TRANSCONTINENTAL GAS PIPE LINE COMPANY, LLC

NORTHEAST SUPPLY ENHANCEMENT PROJECT

COMPLIANCE STATEMENT

APPENDIX H. NJDEP FHA STREAM CROSSING

ENGINEERS REPORT

NOVEMBER 2026

ENGINEER' REPORT
SUPPLEMENTAL STREAM CROSSINGS
for
NJDEP Flood Hazard Area Riparian Verification and Flood Hazard Area Individual Permit

Prepared for:

NORTHEAST SUPPLY ENHANCEMENT PROJECT – MADISON LOOP
Township of Old Bridge & Borough of Sayreville
Middlesex County

Prepared By:

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Certificate of Authorization No. 24GA28032700

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Professional Engineer
N.J. License No. 51591

PS&S Project # 05731-0002
May 2025
Revised June 2025

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2.0 Stream Crossing Analysis....1
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Drainage Area Maps....1
CHANNEL 2-YEAR STORM NORMAL DEPTH FLOW CALCULATIONS....1

Plan References:

"NJDEP Land Use Plans for the Northeast Supply Enhancement Project – Proposed 26" Madison Loop – Freshwater Wetlands Permit Plans", prepared by Paulus, Sokolowski and Sartor, LLC, last revised June 20, 2025.

"NJDEP Land Use Plans for the Northeast Supply Enhancement Project – Proposed 26" Madison Loop – Flood Hazard Area Permit Plans", prepared by Paulus, Sokolowski and Sartor, LLC, last revised June 20, 2025.

"NJDEP Land Use Plans for the Northeast Supply Enhancement Project – Proposed 26" Madison Loop – Waterfront Development Permit Plans", prepared by Paulus, Sokolowski and Sartor, LLC, last revised June 20, 2025.

"Northeast Supply Enhancement Project Proposed 26" Madison Loop Supplemental Stream Crossings", prepared by Paulus, Sokolowski and Sartor, LLC, last revised June 20, 2025.

1.0 INTRODUCTION

The Transcontinental Gas Pipe Line Company, LLC (Transco) is proposing the Northeast Supply Enhancement Project – Madison Loop located in the Township of Old Bridge and Borough of Sayreville, Middlesex County, New Jersey. The project includes the proposed construction of 3.42 miles of 26-inch gas pipeline co-located adjacent to an existing 42-inch gas pipeline. This on-shore project extends from existing Compressor Station 207 at MP8.57 in Old Bridge Township to MP12.00 southwest of the Morgan Meter and Regulating (M&R) Station on the Lower New York Bay Loop C adjacent to New Jersey State Highway Route 35 near the Raritan Bay in the Borough of Sayreville. Approximately 1.2 miles of the loop is proposed to be installed via horizontal directional drilling. Refer to the Application for NJDEP Flood Hazard Area Individual Permit and Verification Environmental Report, prepared by Amy S. Greene Environmental Consultants, Inc. for compliance with environmental regulations under N.J.A.C. 7:13 and site plans entitled "NJDEP Land Use Plans for the Northeast Supply Enhancement Project – Proposed 26" Madison Loop – Freshwater Wetlands Permit Plans", "NJDEP Land Use Plans for the Northeast Supply Enhancement Project – Proposed 26" Madison Loop – Flood Hazard Area Permit Plans", and "NJDEP Land Use Plans for the Northeast Supply Enhancement Project – Proposed 26" Madison Loop – Waterfront Development Permit Plans", prepared by Paulus, Sokolowski and Sartor, LLC, last revised June 20, 2025.

The limit of disturbance associated with the installation of the gas pipeline and work areas crosses six (6) channels along the project route including unnamed tributaries to Tennent Brook and an unnamed tributary to Cheesequake Creek. The purpose of this report is to provide analysis of the streams at each crossing and design temporary bridge crossings that will be utilized during construction.

