Flood Hazard Area Study
Block 801, Lot 20
84-90 East Main Street

BOROUGH OF MENDHAM, MORRIS COUNTY, NEW JERSEY

MAY 2021

PREPARED FOR:

STONEFIELD ENGINEERING & DESIGN, LLC
92 PARK AVENUE
RUTHERFORD, NJ 07070
201-340-4468

PREPARED BY:

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LICENSED
PROFESSIONAL ENGINEER

PRINCETON HYDRO

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I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining and preparing the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment.

Signature | 05/24/2021 (Date) | Seal

Clay Emerson, PhD, PE, CFM
Mark Herrmann, PE, CFM

1.0 INTRODUCTION

Princeton Hydro was contracted by Stonefield Engineering and Design, LLC to perform a flood study of a stream adjacent to the property located at 84-90 East Main Street (Block 801 Lot 20) in Mendham Borough, New Jersey. The property in question contains an existing shopping center and The Club at Mendham, a sports facility. The site is bordered by commercial property to the east, woodlands owned by Mendham Borough to the north, and senior living housing (Heritage Manor) and woodlands to the west. The studied stream originates from the northwest corner of the Heritage Manor property.

The stream is an unnamed tributary of the North Branch Raritan River, and has not been studied by FEMA nor the NJDEP. It flows in a general northerly direction, from the rear line of lots fronting on Dean Road through the Mendham Borough property to the north. The stream begins narrow and deep, with side slopes close to vertical. As it meanders through the Borough property, it becomes much shallower, and the channel becomes less defined. At approximately 300' north of the beginning of the stream, another ditch merges with the stream. This ditch conveys flow from a drainage basin and storm system located on the East Main Street property. The confluence of these two features occurs near the northwest corner of the property.

Upon a review of the watershed, it was determined that the drainage area to the stream is greater than 50 acres. Therefore, a New Jersey Flood Hazard Area analysis was performed for the project site. This report details the methodologies and findings of the hydrologic and hydraulic analysis of the drainage area to the site in accordance with FEMA and NJDEP (NJAC §7:13-3.6) regulations.

2.0 HYDROLOGIC COMPUTATIONS

The drainage areas were determined through a combination of desktop topography analysis, existing drainage system documentation, and a site visits conducted in December 2020 and February 2021. The resultant drainage area is approximately 75 acres, with an average land slope between two and three percent. Hydrologic runoff calculations were completed in accordance with guidelines and methods outlined in Technical Release 55 (TR-55).

The drainage area to the stream was delineated within GIS using utilizing 2015 LiDAR data and on-site observations from Princeton Hydro staff. The drainage area for the subject property was delineated using a topographic survey prepared by Stonefield. Hydrologic soil group data from the NRCS Web Soil survey and land use data from the NJDEP Bureau of GIS were used to calculate a weighted curve number of 74 for the stream drainage area (DA WS1) and 92 for the property drainage area (DA WS2). The time of concentration was estimated using the basin lag equation. 24-hour rainfall data for the 10-year and 100-year events were collected from NOAA Atlas 14. Hydrologic modeling was performed in the HydroCAD computer software. The resulting drainage are delineations are shown in the Figure below.

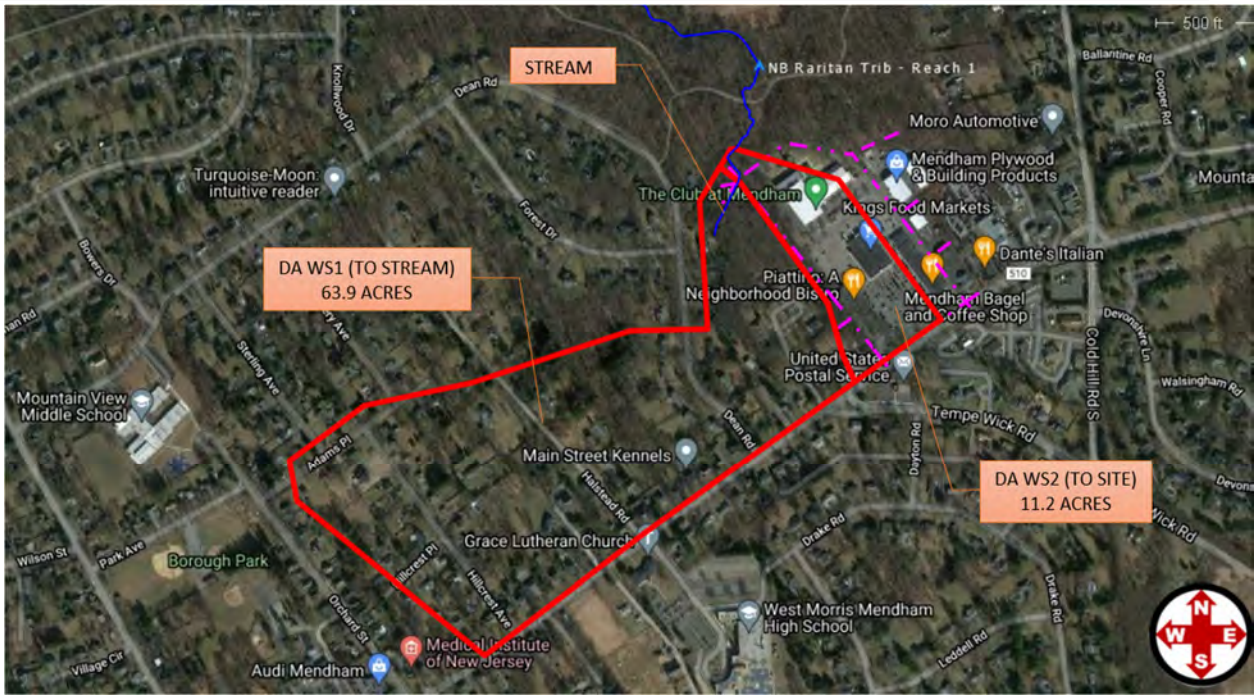

Figure 1. Drainage Area Delineation

The drainage area to the stream is denoted as WS1 and is 63.9 acres in size. This drainage area is predominantly residential in nature. The drainage area to the features leaving the subject property is denoted as WS2 and is 11.2 acres. This drainage area is a commercial property. The total area draining to the point of analysis is 75.1 acres.

The stream within WS1 is fed by a 24" diameter HDPE pipe, which conveys flow from areas to the southwest. This pipe starts approximately 800' southwest of the stream; however, the actual configuration of the pipe run is unknown, as the pipe is located under existing dwellings and Dean Road.

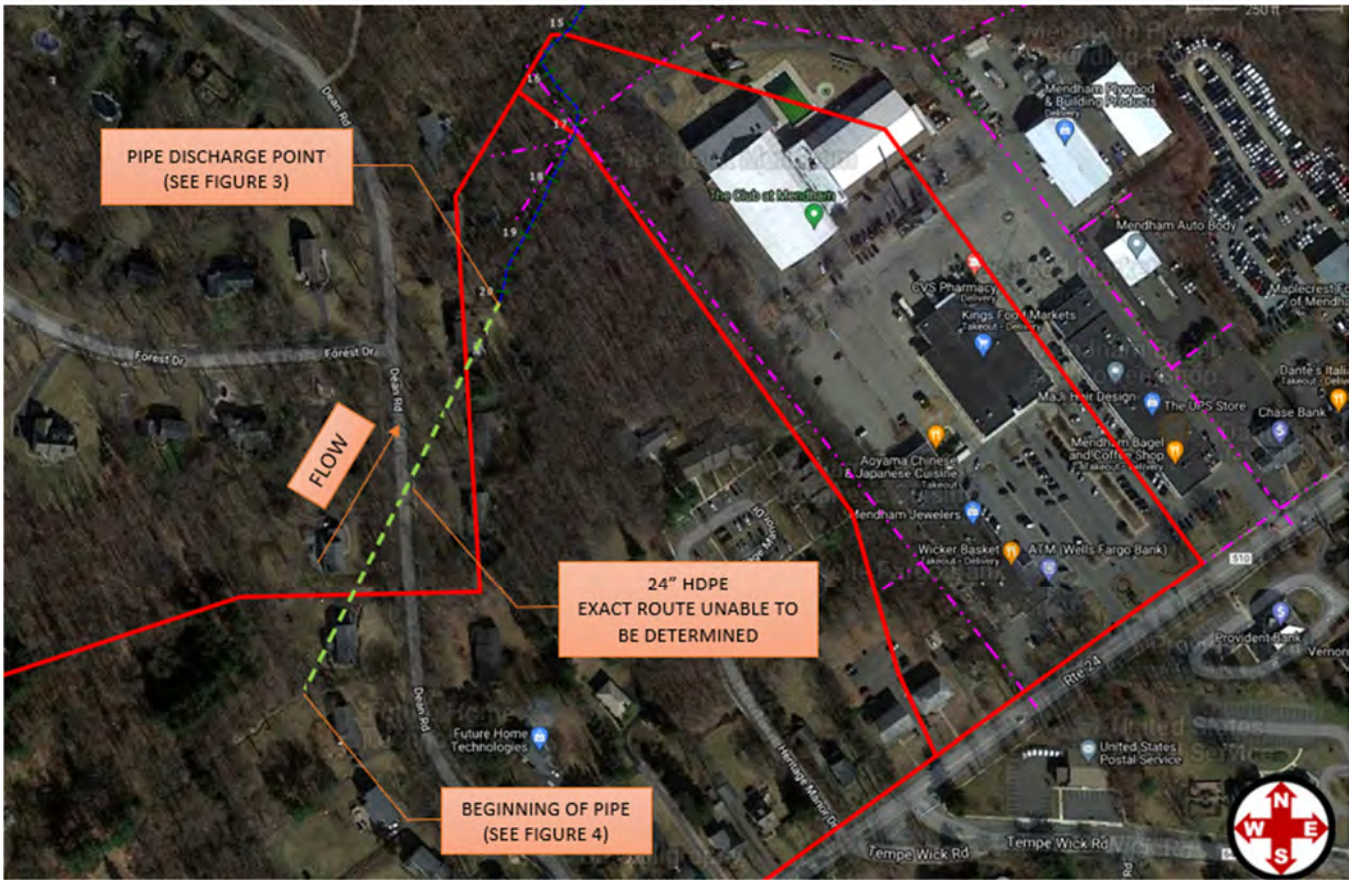

Figure 2. 24" HDPE Pipe Schematic.

Figure 3. 24" HDPE Pipe at beginning of stream (outlet of pipe), located behind 23 Dean Road.

Figure 4. Origin of 24" HDPE Pipe (inlet), located behind 14 Dean Road.

Table 2.1. Watershed Characteristics.

Watershed	Area (acres)	Weighted Curve Number	Time of Concentration (minutes)
1S (To Stream)	63.9	74	52.4
2S (To Site)	11.2	92	17.7

Representative 24-hour rainfall data was collected from NOAA Atlas 14 precipitation frequency data server. For the 100-year storm, the rainfall depth for this location is 8.40 inches. The watershed and rainfall data were input to the HydroCAD computer software to simulate the runoff events and calculate the peak discharges required for the hydraulic model.

Table 2.2. Hydrology Summary

Watershed	10-YR (cfs)	100-YR (cfs)	100-YR + 25% (cfs)
1S (To Stream)	74	155	193
2S (To Site)	35	59	74
3L (Combined Flow)	85	174	217

Note: Combined flow data is the result of the routing calculations. Peak flows less than the sum of 1S and 2S are due to timing.

The flow data summarized in Table 2.2 was used as inputs in the hydraulic model, discussed further in Section 3.0.

3.0 HYDRAULIC MODEL

The hydraulic analysis was completed in HEC-RAS, Version 5.0. The model is a standard one-dimensional, steady-state model. It extends from the beginning of the stream to a point approximately 300' northeast (downstream) of the northwest corner of the subject property. The model results indicated that the water surface elevation at the downstream cross section was approximately one foot below the lowest elevations on the property, furthermore the floodplain drastically expands and there are no structures in the vicinity. Therefore, no additional downstream cross sections were necessary beyond this distance.

Station-elevation data for the HEC-RAS cross sections were generated using surveyed data and supplemented with 2015 one-meter LiDAR data. The stream centerlines and banks were surveyed by Stonefield. Manning's roughness values for the channel and overbank areas were selected based on ortho-imagery and field observations.

The Flood Hazard Area for this stream was delineated using Method 6, which bases the FHA on the 100-year + 25% water surface elevations. Peak flow discharges for the 10-year, 100-year, and 100-year +25% were taken from the hydrologic model detailed in Section 2.0. The downstream boundary condition was set using normal depth, with a calculated average stream slope of approximately 0.4%. Figure 5 displays the HEC-RAS model cross sections with the delineated Flood Hazard Area (100-year+25%) floodplain.

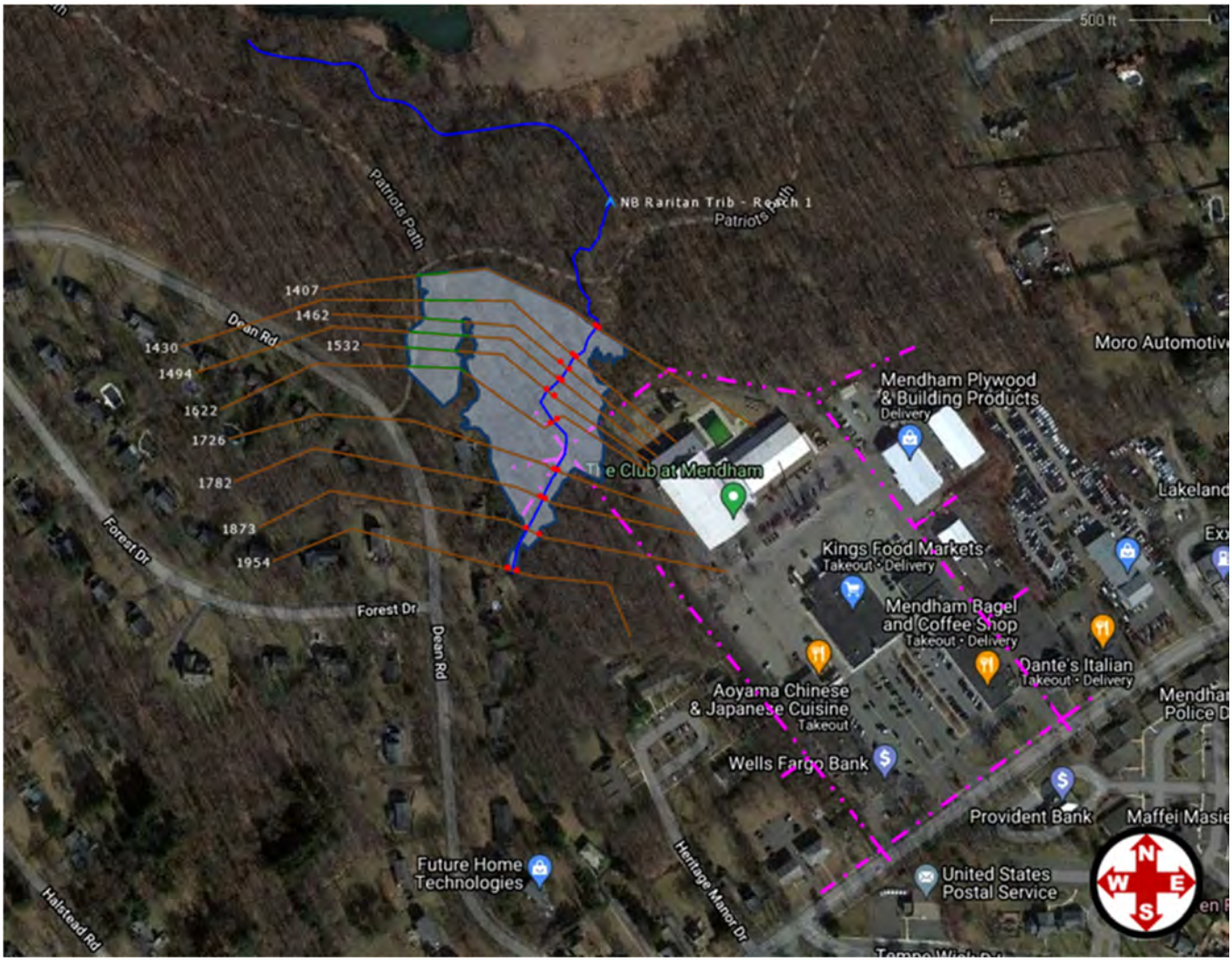

Figure 5. HECRAS Model and Floodplain Delineation.

The property in question, shown in magenta in the above figure, is slightly encumbered at the northwest corner of the parcel. The area is behind an existing stormwater basin, and within a delineated wetland area.

There were no modeling errors reported by the HEC-RAS program. The model provided warnings and recommendations to potentially add additional cross sections because the conveyance ratios were less than 0.7 or greater than 1.4. In the beginning of the model, cross-sections were spaced between 75 and 100 feet. Beyond the confluence of the stream with the site ditch, the spacing is between 30 and 60 feet. This was done because the stream has a few sharp bends, and then becomes very shallow rather rapidly. Based on the section spacing and the location of the sections in relation to the horizontal geometry, it was determined that additional cross sections would not significantly change the computed water surface elevations. The model provided additional warnings where the program reported that the calculation routine was unable to find a valid subcritical answer at this location and therefore defaulted to critical depth. The locations of these warnings occur at cross-sections where there is an abrupt change in bed slope, or a significant increase in flow area. Critical or supercritical flow could be expected in this situation. However, in compliance with the Flood Hazard Control Act Technical Manual, no supercritical depths were mapped. Lastly, the model provided warnings that divided flows were computed for

cross sections below section 1622. This is confirmed through the analysis of the surface topography, as in some cases the channel berm is higher than the overbanks and the flow is then split. There is also another large drainage feature, located approximately 250 feet northwest of the channel, which accepts runoff from another watershed. This conveyance would be affected by flooding from the studied stream due to the flat topography between their respective banks. Engineering judgement was used to place ineffective flow areas in portions of the cross sections where inundation is certain, but conveyance is not expected. These areas can be seen in green in Figure 5.

4.0 FLOODWAY DELINEATION

In accordance with NJDEP rules, the floodway was delineated based on a maximum surcharge of 0.2 feet above the 100-year water surface elevation. As part of the Method 6 verification, the floodway was calculated using the functions available in HEC-RAS. The FHA regulations require equal conveyance reduction on both sides of the flood fringe and that the surcharge over the base 100-year water surface elevation be no greater than 0.2 feet, rounded to the nearest hundredth of a foot.

The floodway encroachment locations for each cross-section were determined using the Method 4 equal conveyance reduction method within HEC-RAS. All surcharges were between 0 and 0.2 as required by the regulations. The only exception to this occurs where the encroachment hit a bank station and the remaining conveyance reduction would occur on the opposite flood fringe.

Due to the topography at and near the site, the floodplain is narrow at the beginning of the stream, then widens significantly downstream as the waterway becomes shallow and the flow overtops the streambanks. The topography beyond the streambanks and property limits is generally flat with no relief. No parts of the of the property are encumbered by the floodway. The majority of the flow within the cross-section is located in the left overbank area. Figure 6 displays the FHA floodplain with the calculated floodway boundary (shown as a black line). Floodway encroachment calculations were completed, and the resulting encroachment table is provided in Appendix B. Minor modifications were made to the resultant floodway lines, to ensure that the stream channel was kept within the floodway boundary. At the few sections where an adjustment was necessary, the width of the floodway was only expanded, and not reduced.

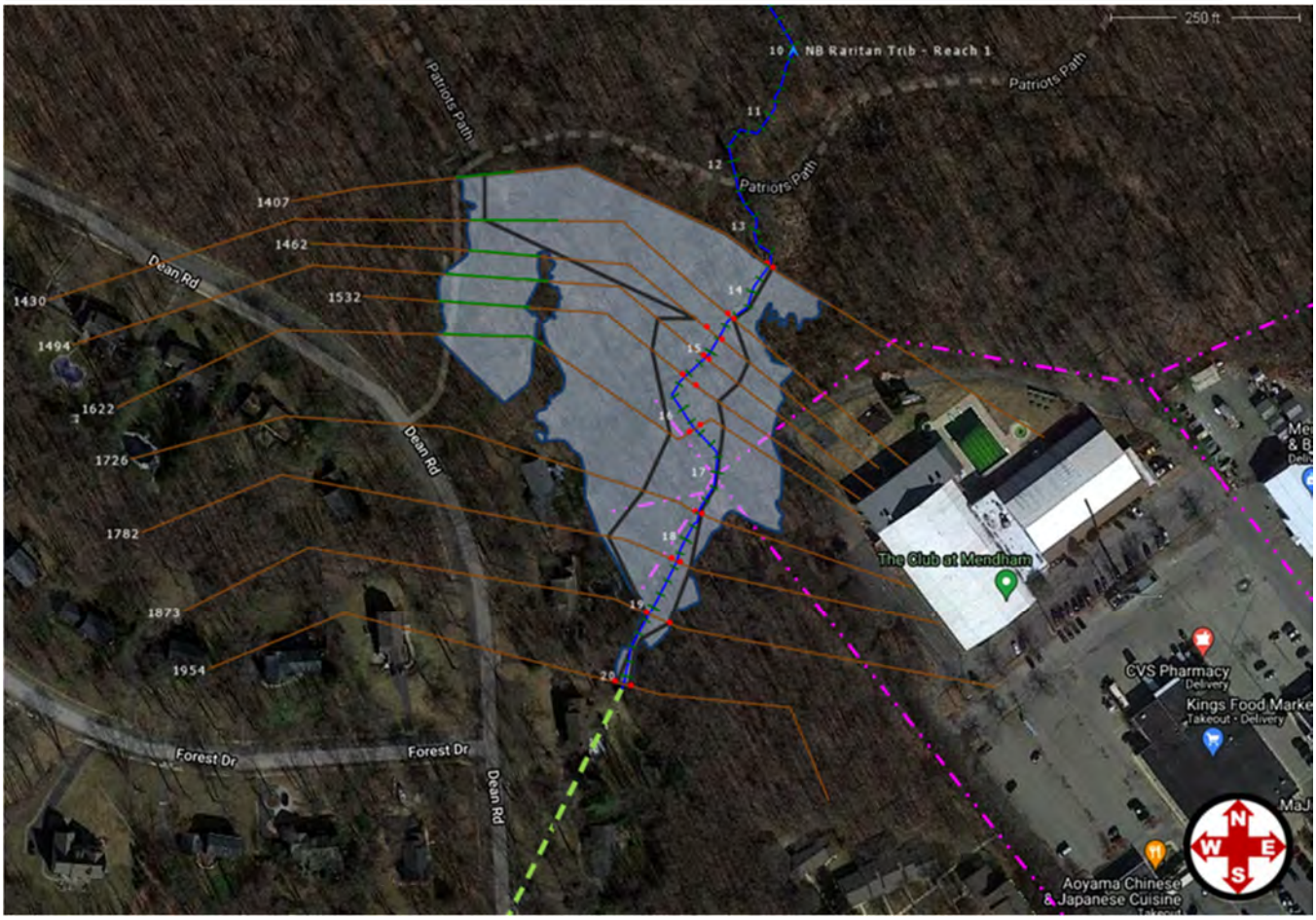

Figure 6. 100-YR Floodway and FHA Floodplain

5.0 SUMMARY AND CONCLUSION

This report supplements the Engineering Report and summarizes the specific methods and results associated with the Method 6 FHA verification process. The calculated Flood Hazard Area clips the northwest corner of the property, behind an existing stormwater basin in an area within the delineated wetland. The floodway does not encroach on the property. Due to the flat topography within the Borough-owned wooded parcel, most of the flood waters are conveyed within the left overbank of the studied stream.

APPENDIX A: HYDROLOGIC MODEL OUTPUT AND SUPPORTING INFORMATION

NOAA Atlas 14, Volume 2, Version 3
Location name: Mendham, New Jersey, USA*
Latitude: 40.7823°, Longitude: -74.5892°
Elevation: 549.77 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

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)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.338** (0.308-0.373)	**0.403** (0.367-0.445)	**0.478** (0.434-0.527)	**0.531** (0.481-0.584)	**0.595** (0.537-0.654)	**0.640** (0.576-0.704)	**0.685** (0.612-0.752)	**0.728** (0.647-0.800)	**0.778** (0.686-0.857)	**0.815** (0.714-0.899)
10-min	**0.539** (0.491-0.595)	**0.644** (0.586-0.710)	**0.762** (0.691-0.839)	**0.844** (0.764-0.929)	**0.943** (0.851-1.04)	**1.01** (0.911-1.11)	**1.08** (0.967-1.19)	**1.14** (1.02-1.26)	**1.22** (1.08-1.34)	**1.27** (1.12-1.40)
15-min	**0.673** (0.613-0.743)	**0.807** (0.734-0.890)	**0.962** (0.873-1.06)	**1.07** (0.965-1.17)	**1.19** (1.08-1.31)	**1.28** (1.15-1.41)	**1.37** (1.22-1.50)	**1.44** (1.28-1.58)	**1.53** (1.35-1.69)	**1.59** (1.40-1.76)
30-min	**0.919** (0.836-1.01)	**1.11** (1.01-1.23)	**1.36** (1.23-1.50)	**1.54** (1.39-1.69)	**1.76** (1.59-1.93)	**1.92** (1.72-2.11)	**2.08** (1.86-2.28)	**2.23** (1.98-2.45)	**2.42** (2.14-2.67)	**2.56** (2.24-2.82)
60-min	**1.14** (1.04-1.26)	**1.39** (1.27-1.53)	**1.74** (1.58-1.92)	**2.00** (1.81-2.20)	**2.33** (2.11-2.57)	**2.59** (2.33-2.85)	**2.85** (2.55-3.14)	**3.11** (2.77-3.42)	**3.46** (3.05-3.81)	**3.72** (3.26-4.10)
2-hr	**1.40** (1.27-1.54)	**1.70** (1.55-1.88)	**2.16** (1.95-2.38)	**2.51** (2.26-2.76)	**3.00** (2.69-3.29)	**3.39** (3.03-3.73)	**3.80** (3.37-4.17)	**4.23** (3.73-4.64)	**4.84** (4.21-5.32)	**5.32** (4.59-5.85)
3-hr	**1.57** (1.43-1.74)	**1.91** (1.74-2.12)	**2.42** (2.20-2.68)	**2.82** (2.55-3.11)	**3.37** (3.03-3.71)	**3.82** (3.41-4.19)	**4.27** (3.80-4.70)	**4.75** (4.19-5.23)	**5.42** (4.73-5.97)	**5.96** (5.15-6.57)
6-hr	**2.03** (1.85-2.25)	**2.47** (2.25-2.72)	**3.12** (2.84-3.44)	**3.65** (3.31-4.01)	**4.41** (3.96-4.83)	**5.04** (4.50-5.51)	**5.72** (5.06-6.25)	**6.45** (5.65-7.04)	**7.50** (6.48-8.20)	**8.38** (7.15-9.17)
12-hr	**2.55** (2.32-2.83)	**3.10** (2.82-3.43)	**3.94** (3.58-4.36)	**4.65** (4.20-5.12)	**5.69** (5.09-6.24)	**6.59** (5.85-7.21)	**7.57** (6.64-8.27)	**8.65** (7.50-9.46)	**10.3** (8.73-11.2)	**11.7** (9.75-12.7)
24-hr	**2.93** (2.70-3.20)	**3.53** (3.26-3.86)	**4.46** (4.11-4.87)	**5.23** (4.81-5.71)	**6.38** (5.83-6.94)	**7.35** (6.68-7.98)	**8.40** (7.59-9.13)	**9.56** (8.55-10.4)	**11.3** (9.94-12.3)	**12.7** (11.1-13.8)
2-day	**3.45** (3.18-3.76)	**4.17** (3.85-4.55)	**5.26** (4.85-5.74)	**6.15** (5.66-6.71)	**7.44** (6.81-8.10)	**8.52** (7.75-9.26)	**9.67** (8.74-10.5)	**10.9** (9.78-11.9)	**12.7** (11.2-13.9)	**14.2** (12.4-15.5)
3-day	**3.62** (3.35-3.93)	**4.37** (4.04-4.75)	**5.50** (5.08-5.97)	**6.42** (5.91-6.96)	**7.74** (7.09-8.38)	**8.83** (8.06-9.56)	**10.0** (9.07-10.8)	**11.3** (10.1-12.2)	**13.1** (11.6-14.2)	**14.5** (12.8-15.9)
4-day	**3.79** (3.51-4.10)	**4.57** (4.24-4.94)	**5.73** (5.31-6.20)	**6.68** (6.17-7.22)	**8.03** (7.38-8.67)	**9.15** (8.37-9.87)	**10.3** (9.40-11.2)	**11.6** (10.5-12.5)	**13.4** (12.0-14.5)	**14.9** (13.2-16.2)
7-day	**4.47** (4.15-4.84)	**5.36** (4.98-5.80)	**6.63** (6.15-7.17)	**7.68** (7.10-8.29)	**9.17** (8.44-9.90)	**10.4** (9.53-11.2)	**11.7** (10.7-12.7)	**13.1** (11.9-14.2)	**15.1** (13.5-16.4)	**16.8** (14.8-18.2)
10-day	**5.15** (4.80-5.53)	**6.15** (5.74-6.61)	**7.50** (6.99-8.05)	**8.60** (7.99-9.23)	**10.1** (9.37-10.9)	**11.4** (10.5-12.2)	**12.7** (11.6-13.6)	**14.0** (12.8-15.1)	**15.9** (14.3-17.1)	**17.4** (15.6-18.8)
20-day	**6.95** (6.52-7.41)	**8.24** (7.73-8.80)	**9.83** (9.22-10.5)	**11.1** (10.4-11.8)	**12.8** (11.9-13.6)	**14.1** (13.1-15.0)	**15.4** (14.3-16.4)	**16.7** (15.5-17.9)	**18.5** (17.0-19.9)	**19.9** (18.2-21.4)
30-day	**8.64** (8.17-9.15)	**10.2** (9.63-10.8)	**11.9** (11.2-12.6)	**13.2** (12.5-14.0)	**14.9** (14.0-15.8)	**16.2** (15.2-17.2)	**17.5** (16.4-18.5)	**18.7** (17.5-19.9)	**20.3** (18.9-21.7)	**21.5** (19.9-23.0)
45-day	**11.0** (10.4-11.6)	**12.9** (12.2-13.6)	**14.9** (14.1-15.7)	**16.3** (15.5-17.2)	**18.2** (17.2-19.2)	**19.6** (18.5-20.7)	**20.9** (19.7-22.0)	**22.1** (20.8-23.4)	**23.7** (22.2-25.1)	**24.8** (23.2-26.3)
60-day	**13.2** (12.5-13.9)	**15.4** (14.6-16.3)	**17.6** (16.7-18.6)	**19.2** (18.3-20.3)	**21.3** (20.2-22.4)	**22.7** (21.5-24.0)	**24.1** (22.8-25.5)	**25.4** (24.0-26.8)	**27.0** (25.4-28.5)	**28.1** (26.3-29.8)

