HYDRAULIC ANALYSIS REPORT

November 2021

RICHMOND ROAD (ROUTE 197) BRIDGE REHABILITATION PROJECT

Town of Litchfield, Maine

PREPARED FOR
Maine Turnpike Authority
2360 Congress St,
Portland, ME 04102

PREPARED BY
HNTB Corporation
82 Running Hill Road
Suite 201
South Portland, ME 04106
Phone: (207) 774-5155

Contact: David N. Murray
Phone: (973) 434-3239

HNTB

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Appendices

1.0 Project Description

The following is a hydraulic analysis report for the Richmond Road (Route 197) Bridge Rehabilitation Project.

The project consists of raising and rehabilitating the existing Route 197 Underpass Bridge. The existing bridge, located in the town of Litchfield, Maine, carries Richmond Road (Route 197) over the Maine Turnpike. The structure was built in 1956 as part of the original construction of the turnpike.

During final design, a 24" CMP, that crosses underneath Route 197, along the eastern approach, was found to be in a deteriorated condition. The culvert is one of three that cross underneath Route 197 in the area. The other two culverts consist of second 24" CMP and a 48" CMP. Runoff that travels through each culvert ultimately discharges into Mill Pond, approximately 0.9 miles northeast of the roadway crossing.

Due to the condition of the first 24" CMP, two proposed alternatives were analyzed. Alternative 01 analyzed removing the culvert and Alternative 02 analyzed using a slipliner. The following narrative summarizes the results of each alternative.

2.0 Hydrology

At Route 197, the culverts have a combined watershed of 1.52 square miles (974 acres). The watershed was initially delineated using the USGS StreamStats website. The boundaries were later revised based on LiDAR topographic data for the region. A series of peaks and ridges make up the limits of the watershed. Aerial photography of the area shows that it mostly consists of undeveloped, forested lands, with parcels of cultivated farmland mixed in the western portion. According to the USGS StreamStats website, approximately 2.8 percent of the watershed consists of impervious area.

Based on the LiDAR topography, Route 197's raised profile has created a detention basin south of the roadway. The culverts control the amount of flow that can pass underneath the roadway, restricting runoff that can pass through. Of the three culverts, the 48" CMP serves the primary culvert crossing, with the other two serving as secondary relief culverts, able to convey flow during larger storm events.

Bentley PondPack software was used to model the culverts, as well as analyze the ponding effect created by Route 197. In the program, the culverts are modeled as part of an outlet control structure. The top of the roadway is modeled as a weir, allowing overtopping during large storm events. Three conditions were created within the model: an existing condition and the two proposed alternatives. Alternative 01 consists of removing the 24" CMP and Alternative 02 consists of inserting a 21" HDPE sliplining within the existing culvert and grouting the void space between the pipes.

In order to compare the three conditions, the PondPack model computed floodplain water surface elevations at Route 197 during the 2-, 10-, 25-, 50-, and 100-year storm events. The alternatives were compared to existing conditions and are summarized in Tables 1 and 2 below. The PondPack output report can be found in Appendix B. A comprehensive summary of the results be found in Appendix C.

Table 1: Existing Conditions vs Alternative 01 (Pipe Removal)
Water Surface Elevations at Route 197 (NAVD 88) (ft)

Storm Event (Years)	Existing Conditions	Proposed Alternative 01 – Pipe Removal	Difference
2	247.68	247.68	0.00
10	250.48	250.48	0.00
25	251.87	251.89	0.02
50	252.85	252.92	0.07
100	253.84	253.99	0.15

Table 2: Existing Conditions vs Alternative 02 (Sliplining)
Water Surface Elevations at Route 197 (NAVD 88) (ft)

Storm Event (Years)	Existing Conditions	Proposed Alternative 02 – Sliplining (Manning's coeff.: 0.009)	Difference
2	247.68	247.68	0.00
10	250.48	250.48	0.00
25	251.87	251.88	0.01
50	252.85	252.86	0.01
100	253.84	253.86	0.02

As shown in Tables 1 and 2, both alternatives minimally impact the area during lower storm events. During larger storm events, where secondary relief is required, removal of the culvert would have a noticeable impact to the upstream floodplain. During the 50- and 100-year storm events, the culvert removal would increase the water surface elevations by 0.07 ft (0.84 inches) and 0.15 ft (1.80 inches), respectively. During these same storm events, the sliplining alternative is shown to only increase the floodplain elevation by 0.01 ft (0.12 inches) and 0.02 ft (0.24 inches), respectively. Please note that the overtopping roadway elevation is at 254 ft. Neither alternative is shown to overtop the roadway.

To further compare the two alternatives, inundation maps were created for each studied storm events. These maps are included in Appendix C.

3.0 Summary

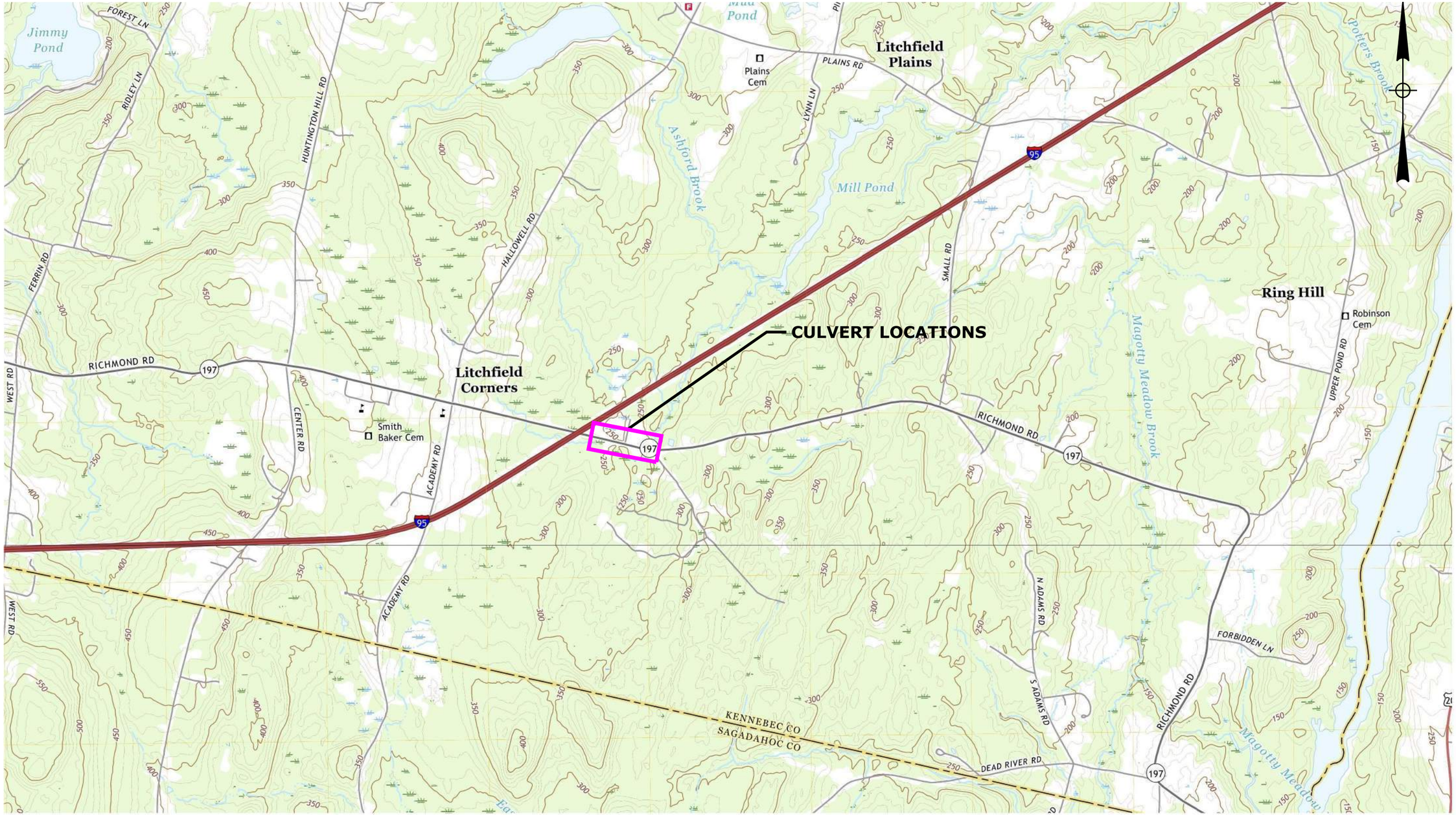
Based on the study, sliplining the culvert is the recommended alternative. The alternative is shown to virtually mimic existing conditions and have negligible impacts to the upstream floodplain.

In December 2014, the State of Maine Department of Transportation produced guidelines for culvert rehabilitation, titled "Culvert Rehabilitation Guidance." The document provides design information on sliplinings, invert liners and spray-on treatments. Further design advancements for lining the 24" CMP culvert should consult this document for additional information.

APPENDIX A

Project Location Map

Date: $date$



Scale: 1000 0 1000 2000
Scale of Feet

No.	Revision	By	Date

Designed by:

CONSULTANT PROJECT MANAGER: $CONSULTANTPM$

	By	Date		By	Date
Designed	NJP	11/2021	Checked	DNM	11/2021
Drawn	NJP	11/2021	In Charge of	---	---

HNTB CORPORATION
82 Running Hill Road, Suite 201
South Portland, ME 04106
TEL (207) 774-5155
FAX (207) 228-0909

MAINE TURNPIKE

THE GOLD STAR MEMORIAL HIGHWAY

MTA PROJECT MANAGER: $MTAPM$

SUPERSTRUCTURE REPLACEMENT ROUTE 197 UNDERPASS

PROJECT LOCATION MAP

SHEET NUMBER: FIG-01

CONTRACTS: 2022.04

OF

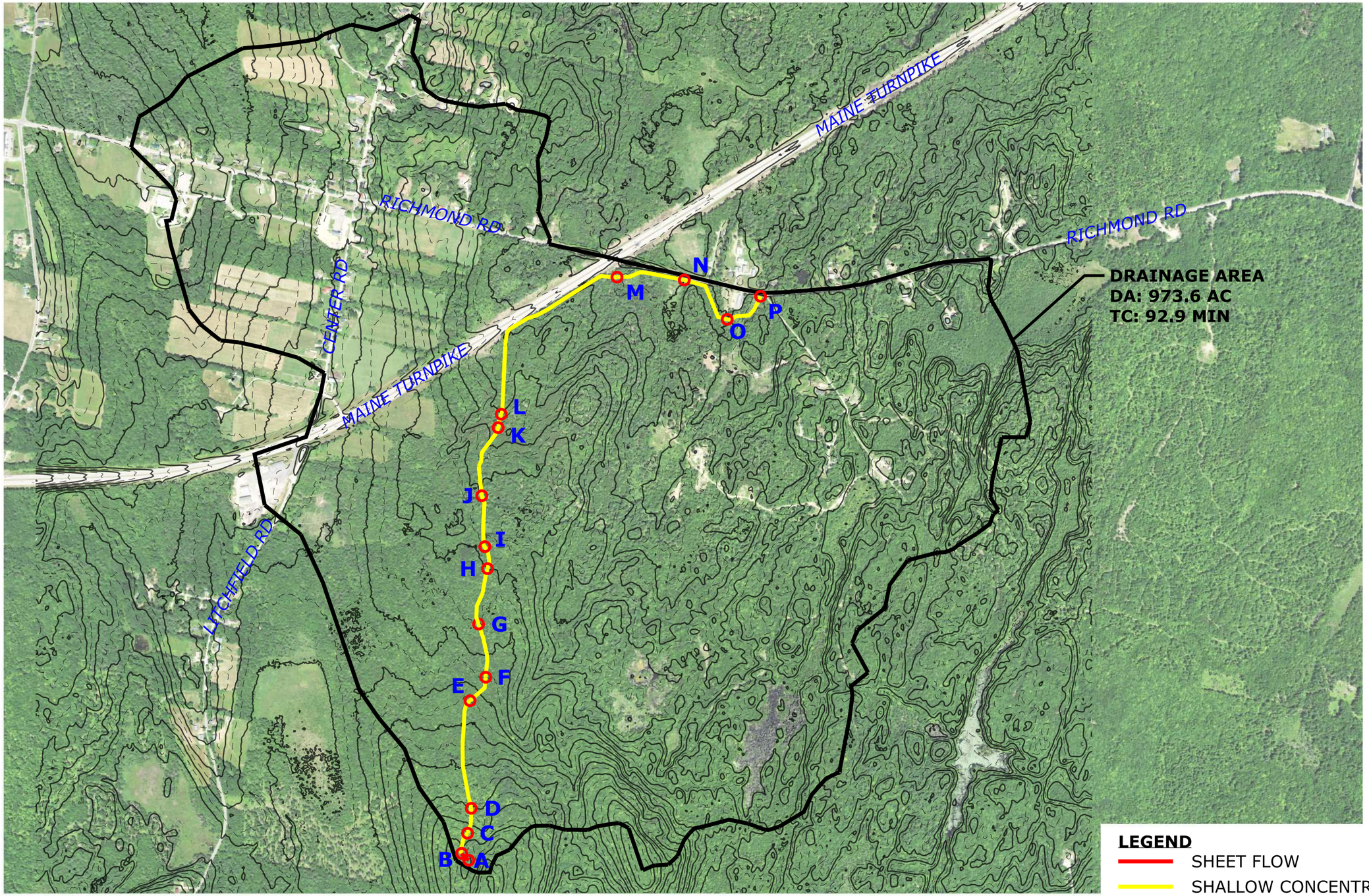
Filename: $file$

APPENDIX B
Hydrologic Analysis

HNTB

Watershed Area Map

Date:$date$



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Scale:

500 0 500 1000

Scale in Feet

No.	Revision	By	Date

Designed by:

HNTB

CONSULTANT PROJECT MANAGER: $CONSULTANTPM$

	By	Date		By	Date
Designed	NJP	10/2021	Checked	DNM	10/2021
Drawn	NJP	10/2021	In Charge of	---	---

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82 Running Hill Road, Suite 201
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TEL (207) 774-5155
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MAINE TURNPIKE

THE GOLD STAR MEMORIAL HIGHWAY

MTA PROJECT MANAGER: $MTAPM$

SUPERSTRUCTURE REPLACEMENT ROUTE 197 UNDERPASS

DRAINAGE AREA MAP

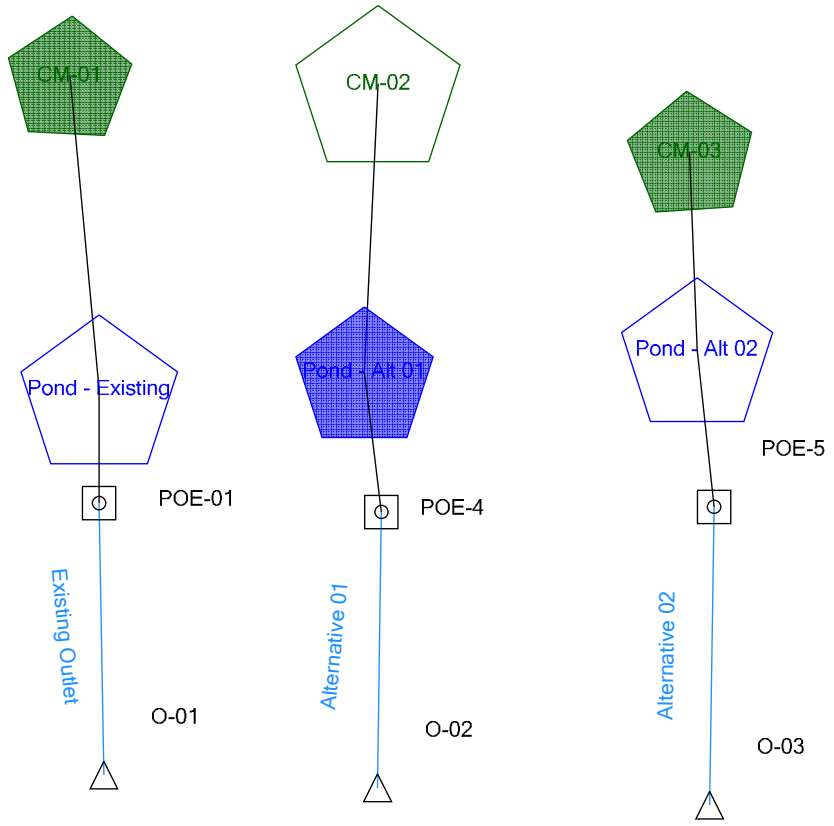
SHEET NUMBER: DA-01

CONTRACTS: 2022.04 OF

PondPack Output Report

HNTB

Scenario: 100-Year



Project Summary	
Title	Superstructre Replacement Route 197 Underpass
Engineer	NJP
Company	HNTB Corp
Date	11/5/2021

