})	≤ 72-hrs
199.00	feet	E _{BTM} = Elevation of the bottom of the basin	
196.00	feet	E _{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
196.00	feet	E _{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
3.00	feet	D _{SHWT} = Separation from SHWT	≥ * ³
3.0	feet	D _{ROCK} = Separation from bedrock	≥ * ³
-	ft	D _{amend} = Depth of amended soil, if applicable due high infiltration rate	≥ 24"
-	ft	D _T = Depth of trench, if trench proposed	4 - 10 ft
N/A	Yes/No	If a trench or underground system is proposed, has observation well been provided?	← yes
		If a trench is proposed, does material meet Env-Wq 1508.06(k)(2) requirements. ⁴	← yes
Y	Yes/No	If a basin is proposed, Is the perimeter curvilinear, and basin floor flat?	← yes
3.0	:1	If a basin is proposed, pond side slopes.	≥ 3:1
199.46	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
200.45	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
201.00	ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES		10 peak elevation ≤ Elevation of the top of the trench? ⁵	← yes
YES		If a basin is proposed, 50-year peak elevation ≤ Elevation of berm?	← yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. K_{sat}_{DESIGN} includes a factor of safety. See Env-Wq 1504.14 for requirements for determining the infiltr. rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.
4. Clean, washed well graded diameter of 1.5 to 3 inches above the in-situ soil.
5. If 50-year peak elevation exceeds top of trench, the overflow must be routed in HydroCAD as secondary discharge.

Designer's Notes: _____

21206-PR-DRAINAGE

Prepared by Jones & Beach Engineers

HydroCAD® 10.10-4a s/n 10589 © 2020 HydroCAD Software Solutions LLC

Type III 24-hr 10-YR Rainfall=4.66"

Printed 5/25/2022

Stage-Area-Storage for Pond 1F: FOREBAY #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
199.00	293	0	200.04	644	475
199.02	298	6	200.06	653	488
199.04	304	12	200.08	661	501
199.06	309	18	200.10	670	514
199.08	315	24	200.12	679	528
199.10	321	31	200.14	687	542
199.12	326	37	200.16	696	555
199.14	332	44	200.18	705	569
199.16	338	50	200.20	714	584
199.18	344	57	200.22	723	598
199.20	350	64	200.24	732	612
199.22	356	71	200.26	742	627
199.24	362	78	200.28	751	642
199.26	368	86	200.30	760	657
199.28	374	93	200.32	769	673
199.30	380	101	200.34	779	688
199.32	386	108	200.36	788	704
199.34	392	116	200.38	798	720
199.36	399	124	200.40	807	736
199.38	405	132	200.42	817	752
199.40	412	140	200.44	826	768
199.42	418	149	200.46	836	785
199.44	424	157	200.48	846	802
199.46	431	166	200.50	856	819
199.48	438	174	200.52	866	836
199.50	444	183	200.54	876	853
199.52	451	192	200.56	886	871
199.54	458	201	200.58	896	889
199.56	465	210	200.60	906	907
199.58	471	220	200.62	916	925
199.60	478	229	200.64	926	943
199.62	485	239	200.66	936	962
199.64	492	249	200.68	947	981
199.66	499	258	200.70	957	1,000
199.68	506	269	200.72	968	1,019
199.70	514	279	200.74	978	1,039
199.72	521	289	200.76	989	1,058
199.74	528	300	200.78	999	1,078
199.76	535	310	200.80	1,010	1,098
199.78	543	321	200.82	1,021	1,119
199.80	550	332	200.84	1,032	1,139
199.82	558	343	200.86	1,042	1,160
199.84	565	354	200.88	1,053	1,181
199.86	573	366	200.90	1,064	1,202
199.88	580	377	200.92	1,075	1,223
199.90	588	389	200.94	1,086	1,245
199.92	596	401	200.96	1,098	1,267
199.94	603	413	200.98	1,109	1,289
199.96	611	425	201.00	1,120	1,311
199.98	619	437			
200.00	627	450			
200.02	635	462			



Lowest Outlet=200.45
 25% WQV= 754 cu.ft.
 Vol Prov'd= 777 cu.ft.

21206-PR-DRAINAGE

Prepared by Jones & Beach Engineers

HydroCAD® 10.10-4a s/n 10589 © 2020 HydroCAD Software Solutions LLC

Type III 24-hr 10-YR Rainfall=4.66"

Printed 5/25/2022

Stage-Area-Storage for Pond 1P: INFILTRATION BASIN #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
199.00	3,268	0	200.04	4,397	3,970
199.02	3,288	66	200.06	4,422	4,058
199.04	3,308	132	200.08	4,447	4,146
199.06	3,328	198	200.10	4,472	4,236
199.08	3,349	265	200.12	4,497	4,325
199.10	3,369	332	200.14	4,522	4,416
199.12	3,389	399	200.16	4,548	4,506
199.14	3,410	467	200.18	4,573	4,597
199.16	3,430	536	200.20	4,599	4,689
199.18	3,451	605	200.22	4,624	4,781
199.20	3,472	674	200.24	4,650	4,874
199.22	3,492	743	200.26	4,676	4,967
199.24	3,513	814	200.28	4,701	5,061
199.26	3,534	884	200.30	4,727	5,155
199.28	3,555	955	200.32	4,753	5,250
199.30	3,576	1,026	200.34	4,779	5,346
199.32	3,597	1,098	200.36	4,805	5,441
199.34	3,618	1,170	200.38	4,831	5,538
199.36	3,639	1,243	200.40	4,857	5,635
199.38	3,660	1,316	200.42	4,884	5,732
199.40	3,681	1,389	200.44	4,910	5,830
199.42	3,702	1,463	200.46	4,936	5,928
199.44	3,724	1,537	200.48	4,963	6,027
199.46	3,745	1,612	200.50	4,989	6,127
199.48	3,767	1,687	200.52	5,016	6,227
199.50	3,788	1,762	200.54	5,043	6,328
199.52	3,810	1,838	200.56	5,069	6,429
199.54	3,832	1,915	200.58	5,096	6,530
199.56	3,853	1,992	200.60	5,123	6,633
199.58	3,875	2,069	200.62	5,150	6,735
199.60	3,897	2,147	200.64	5,177	6,839
199.62	3,919	2,225	200.66	5,204	6,942
199.64	3,941	2,303	200.68	5,231	7,047
199.66	3,963	2,383	200.70	5,259	7,152
199.68	3,985	2,462	200.72	5,286	7,257
199.70	4,007	2,542	200.74	5,313	7,363
199.72	4,029	2,622	200.76	5,341	7,470
199.74	4,052	2,703	200.78	5,368	7,577
199.76	4,074	2,784	200.80	5,396	7,684
199.78	4,096	2,866	200.82	5,424	7,793
199.80	4,119	2,948	200.84	5,451	7,901
199.82	4,141	3,031	200.86	5,479	8,011
199.84	4,164	3,114	200.88	5,507	8,120
199.86	4,187	3,197	200.90	5,535	8,231
199.88	4,209	3,281	200.92	5,563	8,342
199.90	4,232	3,366	200.94	5,591	8,453
199.92	4,255	3,451	200.96	5,619	8,566
199.94	4,278	3,536	200.98	5,648	8,678
199.96	4,301	3,622	201.00	5,676	8,791
199.98	4,324	3,708			
200.00	4,347	3,795			
200.02	4,372	3,882			



Lowest Outlet= 200.10
 WQV Req'd= 3,015 cu.ft.
 WQV Prov'd= 4,236 cu.ft.

10. DRAINAGE ANALYSIS

10.1 INTRODUCTION

The purpose of this project is to construct a commercial welding and repair facility on Town of Barrington Tax Map 265, Lots 11 and 12. The proposed development will contain one 3,480 sq.ft. building, with associated parking, drainage, and utilities. This project will be serviced by on site sewer and water.

10.2 METHODOLOGY

The existing and proposed watersheds were modeled utilizing HydroCad stormwater software, version 9.10. The watersheds were analyzed utilizing the SCS TR-20 methodology for hydrograph development and the TR-55 methodology for Time of Concentration (Tc) determination. The Dynamic-Storage-Indicating method for reach and pond routing was utilized. Type III, 24-hour hydrographs were developed for the 2-year, 10-year, 25-year, and 50-year storm events, corresponding to rainfall events of 3.09", 4.66", 5.91", and 7.06" respectively.

