

JONES & BEACH ENGINEERS INC.

DRAINAGE ANALYSIS

EROSION AND SEDIMENT CONTROL PLAN

VIOLETTE LANE ESTATES

Project Tax Map 1 / LOT 82

Scribner Road

Fremont, NH

Prepared for:

Haus Emily, LLC

56 Westville Road #4

Plaistow, NH 03865



Prepared by:

Jones & Beach Engineers, Inc.

85 Portsmouth Avenue

P.O. Box 219

Stratham, NH 03885

(603) 772-4746

August 31, 2020

JBE Project No. 19175.1

1. EXECUTIVE SUMMARY

The purpose of this project is to construct an 8-Lot Residential Open Space Preservation Subdivision on Town of Fremont Tax Map 1, Lot 82. The proposed project includes the construction of an 1,350 ± roadway with associated utilities and drainage infrastructures. 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	0.54	0.15	2.16	1.75	3.78	3.24	5.47	4.48
Analysis Point #2	1.92	1.92	7.30	7.30	12.72	12.72	18.36	18.36
Analysis Point #3	6.19	6.48	23.45	23.42	40.88	40.18	59.01	58.71
Total	8.65	8.55	32.91	32.47	57.38	56.14	82.84	81.55

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. This has been accomplished through the use of a stormwater basin and 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 erosion control blankets 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.

TABLE OF CONTENTS

1. Executive Summary
2. Drainage Analysis
 - 2.1. Introduction
 - 2.2. Methodology
 - 2.3. Existing Conditions Analysis
 - 2.4. Proposed Conditions Analysis
 - 2.5. Conclusion
 - 2.6. Drainage Calculations – Pre-Development Conditions Analysis
 - 2.6.1. 2-Year – 24 Hour Summary Analysis
 - 2.6.2. 10-Year – 24 Hour Summary Analysis
 - 2.6.3. 25-Year – 24 Hour Complete Analysis
 - 2.6.4. 50-Year – 24 Hour Summary Analysis
 - 2.7. Drainage Calculations – Proposed-Development Conditions Analysis
 - 2.7.1. 2-Year – 24 Hour Summary Analysis
 - 2.7.2. 10-Year – 24 Hour Summary Analysis
 - 2.7.3. 25-Year - 24 Hour Complete Analysis
 - 2.7.4. 50-Year – 24 Hour Summary Analysis
3. Extreme Precipitation Table
4. Rip-Rap Calculations
5. USGS Map
6. Web Soil Survey Map
7. Aerial Photography of Site
8. Representative Photographs of Site
9. Stormwater Operations and Maintenance Manual
10. Plans
 - 10.1. Pre-Development Drainage Plans
 - 10.2. Post-Development Drainage Plans

2. DRAINAGE ANALYSIS

2.1 INTRODUCTION

The purpose of this project is to construct an 8-Lot Residential Open Space Preservation Subdivision on Town of Fremont Tax Map 1, Lot 82. The proposed project includes the construction of a 1,350 ± roadway with associated utilities and drainage infrastructures. This project will be serviced by on-site sewer and water.

2.2 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 3.08", 4.68", 5.94", and 7.12" respectively.

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

2.3 EXISTING CONDITIONS ANALYSIS

The study area consists of the subject property and upstream contributing area. The study area contains 46.957 acres including offsite contributing areas. The existing site is currently undeveloped and consists of partially forested areas and open farmland. The existing site generally drains from west to east.

The majority of the soils for this site are described as Hydrological Soils "B". A small area of soils in the western area of the subcatchment are described as Hydrological Soils "C".

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

Analysis Point #1 is defined as the entrance to the existing culvert under Scribner Road at the north portion of the project along the eastern project property line. Stormwater to this Analysis Point is collected from the east central portion of the proposed project, generally south of the existing woods road.

Analysis Point #2 is defined as the entrance to the existing culvert under Scribner Road at the south portion of the project along the eastern project property line. Stormwater to this Analysis Point is collected from the south-eastern corner of the project and off-site areas to the south and west of the project to South Road.

Analysis Point #3 is defined as the northern property line along the existing wetland line. Stormwater to this Analysis Point is collected in the existing wetlands on- and off-site and discharge towards the existing fire pond located on the property north of the project along Scribner Road.

2.4 PROPOSED CONDITIONS ANALYSIS

The proposed site includes the construction of an approximately 1,350' \pm roadway to support an 8-lot residential subdivision.

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:

Drainage along the eastern half of the proposed roadway is collected in a roadside ditch system and is directed to a proposed detention basin (1P) along the eastern portion of the project adjacent to Scribner Road. Discharge from the proposed detention basin is discharged to the existing culvert located under Scribner Road at Analysis Point #1 (AP-1).

The watershed contributing to Analysis Point #2 remains unchanged.

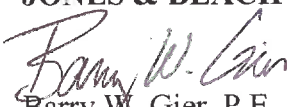
Drainage developed by the cul-de-sac and portions of the developed area west of the cul-de-sac are directed to the infiltration basin located within the center of the proposed cul-de-sac bulb (5P). Discharge from the infiltration basin is directed through the proposed roadside ditch system along with stormwater developed along the western portion of the proposed roadway to the existing wetland system located in the center of the proposed roadway system (Reach 1R). This stormwater along with stormwater collected in the existing wetland system west of the proposed construction is directed to Analysis Point #3.

2.5 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 rates of runoff for the site will be lower than the existing conditions for all analyzed storm events. 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, roadside ditches, a detention pond, 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.

An NHDES Alteration of Terrain Permit (RSA 485:A-17) is not required for this site plan due to the area of disturbance being less than 100,000 square-feet.

Respectfully Submitted,
JONES & BEACH ENGINEERS, INC.


Barry W. Gier, P.E.
Vice-President

2.6 DRAINAGE CALCUALTIONS

PRE-DEVELOPMENT CONDITIONS ANALYSIS

- 2.6.1 2-Year 24-Hour Summary Analysis
- 2.6.2 10-Year 24-Hour Summary Analysis
- 2.6.3 25-Year 24-Hour Complete Analysis
- 2.6.4 50-Year 24-Hour Summary Analysis



EX-WS-1



Analysis Point #1



EX-WS-2



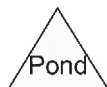
Analysis Point #2



EX-WS-3



Analysis Point #3



Routing Diagram for 19175-EXIST-DRAINAGE

Prepared by {enter your company name here}, Printed 8/31/2020
HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

19175-EXIST-DRAINAGE

Prepared by {enter your company name here}

Printed 8/31/2020

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
27.973	61	>75% Grass cover, Good, HSG B (1S, 2S, 3S)
0.530	96	Gravel surface, HSG B (1S, 2S, 3S)
0.889	98	Unconnected pavement, HSG B (1S, 2S, 3S)
12.056	58	Woods/grass comb., Good, HSG B (3S)
5.508	72	Woods/grass comb., Good, HSG C (3S)
46.957	63	TOTAL AREA

19175-EXIST-DRAINAGE

Prepared by {enter your company name here}

Printed 8/31/2020

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
41.449	HSG B	1S, 2S, 3S
5.508	HSG C	3S
0.000	HSG D	
0.000	Other	
46.957		TOTAL AREA

19175-EXIST-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

PRE-DEVELOPMENT

Type III 24-hr 2-YR Rainfall=3.08"

Printed 8/31/2020

Page 4

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 1S: EX-WS-1

Runoff Area=101,664 sf 2.42% Impervious Runoff Depth>0.37"
Flow Length=618' Tc=17.6 min UI Adjusted CN=62 Runoff=0.54 cfs 0.073 af

Subcatchment 2S: EX-WS-2

Runoff Area=444,071 sf 3.08% Impervious Runoff Depth>0.37"
Flow Length=1,478' Tc=32.6 min CN=62 Runoff=1.92 cfs 0.314 af

Subcatchment 3S: EX-WS-3

Runoff Area=1,499,727 sf 1.51% Impervious Runoff Depth>0.37"
Flow Length=2,635' Tc=36.2 min UI Adjusted CN=62 Runoff=6.19 cfs 1.059 af

Link AP-1: Analysis Point #1

Inflow=0.54 cfs 0.073 af
Primary=0.54 cfs 0.073 af

Link AP-2: Analysis Point #2

Inflow=1.92 cfs 0.314 af
Primary=1.92 cfs 0.314 af

Link AP-3: Analysis Point #3

Inflow=6.19 cfs 1.059 af
Primary=6.19 cfs 1.059 af

Total Runoff Area = 46.957 ac Runoff Volume = 1.446 af Average Runoff Depth = 0.37"
98.11% Pervious = 46.068 ac 1.89% Impervious = 0.889 ac

19175-EXIST-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

PRE-DEVELOPMENT

Type III 24-hr 10-YR Rainfall=4.68"

Printed 8/31/2020

Page 5

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 1S: EX-WS-1

Runoff Area=101,664 sf 2.42% Impervious Runoff Depth>1.12"
Flow Length=618' Tc=17.6 min UI Adjusted CN=62 Runoff=2.16 cfs 0.218 af

Subcatchment 2S: EX-WS-2

Runoff Area=444,071 sf 3.08% Impervious Runoff Depth>1.11"
Flow Length=1,478' Tc=32.6 min CN=62 Runoff=7.30 cfs 0.944 af

Subcatchment 3S: EX-WS-3

Runoff Area=1,499,727 sf 1.51% Impervious Runoff Depth>1.11"
Flow Length=2,635' Tc=36.2 min UI Adjusted CN=62 Runoff=23.45 cfs 3.181 af

Link AP-1: Analysis Point #1

Inflow=2.16 cfs 0.218 af
Primary=2.16 cfs 0.218 af

Link AP-2: Analysis Point #2

Inflow=7.30 cfs 0.944 af
Primary=7.30 cfs 0.944 af

Link AP-3: Analysis Point #3

Inflow=23.45 cfs 3.181 af
Primary=23.45 cfs 3.181 af

Total Runoff Area = 46.957 ac Runoff Volume = 4.342 af Average Runoff Depth = 1.11"
98.11% Pervious = 46.068 ac 1.89% Impervious = 0.889 ac