Notes

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft³/s)
CM-01	2-Year	2	61.713	792.000	194.07
CM-01	10-Year	10	138.078	780.000	504.14
CM-01	25-Year	25	192.262	780.000	732.23
CM-01	50-Year	50	235.024	780.000	911.34
CM-01	100-Year	100	282.481	780.000	1,111.11
CM-02	2-Year	2	61.713	792.000	194.07
CM-02	10-Year	10	138.078	780.000	504.14
CM-02	25-Year	25	192.262	780.000	732.23
CM-02	50-Year	50	235.024	780.000	911.34
CM-02	100-Year	100	282.481	780.000	1,111.11
CM-03	2-Year	2	61.713	792.000	194.07
CM-03	10-Year	10	138.078	780.000	504.14
CM-03	25-Year	25	192.262	780.000	732.23
CM-03	50-Year	50	235.024	780.000	911.34
CM-03	100-Year	100	282.481	780.000	1,111.11

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft³/s)
O-01	2-Year	2	61.636	891.000	103.70
O-01	10-Year	10	131.575	915.000	156.28
O-01	25-Year	25	163.814	924.000	186.60
O-01	50-Year	50	187.409	930.000	211.65
O-01	100-Year	100	211.713	996.000	231.31
O-02	2-Year	2	61.636	891.000	103.70
O-02	10-Year	10	131.575	915.000	156.28
O-02	25-Year	25	162.857	927.000	181.45
O-02	50-Year	50	183.004	999.000	197.96
O-02	100-Year	100	201.950	1,011.000	213.88
O-03	2-Year	2	61.636	891.000	103.70
O-03	10-Year	10	131.575	915.000	156.28
O-03	25-Year	25	163.552	924.000	185.32
O-03	50-Year	50	186.544	930.000	209.19
O-03	100-Year	100	210.476	999.000	230.21

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pond - Existing (IN)	2-Year	2	61.713	792.000	194.07	(N/A)	(N/A)
Pond - Existing (OUT)	2-Year	2	61.636	891.000	103.70	247.68	12.193
Pond - Existing (IN)	10-Year	10	138.078	780.000	504.14	(N/A)	(N/A)
Pond - Existing (OUT)	10-Year	10	131.575	915.000	156.28	250.48	51.804

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pond - Existing (IN)	25-Year	25	192.262	780.000	732.23	(N/A)	(N/A)
Pond - Existing (OUT)	25-Year	25	163.814	924.000	186.60	251.87	83.410
Pond - Existing (IN)	50-Year	50	235.024	780.000	911.34	(N/A)	(N/A)
Pond - Existing (OUT)	50-Year	50	187.409	930.000	211.65	252.85	108.910
Pond - Existing (IN)	100-Year	100	282.481	780.000	1,111.11	(N/A)	(N/A)
Pond - Existing (OUT)	100-Year	100	211.713	996.000	231.31	253.84	138.140
Pond - Alt 01 (IN)	2-Year	2	61.713	792.000	194.07	(N/A)	(N/A)
Pond - Alt 01 (OUT)	2-Year	2	61.636	891.000	103.70	247.68	12.192
Pond - Alt 01 (IN)	10-Year	10	138.078	780.000	504.14	(N/A)	(N/A)
Pond - Alt 01 (OUT)	10-Year	10	131.575	915.000	156.28	250.48	51.804
Pond - Alt 01 (IN)	25-Year	25	192.262	780.000	732.23	(N/A)	(N/A)
Pond - Alt 01 (OUT)	25-Year	25	162.857	927.000	181.45	251.89	83.908
Pond - Alt 01 (IN)	50-Year	50	235.024	780.000	911.34	(N/A)	(N/A)
Pond - Alt 01 (OUT)	50-Year	50	183.004	999.000	197.96	252.92	110.775
Pond - Alt 01 (IN)	100-Year	100	282.481	780.000	1,111.11	(N/A)	(N/A)
Pond - Alt 01 (OUT)	100-Year	100	201.950	1,011.000	213.88	253.99	142.950
Pond - Alt 02 (IN)	2-Year	2	61.713	792.000	194.07	(N/A)	(N/A)
Pond - Alt 02 (OUT)	2-Year	2	61.636	891.000	103.70	247.68	12.193
Pond - Alt 02 (IN)	10-Year	10	138.078	780.000	504.14	(N/A)	(N/A)
Pond - Alt 02 (OUT)	10-Year	10	131.575	915.000	156.28	250.48	51.804
Pond - Alt 02 (IN)	25-Year	25	192.262	780.000	732.23	(N/A)	(N/A)
Pond - Alt 02 (OUT)	25-Year	25	163.552	924.000	185.32	251.88	83.547
Pond - Alt 02 (IN)	50-Year	50	235.024	780.000	911.34	(N/A)	(N/A)
Pond - Alt 02 (OUT)	50-Year	50	186.544	930.000	209.19	252.86	109.264
Pond - Alt 02 (IN)	100-Year	100	282.481	780.000	1,111.11	(N/A)	(N/A)

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Pond - Alt 02 (OUT)	100-Year	100	210.476	999.000	230.21	253.86	138.605

Time-Depth Curve: 10 Year	
Label	10 Year
Start Time	0.000 min
Increment	2.500 min
End Time	1,435.000 min
Return Event	10 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
12.500	0.0	0.0	0.0	0.0	0.0
25.000	0.0	0.0	0.0	0.0	0.0
37.500	0.0	0.0	0.0	0.0	0.0
50.000	0.0	0.0	0.0	0.0	0.0
62.500	0.0	0.0	0.0	0.0	0.0
75.000	0.0	0.0	0.0	0.0	0.0
87.500	0.0	0.0	0.0	0.0	0.0
100.000	0.0	0.0	0.0	0.0	0.0
112.500	0.0	0.0	0.0	0.0	0.0
125.000	0.0	0.0	0.0	0.0	0.0
137.500	0.0	0.0	0.0	0.0	0.0
150.000	0.0	0.0	0.0	0.0	0.0
162.500	0.0	0.0	0.0	0.0	0.0
175.000	0.0	0.0	0.0	0.0	0.0
187.500	0.1	0.1	0.1	0.1	0.1
200.000	0.1	0.1	0.1	0.1	0.1
212.500	0.1	0.1	0.1	0.1	0.1
225.000	0.1	0.1	0.1	0.1	0.1
237.500	0.1	0.1	0.1	0.1	0.1
250.000	0.1	0.1	0.2	0.2	0.2
262.500	0.2	0.2	0.2	0.2	0.2
275.000	0.2	0.2	0.2	0.2	0.2
287.500	0.2	0.2	0.2	0.2	0.2
300.000	0.2	0.3	0.3	0.3	0.3
312.500	0.3	0.3	0.3	0.3	0.3
325.000	0.3	0.3	0.3	0.3	0.3
337.500	0.3	0.3	0.4	0.4	0.4
350.000	0.4	0.4	0.4	0.4	0.4
362.500	0.4	0.4	0.4	0.4	0.4
375.000	0.4	0.4	0.4	0.4	0.4
387.500	0.4	0.4	0.4	0.4	0.4
400.000	0.4	0.4	0.4	0.4	0.4
412.500	0.4	0.4	0.4	0.4	0.4
425.000	0.4	0.4	0.4	0.4	0.4
437.500	0.4	0.4	0.4	0.4	0.4
450.000	0.4	0.4	0.4	0.5	0.5
462.500	0.5	0.5	0.5	0.5	0.5
475.000	0.5	0.5	0.5	0.5	0.5
487.500	0.5	0.5	0.6	0.6	0.6
500.000	0.6	0.6	0.6	0.6	0.6
512.500	0.6	0.6	0.7	0.7	0.7
525.000	0.7	0.7	0.7	0.7	0.7

Subsection: Time-Depth Curve
Label: Time-Depth - 1
Scenario: 10-Year

Return Event: 10 years
Storm Event: 10 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
537.500	0.7	0.7	0.7	0.7	0.7
550.000	0.7	0.7	0.7	0.7	0.8
562.500	0.8	0.8	0.8	0.8	0.8
575.000	0.8	0.8	0.8	0.8	0.8
587.500	0.8	0.8	0.8	0.9	0.9
600.000	0.9	0.9	0.9	0.9	0.9
612.500	1.0	1.0	1.0	1.0	1.0
625.000	1.0	1.1	1.1	1.1	1.1
637.500	1.1	1.1	1.1	1.1	1.1
650.000	1.2	1.2	1.2	1.2	1.2
662.500	1.2	1.2	1.2	1.3	1.3
675.000	1.3	1.3	1.3	1.4	1.4
687.500	1.5	1.5	1.5	1.5	1.5
700.000	1.5	1.6	1.6	1.7	1.7
712.500	1.8	1.8	2.1	2.4	2.5
725.000	2.6	2.7	2.8	2.8	2.8
737.500	2.9	2.9	2.9	3.0	3.0
750.000	3.0	3.0	3.1	3.1	3.1
762.500	3.1	3.2	3.2	3.2	3.2
775.000	3.2	3.2	3.2	3.2	3.3
787.500	3.3	3.3	3.3	3.3	3.3
800.000	3.3	3.4	3.4	3.4	3.4
812.500	3.4	3.4	3.4	3.5	3.5
825.000	3.5	3.5	3.5	3.5	3.6
837.500	3.6	3.6	3.6	3.6	3.6
850.000	3.6	3.6	3.6	3.7	3.7
862.500	3.7	3.7	3.7	3.7	3.7
875.000	3.7	3.7	3.7	3.7	3.7
887.500	3.7	3.7	3.7	3.7	3.7
900.000	3.7	3.7	3.7	3.7	3.8
912.500	3.8	3.8	3.8	3.8	3.8
925.000	3.8	3.8	3.8	3.8	3.9
937.500	3.9	3.9	3.9	3.9	3.9
950.000	3.9	3.9	3.9	3.9	3.9
962.500	3.9	4.0	4.0	4.0	4.0
975.000	4.0	4.0	4.0	4.0	4.0
987.500	4.0	4.0	4.0	4.0	4.0
1,000.000	4.0	4.0	4.0	4.0	4.0
1,012.500	4.0	4.0	4.0	4.0	4.1
1,025.000	4.1	4.1	4.1	4.1	4.1
1,037.500	4.1	4.1	4.1	4.1	4.1
1,050.000	4.1	4.1	4.1	4.1	4.1
1,062.500	4.1	4.1	4.1	4.1	4.1
1,075.000	4.1	4.1	4.1	4.1	4.1
1,087.500	4.1	4.1	4.1	4.1	4.1
1,100.000	4.1	4.1	4.1	4.1	4.1
1,112.500	4.1	4.1	4.1	4.2	4.2
1,125.000	4.2	4.2	4.2	4.2	4.2
1,137.500	4.2	4.2	4.2	4.2	4.2
1,150.000	4.2	4.2	4.2	4.2	4.2
1,162.500	4.3	4.3	4.3	4.3	4.3

Subsection: Time-Depth Curve
Label: Time-Depth - 1
Scenario: 10-Year

Return Event: 10 years
Storm Event: 10 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
1,175.000	4.3	4.3	4.3	4.3	4.3
1,187.500	4.3	4.3	4.3	4.3	4.3
1,200.000	4.3	4.3	4.3	4.3	4.3
1,212.500	4.3	4.3	4.3	4.4	4.4
1,225.000	4.4	4.4	4.4	4.4	4.4
1,237.500	4.4	4.4	4.4	4.4	4.4
1,250.000	4.4	4.4	4.4	4.4	4.4
1,262.500	4.4	4.4	4.4	4.4	4.4
1,275.000	4.4	4.4	4.4	4.4	4.4
1,287.500	4.4	4.4	4.4	4.4	4.4
1,300.000	4.4	4.4	4.4	4.4	4.4
1,312.500	4.4	4.4	4.4	4.4	4.4
1,325.000	4.4	4.4	4.4	4.4	4.4
1,337.500	4.4	4.4	4.4	4.4	4.4
1,350.000	4.4	4.4	4.4	4.4	4.4
1,362.500	4.4	4.4	4.4	4.4	4.4
1,375.000	4.4	4.4	4.4	4.4	4.4
1,387.500	4.4	4.4	4.4	4.4	4.4
1,400.000	4.4	4.4	4.4	4.4	4.4
1,412.500	4.4	4.4	4.4	4.4	4.4
1,425.000	4.4	4.4	4.4	4.4	4.4

Time-Depth Curve: 100 Year	
Label	100 Year
Start Time	0.000 min
Increment	2.500 min
End Time	1,435.000 min
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
12.500	0.0	0.0	0.0	0.0	0.0
25.000	0.0	0.0	0.0	0.0	0.0
37.500	0.0	0.0	0.0	0.0	0.0
50.000	0.0	0.0	0.0	0.0	0.0
62.500	0.0	0.0	0.0	0.0	0.0
75.000	0.0	0.0	0.0	0.0	0.0
87.500	0.0	0.0	0.0	0.0	0.0
100.000	0.0	0.0	0.0	0.0	0.0
112.500	0.0	0.0	0.0	0.0	0.0
125.000	0.0	0.0	0.0	0.0	0.0
137.500	0.0	0.0	0.0	0.0	0.0
150.000	0.0	0.0	0.0	0.0	0.0
162.500	0.0	0.0	0.0	0.0	0.1
175.000	0.1	0.1	0.1	0.1	0.1
187.500	0.1	0.1	0.1	0.1	0.1
200.000	0.1	0.1	0.1	0.1	0.1
212.500	0.1	0.1	0.1	0.1	0.1
225.000	0.1	0.2	0.2	0.2	0.2
237.500	0.2	0.2	0.2	0.2	0.2
250.000	0.2	0.2	0.2	0.2	0.2
262.500	0.2	0.2	0.3	0.3	0.3
275.000	0.3	0.3	0.3	0.3	0.3
287.500	0.3	0.3	0.3	0.3	0.4
300.000	0.4	0.4	0.4	0.4	0.4
312.500	0.4	0.4	0.4	0.4	0.4
325.000	0.5	0.5	0.5	0.5	0.5
337.500	0.5	0.5	0.5	0.5	0.6
350.000	0.6	0.6	0.6	0.6	0.6
362.500	0.6	0.6	0.6	0.6	0.6
375.000	0.6	0.6	0.6	0.6	0.6
387.500	0.6	0.6	0.6	0.6	0.6
400.000	0.6	0.6	0.6	0.6	0.6
412.500	0.6	0.6	0.6	0.6	0.6
425.000	0.6	0.6	0.6	0.6	0.6
437.500	0.6	0.6	0.6	0.6	0.6
450.000	0.6	0.6	0.6	0.7	0.7
462.500	0.7	0.7	0.7	0.7	0.7
475.000	0.7	0.7	0.7	0.8	0.8
487.500	0.8	0.8	0.8	0.8	0.8
500.000	0.8	0.9	0.9	0.9	0.9
512.500	0.9	0.9	0.9	1.0	1.0
525.000	1.0	1.0	1.0	1.1	1.1