Existing topography and site features were obtained through aerial topography and on-ground topography completed by Jones & Beach Engineers. Existing soil conditions were derived from the NRCS Web Soil Survey.

10.3 EXISTING CONDITIONS ANALYSIS

The study area consists of the subject property and upstream contributing area. The study area contains 3.96 acres including offsite contributing areas. The existing site is currently undeveloped and is mostly forested. All soils for this site are described as Hydrological Soils "A". The existing site contains a high point located to the north of the subject parcel. The site drains from north to south from this high point resulting in the Analysis Points as defined below.

Three (3) Analysis Points (AP's) were defined for this project. Analysis Points are described as below:

Analysis Point #1 is defined as the wetland boundary located on the northwest side of the subject parcel. Stormwater from the local high point drains overland to this point.

Analysis Point #2 is defined as discharge from the existing swale located near Calef highway at the northeast corner of the site. Stormwater south of the ridgeline central to the site drain to this point.

Analysis Point #3 is defined as the northwest property line. A small portion of the study area drains to this point.

10.4 PROPOSED CONDITIONS ANALYSIS

The purpose of this project is to construct a commercial welding and repair facility on Town of Barrington Tax Map 265, Lots 11 and 12. The proposed development will contain one 3,480 sq.ft. building, with associated parking, drainage, and utilities.

The addition of the proposed impervious paved areas and buildings 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. To mitigate the potential increase in the peak rate of runoff and to effectively treat the subsequent stormwater runoff the following Best Management Practices (BMP's) have been employed at the Analysis Points as follows:

The gravel pad located in the northwest portion of the site is crowned and swales line both sides. The eastern swale drains to P-201 which conveys stormwater to Forebay #1 (F1). The western swale drains to P-202 which conveys stormwater to Forebay #1. The parking area at the southern end of the development is superelevated and stormwater flows overland directly to Forebay #1. Forebay #1 drains to Infiltration Basin #1 (P1). Infiltration Basin #1 is released by Outlet Structure #1 to Analysis Point #1.

A portion of the site near the proposed entrance along Calef Highway is downgrade of the proposed drainage system. Stormwater drains overland directly to Analysis Point #2.

The western portion of the site contributing to Analysis Point #3 remains mostly unchanged.

ID	Size	Type	Length (ft)	Slope (ft/ft)	N Value	HGL Elev.	Peak Discharge (cfs)	Peak Depth of Flow	Peak Velocity (ft/sec)
P-201	15"	HDPE	62	0.005	0.012	200.83	0.51	0.41'	2.66
P-202	15"	HDPE	67	0.015	0.012	201.03	1.17	0.61'	4.98
Swale #1	4' wide 3:1 side	Vegetated	365	0.038	0.022	216.35	0.51	1.05"	1.26
Swale #2	4' wide 3:1 side	Vegetated	317	0.044	0.022	216.48	1.17	1.86"	1.71

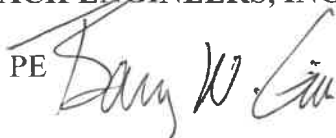
10.5 CONCLUSION

This proposed site development will have minimal adverse effect on abutting infrastructures or properties by way of stormwater runoff or siltation if properly constructed in accordance with this Drainage Analysis and approved project plan set. The post-construction peak rate of runoff for the site will be lower than the existing conditions for all analyzed storm events, with the exception of AP-2 and AP-1 at the 2-year and 25-year storm event respectively*. Appropriate steps will be taken to control erosion and sedimentation; these will be accomplished through the construction of a drainage system consisting of site grading, piping, vegetated treatment swales, an infiltration basin, and riprap outlet protection aprons. The use of Best Management Practices developed by the State of New Hampshire have been utilized in the design of this system and their application will be enforced with regular inspections throughout the construction process.

* Minor increase in post-construction peak rate of runoff is the result of stormwater downgrade of the proposed drainage system. All proposed development area is directed to the stormwater treatment and infiltration system. No stormwater is discharged from the stormwater treatment features at the 2, 10, and 25-year storm event.

Respectfully Submitted,
JONES & BEACH ENGINEERS, INC.

Barry W. Gier, PE
Vice-President



10.6 DRAINAGE CALCULATIONS

PRE-DEVELOPMENT CONDITIONS ANALYSIS

- 10.6.1 2-Year 24-Hour Summary Analysis
- 10.6.2 10-Year 24-Hour Complete Analysis
- 10.6.3 25-Year 24-Hour Summary Analysis
- 10.6.4 50-Year 24-Hour Summary Analysis



EX-WS-1S



AP-1



EX-WS-2S



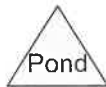
AP-2



EX-WS-3S



AP-3



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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
38,561	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S)
9,821	96	Gravel surface, HSG A (1S, 2S)
10,778	98	Paved parking, HSG A (1S, 2S)
113,390	30	Woods, Good, HSG A (1S, 2S, 3S)
172,550	40	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
172,550	HSG A	1S, 2S, 3S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
172,550		TOTAL AREA

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Type III 24-hr 10-YR Rainfall=4.66"

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Summary for Subcatchment 1S: EX-WS-1S

Runoff = 0.02 cfs @ 15.56 hrs, Volume= 671 cf, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.66"

Area (sf)	CN	Description
5,254	98	Paved parking, HSG A
20,866	39	>75% Grass cover, Good, HSG A
2,506	96	Gravel surface, HSG A
95,997	30	Woods, Good, HSG A
124,623	36	Weighted Average
119,369		95.78% Pervious Area
5,254		4.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.1600	0.18		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.09"
1.7	216	0.1800	2.12		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.0	84	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
5.9	250	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
19.1	650	Total			

Summary for Subcatchment 2S: EX-WS-2S

Runoff = 0.71 cfs @ 12.16 hrs, Volume= 2,994 cf, Depth= 1.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.66"

Area (sf)	CN	Description
5,524	98	Paved parking, HSG A
16,279	39	>75% Grass cover, Good, HSG A
7,315	96	Gravel surface, HSG A
5,213	30	Woods, Good, HSG A
34,331	59	Weighted Average
28,807		83.91% Pervious Area
5,524		16.09% Impervious Area

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Type III 24-hr 10-YR Rainfall=4.66"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.1800	0.18		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.09"
0.9	130	0.2200	2.35		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
10.0	230	Total			

Summary for Subcatchment 3S: EX-WS-3S

Runoff = 0.00 cfs @ 24.02 hrs, Volume= 2 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.66"

Area (sf)	CN	Description
1,416	39	>75% Grass cover, Good, HSG A
12,180	30	Woods, Good, HSG A
13,596	31	Weighted Average
13,596		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.1200	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.09"
1.8	198	0.1400	1.87		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.5	298	Total			

Summary for Link AP1: AP-1

Inflow Area = 124,623 sf, 4.22% Impervious, Inflow Depth = 0.06" for 10-YR event
 Inflow = 0.02 cfs @ 15.56 hrs, Volume= 671 cf
 Primary = 0.02 cfs @ 15.56 hrs, Volume= 671 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link AP2: AP-2

Inflow Area = 34,331 sf, 16.09% Impervious, Inflow Depth = 1.05" for 10-YR event
 Inflow = 0.71 cfs @ 12.16 hrs, Volume= 2,994 cf
 Primary = 0.71 cfs @ 12.16 hrs, Volume= 2,994 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

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Type III 24-hr 10-YR Rainfall=4.66"

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Summary for Link AP3: AP-3

Inflow Area = 13,596 sf, 0.00% Impervious, Inflow Depth = 0.00" for 10-YR event
Inflow = 0.00 cfs @ 24.02 hrs, Volume= 2 cf
Primary = 0.00 cfs @ 24.02 hrs, Volume= 2 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

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Type III 24-hr 25-YR Rainfall=5.91"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EX-WS-1S

Runoff Area=124,623 sf 4.22% Impervious Runoff Depth=0.28"
Flow Length=650' Tc=19.1 min CN=36 Runoff=0.15 cfs 2,860 cf

Subcatchment 2S: EX-WS-2S

Runoff Area=34,331 sf 16.09% Impervious Runoff Depth=1.78"
Flow Length=230' Tc=10.0 min CN=59 Runoff=1.33 cfs 5,097 cf