19175-EXIST-DRAINAGE

PRE-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Prepared by {enter your company name here}

Printed 8/31/2020

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

Page 1

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 1S: EX-WS-1

Runoff Area=101,664 sf 2.42% Impervious Runoff Depth>1.86"
Flow Length=618' Tc=17.6 min UI Adjusted CN=62 Runoff=3.78 cfs 0.363 af

Subcatchment 2S: EX-WS-2

Runoff Area=444,071 sf 3.08% Impervious Runoff Depth>1.85"
Flow Length=1,478' Tc=32.6 min CN=62 Runoff=12.72 cfs 1.574 af

Subcatchment 3S: EX-WS-3

Runoff Area=1,499,727 sf 1.51% Impervious Runoff Depth>1.85"
Flow Length=2,635' Tc=36.2 min UI Adjusted CN=62 Runoff=40.88 cfs 5.306 af

Link AP-1: Analysis Point #1

Inflow=3.78 cfs 0.363 af
Primary=3.78 cfs 0.363 af

Link AP-2: Analysis Point #2

Inflow=12.72 cfs 1.574 af
Primary=12.72 cfs 1.574 af

Link AP-3: Analysis Point #3

Inflow=40.88 cfs 5.306 af
Primary=40.88 cfs 5.306 af

Total Runoff Area = 46.957 ac Runoff Volume = 7.242 af Average Runoff Depth = 1.85"
98.11% Pervious = 46.068 ac 1.89% Impervious = 0.889 ac

19175-EXIST-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

PRE-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Printed 8/31/2020

Page 2

Summary for Subcatchment 1S: EX-WS-1

Runoff = 3.78 cfs @ 12.26 hrs, Volume= 0.363 af, Depth> 1.86"

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 25-YR Rainfall=5.94"

Area (sf)	CN	Adj	Description
2,464	98		Unconnected pavement, HSG B
2,576	96		Gravel surface, HSG B
96,624	61		>75% Grass cover, Good, HSG B
101,664	63	62	Weighted Average, UI Adjusted
99,200			97.58% Pervious Area
2,464			2.42% Impervious Area
2,464			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0350	0.15		Sheet Flow, Through Grass Grass: Dense n= 0.240 P2= 3.20"
6.2	518	0.0390	1.38		Shallow Concentrated Flow, Over Grass Short Grass Pasture Kv= 7.0 fps
17.6	618	Total			

Summary for Subcatchment 2S: EX-WS-2

Runoff = 12.72 cfs @ 12.49 hrs, Volume= 1.574 af, Depth> 1.85"

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 25-YR Rainfall=5.94"

Area (sf)	CN	Description
13,673	98	Unconnected pavement, HSG B
2,972	96	Gravel surface, HSG B
427,426	61	>75% Grass cover, Good, HSG B
444,071	62	Weighted Average
430,398		96.92% Pervious Area
13,673		3.08% Impervious Area
13,673		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0350	0.15		Sheet Flow, Over Grass Grass: Dense n= 0.240 P2= 3.20"
21.2	1,378	0.0240	1.08		Shallow Concentrated Flow, Over Grass Short Grass Pasture Kv= 7.0 fps
32.6	1,478	Total			

19175-EXIST-DRAINAGE

PRE-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Prepared by {enter your company name here}

Printed 8/31/2020

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

Page 3

Summary for Subcatchment 3S: EX-WS-3

Runoff = 40.88 cfs @ 12.54 hrs, Volume= 5.306 af, Depth> 1.85"

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 25-YR Rainfall=5.94"

Area (sf)	CN	Adj	Description
22,590	98		Unconnected pavement, HSG B
17,545	96		Gravel surface, HSG B
694,474	61		>75% Grass cover, Good, HSG B
525,168	58		Woods/grass comb., Good, HSG B
239,950	72		Woods/grass comb., Good, HSG C
1,499,727	63	62	Weighted Average, UI Adjusted
1,477,137			98.49% Pervious Area
22,590			1.51% Impervious Area
22,590			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	100	0.0550	0.12		Sheet Flow, Through Woods Woods: Light underbrush n= 0.400 P2= 3.20"
8.2	965	0.0050	1.97	886.27	Channel Flow, Large Wetland Area= 450.0 sf Perim= 496.0' r= 0.91' n= 0.050 Scattered brush, heavy weeds
13.7	1,570	0.0140	1.91	114.76	Channel Flow, Wetland Channel Area= 60.0 sf Perim= 90.3' r= 0.66' n= 0.070 Sluggish weedy reaches w/pools
36.2	2,635	Total			

Summary for Link AP-1: Analysis Point #1

Inflow Area = 2.334 ac, 2.42% Impervious, Inflow Depth > 1.86" for 25-YR event
 Inflow = 3.78 cfs @ 12.26 hrs, Volume= 0.363 af
 Primary = 3.78 cfs @ 12.26 hrs, Volume= 0.363 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link AP-2: Analysis Point #2

Inflow Area = 10.194 ac, 3.08% Impervious, Inflow Depth > 1.85" for 25-YR event
 Inflow = 12.72 cfs @ 12.49 hrs, Volume= 1.574 af
 Primary = 12.72 cfs @ 12.49 hrs, Volume= 1.574 af, Atten= 0%, Lag= 0.0 min

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

19175-EXIST-DRAINAGE

PRE-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Prepared by {enter your company name here}

Printed 8/31/2020

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

Page 4

Summary for Link AP-3: Analysis Point #3

Inflow Area = 34.429 ac, 1.51% Impervious, Inflow Depth > 1.85" for 25-YR event
Inflow = 40.88 cfs @ 12.54 hrs, Volume= 5.306 af
Primary = 40.88 cfs @ 12.54 hrs, Volume= 5.306 af, Atten= 0%, Lag= 0.0 min

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

19175-EXIST-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

PRE-DEVELOPMENT

Type III 24-hr 50-YR Rainfall=7.12"

Printed 8/31/2020

Page 6

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 1S: EX-WS-1

Runoff Area=101,664 sf 2.42% Impervious Runoff Depth>2.65"
Flow Length=618' Tc=17.6 min UI Adjusted CN=62 Runoff=5.47 cfs 0.515 af

Subcatchment 2S: EX-WS-2

Runoff Area=444,071 sf 3.08% Impervious Runoff Depth>2.63"
Flow Length=1,478' Tc=32.6 min CN=62 Runoff=18.36 cfs 2.236 af

Subcatchment 3S: EX-WS-3

Runoff Area=1,499,727 sf 1.51% Impervious Runoff Depth>2.63"
Flow Length=2,635' Tc=36.2 min UI Adjusted CN=62 Runoff=59.01 cfs 7.539 af

Link AP-1: Analysis Point #1

Inflow=5.47 cfs 0.515 af
Primary=5.47 cfs 0.515 af

Link AP-2: Analysis Point #2

Inflow=18.36 cfs 2.236 af
Primary=18.36 cfs 2.236 af

Link AP-3: Analysis Point #3

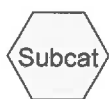
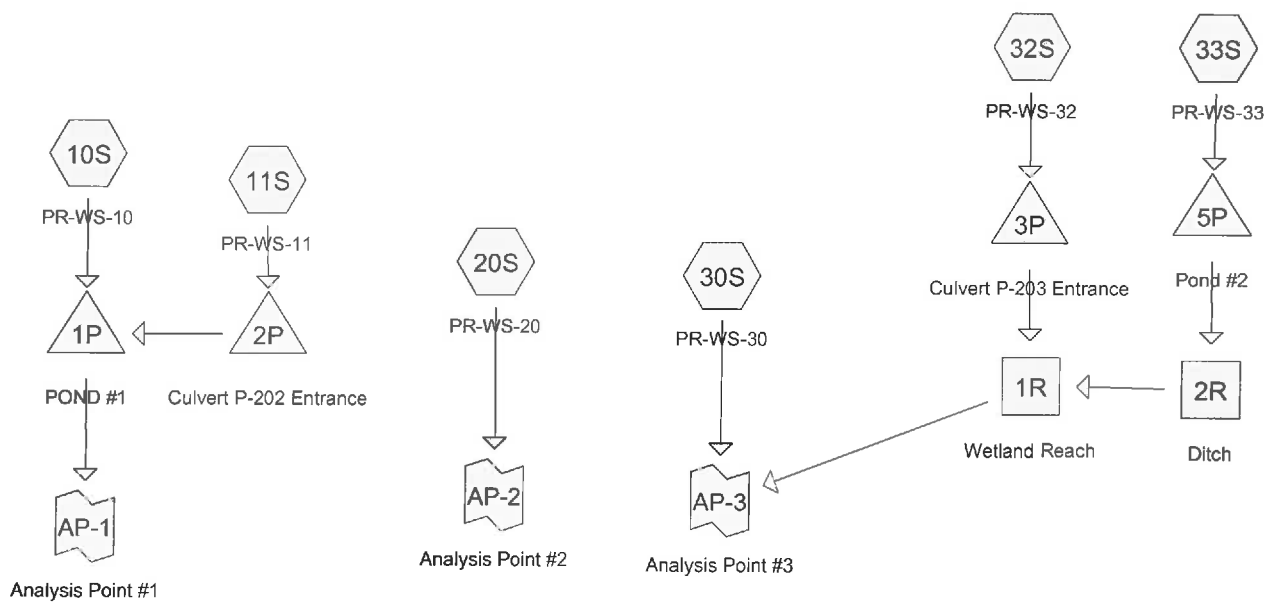
Inflow=59.01 cfs 7.539 af
Primary=59.01 cfs 7.539 af

Total Runoff Area = 46.957 ac Runoff Volume = 10.290 af Average Runoff Depth = 2.63"
98.11% Pervious = 46.068 ac 1.89% Impervious = 0.889 ac