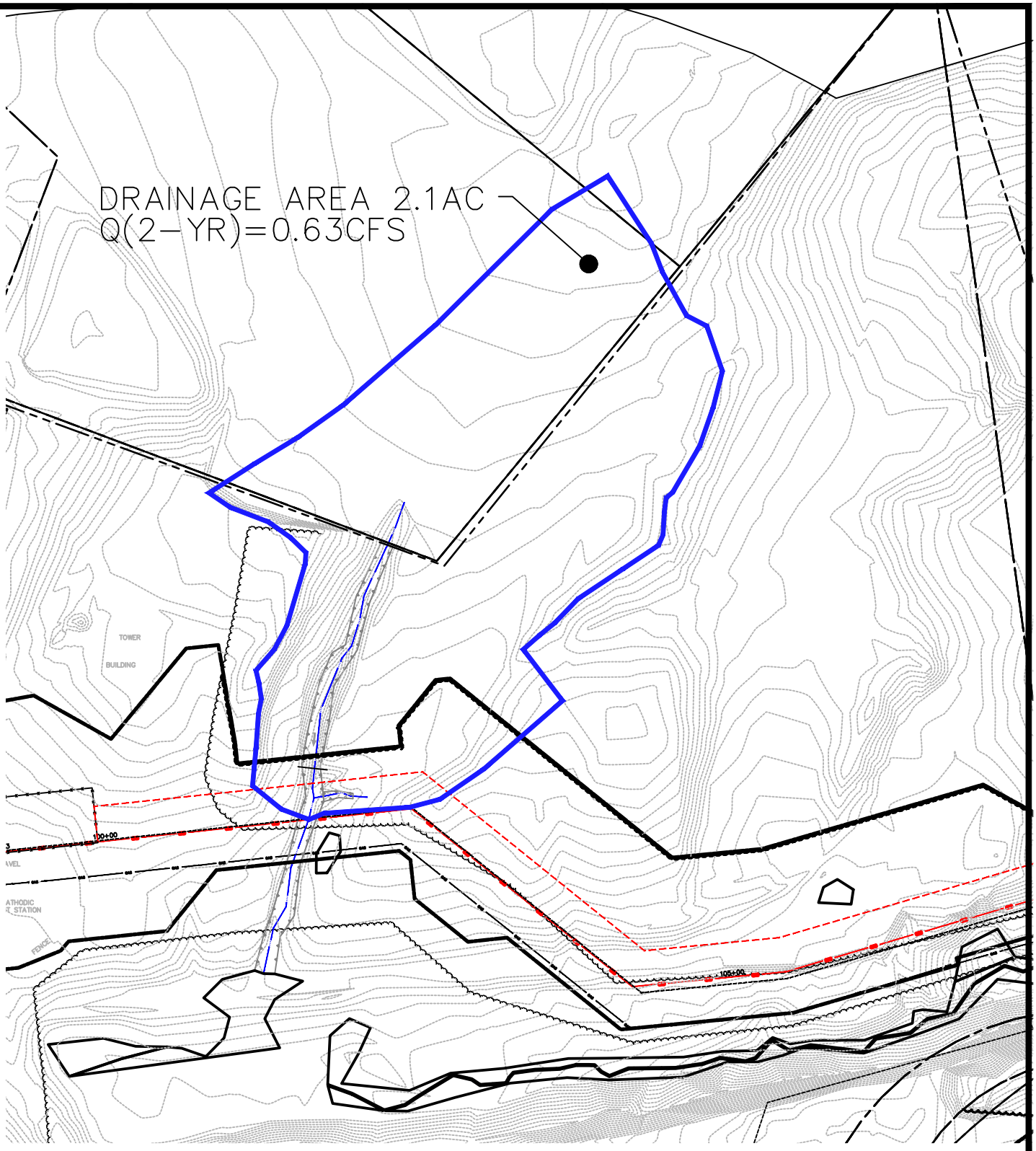
2.0 STREAM CROSSING ANALYSIS

The contributing drainage areas and 2-year peak flow to each stream crossed by the installation of the gas pipeline and work areas has been determined based on USGS StreamStats v4.1.3. The streams associated with the crossings at MP 8.61 and MP 10.05 did not appear on StreamStats, so the contributory drainage areas were delineated from LIDAR topography. The 2-year storm normal depth flow of each channel at the proposed temporary stream crossing locations was calculated using Bentley FlowMaster v8i by utilizing the 2-year peak flow from StreamStats and channel slope and cross-section characteristics as determined by a survey prepared by D.W. Smith Associates, LLC as provided by Williams Transcontinental Gas Pipe Line Company, LLC. Refer to the Appendix of this report for the StreamStats Report and FlowMaster 2-year storm normal depth calculations. Refer to the plans entitled "Northeast Supply Enhancement Project Proposed 26" Madison Loop Stream Crossings", last revised June 20, 2025, prepared by Paulus, Sokolowski and Sartor, LLC for individual stream crossing plans and stream profiles and cross-sections depicting the proposed temporary bridge design, 2-year storm depths and stream diversion method and for proposed temporary bridge construction details.

3.0 SUMMARY

All proposed temporary bridge crossings allow for the passage of the 2-year storm event below the bottom bridge chord. No impact will be realized to habitable buildings, railroads or parking areas upstream of the project.

APPENDIX
STREAMSTATS REPORTS
DRAINAGE AREA MAPS
CHANNEL 2-YEAR STORM NORMAL DEPTH FLOW CALCULATIONS



PAULUS, SOKOLOWSKI AND SARTOR, LLC.