Subcatchment 3S: EX-WS-3S

Runoff Area=13,596 sf 0.00% Impervious Runoff Depth=0.09"
Flow Length=298' Tc=12.5 min CN=31 Runoff=0.00 cfs 102 cf

Link AP1: AP-1

Inflow=0.15 cfs 2,860 cf
Primary=0.15 cfs 2,860 cf

Link AP2: AP-2

Inflow=1.33 cfs 5,097 cf
Primary=1.33 cfs 5,097 cf

Link AP3: AP-3

Inflow=0.00 cfs 102 cf
Primary=0.00 cfs 102 cf

Total Runoff Area = 172,550 sf Runoff Volume = 8,058 cf Average Runoff Depth = 0.56"
93.75% Pervious = 161,772 sf 6.25% Impervious = 10,778 sf

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Type III 24-hr 50-YR Rainfall=7.06"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EX-WS-1S

Runoff Area=124,623 sf 4.22% Impervious Runoff Depth=0.58"
 Flow Length=650' Tc=19.1 min CN=36 Runoff=0.60 cfs 5,993 cf

Subcatchment 2S: EX-WS-2S

Runoff Area=34,331 sf 16.09% Impervious Runoff Depth=2.55"
 Flow Length=230' Tc=10.0 min CN=59 Runoff=1.98 cfs 7,289 cf

Subcatchment 3S: EX-WS-3S

Runoff Area=13,596 sf 0.00% Impervious Runoff Depth=0.27"
 Flow Length=298' Tc=12.5 min CN=31 Runoff=0.01 cfs 310 cf

Link AP1: AP-1

Inflow=0.60 cfs 5,993 cf
 Primary=0.60 cfs 5,993 cf

Link AP2: AP-2

Inflow=1.98 cfs 7,289 cf
 Primary=1.98 cfs 7,289 cf

Link AP3: AP-3

Inflow=0.01 cfs 310 cf
 Primary=0.01 cfs 310 cf

Total Runoff Area = 172,550 sf Runoff Volume = 13,592 cf Average Runoff Depth = 0.95"
93.75% Pervious = 161,772 sf 6.25% Impervious = 10,778 sf

10.7 APPENDIX II

POST-DEVELOPMENT CONDITIONS ANALYSIS

- 10.7.1 2-Year 24-Hour Summary Analysis
- 10.7.2 10-Year 24-Hour Complete Analysis
- 10.7.3 25-Year 24-Hour Summary Analysis
- 10.7.4 50-Year 24-Hour Summary Analysis

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
61,858	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S, 5S, 6S)
21,216	96	Gravel surface, HSG A (1S, 2S)
14,299	98	Paved roads w/curbs & sewers, HSG A (3S, 5S, 6S)
7,200	98	Roofs, HSG A (1S, 2S)
67,977	30	Woods, Good, HSG A (2S, 3S, 4S, 5S)
172,550	50	TOTAL AREA

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
172,550	HSG A	1S, 2S, 3S, 4S, 5S, 6S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
172,550		TOTAL AREA

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Type III 24-hr 2-YR Rainfall=3.09"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 1F: FOREBAY#1 Peak Elev=200.51' Storage=829 cf Inflow=0.47 cfs 2,642 cf
Outflow=0.15 cfs 1,865 cf

Pond 1P: INFILTRATIONBASIN #1 Peak Elev=199.01' Storage=39 cf Inflow=0.15 cfs 1,865 cf
Discarded=0.14 cfs 1,865 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.14 cfs 1,865 cf

Subcatchment1S: EX-WS-1S Runoff Area=24,227 sf 14.86% Impervious Runoff Depth=0.81"
Flow Length=396' Tc=6.4 min CN=71 Runoff=0.47 cfs 1,641 cf

Subcatchment2S: EX-WS-2S Runoff Area=39,526 sf 9.11% Impervious Runoff Depth=0.33"
Flow Length=590' Tc=33.8 min CN=59 Runoff=0.11 cfs 1,101 cf

Subcatchment3S: EX-WS-3S Runoff Area=15,736 sf 11.60% Impervious Runoff Depth=0.01"
Tc=7.0 min CN=43 Runoff=0.00 cfs 18 cf

Subcatchment4S: EX-WS-4S Runoff Area=12,571 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=298' Tc=12.2 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment5S: EX-WS-5S Runoff Area=65,561 sf 8.12% Impervious Runoff Depth=0.00"
Flow Length=283' Tc=16.9 min CN=38 Runoff=0.00 cfs 0 cf

Subcatchment6S: EX-WS-6S Runoff Area=14,929 sf 47.89% Impervious Runoff Depth=0.63"
Flow Length=283' Tc=16.9 min CN=67 Runoff=0.15 cfs 784 cf

Link AP1: AP-1 Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link AP2: AP-2 Inflow=0.15 cfs 784 cf
Primary=0.15 cfs 784 cf

Link AP3: AP-3 Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Pond P201: P-201 Peak Elev=200.80' Storage=109 cf Inflow=0.11 cfs 1,101 cf
15.0" Round Culvert n=0.012 L=66.0' S=0.0050 '/' Outflow=0.15 cfs 992 cf

Pond P202: P-202 Peak Elev=200.83' Storage=11 cf Inflow=0.47 cfs 1,641 cf
15.0" Round Culvert n=0.012 L=71.0' S=0.0141 '/' Outflow=0.47 cfs 1,631 cf

Total Runoff Area = 172,550 sf Runoff Volume = 3,544 cf Average Runoff Depth = 0.25"
87.54% Pervious = 151,051 sf 12.46% Impervious = 21,499 sf

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Type III 24-hr 10-YR Rainfall=4.66"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 1F: FOREBAY#1 Peak Elev=200.66' Storage=962 cf Inflow=1.17 cfs 7,436 cf
 Outflow=0.92 cfs 6,660 cf

Pond 1P: INFILTRATIONBASIN#1 Peak Elev=199.46' Storage=1,627 cf Inflow=0.92 cfs 6,660 cf
 Discarded=0.30 cfs 6,660 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.30 cfs 6,660 cf

Subcatchment1S: EX-WS-1S Runoff Area=24,227 sf 14.86% Impervious Runoff Depth=1.86"
 Flow Length=396' Tc=6.4 min CN=71 Runoff=1.17 cfs 3,761 cf

Subcatchment2S: EX-WS-2S Runoff Area=39,526 sf 9.11% Impervious Runoff Depth=1.05"
 Flow Length=590' Tc=33.8 min CN=59 Runoff=0.51 cfs 3,447 cf

Subcatchment3S: EX-WS-3S Runoff Area=15,736 sf 11.60% Impervious Runoff Depth=0.26"
 Tc=7.0 min CN=43 Runoff=0.03 cfs 347 cf

Subcatchment4S: EX-WS-4S Runoff Area=12,571 sf 0.00% Impervious Runoff Depth=0.00"
 Flow Length=298' Tc=12.2 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment5S: EX-WS-5S Runoff Area=65,561 sf 8.12% Impervious Runoff Depth=0.11"
 Flow Length=283' Tc=16.9 min CN=38 Runoff=0.02 cfs 602 cf

Subcatchment6S: EX-WS-6S Runoff Area=14,929 sf 47.89% Impervious Runoff Depth=1.57"
 Flow Length=283' Tc=16.9 min CN=67 Runoff=0.43 cfs 1,954 cf

Link AP1: AP-1 Inflow=0.02 cfs 602 cf
 Primary=0.02 cfs 602 cf

Link AP2: AP-2 Inflow=0.43 cfs 1,954 cf
 Primary=0.43 cfs 1,954 cf

Link AP3: AP-3 Inflow=0.00 cfs 0 cf
 Primary=0.00 cfs 0 cf

Pond P201: P-201 Peak Elev=200.82' Storage=111 cf Inflow=0.51 cfs 3,447 cf
 15.0" Round Culvert n=0.012 L=66.0' S=0.0050 '/' Outflow=0.51 cfs 3,338 cf

Pond P202: P-202 Peak Elev=200.93' Storage=14 cf Inflow=1.17 cfs 3,761 cf
 15.0" Round Culvert n=0.012 L=71.0' S=0.0141 '/' Outflow=1.17 cfs 3,751 cf

Total Runoff Area = 172,550 sf Runoff Volume = 10,110 cf Average Runoff Depth = 0.70"
87.54% Pervious = 151,051 sf 12.46% Impervious = 21,499 sf