Subsection: Time-Depth Curve
Label: Time-Depth - 1
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
537.500	1.1	1.1	1.1	1.1	1.1
550.000	1.1	1.1	1.1	1.1	1.1
562.500	1.1	1.1	1.1	1.1	1.1
575.000	1.1	1.1	1.2	1.2	1.2
587.500	1.2	1.2	1.2	1.2	1.3
600.000	1.3	1.3	1.3	1.4	1.4
612.500	1.4	1.4	1.5	1.5	1.5
625.000	1.5	1.6	1.6	1.6	1.6
637.500	1.6	1.6	1.6	1.7	1.7
650.000	1.7	1.7	1.8	1.8	1.8
662.500	1.8	1.8	1.8	1.8	1.9
675.000	1.9	1.9	2.0	2.0	2.1
687.500	2.1	2.1	2.2	2.2	2.2
700.000	2.3	2.4	2.4	2.5	2.6
712.500	2.7	2.8	3.2	3.6	3.8
725.000	4.0	4.1	4.2	4.2	4.3
737.500	4.4	4.5	4.5	4.5	4.5
750.000	4.6	4.6	4.7	4.7	4.8
762.500	4.8	4.8	4.9	4.9	4.9
775.000	4.9	4.9	4.9	5.0	5.0
787.500	5.0	5.0	5.1	5.1	5.1
800.000	5.1	5.1	5.1	5.1	5.2
812.500	5.2	5.2	5.3	5.3	5.3
825.000	5.3	5.4	5.4	5.4	5.4
837.500	5.4	5.5	5.5	5.5	5.5
850.000	5.5	5.5	5.6	5.6	5.6
862.500	5.6	5.6	5.6	5.6	5.6
875.000	5.6	5.6	5.6	5.6	5.6
887.500	5.6	5.6	5.6	5.6	5.6
900.000	5.6	5.7	5.7	5.7	5.7
912.500	5.7	5.7	5.8	5.8	5.8
925.000	5.8	5.8	5.8	5.9	5.9
937.500	5.9	5.9	5.9	5.9	5.9
950.000	5.9	6.0	6.0	6.0	6.0
962.500	6.0	6.0	6.0	6.0	6.0
975.000	6.0	6.1	6.1	6.1	6.1
987.500	6.1	6.1	6.1	6.1	6.1
1,000.000	6.1	6.1	6.1	6.1	6.1
1,012.500	6.1	6.1	6.1	6.1	6.2
1,025.000	6.2	6.2	6.2	6.2	6.2
1,037.500	6.2	6.2	6.2	6.2	6.2
1,050.000	6.2	6.2	6.2	6.2	6.2
1,062.500	6.2	6.2	6.2	6.2	6.2
1,075.000	6.2	6.2	6.2	6.2	6.2
1,087.500	6.2	6.2	6.2	6.2	6.2
1,100.000	6.2	6.2	6.2	6.2	6.3
1,112.500	6.3	6.3	6.3	6.3	6.3
1,125.000	6.3	6.3	6.3	6.3	6.3
1,137.500	6.4	6.4	6.4	6.4	6.4
1,150.000	6.4	6.4	6.4	6.4	6.4
1,162.500	6.4	6.4	6.5	6.5	6.5

Subsection: Time-Depth Curve
Label: Time-Depth - 1
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
1,175.000	6.5	6.5	6.5	6.5	6.5
1,187.500	6.5	6.5	6.5	6.5	6.5
1,200.000	6.5	6.5	6.6	6.6	6.6
1,212.500	6.6	6.6	6.6	6.6	6.6
1,225.000	6.6	6.6	6.6	6.6	6.6
1,237.500	6.6	6.6	6.6	6.6	6.6
1,250.000	6.6	6.6	6.7	6.7	6.7
1,262.500	6.7	6.7	6.7	6.7	6.7
1,275.000	6.7	6.7	6.7	6.7	6.7
1,287.500	6.7	6.7	6.7	6.7	6.7
1,300.000	6.7	6.7	6.7	6.7	6.7
1,312.500	6.7	6.7	6.7	6.7	6.7
1,325.000	6.7	6.7	6.7	6.7	6.7
1,337.500	6.7	6.7	6.7	6.7	6.7
1,350.000	6.7	6.7	6.7	6.7	6.7
1,362.500	6.7	6.7	6.7	6.7	6.7
1,375.000	6.7	6.7	6.7	6.7	6.7
1,387.500	6.7	6.7	6.7	6.7	6.7
1,400.000	6.7	6.7	6.7	6.7	6.7
1,412.500	6.7	6.7	6.7	6.7	6.7
1,425.000	6.7	6.7	6.7	6.7	6.7

Time-Depth Curve: 2 Year	
Label	2 Year
Start Time	0.000 min
Increment	2.500 min
End Time	1,435.000 min
Return Event	2 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
12.500	0.0	0.0	0.0	0.0	0.0
25.000	0.0	0.0	0.0	0.0	0.0
37.500	0.0	0.0	0.0	0.0	0.0
50.000	0.0	0.0	0.0	0.0	0.0
62.500	0.0	0.0	0.0	0.0	0.0
75.000	0.0	0.0	0.0	0.0	0.0
87.500	0.0	0.0	0.0	0.0	0.0
100.000	0.0	0.0	0.0	0.0	0.0
112.500	0.0	0.0	0.0	0.0	0.0
125.000	0.0	0.0	0.0	0.0	0.0
137.500	0.0	0.0	0.0	0.0	0.0
150.000	0.0	0.0	0.0	0.0	0.0
162.500	0.0	0.0	0.0	0.0	0.0
175.000	0.0	0.0	0.0	0.0	0.0
187.500	0.0	0.0	0.0	0.0	0.0
200.000	0.1	0.1	0.1	0.1	0.1
212.500	0.1	0.1	0.1	0.1	0.1
225.000	0.1	0.1	0.1	0.1	0.1
237.500	0.1	0.1	0.1	0.1	0.1
250.000	0.1	0.1	0.1	0.1	0.1
262.500	0.1	0.1	0.1	0.1	0.1
275.000	0.1	0.1	0.1	0.1	0.2
287.500	0.2	0.2	0.2	0.2	0.2
300.000	0.2	0.2	0.2	0.2	0.2
312.500	0.2	0.2	0.2	0.2	0.2
325.000	0.2	0.2	0.2	0.2	0.2
337.500	0.2	0.2	0.3	0.3	0.3
350.000	0.3	0.3	0.3	0.3	0.3
362.500	0.3	0.3	0.3	0.3	0.3
375.000	0.3	0.3	0.3	0.3	0.3
387.500	0.3	0.3	0.3	0.3	0.3
400.000	0.3	0.3	0.3	0.3	0.3
412.500	0.3	0.3	0.3	0.3	0.3
425.000	0.3	0.3	0.3	0.3	0.3
437.500	0.3	0.3	0.3	0.3	0.3
450.000	0.3	0.3	0.3	0.3	0.3
462.500	0.3	0.3	0.3	0.3	0.4
475.000	0.4	0.4	0.4	0.4	0.4
487.500	0.4	0.4	0.4	0.4	0.4
500.000	0.4	0.4	0.4	0.4	0.4
512.500	0.4	0.5	0.5	0.5	0.5
525.000	0.5	0.5	0.5	0.5	0.5

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
537.500	0.5	0.5	0.5	0.5	0.5
550.000	0.5	0.5	0.5	0.5	0.5
562.500	0.5	0.5	0.5	0.5	0.5
575.000	0.6	0.6	0.6	0.6	0.6
587.500	0.6	0.6	0.6	0.6	0.6
600.000	0.6	0.6	0.6	0.7	0.7
612.500	0.7	0.7	0.7	0.7	0.7
625.000	0.7	0.7	0.7	0.8	0.8
637.500	0.8	0.8	0.8	0.8	0.8
650.000	0.8	0.8	0.8	0.9	0.9
662.500	0.9	0.9	0.9	0.9	0.9
675.000	0.9	0.9	0.9	1.0	1.0
687.500	1.0	1.0	1.0	1.0	1.0
700.000	1.1	1.1	1.1	1.1	1.2
712.500	1.2	1.3	1.4	1.6	1.7
725.000	1.7	1.8	1.8	1.9	1.9
737.500	1.9	1.9	2.0	2.0	2.0
750.000	2.0	2.0	2.0	2.1	2.1
762.500	2.1	2.1	2.1	2.1	2.1
775.000	2.1	2.1	2.2	2.2	2.2
787.500	2.2	2.2	2.2	2.2	2.2
800.000	2.2	2.2	2.2	2.2	2.3
812.500	2.3	2.3	2.3	2.3	2.3
825.000	2.3	2.3	2.4	2.4	2.4
837.500	2.4	2.4	2.4	2.4	2.4
850.000	2.4	2.4	2.4	2.4	2.4
862.500	2.5	2.5	2.5	2.5	2.5
875.000	2.5	2.5	2.5	2.5	2.5
887.500	2.5	2.5	2.5	2.5	2.5
900.000	2.5	2.5	2.5	2.5	2.5
912.500	2.5	2.5	2.5	2.5	2.6
925.000	2.6	2.6	2.6	2.6	2.6
937.500	2.6	2.6	2.6	2.6	2.6
950.000	2.6	2.6	2.6	2.6	2.6
962.500	2.7	2.7	2.7	2.7	2.7
975.000	2.7	2.7	2.7	2.7	2.7
987.500	2.7	2.7	2.7	2.7	2.7
1,000.000	2.7	2.7	2.7	2.7	2.7
1,012.500	2.7	2.7	2.7	2.7	2.7
1,025.000	2.7	2.7	2.7	2.7	2.7
1,037.500	2.7	2.7	2.7	2.7	2.7
1,050.000	2.7	2.7	2.7	2.7	2.7
1,062.500	2.7	2.7	2.7	2.7	2.7
1,075.000	2.7	2.7	2.7	2.7	2.7
1,087.500	2.7	2.7	2.7	2.8	2.8
1,100.000	2.8	2.8	2.8	2.8	2.8
1,112.500	2.8	2.8	2.8	2.8	2.8
1,125.000	2.8	2.8	2.8	2.8	2.8
1,137.500	2.8	2.8	2.8	2.8	2.8
1,150.000	2.8	2.9	2.9	2.9	2.9
1,162.500	2.9	2.9	2.9	2.9	2.9

Subsection: Time-Depth Curve
Label: Time-Depth - 1
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
1,175.000	2.9	2.9	2.9	2.9	2.9
1,187.500	2.9	2.9	2.9	2.9	2.9
1,200.000	2.9	2.9	2.9	2.9	2.9
1,212.500	2.9	2.9	2.9	2.9	2.9
1,225.000	2.9	2.9	2.9	2.9	3.0
1,237.500	3.0	3.0	3.0	3.0	3.0
1,250.000	3.0	3.0	3.0	3.0	3.0
1,262.500	3.0	3.0	3.0	3.0	3.0
1,275.000	3.0	3.0	3.0	3.0	3.0
1,287.500	3.0	3.0	3.0	3.0	3.0
1,300.000	3.0	3.0	3.0	3.0	3.0
1,312.500	3.0	3.0	3.0	3.0	3.0
1,325.000	3.0	3.0	3.0	3.0	3.0
1,337.500	3.0	3.0	3.0	3.0	3.0
1,350.000	3.0	3.0	3.0	3.0	3.0
1,362.500	3.0	3.0	3.0	3.0	3.0
1,375.000	3.0	3.0	3.0	3.0	3.0
1,387.500	3.0	3.0	3.0	3.0	3.0
1,400.000	3.0	3.0	3.0	3.0	3.0
1,412.500	3.0	3.0	3.0	3.0	3.0
1,425.000	3.0	3.0	3.0	3.0	3.0

Time-Depth Curve: 25 Year	
Label	25 Year
Start Time	0.000 min
Increment	2.500 min
End Time	1,435.000 min
Return Event	25 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
12.500	0.0	0.0	0.0	0.0	0.0
25.000	0.0	0.0	0.0	0.0	0.0
37.500	0.0	0.0	0.0	0.0	0.0
50.000	0.0	0.0	0.0	0.0	0.0
62.500	0.0	0.0	0.0	0.0	0.0
75.000	0.0	0.0	0.0	0.0	0.0
87.500	0.0	0.0	0.0	0.0	0.0
100.000	0.0	0.0	0.0	0.0	0.0
112.500	0.0	0.0	0.0	0.0	0.0
125.000	0.0	0.0	0.0	0.0	0.0
137.500	0.0	0.0	0.0	0.0	0.0
150.000	0.0	0.0	0.0	0.0	0.0
162.500	0.0	0.0	0.0	0.0	0.0
175.000	0.0	0.0	0.1	0.1	0.1
187.500	0.1	0.1	0.1	0.1	0.1
200.000	0.1	0.1	0.1	0.1	0.1
212.500	0.1	0.1	0.1	0.1	0.1
225.000	0.1	0.1	0.1	0.1	0.1
237.500	0.1	0.1	0.2	0.2	0.2
250.000	0.2	0.2	0.2	0.2	0.2
262.500	0.2	0.2	0.2	0.2	0.2
275.000	0.2	0.2	0.2	0.2	0.2
287.500	0.3	0.3	0.3	0.3	0.3
300.000	0.3	0.3	0.3	0.3	0.3
312.500	0.3	0.3	0.3	0.3	0.4
325.000	0.4	0.4	0.4	0.4	0.4
337.500	0.4	0.4	0.4	0.4	0.4
350.000	0.4	0.4	0.4	0.4	0.4
362.500	0.4	0.4	0.4	0.4	0.4
375.000	0.4	0.4	0.4	0.4	0.4
387.500	0.4	0.4	0.4	0.4	0.4
400.000	0.4	0.4	0.5	0.5	0.5
412.500	0.5	0.5	0.5	0.5	0.5
425.000	0.5	0.5	0.5	0.5	0.5
437.500	0.5	0.5	0.5	0.5	0.5
450.000	0.5	0.5	0.5	0.5	0.5
462.500	0.5	0.6	0.6	0.6	0.6
475.000	0.6	0.6	0.6	0.6	0.6
487.500	0.6	0.6	0.6	0.7	0.7
500.000	0.7	0.7	0.7	0.7	0.7
512.500	0.7	0.8	0.8	0.8	0.8
525.000	0.8	0.8	0.8	0.8	0.9