[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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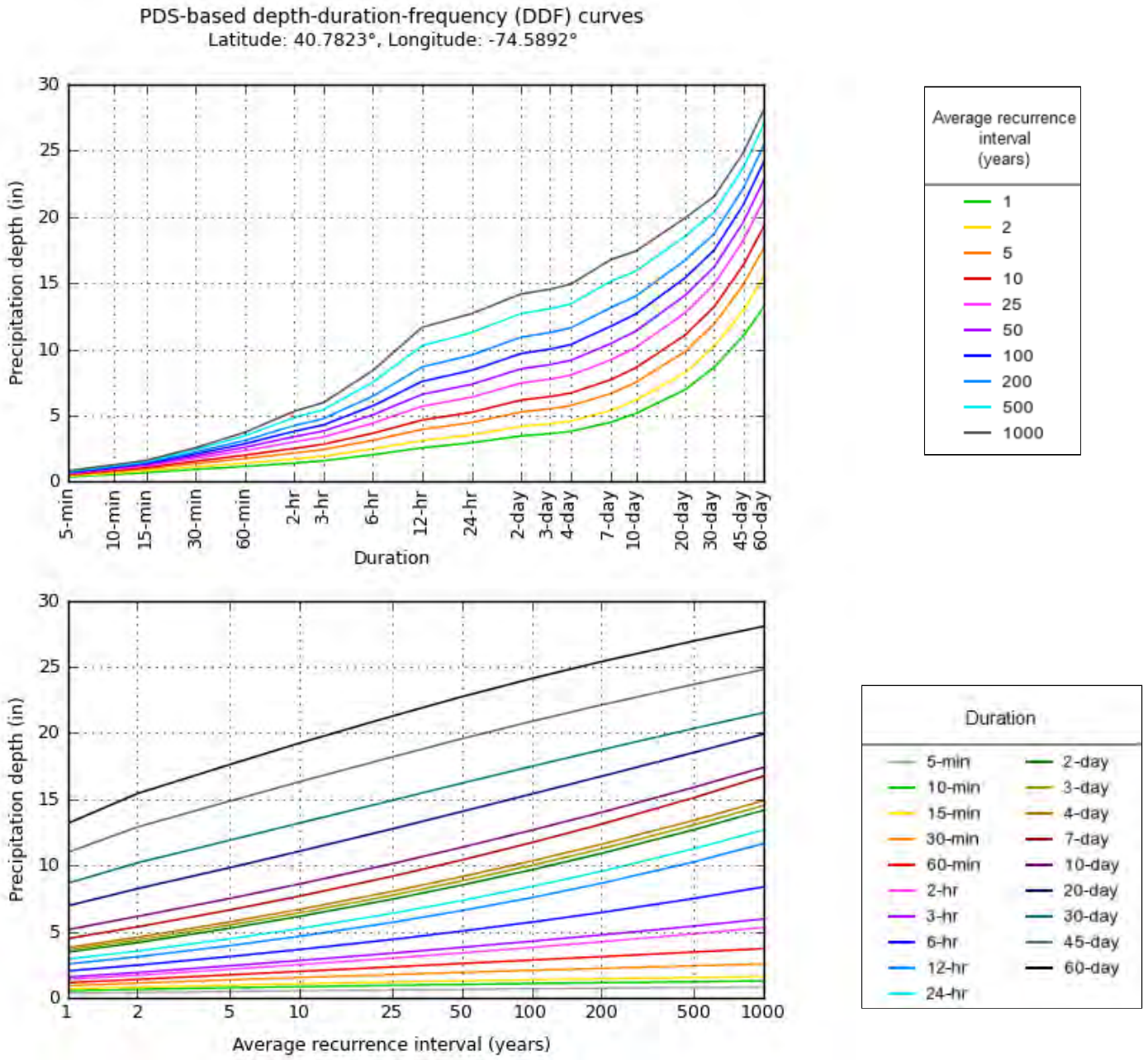
PF graphical



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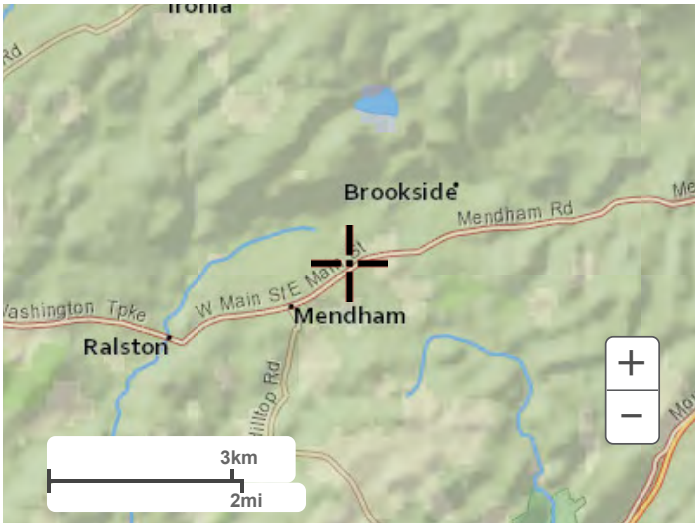
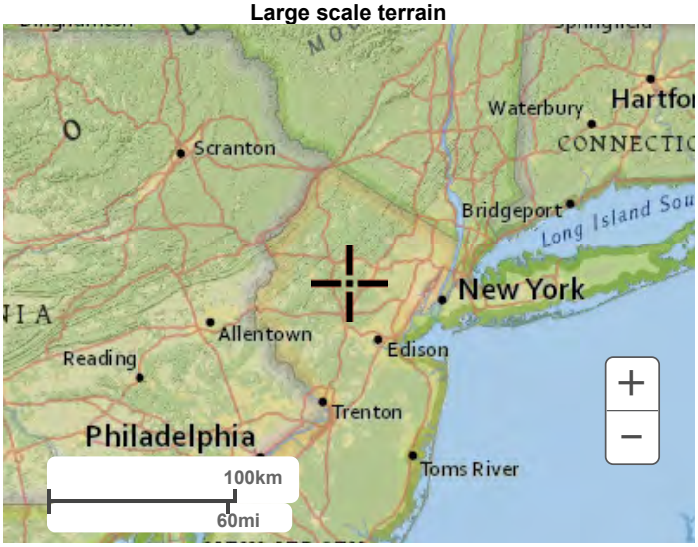
Maps & aerials

Small scale terrain



Large scale terrain



Large scale map

Large scale aerial

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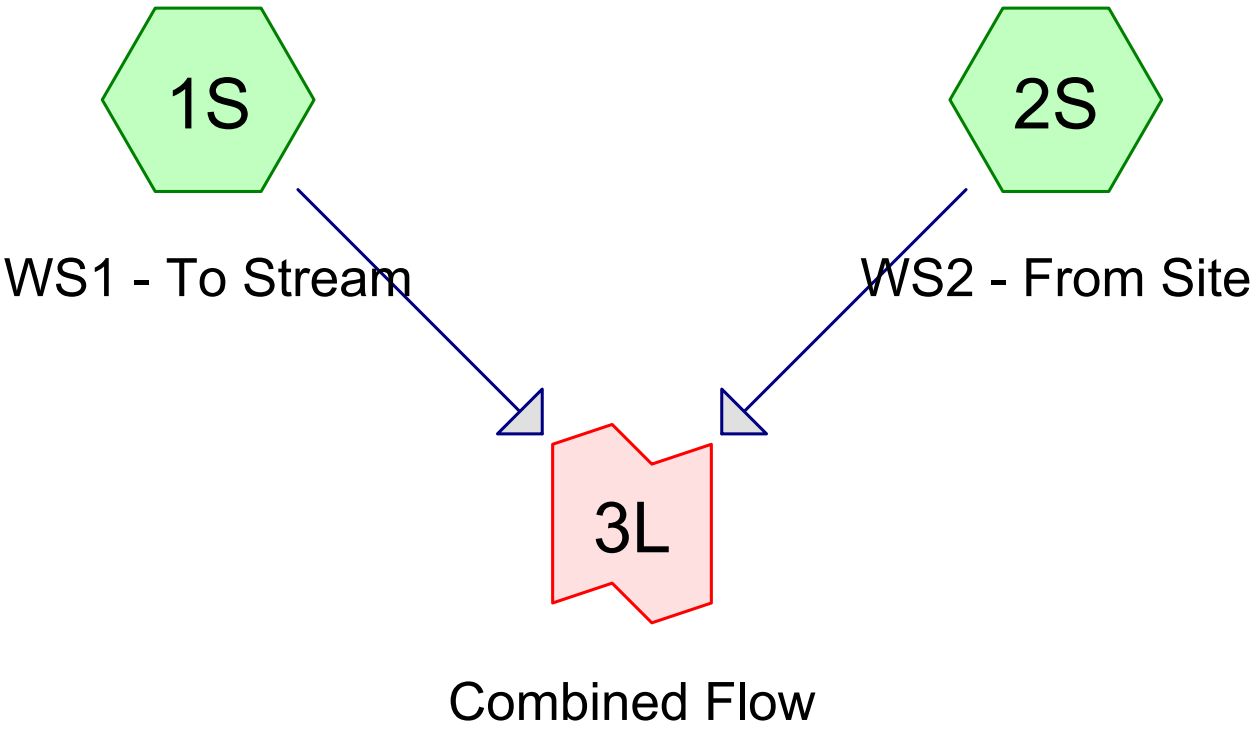
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

WATERSHED	AREA (AC.)	LAND COVER	HSG	CN	AREA X CN
WS1	0.03	RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING	D	92	3.10
WS1	0.00	RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING	C	90	0.03
WS1	0.33	RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING	B	85	27.74
WS1	1.69	RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING	D	92	155.69
WS1	2.02	RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING	C	90	181.87
WS1	2.84	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	B	68	193.18
WS1	0.01	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	D	84	1.19
WS1	20.00	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	B	68	1360.00
WS1	0.45	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	D	84	37.64
WS1	1.85	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	D	84	155.17
WS1	9.67	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	C	79	764.32
WS1	4.14	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	C	79	327.30
WS1	0.00	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	C	80	0.31
WS1	0.07	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	C	80	5.37
WS1	0.72	RESIDENTIAL, RURAL, SINGLE UNIT	B	65	47.03
WS1	7.38	RESIDENTIAL, RURAL, SINGLE UNIT	C	77	568.42
WS1	2.59	RESIDENTIAL, RURAL, SINGLE UNIT	C	77	199.68
WS1	0.32	RESIDENTIAL, RURAL, SINGLE UNIT	B	65	21.01
WS1	1.64	RESIDENTIAL, RURAL, SINGLE UNIT	B	65	106.81
WS1	0.36	RESIDENTIAL, RURAL, SINGLE UNIT	C	77	27.95
WS1	0.01	DECIDUOUS FOREST (>50% CROWN CLOSURE)	D	77	0.81
WS1	1.09	DECIDUOUS FOREST (>50% CROWN CLOSURE)	C	70	76.19
WS1	0.34	DECIDUOUS FOREST (>50% CROWN CLOSURE)	C	70	24.14
WS1	0.07	DECIDUOUS FOREST (>50% CROWN CLOSURE)	D	77	5.44
WS1	0.59	DECIDUOUS FOREST (>50% CROWN CLOSURE)	C	70	41.58
WS1	0.15	DECIDUOUS WOODED WETLANDS	D	77	11.91
WS1	1.83	DECIDUOUS WOODED WETLANDS	C	70	128.35
WS1	0.24	DECIDUOUS WOODED WETLANDS	B	55	13.23
WS1	2.10	DECIDUOUS WOODED WETLANDS	D	77	161.63
WS1	1.30	DECIDUOUS WOODED WETLANDS	C	70	91.18
TOTAL AREA	63.88			TOTAL AREA X CN	4738.26
				WEIGHTED CN	74

WATERSHED	AREA (AC.)	LAND COVER	HSG	CN	AREA X CN
WS2	0.00	RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING	D	92	0.18
WS2	0.07	RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING	C	90	6.00
WS2	0.90	RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING	D	92	82.67
WS2	0.37	RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING	C	90	32.89
WS2	0.02	COMMERCIAL/SERVICES	B	92	2.01
WS2	0.11	COMMERCIAL/SERVICES	C	94	10.56
WS2	4.27	COMMERCIAL/SERVICES	D	95	405.25
WS2	4.19	COMMERCIAL/SERVICES	C	94	393.42
WS2	0.30	DECIDUOUS FOREST (>50% CROWN CLOSURE)	D	77	22.84
WS2	0.99	DECIDUOUS WOODED WETLANDS	D	77	76.22
TOTAL AREA	11.20			TOTAL AREA X CN	1032.03
				WEIGHTED CN	92



Subcat Reach Pond Link

Routing Diagram for 2021-05-21_84 Main Street Mendham
Prepared by Princeton Hydro, Printed 5/24/2021

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
63.900	74	(1S)
11.200	92	(2S)
75.100	**77**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.10 hrs, 361 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS1 - To Stream Runoff Area=63.900 ac 0.00% Impervious Runoff Depth=2.55"
Flow Length=2,750' Slope=0.0265 '/' Tc=52.4 min CN=74 Runoff=74.28 cfs 13.574 af

Subcatchment 2S: WS2 - From Site Runoff Area=11.200 ac 0.00% Impervious Runoff Depth=4.31"
Flow Length=1,340' Slope=0.0215 '/' Tc=17.7 min CN=92 Runoff=35.39 cfs 4.027 af

Link 3L: Combined Flow Inflow=85.49 cfs 17.600 af
Primary=85.49 cfs 17.600 af

Total Runoff Area = 75.100 ac Runoff Volume = 17.600 af Average Runoff Depth = 2.81"
100.00% Pervious = 75.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: WS1 - To Stream

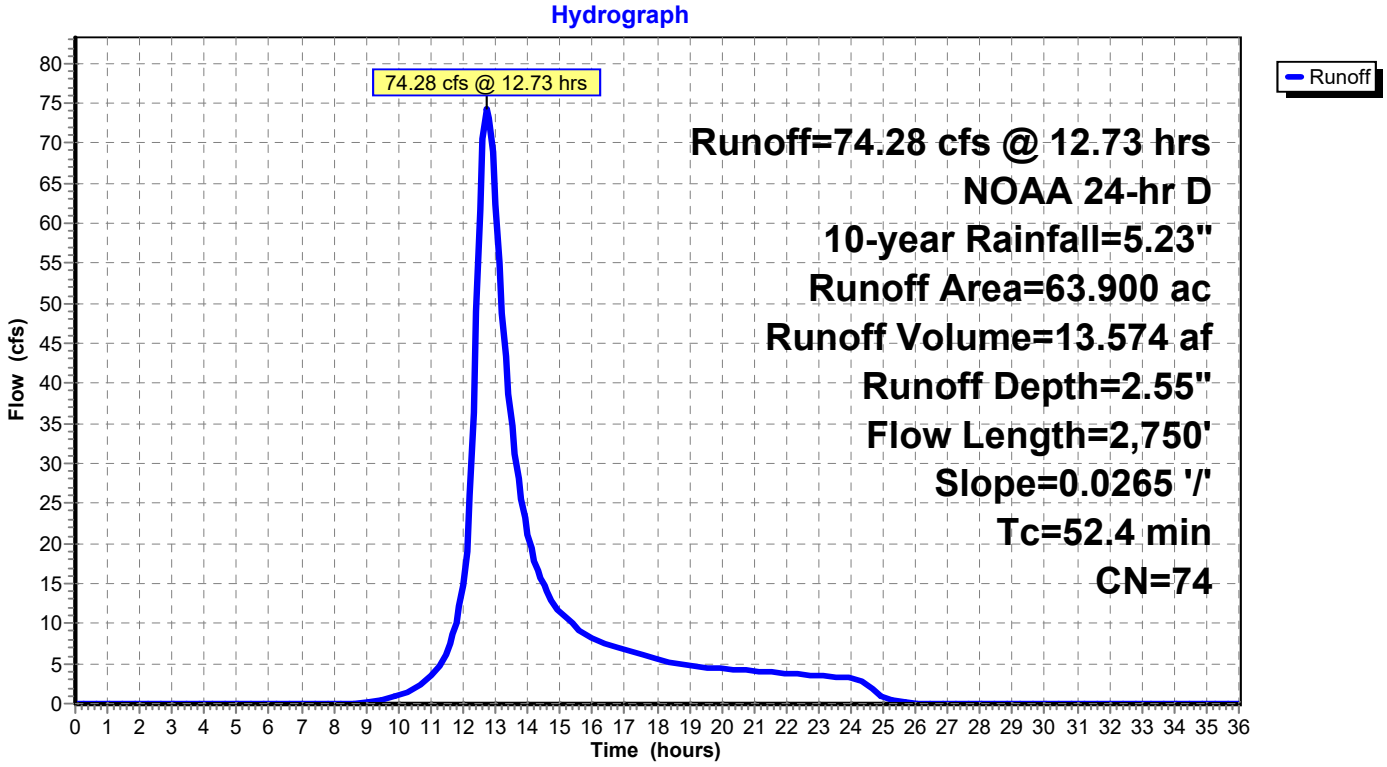
Runoff = 74.28 cfs @ 12.73 hrs, Volume= 13.574 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.10 hrs
NOAA 24-hr D 10-year Rainfall=5.23"

	Area (ac)	CN	Description
*	63.900	74	
	63.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.4	2,750	0.0265	0.87		**Lag/CN Method,**

Subcatchment 1S: WS1 - To Stream



Summary for Subcatchment 2S: WS2 - From Site

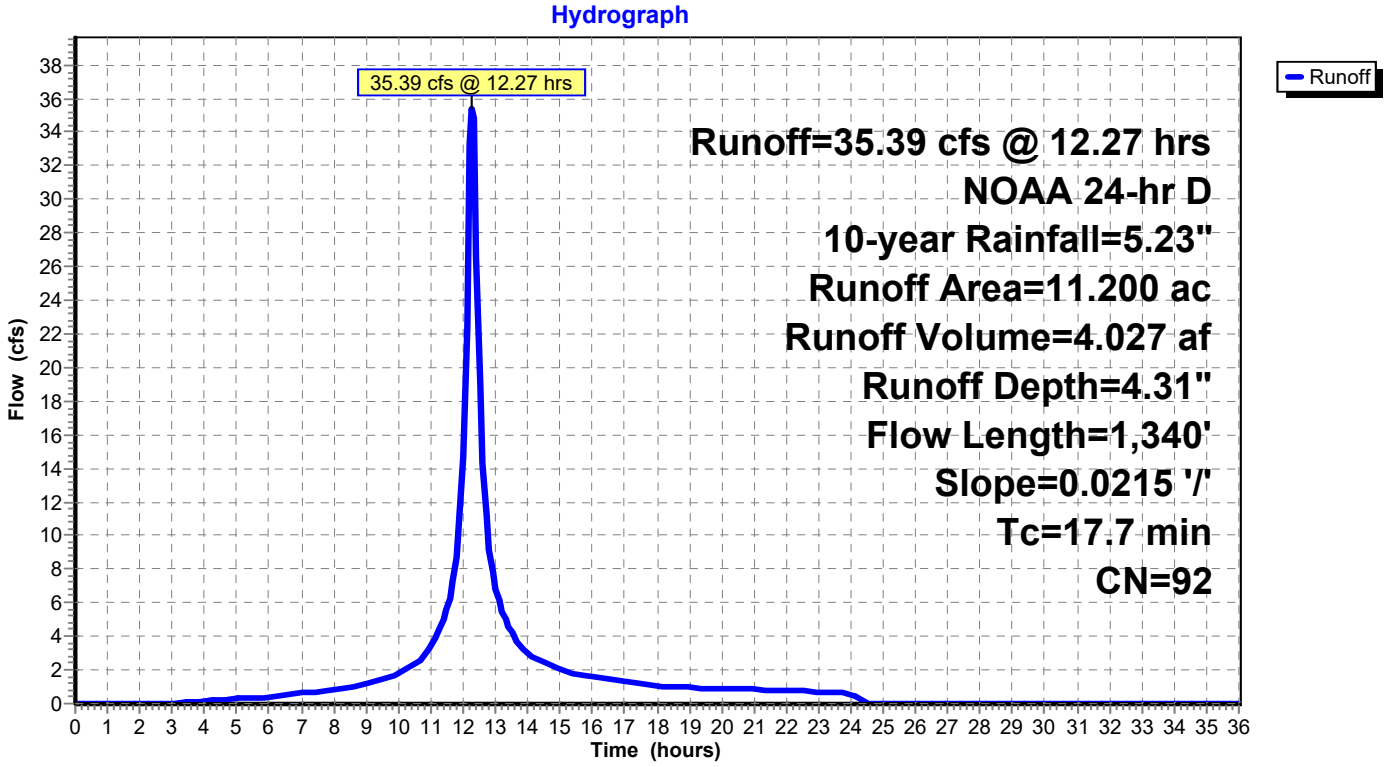
Runoff = 35.39 cfs @ 12.27 hrs, Volume= 4.027 af, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.10 hrs
NOAA 24-hr D 10-year Rainfall=5.23"

	Area (ac)	CN	Description
*	11.200	92	
	11.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	1,340	0.0215	1.26		**Lag/CN Method,**

Subcatchment 2S: WS2 - From Site

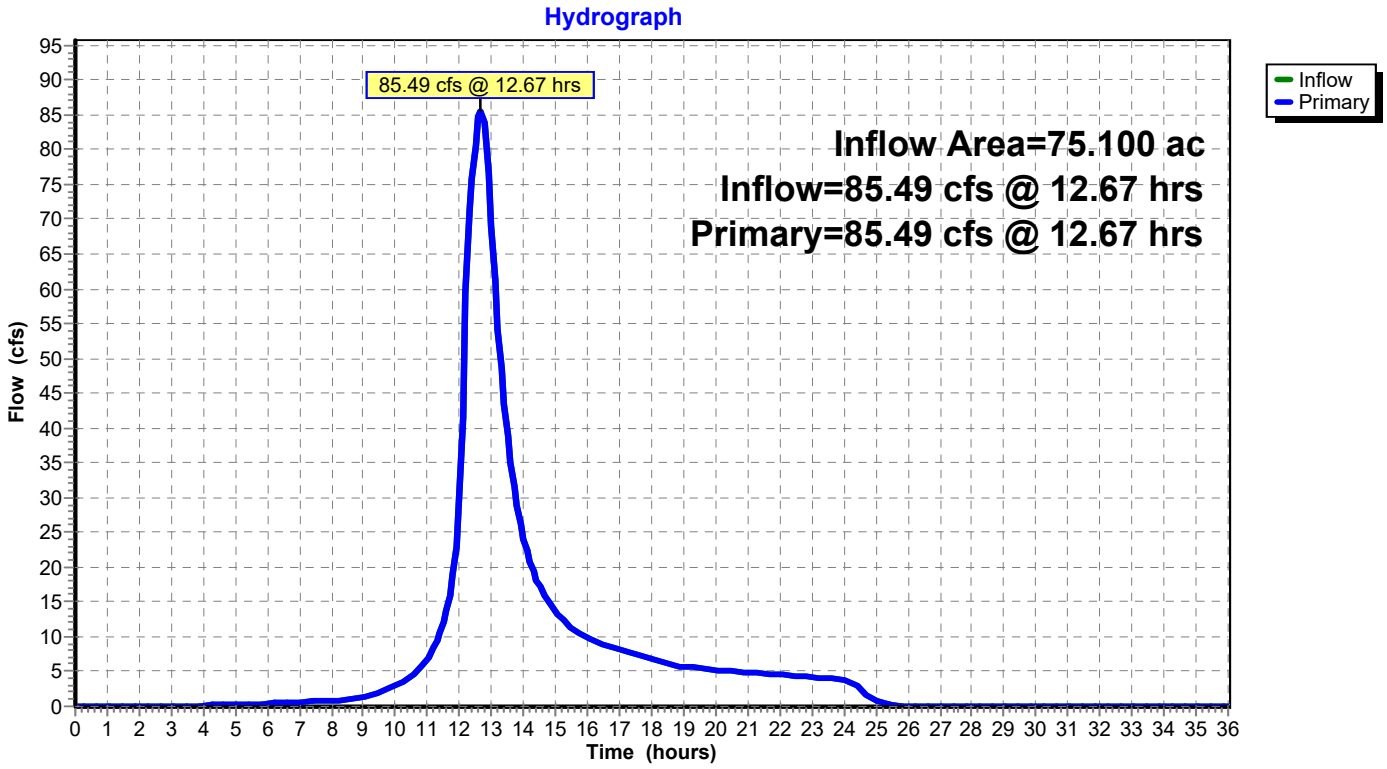


Summary for Link 3L: Combined Flow

Inflow Area = 75.100 ac, 0.00% Impervious, Inflow Depth = 2.81" for 10-year event
Inflow = 85.49 cfs @ 12.67 hrs, Volume= 17.600 af
Primary = 85.49 cfs @ 12.67 hrs, Volume= 17.600 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.10 hrs

Link 3L: Combined Flow



Time span=0.00-36.00 hrs, dt=0.10 hrs, 361 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS1 - To Stream Runoff Area=63.900 ac 0.00% Impervious Runoff Depth=5.28"
Flow Length=2,750' Slope=0.0265 '/' Tc=52.4 min CN=74 Runoff=154.79 cfs 28.142 af

Subcatchment 2S: WS2 - From Site Runoff Area=11.200 ac 0.00% Impervious Runoff Depth=7.44"
Flow Length=1,340' Slope=0.0215 '/' Tc=17.7 min CN=92 Runoff=59.15 cfs 6.944 af

Link 3L: Combined Flow Inflow=173.95 cfs 35.086 af
Primary=173.95 cfs 35.086 af

Total Runoff Area = 75.100 ac Runoff Volume = 35.086 af Average Runoff Depth = 5.61"
100.00% Pervious = 75.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: WS1 - To Stream

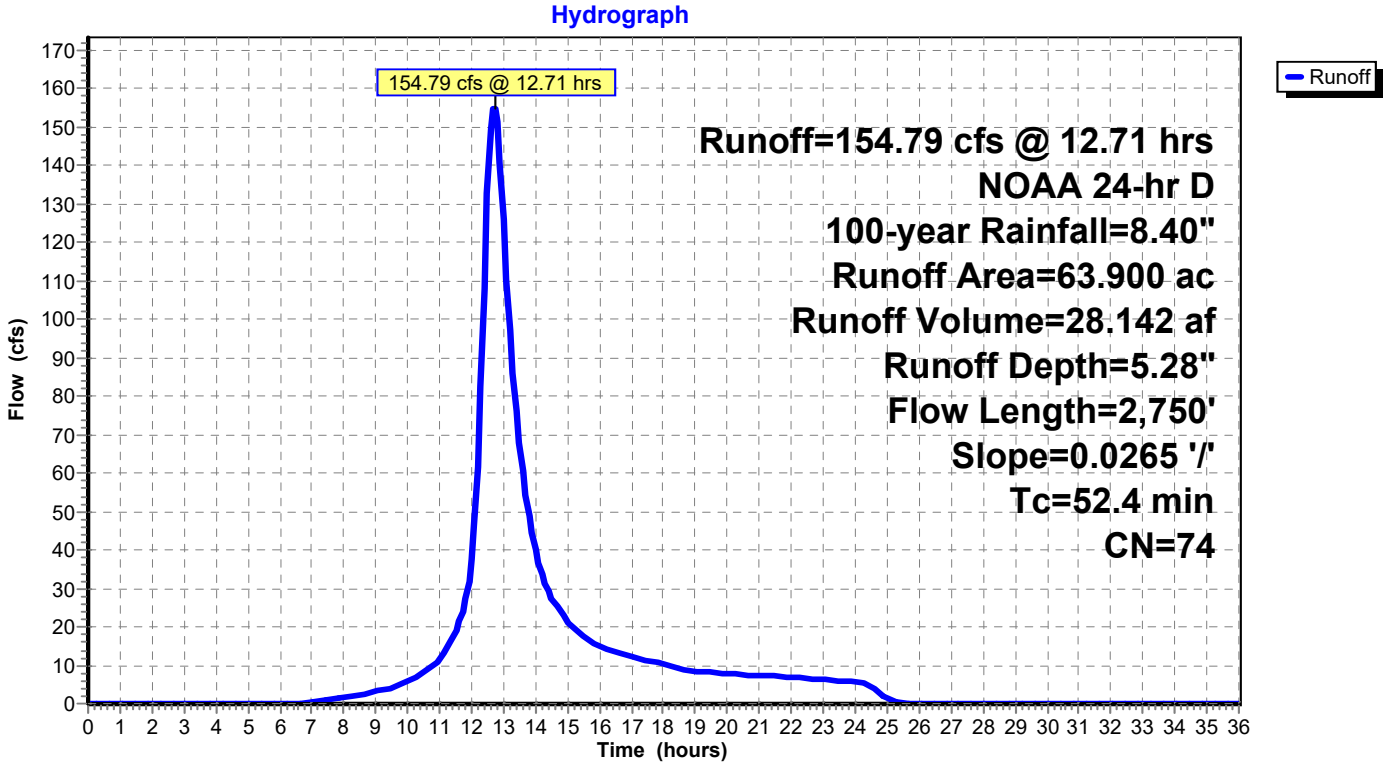
Runoff = 154.79 cfs @ 12.71 hrs, Volume= 28.142 af, Depth= 5.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.10 hrs
NOAA 24-hr D 100-year Rainfall=8.40"

	Area (ac)	CN	Description
*	63.900	74	
	63.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
52.4	2,750	0.0265	0.87		**Lag/CN Method,**