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Type III 24-hr 10-YR Rainfall=4.66"

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Summary for Pond 1F: FOREBAY #1

[81] Warning: Exceeded Pond P201 by 0.49' @ 11.78 hrs

Inflow Area = 79,489 sf, 11.36% Impervious, Inflow Depth = 1.12" for 10-YR event
Inflow = 1.17 cfs @ 12.10 hrs, Volume= 7,436 cf
Outflow = 0.92 cfs @ 12.40 hrs, Volume= 6,660 cf, Atten= 22%, Lag= 18.1 min
Primary = 0.92 cfs @ 12.40 hrs, Volume= 6,660 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 200.66' @ 12.40 hrs Surf.Area= 937 sf Storage= 962 cf

Plug-Flow detention time= 76.7 min calculated for 6,660 cf (90% of inflow)
Center-of-Mass det. time= 26.0 min (911.8 - 885.8)

Volume	Invert	Avail.Storage	Storage Description
#1	199.00'	1,311 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
199.00	293	94.2	0	0	293
200.00	627	124.9	450	450	839
201.00	1,120	172.4	862	1,311	1,973

Device	Routing	Invert	Outlet Devices
#1	Primary	200.45'	4.0' long x 4.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.92 cfs @ 12.40 hrs HW=200.66' (Free Discharge)

↑1=Broad-Crested Rectangular Weir(Weir Controls 0.92 cfs @ 1.09 fps)

Summary for Pond 1P: INFILTRATION BASIN #1

Inflow Area = 79,489 sf, 11.36% Impervious, Inflow Depth = 1.01" for 10-YR event
Inflow = 0.92 cfs @ 12.40 hrs, Volume= 6,660 cf
Outflow = 0.30 cfs @ 13.41 hrs, Volume= 6,660 cf, Atten= 68%, Lag= 60.7 min
Discarded = 0.30 cfs @ 13.41 hrs, Volume= 6,660 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 199.46' @ 13.41 hrs Surf.Area= 3,750 sf Storage= 1,627 cf

Plug-Flow detention time= 48.9 min calculated for 6,660 cf (100% of inflow)
Center-of-Mass det. time= 48.8 min (960.6 - 911.8)

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Type III 24-hr 10-YR Rainfall=4.66"

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Volume	Invert	Avail.Storage	Storage Description
#1	199.00'	8,791 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
199.00	3,268	355.2	0	0	3,268
200.00	4,347	360.3	3,795	3,795	3,729
201.00	5,676	393.9	4,997	8,791	5,780

Device	Routing	Invert	Outlet Devices
#1	Discarded	199.00'	3.000 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 196.00'
#2	Secondary	200.50'	4.0' long x 4.0' breadth EMERGENCY OVERFLOW Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#3	Primary	200.50'	4.0' long TOP OF WEIR Cv= 2.62 (C= 3.28)
#4	Primary	200.10'	30.0 deg x 0.5' long x 0.40' rise Sharp-Crested Vee/Trap Weir Cv= 2.61 (C= 3.26)

Discarded OutFlow Max=0.30 cfs @ 13.41 hrs HW=199.46' (Free Discharge)

↳1=Exfiltration (Controls 0.30 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=199.00' (Free Discharge)

↳3=TOP OF WEIR (Controls 0.00 cfs)

↳4=Sharp-Crested Vee/Trap Weir(Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=199.00' (Free Discharge)

↳2=EMERGENCY OVERFLOW (Controls 0.00 cfs)

Summary for Subcatchment 1S: EX-WS-1S

Runoff = 1.17 cfs @ 12.10 hrs, Volume= 3,761 cf, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.66"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
10,586	39	>75% Grass cover, Good, HSG A
10,041	96	Gravel surface, HSG A
3,600	98	Roofs, HSG A
0	30	Woods, Good, HSG A
24,227	71	Weighted Average
20,627		85.14% Pervious Area
3,600		14.86% Impervious Area

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Type III 24-hr 10-YR Rainfall=4.66"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	45	0.3300	0.30		Sheet Flow, Grass: Dense n= 0.240 P2= 3.09"
1.0	55	0.0100	0.91		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.09"
0.7	70	0.0100	1.61		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.2	226	0.0440	1.71	34.30	Channel Flow, Area= 20.0 sf Perim= 475.0' r= 0.04' n= 0.022 Earth, clean & straight
6.4	396	Total			

Summary for Subcatchment 2S: EX-WS-2S

Runoff = 0.51 cfs @ 12.55 hrs, Volume= 3,447 cf, Depth= 1.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.66"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
17,614	39	>75% Grass cover, Good, HSG A
11,175	96	Gravel surface, HSG A
3,600	98	Roofs, HSG A
7,137	30	Woods, Good, HSG A
39,526	59	Weighted Average
35,926		90.89% Pervious Area
3,600		9.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.8	100	0.0100	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.09"
0.2	125	0.3300	8.62		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.8	365	0.0440	1.26	25.29	Channel Flow, Area= 20.0 sf Perim= 750.0' r= 0.03' n= 0.022 Earth, clean & straight
33.8	590	Total			

Summary for Subcatchment 3S: EX-WS-3S

Runoff = 0.03 cfs @ 12.42 hrs, Volume= 347 cf, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.66"

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Type III 24-hr 10-YR Rainfall=4.66"

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Area (sf)	CN	Description
1,826	98	Paved roads w/curbs & sewers, HSG A
8,854	39	>75% Grass cover, Good, HSG A
5,056	30	Woods, Good, HSG A
15,736	43	Weighted Average
13,910		88.40% Pervious Area
1,826		11.60% Impervious Area

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

Summary for Subcatchment 4S: EX-WS-4S

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.66"

Area (sf)	CN	Description
12,571	30	Woods, Good, HSG A
12,571		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.1200	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.09"
1.5	198	0.2000	2.24		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.2	298	Total			

Summary for Subcatchment 5S: EX-WS-5S

Runoff = 0.02 cfs @ 14.93 hrs, Volume= 602 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.66"

Area (sf)	CN	Description
5,324	98	Paved roads w/curbs & sewers, HSG A
17,024	39	>75% Grass cover, Good, HSG A
43,213	30	Woods, Good, HSG A
65,561	38	Weighted Average
60,237		91.88% Pervious Area
5,324		8.12% Impervious Area

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Type III 24-hr 10-YR Rainfall=4.66"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0800	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.09"
4.3	183	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.9	283	Total			

Summary for Subcatchment 6S: EX-WS-6S

Runoff = 0.43 cfs @ 12.25 hrs, Volume= 1,954 cf, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.66"

Area (sf)	CN	Description
7,149	98	Paved roads w/curbs & sewers, HSG A
7,780	39	>75% Grass cover, Good, HSG A
14,929	67	Weighted Average
7,780		52.11% Pervious Area
7,149		47.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	100	0.0800	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.09"
4.3	183	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.9	283	Total			

Summary for Link AP1: AP-1Inflow Area = 145,050 sf, 9.89% Impervious, Inflow Depth = 0.05" for 10-YR event
Inflow = 0.02 cfs @ 14.93 hrs, Volume= 602 cf
Primary = 0.02 cfs @ 14.93 hrs, Volume= 602 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Link AP2: AP-2Inflow Area = 14,929 sf, 47.89% Impervious, Inflow Depth = 1.57" for 10-YR event
Inflow = 0.43 cfs @ 12.25 hrs, Volume= 1,954 cf
Primary = 0.43 cfs @ 12.25 hrs, Volume= 1,954 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

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Type III 24-hr 10-YR Rainfall=4.66"

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Summary for Link AP3: AP-3

Inflow Area = 12,571 sf, 0.00% Impervious, Inflow Depth = 0.00" for 10-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Summary for Pond P201: P-201

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 39,526 sf, 9.11% Impervious, Inflow Depth = 1.05" for 10-YR event
 Inflow = 0.51 cfs @ 12.55 hrs, Volume= 3,447 cf
 Outflow = 0.51 cfs @ 12.55 hrs, Volume= 3,338 cf, Atten= 0%, Lag= 0.1 min
 Primary = 0.51 cfs @ 12.55 hrs, Volume= 3,338 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 200.82' @ 12.55 hrs Surf.Area= 163 sf Storage= 111 cf