Subsection: Time-Depth Curve
Label: Time-Depth - 1
Scenario: 25-Year

Return Event: 25 years
Storm Event: 25 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
537.500	0.9	0.9	0.9	0.9	0.9
550.000	0.9	0.9	0.9	0.9	0.9
562.500	0.9	0.9	0.9	0.9	0.9
575.000	0.9	0.9	0.9	0.9	1.0
587.500	1.0	1.0	1.0	1.0	1.0
600.000	1.0	1.1	1.1	1.1	1.1
612.500	1.1	1.1	1.2	1.2	1.2
625.000	1.2	1.3	1.3	1.3	1.3
637.500	1.3	1.3	1.3	1.3	1.4
650.000	1.4	1.4	1.4	1.4	1.4
662.500	1.5	1.5	1.5	1.5	1.5
675.000	1.5	1.6	1.6	1.6	1.7
687.500	1.7	1.7	1.7	1.8	1.8
700.000	1.8	1.9	1.9	2.0	2.1
712.500	2.1	2.2	2.5	2.9	3.0
725.000	3.1	3.2	3.3	3.4	3.4
737.500	3.5	3.5	3.6	3.6	3.6
750.000	3.6	3.7	3.7	3.7	3.8
762.500	3.8	3.8	3.8	3.9	3.9
775.000	3.9	3.9	3.9	3.9	3.9
787.500	4.0	4.0	4.0	4.0	4.0
800.000	4.0	4.1	4.1	4.1	4.1
812.500	4.1	4.1	4.2	4.2	4.2
825.000	4.2	4.2	4.3	4.3	4.3
837.500	4.3	4.3	4.3	4.4	4.4
850.000	4.4	4.4	4.4	4.4	4.4
862.500	4.4	4.4	4.4	4.4	4.5
875.000	4.5	4.5	4.5	4.5	4.5
887.500	4.5	4.5	4.5	4.5	4.5
900.000	4.5	4.5	4.5	4.5	4.5
912.500	4.5	4.5	4.6	4.6	4.6
925.000	4.6	4.6	4.6	4.6	4.6
937.500	4.7	4.7	4.7	4.7	4.7
950.000	4.7	4.7	4.7	4.7	4.7
962.500	4.8	4.8	4.8	4.8	4.8
975.000	4.8	4.8	4.8	4.8	4.8
987.500	4.8	4.8	4.8	4.8	4.8
1,000.000	4.9	4.9	4.9	4.9	4.9
1,012.500	4.9	4.9	4.9	4.9	4.9
1,025.000	4.9	4.9	4.9	4.9	4.9
1,037.500	4.9	4.9	4.9	4.9	4.9
1,050.000	4.9	4.9	4.9	4.9	4.9
1,062.500	4.9	4.9	4.9	4.9	4.9
1,075.000	4.9	4.9	4.9	4.9	4.9
1,087.500	4.9	4.9	4.9	4.9	4.9
1,100.000	4.9	4.9	4.9	5.0	5.0
1,112.500	5.0	5.0	5.0	5.0	5.0
1,125.000	5.0	5.0	5.0	5.0	5.0
1,137.500	5.0	5.1	5.1	5.1	5.1
1,150.000	5.1	5.1	5.1	5.1	5.1
1,162.500	5.1	5.1	5.1	5.1	5.1

Subsection: Time-Depth Curve
Label: Time-Depth - 1
Scenario: 25-Year

Return Event: 25 years
Storm Event: 25 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
1,175.000	5.1	5.1	5.2	5.2	5.2
1,187.500	5.2	5.2	5.2	5.2	5.2
1,200.000	5.2	5.2	5.2	5.2	5.2
1,212.500	5.2	5.2	5.2	5.2	5.2
1,225.000	5.2	5.2	5.2	5.3	5.3
1,237.500	5.3	5.3	5.3	5.3	5.3
1,250.000	5.3	5.3	5.3	5.3	5.3
1,262.500	5.3	5.3	5.3	5.3	5.3
1,275.000	5.3	5.3	5.3	5.3	5.3
1,287.500	5.3	5.3	5.3	5.3	5.3
1,300.000	5.3	5.3	5.3	5.3	5.3
1,312.500	5.3	5.3	5.3	5.3	5.3
1,325.000	5.3	5.3	5.3	5.3	5.3
1,337.500	5.3	5.3	5.3	5.3	5.3
1,350.000	5.3	5.3	5.3	5.3	5.3
1,362.500	5.3	5.3	5.3	5.3	5.3
1,375.000	5.3	5.3	5.3	5.3	5.3
1,387.500	5.3	5.3	5.3	5.3	5.3
1,400.000	5.3	5.3	5.3	5.3	5.3
1,412.500	5.3	5.3	5.3	5.3	5.3
1,425.000	5.3	5.3	5.3	5.3	5.3

Time-Depth Curve: 50 Year	
Label	50 Year
Start Time	0.000 min
Increment	2.500 min
End Time	1,435.000 min
Return Event	50 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
12.500	0.0	0.0	0.0	0.0	0.0
25.000	0.0	0.0	0.0	0.0	0.0
37.500	0.0	0.0	0.0	0.0	0.0
50.000	0.0	0.0	0.0	0.0	0.0
62.500	0.0	0.0	0.0	0.0	0.0
75.000	0.0	0.0	0.0	0.0	0.0
87.500	0.0	0.0	0.0	0.0	0.0
100.000	0.0	0.0	0.0	0.0	0.0
112.500	0.0	0.0	0.0	0.0	0.0
125.000	0.0	0.0	0.0	0.0	0.0
137.500	0.0	0.0	0.0	0.0	0.0
150.000	0.0	0.0	0.0	0.0	0.0
162.500	0.0	0.0	0.0	0.0	0.0
175.000	0.0	0.1	0.1	0.1	0.1
187.500	0.1	0.1	0.1	0.1	0.1
200.000	0.1	0.1	0.1	0.1	0.1
212.500	0.1	0.1	0.1	0.1	0.1
225.000	0.1	0.1	0.1	0.1	0.2
237.500	0.2	0.2	0.2	0.2	0.2
250.000	0.2	0.2	0.2	0.2	0.2
262.500	0.2	0.2	0.2	0.2	0.2
275.000	0.3	0.3	0.3	0.3	0.3
287.500	0.3	0.3	0.3	0.3	0.3
300.000	0.3	0.3	0.3	0.3	0.4
312.500	0.4	0.4	0.4	0.4	0.4
325.000	0.4	0.4	0.4	0.4	0.4
337.500	0.5	0.5	0.5	0.5	0.5
350.000	0.5	0.5	0.5	0.5	0.5
362.500	0.5	0.5	0.5	0.5	0.5
375.000	0.5	0.5	0.5	0.5	0.5
387.500	0.5	0.5	0.5	0.5	0.5
400.000	0.5	0.5	0.5	0.5	0.5
412.500	0.5	0.5	0.5	0.5	0.5
425.000	0.5	0.5	0.5	0.5	0.5
437.500	0.5	0.5	0.6	0.6	0.6
450.000	0.6	0.6	0.6	0.6	0.6
462.500	0.6	0.6	0.6	0.6	0.6
475.000	0.7	0.7	0.7	0.7	0.7
487.500	0.7	0.7	0.7	0.7	0.7
500.000	0.8	0.8	0.8	0.8	0.8
512.500	0.8	0.8	0.9	0.9	0.9
525.000	0.9	0.9	0.9	0.9	1.0

Subsection: Time-Depth Curve
Label: Time-Depth - 1
Scenario: 50-Year

Return Event: 50 years
Storm Event: 50 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
537.500	1.0	1.0	1.0	1.0	1.0
550.000	1.0	1.0	1.0	1.0	1.0
562.500	1.0	1.0	1.0	1.0	1.0
575.000	1.0	1.0	1.0	1.1	1.1
587.500	1.1	1.1	1.1	1.1	1.1
600.000	1.2	1.2	1.2	1.2	1.2
612.500	1.3	1.3	1.3	1.3	1.4
625.000	1.4	1.4	1.4	1.4	1.4
637.500	1.4	1.5	1.5	1.5	1.5
650.000	1.5	1.6	1.6	1.6	1.6
662.500	1.6	1.6	1.6	1.7	1.7
675.000	1.7	1.8	1.8	1.8	1.9
687.500	1.9	1.9	1.9	2.0	2.0
700.000	2.1	2.1	2.2	2.2	2.3
712.500	2.4	2.5	2.8	3.2	3.4
725.000	3.5	3.7	3.7	3.8	3.9
737.500	3.9	4.0	4.0	4.0	4.0
750.000	4.1	4.1	4.2	4.2	4.3
762.500	4.3	4.3	4.3	4.3	4.4
775.000	4.4	4.4	4.4	4.4	4.4
787.500	4.5	4.5	4.5	4.5	4.5
800.000	4.6	4.6	4.6	4.6	4.6
812.500	4.6	4.7	4.7	4.7	4.7
825.000	4.8	4.8	4.8	4.8	4.8
837.500	4.9	4.9	4.9	4.9	4.9
850.000	4.9	5.0	5.0	5.0	5.0
862.500	5.0	5.0	5.0	5.0	5.0
875.000	5.0	5.0	5.0	5.0	5.0
887.500	5.0	5.0	5.0	5.0	5.0
900.000	5.0	5.0	5.1	5.1	5.1
912.500	5.1	5.1	5.1	5.2	5.2
925.000	5.2	5.2	5.2	5.2	5.2
937.500	5.3	5.3	5.3	5.3	5.3
950.000	5.3	5.3	5.3	5.3	5.4
962.500	5.4	5.4	5.4	5.4	5.4
975.000	5.4	5.4	5.4	5.4	5.4
987.500	5.4	5.4	5.5	5.5	5.5
1,000.000	5.5	5.5	5.5	5.5	5.5
1,012.500	5.5	5.5	5.5	5.5	5.5
1,025.000	5.5	5.5	5.5	5.5	5.5
1,037.500	5.5	5.5	5.5	5.5	5.5
1,050.000	5.5	5.5	5.5	5.5	5.5
1,062.500	5.5	5.5	5.5	5.5	5.5
1,075.000	5.5	5.5	5.5	5.5	5.5
1,087.500	5.5	5.5	5.5	5.5	5.5
1,100.000	5.6	5.6	5.6	5.6	5.6
1,112.500	5.6	5.6	5.6	5.6	5.6
1,125.000	5.6	5.6	5.7	5.7	5.7
1,137.500	5.7	5.7	5.7	5.7	5.7
1,150.000	5.7	5.7	5.7	5.7	5.7
1,162.500	5.8	5.8	5.8	5.8	5.8

Subsection: Time-Depth Curve
Label: Time-Depth - 1
Scenario: 50-Year

Return Event: 50 years
Storm Event: 50 Year

CUMULATIVE RAINFALL (in)
Output Time Increment = 2.500 min
Time on left represents time for first value in each row.

Time (min)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
1,175.000	5.8	5.8	5.8	5.8	5.8
1,187.500	5.8	5.8	5.8	5.8	5.8
1,200.000	5.8	5.9	5.9	5.9	5.9
1,212.500	5.9	5.9	5.9	5.9	5.9
1,225.000	5.9	5.9	5.9	5.9	5.9
1,237.500	5.9	5.9	5.9	5.9	5.9
1,250.000	5.9	5.9	5.9	5.9	6.0
1,262.500	6.0	6.0	6.0	6.0	6.0
1,275.000	6.0	6.0	6.0	6.0	6.0
1,287.500	6.0	6.0	6.0	6.0	6.0
1,300.000	6.0	6.0	6.0	6.0	6.0
1,312.500	6.0	6.0	6.0	6.0	6.0
1,325.000	6.0	6.0	6.0	6.0	6.0
1,337.500	6.0	6.0	6.0	6.0	6.0
1,350.000	6.0	6.0	6.0	6.0	6.0
1,362.500	6.0	6.0	6.0	6.0	6.0
1,375.000	6.0	6.0	6.0	6.0	6.0
1,387.500	6.0	6.0	6.0	6.0	6.0
1,400.000	6.0	6.0	6.0	6.0	6.0
1,412.500	6.0	6.0	6.0	6.0	6.0
1,425.000	6.0	6.0	6.0	6.0	6.0

Subsection: Runoff CN-Area
Label: CM-01
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious	98.000	26.150	0.0	0.0	98.000
Meadow - HSG C	71.000	97.170	0.0	0.0	71.000
Woods - HSG A	30.000	42.710	0.0	0.0	30.000
Woods - HSG C	70.000	517.480	0.0	0.0	70.000
Woods - HSG D	77.000	221.150	0.0	0.0	77.000
Farmstead - HSG C	82.000	15.130	0.0	0.0	82.000
Farmstead - HSG D	86.000	1.210	0.0	0.0	86.000
Residental - 1 ac - HSG C	77.000	30.170	0.0	0.0	77.000
Residental - 1 ac - HSG D	84.000	7.330	0.0	0.0	84.000
Residental - 2 ac - HSG C	77.000	11.010	0.0	0.0	77.000
Residental - 2 ac - HSG D	82.000	4.090	0.0	0.0	82.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	973.600	(N/A)	(N/A)	71.345

Subsection: Runoff CN-Area
Label: CM-02
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious	98.000	26.150	0.0	0.0	98.000
Meadow - HSG C	71.000	97.170	0.0	0.0	71.000
Woods - HSG A	30.000	42.710	0.0	0.0	30.000
Woods - HSG C	70.000	517.480	0.0	0.0	70.000
Woods - HSG D	77.000	221.150	0.0	0.0	77.000
Farmstead - HSG C	82.000	15.130	0.0	0.0	82.000
Farmstead - HSG D	86.000	1.210	0.0	0.0	86.000
Residental - 1 ac - HSG C	77.000	30.170	0.0	0.0	77.000
Residental - 1 ac - HSG D	84.000	7.330	0.0	0.0	84.000
Residental - 2 ac - HSG C	77.000	11.010	0.0	0.0	77.000
Residental - 2 ac - HSG D	82.000	4.090	0.0	0.0	82.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	973.600	(N/A)	(N/A)	71.345

Subsection: Runoff CN-Area
Label: CM-03
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2 Year

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious	98.000	26.150	0.0	0.0	98.000
Meadow - HSG C	71.000	97.170	0.0	0.0	71.000
Woods - HSG A	30.000	42.710	0.0	0.0	30.000
Woods - HSG C	70.000	517.480	0.0	0.0	70.000
Woods - HSG D	77.000	221.150	0.0	0.0	77.000
Farmstead - HSG C	82.000	15.130	0.0	0.0	82.000
Farmstead - HSG D	86.000	1.210	0.0	0.0	86.000
Residental - 1 ac - HSG C	77.000	30.170	0.0	0.0	77.000
Residental - 1 ac - HSG D	84.000	7.330	0.0	0.0	84.000
Residental - 2 ac - HSG C	77.000	11.010	0.0	0.0	77.000
Residental - 2 ac - HSG D	82.000	4.090	0.0	0.0	82.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	973.600	(N/A)	(N/A)	71.345

Subsection: Elevation-Area Volume Curve
Label: Pond - Alt 01
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2 Year

Elevation (ft)	Planimeter (ft²)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
240.00	0.0	0.001	0.000	0.000	0.000
244.00	0.0	0.216	0.232	0.309	0.309
245.00	0.0	1.410	2.178	0.726	1.035
246.00	0.0	2.705	6.068	2.023	3.058
247.00	0.0	6.074	12.832	4.277	7.335
248.00	0.0	9.476	23.137	7.712	15.047
249.00	0.0	13.832	34.757	11.586	26.633
250.00	0.0	18.320	48.071	16.024	42.656
251.00	0.0	22.252	60.763	20.254	62.910
252.00	0.0	25.017	70.863	23.621	86.531
253.00	0.0	28.155	79.712	26.571	113.102
254.00	0.0	32.082	90.291	30.097	143.199
255.00	0.0	37.120	103.711	34.570	177.770
256.00	0.0	41.042	117.194	39.065	216.834

Subsection: Elevation-Area Volume Curve
Label: Pond - Alt 02
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2 Year

Elevation (ft)	Planimeter (ft²)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
240.00	0.0	0.001	0.000	0.000	0.000
244.00	0.0	0.216	0.232	0.309	0.309
245.00	0.0	1.410	2.178	0.726	1.035
246.00	0.0	2.705	6.068	2.023	3.058
247.00	0.0	6.074	12.832	4.277	7.335
248.00	0.0	9.476	23.137	7.712	15.047
249.00	0.0	13.832	34.757	11.586	26.633
250.00	0.0	18.320	48.071	16.024	42.656
251.00	0.0	22.252	60.763	20.254	62.910
252.00	0.0	25.017	70.863	23.621	86.531
253.00	0.0	28.155	79.712	26.571	113.102
254.00	0.0	32.082	90.291	30.097	143.199
255.00	0.0	37.120	103.711	34.570	177.770
256.00	0.0	41.042	117.194	39.065	216.834