2.7 APPENDIX II

POST-DEVELOPMENT CONDITIONS ANALYSIS

- 2.7.1 2-Year 24-Hour Summary Analysis
- 2.7.2 10-Year 24-Hour Summary Analysis
- 2.7.3 25-Year 24-Hour Complete Analysis
- 2.7.4 50-Year 24-Hour Summary Analysis



Routing Diagram for 19175-PROP-DRAINAGE
 Prepared by {enter your company name here}, Printed 8/31/2020
 HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

Printed 8/31/2020

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
27.225	61	>75% Grass cover, Good, HSG B (10S, 11S, 20S, 30S, 32S, 33S)
0.173	96	Gravel surface, HSG B (20S, 32S)
2.411	98	Unconnected pavement, HSG B (10S, 11S, 20S, 30S, 32S, 33S)
11.640	58	Woods/grass comb., Good, HSG B (30S, 32S)
5.508	72	Woods/grass comb., Good, HSG C (32S)
46.957	64	TOTAL AREA

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

Printed 8/31/2020

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
41.449	HSG B	10S, 11S, 20S, 30S, 32S, 33S
5.508	HSG C	32S
0.000	HSG D	
0.000	Other	
46.957		TOTAL AREA

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

POST-DEVELOPMENT

Type III 24-hr 2-YR Rainfall=3.08"

Printed 8/31/2020

Page 4

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 10S: PR-WS-10 Runoff Area=36,060 sf 21.34% Impervious Runoff Depth>0.48"
Flow Length=618' Tc=17.6 min UI Adjusted CN=65 Runoff=0.28 cfs 0.033 af

Subcatchment 11S: PR-WS-11 Runoff Area=82,389 sf 7.98% Impervious Runoff Depth>0.37"
Flow Length=754' Tc=18.3 min UI Adjusted CN=62 Runoff=0.44 cfs 0.059 af

Subcatchment 20S: PR-WS-20 Runoff Area=444,071 sf 3.08% Impervious Runoff Depth>0.37"
Flow Length=1,478' Tc=32.6 min CN=62 Runoff=1.92 cfs 0.314 af

Subcatchment 30S: PR-WS-30 Runoff Area=282,028 sf 7.67% Impervious Runoff Depth>0.37"
Flow Length=2,635' Tc=36.2 min UI Adjusted CN=62 Runoff=1.16 cfs 0.199 af

Subcatchment 32S: PR-WS-32 Runoff Area=1,113,905 sf 2.59% Impervious Runoff Depth>0.40"
Flow Length=2,433' Tc=34.4 min CN=63 Runoff=5.33 cfs 0.858 af

Subcatchment 33S: PR-WS-33 Runoff Area=87,008 sf 30.60% Impervious Runoff Depth>0.78"
Tc=5.0 min CN=72 Runoff=1.85 cfs 0.129 af

Reach 1R: Wetland Reach Avg. Flow Depth=0.56' Max Vel=1.50 fps Inflow=5.33 cfs 0.858 af
n=0.070 L=171.0' S=0.0189 '/' Capacity=83.06 cfs Outflow=5.31 cfs 0.856 af

Reach 2R: Ditch Avg. Flow Depth=0.03' Max Vel=0.83 fps Inflow=0.00 cfs 0.001 af
n=0.022 L=338.0' S=0.0351 '/' Capacity=161.36 cfs Outflow=0.00 cfs 0.001 af

Pond 1P: POND #1 Peak Elev=189.41' Storage=1,383 cf Inflow=0.71 cfs 0.092 af
Outflow=0.15 cfs 0.081 af

Pond 2P: Culvert P-202 Entrance Peak Elev=189.41' Storage=18 cf Inflow=0.44 cfs 0.059 af
Outflow=0.43 cfs 0.059 af

Pond 3P: Culvert P-203 Entrance Peak Elev=209.62' Storage=96 cf Inflow=5.33 cfs 0.858 af
36.0" Round Culvert n=0.012 L=63.0' S=0.0100 '/' Outflow=5.33 cfs 0.858 af

Pond 5P: Pond #2 Peak Elev=220.04' Storage=2,549 cf Inflow=1.85 cfs 0.129 af
Discarded=0.16 cfs 0.100 af Primary=0.00 cfs 0.001 af Outflow=0.16 cfs 0.101 af

Link AP-1: Analysis Point #1 Inflow=0.15 cfs 0.081 af
Primary=0.15 cfs 0.081 af

Link AP-2: Analysis Point #2 Inflow=1.92 cfs 0.314 af
Primary=1.92 cfs 0.314 af

Link AP-3: Analysis Point #3 Inflow=6.48 cfs 1.055 af
Primary=6.48 cfs 1.055 af

Total Runoff Area = 46.957 ac Runoff Volume = 1.592 af Average Runoff Depth = 0.41"
94.87% Pervious = 44.546 ac 5.13% Impervious = 2.411 ac

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

POST-DEVELOPMENT

Type III 24-hr 10-YR Rainfall=4.68"

Printed 8/31/2020

Page 5

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 10S: PR-WS-10Runoff Area=36,060 sf 21.34% Impervious Runoff Depth>1.31"
Flow Length=618' Tc=17.6 min UI Adjusted CN=65 Runoff=0.92 cfs 0.090 af**Subcatchment 11S: PR-WS-11**Runoff Area=82,389 sf 7.98% Impervious Runoff Depth>1.12"
Flow Length=754' Tc=18.3 min UI Adjusted CN=62 Runoff=1.72 cfs 0.176 af**Subcatchment 20S: PR-WS-20**Runoff Area=444,071 sf 3.08% Impervious Runoff Depth>1.11"
Flow Length=1,478' Tc=32.6 min CN=62 Runoff=7.30 cfs 0.944 af**Subcatchment 30S: PR-WS-30**Runoff Area=282,028 sf 7.67% Impervious Runoff Depth>1.11"
Flow Length=2,635' Tc=36.2 min UI Adjusted CN=62 Runoff=4.41 cfs 0.598 af**Subcatchment 32S: PR-WS-32**Runoff Area=1,113,905 sf 2.59% Impervious Runoff Depth>1.17"
Flow Length=2,433' Tc=34.4 min CN=63 Runoff=19.04 cfs 2.495 af**Subcatchment 33S: PR-WS-33**Runoff Area=87,008 sf 30.60% Impervious Runoff Depth>1.80"
Tc=5.0 min CN=72 Runoff=4.52 cfs 0.300 af**Reach 1R: Wetland Reach**Avg. Flow Depth=1.01' Max Vel=2.21 fps Inflow=19.04 cfs 2.508 af
n=0.070 L=171.0' S=0.0189 '/' Capacity=83.06 cfs Outflow=19.02 cfs 2.504 af**Reach 2R: Ditch**Avg. Flow Depth=0.07' Max Vel=1.34 fps Inflow=0.02 cfs 0.014 af
n=0.022 L=338.0' S=0.0351 '/' Capacity=161.36 cfs Outflow=0.02 cfs 0.014 af**Pond 1P: POND #1**Peak Elev=190.07' Storage=2,692 cf Inflow=2.58 cfs 0.266 af
Outflow=1.75 cfs 0.239 af**Pond 2P: Culvert P-202 Entrance**Peak Elev=190.08' Storage=86 cf Inflow=1.72 cfs 0.176 af
Outflow=1.66 cfs 0.176 af**Pond 3P: Culvert P-203 Entrance**Peak Elev=210.58' Storage=590 cf Inflow=19.04 cfs 2.495 af
36.0" Round Culvert n=0.012 L=63.0' S=0.0100 '/' Outflow=19.02 cfs 2.495 af**Pond 5P: Pond #2**Peak Elev=220.81' Storage=7,888 cf Inflow=4.52 cfs 0.300 af
Discarded=0.19 cfs 0.133 af Primary=0.02 cfs 0.014 af Outflow=0.21 cfs 0.147 af**Link AP-1: Analysis Point #1**Inflow=1.75 cfs 0.239 af
Primary=1.75 cfs 0.239 af**Link AP-2: Analysis Point #2**Inflow=7.30 cfs 0.944 af
Primary=7.30 cfs 0.944 af**Link AP-3: Analysis Point #3**Inflow=23.42 cfs 3.102 af
Primary=23.42 cfs 3.102 afTotal Runoff Area = 46.957 ac Runoff Volume = 4.603 af Average Runoff Depth = 1.18"
94.87% Pervious = 44.546 ac 5.13% Impervious = 2.411 ac

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

POST-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Printed 8/31/2020

Page 1

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 10S: PR-WS-10

Runoff Area=36,060 sf 21.34% Impervious Runoff Depth>2.11"
Flow Length=618' Tc=17.6 min UI Adjusted CN=65 Runoff=1.54 cfs 0.146 af

Subcatchment 11S: PR-WS-11

Runoff Area=82,389 sf 7.98% Impervious Runoff Depth>1.86"
Flow Length=754' Tc=18.3 min UI Adjusted CN=62 Runoff=3.02 cfs 0.294 af

Subcatchment 20S: PR-WS-20

Runoff Area=444,071 sf 3.08% Impervious Runoff Depth>1.85"
Flow Length=1,478' Tc=32.6 min CN=62 Runoff=12.72 cfs 1.574 af

Subcatchment 30S: PR-WS-30

Runoff Area=282,028 sf 7.67% Impervious Runoff Depth>1.85"
Flow Length=2,635' Tc=36.2 min UI Adjusted CN=62 Runoff=7.69 cfs 0.998 af

Subcatchment 32S: PR-WS-32

Runoff Area=1,113,905 sf 2.59% Impervious Runoff Depth>1.93"
Flow Length=2,433' Tc=34.4 min CN=63 Runoff=32.65 cfs 4.116 af

Subcatchment 33S: PR-WS-33

Runoff Area=87,008 sf 30.60% Impervious Runoff Depth>2.73"
Tc=5.0 min CN=72 Runoff=6.89 cfs 0.455 af

Reach 1R: Wetland Reach

Avg. Flow Depth=1.29' Max Vel=2.61 fps Inflow=32.53 cfs 4.179 af
n=0.070 L=171.0' S=0.0189 '/ Capacity=83.06 cfs Outflow=32.50 cfs 4.173 af