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CERTIFICATE OF AUTHORIZATION NO. 24GA28032700

PROJECT TITLE
NORTHEAST SUPPLY ENHANCEMENT PROJECT MADISON LOOP
BOROUGH OF SAYREVILLE & OLD BRIDGE TOWNSHIP, MIDDLESEX COUNTY, NJ

SHEET TITLE
DRAINAGE AREA MAP MP-8.61

PROJ. NO.:	05731-0003	DRN. BY:	IK	SCALE:	1"=100'
DATE:	05/21/2025	CK'D BY:	WS	SHT. NO.:	FIG. 1

FILE NAME: P:\05731\0002\DWGs\CAD\C-Civil\Plotdwgs\05-21-25 NESE 2 Plans\05731-0002-Riparian 05-21-25\Stream Crossing-Supplemental Set.dwg LAST EDIT: 05/19/2025 – 04:51:55 PM LOGIN: jschooling@
XREFS: MADISON_MLLBD_08_56-11_98_PEX ; NJDEP Permit Plan Base Plan ; Points ; Property Lines and ROW ; NJ_NYBL_12_2015_12_CL_00_CNTR_2D ; NJ_NYBL_07_2015_12_CL_00_CNTR_2D ; NJ_NYBL_08_2015_12_CL_00_CNTR_2D ; NJ_NYBL_09_2015_12_CL_00_CNTR_2D ; NJ_NYBL_10_2015_12_CL_00_C

Worksheet for MP-8.61_STA 9+62.93

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.01880	ft/ft
Left Side Slope	0.50	ft/ft (H:V)
Right Side Slope	0.50	ft/ft (H:V)
Bottom Width	1.00	ft
Discharge	0.63	ft^3/s

Results

Normal Depth	0.33	ft
Flow Area	0.38	ft^2
Wetted Perimeter	1.73	ft
Hydraulic Radius	0.22	ft
Top Width	1.33	ft
Critical Depth	0.22	ft
Critical Slope	0.06590	ft/ft
Velocity	1.65	ft/s
Velocity Head	0.04	ft
Specific Energy	0.37	ft
Froude Number	0.54	
Flow Type	Subcritical	

GVF Input Data

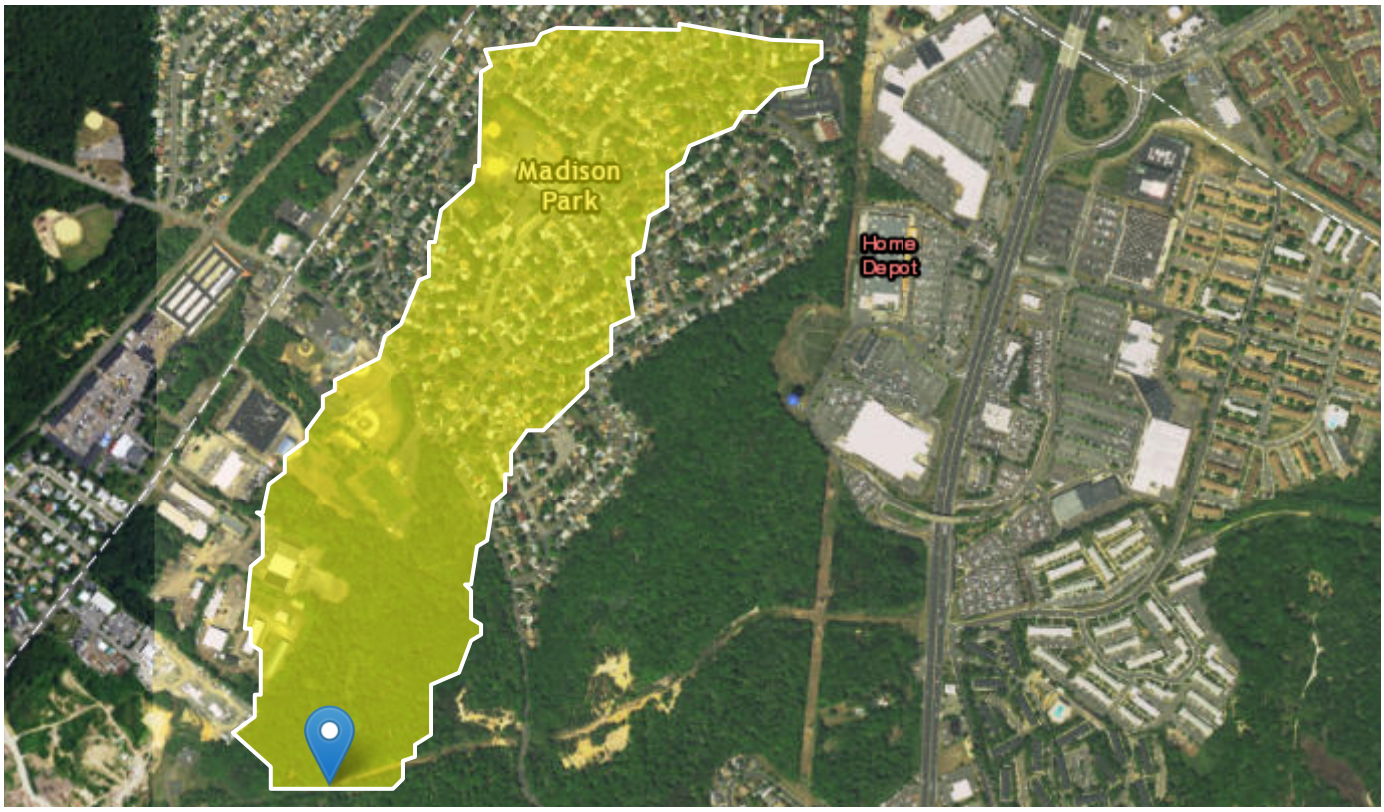
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.22	ft
Channel Slope	0.01880	ft/ft
Critical Slope	0.06590	ft/ft