Plug-Flow detention time= 22.9 min calculated for 3,338 cf (97% of inflow)
 Center-of-Mass det. time= 6.0 min (916.1 - 910.1)

Volume	Invert	Avail.Storage	Storage Description
#1	199.00'	437 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
199.00	2	3.4	0	0	2
200.00	59	36.2	24	24	107
201.00	194	59.7	120	144	293
202.00	406	80.8	294	437	539

Device	Routing	Invert	Outlet Devices
#1	Primary	198.80'	15.0" Round P-201 L= 66.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 198.80' / 198.47' S= 0.0050 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.68 cfs @ 12.55 hrs HW=200.82' TW=200.80' (Fixed TW Elev= 200.80')
 ↑**1=P-201** (Inlet Controls 0.68 cfs @ 0.55 fps)

Summary for Pond P202: P-202

Inflow Area = 24,227 sf, 14.86% Impervious, Inflow Depth = 1.86" for 10-YR event
 Inflow = 1.17 cfs @ 12.10 hrs, Volume= 3,761 cf
 Outflow = 1.17 cfs @ 12.10 hrs, Volume= 3,751 cf, Atten= 0%, Lag= 0.1 min
 Primary = 1.17 cfs @ 12.10 hrs, Volume= 3,751 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

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Type III 24-hr 10-YR Rainfall=4.66"

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Peak Elev= 200.93' @ 12.10 hrs Surf.Area= 35 sf Storage= 14 cf

Plug-Flow detention time= 2.2 min calculated for 3,751 cf (100% of inflow)

Center-of-Mass det. time= 0.7 min (849.9 - 849.2)

Volume	Invert	Avail.Storage	Storage Description			
#1	200.00'	241 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
200.00	2	5.9	0	0	2	
201.00	39	27.2	17	17	60	
202.00	108	41.4	71	87	145	
203.00	205	56.0	154	241	268	

Device	Routing	Invert	Outlet Devices
#1	Primary	200.00'	15.0" Round P-202 L= 71.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 200.00' / 199.00' S= 0.0141 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.17 cfs @ 12.10 hrs HW=200.93' TW=200.80' (Fixed TW Elev= 200.80')↑**1=P-202** (Outlet Controls 1.17 cfs @ 1.67 fps)

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Type III 24-hr 25-YR Rainfall=5.91"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 1F: FOREBAY#1 Peak Elev=200.80' Storage=1,095 cf Inflow=2.15 cfs 12,299 cf
 Outflow=2.04 cfs 11,522 cf

Pond 1P: INFILTRATIONBASIN#1 Peak Elev=200.07' Storage=4,104 cf Inflow=2.04 cfs 11,522 cf
 Discarded=0.40 cfs 11,522 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.40 cfs 11,522 cf

Subcatchment1S: EX-WS-1S Runoff Area=24,227 sf 14.86% Impervious Runoff Depth=2.83"
 Flow Length=396' Tc=6.4 min CN=71 Runoff=1.81 cfs 5,706 cf

Subcatchment2S: EX-WS-2S Runoff Area=39,526 sf 9.11% Impervious Runoff Depth=1.78"
 Flow Length=590' Tc=33.8 min CN=59 Runoff=0.94 cfs 5,868 cf

Subcatchment3S: EX-WS-3S Runoff Area=15,736 sf 11.60% Impervious Runoff Depth=0.64"
 Tc=7.0 min CN=43 Runoff=0.12 cfs 843 cf

Subcatchment4S: EX-WS-4S Runoff Area=12,571 sf 0.00% Impervious Runoff Depth=0.06"
 Flow Length=298' Tc=12.2 min CN=30 Runoff=0.00 cfs 66 cf

Subcatchment5S: EX-WS-5S Runoff Area=65,561 sf 8.12% Impervious Runoff Depth=0.37"
 Flow Length=283' Tc=16.9 min CN=38 Runoff=0.16 cfs 2,018 cf

Subcatchment6S: EX-WS-6S Runoff Area=14,929 sf 47.89% Impervious Runoff Depth=2.46"
 Flow Length=283' Tc=16.9 min CN=67 Runoff=0.70 cfs 3,063 cf

Link AP1: AP-1 Inflow=0.16 cfs 2,018 cf
 Primary=0.16 cfs 2,018 cf

Link AP2: AP-2 Inflow=0.70 cfs 3,063 cf
 Primary=0.70 cfs 3,063 cf

Link AP3: AP-3 Inflow=0.00 cfs 66 cf
 Primary=0.00 cfs 66 cf

Pond P201: P-201 Peak Elev=200.83' Storage=114 cf Inflow=0.94 cfs 5,868 cf
 15.0" Round Culvert n=0.012 L=66.0' S=0.0050 '/ Outflow=0.94 cfs 5,759 cf

Pond P202: P-202 Peak Elev=201.03' Storage=18 cf Inflow=1.81 cfs 5,706 cf
 15.0" Round Culvert n=0.012 L=71.0' S=0.0141 '/ Outflow=1.81 cfs 5,696 cf

Total Runoff Area = 172,550 sf Runoff Volume = 17,565 cf Average Runoff Depth = 1.22"
87.54% Pervious = 151,051 sf 12.46% Impervious = 21,499 sf

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Type III 24-hr 50-YR Rainfall=7.06"

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Pond 1F: FOREBAY#1 Peak Elev=200.89' Storage=1,193 cf Inflow=3.14 cfs 17,336 cf
 Outflow=3.02 cfs 16,559 cf

Pond 1P: INFILTRATIONBASIN#1 Peak Elev=200.45' Storage=5,896 cf Inflow=3.02 cfs 16,559 cf
 Discarded=0.47 cfs 14,476 cf Primary=0.39 cfs 2,083 cf Secondary=0.00 cfs 0 cf Outflow=0.87 cfs 16,559 cf

Subcatchment1S: EX-WS-1S Runoff Area=24,227 sf 14.86% Impervious Runoff Depth=3.77"
 Flow Length=396' Tc=6.4 min CN=71 Runoff=2.43 cfs 7,619 cf

Subcatchment2S: EX-WS-2S Runoff Area=39,526 sf 9.11% Impervious Runoff Depth=2.55"
 Flow Length=590' Tc=33.8 min CN=59 Runoff=1.40 cfs 8,392 cf

Subcatchment3S: EX-WS-3S Runoff Area=15,736 sf 11.60% Impervious Runoff Depth=1.10"
 Tc=7.0 min CN=43 Runoff=0.31 cfs 1,443 cf

Subcatchment4S: EX-WS-4S Runoff Area=12,571 sf 0.00% Impervious Runoff Depth=0.22"
 Flow Length=298' Tc=12.2 min CN=30 Runoff=0.01 cfs 233 cf

Subcatchment5S: EX-WS-5S Runoff Area=65,561 sf 8.12% Impervious Runoff Depth=0.72"
 Flow Length=283' Tc=16.9 min CN=38 Runoff=0.47 cfs 3,916 cf

Subcatchment6S: EX-WS-6S Runoff Area=14,929 sf 47.89% Impervious Runoff Depth=3.35"
 Flow Length=283' Tc=16.9 min CN=67 Runoff=0.97 cfs 4,174 cf

Link AP1: AP-1 Inflow=0.59 cfs 5,999 cf
 Primary=0.59 cfs 5,999 cf

Link AP2: AP-2 Inflow=0.97 cfs 4,174 cf
 Primary=0.97 cfs 4,174 cf

Link AP3: AP-3 Inflow=0.01 cfs 233 cf
 Primary=0.01 cfs 233 cf

Pond P201: P-201 Peak Elev=200.87' Storage=121 cf Inflow=1.40 cfs 8,392 cf
 15.0" Round Culvert n=0.012 L=66.0' S=0.0050 '/' Outflow=1.40 cfs 8,283 cf

Pond P202: P-202 Peak Elev=201.13' Storage=22 cf Inflow=2.43 cfs 7,619 cf
 15.0" Round Culvert n=0.012 L=71.0' S=0.0141 '/' Outflow=2.43 cfs 7,609 cf

Total Runoff Area = 172,550 sf Runoff Volume = 25,777 cf Average Runoff Depth = 1.79"
87.54% Pervious = 151,051 sf 12.46% Impervious = 21,499 sf