Reach 2R: Ditch

Avg. Flow Depth=0.18' Max Vel=2.49 fps Inflow=0.29 cfs 0.064 af
n=0.022 L=338.0' S=0.0351 '/ Capacity=161.36 cfs Outflow=0.29 cfs 0.064 af

Pond 1P: POND #1

Peak Elev=190.53' Storage=3,778 cf Inflow=4.39 cfs 0.439 af
Outflow=3.24 cfs 0.406 af

Pond 2P: Culvert P-202 Entrance

Peak Elev=190.56' Storage=184 cf Inflow=3.02 cfs 0.294 af
Outflow=2.86 cfs 0.293 af

Pond 3P: Culvert P-203 Entrance

Peak Elev=211.34' Storage=1,608 cf Inflow=32.65 cfs 4.116 af
36.0" Round Culvert n=0.012 L=63.0' S=0.0100 '/ Outflow=32.50 cfs 4.115 af

Pond 5P: Pond #2

Peak Elev=221.32' Storage=11,703 cf Inflow=6.89 cfs 0.455 af
Discarded=0.21 cfs 0.153 af Primary=0.29 cfs 0.064 af Outflow=0.49 cfs 0.217 af

Link AP-1: Analysis Point #1

Inflow=3.24 cfs 0.406 af
Primary=3.24 cfs 0.406 af

Link AP-2: Analysis Point #2

Inflow=12.72 cfs 1.574 af
Primary=12.72 cfs 1.574 af

Link AP-3: Analysis Point #3

Inflow=40.18 cfs 5.171 af
Primary=40.18 cfs 5.171 af

Total Runoff Area = 46.957 ac Runoff Volume = 7.582 af Average Runoff Depth = 1.94"
94.87% Pervious = 44.546 ac 5.13% Impervious = 2.411 ac

19175-PROP-DRAINAGE

Type III 24-hr 25-YR Rainfall=5.94"

Prepared by {enter your company name here}

Printed 8/31/2020

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

Page 2

Summary for Subcatchment 10S: PR-WS-10

Runoff = 1.54 cfs @ 12.26 hrs, Volume= 0.146 af, Depth> 2.11"

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 25-YR Rainfall=5.94"

Area (sf)	CN	Adj	Description
7,695	98		Unconnected pavement, HSG B
28,365	61		>75% Grass cover, Good, HSG B
36,060	69	65	Weighted Average, UI Adjusted
28,365			78.66% Pervious Area
7,695			21.34% Impervious Area
7,695			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0350	0.15		Sheet Flow, Through Grass
					Grass: Dense n= 0.240 P2= 3.20"
6.2	518	0.0390	1.38		Shallow Concentrated Flow, Over Grass
					Short Grass Pasture Kv= 7.0 fps
17.6	618	Total			

Summary for Subcatchment 11S: PR-WS-11

Runoff = 3.02 cfs @ 12.27 hrs, Volume= 0.294 af, Depth> 1.86"

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 25-YR Rainfall=5.94"

Area (sf)	CN	Adj	Description
6,575	98		Unconnected pavement, HSG B
75,814	61		>75% Grass cover, Good, HSG B
82,389	64	62	Weighted Average, UI Adjusted
75,814			92.02% Pervious Area
6,575			7.98% Impervious Area
6,575			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0350	0.15		Sheet Flow, Through Grass
					Grass: Dense n= 0.240 P2= 3.20"
6.7	559	0.0390	1.38		Shallow Concentrated Flow, Over Grass
					Short Grass Pasture Kv= 7.0 fps
0.2	95	0.0400	8.24	109.64	Channel Flow, Through Ditch
					Area= 13.3 sf Perim= 27.9' r= 0.48'
					n= 0.022 Earth, clean & straight
18.3	754	Total			

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

POST-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Printed 8/31/2020

Page 3

Summary for Subcatchment 20S: PR-WS-20

Runoff = 12.72 cfs @ 12.49 hrs, Volume= 1.574 af, Depth> 1.85"

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 25-YR Rainfall=5.94"

Area (sf)	CN	Description
13,673	98	Unconnected pavement, HSG B
2,972	96	Gravel surface, HSG B
427,426	61	>75% Grass cover, Good, HSG B
444,071	62	Weighted Average
430,398		96.92% Pervious Area
13,673		3.08% Impervious Area
13,673		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0350	0.15		Sheet Flow, Over Grass Grass: Dense n= 0.240 P2= 3.20"
21.2	1,378	0.0240	1.08		Shallow Concentrated Flow, Over Grass Short Grass Pasture Kv= 7.0 fps
32.6	1,478	Total			

Summary for Subcatchment 30S: PR-WS-30

Runoff = 7.69 cfs @ 12.54 hrs, Volume= 0.998 af, Depth> 1.85"

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 25-YR Rainfall=5.94"

Area (sf)	CN	Adj	Description
21,623	98		Unconnected pavement, HSG B
245,939	61		>75% Grass cover, Good, HSG B
14,466	58		Woods/grass comb., Good, HSG B
282,028	64	62	Weighted Average, UI Adjusted
260,405			92.33% Pervious Area
21,623			7.67% Impervious Area
21,623			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	100	0.0550	0.12		Sheet Flow, Through Woods Woods: Light underbrush n= 0.400 P2= 3.20"
8.2	965	0.0050	1.97	886.27	Channel Flow, Large Wetland Area= 450.0 sf Perim= 496.0' r= 0.91' n= 0.050 Scattered brush, heavy weeds
13.7	1,570	0.0140	1.91	114.76	Channel Flow, Wetland Channel Area= 60.0 sf Perim= 90.3' r= 0.66' n= 0.070 Sluggish weedy reaches w/pools

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

POST-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Printed 8/31/2020

Page 4

36.2 2,635 Total

Summary for Subcatchment 32S: PR-WS-32

Runoff = 32.65 cfs @ 12.51 hrs, Volume= 4.116 af, Depth> 1.93"

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 25-YR Rainfall=5.94"

Area (sf)	CN	Description
28,843	98	Unconnected pavement, HSG B
4,574	96	Gravel surface, HSG B
347,979	61	>75% Grass cover, Good, HSG B
492,559	58	Woods/grass comb., Good, HSG B
239,950	72	Woods/grass comb., Good, HSG C
1,113,905	63	Weighted Average
1,085,062		97.41% Pervious Area
28,843		2.59% Impervious Area
28,843		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	100	0.0550	0.12		Sheet Flow, Through Woods Woods: Light underbrush n= 0.400 P2= 3.20"
8.2	965	0.0050	1.97	886.27	Channel Flow, Large Wetland Area= 450.0 sf Perim= 496.0' r= 0.91' n= 0.050 Scattered brush, heavy weeds
11.9	1,368	0.0140	1.91	114.76	Channel Flow, Wetland Channel Area= 60.0 sf Perim= 90.3' r= 0.66' n= 0.070 Sluggish weedy reaches w/pools
34.4	2,433	Total			

Summary for Subcatchment 33S: PR-WS-33

Runoff = 6.89 cfs @ 12.08 hrs, Volume= 0.455 af, Depth> 2.73"

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 25-YR Rainfall=5.94"

Area (sf)	CN	Description
26,624	98	Unconnected pavement, HSG B
60,384	61	>75% Grass cover, Good, HSG B
87,008	72	Weighted Average
60,384		69.40% Pervious Area
26,624		30.60% Impervious Area
26,624		100.00% Unconnected

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

POST-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Printed 8/31/2020

Page 5

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

Summary for Reach 1R: Wetland Reach

Inflow Area = 27.569 ac, 4.62% Impervious, Inflow Depth > 1.82" for 25-YR event
Inflow = 32.53 cfs @ 12.54 hrs, Volume= 4.179 af
Outflow = 32.50 cfs @ 12.55 hrs, Volume= 4.173 af, Atten= 0%, Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.61 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.30 fps, Avg. Travel Time= 2.2 min

Peak Storage= 2,133 cf @ 12.55 hrs
Average Depth at Peak Storage= 1.29'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 83.06 cfs

18.00' x 2.00' deep Parabolic Channel, n= 0.070 Sluggish weedy reaches w/pools
Length= 171.0' Slope= 0.0189 '/'
Inlet Invert= 208.12', Outlet Invert= 204.89'



Summary for Reach 2R: Ditch

Inflow Area = 1.997 ac, 30.60% Impervious, Inflow Depth > 0.38" for 25-YR event
Inflow = 0.29 cfs @ 13.85 hrs, Volume= 0.064 af
Outflow = 0.29 cfs @ 13.88 hrs, Volume= 0.064 af, Atten= 0%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.49 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.74 fps, Avg. Travel Time= 3.2 min

Peak Storage= 39 cf @ 13.88 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 1.95' Flow Area= 13.3 sf, Capacity= 161.36 cfs

0.00' x 1.95' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 4.0 3.0 '/' Top Width= 13.65'
Length= 338.0' Slope= 0.0351 '/'
Inlet Invert= 220.00', Outlet Invert= 208.12'

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

POST-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Printed 8/31/2020

Page 6

**Summary for Pond 1P: POND #1**

Inflow Area = 2.719 ac, 12.05% Impervious, Inflow Depth > 1.94" for 25-YR event
 Inflow = 4.39 cfs @ 12.27 hrs, Volume= 0.439 af
 Outflow = 3.24 cfs @ 12.48 hrs, Volume= 0.406 af, Atten= 26%, Lag= 12.7 min
 Primary = 3.24 cfs @ 12.48 hrs, Volume= 0.406 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 190.53' @ 12.48 hrs Surf.Area= 2,491 sf Storage= 3,778 cf

Plug-Flow detention time= 46.4 min calculated for 0.406 af (92% of inflow)
 Center-of-Mass det. time= 21.6 min (845.1 - 823.5)