StreamStats Report

Region ID: NJ
Workspace ID: NJ20170802132329786000
Clicked Point (Latitude, Longitude): 40.44231, -74.31292
Time: 2017-08-02 13:24:14 -0400



MP-8.76

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.21	square miles
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	5.04	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	84.9	feet per mi
POPDENS	Basin Population Density	3380	persons per square mile

Peak-Flow Statistics Parameters [Peak Inner Coastal Region 2009 5167]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.21	square miles	0.41	118
STORAGE	Percent Storage	5.04	percent	1	41.1
CSL10_85	Stream Slope 10 and 85 Method	84.9	feet per mi	2.49	55.5
POPDENS	Basin Population Density	3380	persons per square mile	34	5382

Peak-Flow Statistics Disclaimers [Peak Inner Coastal Region 2009 5167]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [Peak Inner Coastal Region 2009 5167]

Statistic	Value	Unit
2 Year Peak Flood	42	ft^3/s
5 Year Peak Flood	73.2	ft^3/s
10 Year Peak Flood	98.2	ft^3/s
25 Year Peak Flood	134	ft^3/s
50 Year Peak Flood	163	ft^3/s
100 Year Peak Flood	195	ft^3/s
500 Year Peak Flood	270	ft^3/s

Peak-Flow Statistics Citations

Watson, K.M.,and Schopp, R.D.,2009, Methodology for estimation of flood magnitude and frequency for New Jersey streams, U.S. Geological Survey Scientific Investigations Report 2009-5167, 51 p. (http://pubs.usgs.gov/sir/2009/5167/)

Worksheet for MP-8.76 STA. 9+75 EX.

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00900	ft/ft
Discharge	42.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	63.00
0+03	62.00
0+09	62.00
0+15	62.20
0+38	61.00
0+44	61.10
0+49	60.20
0+56	61.30
0+63	61.00
0+89	61.00
1+01	64.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 63.00)	(1+01, 64.00)	0.045

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.20	ft
Elevation Range	60.20 to 64.00 ft	

Worksheet for MP-8.76 STA. 9+75 EX.

Results

Flow Area		24.50	ft²
Wetted Perimeter		60.54	ft
Hydraulic Radius		0.40	ft
Top Width		60.30	ft
Normal Depth		1.20	ft
Critical Depth		1.03	ft
Critical Slope		0.04613	ft/ft
Velocity		1.71	ft/s
Velocity Head		0.05	ft
Specific Energy		1.25	ft
Froude Number		0.47	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.20	ft
Critical Depth	1.03	ft
Channel Slope	0.00900	ft/ft
Critical Slope	0.04613	ft/ft

Worksheet for MP-8.76 STA. 9+75 PR.

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00900	ft/ft
Discharge	42.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	62.43
0+00	61.10
0+05	60.20
0+12	61.30
0+12	62.43

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 62.43)	(0+12, 62.43)	0.045

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.64	ft
Elevation Range	60.20 to 62.43 ft	
Flow Area	13.30	ft²
Wetted Perimeter	13.13	ft
Hydraulic Radius	1.01	ft
Top Width	12.02	ft
Normal Depth	1.64	ft
Critical Depth	1.25	ft

Worksheet for MP-8.76 STA. 9+75 PR.

Results

Critical Slope		0.03474	ft/ft
Velocity		3.16	ft/s
Velocity Head		0.16	ft
Specific Energy		1.80	ft
Froude Number		0.53	
Flow Type	Subcritical		