Subsection: Elevation-Area Volume Curve
Label: Pond - Existing
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2 Year

Elevation (ft)	Planimeter (ft²)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
240.00	0.0	0.001	0.000	0.000	0.000
244.00	0.0	0.216	0.232	0.309	0.309
245.00	0.0	1.410	2.178	0.726	1.035
246.00	0.0	2.705	6.068	2.023	3.058
247.00	0.0	6.074	12.832	4.277	7.335
248.00	0.0	9.476	23.137	7.712	15.047
249.00	0.0	13.832	34.757	11.586	26.633
250.00	0.0	18.320	48.071	16.024	42.656
251.00	0.0	22.252	60.763	20.254	62.910
252.00	0.0	25.017	70.863	23.621	86.531
253.00	0.0	28.155	79.712	26.571	113.102
254.00	0.0	32.082	90.291	30.097	143.199
255.00	0.0	37.120	103.711	34.570	177.770
256.00	0.0	41.042	117.194	39.065	216.834

Requested Pond Water Surface Elevations	
Minimum (Headwater)	240.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	256.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	Culvert - 1	Forward	TW	240.76	256.00
Culvert-Circular	Culvert - 2	Forward	TW	248.41	256.00
Culvert-Circular	Culvert - 3	Forward	TW	250.69	256.00
Irregular Weir	Weir - 1	Forward	TW	254.00	256.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	48.0 in
Length	70.00 ft
Length (Computed Barrel)	70.01 ft
Slope (Computed)	-0.012 ft/ft

Outlet Control Data	
Manning's n	0.024
Ke	0.200
Kb	0.017
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.101
T2 ratio (HW/D)	1.203
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	245.17 ft	T1 Flow	87.96 ft³/s
T2 Elevation	245.57 ft	T2 Flow	100.53 ft³/s

Structure ID: Culvert - 2 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.0 in
Length	70.00 ft
Length (Computed Barrel)	70.00 ft
Slope (Computed)	0.000 ft/ft

Outlet Control Data	
Manning's n	0.024
Ke	0.200
Kb	0.042
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.096
T2 ratio (HW/D)	1.197
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	250.60 ft	T1 Flow	15.55 ft³/s
T2 Elevation	250.80 ft	T2 Flow	17.77 ft³/s

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	256.00
95.00	255.00
700.00	254.00
720.00	254.00
820.00	255.00
895.00	256.00

Lowest Elevation	254.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Culvert - 3 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.0 in
Length	70.00 ft
Length (Computed Barrel)	70.01 ft
Slope (Computed)	0.016 ft/ft

Outlet Control Data	
Manning's n	0.024
Ke	0.200
Kb	0.042
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.087
T2 ratio (HW/D)	1.189
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	252.86 ft	T1 Flow	15.55 ft³/s
T2 Elevation	253.07 ft	T2 Flow	17.77 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	240.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	256.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	Culvert - 1	Forward	TW	240.76	256.00
Culvert-Circular	Culvert - 3	Forward	TW	248.41	256.00
Irregular Weir	Weir - 1	Forward	TW	254.00	256.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	48.0 in
Length	70.00 ft
Length (Computed Barrel)	70.01 ft
Slope (Computed)	-0.012 ft/ft

Outlet Control Data	
Manning's n	0.024
Ke	0.200
Kb	0.017
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.101
T2 ratio (HW/D)	1.203
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	245.17 ft	T1 Flow	87.96 ft³/s
T2 Elevation	245.57 ft	T2 Flow	100.53 ft³/s

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	256.00
95.00	255.00
700.00	254.00
720.00	254.00
820.00	255.00
895.00	256.00

Lowest Elevation	254.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Culvert - 3 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.0 in
Length	70.00 ft
Length (Computed Barrel)	70.00 ft
Slope (Computed)	0.000 ft/ft

Outlet Control Data	
Manning's n	0.024
Ke	0.200
Kb	0.042
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.096
T2 ratio (HW/D)	1.197
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	250.60 ft	T1 Flow	15.55 ft³/s
T2 Elevation	250.80 ft	T2 Flow	17.77 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	240.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	256.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	Culvert - 1	Forward	TW	240.76	256.00
Culvert-Circular	Culvert - 3	Forward	TW	248.41	256.00
Culvert-Circular	Culvert - 2	Forward	TW	250.82	256.00
Irregular Weir	Weir - 1	Forward	TW	254.00	256.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	48.0 in
Length	70.00 ft
Length (Computed Barrel)	70.01 ft
Slope (Computed)	-0.012 ft/ft

Outlet Control Data	
Manning's n	0.024
Ke	0.200
Kb	0.017
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.101
T2 ratio (HW/D)	1.203
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	245.17 ft	T1 Flow	87.96 ft³/s
T2 Elevation	245.57 ft	T2 Flow	100.53 ft³/s

Structure ID: Culvert - 2 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	21.0 in
Length	70.00 ft
Length (Computed Barrel)	70.01 ft
Slope (Computed)	0.016 ft/ft

Outlet Control Data	
Manning's n	0.009
Ke	0.200
Kb	0.007
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.087
T2 ratio (HW/D)	1.189
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	252.72 ft	T1 Flow	11.14 ft³/s
T2 Elevation	252.90 ft	T2 Flow	12.73 ft³/s

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	256.00
95.00	255.00
700.00	254.00
720.00	254.00
820.00	255.00
895.00	256.00

Lowest Elevation	254.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Culvert - 3 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.0 in
Length	70.00 ft
Length (Computed Barrel)	70.00 ft
Slope (Computed)	0.000 ft/ft

Outlet Control Data	
Manning's n	0.024
Ke	0.200
Kb	0.042
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.096
T2 ratio (HW/D)	1.197
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	250.60 ft	T1 Flow	15.55 ft³/s
T2 Elevation	250.80 ft	T2 Flow	17.77 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	194.07 ft³/s	Time to Peak (Flow, In)	792.000 min
Flow (Peak Outlet)	103.70 ft³/s	Time to Peak (Flow, Outlet)	891.000 min

Elevation (Water Surface, Peak)	247.68 ft
Volume (Peak)	12.192 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	61.713 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	61.636 ac-ft
Volume (Retained)	0.062 ac-ft
Volume (Unrouted)	-0.014 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	504.14 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	156.28 ft³/s	Time to Peak (Flow, Outlet)	915.000 min

Elevation (Water Surface, Peak)	250.48 ft
Volume (Peak)	51.804 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	138.078 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	131.575 ac-ft
Volume (Retained)	6.024 ac-ft
Volume (Unrouted)	-0.479 ac-ft
Error (Mass Balance)	0.3 %

Subsection: Level Pool Pond Routing Summary
Label: Pond - Alt 01 (IN)
Scenario: 25-Year

Return Event: 25 years
Storm Event: 25 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	732.23 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	181.45 ft³/s	Time to Peak (Flow, Outlet)	927.000 min

Elevation (Water Surface, Peak)	251.89 ft
Volume (Peak)	83.908 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	192.262 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	162.857 ac-ft
Volume (Retained)	28.757 ac-ft
Volume (Unrouted)	-0.648 ac-ft
Error (Mass Balance)	0.3 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	911.34 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	197.96 ft³/s	Time to Peak (Flow, Outlet)	999.000 min

Elevation (Water Surface, Peak)	252.92 ft
Volume (Peak)	110.775 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	235.024 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	183.004 ac-ft
Volume (Retained)	51.333 ac-ft
Volume (Unrouted)	-0.687 ac-ft
Error (Mass Balance)	0.3 %

Subsection: Level Pool Pond Routing Summary
Label: Pond - Alt 01 (IN)
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	1,111.11 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	213.88 ft³/s	Time to Peak (Flow, Outlet)	1,011.000 min

Elevation (Water Surface, Peak)	253.99 ft
Volume (Peak)	142.950 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	282.481 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	201.950 ac-ft
Volume (Retained)	79.705 ac-ft
Volume (Unrouted)	-0.826 ac-ft
Error (Mass Balance)	0.3 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	194.07 ft³/s	Time to Peak (Flow, In)	792.000 min
Flow (Peak Outlet)	103.70 ft³/s	Time to Peak (Flow, Outlet)	891.000 min

Elevation (Water Surface, Peak)	247.68 ft
Volume (Peak)	12.193 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	61.713 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	61.636 ac-ft
Volume (Retained)	0.062 ac-ft
Volume (Unrouted)	-0.014 ac-ft
Error (Mass Balance)	0.0 %

Subsection: Level Pool Pond Routing Summary
Label: Pond - Alt 02 (IN)
Scenario: 10-Year

Return Event: 10 years
Storm Event: 10 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	504.14 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	156.28 ft³/s	Time to Peak (Flow, Outlet)	915.000 min

Elevation (Water Surface, Peak)	250.48 ft
Volume (Peak)	51.804 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	138.078 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	131.575 ac-ft
Volume (Retained)	6.024 ac-ft
Volume (Unrouted)	-0.479 ac-ft
Error (Mass Balance)	0.3 %

Subsection: Level Pool Pond Routing Summary
Label: Pond - Alt 02 (IN)
Scenario: 25-Year

Return Event: 25 years
Storm Event: 25 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	732.23 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	185.32 ft³/s	Time to Peak (Flow, Outlet)	924.000 min

Elevation (Water Surface, Peak)	251.88 ft
Volume (Peak)	83.547 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	192.262 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	163.552 ac-ft
Volume (Retained)	28.090 ac-ft
Volume (Unrouted)	-0.620 ac-ft
Error (Mass Balance)	0.3 %

Subsection: Level Pool Pond Routing Summary
Label: Pond - Alt 02 (IN)
Scenario: 50-Year

Return Event: 50 years
Storm Event: 50 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	911.34 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	209.19 ft³/s	Time to Peak (Flow, Outlet)	930.000 min

Elevation (Water Surface, Peak)	252.86 ft
Volume (Peak)	109.264 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	235.024 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	186.544 ac-ft
Volume (Retained)	47.731 ac-ft
Volume (Unrouted)	-0.749 ac-ft
Error (Mass Balance)	0.3 %

Subsection: Level Pool Pond Routing Summary
Label: Pond - Alt 02 (IN)
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	1,111.11 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	230.21 ft³/s	Time to Peak (Flow, Outlet)	999.000 min

Elevation (Water Surface, Peak)	253.86 ft
Volume (Peak)	138.605 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	282.481 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	210.476 ac-ft
Volume (Retained)	71.217 ac-ft
Volume (Unrouted)	-0.788 ac-ft
Error (Mass Balance)	0.3 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	194.07 ft³/s	Time to Peak (Flow, In)	792.000 min
Flow (Peak Outlet)	103.70 ft³/s	Time to Peak (Flow, Outlet)	891.000 min

Elevation (Water Surface, Peak)	247.68 ft
Volume (Peak)	12.193 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	61.713 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	61.636 ac-ft
Volume (Retained)	0.062 ac-ft
Volume (Unrouted)	-0.014 ac-ft
Error (Mass Balance)	0.0 %

Subsection: Level Pool Pond Routing Summary
Label: Pond - Existing (IN)
Scenario: 10-Year

Return Event: 10 years
Storm Event: 10 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	504.14 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	156.28 ft³/s	Time to Peak (Flow, Outlet)	915.000 min

Elevation (Water Surface, Peak)	250.48 ft
Volume (Peak)	51.804 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	138.078 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	131.575 ac-ft
Volume (Retained)	6.024 ac-ft
Volume (Unrouted)	-0.479 ac-ft
Error (Mass Balance)	0.3 %

Subsection: Level Pool Pond Routing Summary
Label: Pond - Existing (IN)
Scenario: 25-Year

Return Event: 25 years
Storm Event: 25 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	732.23 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	186.60 ft³/s	Time to Peak (Flow, Outlet)	924.000 min

Elevation (Water Surface, Peak)	251.87 ft
Volume (Peak)	83.410 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	192.262 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	163.814 ac-ft
Volume (Retained)	27.841 ac-ft
Volume (Unrouted)	-0.606 ac-ft
Error (Mass Balance)	0.3 %

Subsection: Level Pool Pond Routing Summary
Label: Pond - Existing (IN)
Scenario: 50-Year

Return Event: 50 years
Storm Event: 50 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	911.34 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	211.65 ft³/s	Time to Peak (Flow, Outlet)	930.000 min

Elevation (Water Surface, Peak)	252.85 ft
Volume (Peak)	108.910 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	235.024 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	187.409 ac-ft
Volume (Retained)	46.871 ac-ft
Volume (Unrouted)	-0.744 ac-ft
Error (Mass Balance)	0.3 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	240.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.000 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	1,111.11 ft³/s	Time to Peak (Flow, In)	780.000 min
Flow (Peak Outlet)	231.31 ft³/s	Time to Peak (Flow, Outlet)	996.000 min

Elevation (Water Surface, Peak)	253.84 ft
Volume (Peak)	138.140 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	282.481 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	211.713 ac-ft
Volume (Retained)	69.969 ac-ft
Volume (Unrouted)	-0.799 ac-ft
Error (Mass Balance)	0.3 %

Time of Concentration Calculation

HNTB

HNTB	Made by	NJP	Date	10/25/21	Job No.	
	Checked by	DNM	Date	10/29/21	Sheet No.	1 of 1
For Route 197 Underpass	Backchecked by		Date			

USDA NRCS Time of Concentration Worksheet

Drainage Area ID:	**CM-01/CM-02**			
Description:	**Richmond Rd Culverts**			
Sheet Flow	A-B			
Surface Description	Woods			
Manning's Roughness Coefficient, n	0.400			
Terrain Measurement Length, L, ft	100			
2-year, 24-hour Rainfall, P_2, (inches)	3.0			
Upstream Elevation (ft)	391.0			
Downstream Elevation (ft)	382.0			
Land Slope, s (ft/ft)	0.090			
McCuen-Spiess Calculated Flow Length	75.0			
Flow Length, L, ft (Min of Terrain or McCuen, Max=100')	75.0			
Travel Time, Tt (min)	9.6			
Shallow Concentrated Flow	B-C	C-D	D-E	E-F
Surface Description	Unpaved	Unpaved	Unpaved	Unpaved
Flow Length, L (ft)	221	257	1105	300
Upstream Elevation (ft)	382.0	375.0	360	335
Downstream Elevation (ft)	375.0	360.0	335.0	325
Watercourse Slope, s (ft/ft)	0.032	0.058	0.023	0.033
Average Velocity, V (ft/s)	2.87	3.90	2.43	2.95
Travel Time, Tt (min)	1.3	1.1	7.6	1.7
Shallow Concentrated Flow	F-G	G-H	H-I	I-J
Surface Description	Unpaved	Unpaved	Unpaved	Unpaved
Flow Length, L (ft)	557	575	233	521
Upstream Elevation (ft)	325.0	315.0	310.0	305.0
Downstream Elevation (ft)	315.0	310.0	305.0	300.0
Watercourse Slope, s (ft/ft)	0.018	0.009	0.021	0.010
Average Velocity, V (ft/s)	2.16	1.50	2.36	1.58
Travel Time, Tt (min)	4.3	6.4	1.6	5.5
Shallow Concentrated Flow	J-K	K-L	L-M	M-N
Surface Description	Unpaved	Unpaved	Unpaved	Unpaved
Flow Length, L (ft)	950	140	2085	691
Upstream Elevation (ft)	300.0	285.0	280.0	255.0
Downstream Elevation (ft)	285.0	280.0	255.0	250.0
Watercourse Slope, s (ft/ft)	0.016	0.036	0.012	0.007
Average Velocity, V (ft/s)	2.03	3.05	1.77	1.37
Travel Time, Tt (min)	7.8	0.8	19.7	8.4
Shallow Concentrated Flow	N-O	O-P		
Surface Description	Unpaved	Unpaved		
Flow Length, L (ft)	650	453		
Upstream Elevation (ft)	250.0	248.0		
Downstream Elevation (ft)	248.0	244.0		
Watercourse Slope, s (ft/ft)	0.003	0.009		
Average Velocity, V (ft/s)	0.89	1.52		
Travel Time, Tt (min)	12.1	5.0		
Total Time of Concentration, Tc, min:	**92.9**			
Total Time of Concentration, Tc, hrs:	**1.55**			