Volume	Invert	Avail.Storage	Storage Description
#1	188.50'	8,184 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)
188.50	1,261	184.4	0	0	1,261
189.00	1,545	193.9	700	700	1,562
190.00	2,155	212.7	1,842	2,542	2,204
192.00	3,544	250.4	5,642	8,184	3,668

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.50'	2.5" Vert. Orifice/Grate C= 0.600
#2	Device 3	189.40'	12.0" Vert. Orifice/Grate C= 0.600
#3	Primary	188.50'	15.0" Round P-201 L= 17.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.50' / 188.27' S= 0.0135 ' / Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#4	Device 3	191.00'	4.0' long Sharp-Crested Vee/Trap Weir Cv= 2.62 (C= 3.28)
#5	Primary	191.50'	10.0' 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=3.23 cfs @ 12.48 hrs HW=190.53' TW=0.00' (Dynamic Tailwater)

3=P-201 (Passes 3.23 cfs of 7.00 cfs potential flow)
 1=Orifice/Grate (Orifice Controls 0.23 cfs @ 6.68 fps)
 2=Orifice/Grate (Orifice Controls 3.00 cfs @ 3.82 fps)
 4=Sharp-Crested Vee/Trap Weir (Controls 0.00 cfs)
 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

POST-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Printed 8/31/2020

Page 7

Summary for Pond 2P: Culvert P-202 Entrance

Inflow Area = 1.891 ac, 7.98% Impervious, Inflow Depth > 1.86" for 25-YR event
 Inflow = 3.02 cfs @ 12.27 hrs, Volume= 0.294 af
 Outflow = 2.86 cfs @ 12.27 hrs, Volume= 0.293 af, Atten= 5%, Lag= 0.1 min
 Primary = 2.86 cfs @ 12.27 hrs, Volume= 0.293 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 190.56' @ 12.52 hrs Surf.Area= 261 sf Storage= 184 cf

Plug-Flow detention time= 1.6 min calculated for 0.293 af (100% of inflow)
 Center-of-Mass det. time= 1.0 min (825.8 - 824.8)

Volume	Invert	Avail.Storage	Storage Description		
#1	188.75'	2,045 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)
188.75	5	13.0	0	0	5
189.00	19	23.5	3	3	36
190.00	142	54.5	71	74	232
192.00	735	151.5	800	874	1,836
192.50	1,221	203.8	484	1,358	3,317
193.00	1,534	213.2	687	2,045	3,646

Device	Routing	Invert	Outlet Devices
#1	Primary	188.75'	24.0" Round P-202 L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.75' / 188.47' S= 0.0050 '/ Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	192.50'	10.0' long x 20.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 12.27 hrs HW=190.19' TW=190.27' (Dynamic Tailwater)

1=P-202 (Controls 0.00 cfs)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 3P: Culvert P-203 Entrance

Inflow Area = 25.572 ac, 2.59% Impervious, Inflow Depth > 1.93" for 25-YR event
 Inflow = 32.65 cfs @ 12.51 hrs, Volume= 4.116 af
 Outflow = 32.50 cfs @ 12.54 hrs, Volume= 4.115 af, Atten= 0%, Lag= 1.7 min
 Primary = 32.50 cfs @ 12.54 hrs, Volume= 4.115 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 211.34' @ 12.54 hrs Surf.Area= 1,834 sf Storage= 1,608 cf

Plug-Flow detention time= 0.5 min calculated for 4.115 af (100% of inflow)
 Center-of-Mass det. time= 0.4 min (835.6 - 835.2)

19175-PROP-DRAINAGE

Type III 24-hr 25-YR Rainfall=5.94"

Prepared by {enter your company name here}

Printed 8/31/2020

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

Page 8

Volume	Invert	Avail.Storage	Storage Description
#1	208.75'	6,577 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)
208.75	12	44.6	0	0	12
209.00	62	87.4	8	8	462
210.00	411	142.5	211	219	1,476
212.00	2,913	240.0	2,945	3,165	4,469
213.00	3,938	272.6	3,413	6,577	5,823

Device	Routing	Invert	Outlet Devices
#1	Primary	208.75'	36.0" Round P-203 L= 63.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 208.75' / 208.12' S= 0.0100 ' Cc= 0.900 n= 0.012, Flow Area= 7.07 sf

Primary OutFlow Max=32.43 cfs @ 12.54 hrs HW=211.33' TW=209.41' (Dynamic Tailwater)

↑ **1=P-203** (Barrel Controls 32.43 cfs @ 6.71 fps)

Summary for Pond 5P: Pond #2

Inflow Area = 1.997 ac, 30.60% Impervious, Inflow Depth > 2.73" for 25-YR event
 Inflow = 6.89 cfs @ 12.08 hrs, Volume= 0.455 af
 Outflow = 0.49 cfs @ 13.85 hrs, Volume= 0.217 af, Atten= 93%, Lag= 106.2 min
 Discarded = 0.21 cfs @ 13.85 hrs, Volume= 0.153 af
 Primary = 0.29 cfs @ 13.85 hrs, Volume= 0.064 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 221.32' @ 13.85 hrs Surf.Area= 7,729 sf Storage= 11,703 cf

Plug-Flow detention time= 204.8 min calculated for 0.217 af (48% of inflow)
 Center-of-Mass det. time= 119.9 min (915.9 - 796.1)

Volume	Invert	Avail.Storage	Storage Description
#1	219.50'	19,288 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)
219.50	2,817	194.1	0	0	2,817
220.00	6,541	286.9	2,275	2,275	6,371
221.00	7,430	305.7	6,981	9,256	7,306
222.00	8,375	324.6	7,898	17,154	8,305
222.25	8,703	330.8	2,135	19,288	8,638

19175-PROP-DRAINAGE

Prepared by {enter your company name here}

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

POST-DEVELOPMENT

Type III 24-hr 25-YR Rainfall=5.94"

Printed 8/31/2020

Page 9

Device	Routing	Invert	Outlet Devices
#1	Device 4	219.50'	1.0" Vert. Orifice/Grate C= 0.600
#2	Device 4	221.25'	4.0' long Sharp-Crested Vee/Trap Weir Cv= 2.62 (C= 3.28)
#3	Device 4	222.25'	48.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Primary	219.50'	15.0" Round P-204 L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 219.50' / 219.00' S= 0.0076 ' / Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#5	Discarded	219.50'	1.000 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 210.00'

Discarded OutFlow Max=0.21 cfs @ 13.85 hrs HW=221.32' (Free Discharge)↑ **5=Exfiltration** (Controls 0.21 cfs)**Primary OutFlow** Max=0.29 cfs @ 13.85 hrs HW=221.32' TW=220.18' (Dynamic Tailwater)↑ **4=P-204** (Passes 0.29 cfs of 6.08 cfs potential flow)↑ **1=Orifice/Grate** (Orifice Controls 0.03 cfs @ 5.15 fps)↑ **2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.26 cfs @ 0.88 fps)↑ **3=Orifice/Grate** (Controls 0.00 cfs)**Summary for Link AP-1: Analysis Point #1**

Inflow Area = 2.719 ac, 12.05% Impervious, Inflow Depth > 1.79" for 25-YR event

Inflow = 3.24 cfs @ 12.48 hrs, Volume= 0.406 af

Primary = 3.24 cfs @ 12.48 hrs, Volume= 0.406 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link AP-2: Analysis Point #2

Inflow Area = 10.194 ac, 3.08% Impervious, Inflow Depth > 1.85" for 25-YR event

Inflow = 12.72 cfs @ 12.49 hrs, Volume= 1.574 af

Primary = 12.72 cfs @ 12.49 hrs, Volume= 1.574 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link AP-3: Analysis Point #3

Inflow Area = 34.044 ac, 5.20% Impervious, Inflow Depth > 1.82" for 25-YR event

Inflow = 40.18 cfs @ 12.55 hrs, Volume= 5.171 af

Primary = 40.18 cfs @ 12.55 hrs, Volume= 5.171 af, Atten= 0%, Lag= 0.0 min

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

19175-PROP-DRAINAGE

Type III 24-hr 50-YR Rainfall=7.12"

Prepared by {enter your company name here}

Printed 8/31/2020

HydroCAD® 10.00-25 s/n 03433 © 2019 HydroCAD Software Solutions LLC

Page 6

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 10S: PR-WS-10 Runoff Area=36,060 sf 21.34% Impervious Runoff Depth>2.94"
Flow Length=618' Tc=17.6 min UI Adjusted CN=65 Runoff=2.17 cfs 0.203 af

Subcatchment 11S: PR-WS-11 Runoff Area=82,389 sf 7.98% Impervious Runoff Depth>2.65"
Flow Length=754' Tc=18.3 min UI Adjusted CN=62 Runoff=4.37 cfs 0.417 af

Subcatchment 20S: PR-WS-20 Runoff Area=444,071 sf 3.08% Impervious Runoff Depth>2.63"
Flow Length=1,478' Tc=32.6 min CN=62 Runoff=18.36 cfs 2.236 af

Subcatchment 30S: PR-WS-30 Runoff Area=282,028 sf 7.67% Impervious Runoff Depth>2.63"
Flow Length=2,635' Tc=36.2 min UI Adjusted CN=62 Runoff=11.10 cfs 1.418 af

Subcatchment 32S: PR-WS-32 Runoff Area=1,113,905 sf 2.59% Impervious Runoff Depth>2.73"
Flow Length=2,433' Tc=34.4 min CN=63 Runoff=46.70 cfs 5.810 af

Subcatchment 33S: PR-WS-33 Runoff Area=87,008 sf 30.60% Impervious Runoff Depth>3.67"
Tc=5.0 min CN=72 Runoff=9.21 cfs 0.610 af

Reach 1R: Wetland Reach Avg. Flow Depth=1.54' Max Vel=2.93 fps Inflow=47.69 cfs 6.009 af
n=0.070 L=171.0' S=0.0189 '/' Capacity=83.06 cfs Outflow=47.66 cfs 6.003 af