GVF Input Data

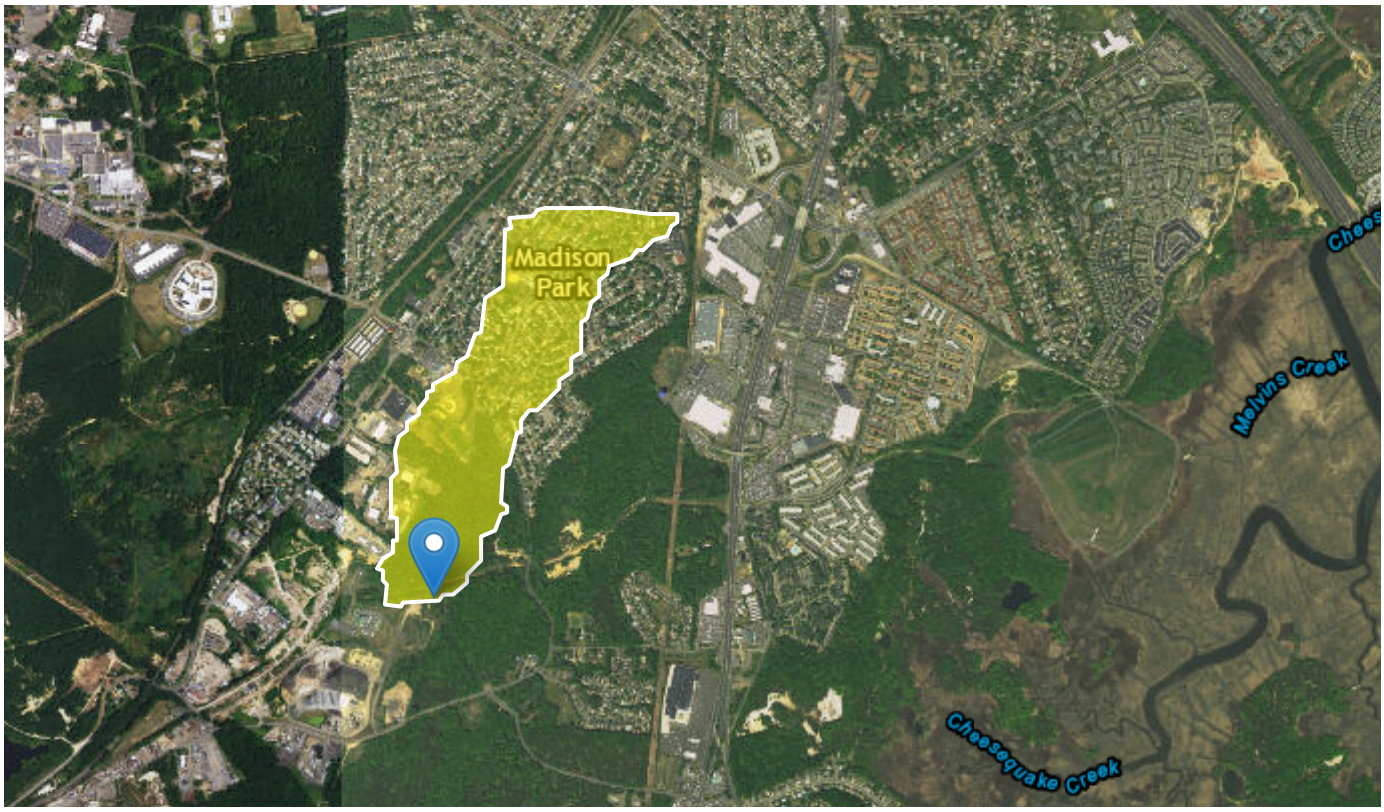
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.64	ft
Critical Depth	1.25	ft
Channel Slope	0.00900	ft/ft
Critical Slope	0.03474	ft/ft

StreamStats Report

Region ID: NJ
Workspace ID: NJ20170803164649707000
Clicked Point (Latitude, Longitude): 40.44190, -74.31277
Time: 2017-08-03 16:47:32 -0400



MP-8.76-Access Road

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.22	square miles
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	5.06	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	84.3	feet per mi
POPDENS	Basin Population Density	3290	persons per square mile

Peak-Flow Statistics Parameters [Peak Inner Coastal Region 2009 5167]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.22	square miles	0.41	118
STORAGE	Percent Storage	5.06	percent	1	41.1
CSL10_85	Stream Slope 10 and 85 Method	84.3	feet per mi	2.49	55.5
POPDENS	Basin Population Density	3290	persons per square mile	34	5382

Peak-Flow Statistics Disclaimers [Peak Inner Coastal Region 2009 5167]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [Peak Inner Coastal Region 2009 5167]

Statistic	Value	Unit
2 Year Peak Flood	43.2	ft^3/s
5 Year Peak Flood	75.4	ft^3/s
10 Year Peak Flood	101	ft^3/s
25 Year Peak Flood	138	ft^3/s
50 Year Peak Flood	168	ft^3/s
100 Year Peak Flood	200	ft^3/s
500 Year Peak Flood	278	ft^3/s

Peak-Flow Statistics Citations

Watson, K.M.,and Schopp, R.D.,2009, Methodology for estimation of flood magnitude and frequency for New Jersey streams, U.S. Geological Survey Scientific Investigations Report 2009-5167, 51 p. (http://pubs.usgs.gov/sir/2009/5167/)

Worksheet for MP-8.76 ACCESS ROAD

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02000	ft/ft
Discharge	43.20	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	57.30
0+10	57.00
0+15	57.00
0+17	56.50
0+20	56.00
0+22	56.20
0+26	57.30
0+34	57.00
0+50	59.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 57.30)	(0+50, 59.50)	0.045

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.38	ft
Elevation Range	56.00 to 59.50 ft	
Flow Area	16.07	ft²
Wetted Perimeter	36.78	ft
Hydraulic Radius	0.44	ft
Top Width	36.40	ft
Normal Depth	1.38	ft
Critical Depth	1.28	ft
Critical Slope	0.04173	ft/ft

Worksheet for MP-8.76 ACCESS ROAD

Results

Velocity		2.69	ft/s
Velocity Head		0.11	ft
Specific Energy		1.49	ft
Froude Number		0.71	
Flow Type	Subcritical		