NOAA Atlas 14
Precipitation Data

HNTB

NOAA Atlas 14, Volume 10, Version 3
Location name: Gardiner, Maine, USA*
Latitude: 44.2203°, Longitude: -69.7889°
Elevation: 138.62 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**3.22** (2.65-3.90)	**3.97** (3.28-4.82)	**5.22** (4.27-6.34)	**6.25** (5.08-7.66)	**7.67** (5.98-9.84)	**8.72** (6.65-11.5)	**9.85** (7.22-13.5)	**11.1** (7.63-15.5)	**13.0** (8.50-18.8)	**14.6** (9.25-21.5)
10-min	**2.28** (1.88-2.76)	**2.81** (2.32-3.41)	**3.69** (3.03-4.49)	**4.42** (3.60-5.42)	**5.43** (4.24-6.97)	**6.18** (4.70-8.11)	**6.97** (5.11-9.53)	**7.89** (5.39-11.0)	**9.24** (6.02-13.3)	**10.4** (6.56-15.2)
15-min	**1.79** (1.47-2.16)	**2.21** (1.82-2.68)	**2.90** (2.37-3.52)	**3.47** (2.82-4.25)	**4.26** (3.32-5.46)	**4.85** (3.69-6.36)	**5.47** (4.01-7.47)	**6.19** (4.24-8.62)	**7.25** (4.72-10.5)	**8.12** (5.14-12.0)
30-min	**1.22** (1.01-1.48)	**1.51** (1.24-1.83)	**1.98** (1.62-2.41)	**2.37** (1.93-2.90)	**2.90** (2.27-3.73)	**3.30** (2.51-4.34)	**3.73** (2.74-5.10)	**4.22** (2.89-5.88)	**4.94** (3.22-7.12)	**5.54** (3.50-8.15)
60-min	**0.775** (0.638-0.938)	**0.956** (0.787-1.16)	**1.25** (1.03-1.53)	**1.50** (1.22-1.84)	**1.84** (1.44-2.36)	**2.09** (1.59-2.75)	**2.36** (1.73-3.23)	**2.67** (1.83-3.72)	**3.13** (2.04-4.51)	**3.51** (2.22-5.16)
2-hr	**0.524** (0.434-0.630)	**0.640** (0.530-0.772)	**0.832** (0.686-1.00)	**0.990** (0.811-1.20)	**1.21** (0.951-1.54)	**1.37** (1.05-1.79)	**1.55** (1.15-2.10)	**1.75** (1.21-2.41)	**2.06** (1.35-2.94)	**2.32** (1.48-3.37)
3-hr	**0.413** (0.343-0.495)	**0.501** (0.417-0.602)	**0.647** (0.536-0.780)	**0.768** (0.632-0.930)	**0.935** (0.739-1.19)	**1.06** (0.817-1.38)	**1.19** (0.888-1.61)	**1.35** (0.936-1.85)	**1.59** (1.05-2.25)	**1.79** (1.15-2.59)
6-hr	**0.270** (0.227-0.322)	**0.326** (0.273-0.388)	**0.416** (0.347-0.498)	**0.491** (0.407-0.591)	**0.595** (0.474-0.748)	**0.672** (0.522-0.864)	**0.754** (0.567-1.01)	**0.852** (0.596-1.15)	**1.00** (0.667-1.40)	**1.13** (0.730-1.61)
12-hr	**0.170** (0.144-0.201)	**0.203** (0.171-0.241)	**0.258** (0.216-0.306)	**0.303** (0.252-0.362)	**0.365** (0.292-0.455)	**0.411** (0.322-0.523)	**0.460** (0.348-0.608)	**0.518** (0.366-0.694)	**0.604** (0.407-0.835)	**0.676** (0.443-0.952)
24-hr	**0.103** (0.088-0.121)	**0.123** (0.104-0.144)	**0.154** (0.130-0.182)	**0.181** (0.152-0.214)	**0.217** (0.175-0.268)	**0.244** (0.192-0.308)	**0.273** (0.208-0.356)	**0.306** (0.218-0.406)	**0.355** (0.241-0.485)	**0.395** (0.261-0.550)
2-day	**0.059** (0.051-0.069)	**0.070** (0.060-0.082)	**0.088** (0.075-0.104)	**0.103** (0.087-0.122)	**0.124** (0.101-0.151)	**0.139** (0.110-0.174)	**0.155** (0.119-0.200)	**0.174** (0.125-0.228)	**0.201** (0.138-0.271)	**0.223** (0.149-0.306)
3-day	**0.043** (0.037-0.050)	**0.051** (0.044-0.059)	**0.064** (0.054-0.074)	**0.074** (0.063-0.087)	**0.089** (0.073-0.108)	**0.100** (0.080-0.124)	**0.111** (0.086-0.143)	**0.124** (0.090-0.162)	**0.143** (0.099-0.192)	**0.159** (0.107-0.217)
4-day	**0.035** (0.030-0.040)	**0.041** (0.035-0.048)	**0.051** (0.044-0.059)	**0.059** (0.050-0.069)	**0.071** (0.058-0.086)	**0.079** (0.063-0.098)	**0.088** (0.068-0.112)	**0.098** (0.071-0.127)	**0.113** (0.078-0.151)	**0.125** (0.084-0.169)
7-day	**0.024** (0.020-0.027)	**0.028** (0.024-0.032)	**0.034** (0.029-0.039)	**0.039** (0.033-0.045)	**0.046** (0.038-0.055)	**0.051** (0.041-0.063)	**0.057** (0.044-0.072)	**0.063** (0.046-0.081)	**0.072** (0.050-0.095)	**0.079** (0.054-0.106)
10-day	**0.019** (0.017-0.022)	**0.022** (0.019-0.025)	**0.027** (0.023-0.031)	**0.031** (0.026-0.035)	**0.036** (0.030-0.043)	**0.040** (0.032-0.048)	**0.044** (0.034-0.055)	**0.049** (0.036-0.062)	**0.055** (0.039-0.072)	**0.060** (0.041-0.080)
20-day	**0.014** (0.012-0.015)	**0.015** (0.013-0.017)	**0.018** (0.016-0.020)	**0.020** (0.017-0.023)	**0.023** (0.019-0.027)	**0.026** (0.021-0.031)	**0.028** (0.022-0.034)	**0.030** (0.023-0.038)	**0.033** (0.024-0.043)	**0.036** (0.025-0.047)
30-day	**0.011** (0.010-0.013)	**0.012** (0.011-0.014)	**0.014** (0.013-0.016)	**0.016** (0.014-0.018)	**0.018** (0.015-0.022)	**0.020** (0.016-0.024)	**0.022** (0.017-0.027)	**0.024** (0.018-0.029)	**0.026** (0.018-0.033)	**0.027** (0.019-0.036)
45-day	**0.009** (0.008-0.011)	**0.010** (0.009-0.012)	**0.012** (0.010-0.013)	**0.013** (0.011-0.015)	**0.015** (0.012-0.017)	**0.016** (0.013-0.019)	**0.017** (0.014-0.021)	**0.019** (0.014-0.023)	**0.020** (0.015-0.026)	**0.021** (0.015-0.028)
60-day	**0.008** (0.007-0.009)	**0.009** (0.008-0.010)	**0.010** (0.009-0.012)	**0.011** (0.010-0.013)	**0.013** (0.011-0.015)	**0.014** (0.011-0.016)	**0.015** (0.012-0.018)	**0.016** (0.012-0.020)	**0.017** (0.012-0.022)	**0.018** (0.013-0.023)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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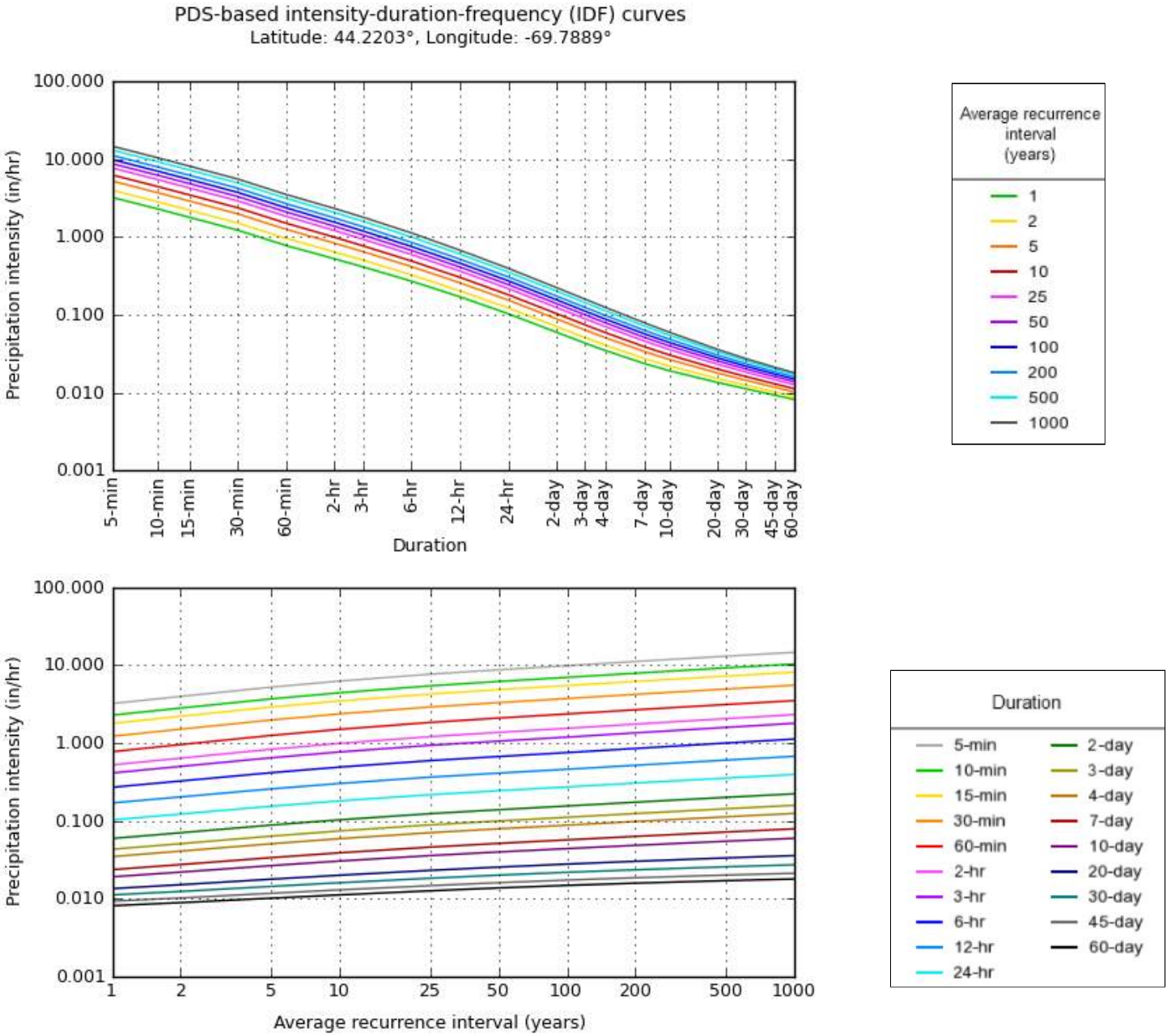
PF graphical



NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Wed Nov 3 15:56:31 2021

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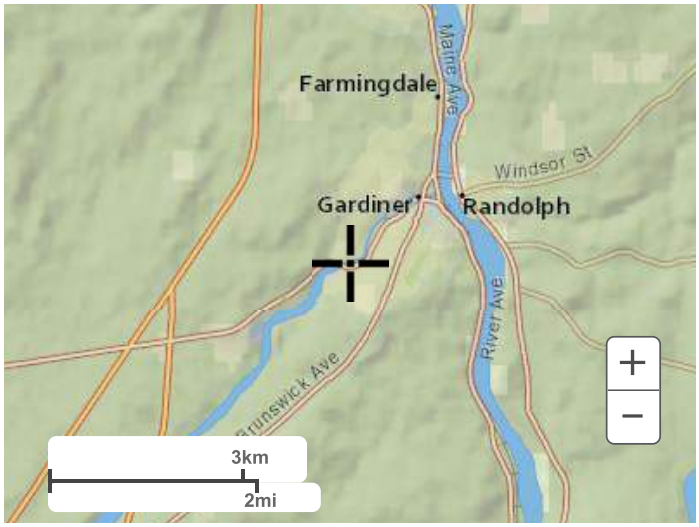
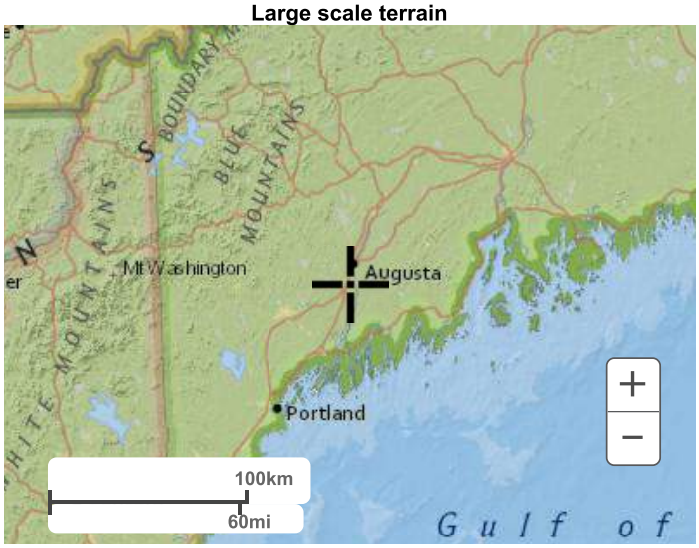
Maps & aerials

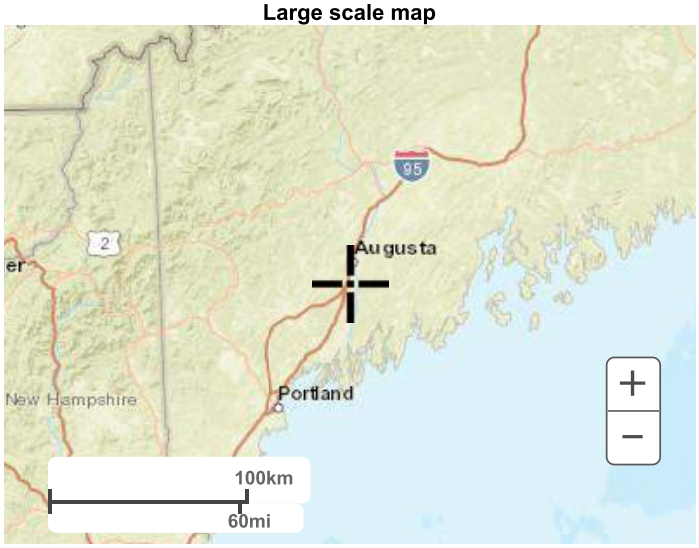
Small scale terrain



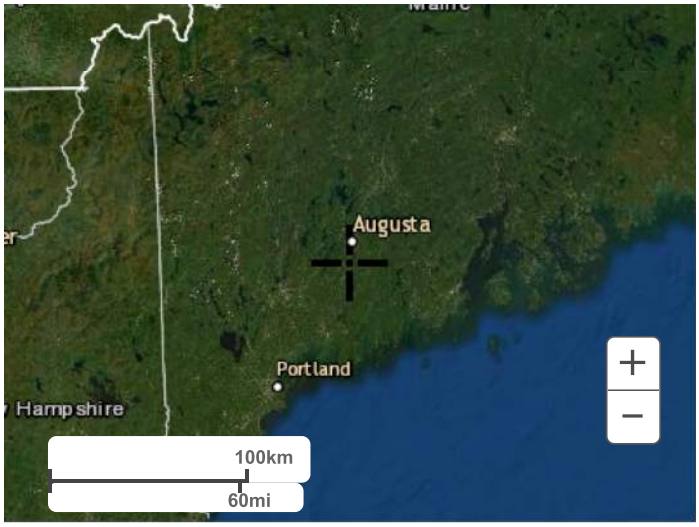
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX C