Subcatchment 1S: WS1 - To Stream



Summary for Subcatchment 2S: WS2 - From Site

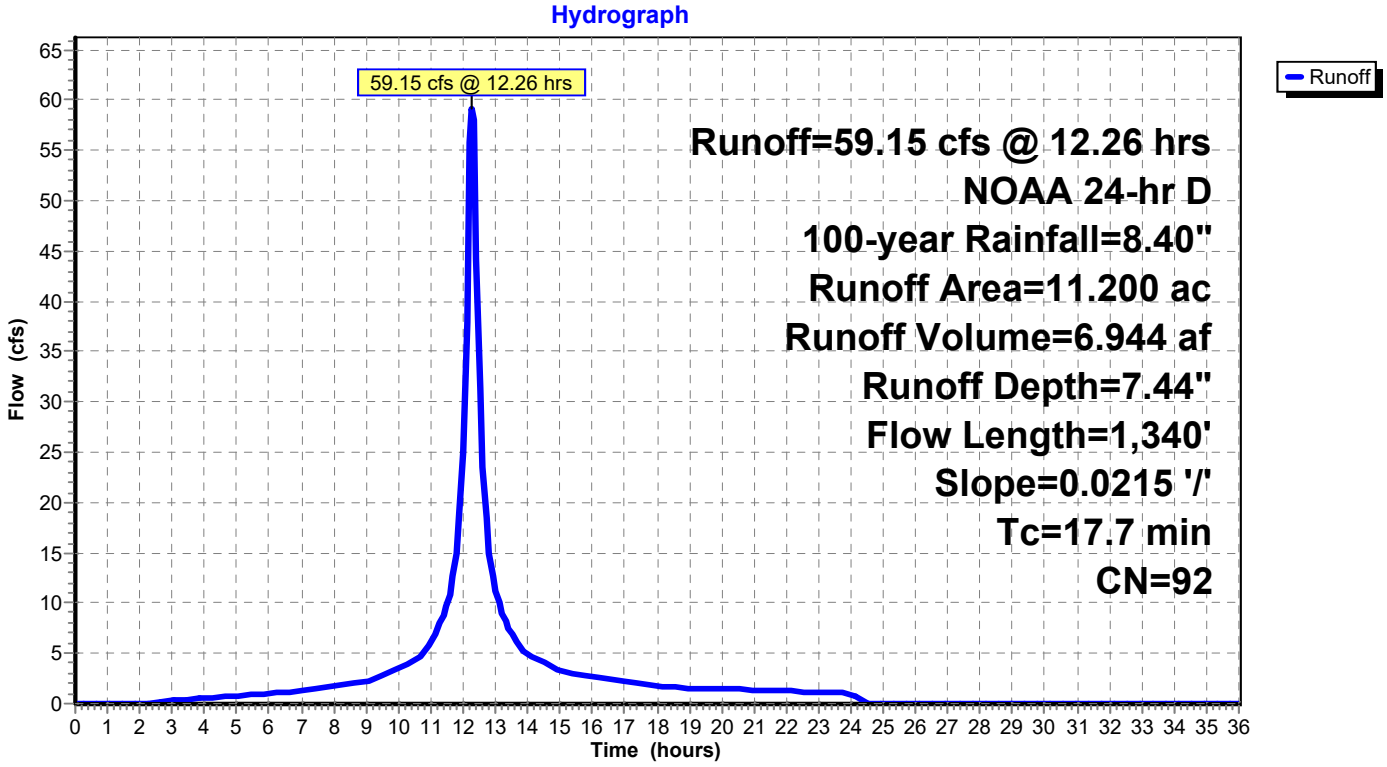
Runoff = 59.15 cfs @ 12.26 hrs, Volume= 6.944 af, Depth= 7.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.10 hrs
NOAA 24-hr D 100-year Rainfall=8.40"

	Area (ac)	CN	Description
*	11.200	92	
	11.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	1,340	0.0215	1.26		**Lag/CN Method,**

Subcatchment 2S: WS2 - From Site

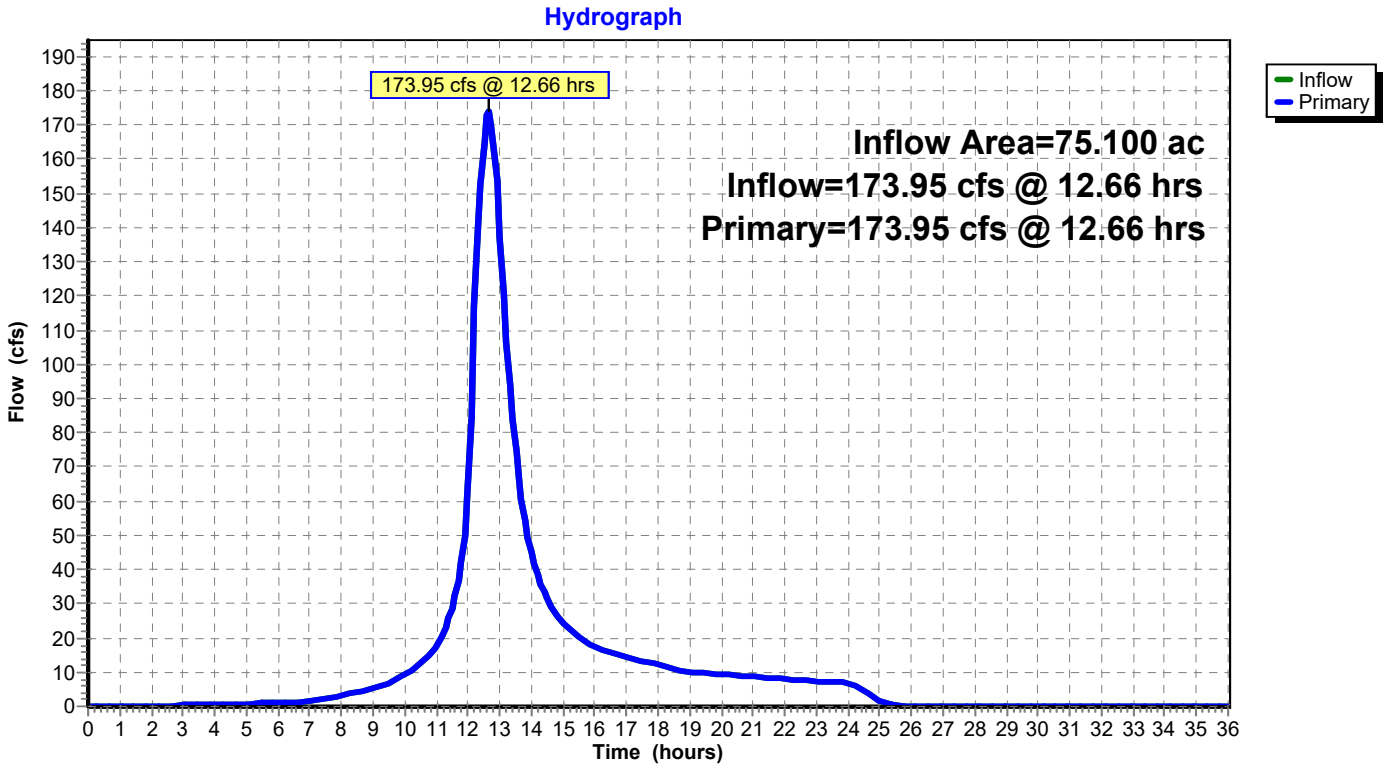


Summary for Link 3L: Combined Flow

Inflow Area = 75.100 ac, 0.00% Impervious, Inflow Depth = 5.61" for 100-year event
Inflow = 173.95 cfs @ 12.66 hrs, Volume= 35.086 af
Primary = 173.95 cfs @ 12.66 hrs, Volume= 35.086 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.10 hrs

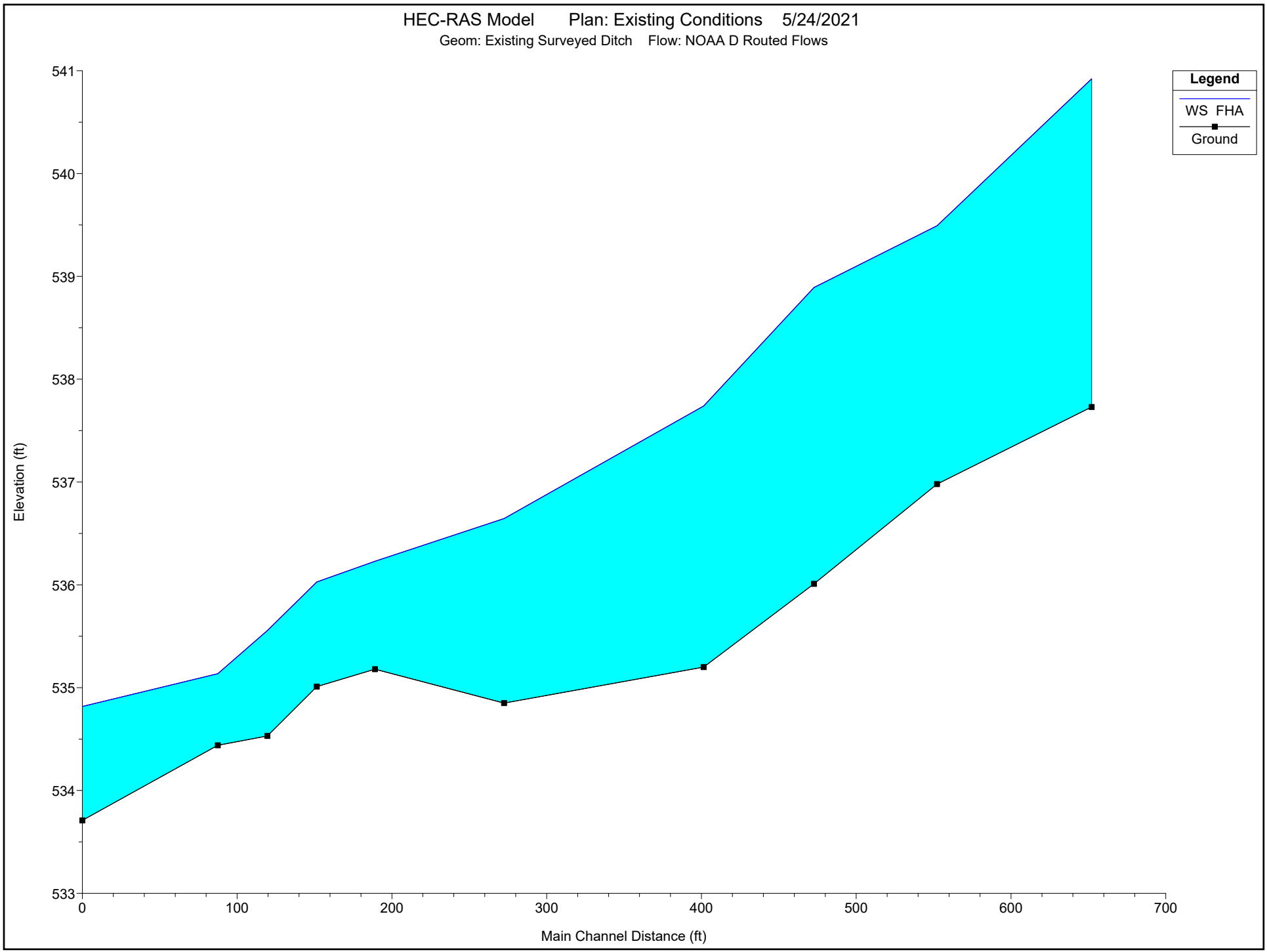
Link 3L: Combined Flow

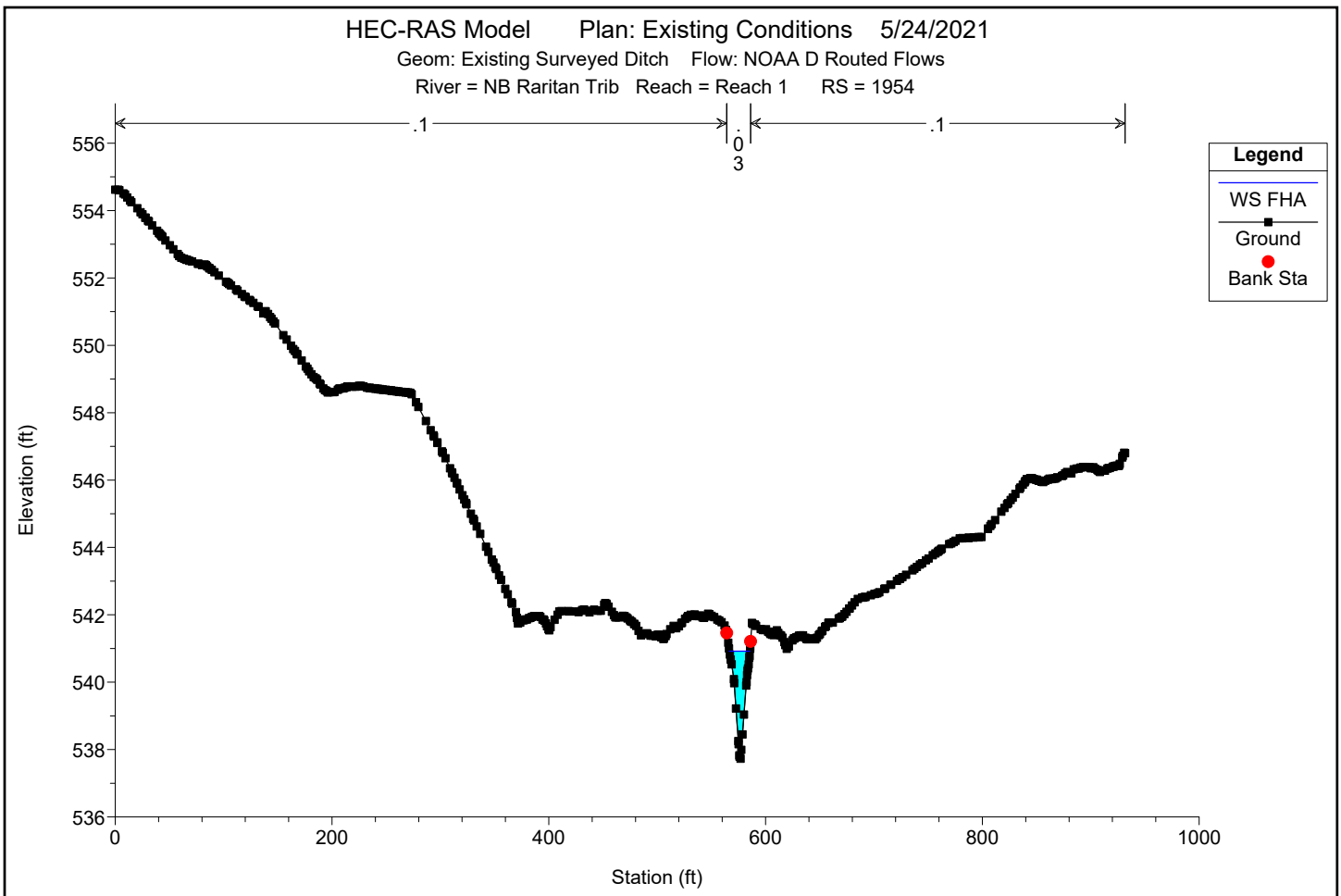


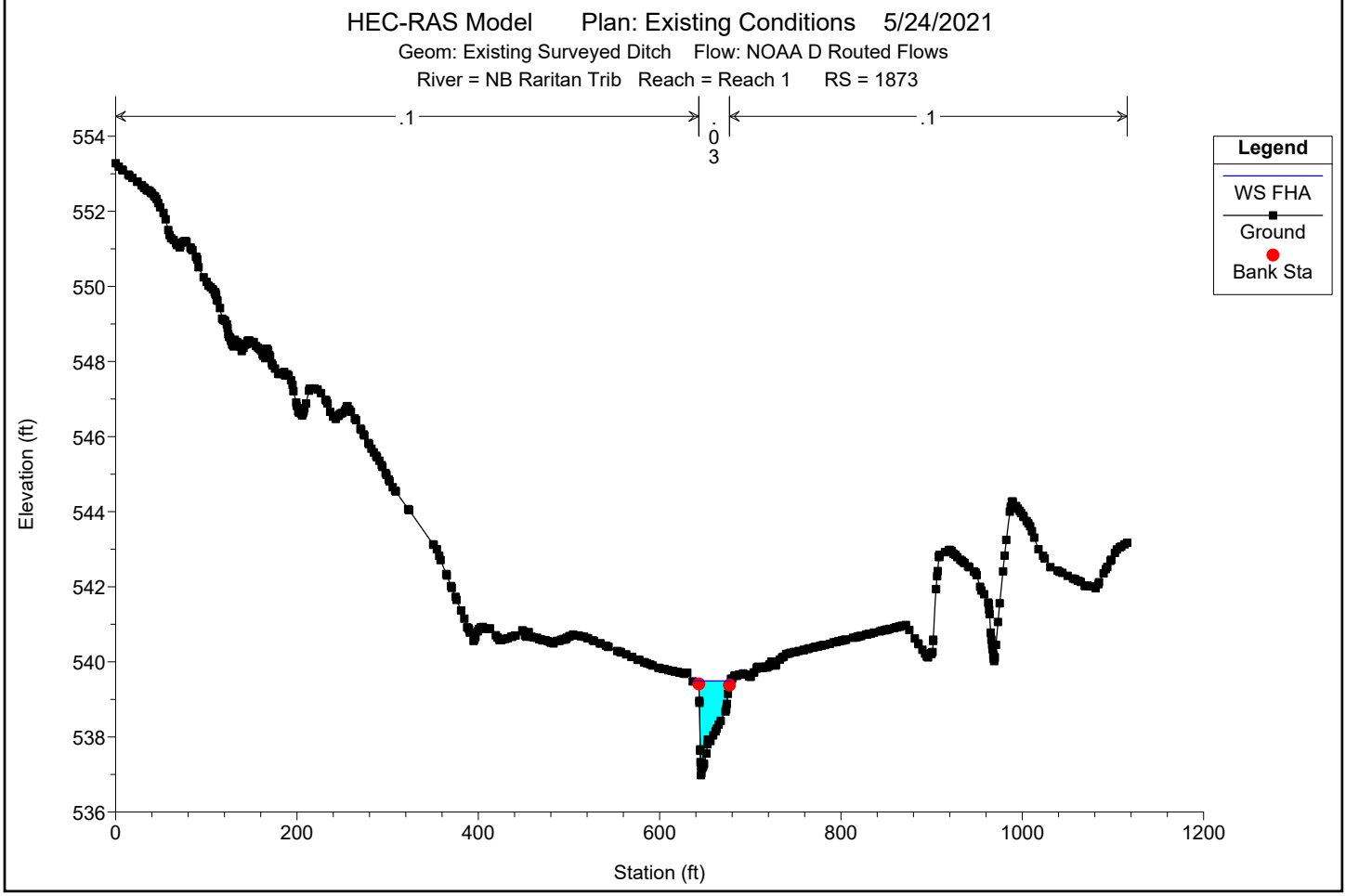
APPENDIX B: HEC-RAS MODEL OUTPUTS

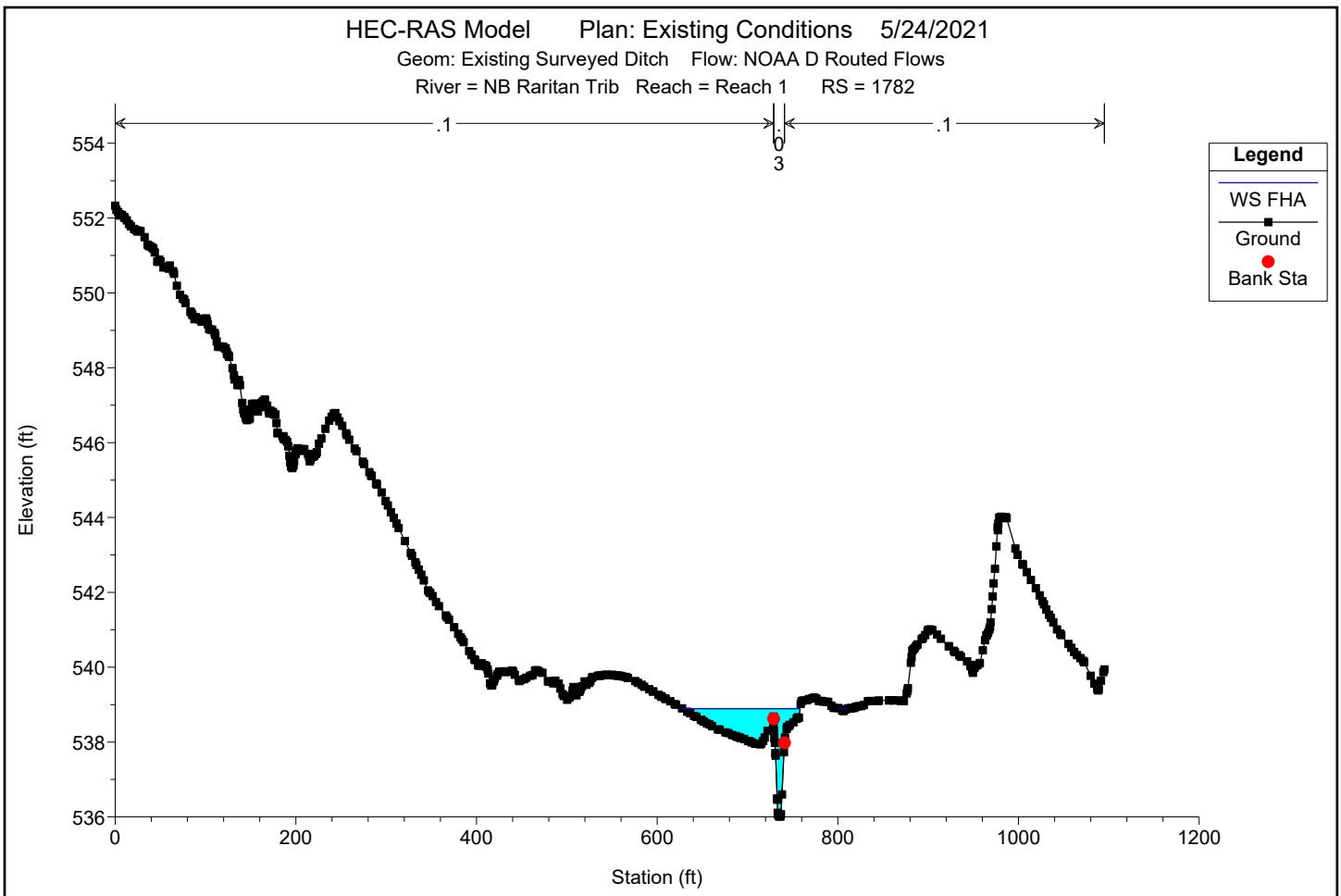
HEC-RAS Plan: Existing Conditions River: NB Raritan Trib Reach: Reach 1

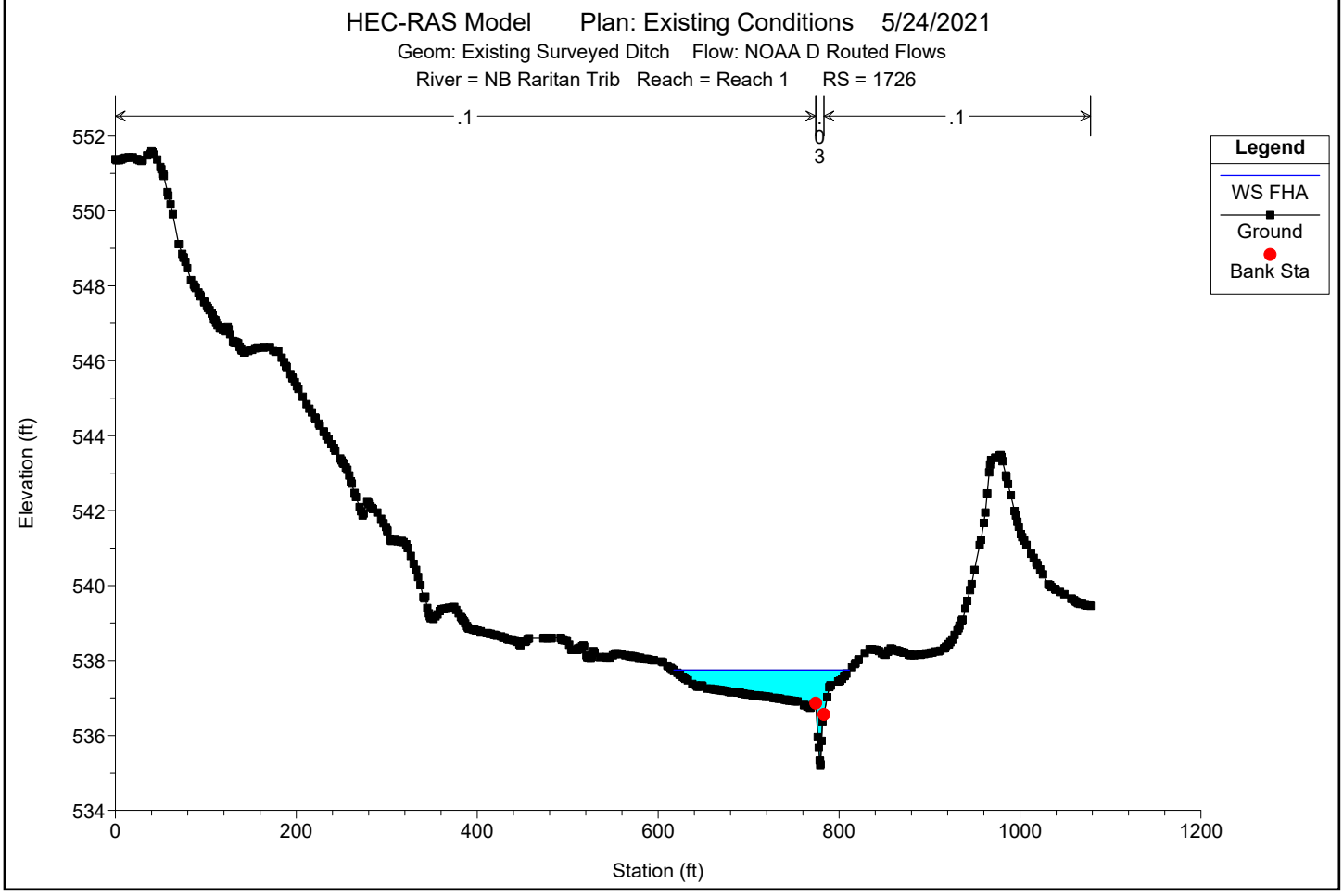
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1954	10-YR	74.28	537.73	539.83	539.83	540.42	0.014289	6.14	12.10	10.60	1.01
Reach 1	1954	100-YR	154.79	537.73	540.66	540.66	541.36	0.013072	6.70	23.10	16.84	1.01
Reach 1	1954	FHA	193.49	537.73	540.92	540.92	541.67	0.012889	6.96	27.81	19.03	1.01
Reach 1	1873	10-YR	74.28	536.98	538.89		539.02	0.004090	2.82	26.38	30.26	0.53
Reach 1	1873	100-YR	154.79	536.98	539.36		539.58	0.004599	3.75	41.26	33.52	0.60
Reach 1	1873	FHA	193.49	536.98	539.49		539.77	0.005175	4.24	46.01	41.94	0.64
Reach 1	1782	10-YR	74.28	536.01	537.81	537.81	538.42	0.014336	6.28	11.83	9.92	1.01
Reach 1	1782	100-YR	154.79	536.01	538.71	538.71	539.12	0.006792	5.72	64.32	116.75	0.75
Reach 1	1782	FHA	193.49	536.01	538.89	538.89	539.30	0.006425	5.93	87.46	138.75	0.74
Reach 1	1726	10-YR	74.28	535.20	537.34	537.34	537.57	0.005982	4.51	51.82	150.88	0.68
Reach 1	1726	100-YR	154.79	535.20	537.65	537.65	537.92	0.007001	5.59	104.41	185.79	0.76
Reach 1	1726	FHA	193.49	535.20	537.74	537.74	538.04	0.007867	6.13	121.45	193.93	0.81
Reach 1	1622	10-YR	85.49	534.85	536.26	535.93	536.32	0.002996	2.71	93.16	328.56	0.48
Reach 1	1622	100-YR	173.95	534.85	536.54	536.23	536.63	0.003852	3.61	172.29	460.56	0.56
Reach 1	1622	FHA	217.44	534.85	536.65	536.35	536.75	0.003977	3.87	211.80	500.40	0.58
Reach 1	1532	10-YR	85.49	535.18	535.89	535.77	535.97	0.006439	2.96	87.57	363.74	0.65
Reach 1	1532	100-YR	173.95	535.18	536.14	535.97	536.23	0.006166	3.59	157.40	421.97	0.67
Reach 1	1532	FHA	217.44	535.18	536.23	536.05	536.33	0.006445	3.92	187.37	453.48	0.70
Reach 1	1494	10-YR	85.49	535.01	535.68	535.37	535.71	0.006497	2.91	101.18	361.31	0.65
Reach 1	1494	100-YR	173.95	535.01	535.93	535.58	535.98	0.006410	3.64	182.66	478.39	0.68
Reach 1	1494	FHA	217.44	535.01	536.03	535.61	536.07	0.006328	3.87	216.14	490.66	0.69
Reach 1	1462	10-YR	85.49	534.53	535.23	535.23	535.40	0.015158	4.04	49.33	247.29	0.97
Reach 1	1462	100-YR	173.95	534.53	535.47	535.47	535.68	0.013398	4.85	100.98	364.69	0.97
Reach 1	1462	FHA	217.44	534.53	535.56	535.56	535.78	0.013078	5.13	126.58	416.67	0.97
Reach 1	1430	10-YR	85.49	534.44	534.91	534.91	534.91	0.001410	0.81	183.68	277.34	0.27
Reach 1	1430	100-YR	173.95	534.44	535.03	534.91	535.04	0.003694	1.60	220.71	338.11	0.45
Reach 1	1430	FHA	217.44	534.44	535.14	534.92	535.15	0.004037	1.96	259.79	394.81	0.49
Reach 1	1407	10-YR	85.49	533.71	534.57	534.57	534.58	0.001711	1.41	200.12	433.22	0.33
Reach 1	1407	100-YR	173.95	533.71	534.72	534.57	534.74	0.003256	2.28	270.78	484.54	0.47
Reach 1	1407	FHA	217.44	533.71	534.82	534.57	534.83	0.003256	2.47	318.24	537.34	0.48