GVF Input Data

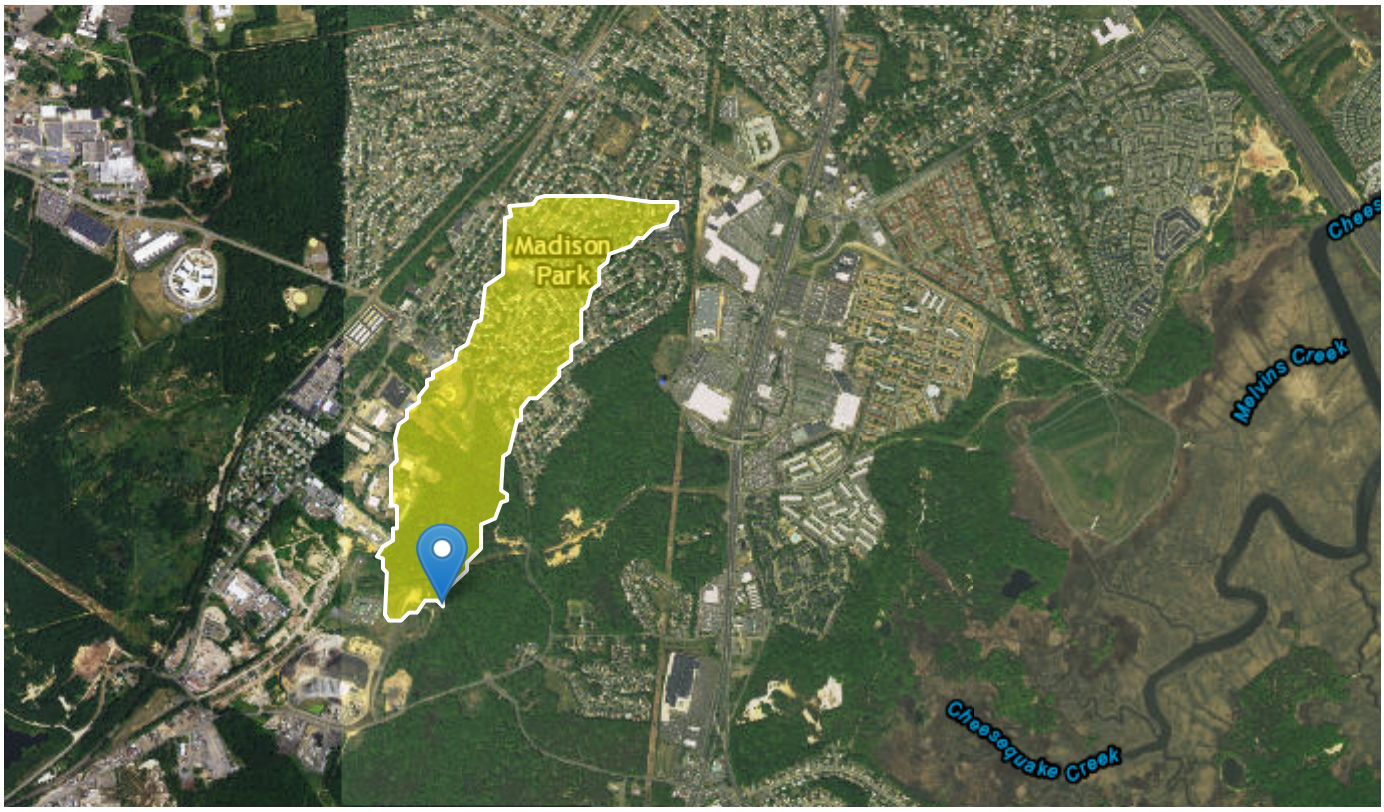
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.38	ft
Critical Depth	1.28	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.04173	ft/ft

StreamStats Report

Region ID: NJ
Workspace ID: NJ20170803165519378000
Clicked Point (Latitude, Longitude): 40.44126, -74.31245
Time: 2017-08-03 16:56:00 -0400



MP-8.76 (HDD Temporary Workspace)

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.23	square miles
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	5.23	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	82.5	feet per mi
POPDENS	Basin Population Density	3200	persons per square mile

Peak-Flow Statistics Parameters [Peak Inner Coastal Region 2009 5167]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.23	square miles	0.41	118
STORAGE	Percent Storage	5.23	percent	1	41.1
CSL10_85	Stream Slope 10 and 85 Method	82.5	feet per mi	2.49	55.5
POPDENS	Basin Population Density	3200	persons per square mile	34	5382

Peak-Flow Statistics Disclaimers [Peak Inner Coastal Region 2009 5167]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [Peak Inner Coastal Region 2009 5167]

Statistic	Value	Unit
2 Year Peak Flood	44.2	ft^3/s
5 Year Peak Flood	77.1	ft^3/s
10 Year Peak Flood	103	ft^3/s
25 Year Peak Flood	141	ft^3/s
50 Year Peak Flood	171	ft^3/s
100 Year Peak Flood	205	ft^3/s
500 Year Peak Flood	284	ft^3/s

Peak-Flow Statistics Citations

Watson, K.M.,and Schopp, R.D.,2009, Methodology for estimation of flood magnitude and frequency for New Jersey streams, U.S. Geological Survey Scientific Investigations Report 2009-5167, 51 p. (http://pubs.usgs.gov/sir/2009/5167/)