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	71.006 degrees West
Latitude	43.164 degrees North
Elevation	0 feet
Date/Time	Thu, 13 Jan 2022 13:47:42 -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	0.65	0.81	1.03	1yr	0.70	0.98	1.20	1.54	1.98	2.57	2.81	1yr	2.28	2.70	3.11	3.82	4.40	1yr
2yr	0.32	0.49	0.61	0.80	1.01	1.28	2yr	0.87	1.16	1.49	1.89	2.41	3.09	3.43	2yr	2.73	3.29	3.79	4.52	5.15	2yr
5yr	0.37	0.57	0.72	0.96	1.23	1.58	5yr	1.06	1.44	1.85	2.37	3.04	3.90	4.39	5yr	3.46	4.22	4.83	5.71	6.46	5yr
10yr	0.40	0.63	0.80	1.09	1.42	1.84	10yr	1.22	1.69	2.17	2.80	3.62	4.66	5.29	10yr	4.13	5.09	5.80	6.81	7.67	10yr
25yr	0.46	0.74	0.94	1.30	1.72	2.27	25yr	1.49	2.09	2.69	3.50	4.56	5.91	6.78	25yr	5.23	6.52	7.40	8.62	9.64	25yr
50yr	0.52	0.83	1.06	1.49	2.01	2.67	50yr	1.73	2.46	3.18	4.16	5.43	7.06	8.19	50yr	6.25	7.87	8.89	10.30	11.47	50yr
100yr	0.58	0.94	1.21	1.71	2.33	3.13	100yr	2.01	2.89	3.74	4.93	6.47	8.45	9.89	100yr	7.48	9.51	10.69	12.32	13.65	100yr
200yr	0.64	1.05	1.36	1.96	2.71	3.68	200yr	2.34	3.40	4.43	5.87	7.72	10.11	11.95	200yr	8.95	11.49	12.86	14.73	16.26	200yr
500yr	0.76	1.25	1.63	2.37	3.32	4.55	500yr	2.86	4.22	5.50	7.35	9.74	12.83	15.35	500yr	11.36	14.76	16.42	18.69	20.49	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	0.36	0.44	0.60	0.73	0.90	1yr	0.63	0.88	0.92	1.26	1.54	1.96	2.49	1yr	1.74	2.40	2.91	3.33	3.96	1yr
2yr	0.31	0.49	0.60	0.81	1.00	1.18	2yr	0.86	1.15	1.36	1.82	2.34	3.00	3.32	2yr	2.65	3.19	3.68	4.41	5.03	2yr
5yr	0.35	0.54	0.67	0.92	1.16	1.40	5yr	1.01	1.37	1.61	2.14	2.77	3.61	4.02	5yr	3.19	3.86	4.46	5.36	5.99	5yr
10yr	0.38	0.59	0.73	1.02	1.32	1.60	10yr	1.14	1.56	1.82	2.44	3.13	4.13	4.64	10yr	3.65	4.46	5.15	6.21	6.83	10yr
25yr	0.44	0.67	0.83	1.19	1.56	1.91	25yr	1.35	1.87	2.12	2.84	3.66	4.92	5.58	25yr	4.35	5.37	6.24	7.55	8.40	25yr
50yr	0.49	0.74	0.92	1.32	1.78	2.19	50yr	1.54	2.14	2.37	3.21	4.12	5.61	6.41	50yr	4.96	6.16	7.22	8.75	9.68	50yr
100yr	0.54	0.82	1.03	1.49	2.04	2.51	100yr	1.76	2.45	2.66	3.60	4.62	6.38	7.35	100yr	5.65	7.06	8.36	10.14	11.11	100yr
200yr	0.61	0.91	1.15	1.67	2.33	2.87	200yr	2.01	2.80	2.97	4.04	5.18	7.26	8.99	200yr	6.42	8.64	9.69	11.75	12.78	200yr
500yr	0.71	1.06	1.36	1.97	2.80	3.45	500yr	2.42	3.38	3.46	4.70	6.06	8.55	10.92	500yr	7.57	10.50	11.79	14.30	15.31	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	0.43	0.53	0.71	0.87	1.08	1yr	0.75	1.05	1.23	1.73	2.19	2.78	3.05	1yr	2.46	2.93	3.36	4.11	4.75	1yr
2yr	0.33	0.50	0.62	0.84	1.04	1.24	2yr	0.89	1.21	1.47	1.94	2.49	3.21	3.55	2yr	2.84	3.42	3.93	4.65	5.29	2yr
5yr	0.39	0.60	0.75	1.03	1.31	1.57	5yr	1.13	1.54	1.84	2.47	3.16	4.21	4.75	5yr	3.72	4.57	5.22	6.06	6.91	5yr
10yr	0.46	0.70	0.87	1.22	1.57	1.91	10yr	1.36	1.86	2.21	3.00	3.79	5.20	5.95	10yr	4.61	5.72	6.49	7.42	8.45	10yr
25yr	0.56	0.85	1.05	1.50	1.98	2.46	25yr	1.71	2.40	2.85	3.89	4.85	6.91	8.01	25yr	6.11	7.70	8.63	9.74	10.80	25yr
50yr	0.64	0.98	1.22	1.75	2.36	2.97	50yr	2.03	2.90	3.45	4.73	5.86	8.55	10.05	50yr	7.57	9.67	10.74	11.95	13.18	50yr
100yr	0.75	1.13	1.42	2.05	2.81	3.58	100yr	2.42	3.50	4.18	5.76	7.10	10.60	12.62	100yr	9.38	12.14	13.34	14.68	16.10	100yr
200yr	0.87	1.31	1.65	2.40	3.34	4.34	200yr	2.88	4.24	5.08	7.03	8.57	13.19	15.12	200yr	11.68	14.54	16.58	18.02	19.71	200yr
500yr	1.06	1.58	2.03	2.95	4.20	5.57	500yr	3.62	5.44	6.54	9.16	11.03	17.64	20.27	500yr	15.62	19.49	22.10	23.69	25.75	500yr



Project Name:

JBE #: 21206

Town/City: BARRINGTON, NH

Date: 3/1/2022

Rip Rap Outlet Protection Calculation

Outlet Designation: P-202

Pipe Size (Do): 12 in. 1 ft

Q25 (cfs): 1.36 cfs

Tailwater Elevation (TW)(ft): 0.25 if TW = 0, assume 3"

Apron Length (La):

TW < Do YES $La = 1.8Q/Do^{1.5} + 7Do$
La = 9.45 ft

TW > Do No $La = 3.0Q/Do^{1.5} + 7Do$
La =

Apron Width (W₂)

TW < Do $W_2 = 3Do + La$
W₂ = 12.45 ft.

TW > Do $W_2 = 3Do + .4La$
W₂ = ft.

Rip-Rap Diameter (D₅₀):

D₅₀: $D_{50} = 0.02Q^{1.3}/TW*Do$
D₅₀ = 0.12 ft. 1.43 in.

Use 3" minimum D₅₀ ==> D₅₀ = 4.0 in.

Rip-Rap Thickness (T):

$T = 2.5*D_{50}$
T = 10.0 in.

Apron Width (W₁):

$W_1 = 3*Do$
W₁ = 3.00 ft.

Project Name:

JBE #: 21206

Town/City: BARRINGTON, NH

Date: 3/1/2022

Rip Rap Outlet Protection Calculation

Outlet Designation: OS1

Pipe Size (Do): 24 in. 2 ft

Q25 (cfs): 0.07 cfs

Tailwater Elevation (TW)(ft): 0.25 if TW = 0, assume 3"

Apron Length (La):

TW < Do YES $La = 1.8Q/Do^{1.5} + 7Do$
La = 14.04 ft

TW > Do No $La = 3.0Q/Do^{1.5} + 7Do$
La =

Apron Width (W₂):

TW < Do $W_2 = 3Do + La$
W₂ = 20.04 ft.

TW > Do $W_2 = 3Do + .4La$
W₂ = ft.

Rip-Rap Diameter (D₅₀):

D₅₀: $D_{50} = 0.02Q^{1.3}/TW*Do$
D₅₀ = 0.00 ft. 0.02 in.

Use 3" minimum D₅₀ ==> D50 = 4.0 in.

Rip-Rap Thickness (T):

$T = 2.5*D_{50}$
T = 10.0 in.

Apron Width (W₁):

$W_1 = 3*Do$
W₁ = 6.00 ft.