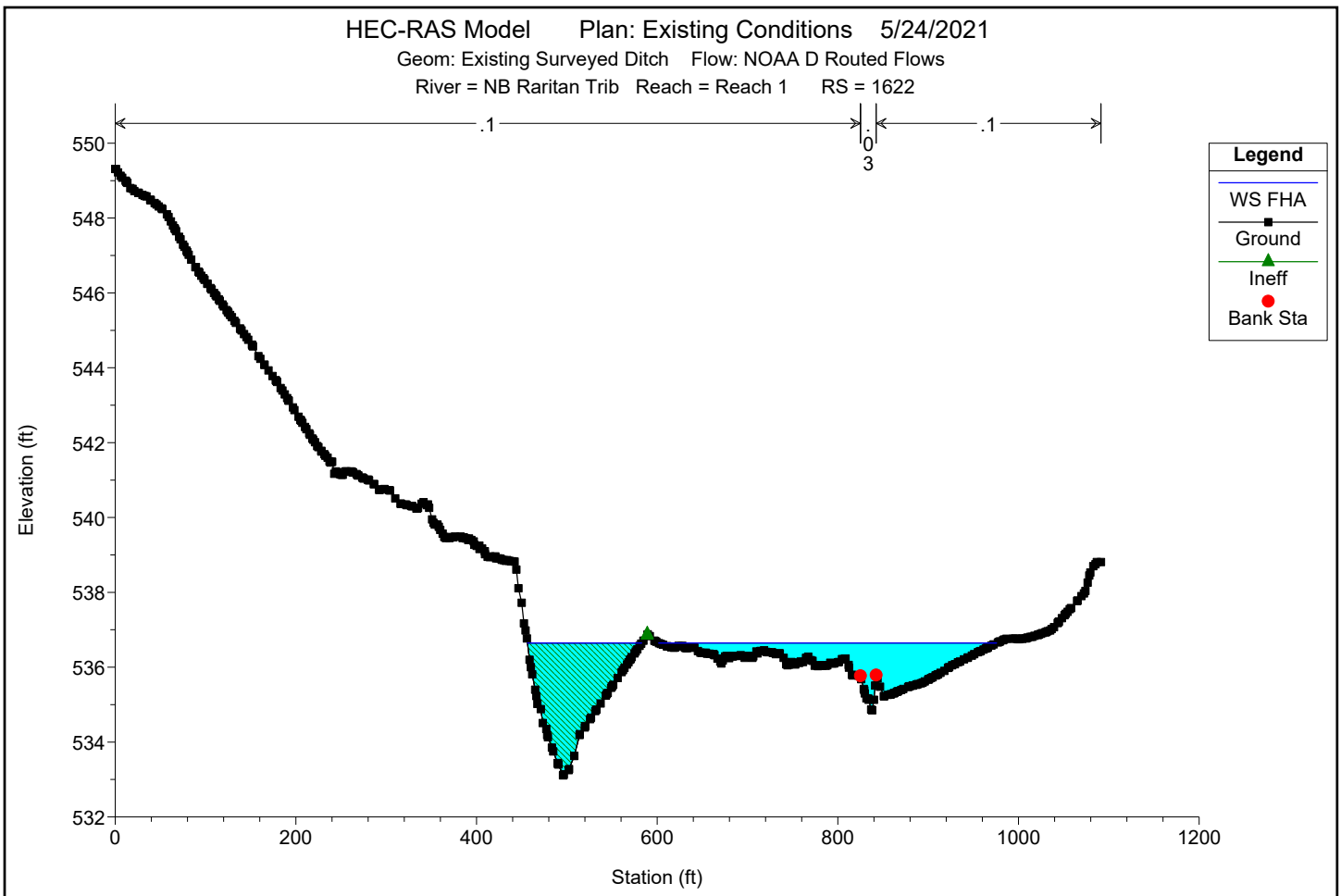

HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
Legend
WS FHA
Ground
Elevation (ft)
541
540
539
538
537
536
535
534
533
0
100
200
300
400
500
600
700
Main Channel Distance (ft)

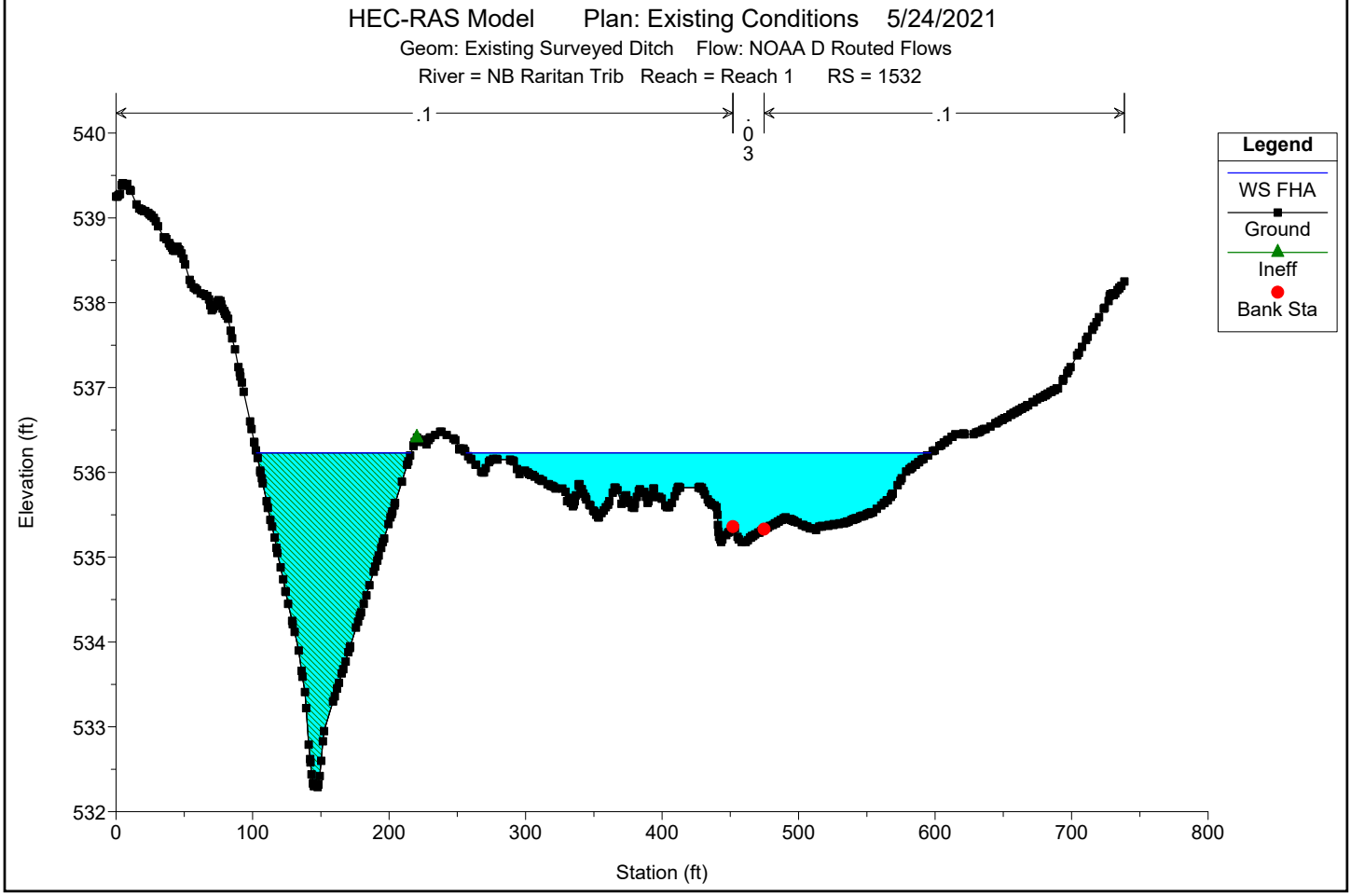

HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
River = NB Raritan Trib Reach = Reach 1 RS = 1954
.1
.03
.1
Legend
WS FHA
Ground
Bank Sta
Elevation (ft)
Station (ft)
536
538
540
542
544
546
548
550
552
554
556
0
200
400
600
800
1000

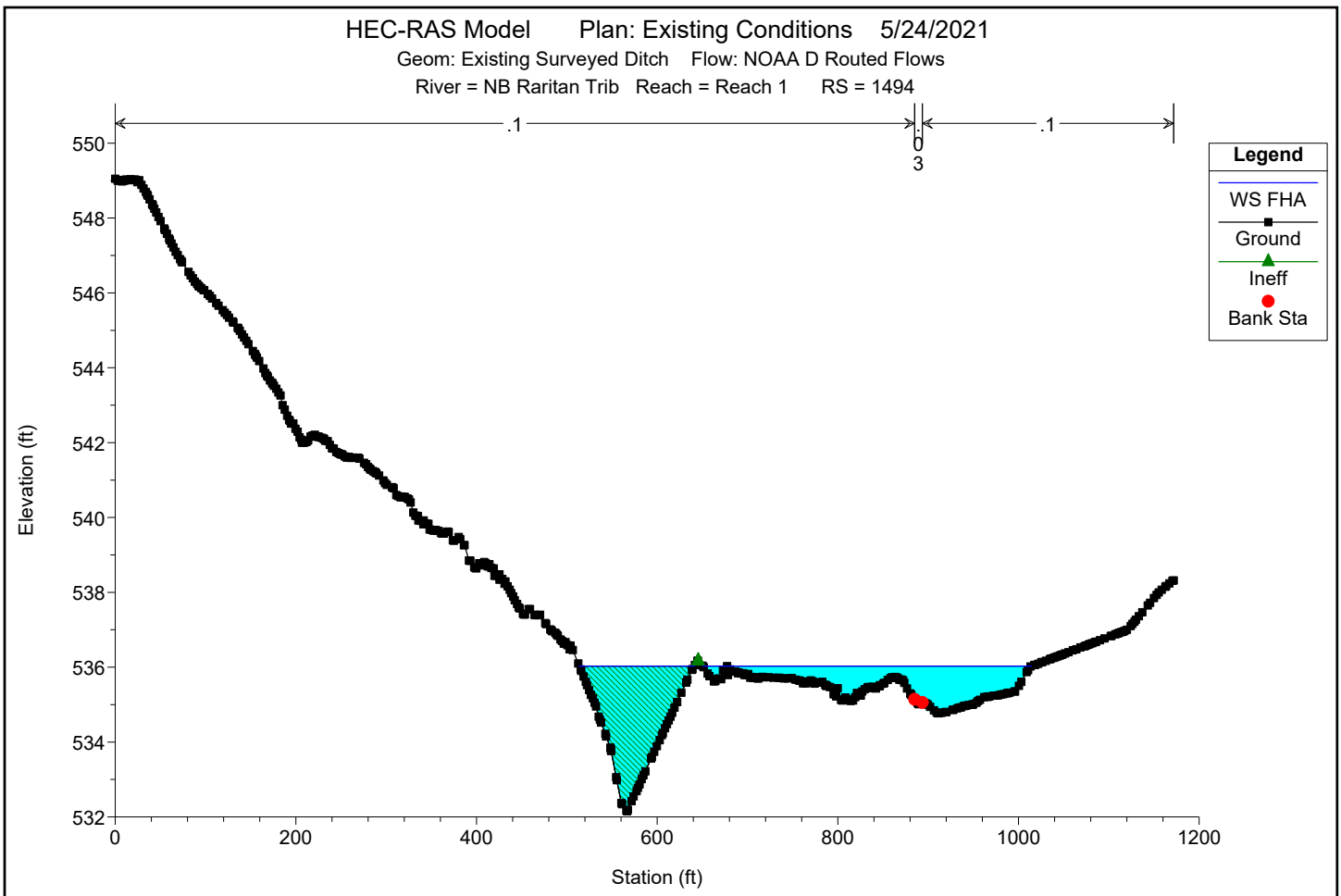

HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
River = NB Raritan Trib Reach = Reach 1 RS = 1873
.1
.03
.1
Legend
WS FHA
Ground
Bank Sta
Elevation (ft)
Station (ft)
536
538
540
542
544
546
548
550
552
554
0
200
400
600
800
1000
1200

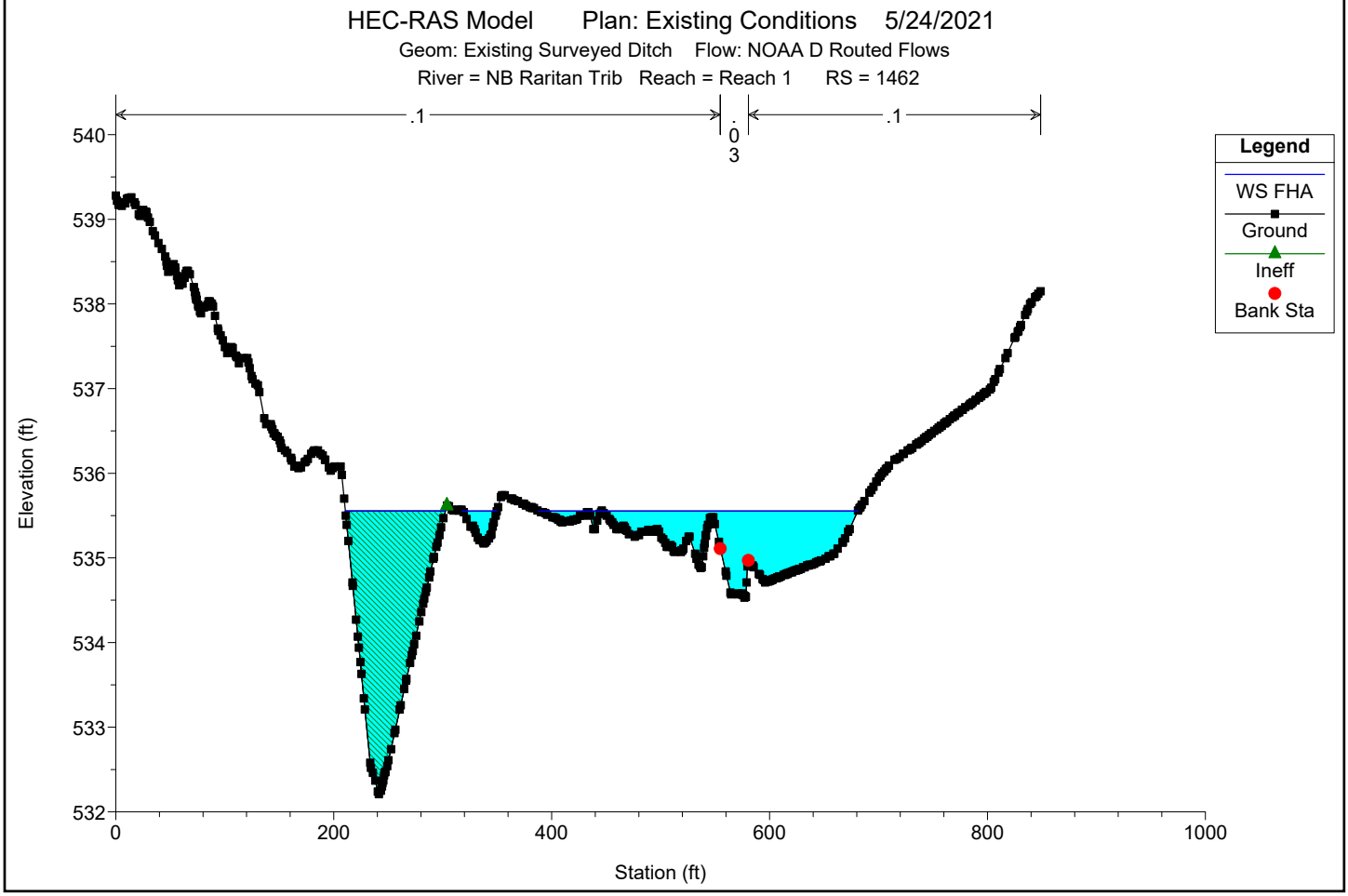

HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
River = NB Raritan Trib Reach = Reach 1 RS = 1782
.1
0
3
.1
Legend
WS FHA
Ground
Bank Sta
Elevation (ft)
554
552
550
548
546
544
542
540
538
536
0
200
400
600
800
1000
1200
Station (ft)

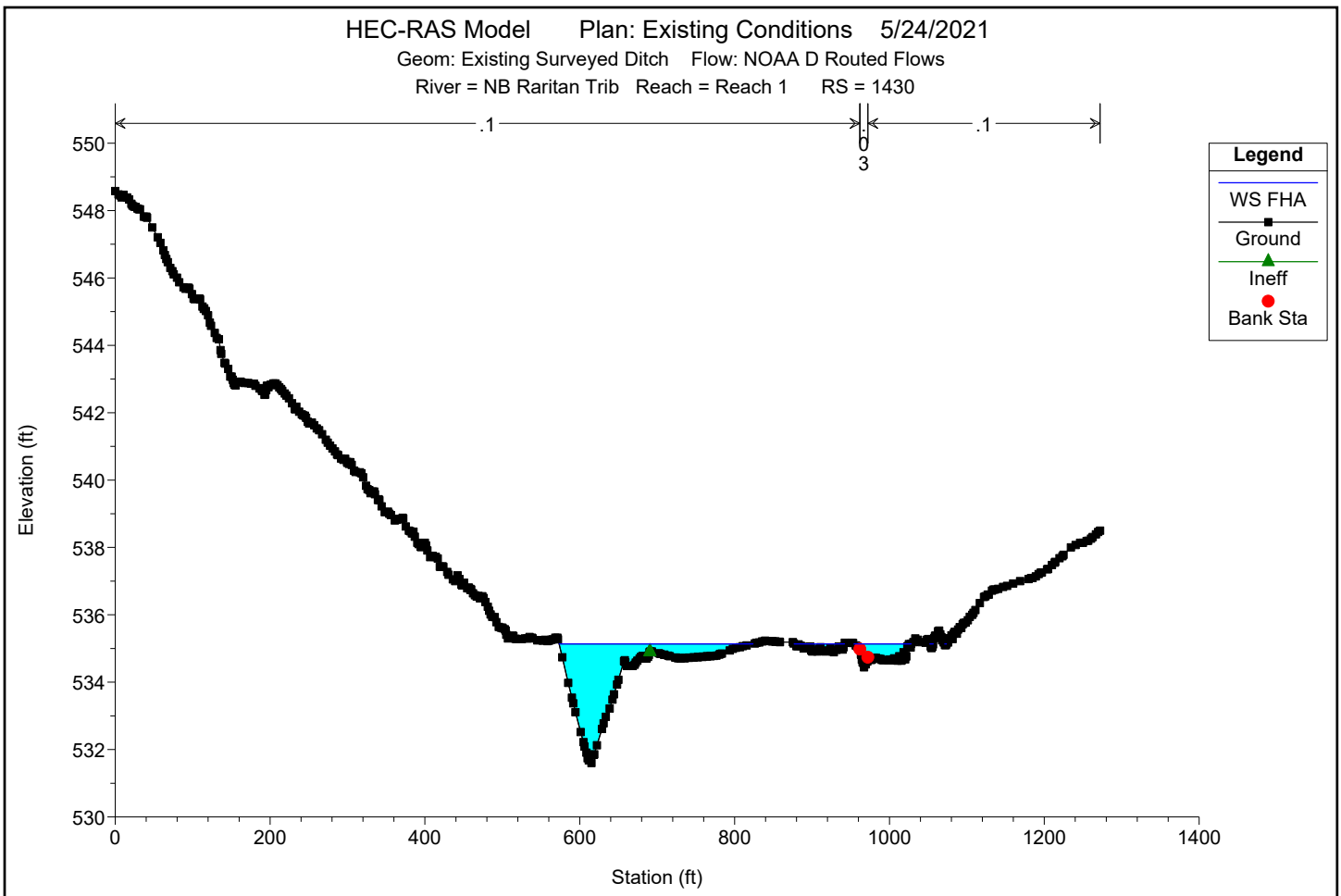

HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
River = NB Raritan Trib Reach = Reach 1 RS = 1726
.1
0
3
.1
Legend
WS FHA
Ground
Bank Sta
Elevation (ft)
552
550
548
546
544
542
540
538
536
534
0
200
400
600
800
1000
1200
Station (ft)

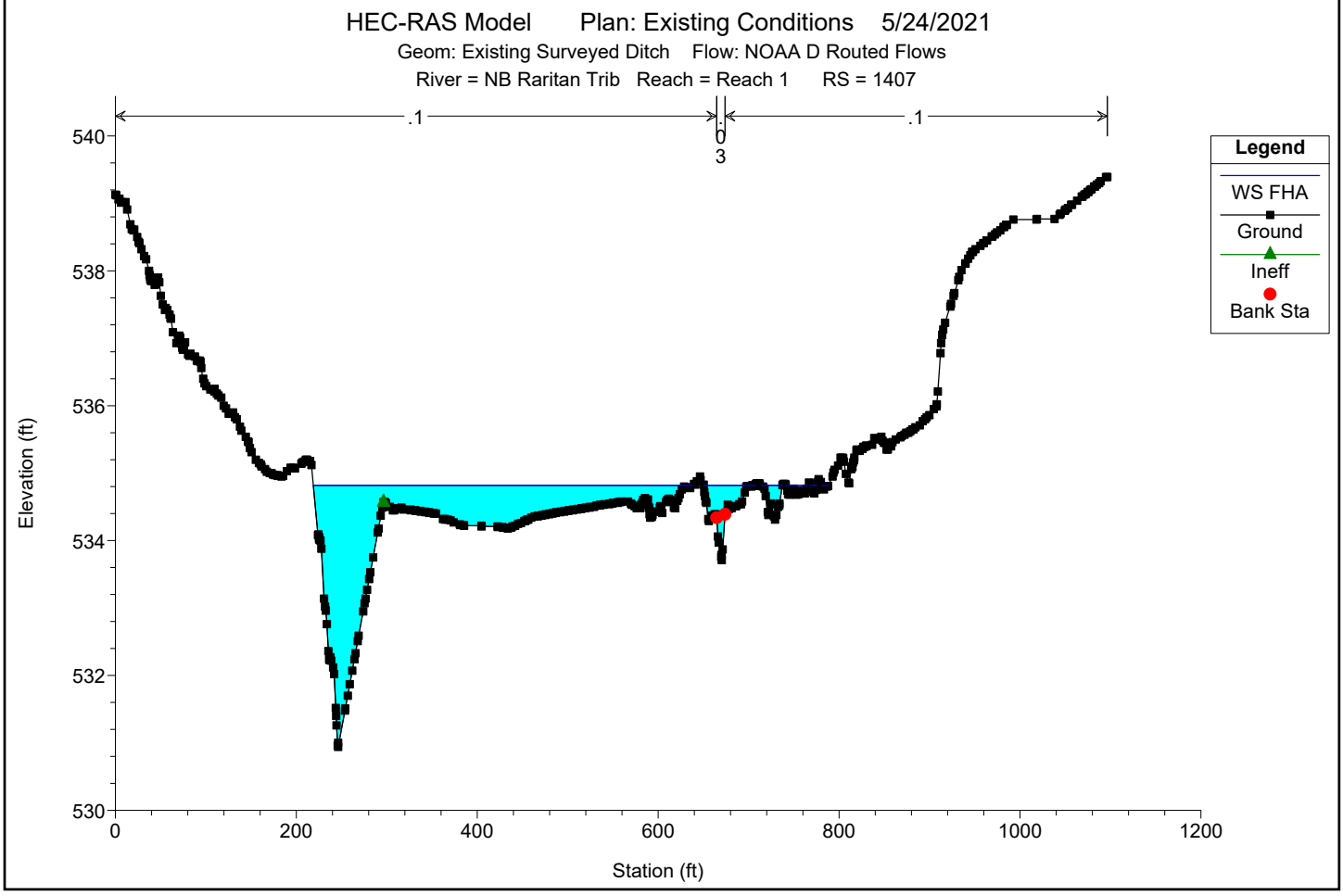

HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
River = NB Raritan Trib Reach = Reach 1 RS = 1622
.1
.03
.1
Legend
WS FHA
Ground
Ineff
Bank Sta
Elevation (ft)
550
548
546
544
542
540
538
536
534
532
0
200
400
600
800
1000
1200
Station (ft)


HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
River = NB Raritan Trib Reach = Reach 1 RS = 1532
.1
.03
.1
Legend
WS FHA
Ground
Ineff
Bank Sta
Elevation (ft)
540
539
538
537
536
535
534
533
532
0
100
200
300
400
500
600
700
800
Station (ft)


HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
River = NB Raritan Trib Reach = Reach 1 RS = 1494
.1
.03
.1
Legend
WS FHA
Ground
Ineff
Bank Sta
Elevation (ft)
550
548
546
544
542
540
538
536
534
532
0
200
400
600
800
1000
1200
Station (ft)


HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
River = NB Raritan Trib Reach = Reach 1 RS = 1462
.1
.03
.1
Legend
WS FHA
Ground
Ineff
Bank Sta
Elevation (ft)
540
539
538
537
536
535
534
533
532
0
200
400
600
800
1000
Station (ft)


HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
River = NB Raritan Trib Reach = Reach 1 RS = 1430
.1
.1
0
3
Legend
WS FHA
Ground
Ineff
Bank Sta
Elevation (ft)
550
548
546
544
542
540
538
536
534
532
530
0
200
400
600
800
1000
1200
1400
Station (ft)


HEC-RAS Model Plan: Existing Conditions 5/24/2021
Geom: Existing Surveyed Ditch Flow: NOAA D Routed Flows
River = NB Raritan Trib Reach = Reach 1 RS = 1407
.1
.1
0
3
Legend
WS FHA
Ground
Ineff
Bank Sta
Elevation (ft)
540
538
536
534
532
530
0
200
400
600
800
1000
1200
Station (ft)

HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X   X XXXXXX  XXXX     XXXX     XX    XXXX
X   X X      X   X    X  X   X X  X
X   X X      X       X  X   X   X  X
XXXXXXX XXXX   X    XXX XXXX   XXXXXX   XXXX
X   X X      X       X X   X   X     X
X   X X      X   X    X  X   X   X     X
X   X XXXXXX  XXXX     X   X  X   X  XXXXX
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PROJECT DATA
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Project File : 84-90E Main Street.prj
Run Date and Time: 5/24/2021 6:07:32 PM

Project in English units

Project Description:
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PLAN DATA

Plan Title: Existing Conditions
Plan File : C:\Users\mherrmann\Documents_Projects\1934003\Hydraulics\84-90E Main Street.p02

Geometry Title: Existing Surveyed Ditch
Geometry File : C:\Users\mherrmann\Documents_Projects\1934003\Hydraulics\84-90E Main Street.g04

Flow Title : NOAA D Routed Flows
Flow File : C:\Users\mherrmann\Documents_Projects\1934003\Hydraulics\84-90E Main Street.f03

Plan Summary Information:
Number of: Cross Sections = 10 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20

Maximum difference tolerance = 0.33
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: NOAA D Routed Flows
Flow File : C:\Users\mherrmann\Documents_Projects\1934003\Hydraulics\84-90E Main Street.f03

Flow Data (cfs)

River	Reach	RS	10-YR	100-YR	FHA
NB Raritan Trib	Reach 1	1954	74.28	154.79	193.49
NB Raritan Trib	Reach 1	1622	85.49	173.95	217.44

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
NB Raritan Trib	Reach 1	10-YR		Normal S = 0.003256
NB Raritan Trib	Reach 1	100-YR		Normal S = 0.003256
NB Raritan Trib	Reach 1	FHA		Normal S = 0.003256

GEOMETRY DATA

Geometry Title: Existing Surveyed Ditch
Geometry File : C:\Users\mherrmann\Documents_Projects\1934003\Hydraulics\84-90E Main Street.g04

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1954

INPUT
Description:
Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	554.62	2.68	554.62	3.8	554.6	7.48	554.51	8.96	554.48
11.07	554.39	13.69	554.3	14.85	554.25	20.3	554.07	23.36	553.95
25.19	553.89	27.74	553.79	27.96	553.79	30.25	553.7	31.02	553.68
34.08	553.56	38.68	553.4	40.33	553.33	41.41	553.3	42.53	553.25