Result Summary

Results Summary Sheet

HNTB	Made by	NJP	Date 11/11/21	Job No.
	Checked by	DNM	Date 11/12/21	Sheet No. 1 of 1
For Route 197 Underpass	Backchecked by		Date	

Headwater Elevations from PondPack (NAVD88) (ft)

Storm Event	Existing Conditions	Proposed Alternative 01 - Pipe Removal	Difference	Notes
2-Year	247.68	247.68	0.00	
10-Year	250.48	250.48	0.00	
25-Year	251.87	251.89	0.02	
50-Year	252.85	252.92	0.07	**Design Storm Event**
100-Year	253.84	253.99	0.15	**Check Storm Event**

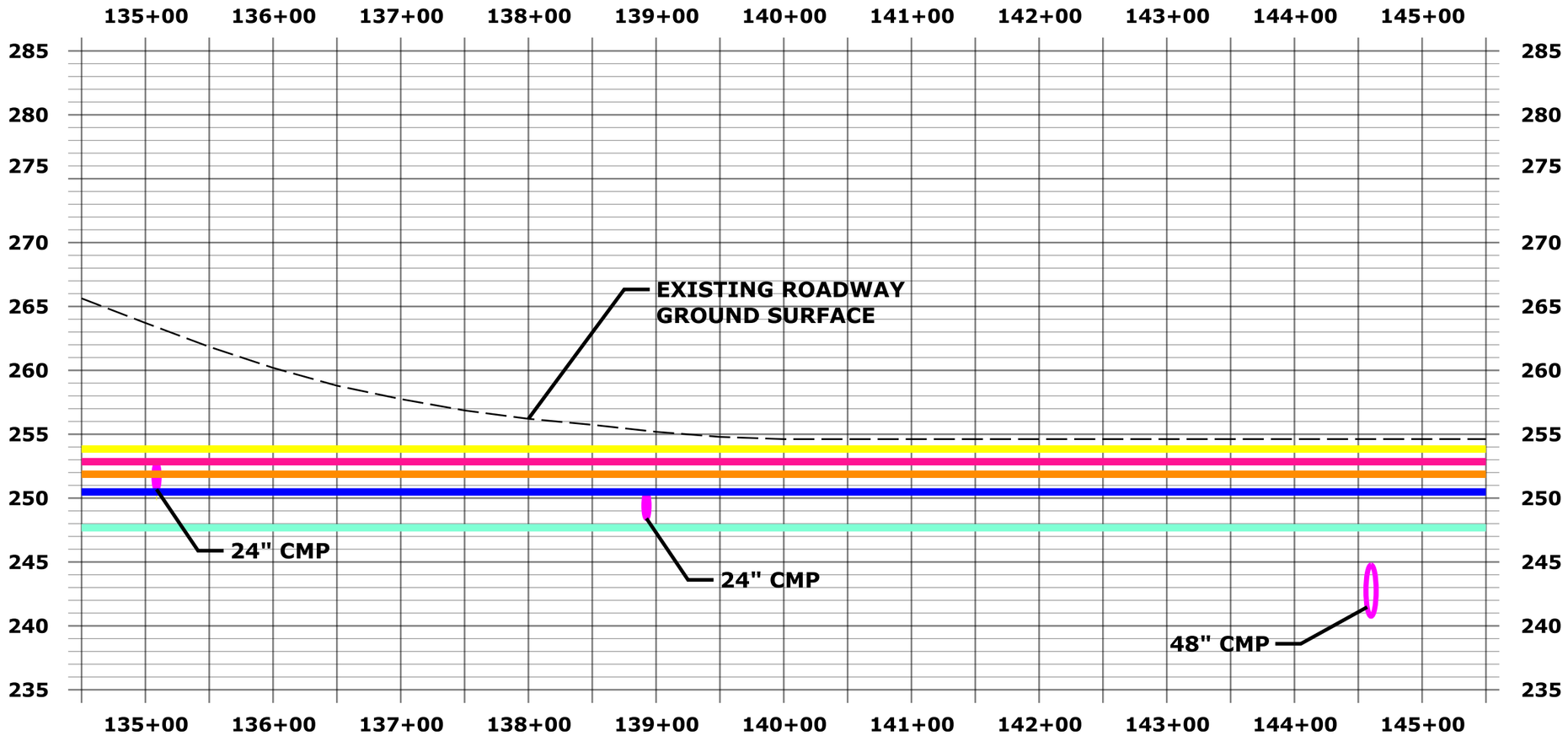
Storm Event	Existing Conditions	Proposed Alternative 03 - Sliplining	Difference	Notes
2-Year	247.68	247.68	0.00	
10-Year	250.48	250.48	0.00	
25-Year	251.87	251.88	0.01	
50-Year	252.85	252.86	0.01	**Design Storm Event**
100-Year	253.84	253.86	0.02	**Check Storm Event**

NOTES:

1. The proposed alternatives look at either removing or sliplining the higher 24" CMP cross culvert. The remaing 24" and 48" CMP cross culverts will remain unaffected.
2. Approximate roadway overtopping elevation is 254 ft (NAVD 88).
3. The existing, unaltered 24" and 48" CMP pipes use a manning's n value of 0.024. Alternative 02, sliplining, use a manning's n value of 0.009.

Water Surface Profile

HNTB



LEGEND

- 2-YEAR WATER SURFACE
- 10-YEAR WATER SURFACE
- 25-YEAR WATER SURFACE
- 50-YEAR WATER SURFACE
- 100-YEAR WATER SURFACE

Date: $date$

Filename: $file$

Scale:
HORIZ. 50 0 50 100
VERT. 5 0 5 10

No.	Revision	By	Date

Designed by: HNTB

CONSULTANT PROJECT MANAGER: $CONSULTANTPM$

	By	Date		By	Date
Designed	NJP	11/2021	Checked	DNM	11/2021
Drawn	NJP	11/2021	In Charge of	---	---

HNTB CORPORATION
82 Running Hill Road, Suite 201
South Portland, ME 04106
TEL (207) 774-5155
FAX (207) 228-0909

MAINE TURNPIKE

THE GOLD STAR MEMORIAL HIGHWAY

MTA PROJECT MANAGER: $MTAPM$

SUPERSTRUCTURE REPLACEMENT ROUTE 197 UNDERPASS

WATER SURFACE PROFILE

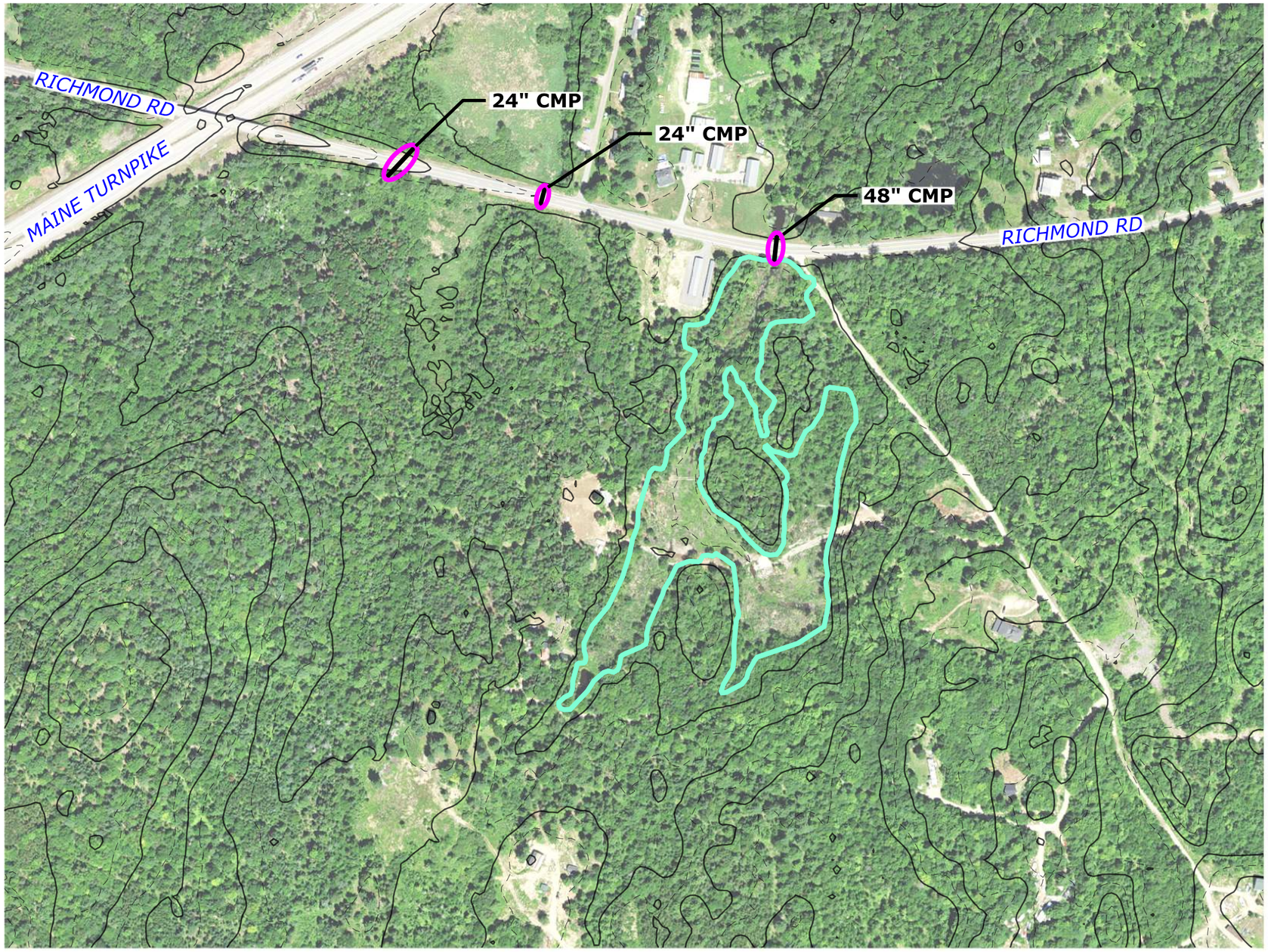
CONTRACTS: 2022.04

SHEET NUMBER: FIG-06
OF

Inundation Maps

HNTB

Date: $date$



LEGEND

2-YEAR FLOODPLAIN

Filename: $file$

Scale: 150 0 150 300 Scale of Feet

No.	Revision	By	Date

Designed by:

CONSULTANT PROJECT MANAGER: $CONSULTANTPM$

	By	Date		By	Date
Designed	NJP	10/2021	Checked	DNM	11/2021
Drawn	NJP	10/2021	In Charge of	---	---

HNTB CORPORATION
82 Running Hill Road, Suite 201
South Portland, ME 04106
TEL (207) 774-5155
FAX (207) 228-0909

MAINE TURNPIKE

THE GOLD STAR MEMORIAL HIGHWAY

MTA PROJECT MANAGER: $MTAPM$

SUPERSTRUCTURE REPLACEMENT ROUTE 197 UNDERPASS

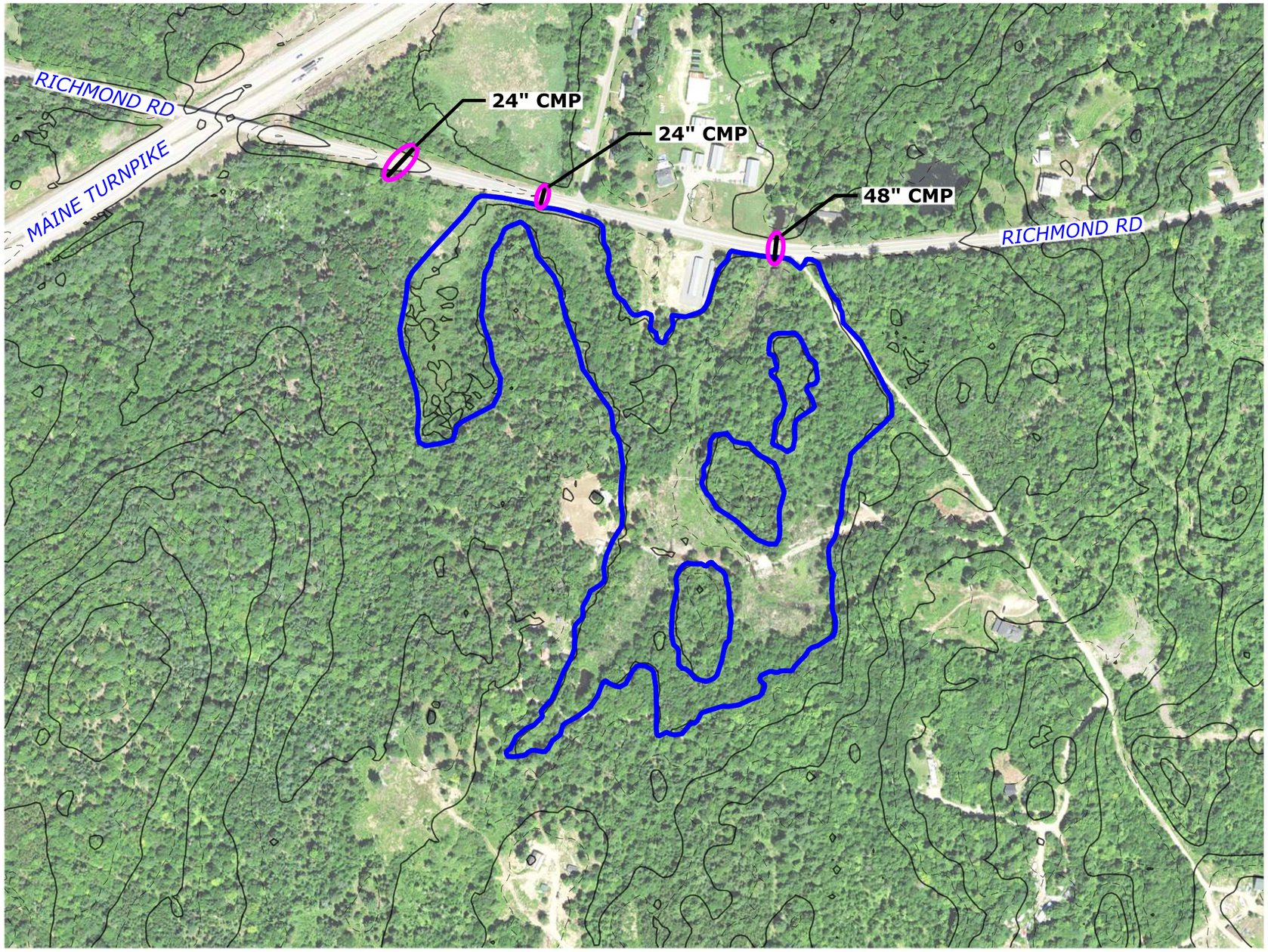
2-YEAR FLOODPLAIN MAP

CONTRACTS: 2022.04

SHEET NUMBER: FIG-01

OF

Date: $date$



LEGEND

10-YEAR FLOODPLAIN

Scale: 150 0 150 300
Scale of Feet

No.	Revision	By	Date

Designed by:

CONSULTANT PROJECT MANAGER: $CONSULTANTPM$

	By	Date		By	Date
Designed	NJP	10/2021	Checked	DNM	11/2021
Drawn	NJP	10/2021	In Charge of	---	---

HNTB CORPORATION
82 Running Hill Road, Suite 201
South Portland, ME 04106
TEL (207) 774-5155
FAX (207) 228-0909

MAINE TURNPIKE

THE GOLD STAR MEMORIAL HIGHWAY

MTA PROJECT MANAGER: $MTAPM$

SUPERSTRUCTURE REPLACEMENT ROUTE 197 UNDERPASS

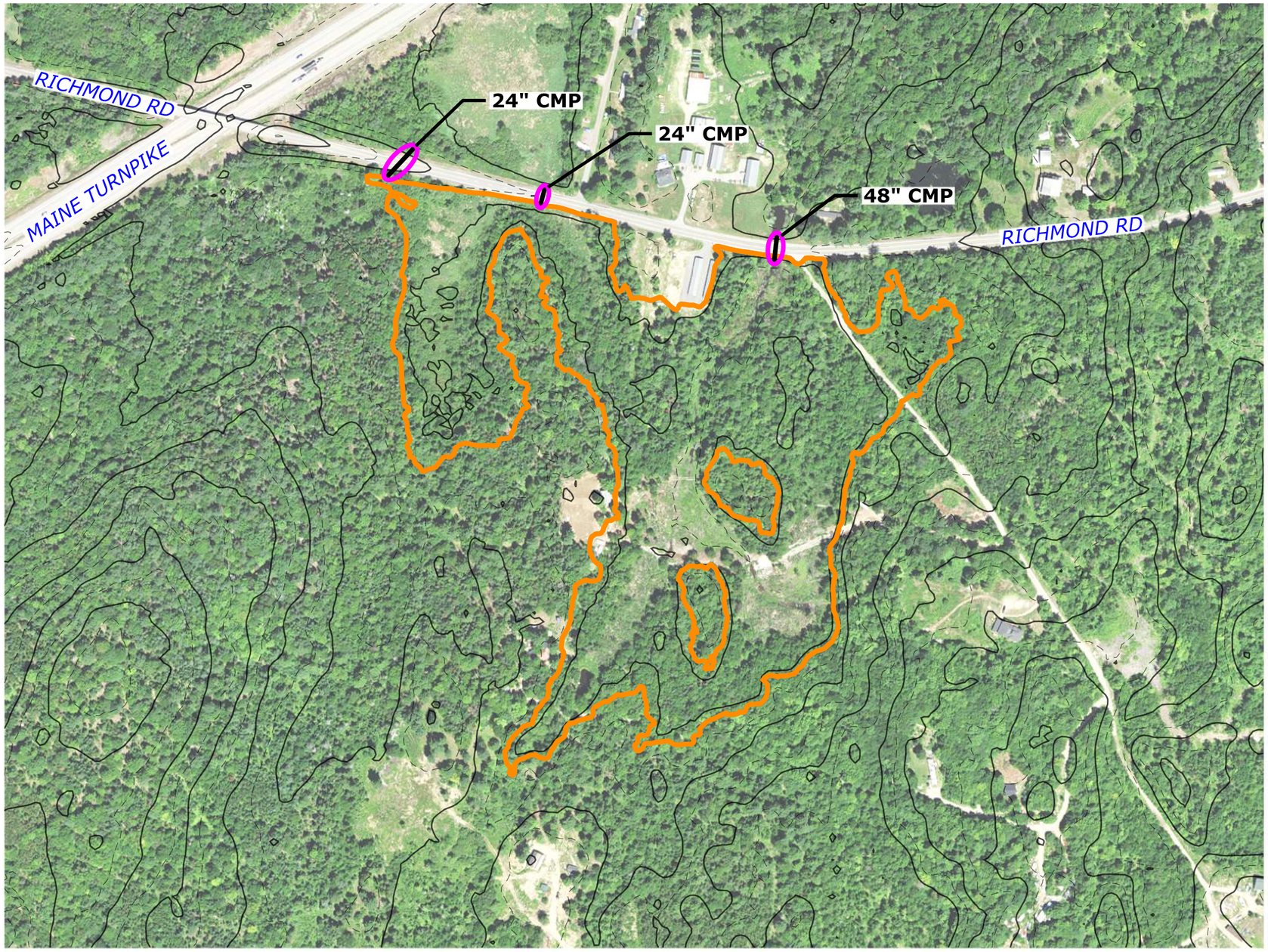
10-YEAR FLOODPLAIN MAP

SHEET NUMBER: FIG-02

CONTRACTS: 2022.04 OF

Filename: $file$

Date: $date$



LEGEND

25-YEAR FLOODPLAIN

Filename: $file$

Scale: 150 0 150 300
Scale of Feet

No.	Revision	By	Date

Designed by:

CONSULTANT PROJECT MANAGER: $CONSULTANTPM$

	By	Date		By	Date
Designed	NJP	10/2021	Checked	DNM	11/2021
Drawn	NJP	10/2021	In Charge of	---	---

HNTB CORPORATION
82 Running Hill Road, Suite 201
South Portland, ME 04106
TEL (207) 774-5155
FAX (207) 228-0909

MAINE TURNPIKE

THE GOLD STAR MEMORIAL HIGHWAY

MTA PROJECT MANAGER: $MTAPM$

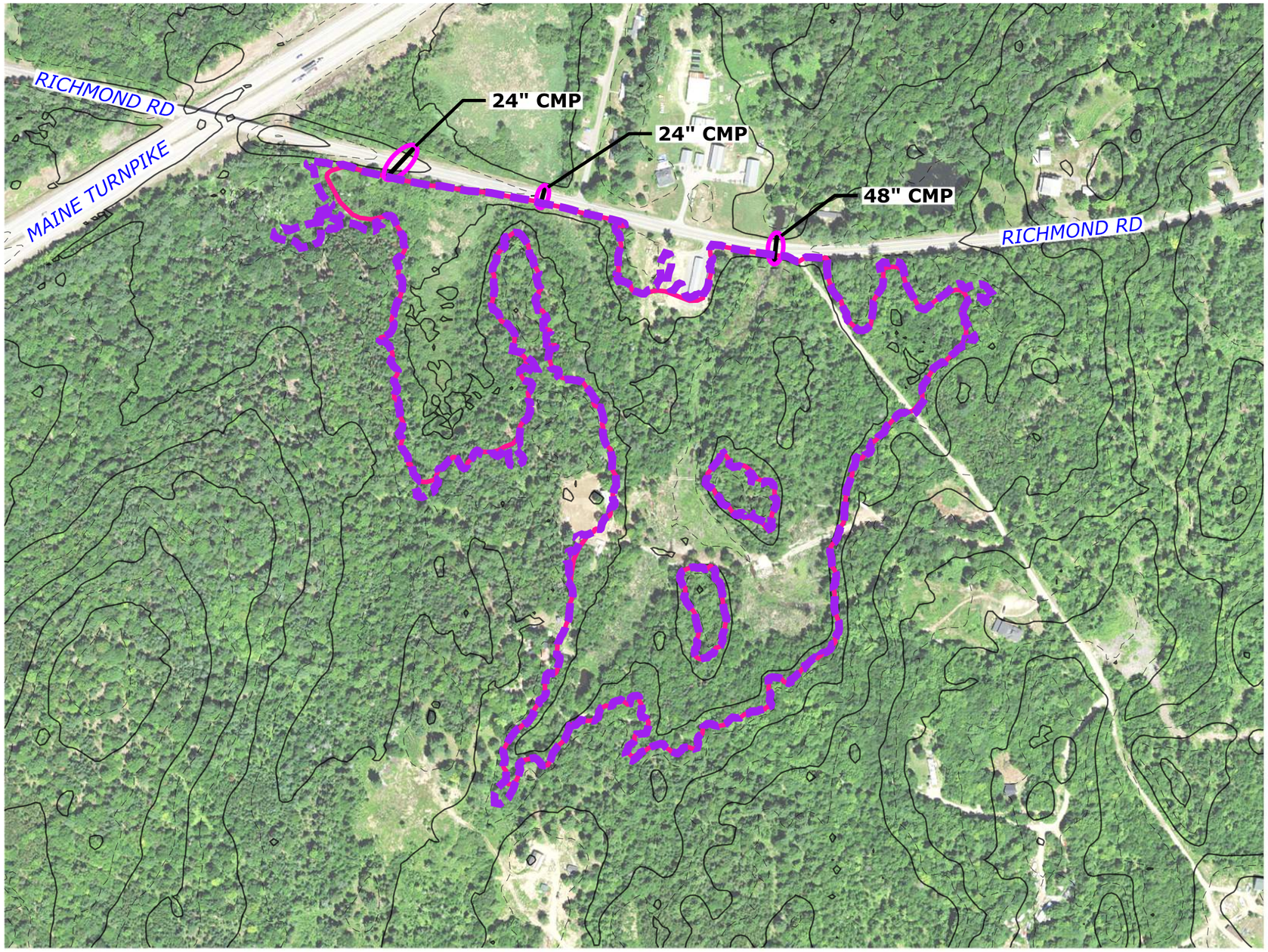
SUPERSTRUCTURE REPLACEMENT ROUTE 197 UNDERPASS

25-YEAR FLOODPLAIN MAP

SHEET NUMBER: FIG-03

CONTRACTS: 2022.04 OF

Date: $date$



LEGEND

EXISTING/ALTERNATIVE 02
50-YEAR FLOODPLAIN

ALTERNATIVE 01
50-YEAR FLOODPLAIN

Scale: 150 0 150 300
Scale of Feet

No.	Revision	By	Date

Designed by:

CONSULTANT PROJECT MANAGER: $CONSULTANTPM$

	By	Date		By	Date
Designed	NJP	10/2021	Checked	DNM	11/2021
Drawn	NJP	10/2021	In Charge of	---	---

HNTB CORPORATION
82 Running Hill Road, Suite 201
South Portland, ME 04106
TEL (207) 774-5155
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MAINE TURNPIKE

THE GOLD STAR MEMORIAL HIGHWAY

MTA PROJECT MANAGER: $MTAPM$

SUPERSTRUCTURE REPLACEMENT ROUTE 197 UNDERPASS

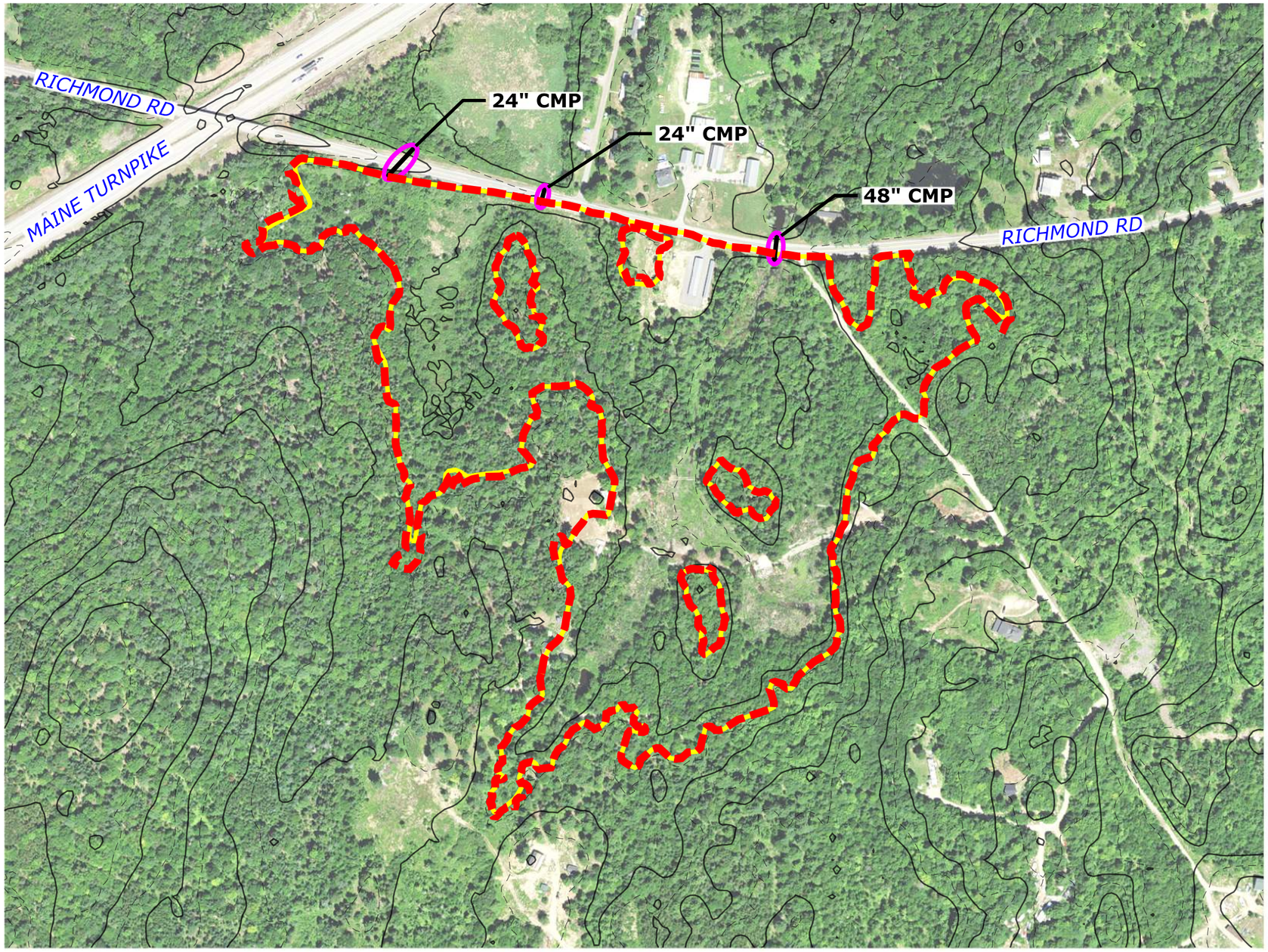
50-YEAR FLOODPLAIN MAP

SHEET NUMBER: FIG-04

CONTRACTS: 2022.04 OF

Filename: $file$

Date: $date$



LEGEND

EXISTING/ALTERNATIVE 02
100-YEAR FLOODPLAIN

ALTERNATIVE 01
100-YEAR FLOODPLAIN

Scale: 150 0 150 300
Scale of Feet

No.	Revision	By	Date

Designed by:

CONSULTANT PROJECT MANAGER: $CONSULTANTPM$

	By	Date		By	Date
Designed	NJP	10/2021	Checked	DNM	11/2021
Drawn	NJP	10/2021	In Charge of	---	---

HNTB CORPORATION
82 Running Hill Road, Suite 201
South Portland, ME 04106
TEL (207) 774-5155
FAX (207) 228-0909

MAINE TURNPIKE

THE GOLD STAR MEMORIAL HIGHWAY

MTA PROJECT MANAGER: $MTAPM$

SUPERSTRUCTURE REPLACEMENT ROUTE 197 UNDERPASS

100-YEAR FLOODPLAIN MAP

SHEET NUMBER: FIG-05

CONTRACTS: 2022.04

OF

Filename: $file$