Worksheet for MP8.76 HDD-STA 18+83

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02000	ft/ft
Discharge	44.20	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	56.00
0+05	55.00
0+09	55.20
0+10	54.00
0+12	54.00
0+13	53.50
0+18	55.50
0+21	55.00
0+24	55.00
0+53	56.10

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 56.00)	(0+53, 56.10)	0.045

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.92	ft
Elevation Range	53.50 to 56.10 ft	
Flow Area	15.43	ft²
Wetted Perimeter	32.11	ft
Hydraulic Radius	0.48	ft
Top Width	30.99	ft
Normal Depth	1.92	ft
Critical Depth	1.78	ft

Worksheet for MP8.76 HDD-STA 18+83

Results

Critical Slope		0.04055	ft/ft
Velocity		2.86	ft/s
Velocity Head		0.13	ft
Specific Energy		2.04	ft
Froude Number		0.72	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.92	ft
Critical Depth	1.78	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.04055	ft/ft

StreamStats Report

Region ID: NJ
Workspace ID: NJ20170802170014963000
Clicked Point (Latitude, Longitude): 40.44440, -74.30455
Time: 2017-08-02 17:00:58 -0400



MP-9.26

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.16	square miles
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	4.47	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	114	feet per mi
POPDENS	Basin Population Density	3190	persons per square mile

Peak-Flow Statistics Parameters [Peak Inner Coastal Region 2009 5167]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.16	square miles	0.41	118
STORAGE	Percent Storage	4.47	percent	1	41.1
CSL10_85	Stream Slope 10 and 85 Method	114	feet per mi	2.49	55.5
POPDENS	Basin Population Density	3190	persons per square mile	34	5382

Peak-Flow Statistics Disclaimers [Peak Inner Coastal Region 2009 5167]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [Peak Inner Coastal Region 2009 5167]

Statistic	Value	Unit
2 Year Peak Flood	36.7	ft^3/s
5 Year Peak Flood	64.6	ft^3/s
10 Year Peak Flood	87.1	ft^3/s
25 Year Peak Flood	119	ft^3/s
50 Year Peak Flood	146	ft^3/s
100 Year Peak Flood	175	ft^3/s
500 Year Peak Flood	244	ft^3/s

Peak-Flow Statistics Citations

Watson, K.M.,and Schopp, R.D.,2009, Methodology for estimation of flood magnitude and frequency for New Jersey streams, U.S. Geological Survey Scientific Investigations Report 2009-5167, 51 p. (http://pubs.usgs.gov/sir/2009/5167/)

Worksheet for MP-9.26 DA102AC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.02000	ft/ft
Left Side Slope	0.34	ft/ft (H:V)
Right Side Slope	0.30	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	36.70	ft^3/s

Results

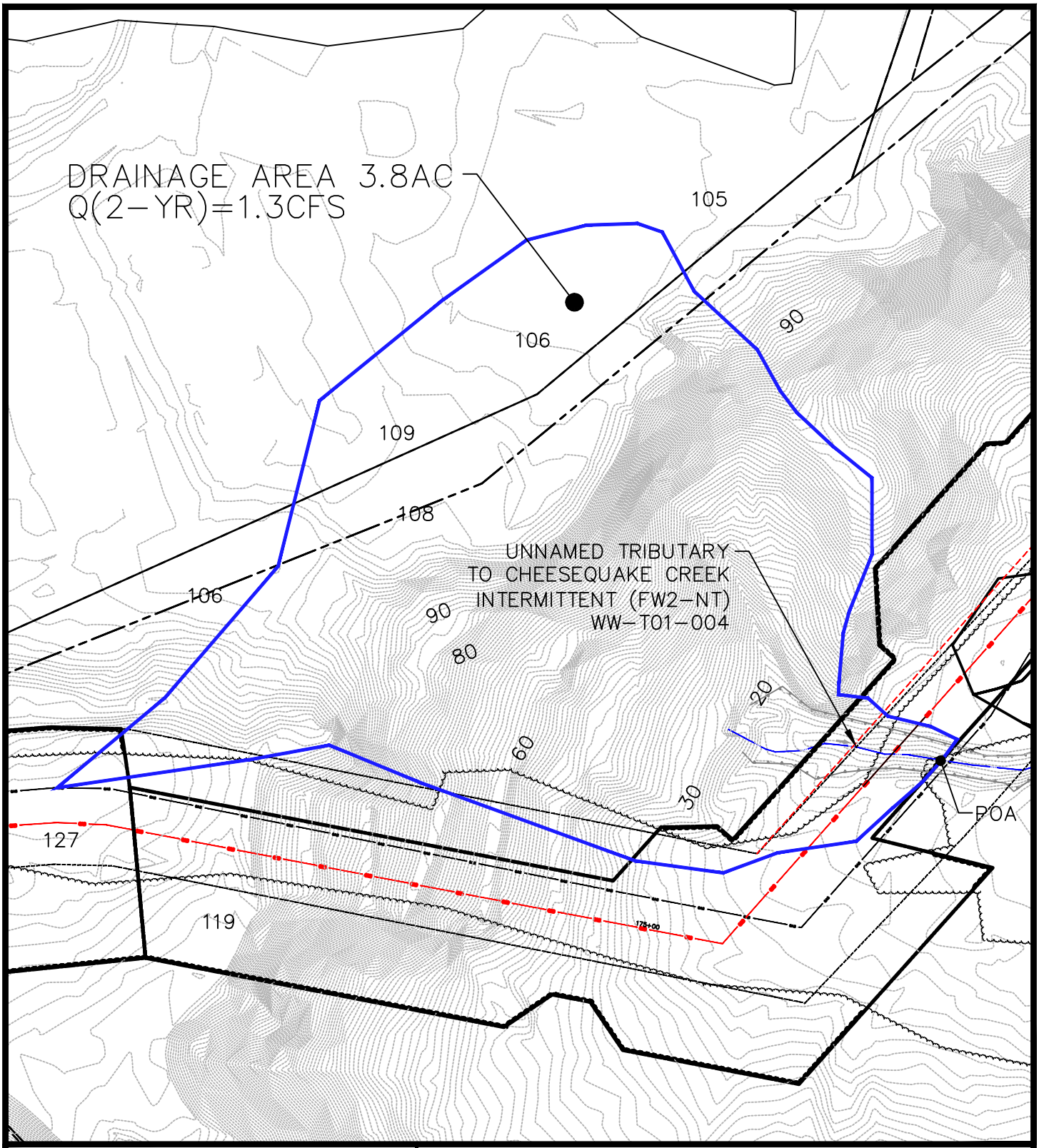
Normal Depth	0.58	ft
Flow Area	11.70	ft^2
Wetted Perimeter	21.22	ft
Hydraulic Radius	0.55	ft
Top Width	20.37	ft
Critical Depth	0.47	ft
Critical Slope	0.03976	ft/ft
Velocity	3.14	ft/s
Velocity Head	0.15	ft
Specific Energy	0.73	ft
Froude Number	0.73	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.58	ft
Critical Depth	0.47	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.03976	ft/ft