43.58 553.22 46.34 553.11 50.4 552.97 53.52 552.85 57.64 552.71
59.04 552.65 60.88 552.6 63.51 552.57 65.48 552.54 66.29 552.54
68.25 552.51 70.84 552.49 76.2 552.42 76.97 552.42 80.03 552.38
82.52 552.4 83.6 552.38 84.82 552.34 86.66 552.3 87.11 552.28
89.01 552.24 91.52 552.17 95.5 552.07 102.24 551.89 103.77 551.86
105.08 551.82 106.83 551.78 111.43 551.66 112.81 551.62 116.79 551.52
119.3 551.45 120.38 551.43 123.82 551.35 124.71 551.32 127.51 551.26
131.34 551.16 132.28 551.14 136.61 550.95 138.23 551.01 138.77 551.01
140.93 550.93 142.83 550.84 144.18 550.79 145.89 550.71 147.42 550.65
155 550.3 158.15 550.17 162.16 549.99 164.27 549.89 165.78 549.83
167.33 549.75 167.98 549.73 171.93 549.55 175.76 549.37 177.29 549.31
178.89 549.23 180.96 549.14 183.12 549.06 184.95 549.02 186.37 548.98
188.53 548.87 189.38 548.84 192 548.72 193.46 548.67 194.9 548.65
196.07 548.6 197.86 548.61 201.38 548.61 202.27 548.62 205.26 548.68
206.4 548.71 207.43 548.72 210.53 548.72 211.56 548.74 213.48 548.76
214.3 548.78 218.41 548.78 218.78 548.77 221.88 548.77 223.57 548.78
224.96 548.8 226.63 548.8 228.07 548.78 229.05 548.78 232.38 548.74
234.67 548.74 234.85 548.73 237.45 548.73 238.14 548.72 239.78 548.72
240.22 548.71 242.24 548.71 242.52 548.7 244.38 548.7 244.59 548.69
246.65 548.69 247.16 548.68 249.64 548.68 249.75 548.67 252.11 548.67
252.7 548.66 254.57 548.66 254.91 548.65 257.04 548.65 257.29 548.64
259.04 548.64 259.51 548.63 261.33 548.63 261.97 548.62 264.44 548.62
265.19 548.61 267.72 548.61 267.96 548.6 270.19 548.6 270.39 548.59
272.12 548.59 273.43 548.55 277.46 548.31 279.68 548.17 286.63 547.75
291.04 547.48 293.6 547.33 294.13 547.29 297.09 547.12 297.31 547.1
301.42 546.85 302.24 546.81 304.71 546.65 308.82 546.35 310.65 546.23
310.96 546.2 312.93 546.07 315.12 545.91 315.4 545.9 317.81 545.72
320.33 545.55 322.06 545.42 323.61 545.32 324.07 545.28 328.2 545
330.19 544.85 331.01 544.8 333.48 544.62 336.77 544.4 342.02 544.02
344.25 543.87 347.45 543.64 348.84 543.55 350.74 543.41 351.56 543.36
354.12 543.17 356.07 543.04 359.78 542.77 362.19 542.61 365.53 542.37
366.22 542.33 369.64 542.08 370.61 541.91 371.29 541.84 371.55 541.74
373.61 541.77 375.68 541.84 377.04 541.84 378.33 541.86 379.81 541.86
381.7 541.9 383.09 541.91 384.44 541.94 386.39 541.96 391.16 541.96
392.19 541.94 394.19 541.86 395.29 541.86 395.94 541.83 397.35 541.74
398.35 541.66 399.74 541.57 400.45 541.54 401.7 541.63 405.28 541.85
408.06 542 409.74 542.1 411.56 542.11 418.14 542.11 418.67 542.1
425.53 542.1 427.48 542.08 430.77 542.14 432.45 542.16 434.41 542.12
437.61 542.07 441.74 542.15 441.98 542.14 445.27 542.12 446.98 542.13
447.93 542.12 451.04 542.3 452.06 542.35 453.09 542.33 453.49 542.3
455.17 542.24 458.25 542.09 460.08 541.99 461.34 541.93 462.08 541.92
464.44 541.92 468.3 541.97 469.95 541.96 471.77 541.92 472.69 541.89
474.89 541.84 475.71 541.81 476.82 541.79 478.68 541.73 479 541.73
480.65 541.67 482.83 541.52 485.07 541.39 488.36 541.44 490.52 541.45
491.13 541.43 493.81 541.38 495.46 541.39 495.72 541.38 498.75 541.36
500.39 541.41 501.58 541.41 503.84 541.33 505.71 541.28 506.34 541.3
507.73 541.37 508.62 541.43 511.96 541.57 515.2 541.67 517.41 541.62
517.67 541.6 520.09 541.66 522.22 541.75 522.94 541.77 525.71 541.88
527.54 541.92 528.41 541.96 529.19 541.96 530.83 542 532.62 541.99
534.6 542.01 536.59 541.96 538.24 541.96 539.54 541.98 540.39 541.97
541.82 541.92 543.18 541.91 544.82 541.95 546.98 542.03 548.11 542.02
550.07 541.97 552.58 541.93 555.52 541.86 557.29 541.83 559.36 541.78
562.1 541.68 563.49 541.55 564.15 541.46 564.44 541.44 565.56 541.17
566.19 541 567.01 540.82 567.82 540.67 568.71 540.53 570.74 540.09

571.08 539.97 572.71 539.22 574.88 538.25 575.16 538.16 575.83 537.83
575.97 537.79 576.95 537.73 577.6 537.99 578.67 538.45 580.1 539.04
582.14 539.9 582.49 540 582.94 540.21 583.3 540.34 583.79 540.41
584.37 540.53 584.93 540.73 585.24 540.78 585.75 540.99 585.79 541.05
586.16 541.21 587.37 541.76 588.18 541.73 590.12 541.71 591.26 541.67
595.48 541.58 597.34 541.55 598.78 541.55 600.35 541.57 602.35 541.5
603.94 541.46 604.56 541.43 606 541.41 607.65 541.4 608.46 541.43
609.13 541.49 610.33 541.54 611.78 541.46 613.22 541.4 614.32 541.38
615.76 541.32 617.38 541.19 618.19 541.1 619.52 540.99 621.43 541.06
624.71 541.24 626.14 541.3 626.76 541.3 628.18 541.33 629.49 541.34
630.92 541.38 632.32 541.39 634.57 541.39 636.81 541.32 637.81 541.28
638.82 541.27 640.66 541.3 643.84 541.29 645.85 541.27 647.37 541.32
649.2 541.4 650.11 541.43 651.82 541.51 652.49 541.53 654.9 541.64
655.59 541.66 657.91 541.76 658.51 541.77 661.99 541.77 667.47 541.89
668.39 541.9 669.97 541.94 670.79 541.95 672.66 542.02 674.79 542.09
677.01 542.18 677.53 542.19 679.72 542.28 682.1 542.37 685.05 542.47
689.07 542.51 690.07 542.51 691.24 542.53 692.15 542.53 697.11 542.58
700.37 542.62 701.29 542.62 703.16 542.64 704.94 542.67 709.51 542.77
710.43 542.78 715.2 542.89 715.91 542.9 721.23 543.01 723.25 543.06
724.14 543.07 726.25 543.12 729.62 543.19 735.53 543.32 737.3 543.37
739.67 543.42 742.41 543.49 744.46 543.53 747.9 543.62 750.37 543.67
754.29 543.77 756.74 543.82 758.86 543.87 759.78 543.9 761.42 543.93
762.52 543.96 769.46 544.1 771.25 544.12 773.52 544.16 775.31 544.2
779.06 544.27 781.52 544.27 781.71 544.28 787.19 544.28 787.55 544.29
791.76 544.29 792.45 544.3 796.33 544.3 796.6 544.31 799.15 544.31
805.22 544.55 805.25 544.56 807.4 544.64 808.48 544.69 811.73 544.81
817.47 545.06 820.4 545.17 822.83 545.28 823.78 545.31 826.06 545.41
827.98 545.48 830.47 545.59 834.3 545.74 835.06 545.78 837.36 545.86
839.07 545.93 839.65 545.97 840.98 546.03 841.95 546.03 844.19 546.06
845.77 546.06 847.48 546.03 849.48 546.01 850.36 546.01 851.81 545.98
852.65 545.98 854.68 545.95 856.14 545.94 858.01 545.98 860.48 546.01
861.83 546.04 862.49 546.03 864.13 546.03 864.61 546.04 866.46 546.04
867.69 546.05 869.14 546.08 873.47 546.12 874.56 546.14 876.36 546.2
878.1 546.24 879.42 546.2 880.7 546.21 882.14 546.2 884.31 546.32
886.88 546.34 888.73 546.34 890.59 546.37 892.97 546.39 895.14 546.39
895.48 546.38 898.91 546.38 900.07 546.35 901.72 546.36 902.37 546.38
903.9 546.34 906.19 546.3 907.05 546.27 908.48 546.24 911.39 546.29
913.07 546.28 915.37 546.34 916.57 546.36 917.66 546.36 920.28 546.4
921.13 546.4 922.33 546.42 923.99 546.43 925.47 546.42 926.07 546.43
926.84 546.48 929.13 546.67 929.56 546.72 930.88 546.81 931.69 546.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	564.15	.03	586.16	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
564.15	586.16	99.91	99.91	.1	.3

CROSS SECTION OUTPUT Profile #10-YR

E.G. Elev (ft)	540.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.		0.030	
W.S. Elev (ft)	539.83	Reach Len. (ft)	99.91	99.91	99.91
Crit W.S. (ft)	539.83	Flow Area (sq ft)		12.10	

E.G. Slope (ft/ft)	0.014289	Area (sq ft)	12.10		
Q Total (cfs)	74.28	Flow (cfs)	74.28		
Top Width (ft)	10.60	Top Width (ft)	10.60		
Vel Total (ft/s)	6.14	Avg. Vel. (ft/s)	6.14		
Max Chl Dpth (ft)	2.10	Hydr. Depth (ft)	1.14		
Conv. Total (cfs)	621.4	Conv. (cfs)	621.4		
Length Wtd. (ft)	99.91	Wetted Per. (ft)	11.46		
Min Ch El (ft)	537.73	Shear (lb/sq ft)	0.94		
Alpha	1.00	Stream Power (lb/ft s)	5.78		
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	1.54	0.20	0.30
C & E Loss (ft)	0.14	Cum SA (acres)	2.13	0.23	0.66

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100-YR

E.G. Elev (ft)	541.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.70	Wt. n-Val.	0.030		
W.S. Elev (ft)	540.66	Reach Len. (ft)	99.91	99.91	99.91
Crit W.S. (ft)	540.66	Flow Area (sq ft)	23.10		
E.G. Slope (ft/ft)	0.013072	Area (sq ft)	23.10		
Q Total (cfs)	154.79	Flow (cfs)	154.79		
Top Width (ft)	16.84	Top Width (ft)	16.84		
Vel Total (ft/s)	6.70	Avg. Vel. (ft/s)	6.70		
Max Chl Dpth (ft)	2.93	Hydr. Depth (ft)	1.37		
Conv. Total (cfs)	1353.8	Conv. (cfs)	1353.8		
Length Wtd. (ft)	99.91	Wetted Per. (ft)	17.95		
Min Ch El (ft)	537.73	Shear (lb/sq ft)	1.05		
Alpha	1.00	Stream Power (lb/ft s)	7.04		
Frctn Loss (ft)	0.72	Cum Volume (acre-ft)	2.19	0.30	0.49
C & E Loss (ft)	0.14	Cum SA (acres)	2.93	0.25	0.84

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #FHA

E.G. Elev (ft)	541.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.75	Wt. n-Val.		0.030	
W.S. Elev (ft)	540.92	Reach Len. (ft)	99.91	99.91	99.91
Crit W.S. (ft)	540.92	Flow Area (sq ft)		27.81	
E.G. Slope (ft/ft)	0.012889	Area (sq ft)		27.81	
Q Total (cfs)	193.49	Flow (cfs)		193.49	
Top Width (ft)	19.03	Top Width (ft)		19.03	
Vel Total (ft/s)	6.96	Avg. Vel. (ft/s)		6.96	
Max Chl Dpth (ft)	3.19	Hydr. Depth (ft)		1.46	
Conv. Total (cfs)	1704.3	Conv. (cfs)		1704.3	
Length Wtd. (ft)	99.91	Wetted Per. (ft)		20.21	
Min Ch El (ft)	537.73	Shear (lb/sq ft)		1.11	
Alpha	1.00	Stream Power (lb/ft s)		7.70	
Frctn Loss (ft)	0.77	Cum Volume (acre-ft)	2.50	0.33	0.58
C & E Loss (ft)	0.14	Cum SA (acres)	3.21	0.26	0.96

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1873

INPUT
Description:
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	553.28	3.46	553.19	7.25	553.11	7.85	553.09	13.99	552.98
15.11	552.95	18.6	552.89	23.8	552.79	24.1	552.79	28.59	552.69
29	552.69	31.23	552.63	32.01	552.62	34.2	552.56	35.69	552.56
37.57	552.54	38.8	552.5	40.15	552.48	42.38	552.41	43.4	552.39
45.18	552.33	46.84	552.22	49.07	552.11	52.78	551.96	55.01	551.79

57.98 551.5 59.47 551.37 61.16 551.28 63.93 551.24 66.78 551.15
67.65 551.1 70.62 551.04 71.36 551.08 72.1 551.16 73.59 551.17
75.08 551.2 76.89 551.21 78.13 551.19 82.52 551.04 83.25 551
84.72 550.96 88.45 550.79 89.11 550.78 89.94 550.72 91.49 550.51
97.1 550.24 100.34 550.12 102.29 550.02 104.97 549.98 107.21 549.92
109.26 549.85 110 549.84 110.07 549.8 110.75 549.77 111.49 549.64
112.37 549.62 115.07 549.42 117.44 549.14 118.92 549.1 119.27 549.11
120.69 549.08 122.64 548.99 123.38 548.89 124.25 548.73 124.87 548.66
126.35 548.63 127.1 548.56 127.84 548.53 128.46 548.45 129.33 548.45
130.07 548.4 130.76 548.42 131.55 548.58 133.03 548.51 133.78 548.52
136.01 548.48 137.42 548.4 138.99 548.28 140.91 548.36 142.7 548.45
144.28 548.46 145.4 548.55 146.85 548.56 147.9 548.55 151.02 548.48
152.36 548.52 154.99 548.41 157.19 548.36 159.05 548.33 160.54 548.29
162.02 548.19 162.95 548.15 165 548.09 165.74 548.15 166.74 548.34
168.17 548.3 169.45 548.17 170.37 548.13 172.36 547.95 173.17 547.9
175.73 547.81 179.1 547.67 180.6 547.67 181.34 547.69 182.83 547.69
184.32 547.67 185.94 547.72 186.95 547.63 189.12 547.66 190.86 547.62
193.47 547.5 195.06 547.38 196.07 547.21 199.12 546.91 199.73 546.82
201.29 546.67 202.14 546.64 204.59 546.61 205.63 546.56 205.81 546.61
206.5 546.62 207.37 546.67 208.23 546.75 209.98 546.88 213.31 547.22
214.31 547.28 219.53 547.28 222.84 547.25 226.49 547.16 231.36 546.98
232.57 546.95 233.79 546.88 236.63 546.66 239.87 546.53 242.71 546.47
245.75 546.55 246.47 546.58 248.39 546.62 249.95 546.63 252.85 546.68
253.86 546.73 254.87 546.81 255.69 546.81 257.77 546.72 259.51 546.66
263.85 546.48 265.01 546.44 269.93 546.21 270.8 546.18 273.41 546.06
274.28 546.03 278.62 545.83 279.49 545.8 282.1 545.68 284.71 545.58
287.32 545.49 288.18 545.45 290.79 545.36 293.4 545.24 294.26 545.19
297.74 545.03 298.61 544.98 301.22 544.86 302.08 544.81 305.54 544.65
308.17 544.56 309.04 544.54 322.6 544.07 323.78 544.04 350.17 543.13
350.75 543.12 354.23 543 356.83 542.82 358.28 542.71 364.65 542.34
365.18 542.3 370.05 542.02 370.73 541.97 374.92 541.73 376.13 541.65
381 541.37 384.65 541.15 387.68 540.92 388.98 540.9 389.85 540.86
390.68 540.78 394.78 540.56 395.79 540.59 396.81 540.66 399.41 540.81
400.86 540.88 402.84 540.92 404.92 540.93 407.76 540.88 412.01 540.88
413.03 540.89 419.39 540.71 421.09 540.65 422.87 540.61 423.58 540.58
425.47 540.58 427.17 540.6 429.82 540.61 432.43 540.63 436.34 540.67
437.36 540.67 440.25 540.7 441.12 540.7 448.51 540.84 449.81 540.81
451.5 540.71 452.78 540.67 454.59 540.77 455.61 540.79 458.49 540.67
461.1 540.65 464.73 540.64 467.18 540.6 468.79 540.6 470.66 540.57
471.53 540.58 474.14 540.58 476.74 540.55 478.48 540.54 479.94 540.51
482.98 540.49 486.84 540.56 489.28 540.56 491.51 540.59 494.14 540.61
494.99 540.59 496.73 540.61 497.6 540.64 500.22 540.67 501.07 540.69
504.55 540.73 508.89 540.7 510.63 540.7 513.24 540.68 516.71 540.67
520.19 540.63 521.06 540.63 526.27 540.57 527.59 540.56 534.09 540.49
534.96 540.49 540.76 540.43 542.72 540.4 543.65 540.4 553.21 540.29
556.19 540.27 557.4 540.25 563.07 540.2 568.85 540.13 569.72 540.13
575.65 540.06 577.54 540.05 582.75 539.99 583.62 539.99 586.23 539.96
589.71 539.93 592.31 539.9 598.76 539.84 599.89 539.84 603.6 539.81
605.4 539.81 609.35 539.78 613.07 539.76 614.63 539.76 616.89 539.74
620.31 539.73 621.92 539.71 625.22 539.7 627.38 539.68 629.42 539.71
630.45 539.71 636.48 539.48 643.27 539.41 643.73 538.96 643.94 538.91
644.77 537.67 644.8 537.63 645.04 537.33 645.53 536.98 645.77 537.22
646.14 537.04 647.03 537.17 647.79 537.25 647.82 537.21 648.54 537.28
648.96 537.28 651.56 537.56 652.75 537.81 653.06 537.93 656.13 537.89

659.09 538.04 661.56 538.15 662.93 538.22 665.12 538.33 667.38 538.43
672.57 538.68 673.41 538.74 674.16 538.88 675.23 539.15 676.98 539.38
678.69 539.55 680 539.55 682.39 539.63 683.21 539.64 685.47 539.63
687.73 539.66 692.12 539.69 694.89 539.66 698.45 539.61 700.49 539.6
703.65 539.71 704.32 539.72 706.9 539.82 707.39 539.85 708.55 539.87
712.69 539.84 714.02 539.84 716.33 539.87 717.78 539.87 718.64 539.85
720.62 539.89 721.13 539.93 723.19 540.01 724.97 540 726.13 539.97
727.95 539.9 728.34 539.92 732.63 540.06 735.07 540.12 736.92 540.14
739.49 540.21 742.37 540.22 744.22 540.24 748.07 540.26 749.86 540.26
753.61 540.29 758.61 540.31 759.22 540.32 763.3 540.34 764.85 540.36
769.85 540.38 771.69 540.4 774.85 540.41 777.23 540.43 778.95 540.43
780.84 540.45 782.38 540.45 787.53 540.48 791.82 540.52 795.25 540.53
797.33 540.55 798.68 540.55 801.08 540.57 802.33 540.57 804.23 540.59
805.54 540.59 813.26 540.64 816.44 540.65 818.05 540.67 819.26 540.67
820.98 540.69 822.32 540.69 827.63 540.73 829 540.73 831.06 540.75
832.71 540.75 836.42 540.78 842.88 540.81 844.92 540.83 847.97 540.84
850.14 540.86 851.86 540.86 853.57 540.88 858.72 540.9 860.44 540.92
861.85 540.92 863.87 540.94 865.26 540.94 867.29 540.96 871.59 540.98
875.43 540.85 881.53 540.62 885.31 540.49 885.6 540.47 889.77 540.32
892.72 540.22 894.7 540.14 896.02 540.12 899.77 540.21 899.89 540.24
901.01 540.26 901.61 540.56 901.88 540.59 904.93 541.94 906.01 542.28
906.75 542.42 907.98 542.8 908.47 542.79 908.51 542.85 914.76 542.92
919.17 542.98 920.48 542.98 922.25 542.95 923.91 542.88 926 542.85
928.32 542.79 931.63 542.72 933.49 542.69 935.06 542.65 936.46 542.63
940.21 542.54 941.54 542.52 946.63 542.41 948.48 542.38 949.73 542.31
953.48 542 954.92 541.9 957.82 541.8 962.51 541.58 962.9 541.54
963.37 541.39 963.92 541.27 965.08 540.78 965.97 540.59 966.8 540.45
967.22 540.34 967.66 540.33 967.99 540.18 968.47 540.08 968.51 540.14
969 540.02 969.37 540.14 969.72 540.11 970.97 540.45 973.07 541.06
975.11 541.56 978.81 542.41 980.52 542.83 982.29 543.25 986.3 544
987.21 544.13 988.46 544.27 989.1 544.24 989.35 544.27 993.24 544.15
995.1 544.08 997.2 544.02 998.72 543.96 1000.95 543.89 1001.55 543.86
1004.7 543.75 1006.64 543.69 1008.67 543.61 1010.71 543.48 1013.12 543.31
1017.83 543 1022.91 542.82 1024.68 542.75 1030.93 542.52 1038.85 542.43
1040.92 542.4 1044.27 542.37 1050 542.29 1055.91 542.22 1058.41 542.2
1061.15 542.16 1062.01 542.16 1064.42 542.13 1068.87 542.03 1069.65 542.02
1072.15 542.03 1074.88 542.01 1078.85 542.01 1080.9 541.96 1083.94 542.07
1084.64 542.12 1089.64 542.36 1092.14 542.47 1093.75 542.53 1097.27 542.69
1098.18 542.72 1102.13 542.9 1104.28 542.99 1107.33 543.05 1109.19 543.07
1112.62 543.13 1115.8 543.17

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	643.27	.03	676.98	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
643.27	676.98	79.5	79.5	.1	.3

CROSS SECTION OUTPUT Profile #10-YR

E.G. Elev (ft)	539.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.030	
W.S. Elev (ft)	538.89	Reach Len. (ft)	79.50	79.50	79.50
Crit W.S. (ft)		Flow Area (sq ft)		26.38	

E.G. Slope (ft/ft)	0.004090	Area (sq ft)	26.38		
Q Total (cfs)	74.28	Flow (cfs)	74.28		
Top Width (ft)	30.26	Top Width (ft)	30.26		
Vel Total (ft/s)	2.82	Avg. Vel. (ft/s)	2.82		
Max Chl Dpth (ft)	1.91	Hydr. Depth (ft)	0.87		
Conv. Total (cfs)	1161.4	Conv. (cfs)	1161.4		
Length Wtd. (ft)	79.50	Wetted Per. (ft)	31.47		
Min Ch El (ft)	536.98	Shear (lb/sq ft)	0.21		
Alpha	1.00	Stream Power (lb/ft s)	0.60		
Frctn Loss (ft)	0.55	Cum Volume (acre-ft)	1.54	0.16	0.30
C & E Loss (ft)	0.05	Cum SA (acres)	2.13	0.19	0.66

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #100-YR

E.G. Elev (ft)	539.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.030		
W.S. Elev (ft)	539.36	Reach Len. (ft)	79.50	79.50	79.50
Crit W.S. (ft)		Flow Area (sq ft)	41.26		
E.G. Slope (ft/ft)	0.004599	Area (sq ft)	41.26		
Q Total (cfs)	154.79	Flow (cfs)	154.79		
Top Width (ft)	33.52	Top Width (ft)	33.52		
Vel Total (ft/s)	3.75	Avg. Vel. (ft/s)	3.75		
Max Chl Dpth (ft)	2.38	Hydr. Depth (ft)	1.23		
Conv. Total (cfs)	2282.5	Conv. (cfs)	2282.5		
Length Wtd. (ft)	79.50	Wetted Per. (ft)	34.96		
Min Ch El (ft)	536.98	Shear (lb/sq ft)	0.34		
Alpha	1.00	Stream Power (lb/ft s)	1.27		
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	2.19	0.23	0.49
C & E Loss (ft)	0.02	Cum SA (acres)	2.93	0.20	0.84

CROSS SECTION OUTPUT Profile #FHA

E.G. Elev (ft)	539.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	539.49	Reach Len. (ft)	79.50	79.50	79.50
Crit W.S. (ft)		Flow Area (sq ft)	0.32	45.63	0.06
E.G. Slope (ft/ft)	0.005175	Area (sq ft)	0.32	45.63	0.06
Q Total (cfs)	193.49	Flow (cfs)	0.04	193.44	0.01
Top Width (ft)	41.94	Top Width (ft)	7.10	33.71	1.12
Vel Total (ft/s)	4.21	Avg. Vel. (ft/s)	0.14	4.24	0.16
Max Chl Dpth (ft)	2.51	Hydr. Depth (ft)	0.05	1.35	0.06
Conv. Total (cfs)	2689.7	Conv. (cfs)	0.6	2688.9	0.1
Length Wtd. (ft)	79.50	Wetted Per. (ft)	7.10	35.16	1.13
Min Ch El (ft)	536.98	Shear (lb/sq ft)	0.01	0.42	0.02
Alpha	1.02	Stream Power (lb/ft s)	0.00	1.78	0.00
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)	2.50	0.25	0.58
C & E Loss (ft)	0.01	Cum SA (acres)	3.20	0.20	0.95

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1782

INPUT
Description:
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	552.33	1.33	552.22	3.27	552.16	4.4	552.07	5.16	552.1
7.6	552.08	9.79	552.03	10.52	552	12.82	551.94	15.32	551.84
17.41	551.78	20.86	551.71	22.82	551.68	24.55	551.64	25.83	551.66
28.05	551.65	32.49	551.49	35.79	551.29	37.32	551.25	38.52	551.25
41.15	551.21	42.23	551.18	43.76	551.08	46.56	550.84	47.64	550.83
48.72	550.89	50.33	550.84	53.39	550.68	55.21	550.69	57.99	550.68
59.52	550.65	60.28	550.73	64.11	550.58	65.13	550.51	68.2	550.19
71.77	549.95	74.69	549.85	76.36	549.82	77.94	549.73	83.25	549.5
84.43	549.47	85.42	549.41	87.68	549.3	89.38	549.35	92.8	549.29
95.5	549.23	98.56	549.31	100.66	549.32	101.63	549.25	102.39	549.16
103.87	549.04	105.72	549.02	107.15	549.02	110.05	548.93	110.81	548.87
112.34	548.7	113.87	548.56	116.89	548.56	116.94	548.57	119.66	548.56
121.53	548.52	122.32	548.52	123.39	548.43	123.83	548.37	125.36	548.33
126.01	548.29	129.88	547.99	131.48	547.8	132.04	547.69	135.23	547.54
136.37	547.66	136.84	547.67	137.98	547.54	140.7	547.06	141.78	546.88
142.2	546.88	142.61	546.79	143.73	546.75	144.46	546.67	144.5	546.72
145.03	546.64	145.83	546.6	146.79	546.67	147.56	546.68	148.15	546.63
149.09	546.66	150.44	546.85	151.39	547.02	152.15	547.04	154.77	547.04
156.75	546.99	158.01	546.83	159.22	546.96	160.18	547.03	160.57	547.02
161.54	547.06	163.42	547.11	165.59	547.15	165.93	547.12	166.6	546.95
168.23	546.99	169.76	546.86	170.29	546.84	170.53	546.78	171.29	546.79
172.01	546.85	173.59	546.81	174.62	546.82	175.89	546.75	177.42	546.75
178.57	546.52	179.65	546.27	179.86	546.25	185.04	546.17	186.15	546.17
186.6	546.1	188.9	546.07	190.33	546.02	191.56	545.9	192.73	545.65
193.72	545.47	194.8	545.36	196.11	545.32	196.56	545.37	197.32	545.39
197.96	545.5	199.62	545.69	200.57	545.78	201.67	545.85	202.52	545.84
204.24	545.79	205.29	545.78	206.84	545.82	207.66	545.8	208.1	545.83
209.42	545.82	213.44	545.7	214.51	545.62	215.47	545.5	216.22	545.55
218.52	545.62	220.2	545.64	222.22	545.7	223.15	545.74	225.6	545.97
228.21	546.11	232.77	546.37	236.95	546.59	239.45	546.69	241.96	546.78
243.62	546.79	246	546.67	248.23	546.57	251.32	546.45	255.6	546.25
256.46	546.2	259.03	546.08	265.02	545.84	267.05	545.77	274.15	545.49
275.51	545.43	281.29	545.21	283.35	545.12	283.86	545.11	288.74	544.91
289.62	544.88	294.85	544.67	299.27	544.44	301.84	544.32	305.26	544.14
308.44	543.99	311.25	543.84	313.82	543.72	320.67	543.37	327.25	543.05
328.51	542.98	332.27	542.8	333.49	542.73	336.08	542.61	338.88	542.47
341.66	542.32	346.35	542.05	347.76	542	348.92	541.98	351.49	541.9
355.07	541.74	358.34	541.63	366.13	541.38	367.39	541.33	369.47	541.27
375.24	541.07	379.74	540.89	382.31	540.8	383.69	540.74	385.74	540.67
391.73	540.43	394.3	540.34	394.57	540.32	397.72	540.21	398.58	540.19
401.7	540.05	402.86	540.04	404.57	540.1	405.77	540.1	407.14	540.06
409.01	540.05	409.71	540.02	410.86	540.03	412.28	539.94	413.13	539.83
414.84	539.57	416.3	539.51	417.41	539.52	419.13	539.62	420.07	539.69