Reach 2R: Ditch Avg. Flow Depth=0.35' Max Vel=3.83 fps Inflow=1.62 cfs 0.200 af
n=0.022 L=338.0' S=0.0351 '/' Capacity=161.36 cfs Outflow=1.61 cfs 0.200 af

Pond 1P: POND #1 Peak Elev=191.05' Storage=5,168 cf Inflow=6.26 cfs 0.620 af
Outflow=4.48 cfs 0.584 af

Pond 2P: Culvert P-202 Entrance Peak Elev=191.09' Storage=361 cf Inflow=4.37 cfs 0.417 af
Outflow=4.09 cfs 0.417 af

Pond 3P: Culvert P-203 Entrance Peak Elev=212.12' Storage=3,514 cf Inflow=46.70 cfs 5.810 af
36.0" Round Culvert n=0.012 L=63.0' S=0.0100 '/' Outflow=46.08 cfs 5.809 af

Pond 5P: Pond #2 Peak Elev=221.49' Storage=13,046 cf Inflow=9.21 cfs 0.610 af
Discarded=0.21 cfs 0.162 af Primary=1.62 cfs 0.200 af Outflow=1.83 cfs 0.362 af

Link AP-1: Analysis Point #1 Inflow=4.48 cfs 0.584 af
Primary=4.48 cfs 0.584 af

Link AP-2: Analysis Point #2 Inflow=18.36 cfs 2.236 af
Primary=18.36 cfs 2.236 af

Link AP-3: Analysis Point #3 Inflow=58.71 cfs 7.420 af
Primary=58.71 cfs 7.420 af

Total Runoff Area = 46.957 ac Runoff Volume = 10.694 af Average Runoff Depth = 2.73"
94.87% Pervious = 44.546 ac 5.13% Impervious = 2.411 ac

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	71.143 degrees West
Latitude	42.991 degrees North
Elevation	0 feet
Date/Time	Wed, 19 Aug 2020 10:34:59 -0400

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	1.21	1.55	1.99	2.58	2.77	1yr	2.28	2.66	3.08	3.76	4.37	1yr
2yr	0.32	0.50	0.62	0.81	1.02	1.29	2yr	0.88	1.18	1.50	1.90	2.42	3.08	3.42	2yr	2.73	3.29	3.80	4.51	5.14	2yr
5yr	0.38	0.59	0.74	0.99	1.26	1.62	5yr	1.09	1.47	1.89	2.41	3.06	3.91	4.39	5yr	3.46	4.22	4.84	5.74	6.49	5yr
10yr	0.42	0.66	0.84	1.14	1.48	1.92	10yr	1.28	1.74	2.25	2.88	3.67	4.68	5.30	10yr	4.14	5.10	5.81	6.91	7.75	10yr
25yr	0.49	0.79	1.00	1.38	1.83	2.40	25yr	1.58	2.17	2.83	3.64	4.66	5.94	6.81	25yr	5.26	6.55	7.40	8.83	9.80	25yr
50yr	0.56	0.90	1.15	1.60	2.16	2.85	50yr	1.86	2.56	3.37	4.35	5.59	7.12	8.24	50yr	6.30	7.92	8.89	10.63	11.71	50yr
100yr	0.63	1.02	1.31	1.86	2.54	3.39	100yr	2.19	3.03	4.03	5.22	6.70	8.54	9.97	100yr	7.56	9.59	10.69	12.81	14.01	100yr
200yr	0.72	1.17	1.52	2.17	2.99	4.02	200yr	2.58	3.60	4.79	6.23	8.02	10.25	12.07	200yr	9.07	11.60	12.85	15.46	16.77	200yr
500yr	0.85	1.40	1.83	2.66	3.72	5.05	500yr	3.21	4.50	6.05	7.90	10.20	13.05	15.54	500yr	11.55	14.95	16.39	19.83	21.30	500yr

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.36	0.44	0.59	0.72	0.88	1yr	0.62	0.86	1.01	1.30	1.56	2.10	2.54	1yr	1.86	2.44	2.83	3.42	3.90	1yr
2yr	0.31	0.48	0.60	0.81	1.00	1.18	2yr	0.86	1.15	1.35	1.79	2.29	2.97	3.26	2yr	2.63	3.14	3.65	4.30	4.91	2yr
5yr	0.36	0.55	0.68	0.93	1.19	1.41	5yr	1.03	1.38	1.60	2.08	2.68	3.54	3.89	5yr	3.14	3.74	4.30	5.37	5.83	5yr

Project Name: Scribner Road

JBE #: 19119

Town/City: East Kingston, NH

Date: 12/20/2019

Rip Rap Outlet Protection Calculation

Outlet Designation: P-201

Pipe Size (Do): 15 in. 1.25 ft

Q25 (cfs): 3.24 cfs

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

Apron Length (La):

TW < Do YES $La = 1.8Q/Do^{1.5} + 7Do$
La = 12.92 ft

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

Apron Width (W₂):

TW < Do $W_2 = 3Do + La$
W₂ = 16.67 ft.

TW > Do $W_2 = 3Do + .4La$
W₂ = ft.

Rip-Rap Diameter (D₅₀):

D₅₀: $D_{50} = 0.02Q^{1.3}/TW*Do$
D₅₀ = 0.30 ft. 3.54 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 = 3.75 ft.

Project Name: Scribner Road

JBE #: 19119

Town/City: East Kingston, NH

Date: 12/20/2019

Rip Rap Outlet Protection Calculation

Outlet Designation: P-202

Pipe Size (Do): 15 in. 1.25 ft

Q25 (cfs): 2.86 cfs

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

Apron Length (La):

TW < Do YES $La = 1.8Q/Do^{1.5} + 7Do$
La = 12.43 ft

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

Apron Width (W₂)

TW < Do $W_2 = 3Do + La$
W₂ = 16.18 ft.

TW > Do $W_2 = 3Do + .4La$
W₂ = ft.

Rip-Rap Diameter (D₅₀):

D₅₀: $D_{50} = 0.02Q^{1.3}/TW*Do$
D₅₀ = 0.25 ft. 3.01 in.

Use 3" minimum D₅₀ ==> D₅₀ = 3.0 in.

Rip-Rap Thickness (T):

$T = 2.5*D_{50}$
T = 7.5 in.

Apron Width (W₁):

$W_1 = 3*Do$
W₁ = 3.75 ft.

Project Name: Scribner Road

JBE #: 19119

Town/City: East Kingston, NH

Date: 12/20/2019

Rip Rap Outlet Protection Calculation

Outlet Designation: P-203

Pipe Size (Do): 30 in. 2.5 ft

Q25 (cfs): 31.77 cfs

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

Apron Length (La):

TW < Do YES $La = 1.8Q/Do^{1.5} + 7Do$
La = 31.97 ft

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

Apron Width (W₂):

TW < Do $W_2 = 3Do + La$
W₂ = 39.47 ft.

TW > Do $W_2 = 3Do + .4La$
W₂ = ft.

Rip-Rap Diameter (D₅₀):

D₅₀: $D_{50} = 0.02Q^{1.3}/TW*Do$
D₅₀ = 2.87 ft. 34.43 in.

Use 3" minimum D₅₀ ==> D50 = 12.0 in.

Rip-Rap Thickness (T):

$T = 2.5*D_{50}$
T = 30.0 in.

Apron Width (W₁):

$W_1 = 3*Do$
W₁ = 7.5 ft.

Project Name: Scribner Road

JBE #: 19119

Town/City: East Kingston, NH

Date: 12/20/2019

Rip Rap Outlet Protection Calculation

Outlet Designation: P-204

Pipe Size (Do): 15 in. 1.25 ft

Q25 (cfs): 0.04 cfs

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

Apron Length (La):

TW < Do YES $La = 1.8Q/Do^{1.5} + 7Do$
La = 8.80 ft

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

Apron Width (W₂)

TW < Do $W_2 = 3Do + La$
W₂ = 12.55 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. 0.01 in.

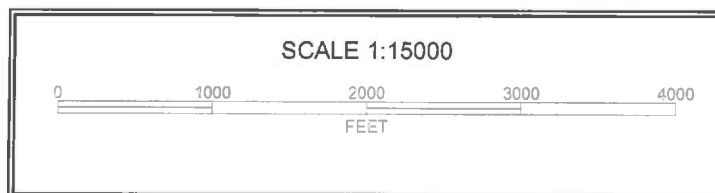
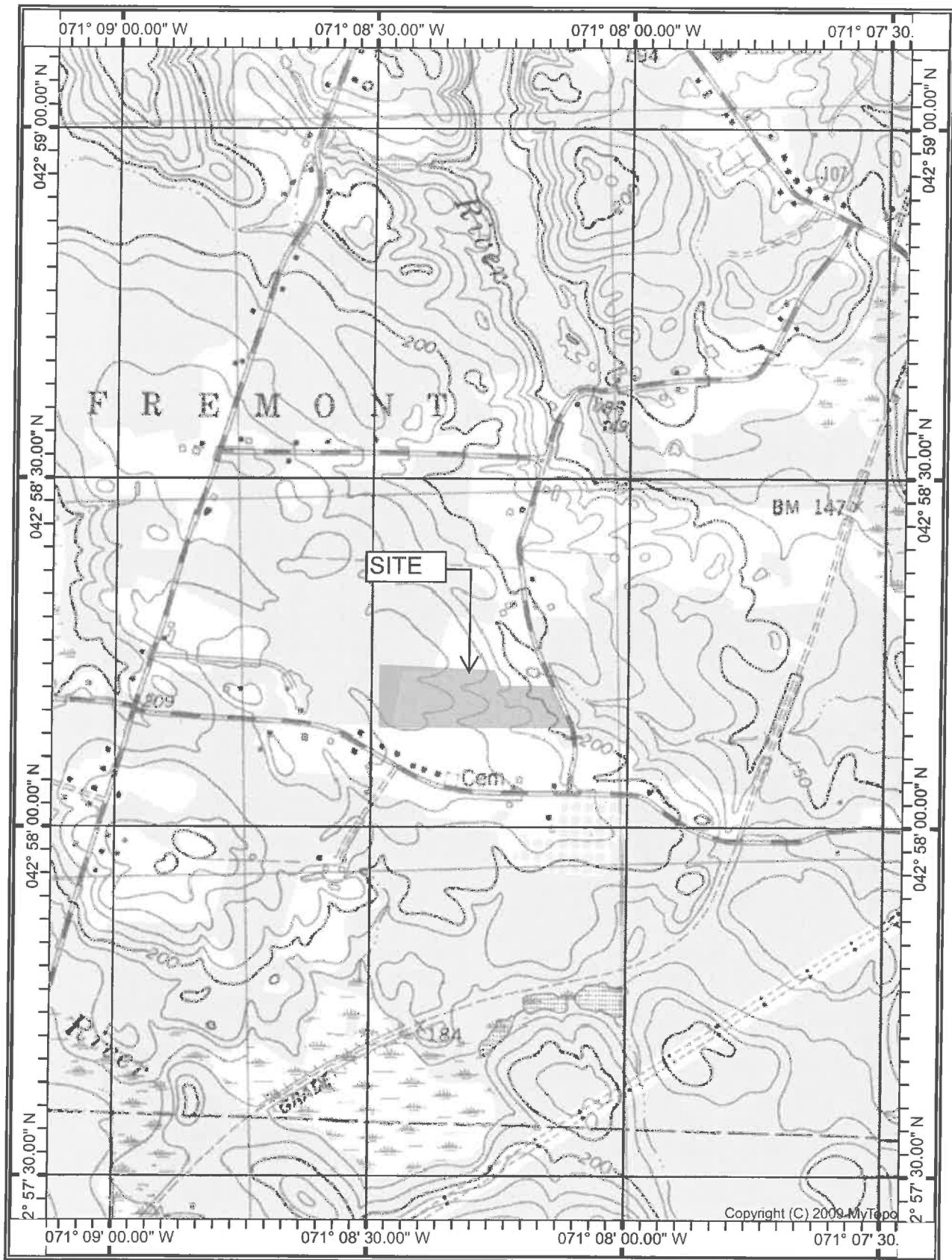
Use 3" minimum D₅₀ ==> D₅₀ = 3.0 in.