PAULUS, SOKOLOWSKI AND SARTOR, LLC.

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CERTIFICATE OF AUTHORIZATION NO. 24GA28032700

PROJECT TITLE

NORTHEAST SUPPLY ENHANCEMENT PROJECT MADISON LOOP

BOROUGH OF SAYREVILLE & OLD BRIDGE TOWNSHIP, MIDDLESEX COUNTY, NJ

SHEET TITLE

DRAINAGE AREA MAP MP-10.05

PROJ. NO.:	05731-0003	DRN. BY:	IK	SCALE:	1"=100'
DATE:	05/21/2025	CK'D BY:	WS	SHT. NO.:	FIG. 1

FILE NAME: P:\05731\0002\DWGs\CAD\C-Civil\Plotdwgs\05-21-25 NESE 2 Plans\05731-0002-Riparian 05-21-25\Stream Crossing-Supplemental Set.dwg LAST EDIT: 05/19/2025 - 04:51:03 PM LOGIN: jschooling@
XREFS: MADISON_MLLBD_08_56-11_98_PEX ; NJDEP Permit Plan Base Plan ; Points ; Property Lines and ROW ; NJ_NYBL_12_2015_12_CL_00_CNTR_2D ; NJ_NYBL_07_2015_12_CL_00_CNTR_2D ; NJ_NYBL_08_2015_12_CL_00_CNTR_2D ; NJ_NYBL_09_2015_12_CL_00_CNTR_2D ; NJ_NYBL_10_2015_12_CL_00

Worksheet for MP-10.05 STA10+00

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.01900	ft/ft
Left Side Slope	0.32	ft/ft (H:V)
Right Side Slope	0.24	ft/ft (H:V)
Bottom Width	4.90	ft
Discharge	1.30	ft^3/s

Results

Normal Depth	0.19	ft
Flow Area	0.92	ft^2
Wetted Perimeter	5.29	ft
Hydraulic Radius	0.17	ft
Top Width	5.00	ft
Critical Depth	0.13	ft
Critical Slope	0.06154	ft/ft
Velocity	1.42	ft/s
Velocity Head	0.03	ft
Specific Energy	0.22	ft
Froude Number	0.58	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.19	ft
Critical Depth	0.13	ft
Channel Slope	0.01900	ft/ft
Critical Slope	0.06154	ft/ft

NORTHEAST SUPPLY ENHANCEMENT PROJECT - MADISON LOOP AVERAGE STREAM FLOW ANALYSIS			
STREAM MP	2-YEAR FLOW (CFS)	DRAINAGE AREA (AC.)	RATIO (CFS/AC.)
8.76	42	136	0.31
8.76 ACCESS ROAD	43.2	141	0.31
8.76 HDD	44.2	141	0.31
9.26	36.7	105	0.35
TOTAL	166.1	523	0.32

NOTE: 2-year flow rate for Drainge Areas to streams at MP 8.61 and 10.05 calculated based upon ratio of average flow rate per acre for other streams analyzed in the region.