422.55 539.77 423.41 539.82 425.08 539.88 427.69 539.88 430.59 539.89
432.61 539.87 436.37 539.88 439.35 539.91 440.53 539.88 442.24 539.8
446.78 539.66 447.38 539.63 449.09 539.66 452.68 539.68 455.08 539.72
459.36 539.77 461.93 539.79 464.79 539.91 466.21 539.92 468.35 539.9
470.23 539.87 472.93 539.85 479.04 539.63 480.06 539.61 483.11 539.61
485.05 539.57 487.18 539.64 491.04 539.56 492.81 539.43 495.32 539.28
496.57 539.23 500.34 539.13 502.84 539.19 503.03 539.21 504.74 539.24
506.45 539.38 507.31 539.47 508.55 539.44 509.02 539.37 509.12 539.41
509.88 539.36 510.59 539.25 512.88 539.35 513.3 539.34 514.13 539.39
514.16 539.35 515.01 539.41 516.64 539.49 519.74 539.62 520.76 539.55
521.66 539.53 524.83 539.58 526.14 539.63 527.93 539.72 528.71 539.74
534.2 539.77 536.71 539.77 537.04 539.78 539.84 539.79 543.26 539.79
543.88 539.8 550.51 539.8 552.68 539.78 556.11 539.78 556.38 539.77
559.29 539.77 561.79 539.75 565.45 539.74 567.57 539.71 575.8 539.63
578.77 539.58 582.84 539.53 585.62 539.48 591.21 539.41 595.05 539.35
595.66 539.35 601.48 539.26 604.05 539.23 604.91 539.21 608.61 539.17
609.45 539.15 614.47 539.09 619.4 539.01 620.74 539 627.61 538.9
633.29 538.81 636.58 538.77 640.81 538.7 643.43 538.67 648.34 538.59
648.98 538.59 651.14 538.55 651.77 538.55 655.09 538.5 657.99 538.47
660.88 538.42 667.14 538.34 669 538.33 675.56 538.26 678.63 538.24
682.93 538.19 687.05 538.16 688.44 538.14 690.88 538.13 692.12 538.11
696.24 538.08 700.5 538.03 702.37 538.02 704.67 537.99 708.27 537.96
710.83 537.96 714.06 537.94 715.28 537.96 717.36 538.03 719.06 538.12
722.08 538.3 728.13 538.63 728.33 538.65 728.86 538.4 728.88 538.68
728.96 538.62 729.43 538.3 729.64 538.1 730.4 537.98 730.87 537.7
731.15 537.64 732.72 536.49 732.87 536.46 733.42 536.11 733.82 536.06
734.18 536.08 734.87 536.01 735.69 536.04 736.44 536.01 737.11 536.07
738.21 536.6 740.4 537.73 740.98 537.96 741.05 537.98 741.5 538.12
743.24 538.35 744 538.4 745.89 538.43 746.89 538.46 750.9 538.53
754.38 538.62 755.34 538.66 756.86 538.65 758.91 539.02 759.87 539.09
761.67 539.11 765.64 539.12 767.91 539.15 771.85 539.17 773.86 539.19
776.29 539.16 778.98 539.1 780.17 539.09 782.05 539.1 784.1 539.08
787.72 539.08 789.4 539.07 792.75 538.97 795.27 538.92 796.39 538.91
800.78 538.91 804.72 538.84 806.17 538.83 808.67 538.87 811.2 538.9
813.93 538.9 814.56 538.91 817.99 538.91 819.94 538.94 822.62 538.96
826.09 538.96 828.82 538.99 833.26 539.09 836.28 539.1 844.75 539.1
845.48 539.11 856.49 539.11 857.31 539.12 860.91 539.12 861.26 539.11
869.15 539.11 869.91 539.1 873.09 539.1 876.27 539.3 877.04 539.37
877.46 539.44 880.82 540.12 881.66 540.27 882.42 540.44 883.61 540.48
884.93 540.51 886.69 540.57 888.37 540.61 892.81 540.75 894.13 540.78
896.75 540.86 899.39 540.96 900.11 541 902.62 541.01 904.65 540.99
909.91 540.87 914.17 540.76 922.75 540.56 923.06 540.56 928.31 540.44
929.63 540.4 934.5 540.32 936.2 540.28 943.07 540.16 946.72 540.06
947.08 540.03 948.04 540.02 948.75 539.92 949.35 539.92 949.59 539.85
951.27 539.98 952.33 540.03 953.79 540.06 954.62 540.06 957.24 540.11
960.5 540.45 963.01 540.72 964.35 540.85 965.13 540.86 966.44 540.92
967.76 541 968.45 541.07 969.07 541.2 970.39 541.55 971.4 541.89
972.54 542.24 973.92 542.63 975.65 543.23 976.96 543.74 977.27 543.66
977.66 543.84 978.69 544 980.74 544.02 985.66 544.01 986.88 543.98
996.56 543.17 999.08 543 1004.29 542.76 1004.95 542.74 1009.14 542.54
1013.78 542.33 1019.21 542.11 1023.4 541.92 1026.45 541.76 1028.24 541.68
1030.87 541.54 1033.99 541.4 1035.98 541.32 1038.5 541.2 1042.7 541.01
1046.28 540.9 1047.3 540.86 1055.27 540.62 1058.48 540.52 1061.64 540.41
1064.71 540.32 1068.69 540.24 1071.63 540.17 1072.78 540.13 1080.08 539.77

1084.17 539.56 1087.14 539.42 1088.27 539.38 1088.82 539.41 1091.31 539.64
1093.98 539.87 1095.02 539.94

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	728.96	.03	741.05	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
728.96	741.05	71.34	71.34	.1	.3

CROSS SECTION OUTPUT Profile #10-YR

E.G. Elev (ft)	538.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.61	Wt. n-Val.		0.030	
W.S. Elev (ft)	537.81	Reach Len. (ft)	71.34	71.34	71.34
Crit W.S. (ft)	537.81	Flow Area (sq ft)		11.83	
E.G. Slope (ft/ft)	0.014336	Area (sq ft)		11.83	
Q Total (cfs)	74.28	Flow (cfs)		74.28	
Top Width (ft)	9.92	Top Width (ft)		9.92	
Vel Total (ft/s)	6.28	Avg. Vel. (ft/s)		6.28	
Max Chl Dpth (ft)	1.80	Hydr. Depth (ft)		1.19	
Conv. Total (cfs)	620.4	Conv. (cfs)		620.4	
Length Wtd. (ft)	71.34	Wetted Per. (ft)		10.86	
Min Ch El (ft)	536.01	Shear (lb/sq ft)		0.98	
Alpha	1.00	Stream Power (lb/ft s)		6.12	
Frctn Loss (ft)	0.63	Cum Volume (acre-ft)	1.54	0.12	0.30
C & E Loss (ft)	0.11	Cum SA (acres)	2.13	0.15	0.66

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100-YR

E.G. Elev (ft)	539.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	538.71	Reach Len. (ft)	71.34	71.34	71.34
Crit W.S. (ft)	538.71	Flow Area (sq ft)	38.65	22.04	3.64
E.G. Slope (ft/ft)	0.006792	Area (sq ft)	38.65	22.04	3.64
Q Total (cfs)	154.79	Flow (cfs)	27.17	125.98	1.65
Top Width (ft)	116.75	Top Width (ft)	88.54	12.09	16.12
Vel Total (ft/s)	2.41	Avg. Vel. (ft/s)	0.70	5.72	0.45
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)	0.44	1.82	0.23
Conv. Total (cfs)	1878.2	Conv. (cfs)	329.6	1528.5	20.0
Length Wtd. (ft)	71.34	Wetted Per. (ft)	88.90	13.30	16.17
Min Ch El (ft)	536.01	Shear (lb/sq ft)	0.18	0.70	0.10

Alpha	4.61	Stream Power (lb/ft s)	0.13	4.02	0.04
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)	2.15	0.17	0.49
C & E Loss (ft)	0.04	Cum SA (acres)	2.85	0.15	0.82

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #FHA

E.G. Elev (ft)	539.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	538.89	Reach Len. (ft)	71.34	71.34	71.34
Crit W.S. (ft)	538.89	Flow Area (sq ft)	56.19	24.28	7.00
E.G. Slope (ft/ft)	0.006425	Area (sq ft)	56.19	24.28	7.00
Q Total (cfs)	193.49	Flow (cfs)	45.21	143.97	4.31
Top Width (ft)	138.75	Top Width (ft)	100.82	12.09	25.83
Vel Total (ft/s)	2.21	Avg. Vel. (ft/s)	0.80	5.93	0.62
Max Chl Dpth (ft)	2.88	Hydr. Depth (ft)	0.56	2.01	0.27
Conv. Total (cfs)	2413.9	Conv. (cfs)	564.1	1796.1	53.7
Length Wtd. (ft)	71.34	Wetted Per. (ft)	101.18	13.30	25.90
Min Ch El (ft)	536.01	Shear (lb/sq ft)	0.22	0.73	0.11
Alpha	5.38	Stream Power (lb/ft s)	0.18	4.34	0.07
Frctn Loss (ft)	0.51	Cum Volume (acre-ft)	2.45	0.18	0.57
C & E Loss (ft)	0.03	Cum SA (acres)	3.10	0.15	0.93

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1726

INPUT

Description:
Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	551.38	1.37	551.35	4.13	551.35	6.57	551.37	8.55	551.4
10.63	551.42	14.29	551.42	14.7	551.43	19.22	551.43	23.37	551.38
24.45	551.38	26.48	551.35	28.64	551.33	30.13	551.36	35.01	551.48
37.9	551.52	39.88	551.59	41.01	551.56	42.05	551.5	46.2	551.37
49.63	551.17	50.8	551.11	52.88	550.98	53.46	550.93	57.76	550.5
58.57	550.41	61.01	550.17	63.45	549.91	69.95	549.11	74.01	548.85
75.25	548.76	75.63	548.75	77.33	548.64	79.4	548.47	83.55	548.15
86.67	548.03	87.7	547.98	88.93	547.94	91.8	547.82	93.51	547.76
94.32	547.72	98.08	547.58	98.39	547.56	101.19	547.46	102.23	547.41
104.07	547.35	106.51	547.26	107.59	547.21	108.95	547.1	110.53	547.08
111.39	547.02	113.01	546.95	115.45	546.88	116.76	546.88	118.84	546.84
121.14	546.78	121.95	546.8	122.76	546.86	124.02	546.89	125.06	546.83
126.82	546.7	130.07	546.52	131.29	546.5	132.51	546.5	133.18	546.48
134.14	546.48	135.76	546.46	137.39	546.37	139.01	546.32	139.59	546.28
140.67	546.27	142.26	546.22	143.07	546.22	143.48	546.26	146.85	546.26
148.76	546.29	151.2	546.29	154.45	546.33	156.89	546.34	157.23	546.35
163.58	546.35	164.2	546.36	170.75	546.36	174.37	546.28	176.95	546.24
178.83	546.26	180.06	546.25	183.7	546.08	186.54	545.96	188.58	545.86
189.41	545.83	193.45	545.64	195.62	545.55	195.89	545.53	198.33	545.43
200.59	545.32	202.33	545.25	207.04	545.04	211.33	544.84	214.36	544.72
217.17	544.62	220.58	544.48	221.26	544.46	224.88	544.32	225.96	544.27
230.26	544.11	230.3	544.1	233.12	543.99	235.64	543.9	238.75	543.77
241.56	543.67	243.17	543.6	248.55	543.39	250	543.34	251.33	543.28
252.34	543.25	254.69	543.15	256.34	543.09	258.45	542.94	260.39	542.78
261.26	542.72	264.36	542.47	265.95	542.36	270.07	542.09	271.58	541.98
273.3	541.87	274.38	541.92	278.4	542.25	279.4	542.22	280.02	542.18
281.9	542.11	283.78	542.07	284.71	542.04	289.44	541.95	293.75	541.78
296.44	541.66	299.13	541.56	300.45	541.48	300.66	541.45	303.43	541.25
304.41	541.2	305.35	541.19	307.73	541.21	309.47	541.24	311.92	541.18
315.48	541.17	316.61	541.19	318.49	541.16	321.5	541.1	323.18	541
326.51	540.79	329.74	540.58	332.48	540.42	334.63	540.23	337.25	540.01
340.54	539.69	341.54	539.66	342.55	539.7	344.75	539.4	346.63	539.26
347.55	539.18	348.5	539.13	351.57	539.11	354	539.18	356.01	539.23
358.58	539.32	360.46	539.37	362.61	539.37	363.51	539.38	365.6	539.38
367.27	539.39	368.61	539.41	371.61	539.4	372.62	539.42	374.62	539.43
376.65	539.35	379.46	539.26	381.98	539.16	383.06	539.13	384.15	539.08
385.65	539.04	386.65	538.99	388.65	538.92	389.51	538.88	390.72	538.85
393.82	538.84	395.67	538.82	397.04	538.82	398.68	538.8	400.27	538.8
403.69	538.78	403.85	538.77	410.42	538.73	411.71	538.73	413.71	538.71
415.11	538.71	418.57	538.68	419.8	538.68	421.68	538.66	426.37	538.64
428.75	538.61	430.12	538.61	433.42	538.57	434.85	538.56	438.37	538.56
439.76	538.54	441.59	538.54	443.37	538.5	445.31	538.51	446.53	538.43
447.69	538.41	450.73	538.52	452.06	538.52	452.84	538.5	454.03	538.52
455.61	538.57	457.2	538.59	473.05	538.59	473.74	538.6	477.08	538.6
477.81	538.59	481.77	538.59	482.3	538.6	492.08	538.6	492.87	538.59
493.66	538.55	495.25	538.56	496.24	538.54	498.42	538.54	499.21	538.53
501.59	538.42	503.97	538.29	504.76	538.28	510.31	538.28	511.11	538.29
511.49	538.32	513.06	538.34	513.48	538.31	514.92	538.32	515.86	538.38
517.45	538.4	518.24	538.37	520.62	538.14	521.41	538.09	522.44	538.1
523	538.08	525.44	538.07	526.49	538.1	526.96	538.15	528.55	538.25
529.65	538.21	535.68	538.09	542.81	538.09	543.33	538.08	546.78	538.08

549.95 538.14 552.16 538.17 552.8 538.19 554.9 538.19 555.29 538.18
557.32 538.18 559.46 538.17 563.75 538.14 567.8 538.12 569.77 538.12
570.18 538.11 572.15 538.11 572.49 538.1 574.52 538.1 578.49 538.07
580.31 538.07 585.01 538.04 587.21 538.04 587.52 538.03 589.7 538.03
592.69 538.01 594.88 538.01 595.14 538 603.86 537.97 605.34 537.95
610.2 537.86 610.99 537.84 613.82 537.8 615.19 537.77 617.33 537.74
621.3 537.67 623.67 537.62 624.11 537.62 627.24 537.56 628.8 537.54
630.02 537.51 632.76 537.47 637.69 537.37 641.91 537.33 643.29 537.3
645.39 537.3 646.66 537.32 648.25 537.33 649.04 537.31 653.77 537.25
658.02 537.25 660.93 537.23 663.21 537.23 663.28 537.22 665.69 537.22
666.34 537.21 668.86 537.21 669.47 537.2 671.7 537.2 672.03 537.19
674.16 537.19 676.27 537.18 678.01 537.16 679.96 537.16 680.11 537.15
687.48 537.15 687.89 537.14 690.26 537.14 692.35 537.12 694.23 537.12
696.61 537.1 698.98 537.1 699.05 537.09 701.36 537.09 704.31 537.07
707.47 537.07 707.7 537.06 711.7 537.06 712.46 537.05 714.85 537.05
715.63 537.04 718.8 537.04 719.04 537.03 722.2 537.03 727.34 537
729.57 537 729.9 536.99 732.72 536.99 733.07 536.98 735.16 536.98
739.85 536.95 741.79 536.95 742.19 536.94 744.55 536.94 744.96 536.93
747.68 536.93 748.13 536.92 750.77 536.92 751.14 536.91 754.04 536.91
761.16 536.81 762.02 536.81 764.87 536.77 765.65 536.77 767.83 536.74
768.72 536.75 771.46 536.81 774.31 536.86 774.37 536.86 776.43 535.96
777.48 535.67 778.52 535.33 778.81 535.33 779.17 535.2 779.57 535.23
780.61 535.86 781.66 536.38 783.23 536.56 786.95 537.02 789.19 537.29
790.28 537.33 790.82 537.33 798.95 537.44 801.08 537.46 803.26 537.51
805.52 537.58 806.16 537.59 808.06 537.65 814.19 537.82 817.34 537.9
818.13 537.93 821.28 538.01 821.67 538.03 828.37 538.2 833.7 538.3
836.25 538.3 836.9 538.29 839.4 538.29 841.77 538.28 844.13 538.25
847.28 538.19 849.65 538.16 851.33 538.15 853.9 538.23 854.53 538.26
857.07 538.32 858.88 538.31 863.04 538.27 864.14 538.27 865.52 538.25
866.58 538.25 868.18 538.23 869.35 538.23 870.92 538.21 872.15 538.21
876.96 538.16 878.02 538.16 879.25 538.14 882.74 538.14 883.37 538.15
889.89 538.15 890.62 538.16 894.04 538.17 896.09 538.19 899.39 538.19
901.44 538.21 903.23 538.21 906.38 538.24 909.89 538.24 911.9 538.26
915.84 538.32 917.02 538.33 918.2 538.37 920.45 538.43 921.51 538.43
922.93 538.49 925.03 538.56 927.66 538.68 930.81 538.8 932.08 538.86
933.04 538.93 935.54 539.06 936.41 539.09 939.45 539.38 941.58 539.59
944.75 539.88 946.57 540.04 949.72 540.42 955.47 541.08 956.82 541.22
959.97 541.67 961.66 541.95 963.77 542.46 965.88 543.02 966.94 543.23
967.99 543.35 972.57 543.41 973.1 543.41 976.72 543.47 978.56 543.48
979.51 543.43 980.67 543.32 984.39 542.94 984.9 542.9 986.76 542.71
989.91 542.41 993.93 541.99 995.33 541.87 997.13 541.7 998.74 541.57
1000.94 541.37 1002.52 541.29 1004.63 541.2 1007.08 541.08 1007.25 541.08
1012.36 540.85 1015.13 540.74 1017.96 540.61 1019.57 540.55 1022.22 540.43
1025.37 540.3 1031.38 540.03 1033.25 540.01 1034.83 539.96 1038.79 539.91
1039.55 539.89 1044.06 539.83 1049.01 539.77 1056.73 539.65 1057.35 539.65
1059.9 539.61 1061.23 539.58 1062.83 539.56 1064.13 539.53 1066.24 539.51
1068.71 539.51 1071.86 539.48 1074.04 539.47 1076.81 539.47 1078.07 539.46

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	774.31	.03	783.23	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff	Contr.	Expan.
774.31	783.23		128.93	128.93	128.93	.1	.3

CROSS SECTION OUTPUT Profile #10-YR

E.G. Elev (ft)	537.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	537.34	Reach Len. (ft)	128.93	128.93	128.93
Crit W.S. (ft)	537.34	Flow Area (sq ft)	37.15	12.16	2.51
E.G. Slope (ft/ft)	0.005982	Area (sq ft)	37.15	12.16	2.51
Q Total (cfs)	74.28	Flow (cfs)	18.19	54.81	1.28
Top Width (ft)	150.88	Top Width (ft)	133.56	8.92	8.40
Vel Total (ft/s)	1.43	Avg. Vel. (ft/s)	0.49	4.51	0.51
Max Chl Dpth (ft)	2.14	Hydr. Depth (ft)	0.28	1.36	0.30
Conv. Total (cfs)	960.4	Conv. (cfs)	235.2	708.6	16.6
Length Wtd. (ft)	128.93	Wetted Per. (ft)	133.57	9.53	8.45
Min Ch El (ft)	535.20	Shear (lb/sq ft)	0.10	0.48	0.11
Alpha	7.32	Stream Power (lb/ft s)	0.05	2.15	0.06
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	1.51	0.10	0.30
C & E Loss (ft)	0.05	Cum SA (acres)	2.02	0.14	0.65

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100-YR

E.G. Elev (ft)	537.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	537.65	Reach Len. (ft)	128.93	128.93	128.93
Crit W.S. (ft)	537.65	Flow Area (sq ft)	81.38	14.92	8.12
E.G. Slope (ft/ft)	0.007001	Area (sq ft)	81.38	14.92	8.12
Q Total (cfs)	154.79	Flow (cfs)	66.69	83.31	4.79
Top Width (ft)	185.79	Top Width (ft)	152.05	8.92	24.82
Vel Total (ft/s)	1.48	Avg. Vel. (ft/s)	0.82	5.59	0.59
Max Chl Dpth (ft)	2.45	Hydr. Depth (ft)	0.54	1.67	0.33
Conv. Total (cfs)	1850.0	Conv. (cfs)	797.1	995.7	57.2
Length Wtd. (ft)	128.93	Wetted Per. (ft)	152.06	9.53	24.87
Min Ch El (ft)	535.20	Shear (lb/sq ft)	0.23	0.68	0.14
Alpha	7.78	Stream Power (lb/ft s)	0.19	3.82	0.08
Frctn Loss (ft)	0.64	Cum Volume (acre-ft)	2.05	0.14	0.48
C & E Loss (ft)	0.05	Cum SA (acres)	2.66	0.14	0.79

Warning: The energy equation could not be balanced within the specified number of iterations. The program used

critical
depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #FHA

E.G. Elev (ft)	538.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	537.74	Reach Len. (ft)	128.93	128.93	128.93
Crit W.S. (ft)	537.74	Flow Area (sq ft)	95.24	15.72	10.49
E.G. Slope (ft/ft)	0.007867	Area (sq ft)	95.24	15.72	10.49
Q Total (cfs)	193.49	Flow (cfs)	89.97	96.35	7.17
Top Width (ft)	193.93	Top Width (ft)	156.95	8.92	28.06
Vel Total (ft/s)	1.59	Avg. Vel. (ft/s)	0.94	6.13	0.68
Max Chl Dpth (ft)	2.54	Hydr. Depth (ft)	0.61	1.76	0.37
Conv. Total (cfs)	2181.6	Conv. (cfs)	1014.3	1086.4	80.9
Length Wtd. (ft)	128.93	Wetted Per. (ft)	156.96	9.53	28.11
Min Ch El (ft)	535.20	Shear (lb/sq ft)	0.30	0.81	0.18
Alpha	7.54	Stream Power (lb/ft s)	0.28	4.96	0.13
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	2.33	0.15	0.56
C & E Loss (ft)	0.06	Cum SA (acres)	2.89	0.14	0.89

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1622

INPUT
Description:

Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	549.31	.82	549.31	3.15	549.22	5.86	549.13	7.65	549.08
11.43	549	12.15	548.98	12.49	548.96	13.46	548.94	16.65	548.8
19.13	548.78	21.15	548.72	25.41	548.68	25.77	548.67	26.09	548.67
30.15	548.62	32.4	548.59	34.65	548.58	38.73	548.49	39.04	548.48
39.39	548.48	43.65	548.4	45.68	548.36	48.15	548.31	51.36	548.26
52.32	548.24	57.16	548.1	58.95	548.03	61.66	547.91	64	547.8
65.59	547.73	66.16	547.7	67.35	547.65	70.66	547.5	72.23	547.43
75.16	547.29	76.63	547.23	78.86	547.13	79.66	547.09	81.33	547.02
84.16	546.89	88.66	546.69	89.27	546.69	92.14	546.57	93.16	546.54
95.31	546.46	97.66	546.39	98.78	546.35	101.9	546.25	102.16	546.24
105.41	546.13	106.66	546.09	109.29	546	111.16	545.94	112.05	545.91
114.54	545.83	115.66	545.79	118.69	545.69	120.16	545.64	123.28	545.54
124.66	545.5	125.32	545.47	127.17	545.41	129.17	545.35	131.96	545.25
133.67	545.2	138.17	545.05	138.6	545.04	139.81	545	142.67	544.9
145.24	544.82	147.17	544.75	151.24	544.62	151.67	544.6	151.87	544.6
152.45	544.57	158.51	544.31	160.67	544.24	165.08	544.08	165.22	544.08
169.67	543.93	174.17	543.78	177.72	543.67	178.42	543.65	179.2	543.62
183.17	543.46	185.06	543.39	187.67	543.29	190.35	543.19	191.7	543.13
192.17	543.12	196.68	542.94	198.33	542.87	202.99	542.69	204.97	542.61
205.68	542.59	207.16	542.53	210.18	542.42	211.61	542.36	214.68	542.25
215.62	542.21	218.24	542.11	219.18	542.08	221.15	542.01	223.68	541.91
224.88	541.88	228.18	541.76	228.26	541.78	231.52	541.69	232.68	541.65
235.13	541.6	237.18	541.5	238.16	541.47	239.46	541.49	240.12	541.49
242.51	541.17	244.28	541.23	245.95	541.21	248.69	541.16	250.28	541.14
251.77	541.14	254.87	541.23	256.27	541.23	257.6	541.22	261.04	541.23
262.27	541.22	263.43	541.2	267.22	541.16	268.27	541.13	269.26	541.12
273.4	541.07	274.27	541.05	275.09	541.04	279.57	541.01	280.26	541.01
280.92	540.99	286.26	540.89	286.74	540.89	291.93	540.75	292.26	540.74
292.57	540.74	298.11	540.76	298.4	540.75	303.31	540.73	304.28	540.72
310.06	540.51	315.89	540.37	316.25	540.37	316.64	540.36	321.71	540.35
322.82	540.33	327.54	540.31	328.25	540.3	328.99	540.3	333.37	540.24
334.24	540.24	335.17	540.26	339.2	540.37	341.35	540.41	345.03	540.33
346.24	540.35	347.53	540.26	350.86	539.95	352.24	539.86	353.7	539.81
356.68	539.81	358.24	539.75	359.88	539.67	362.51	539.57	364.23	539.48
366.06	539.45	368.34	539.48	370.23	539.45	374.17	539.47	376.23	539.49
382.23	539.49	384.59	539.45	385.82	539.47	388.22	539.44	390.77	539.4
391.65	539.44	394.22	539.4	396.94	539.36	397.48	539.27	400.22	539.24
403.12	539.25	403.31	539.16	406.22	539.17	409.14	539.1	409.3	539.02
412.22	538.95	414.97	538.94	415.48	538.96	418.21	538.95	420.79	538.96
421.65	538.91	424.21	538.91	426.62	538.9	427.83	538.87	430.21	538.86
432.45	538.84	434.01	538.86	436.21	538.84	438.28	538.83	440.19	538.83
442.2	538.82	444.11	538.61	446.36	538.11	449.94	537.72	452.54	537.17
454.2	536.98	455.76	536.77	458.72	536.2	460.2	536	461.59	535.81
464.9	535.4	466.19	535.23	467.42	535.02	471.07	534.88	473.25	534.51
477.25	534.35	478.19	534.19	479.08	534.13	483.43	533.85	484.9	533.75
489.6	533.44	490.19	533.41	490.73	533.4	495.78	533.11	496.18	533.11
496.56	533.14	501.96	533.25	502.39	533.28	508.14	533.63	508.22	533.63
514.05	534.19	514.31	534.21	519.87	534.39	520.49	534.43	525.7	534.61
526.67	534.65	531.53	534.83	532.85	534.87	537.36	535.03	543.19	535.24
544.17	535.28	545.2	535.31	549.02	535.45	550.16	535.49	551.38	535.53
556.16	535.71	560.67	535.87	562.16	535.92	563.73	535.98	566.5	536.07
568.16	536.13	569.91	536.2	570.62	536.22	571.88	536.27	574.92	536.37

576.19 536.42 578.02 536.48 580.5 536.57 582.22 536.63 584.81 536.71
589.12 536.86 589.52 536.88 591.76 536.83 596.82 536.71 597.73 536.7
599.05 536.68 602.04 536.64 604.12 536.62 606.35 536.6 610.66 536.56
611.42 536.56 614.97 536.55 615.63 536.53 618.72 536.52 619.28 536.53
620.08 536.53 623.59 536.57 626.02 536.56 627.89 536.57 630.59 536.52
632.2 536.51 633.32 536.51 636.51 536.55 639.5 536.53 640.62 536.54
641.11 536.52 645.13 536.43 647.92 536.39 649.44 536.38 651.62 536.38
653.75 536.39 655.22 536.36 658.05 536.36 662.36 536.35 662.52 536.34
663.38 536.32 666.67 536.23 669.82 536.15 670.98 536.1 672.65 536.18
675.29 536.29 677.12 536.3 679.6 536.24 683.17 536.29 683.91 536.29
684.42 536.3 691.72 536.3 692.52 536.32 693.68 536.3 696.83 536.25
699.02 536.3 701.14 536.3 704.2 536.27 705.45 536.25 706.32 536.29
709.76 536.42 711.13 536.37 714.07 536.43 714.71 536.43 718.37 536.45
720.92 536.41 722.68 536.4 726.99 536.4 728.22 536.38 731.3 536.35
735 536.37 735.61 536.37 735.74 536.36 739.92 536.25 742.82 536.08
744.23 536.05 746.26 536.07 748.53 536.14 750.12 536.12 752.84 536.07
756.77 536.12 757.42 536.12 758.88 536.15 761.46 536.14 764.71 536.25
765.77 536.24 767.29 536.28 770.08 536.19 772.01 536.17 774.39 536.04
777.8 536.03 778.69 536.05 779.31 536.04 782.75 536.04 783 536.05
786.61 536.04 787.31 536.05 788.31 536.05 791.62 536.12 793.91 536.1
795.93 536.1 800.24 536.13 801.21 536.14 804.55 536.22 806.63 536.21
807.88 536.23 808.5 536.23 812 536.06 812.26 535.99 815.59 535.8
816.34 535.78 822.69 535.78 825.03 535.77 825.94 535.68 828.73 535.42
829.38 535.38 829.79 535.3 831.63 535.17 833.72 535.16 834.02 535.13
836.89 534.87 838.07 534.85 839.93 535.13 841.34 535.51 842.41 535.79
843.99 535.7 846.76 535.48 850.99 535.23 851.14 535.22 855.45 535.26
858.18 535.27 859.04 535.28 861.57 535.3 862.58 535.31 865.32 535.34
865.91 535.35 866.81 535.36 870.24 535.39 872.46 535.42 877.85 535.47
878.91 535.49 879.6 535.49 882.82 535.51 883.25 535.51 886.74 535.53
887.59 535.54 888.89 535.55 891.92 535.57 893.89 535.59 896.26 535.62
899.92 535.67 900.59 535.68 901.03 535.68 903.06 535.71 904.93 535.73
908.17 535.78 909.27 535.79 910.96 535.81 913.6 535.85 917.94 535.9
922 535.98 922.28 535.99 923.3 536 926.61 536.05 929.6 536.08
933.03 536.13 935.28 536.15 939.62 536.21 943.54 536.25 944.07 536.26
948.29 536.31 951.03 536.35 955.11 536.4 956.97 536.42 958.17 536.43
961.3 536.47 963.79 536.5 965.31 536.52 965.64 536.52 966.14 536.53
969.97 536.58 972.45 536.61 977.18 536.66 978.65 536.68 979.6 536.69
982.98 536.72 984.03 536.74 986.74 536.76 993.88 536.76 995.99 536.77
999.25 536.75 1001.02 536.75 1004.27 536.76 1004.66 536.77 1008.16 536.77
1009 536.78 1010.29 536.79 1013.34 536.81 1015.31 536.81 1017.67 536.84
1021.33 536.86 1022.01 536.87 1022.45 536.87 1024.51 536.89 1026.34 536.91
1029.59 536.93 1030.68 536.94 1032.36 536.96 1035.02 536.98 1036.73 537.02
1039.35 537.07 1043.4 537.18 1043.88 537.2 1044.75 537.22 1048.02 537.31
1051.02 537.39 1052.36 537.43 1054.44 537.48 1056.7 537.55 1058.16 537.58
1064.99 537.77 1065.47 537.78 1069.71 537.9 1072.45 537.97 1074.04 538.04
1076.51 538.26 1078.38 538.45 1079.59 538.53 1082.71 538.7 1085.24 538.75
1086.73 538.81 1091.34 538.81

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	825.03	.03	842.41	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
825.03	842.41		83.43	83.43	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	588.96	536.88	F