STORMWATER MANAGEMENT OPERATION AND MAINTENANCE MANUAL

Prepared for:

**ROCK IRON REPAIR
Project Tax Map 265 / Lot 11 & 12
Calef Highway
Barrington, NH**

**3/2/2022
Rev. #1: 5/25/2022
JBE Project No. 21206**

Inspection and Maintenance of Facilities and Property

A. Maintenance of Common Facilities or Property

1. Rock Iron Repair, future owners and assigns are responsible to perform the maintenance obligations or hire a Professional Engineer to review the site on an annual basis for maintenance and certification of the stormwater system. The owner shall keep receipts and records of all maintenance companies hired throughout the year to submit along with the following form.

B. General Inspection and Maintenance Requirements

- a. Permanent stormwater and sediment and erosion control facilities to be maintained on the site include, but are not limited to, the following:
 - a. Culverts
 - b. Vegetation and landscaping
 - c. Parking lots and roadways
 - d. Riprap inlet and outlet protection aprons
- b. Maintenance of permanent measures shall follow the following schedule:
 - a. Normal winter roadway and parking lot maintenance including plowing and snow removal.
 - b. Road and parking lot sweeping at the end of every winter, preferably at the start of the spring rain season.
 - c. **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 by owner or contractor.
 - d. **Annual inspection** of the site for erosion, destabilization, settling, and sloughing. Any needed repairs are to be conducted immediately.
 - e. **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.
 - f. Permanent stone check dams should be **inspected annually** in order to ensure that they are in good condition. Any sediment accumulated behind them shall be removed if it is deeper than six inches.
 - g. Rock riprap should be **inspected annually** 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.

h. Cleaning Criteria for all Sedimentation Forebays: Sediment should be removed from the sedimentation chamber (forebay) when it accumulates to a depth of more than 12 inches (30 cm) or 10 percent of the pretreatment volume. The sedimentation forebay should be cleaned of vegetation if persistent standing water and wetland vegetation becomes dominant. The cleaning interval is once every year. A dry sedimentation forebay is the optimal condition while in practice this condition is rarely achieved. The sedimentation chamber, forebay, and treatment cell outlet devices should be cleaned when drawdown times exceed 60 to 72 hours. Materials can be removed with heavy construction equipment; however this equipment should not track on the wetland surface. Revegetation of disturbed areas as necessary. Removed sediments should be dewatered (if necessary) and disposed of in an acceptable manner.

i. Treatment 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. Do not cut shorter than Water Quality Flow depth (maximum 4-inches). 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.

j. Vegetated Buffers:

Inspect buffer at least annually for signs of erosion, sediment buildup, or vegetation loss. If a meadow buffer, provide periodic mowing as needed to maintain a healthy stand of herbaceous vegetation. If a forested buffer, then the buffer should be maintained in an undisturbed condition, unless erosion occurs. If erosion of the buffer (forested or meadow) occurs, eroded areas should be repaired and replanted with vegetation similar to the remaining buffer. Corrective action should include eliminating the source of the erosion problem, and may require retrofit with a level spreader. Remove debris and accumulated sediment, based on inspection.

n. Infiltration Basin:

Infiltration Basins and forebays should be inspected twice annually and after every rainfall event of 2.5" or greater within a 24-hour period at a minimum. The infiltration basin areas designed to collect and infiltrate stormwater will need only minimal maintenance. Traffic over the basin areas should be kept to a minimum prior to construction to prevent compaction of the soil reducing infiltration.

Basins shall be inspected for effectiveness at a minimum of twice annually. If basin has not completely drained 72-hours after a rainfall event, the existing clogged layer of soil shall be removed and replaced with new material as specified within the design plans.

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

Commitment to maintenance requirements

I agree to complete and/or observe all of the required maintenance practices and their respective schedules as outlined above.

Signature

Print Name

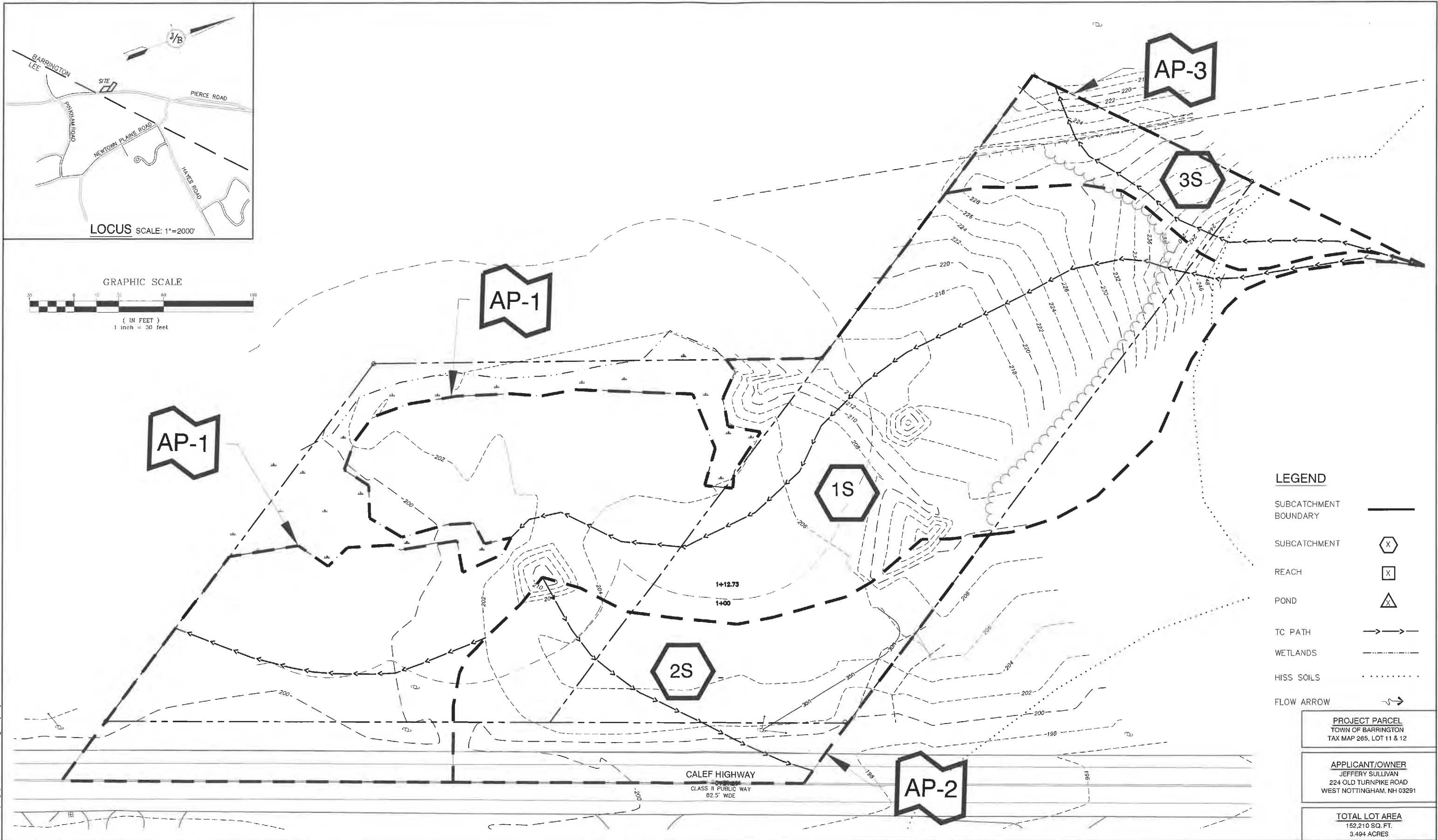
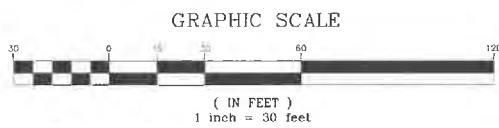
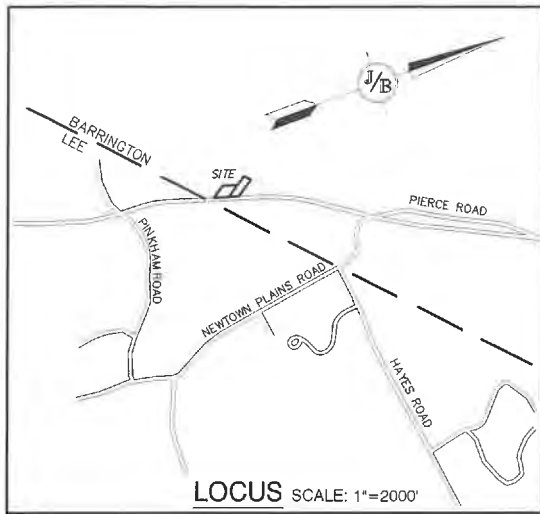
Title

Date

Annual Operations and Maintenance Report

Rock Iron Repair, future owners and assigns are responsible to perform the maintenance obligations or hire a Professional Engineer to review the site on an annual basis for maintenance and certification of the stormwater system. The owner shall keep receipts and records of all maintenance companies hired throughout the year to submit along with the following form.