Rip-Rap Thickness (T):

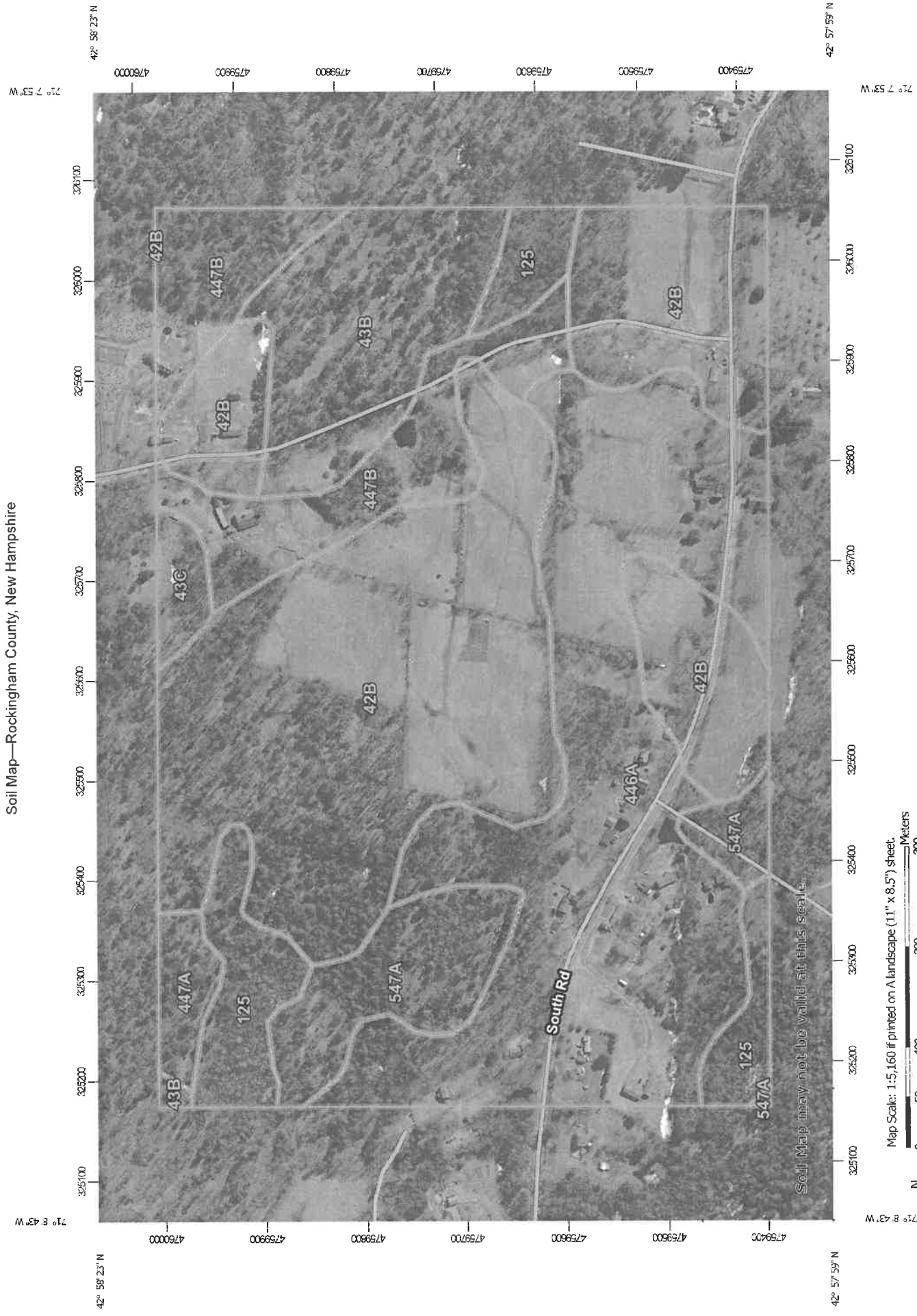
$T = 2.5*D_{50}$
T = 7.5 in.

Apron Width (W₁):





































$W_1 = 3*Do$
W₁ = 3.75 ft.



Soil Map—Rockingham County, New Hampshire



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 1:24,000.

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: Mar 30, 2011—Apr 8, 2011

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
42B	Canton fine sandy loam, 3 to 8 percent slopes	52.5	38.7%
43B	Canton fine sandy loam, 0 to 8 percent slopes, very stony	11.8	8.7%
43C	Canton fine sandy loam, 8 to 15 percent slopes, very stony	1.6	1.2%
125	Scarboro muck, very stony	8.5	6.3%
446A	Scituate-Newfields complex, 0 to 3 percent slopes	37.9	27.9%
447A	Scituate-Newfields complex, 0 to 3 percent slopes, very stony	2.0	1.5%
447B	Scituate-Newfields complex, 3 to 8 percent slopes, very stony	12.9	9.5%
547A	Walpole very fine sandy loam, 0 to 3 percent slopes, very stony	8.4	6.2%
Totals for Area of Interest		135.6	100.0%

SCRIBNER ROAD - AERIAL

Legend

- Polygons
- Additional lines
- ★ Attributes for additional lines
- code State
- name County
- City/Town