CROSS SECTION OUTPUT Profile #10-YR

E.G. Elev (ft)	536.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	536.26	Reach Len. (ft)	83.43	83.43	83.43
Crit W.S. (ft)	535.93	Flow Area (sq ft)	16.23	17.49	59.44
E.G. Slope (ft/ft)	0.002996	Area (sq ft)	194.98	17.49	59.44
Q Total (cfs)	85.49	Flow (cfs)	4.32	47.35	33.82
Top Width (ft)	328.56	Top Width (ft)	209.61	17.38	101.57
Vel Total (ft/s)	0.92	Avg. Vel. (ft/s)	0.27	2.71	0.57
Max Chl Dpth (ft)	3.15	Hydr. Depth (ft)	0.17	1.01	0.59
Conv. Total (cfs)	1561.7	Conv. (cfs)	78.9	865.0	617.8
Length Wtd. (ft)	83.43	Wetted Per. (ft)	96.49	17.53	101.59
Min Ch El (ft)	534.85	Shear (lb/sq ft)	0.03	0.19	0.11
Alpha	4.98	Stream Power (lb/ft s)	0.01	0.51	0.06
Frctn Loss (ft)	0.35	Cum Volume (acre-ft)	1.17	0.06	0.21
C & E Loss (ft)	0.00	Cum SA (acres)	1.52	0.10	0.49

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #100-YR

E.G. Elev (ft)	536.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	536.54	Reach Len. (ft)	83.43	83.43	83.43
Crit W.S. (ft)	536.23	Flow Area (sq ft)	59.27	22.31	90.71
E.G. Slope (ft/ft)	0.003852	Area (sq ft)	270.71	22.31	90.71
Q Total (cfs)	173.95	Flow (cfs)	25.56	80.54	67.85
Top Width (ft)	460.56	Top Width (ft)	319.03	17.38	124.15
Vel Total (ft/s)	1.01	Avg. Vel. (ft/s)	0.43	3.61	0.75
Max Chl Dpth (ft)	3.43	Hydr. Depth (ft)	0.30	1.28	0.73
Conv. Total (cfs)	2802.8	Conv. (cfs)	411.8	1297.7	1093.3
Length Wtd. (ft)	83.43	Wetted Per. (ft)	196.52	17.53	124.18
Min Ch El (ft)	534.85	Shear (lb/sq ft)	0.07	0.31	0.18
Alpha	6.16	Stream Power (lb/ft s)	0.03	1.10	0.13
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)	1.53	0.08	0.33
C & E Loss (ft)	0.00	Cum SA (acres)	1.96	0.10	0.57

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #FHA

E.G. Elev (ft)	536.75	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.11	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	536.65	Reach Len. (ft)	83.43	83.43	83.43
Crit W.S. (ft)	536.35	Flow Area (sq ft)	82.80	24.21	104.79
E.G. Slope (ft/ft)	0.003977	Area (sq ft)	307.87	24.21	104.79
Q Total (cfs)	217.44	Flow (cfs)	40.04	93.80	83.60
Top Width (ft)	500.40	Top Width (ft)	349.66	17.38	133.36
Vel Total (ft/s)	1.03	Avg. Vel. (ft/s)	0.48	3.87	0.80
Max Chl Dpth (ft)	3.54	Hydr. Depth (ft)	0.37	1.39	0.79
Conv. Total (cfs)	3447.9	Conv. (cfs)	634.8	1487.4	1325.6
Length Wtd. (ft)	83.43	Wetted Per. (ft)	223.42	17.53	133.38
Min Ch El (ft)	534.85	Shear (lb/sq ft)	0.09	0.34	0.20
Alpha	6.42	Stream Power (lb/ft s)	0.04	1.33	0.16
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)	1.73	0.09	0.39
C & E Loss (ft)	0.00	Cum SA (acres)	2.14	0.10	0.65

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1532

INPUT
Description:
Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	539.25	.95	539.25	1.7	539.27	2.86	539.28	4.19	539.39
4.51	539.38	4.86	539.41	5.86	539.4	8.25	539.4	10.13	539.33
10.67	539.32	14.98	539.16	16.89	539.11	18.55	539.1	18.9	539.09
20.38	539.08	21.46	539.08	23.62	539.06	24.7	539.04	25.92	539.03
26.03	539.02	27.68	539	29.02	538.96	30.71	538.9	34.94	538.77
35.94	538.77	36.94	538.75	38.73	538.7	39.13	538.7	39.81	538.67
41.01	538.65	41.74	538.62	43.05	538.61	43.81	538.64	44.96	538.66
45.68	538.63	46.62	538.62	47.97	538.58	49.43	538.52	50.61	538.45
53.85	538.27	54.93	538.22	56.91	538.18	58.17	538.17	59.25	538.15
62.01	538.11	64.4	538.1	65.72	538.08	66.8	538.08	68.14	538.04
68.96	537.97	70.04	537.91	71.12	537.93	71.89	537.96	72.82	537.97
74.04	538.01	75.04	538.03	76.52	538.02	76.57	537.98	77.05	537.98
78.05	537.93	79.37	537.9	79.76	537.87	80.84	537.85	82.06	537.81
83.89	537.67	84.99	537.58	87.07	537.45	89.67	537.24	90.55	537.18
91.08	537.13	92.08	537.06	93.41	536.95	98.11	536.6	99.19	536.51
101.11	536.36	101.35	536.35	102.43	536.26	103.7	536.17	105.57	536.02
105.67	536	106.75	535.93	107.45	535.87	110.25	535.66	111.19	535.58
113.06	535.44	114.3	535.36	116.14	535.23	117.54	535.11	118.15	535.05
120.55	534.88	122.42	534.74	124.02	534.6	124.29	534.59	126.04	534.45
128.97	534.25	129.42	534.21	130.84	534.12	133.74	533.9	135.9	533.66
136.45	533.59	138.33	533.41	139.26	533.22	141.13	532.79	142.21	532.62
142.37	532.58	143.21	532.44	144.22	532.33	144.53	532.34	144.88	532.3
146.22	532.31	147.68	532.29	147.77	532.32	148.23	532.32	149.23	532.42
150.23	532.6	151.43	532.83	152.36	532.95	158.91	533.3	160.26	533.36
161.81	533.45	163.26	533.52	165.27	533.63	166.4	533.68	168.2	533.77

170.14 533.88 171.28 533.93 171.52 533.95 175.76 534.17 177.3 534.24
178.56 534.31 179.5 534.35 181.37 534.45 183.4 534.55 185.56 534.67
188.79 534.83 189.87 534.89 191.33 534.96 192.34 535.02 194.19 535.11
195.41 535.18 196.35 535.22 199.59 535.39 201.02 535.47 201.96 535.51
202.36 535.54 203.91 535.61 204.37 535.64 209.45 535.89 213.19 536.09
214.12 536.13 215.4 536.2 217.87 536.32 217.94 536.31 218.8 536.36
220.41 536.41 222.41 536.39 222.55 536.38 224.4 536.36 225.35 536.36
227.43 536.33 228.74 536.39 229.1 536.38 229.82 536.41 230.43 536.41
233.78 536.44 237.37 536.48 238.45 536.48 242.2 536.44 247.09 536.4
248.48 536.38 251.41 536.28 251.49 536.27 252.49 536.28 254.49 536.28
255.3 536.25 255.73 536.25 257.89 536.19 259.98 536.15 260.05 536.16
263.28 536.09 263.72 536.09 267.46 536.01 268.4 536 269.53 536
270.84 536.05 273.08 536.12 274.01 536.14 276.24 536.16 278.69 536.16
279.48 536.15 288.58 536.15 288.99 536.14 290.59 536.14 291.35 536.13
293.66 536.04 295.54 535.98 299.61 536.02 301.61 536 302.62 535.98
303.96 535.97 305.39 535.97 306.63 535.95 309.57 535.92 310.51 535.92
311.64 535.9 312.64 535.9 316.12 535.86 317.06 535.86 318.34 535.84
319.42 535.84 320.66 535.83 321.96 535.81 326.85 535.81 329.27 535.77
330.33 535.66 331.65 535.7 333.12 535.64 334.6 535.6 335.31 535.62
336.02 535.66 336.96 535.73 338.86 535.86 339.04 535.84 339.52 535.86
341 535.8 341.24 535.8 342.42 535.75 343.84 535.71 344.44 535.68
346.69 535.62 347.4 535.61 349.54 535.55 350.25 535.54 351.67 535.5
353.09 535.47 353.62 535.47 355.63 535.52 357.23 535.55 358.83 535.59
360.43 535.62 361.31 535.66 363.87 535.76 365.15 535.82 365.9 535.82
367.32 535.79 370.28 535.63 372.3 535.69 373.01 535.72 373.72 535.73
375.4 535.67 376.42 535.64 377.28 535.64 377.97 535.59 379.41 535.58
380.13 535.63 381.55 535.71 382.97 535.78 383.68 535.8 385.65 535.76
386.94 535.77 388.22 535.71 389.37 535.64 390.08 535.66 390.82 535.73
391.51 535.73 392.93 535.71 393.64 535.81 394.02 535.81 395.62 535.71
397.91 535.71 399.75 535.69 402.31 535.61 403.52 535.59 405.21 535.59
407.16 535.64 409.29 535.72 410.72 535.78 411.43 535.82 412.14 535.83
413.21 535.82 426.66 535.82 427.6 535.83 428.5 535.81 429.2 535.82
430.5 535.78 431.35 535.74 433.48 535.68 434.35 535.65 435.63 535.64
436.33 535.62 438.46 535.61 439.88 535.59 440.58 535.5 440.87 535.38
441.29 535.3 441.76 535.24 442.71 535.21 443.27 535.18 444.12 535.21
446.96 535.26 448.37 535.29 449.28 535.3 450.79 535.33 451.92 535.36
452.62 535.36 453.33 535.34 455.3 535.24 456.18 535.21 458.29 535.18
461.33 535.18 462.83 535.2 464.33 535.23 464.99 535.23 465.84 535.25
466.82 535.25 468.25 535.27 470.41 535.29 471.32 535.29 472.57 535.31
473.59 535.31 474.73 535.33 475.45 535.33 476.88 535.35 477.6 535.35
479.04 535.37 481.2 535.38 482.64 535.4 483.45 535.4 484.79 535.42
485.51 535.42 486.84 535.44 487.67 535.44 489.11 535.46 490.51 535.47
493 535.45 494.14 535.45 494.21 535.44 495.43 535.44 495.58 535.43
496.64 535.43 497.02 535.42 499.34 535.41 502.35 535.38 503.49 535.38
505.13 535.36 506.4 535.36 508.17 535.34 510.68 535.34 512.84 535.32
515.23 535.36 517 535.36 517.16 535.37 521.74 535.37 522.12 535.38
525.61 535.38 525.76 535.39 529.49 535.39 530.1 535.4 533.37 535.4
533.7 535.41 535.14 535.41 535.47 535.42 536.68 535.42 538.73 535.44
539.95 535.44 540.17 535.45 541.61 535.45 541.72 535.46 543.05 535.46
545 535.48 546.39 535.48 546.64 535.49 548.08 535.49 550.03 535.51
551.24 535.51 551.68 535.52 552.76 535.52 553.11 535.53 554.55 535.53
557.31 535.57 560.52 535.61 562.46 535.64 562.91 535.64 564.59 535.67
565.34 535.67 567.5 535.71 568.27 535.74 568.94 535.75 572.53 535.85
574.69 535.9 575.51 535.93 578.8 536.01 581.16 536.04 581.88 536.04

582.79 536.06 583.32 536.06 585.21 536.09 585.86 536.09 587.63 536.12
588.35 536.12 590.07 536.15 591.54 536.16 594.11 536.2 594.83 536.2
598.22 536.25 599.77 536.26 603.17 536.31 604.63 536.32 606.33 536.35
607.05 536.35 608.82 536.38 609.48 536.38 612.09 536.42 612.81 536.42
614.81 536.45 620.4 536.45 620.72 536.46 621.61 536.45 628.24 536.45
630.01 536.47 631.5 536.47 631.77 536.48 632.94 536.48 634.38 536.5
635.82 536.51 637.07 536.51 640.6 536.54 644.13 536.58 645.17 536.58
646.61 536.6 648.76 536.62 649.52 536.62 650.73 536.64 652.96 536.65
655.24 536.68 655.96 536.68 657.39 536.7 658.26 536.7 659.55 536.72
660.44 536.72 661.65 536.74 663.56 536.75 663.87 536.76 666.02 536.77
667.46 536.79 668.18 536.79 671.36 536.83 672.39 536.83 674.65 536.86
676.85 536.88 678.97 536.89 680.41 536.91 681.22 536.91 682.56 536.93
684.61 536.95 685.44 536.95 686.88 536.97 687.6 536.97 689.04 536.99
690.04 536.99 693.58 537.08 694.07 537.1 696.84 537.17 697.67 537.2
699.26 537.24 704 537.38 705.33 537.41 707.7 537.48 710.61 537.56
711.75 537.6 715.04 537.68 716.25 537.72 718.3 537.77 720.06 537.83
723.59 537.93 724.28 537.94 727.13 538.02 727.87 538.08 728.38 538.1
729.6 538.1 730.03 538.11 730.81 538.09 731.47 538.11 732.02 538.11
733.62 538.15 735.02 538.17 735.06 538.18 736.5 538.2 738.68 538.25

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	451.92	.03	474.73	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
451.92	474.73	37.6	37.6	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	220.32	536.41	F

CROSS SECTION OUTPUT Profile #10-YR

E.G. Elev (ft)	535.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	535.89	Reach Len. (ft)	37.60	37.60	37.60
Crit W.S. (ft)	535.77	Flow Area (sq ft)	29.97	14.68	42.92
E.G. Slope (ft/ft)	0.006439	Area (sq ft)	196.83	14.68	42.92
Q Total (cfs)	85.49	Flow (cfs)	12.85	43.46	29.17
Top Width (ft)	363.74	Top Width (ft)	241.19	22.81	99.73
Vel Total (ft/s)	0.98	Avg. Vel. (ft/s)	0.43	2.96	0.68
Max Chl Dpth (ft)	3.60	Hydr. Depth (ft)	0.22	0.64	0.43
Conv. Total (cfs)	1065.4	Conv. (cfs)	160.2	541.6	363.6
Length Wtd. (ft)	37.60	Wetted Per. (ft)	138.94	22.81	99.74
Min Ch El (ft)	535.18	Shear (lb/sq ft)	0.09	0.26	0.17
Alpha	4.87	Stream Power (lb/ft s)	0.04	0.77	0.12
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	0.79	0.03	0.11
C & E Loss (ft)	0.01	Cum SA (acres)	1.09	0.06	0.30

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #100-YR

E.G. Elev (ft)	536.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	536.14	Reach Len. (ft)	37.60	37.60	37.60
Crit W.S. (ft)	535.97	Flow Area (sq ft)	68.34	20.25	68.81
E.G. Slope (ft/ft)	0.006166	Area (sq ft)	261.17	20.25	68.81
Q Total (cfs)	173.95	Flow (cfs)	44.10	72.76	57.10
Top Width (ft)	421.97	Top Width (ft)	284.44	22.81	114.72
Vel Total (ft/s)	1.11	Avg. Vel. (ft/s)	0.65	3.59	0.83
Max Chl Dpth (ft)	3.85	Hydr. Depth (ft)	0.39	0.89	0.60
Conv. Total (cfs)	2215.2	Conv. (cfs)	561.6	926.5	727.1
Length Wtd. (ft)	37.60	Wetted Per. (ft)	174.36	22.81	114.73
Min Ch El (ft)	535.18	Shear (lb/sq ft)	0.15	0.34	0.23
Alpha	4.69	Stream Power (lb/ft s)	0.10	1.23	0.19
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	1.02	0.04	0.18
C & E Loss (ft)	0.01	Cum SA (acres)	1.38	0.06	0.34

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #FHA

E.G. Elev (ft)	536.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	536.23	Reach Len. (ft)	37.60	37.60	37.60
Crit W.S. (ft)	536.05	Flow Area (sq ft)	85.58	22.31	79.48
E.G. Slope (ft/ft)	0.006445	Area (sq ft)	288.47	22.31	79.48
Q Total (cfs)	217.44	Flow (cfs)	58.84	87.38	71.22
Top Width (ft)	453.48	Top Width (ft)	308.59	22.81	122.09
Vel Total (ft/s)	1.16	Avg. Vel. (ft/s)	0.69	3.92	0.90
Max Chl Dpth (ft)	3.94	Hydr. Depth (ft)	0.44	0.98	0.65
Conv. Total (cfs)	2708.4	Conv. (cfs)	732.9	1088.5	887.1
Length Wtd. (ft)	37.60	Wetted Per. (ft)	195.57	22.81	122.10
Min Ch El (ft)	535.18	Shear (lb/sq ft)	0.18	0.39	0.26
Alpha	4.87	Stream Power (lb/ft s)	0.12	1.54	0.23
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	1.16	0.05	0.21
C & E Loss (ft)	0.02	Cum SA (acres)	1.51	0.06	0.40

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1494

INPUT
Description:
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	549.05	2.8	549	3.71	549	5.53	549.02	7.54	548.98
10.03	549	12.29	549.03	14.98	549.01	16.35	549.03	17.03	549.03

19.09 549.02 21.77 549.03 22.66 549.02 24.44 548.96 26.51 549.01
28.98 548.89 31.26 548.79 33.9 548.7 35.3 548.63 36 548.6
38.11 548.5 40.74 548.37 41.62 548.34 43.36 548.25 45.48 548.15
47.93 548.03 50.23 547.92 54.25 547.72 54.97 547.68 57.14 547.58
59.71 547.45 60.57 547.41 62.27 547.32 64.46 547.22 66.89 547.1
69.2 547.01 71.73 546.9 73.2 546.85 73.94 546.82 81.19 546.56
83.43 546.47 85.84 546.39 88.17 546.3 90.65 546.24 92.15 546.19
92.91 546.17 95.19 546.13 97.65 546.08 98.47 546.07 102.4 545.97
104.79 545.92 107.14 545.85 111.88 545.73 114.22 545.66 119.02 545.54
121.37 545.47 123.74 545.41 126.11 545.34 130.06 545.24 130.85 545.21
135.6 545.07 136.38 545.05 137.93 544.99 140.34 544.89 142.69 544.81
145.08 544.72 147.39 544.63 152.27 544.45 154.57 544.37 155.33 544.33
156.85 544.27 159.31 544.18 164.05 543.98 166.31 543.86 167.96 543.79
168.79 543.76 171.29 543.66 173.54 543.6 174.28 543.57 175.77 543.52
178.28 543.44 180.6 543.34 183.02 543.26 185.22 543 187.76 542.88
190.32 542.72 192.51 542.61 193.23 542.58 194.68 542.51 197.25 542.51
199.55 542.37 201.99 542.29 204.14 542.14 205.87 542.08 206.74 542
209.35 542 211.48 542.02 212.19 542.03 213.6 542.06 216.22 542.16
218.5 542.19 220.96 542.21 223.05 542.16 224.82 542.16 225.71 542.15
228.37 542.13 230.45 542.11 231.14 542.1 232.51 542.05 235.19 542.04
237.46 541.94 239.93 541.85 241.97 541.84 244.68 541.75 247.4 541.72
249.42 541.69 250.09 541.69 251.43 541.68 254.16 541.63 256.41 541.6
258.9 541.62 260.89 541.59 262.72 541.6 269.04 541.6 270.34 541.57
275.36 541.46 277.88 541.42 279.8 541.35 281.68 541.31 282.62 541.28
285.45 541.24 287.36 541.21 287.99 541.21 289.26 541.18 292.1 541.12
296.85 540.99 298.72 540.92 300.63 540.87 306.33 540.81 306.95 540.81
308.17 540.78 311.07 540.6 313.26 540.57 315.82 540.54 317.63 540.56
319.58 540.54 320.56 540.55 323.5 540.51 325.3 540.48 327.09 540.4
330.04 540.13 332.22 540.05 334.03 540.04 335.06 540.04 335.53 539.92
338.31 539.91 341.15 539.82 341.52 539.92 344.32 539.84 346.77 539.83
347.98 539.68 350.33 539.67 352.39 539.65 354.43 539.67 356.34 539.65
358.01 539.64 360.89 539.58 362.35 539.57 363.63 539.57 367.35 539.62
368.36 539.62 369.25 539.61 373.81 539.39 374.87 539.38 380.26 539.48
381.97 539.42 386.1 539.26 386.72 539.26 391.72 538.85 392.4 538.85
393.18 538.84 397.34 538.67 398.41 538.66 399.64 538.64 402.96 538.78
404.42 538.76 406.09 538.72 408.58 538.81 410.43 538.77 412.55 538.69
414.2 538.75 416.44 538.65 419.01 538.64 419.82 538.44 422.45 538.44
425.44 538.48 425.47 538.34 428.46 538.36 431.06 538.23 431.92 538.29
434.47 538.16 436.68 538.07 438.38 537.98 440.48 537.89 442.3 537.79
444.84 537.69 446.49 537.6 447.92 537.57 451.3 537.43 452.5 537.41
453.54 537.41 457.75 537.55 459.16 537.55 464.21 537.4 464.78 537.39
468.61 537.39 470.4 537.4 476.02 537.18 477.13 537.15 481.64 537.01
482.55 536.99 483.58 536.96 487.26 536.92 488.56 536.88 490.04 536.84
492.88 536.74 494.56 536.7 496.5 536.63 498.5 536.67 500.57 536.59
502.96 536.48 504.12 536.58 506.58 536.46 512.59 536.1 515.36 535.94
515.87 535.9 518.6 535.75 520.98 535.61 522.33 535.52 524.61 535.39
526.6 535.26 528.79 535.17 530.62 535.05 532.22 534.95 535.24 534.68
536.63 534.6 537.84 534.52 542.64 534.22 543.46 534.15 548.16 533.85
548.65 533.81 549.08 533.76 554.62 533.06 555.24 532.98 560.32 532.37
561.07 532.34 565.94 532.17 566.68 532.15 567.53 532.19 571.56 532.42
573.99 532.55 577.18 532.69 578.7 532.78 580.45 532.87 582.8 533.01
584.71 533.11 586.91 533.22 593.36 533.56 594.04 533.6 596.73 533.74
599.66 533.89 602.74 534.05 605.28 534.19 606.28 534.24 608.75 534.37
610.9 534.48 612.74 534.58 614.76 534.68 616.52 534.78 619.19 534.92

622.14 535.07 626.78 535.32 632.11 535.59 633.38 535.67 638.57 535.93
639 535.95 641.88 536.06 644.62 536.17 645.02 536.17 650.23 536.04
651.48 536 655.85 535.83 657.94 535.76 662.83 535.62 664.4 535.63
667.09 535.69 668.84 535.7 670.85 535.68 672.71 535.93 674.85 535.9
677.31 536.03 678.33 535.79 680.86 535.94 686.87 535.88 689.57 535.84
690.23 535.86 692.88 535.83 695.19 535.84 696.68 535.79 698.89 535.79
700.81 535.82 703.14 535.72 704.9 535.74 706.43 535.71 709.6 535.73
710.91 535.7 712.05 535.7 716.06 535.74 716.92 535.74 717.67 535.73
723.29 535.73 728.51 535.72 734.95 535.72 735.43 535.71 740.15 535.7
744.53 535.7 748.88 535.71 753.04 535.67 756.7 535.65 758.01 535.64
761.55 535.57 764.52 535.57 765.81 535.59 767.35 535.62 770.07 535.65
772.35 535.62 774.32 535.56 776.69 535.59 780.17 535.59 782.84 535.61
786.03 535.53 787.09 535.5 787.99 535.5 791.35 535.47 795.36 535.28
795.81 535.28 798.13 535.22 799.86 535.44 803.63 535.13 804.12 535.13
804.7 535.11 808.38 535.19 811.46 535.13 812.64 535.15 814.04 535.1
816.89 535.11 819.28 535.2 821.15 535.31 823.38 535.28 825.41 535.24
827.1 535.35 829.66 535.41 832.72 535.46 833.92 535.47 834.92 535.44
838.18 535.48 842.06 535.43 846.3 535.49 846.69 535.52 850.57 535.56
851.4 535.58 855.2 535.66 858.39 535.71 860.33 535.73 863.73 535.74
866.06 535.72 868 535.67 869.68 535.67 870.48 535.67 872.27 535.65
873.67 535.58 876.54 535.43 880.21 535.3 880.82 535.27 881.29 535.26
885.09 535.13 885.14 535.14 888.05 535.05 888.9 535.03 889.36 535.01
889.94 535.02 893.63 535.06 896.51 535.03 897.9 535.03 899.67 535
902.17 534.94 906.45 534.85 909.41 534.79 910.72 534.77 911.74 534.77
914.99 534.78 919.14 534.8 920.16 534.8 926.97 534.86 927.8 534.86
932.08 534.9 934.59 534.92 936.35 534.93 939.42 534.96 940.62 534.97
942.2 534.97 944.89 534.99 948.33 535 949.16 535 949.81 535.01
953.43 535.05 955.17 535.1 957.43 535.13 961.98 535.2 965.04 535.21
966.25 535.21 967.79 535.22 972.66 535.24 974.79 535.24 977.52 535.25
980.27 535.27 983.34 535.28 987.25 535.3 987.89 535.31 990.18 535.32
995.5 535.35 996.15 535.35 1000.42 535.5 1003.12 535.61 1008.96 535.87
1010.73 535.92 1013.24 536.02 1017.51 536.06 1018.34 536.06 1021.78 536.09
1025.19 536.13 1025.96 536.13 1026.17 536.14 1030.32 536.17 1034.59 536.21
1035.9 536.23 1038.87 536.25 1041.19 536.27 1043.14 536.29 1045.63 536.31
1047.41 536.33 1048.8 536.34 1051.68 536.37 1055.36 536.4 1060.2 536.45
1064.03 536.48 1068.77 536.53 1073.04 536.56 1074.82 536.58 1077.31 536.6
1079.26 536.62 1081.58 536.64 1084.55 536.67 1085.85 536.68 1090.13 536.72
1095.22 536.77 1102.1 536.83 1102.94 536.84 1107.21 536.88 1109.72 536.9
1111.48 536.92 1113.75 536.94 1115.76 536.95 1117.33 536.97 1120.03 537
1124.3 537.1 1126.27 537.16 1128.57 537.22 1130.04 537.27 1133.26 537.36
1137.12 537.47 1143.07 537.65 1145.67 537.72 1149.95 537.85 1152.87 537.93
1155.27 538 1158.5 538.07 1162.68 538.15 1163.41 538.17 1167.05 538.24
1170.42 538.31 1171.82 538.32

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	885.14	.03	893.63	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
885.14	893.63	31.89	31.89	31.89	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	645.36	536.18	F

CROSS SECTION OUTPUT Profile #10-YR

E.G. Elev (ft)	535.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	535.68	Reach Len. (ft)	31.89	31.89	31.89
Crit W.S. (ft)	535.37	Flow Area (sq ft)	29.39	5.30	66.49
E.G. Slope (ft/ft)	0.006497	Area (sq ft)	225.86	5.30	66.49
Q Total (cfs)	85.49	Flow (cfs)	13.49	15.44	56.56
Top Width (ft)	361.31	Top Width (ft)	241.75	8.49	111.07
Vel Total (ft/s)	0.84	Avg. Vel. (ft/s)	0.46	2.91	0.85
Max Chl Dpth (ft)	3.53	Hydr. Depth (ft)	0.23	0.62	0.60
Conv. Total (cfs)	1060.7	Conv. (cfs)	167.4	191.6	701.7
Length Wtd. (ft)	31.89	Wetted Per. (ft)	128.03	8.49	111.08
Min Ch El (ft)	535.01	Shear (lb/sq ft)	0.09	0.25	0.24
Alpha	2.87	Stream Power (lb/ft s)	0.04	0.74	0.21
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	0.61	0.02	0.06
C & E Loss (ft)	0.01	Cum SA (acres)	0.88	0.04	0.21

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #100-YR

E.G. Elev (ft)	535.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	535.93	Reach Len. (ft)	31.89	31.89	31.89
Crit W.S. (ft)	535.58	Flow Area (sq ft)	79.66	7.46	95.54
E.G. Slope (ft/ft)	0.006410	Area (sq ft)	306.34	7.46	95.54
Q Total (cfs)	173.95	Flow (cfs)	47.79	27.14	99.02
Top Width (ft)	478.39	Top Width (ft)	352.43	8.49	117.47
Vel Total (ft/s)	0.95	Avg. Vel. (ft/s)	0.60	3.64	1.04
Max Chl Dpth (ft)	3.78	Hydr. Depth (ft)	0.35	0.88	0.81
Conv. Total (cfs)	2172.6	Conv. (cfs)	596.9	339.0	1236.7
Length Wtd. (ft)	31.89	Wetted Per. (ft)	229.30	8.49	117.49
Min Ch El (ft)	535.01	Shear (lb/sq ft)	0.14	0.35	0.33
Alpha	3.06	Stream Power (lb/ft s)	0.08	1.28	0.34
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	0.78	0.03	0.11
C & E Loss (ft)	0.02	Cum SA (acres)	1.11	0.05	0.24

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #FHA

E.G. Elev (ft)	536.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.100	0.030	0.100

W.S. Elev (ft)	536.03	Reach Len. (ft)	31.89	31.89	31.89
Crit W.S. (ft)	535.61	Flow Area (sq ft)	101.29	8.25	106.60
E.G. Slope (ft/ft)	0.006328	Area (sq ft)	339.63	8.25	106.60
Q Total (cfs)	217.44	Flow (cfs)	69.42	31.90	116.12
Top Width (ft)	490.66	Top Width (ft)	361.70	8.49	120.47
Vel Total (ft/s)	1.01	Avg. Vel. (ft/s)	0.69	3.87	1.09
Max Chl Dpth (ft)	3.88	Hydr. Depth (ft)	0.43	0.97	0.88
Conv. Total (cfs)	2733.5	Conv. (cfs)	872.7	401.0	1459.7
Length Wtd. (ft)	31.89	Wetted Per. (ft)	234.63	8.49	120.49
Min Ch El (ft)	535.01	Shear (lb/sq ft)	0.17	0.38	0.35
Alpha	2.94	Stream Power (lb/ft s)	0.12	1.48	0.38
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	0.89	0.03	0.13
C & E Loss (ft)	0.02	Cum SA (acres)	1.22	0.05	0.30