Construction Activity	Date of Inspection	Who Inspected	Findings of Inspector
Culverts			
Swales & Plunge Pools			
Vegetation and landscaping			
Parking lots and roadways			
Infiltration Basin			



LEGEND

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

PROJECT PARCEL TOWN OF BARRINGTON TAX MAP 285, LOT 11 & 12
APPLICANT/OWNER JEFFERY SULLIVAN 224 OLD TURNPIKE ROAD WEST NOTTINGHAM, NH 03291
TOTAL LOT AREA 152,210 SQ. FT. 3.494 ACRES

F:\CADD\MASTER STANDARD\dwg\LB-LAYOUTS.dwg 3/12/2015 3:27:28 PM EDT

Design: BWG	Draft: DFP	Date: 05/04/22
Checked: BWG	Scale: AS NOTED	Project No.: 21206
Drawing Name: 21206-WATERSHED.dwg		
THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM JONES & BEACH ENGINEERS, INC. (JBE). ANY ALTERATIONS, AUTHORIZED OR OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO JBE.		

REV.	DATE	REVISION	BY
0	3/15/22	ISSUED FOR REVIEW	BWG

Designed and Produced in NH

J/B Jones & Beach Engineers, Inc.

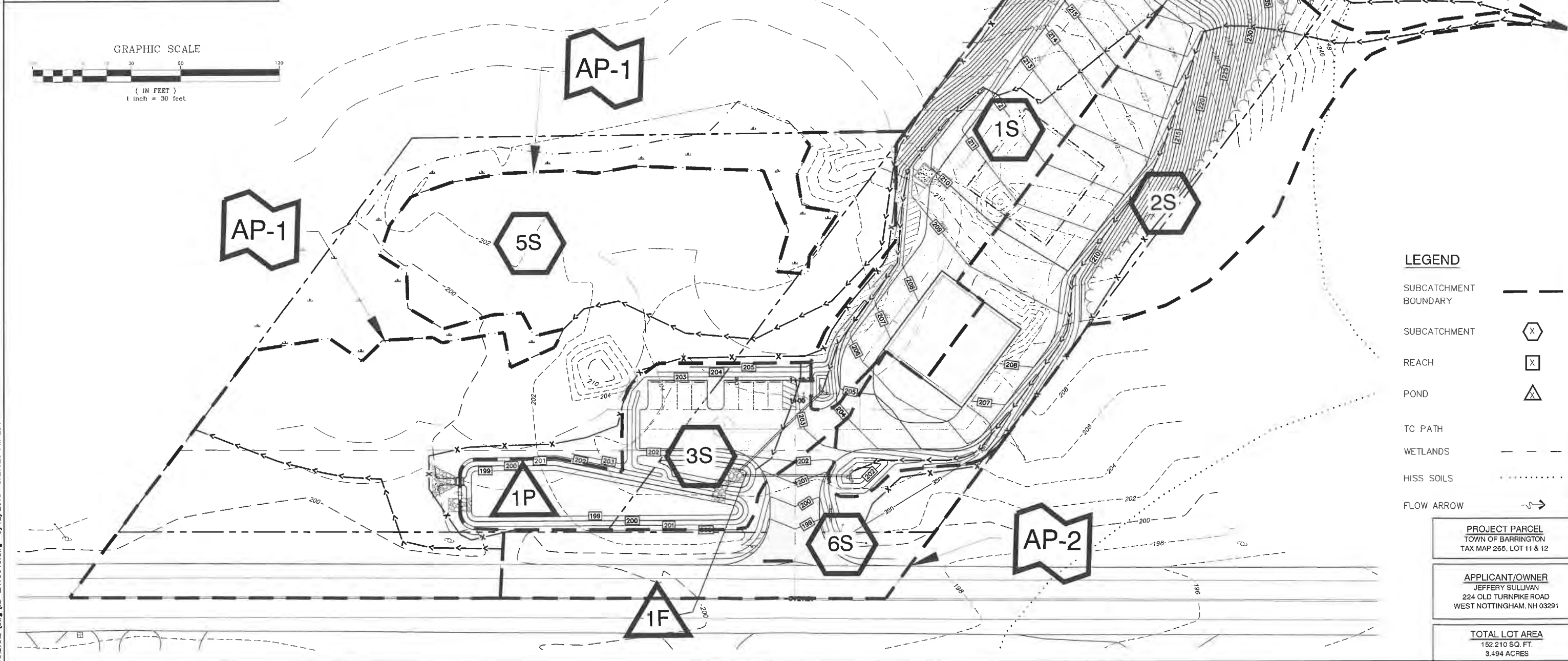
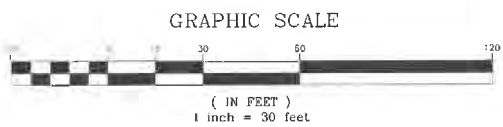
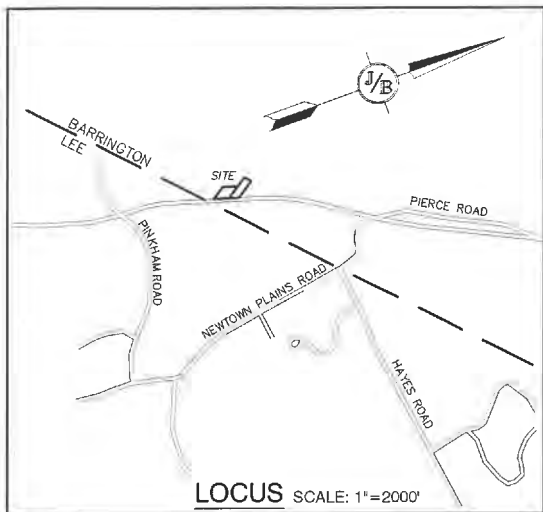
85 Portsmouth Ave. Civil Engineering Services 603-772-4746
 PO Box 219 Stratham, NH 03885 FAX: 603-772-0227
 E-MAIL: JBE@JONESANDBEACH.COM

Plan Name:	EXISTING WATERSHED PLAN
Project:	ROCK IRON REPAIR CALEF HIGHWAY, BARRINGTON, NH
Owner of Record:	JEFFERY SULLIVAN 224 OLD TURNPIKE RD., WEST NOTTINGHAM, NH 03291

DRAWING No.

W1

SHEET 1 OF 2
JBE PROJECT NO. 21206



LEGEND

SUBCATCHMENT BOUNDARY	---
SUBCATCHMENT	X
REACH	X
POND	△
TC PATH	---
WETLANDS
HISS SOILS
FLOW ARROW	→

PROJECT PARCEL
TOWN OF BARRINGTON
TAX MAP 265, LOT 11 & 12

APPLICANT/OWNER
JEFFERY SULLIVAN
224 OLD TURNPIKE ROAD
WEST NOTTINGHAM, NH 03291

TOTAL LOT AREA
152,210 SQ. FT.
3.494 ACRES

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Design: BWG Draft: DFP Date: 05/04/22
 Checked: BWG Scale: AS NOTED Project No.: 21206
 Drawing Name: 21206-WATERSHED.dwg
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REV.	DATE	REVISION	BY
0	3/15/22	ISSUED FOR REVIEW	BWG

Designed and Produced in NH

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

Plan Name: **PROPOSED WATERSHED PLAN**
 Project: **ROCK IRON REPAIR CALEF HIGHWAY, BARRINGTON, NH**
 Owner of Record: **JEFFREY SULLIVAN 224 OLD TURNPIKE RD., WEST NOTTINGHAM, NH 03291**

DRAWING No.
W2
SHEET 2 OF 2
JBE PROJECT NO. 21206