Map Scale

1: 4,905

© NH GRANIT, www.granit.unh.edu

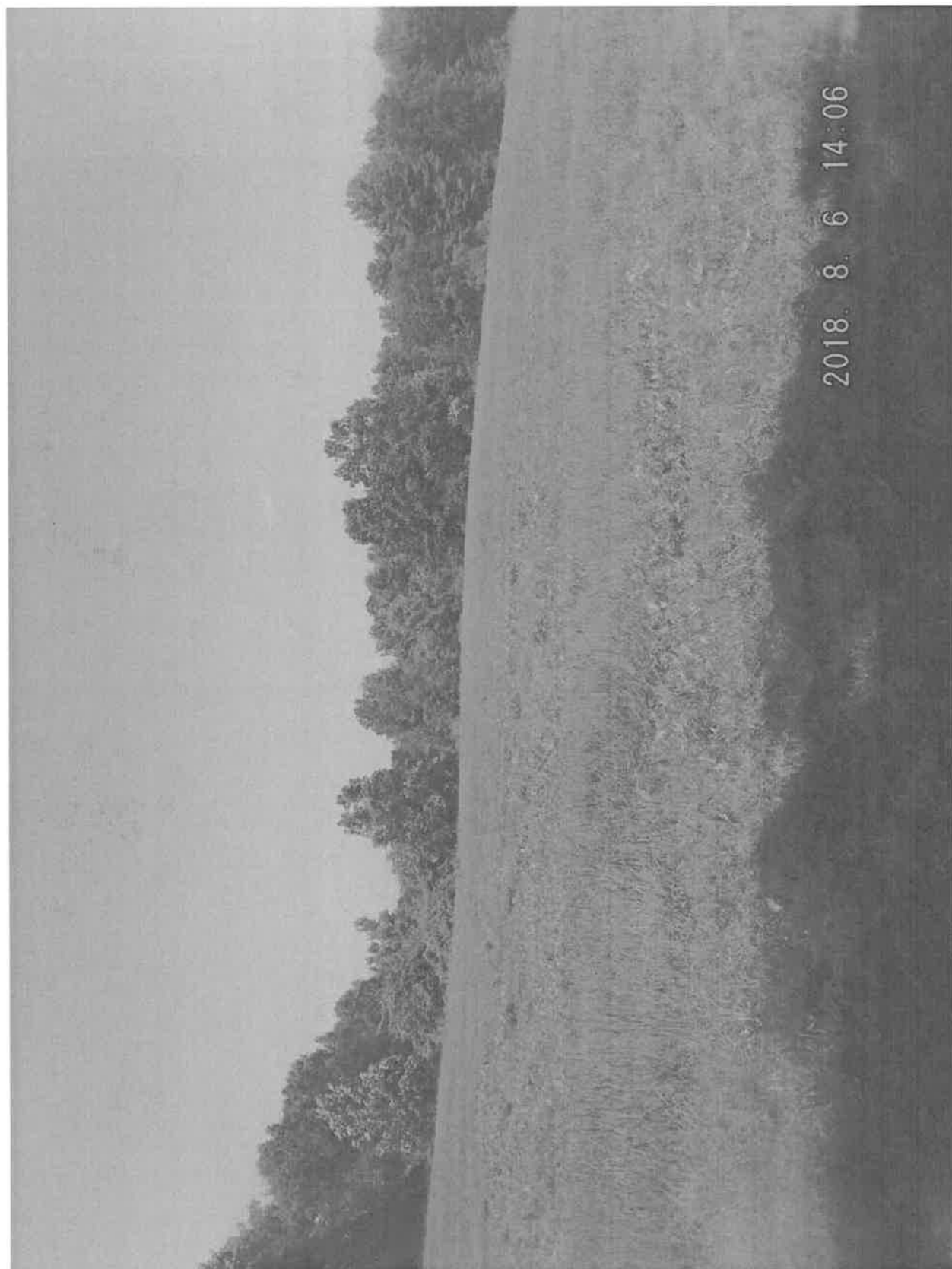
Map Generated: 9/1/2020



Notes

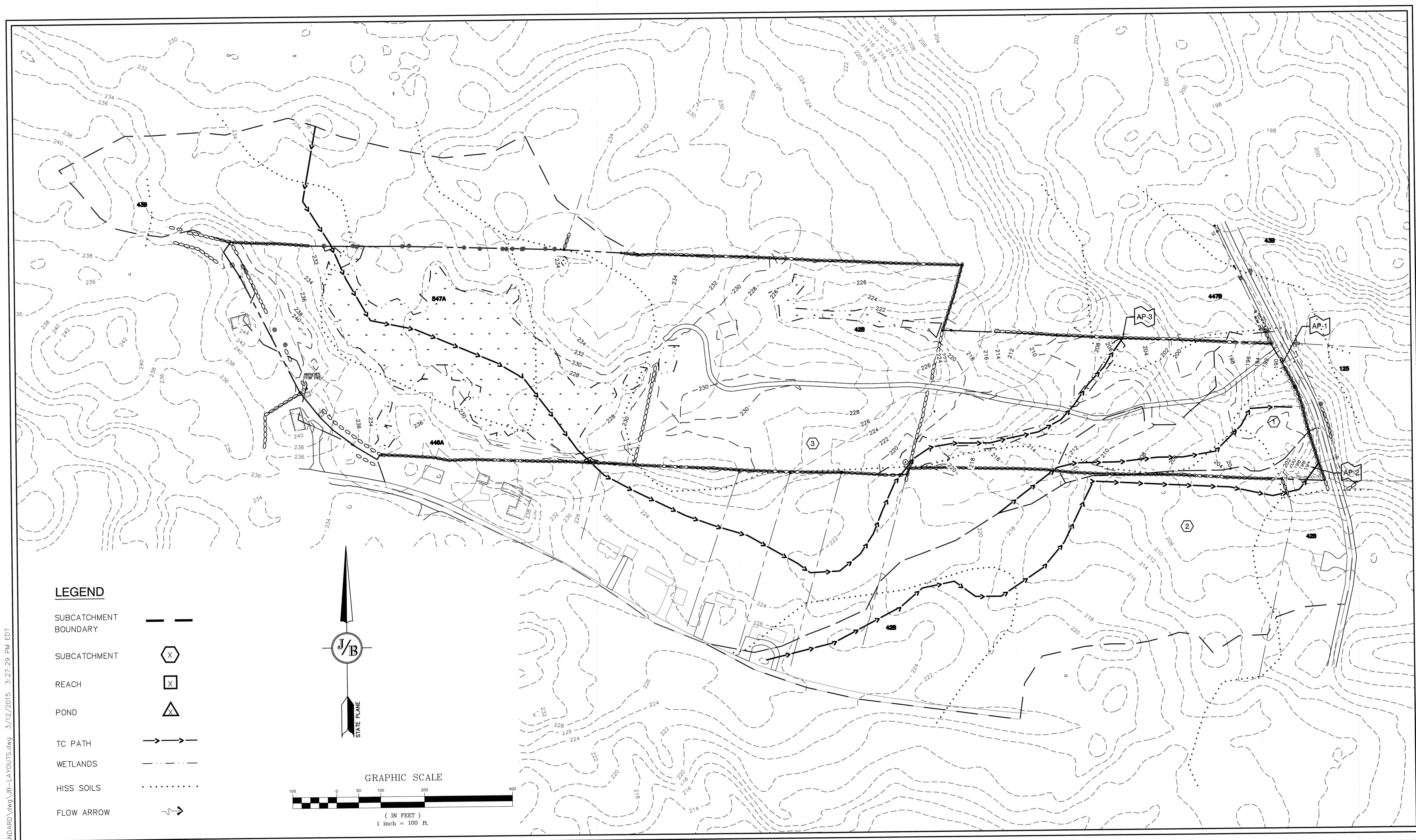


NH
GRANIT





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



Design: BWG	Draft: BWG	Date: 08/31/20
Checked: BWG	Scale: 1"=100'	Project No.: 19175.1
Drawing Name: 19175-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	08/31/20	ISSUED FOR REVIEW	BWG

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

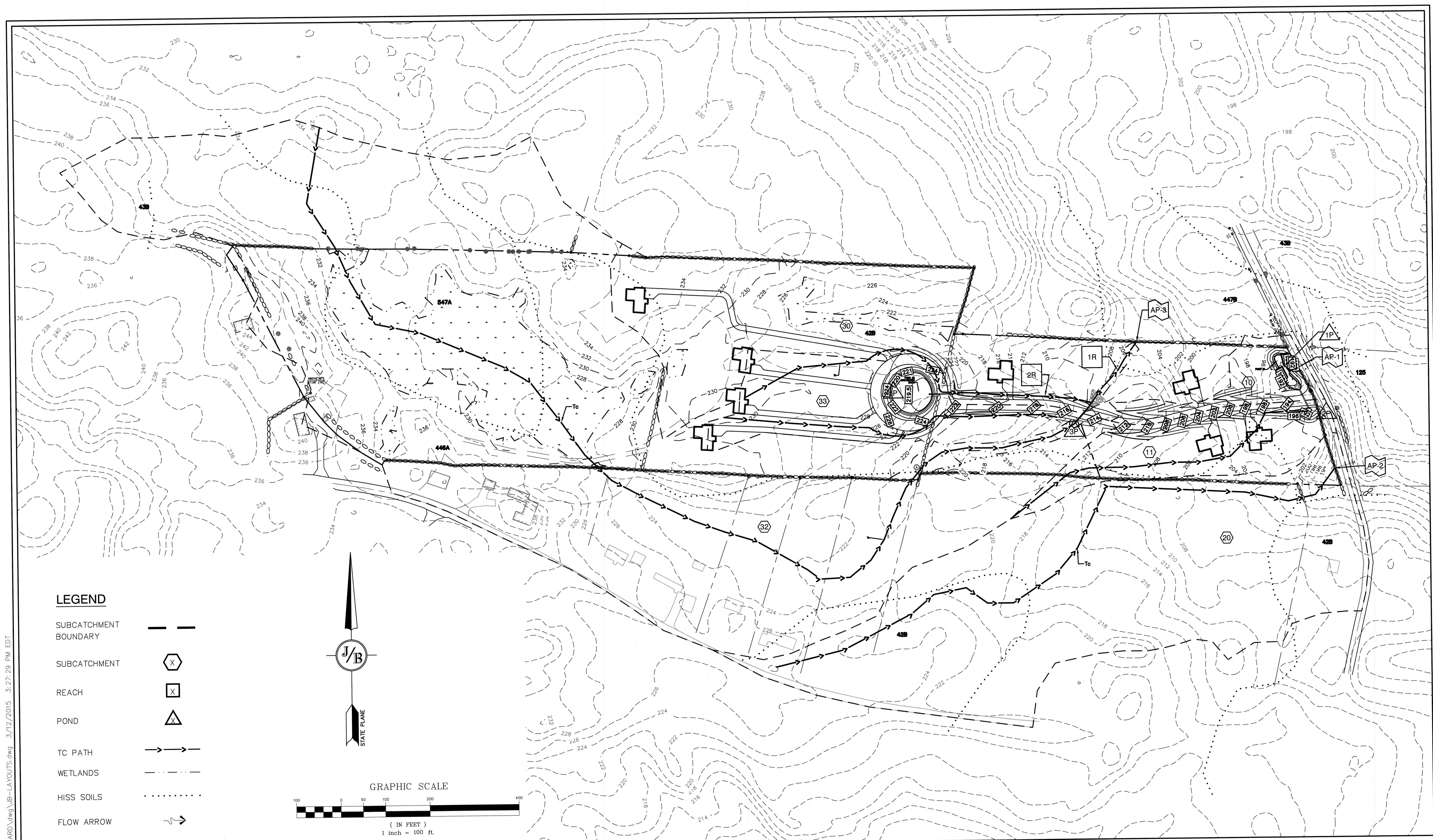
Plan Name:	EXISTING WATERSHED PLAN
Project:	VIOLETTE LANE ESTATES FREMONT, NH
Owner of Record:	HERITAGE FARM TRUST PO BOX 212, NEWFIELDS, NH 03856

DRAWING No.

W1

SHEET 1 OF 2
JBE PROJECT NO. 19175.1

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



Design: BWG	Draft: BWG	Date: 08/31/20
Checked: BWG	Scale: 1"=100'	Project No.: 19175.1
Drawing Name: 19175-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	08/31/20	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:	VIOLETTE LANE ESTATES FREMONT, NH
Owner of Record:	HERITAGE FARM TRUST PO BOX 212, NEWFIELDS, NH 03856

DRAWING No.

W2

SHEET 2 OF 2
JBE PROJECT NO. 19175.1