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1462

INPUT
Description:
Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	539.28	1.08	539.22	2.5	539.19	2.66	539.17	5.53	539.16
5.64	539.19	6.69	539.2	8.78	539.19	10.09	539.24	11.29	539.25
13.21	539.25	14.17	539.26	17.15	539.2	18.2	539.17	21.1	539.06
22.38	539.04	24.1	539.09	25.1	539.11	26.64	539.08	27.6	539.09
28.11	539.08	29.52	539.02	31.11	538.97	33.89	538.86	35.98	538.81
39.07	538.72	42.26	538.65	45.4	538.56	46.44	538.5	46.79	538.45
48.13	538.38	49.13	538.39	53.13	538.47	54.47	538.43	54.81	538.39
56.13	538.33	56.9	538.28	58.13	538.22	59.26	538.24	60.04	538.27
61.18	538.24	63.1	538.31	64.06	538.36	65.02	538.39	66.14	538.39
67.9	538.35	71.55	538.2	72.7	538.14	73.15	538.1	73.64	538.09
73.66	538.06	74.15	538.05	75.57	537.99	75.73	537.97	77.15	537.91
78.15	537.89	79.41	537.96	80.97	537.96	81.16	537.97	83.25	537.97
84.21	537.99	85.15	538.03	86.2	538.03	87.09	538.01	88.29	538
89.16	537.97	90.93	537.86	93.52	537.71	94.17	537.68	96.17	537.63
98.17	537.57	100.17	537.49	102.18	537.42	103.4	537.42	106.07	537.49
107.18	537.48	110.11	537.39	111.07	537.37	112.99	537.3	117.19	537.36
120.67	537.36	121.77	537.31	122.81	537.24	124.51	537.15	125.46	537.11
128.2	537.06	130.26	537.04	131.66	536.96	136.21	536.65	137.94	536.58
142.21	536.58	142.73	536.55	143.74	536.52	144.78	536.47	145.61	536.47
146.87	536.44	148.49	536.43	150.41	536.39	151.37	536.35	152.11	536.3
155.24	536.27	157.34	536.24	160.47	536.18	160.96	536.18	161.52	536.15
163.84	536.08	165.71	536.09	167.68	536.06	169.89	536.07	173.24	536.13
174.4	536.14	176.17	536.17	179.19	536.23	181.11	536.25	182.07	536.27

185.58 536.27 187.83 536.23 189.85 536.21 191.96 536.16 192.27 536.16
195.5 536.07 197.14 536.03 198.99 536.06 200.84 536.08 206.32 536.08
207.34 535.98 209.54 535.7 211 535.5 211.93 535.39 213.34 535.2
217.23 534.71 217.47 534.67 220.52 534.27 222.09 534.07 223.02 533.94
224.39 533.77 225.39 533.63 227.64 533.34 228.56 533.21 233.42 532.58
234.1 532.52 235.95 532.46 238.1 532.37 240.44 532.24 241.39 532.21
243.34 532.25 244.27 532.3 244.69 532.34 245.46 532.37 246.11 532.43
247.04 532.47 247.47 532.47 249.08 532.54 250.18 532.61 252.58 532.74
255.67 532.93 256.5 532.97 260.52 533.21 261.52 533.26 264.59 533.45
266.44 533.55 266.66 533.57 270.14 533.76 271.56 533.85 272.56 533.9
273.83 533.98 275.68 534.08 278.59 534.25 280.3 534.36 282.15 534.46
283.07 534.52 284.61 534.6 285.33 534.65 287.53 534.77 288.63 534.84
291.39 534.99 291.92 535.01 294.12 535.13 295.22 535.18 296.93 535.27
298.51 535.36 300.71 535.47 304.01 535.62 305.69 535.61 308.4 535.57
309.87 535.56 314.49 535.56 314.72 535.57 317.19 535.57 317.26 535.56
319.39 535.54 321.88 535.46 325.58 535.37 327.08 535.37 327.77 535.38
329.27 535.34 330.2 535.3 332.05 535.24 333.67 535.21 335.1 535.21
336.96 535.19 337.59 535.17 338.81 535.18 339.44 535.2 340.36 535.2
342.45 535.23 343.83 535.27 344.65 535.28 345.91 535.37 346.85 535.42
348.68 535.5 349.6 535.55 350.85 535.6 353.44 535.72 354.54 535.74
356.99 535.74 362.54 535.7 363.9 535.7 365.91 535.68 369.01 535.67
373.21 535.64 374.55 535.64 376.4 535.62 379.8 535.6 381.63 535.6
381.94 535.59 383.79 535.59 386.99 535.56 390.26 535.54 392.11 535.54
394.08 535.53 395.8 535.51 400.67 535.48 402.27 535.48 404.12 535.47
405.96 535.45 407.27 535.45 408.36 535.43 408.74 535.44 409.66 535.42
410.07 535.43 416.53 535.43 417.05 535.44 419.35 535.44 419.82 535.45
422.12 535.45 423.32 535.46 425.9 535.5 428.48 535.5 432.35 535.54
433.93 535.54 435.35 535.5 438.19 535.34 439.62 535.34 441.75 535.44
443.8 535.52 445.38 535.54 446.01 535.56 447.82 535.53 450.4 535.5
452.98 535.46 453.83 535.44 455.55 535.42 456.84 535.39 459.42 535.35
459.52 535.34 461.65 535.34 463.07 535.35 463.78 535.37 465.42 535.37
465.97 535.38 467.16 535.36 468.05 535.33 469.14 535.32 470.89 535.28
476.18 535.25 477.06 535.27 480.23 535.27 482.26 535.31 486.21 535.31
488.66 535.33 490.79 535.33 492.22 535.31 492.9 535.32 494.49 535.32
495.77 535.31 496.48 535.34 497.19 535.34 498.61 535.31 500.68 535.24
502.41 535.22 504.3 535.18 505.58 535.13 507.16 535.13 508.42 535.15
509.28 535.15 510.7 535.13 511.91 535.08 512.83 535.07 518.73 535.07
519.23 535.09 520.02 535.09 520.86 535.11 523.49 535.2 525.62 535.25
526.47 535.25 531.63 535.05 532.92 534.99 534.86 534.92 536.29 534.9
536.79 534.88 537.71 534.89 539.13 535.02 539.84 535.12 540.43 535.17
541.26 535.27 541.65 535.26 542.68 535.35 543.39 535.39 545.18 535.47
546.76 535.48 548.39 535.48 549.68 535.4 553.55 535.19 554.84 535.11
559.74 534.84 560.45 534.79 564.01 534.59 564.72 534.57 571.12 534.57
571.6 534.58 574.67 534.58 575.28 534.56 576.09 534.56 576.86 534.53
577.51 534.55 578.22 534.54 578.94 534.71 579.65 534.9 580.62 534.97
581.61 534.95 584.62 534.91 585.33 534.89 590.16 534.81 591.12 534.8
593.52 534.75 594.57 534.74 595.87 534.71 597.09 534.72 598.84 534.72
599.04 534.73 600.62 534.73 600.97 534.74 602.54 534.74 603.1 534.75
605.12 534.76 606.66 534.76 606.96 534.77 608.54 534.77 608.79 534.78
610.28 534.78 612.86 534.8 614.48 534.8 614.88 534.81 616.61 534.81
616.73 534.82 618.74 534.83 620.6 534.83 620.87 534.84 622.8 534.85
624.46 534.85 624.82 534.86 626.56 534.86 627.04 534.87 628.69 534.87
630.72 534.89 632.3 534.89 634.38 534.91 636.07 534.91 636.51 534.92
638.68 534.92 640.78 534.93 642.91 534.95 644.98 534.96 646.56 534.96

647.17 534.97 651.31 534.99 654.28 535.02 655.7 535.02 658.55 535.05
659.47 535.05 662.4 535.11 667.01 535.18 667.15 535.19 669.21 535.23
672.17 535.31 673.49 535.34 681.2 535.56 682.49 535.59 683.43 535.6
684.58 535.63 686.98 535.67 691.51 535.77 693.38 535.8 695.38 535.84
697.96 535.9 698.35 535.9 700.42 535.95 701.83 535.97 703.12 536
705.17 536.02 706.76 536.05 707.98 536.06 709.56 536.09 714.68 536.16
716.83 536.17 719.43 536.19 722.46 536.23 723.23 536.23 726.78 536.27
728.93 536.28 730.19 536.3 731.05 536.3 734.6 536.34 735.35 536.34
736.64 536.36 737.45 536.36 739.58 536.38 741.8 536.41 742.63 536.41
743.84 536.43 744.77 536.43 745.98 536.45 747.94 536.47 748.82 536.47
751.11 536.5 753.8 536.52 755.22 536.54 755.98 536.54 757.27 536.56
758.06 536.56 760.19 536.59 761.14 536.59 762.2 536.61 763.04 536.61
765.37 536.64 768.01 536.66 769.43 536.68 770.16 536.68 772.28 536.71
774.03 536.72 776.46 536.75 777.29 536.75 779.63 536.78 783.06 536.8
784.22 536.82 785.07 536.82 786.49 536.84 789.13 536.86 789.34 536.87
792.18 536.89 793.37 536.91 794.31 536.91 796.44 536.94 797.24 536.94
798.53 536.96 799.29 536.96 802.13 536.99 803.39 537.01 805.69 537.08
807.11 537.11 810.14 537.19 811.37 537.23 816.58 537.36 818.48 537.42
824.88 537.6 825.56 537.61 827.72 537.67 828.43 537.68 829.85 537.73
830.77 537.75 834.63 537.87 836.25 537.91 836.96 537.94 839.09 538
840.52 538.02 843.66 538.08 844.95 538.09 846.59 538.12 848.75 538.15

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	554.84	.03	580.62	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
554.84	580.62	32.02	32.02	32.02	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	303.86	535.62	F

CROSS SECTION OUTPUT Profile #10-YR

E.G. Elev (ft)	535.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	535.23	Reach Len. (ft)	32.02	32.02	32.02
Crit W.S. (ft)	535.23	Flow Area (sq ft)	5.63	13.96	29.75
E.G. Slope (ft/ft)	0.015158	Area (sq ft)	139.67	13.96	29.75
Q Total (cfs)	85.49	Flow (cfs)	2.78	56.43	26.27
Top Width (ft)	247.29	Top Width (ft)	132.82	25.78	88.68
Vel Total (ft/s)	1.73	Avg. Vel. (ft/s)	0.49	4.04	0.88
Max Chl Dpth (ft)	3.02	Hydr. Depth (ft)	0.11	0.54	0.34
Conv. Total (cfs)	694.4	Conv. (cfs)	22.6	458.4	213.4
Length Wtd. (ft)	32.02	Wetted Per. (ft)	49.74	25.84	88.69
Min Ch El (ft)	534.53	Shear (lb/sq ft)	0.11	0.51	0.32
Alpha	3.68	Stream Power (lb/ft s)	0.05	2.07	0.28
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.48	0.01	0.03
C & E Loss (ft)	0.05	Cum SA (acres)	0.74	0.03	0.13

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #100-YR

E.G. Elev (ft)	535.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	535.47	Reach Len. (ft)	32.02	32.02	32.02
Crit W.S. (ft)	535.47	Flow Area (sq ft)	29.03	20.08	51.87
E.G. Slope (ft/ft)	0.013398	Area (sq ft)	183.56	20.08	51.87
Q Total (cfs)	173.95	Flow (cfs)	18.06	97.29	58.60
Top Width (ft)	364.69	Top Width (ft)	241.49	25.78	97.42
Vel Total (ft/s)	1.72	Avg. Vel. (ft/s)	0.62	4.85	1.13
Max Chl Dpth (ft)	3.26	Hydr. Depth (ft)	0.19	0.78	0.53
Conv. Total (cfs)	1502.8	Conv. (cfs)	156.0	840.5	506.3
Length Wtd. (ft)	32.02	Wetted Per. (ft)	152.11	25.84	97.44
Min Ch El (ft)	534.53	Shear (lb/sq ft)	0.16	0.65	0.45
Alpha	4.58	Stream Power (lb/ft s)	0.10	3.15	0.50
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	0.60	0.02	0.05
C & E Loss (ft)	0.06	Cum SA (acres)	0.89	0.03	0.16

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #FHA

E.G. Elev (ft)	535.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	535.56	Reach Len. (ft)	32.02	32.02	32.02
Crit W.S. (ft)	535.56	Flow Area (sq ft)	44.02	22.27	60.28
E.G. Slope (ft/ft)	0.013078	Area (sq ft)	206.26	22.27	60.28
Q Total (cfs)	217.44	Flow (cfs)	30.30	114.24	72.90
Top Width (ft)	416.67	Top Width (ft)	290.49	25.78	100.40
Vel Total (ft/s)	1.72	Avg. Vel. (ft/s)	0.69	5.13	1.21
Max Chl Dpth (ft)	3.34	Hydr. Depth (ft)	0.22	0.86	0.60
Conv. Total (cfs)	1901.4	Conv. (cfs)	265.0	998.9	637.4

Length Wtd. (ft)	32.02	Wetted Per. (ft)	198.59	25.84	100.42
Min Ch El (ft)	534.53	Shear (lb/sq ft)	0.18	0.70	0.49
Alpha	4.87	Stream Power (lb/ft s)	0.12	3.61	0.59
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	0.69	0.02	0.07
C & E Loss (ft)	0.06	Cum SA (acres)	0.99	0.03	0.22

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1430

INPUT
Description:
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	548.58	4.23	548.48	6.42	548.45	8.19	548.39	10.64	548.47
15.32	548.39	18	548.33	20.86	548.2	22.22	548.15	24.32	548.12
26.47	548.11	28.78	548.06	30.37	548.04	31.95	548.04	36.95	547.82
39.15	547.81	40.11	547.82	41.16	547.79	47.79	547.5	54.92	547.21
58.34	547.04	62.22	546.82	64.12	546.68	66.01	546.56	67.94	546.47
71.14	546.3	73.8	546.2	75.52	546.11	79.81	546.01	82.65	545.87
88.19	545.72	90.79	545.68	92.94	545.71	94.85	545.71	95.91	545.68
99.07	545.52	101.17	545.39	102.45	545.37	105.62	545.39	108.54	545.39
109.62	545.36	112.73	545.15	114.33	545.08	114.86	545.1	116.96	545.02
119.88	544.89	122.17	544.67	123.74	544.58	128.45	544.37	130.97	544.22
133.81	544.18	135.91	543.86	136.96	543.75	141.17	543.48	142.05	543.46
146.02	543.3	148.54	543.07	150.41	543.07	151.7	542.98	152.75	542.88
153.94	542.83	155.52	542.81	159.83	542.91	161.86	542.92	163.28	542.9
167.13	542.88	171.7	542.88	175.32	542.86	179.28	542.86	181.18	542.8
186.32	542.72	188	542.73	188.79	542.71	189.58	542.65	190.37	542.65
192.72	542.53	193.81	542.54	195.13	542.67	195.92	542.8	196.71	542.8
198.02	542.76	200.67	542.83	201.46	542.82	204.34	542.87	207.01	542.87
209.6	542.82	211.92	542.75	214.14	542.7	215.72	542.65	219.08	542.57
221.02	542.51	224.43	542.43	228.39	542.28	231.71	542.12	232.36	542.1
233.94	542.18	237.51	542.03	241.07	541.95	242.98	541.92	245.03	541.91
246.61	541.85	248.55	541.73	250.31	541.68	251.71	541.68	253.97	541.71
257.11	541.63	260.24	541.53	263.38	541.48	267.21	541.36	271.96	541.2
274.36	541.11	277.5	541.02	280.64	540.94	283.78	540.85	286.45	540.76
287.8	540.74	291.62	540.64	294.76	540.6	295.93	540.63	296.98	540.63

299.47 540.54 299.68 540.51 302.06 540.48 302.85 540.53 303.64 540.53
305.4 540.45 308.56 540.28 310.45 540.24 315.93 540.23 318.03 540.2
320.14 540.08 323.9 539.83 325.82 539.73 328.2 539.7 329.78 539.61
330.67 539.64 332.42 539.66 334.54 539.66 335.56 539.58 339.29 539.41
340.3 539.43 341.27 539.4 344.05 539.22 348.07 539.05 352.21 539.06
354.11 539 356.18 538.96 361.15 538.8 364.17 538.82 366.12 538.85
369.19 538.85 371.21 538.88 372.09 538.86 375.23 538.62 379.25 538.5
381.04 538.48 383.03 538.42 384.15 538.42 385.15 538.47 387 538.32
390.15 538.14 391.97 538.1 394.34 538.02 395.35 538.01 397.15 538.07
399.37 538.09 399.93 538.14 401.38 538.06 403.15 537.91 406.89 537.71
408.15 537.75 409.87 537.75 412.15 537.72 414.15 537.72 416.47 537.67
419.15 537.43 420.15 537.42 422.79 537.44 423.79 537.42 428.76 537.27
430.56 537.19 436.15 537.05 439.15 537 442.15 537.17 444.67 537.06
447.15 536.9 448.15 536.87 449.15 536.94 450.67 536.95 454.7 536.79
456.6 536.81 458.58 536.74 458.72 536.77 459.73 536.75 462.15 536.64
464.55 536.58 466.77 536.54 469.15 536.56 471.15 536.49 474.15 536.55
475.82 536.5 478.15 536.38 481.15 536.24 482.86 536.12 484.87 536.01
486.89 535.94 490.15 535.93 492.39 535.78 495.37 535.64 497.95 535.62
499.96 535.62 500.34 535.6 503.15 535.57 504.32 535.53 505.15 535.41
507.15 535.3 513.26 535.38 514.26 535.37 517.06 535.29 518.07 535.28
525.19 535.28 529.14 535.3 532.15 535.3 535.14 535.34 538.19 535.32
539.11 535.3 545.08 535.24 548.25 535.25 552.27 535.23 553.15 535.25
555.29 535.26 558 535.22 560.32 535.23 563.15 535.26 565.15 535.27
568.37 535.32 571.15 535.32 571.92 535.27 577.42 534.74 585.15 533.98
589.82 533.54 591.5 533.37 594.52 533.11 601.15 532.52 604.73 532.22
606.15 532.09 608.6 531.91 610.15 531.74 611.69 531.68 615.15 531.6
618.15 531.84 618.65 531.86 622.15 532.13 628.59 532.61 630.73 532.78
633.56 532.97 638.53 533.22 642.15 533.48 644.15 533.64 648.15 533.93
649.84 534.07 657.16 534.62 658.16 534.65 658.9 534.59 660.91 534.48
668.36 534.48 670.97 534.52 672.33 534.58 674.32 534.64 677.3 534.7
679.02 534.75 681.16 534.78 684.26 534.75 685.05 534.71 686.06 534.7
688.07 534.75 689.23 534.81 690.08 534.89 691.09 534.91 693.21 534.91
702.15 534.86 704.15 534.84 709.12 534.82 709.16 534.81 714.22 534.79
716.24 534.77 723.28 534.73 725.03 534.73 727.01 534.71 730 534.7
730.16 534.71 735.35 534.71 735.96 534.72 741.16 534.72 741.38 534.73
746.9 534.73 747.16 534.74 752.45 534.74 752.86 534.75 758.48 534.75
758.83 534.76 764.16 534.76 764.52 534.77 768.77 534.77 769.16 534.78
773.16 534.78 776.53 534.79 780.07 534.82 781.38 534.84 783.61 534.85
793.72 534.94 797.75 534.99 801.82 535.02 806.97 535.04 810.51 535.07
815.47 535.09 826.13 535.15 828.21 535.17 831.75 535.18 835.53 535.21
839.5 535.23 841.67 535.22 848.44 535.22 848.75 535.21 852.29 535.21
852.91 535.2 857.95 535.2 858.46 535.19 875.27 535.19 876.36 535.15
879.74 535.07 881.31 535.07 882.72 535.12 885.43 535.08 889.1 535
894.06 535.05 897.62 535.06 898.3 535.03 898.92 534.94 900.27 534.91
901.14 534.92 904.31 534.92 907.01 534.91 908.92 534.99 911.04 535.04
914.99 534.92 917.26 534.91 919.57 534.94 923.54 535.01 926.62 534.91
928.25 534.89 931.64 534.96 934.45 535.06 937.66 534.99 939.65 534.97
940.78 535.04 942.34 535.17 951.71 535.17 952.95 535.16 956.39 535.09
957.96 535.07 958.69 535.05 961.79 534.98 963.09 534.83 963.6 534.81
964.39 534.67 965.02 534.69 965.35 534.59 966.44 534.56 967.15 534.44
968.89 534.54 969.28 534.53 970.45 534.63 971.41 534.61 972.2 534.74
973.57 534.73 976.11 534.66 977.41 534.67 979.82 534.72 982.62 534.72
984.9 534.7 985.67 534.7 988.45 534.69 989.87 534.66 992.31 534.65
998.55 534.65 1000.52 534.67 1001.23 534.65 1004.8 534.65 1006.06 534.71

1007.62 534.65 1010.46 534.64 1012.61 534.77 1014.17 534.65 1015.43 534.64
1016.14 534.66 1018.27 534.89 1020.38 534.68 1021.11 534.78 1021.68 534.76
1022.98 535.06 1023.95 535.07 1025.1 535.13 1026.66 535.11 1027.5 535.03
1028.05 535.14 1030.8 535.19 1033.4 535.3 1036.73 535.26 1041.21 535.19
1046.67 535.17 1048.52 535.26 1050.08 535.28 1053.2 535.06 1054.48 535.01
1055.54 535.05 1056.33 535.12 1057.89 535.31 1058.74 535.37 1059.45 535.38
1062.57 535.51 1064.13 535.53 1065.7 535.42 1066.55 535.34 1067.24 535.33
1067.97 535.24 1070.1 535.18 1070.81 535.3 1071.52 535.1 1072.23 535.19
1072.94 535.1 1073.65 535.15 1074.36 535.27 1075.78 535.18 1076.49 535.29
1077.91 535.3 1080.04 535.39 1081.58 535.28 1082.91 535.44 1084.18 535.49
1085.01 535.49 1087.14 535.44 1088.56 535.56 1090.68 535.63 1092.82 535.61
1094.6 535.72 1095.9 535.76 1098.59 535.77 1101.34 535.84 1103.71 535.94
1107.02 536 1108.44 536.06 1110.98 536.14 1116.73 536.35 1122.1 536.53
1124.06 536.55 1126.9 536.6 1128.15 536.6 1132.36 536.72 1134.4 536.75
1136.26 536.75 1140.39 536.77 1146.78 536.83 1151.89 536.86 1159.7 536.93
1168.75 537 1179.68 537.06 1182.99 537.09 1184.8 537.09 1189.05 537.14
1192.63 537.21 1195.3 537.25 1196.86 537.26 1203.58 537.35 1205 537.36
1209.97 537.48 1213.52 537.55 1214.03 537.57 1219.59 537.68 1223.4 537.74
1224.8 537.78 1234.33 538 1240.58 538.07 1246.18 538.14 1249.95 538.14
1254.63 538.19 1256.83 538.2 1260.38 538.26 1262.56 538.31 1266.77 538.39
1269.61 538.46 1272.13 538.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	961.79	.03	972.2	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
961.79	972.2	87.52	87.52	87.52	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	690.54	534.91	F

CROSS SECTION OUTPUT Profile #10-YR

E.G. Elev (ft)	534.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	534.91	Reach Len. (ft)	87.52	87.52	87.52
Crit W.S. (ft)	534.91	Flow Area (sq ft)	169.82	2.83	11.03
E.G. Slope (ft/ft)	0.001410	Area (sq ft)	169.82	2.83	11.03
Q Total (cfs)	85.49	Flow (cfs)	80.96	2.28	2.24
Top Width (ft)	277.34	Top Width (ft)	217.40	9.80	50.13
Vel Total (ft/s)	0.47	Avg. Vel. (ft/s)	0.48	0.81	0.20
Max Chl Dpth (ft)	3.31	Hydr. Depth (ft)	0.78	0.29	0.22
Conv. Total (cfs)	2276.4	Conv. (cfs)	2155.8	60.8	59.7
Length Wtd. (ft)	87.52	Wetted Per. (ft)	217.68	9.87	50.19
Min Ch El (ft)	534.44	Shear (lb/sq ft)	0.07	0.03	0.02
Alpha	1.08	Stream Power (lb/ft s)	0.03	0.02	0.00
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	0.36	0.01	0.01
C & E Loss (ft)	0.00	Cum SA (acres)	0.61	0.02	0.08

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.

Warning: Divided flow computed for this cross-section.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100-YR

E.G. Elev (ft)	535.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	535.03	Reach Len. (ft)	87.52	87.52	87.52
Crit W.S. (ft)	534.91	Flow Area (sq ft)	199.56	4.05	17.09
E.G. Slope (ft/ft)	0.003694	Area (sq ft)	199.56	4.05	17.09
Q Total (cfs)	173.95	Flow (cfs)	160.00	6.48	7.47
Top Width (ft)	338.11	Top Width (ft)	276.00	10.41	51.70
Vel Total (ft/s)	0.79	Avg. Vel. (ft/s)	0.80	1.60	0.44
Max Chl Dpth (ft)	3.43	Hydr. Depth (ft)	0.72	0.39	0.33
Conv. Total (cfs)	2862.1	Conv. (cfs)	2632.5	106.7	122.9
Length Wtd. (ft)	87.52	Wetted Per. (ft)	276.30	10.48	51.78
Min Ch El (ft)	534.44	Shear (lb/sq ft)	0.17	0.09	0.08
Alpha	1.12	Stream Power (lb/ft s)	0.13	0.14	0.03
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	0.46	0.01	0.03
C & E Loss (ft)	0.00	Cum SA (acres)	0.70	0.02	0.11

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #FHA

E.G. Elev (ft)	535.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	535.14	Reach Len. (ft)	87.52	87.52	87.52
Crit W.S. (ft)	534.92	Flow Area (sq ft)	231.60	5.16	23.03
E.G. Slope (ft/ft)	0.004037	Area (sq ft)	231.60	5.16	23.03
Q Total (cfs)	217.44	Flow (cfs)	195.52	10.12	11.79
Top Width (ft)	394.81	Top Width (ft)	323.02	10.41	61.39
Vel Total (ft/s)	0.84	Avg. Vel. (ft/s)	0.84	1.96	0.51
Max Chl Dpth (ft)	3.54	Hydr. Depth (ft)	0.72	0.50	0.38
Conv. Total (cfs)	3422.1	Conv. (cfs)	3077.1	159.3	185.6
Length Wtd. (ft)	87.52	Wetted Per. (ft)	323.34	10.48	61.50
Min Ch El (ft)	534.44	Shear (lb/sq ft)	0.18	0.12	0.09
Alpha	1.19	Stream Power (lb/ft s)	0.15	0.24	0.05
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)	0.53	0.01	0.04
C & E Loss (ft)	0.00	Cum SA (acres)	0.76	0.02	0.16

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1407

INPUT
Description:
Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	539.13	.96	539.12	3.37	539.06	4.4	539.07	6.09	539.01
6.92	539.02	11.21	539.02	12.92	538.91	16.61	538.69	18.05	538.62
19.76	538.6	20.78	538.61	24.03	538.5	25.55	538.43	26.59	538.41
28.83	538.32	31.71	538.22	33.92	538.17	37.17	538	37.69	537.94
38.43	537.91	38.55	537.87	39.4	537.85	41.11	537.85	43.47	537.79
44.53	537.8	46.75	537.89	47.25	537.9	48.51	537.83	50.21	537.63
52.22	537.5	54.78	537.42	55.63	537.45	57.36	537.42	59.85	537.35
60.76	537.3	61.41	537.29	63.63	537.09	67.42	536.93	69.3	537.02
70.58	537.04	71.59	537.01	72.72	536.92	73.72	536.86	74.65	536.83
75.67	536.85	76.99	536.94	80.4	536.76	81.78	536.74	82.97	536.77
87.89	536.73	89.92	536.67	90.94	536.66	93.22	536.67	94.07	536.65
94.94	536.56	97.02	536.4	98.59	536.33	100.41	536.29	104.97	536.24
108.62	536.23	109.53	536.21	109.65	536.25	112.1	536.18	113.91	536.15
117.12	536.12	119.73	536	122.3	535.96	125.17	535.88	127.77	535.88
130.19	535.9	132.05	535.83	134.15	535.8	137.65	535.69	139.24	535.63
144.18	535.54	146.62	535.47	147.28	535.46	148.74	535.37	150.56	535.31
155.32	535.2	158.77	535.15	160.59	535.13	161.5	535.1	165.38	535.06
167.39	535.02	170.62	535	172.44	535	174.26	534.98	176.43	534.97
179.1	534.97	179.45	534.96	183.58	534.95	185.48	534.96	189.5	535.03
193.66	535.08	196.54	535.08	198.55	535.07	205.59	535.14	206.59	535.16
208.6	535.17	210.46	535.2	211.92	535.2	215.29	535.18	216.64	535.12
223.9	534.08	224.41	534.09	225.02	534.02	225.32	534.05	225.69	534.01
226.7	534	227.7	533.88	230.62	533.14	231.75	533.02	232.62	532.96
233.73	532.76	235.35	532.36	236.26	532.24	236.75	532.23	237.75	532.27
238.47	532.22	240.71	532.12	241.83	532.02	243.56	531.52	244.07	531.4
244.47	531.26	245.8	530.96	246.29	531	246.31	530.94	253.84	531.48
254.15	531.51	256.85	531.7	259.06	531.87	261.79	532.07	264.23	532.24
265.35	532.33	267.91	532.51	268.92	532.59	273.94	532.95	275.47	533.07
276.55	533.14	278.2	533.27	280.53	533.43	281.85	533.53	285	533.75
289.99	534.12	290.97	534.18	293.35	534.37	295.05	534.49	296.44	534.57
298.26	534.57	299.17	534.55	303.43	534.5	306.79	534.45	308.29	534.45
312.39	534.48	314.67	534.48	316.16	534.49	317.99	534.46	326.22	534.46
326.52	534.45	331.44	534.45	331.99	534.44	337.27	534.44	337.46	534.43
342.3	534.43	342.64	534.42	346.58	534.42	347.12	534.41	351.6	534.41
352.05	534.4	354.36	534.4	362.08	534.32	364.41	534.32	364.82	534.31
367.55	534.31	370.45	534.3	373.93	534.27	380.72	534.24	381.23	534.23
385.19	534.23	385.33	534.22	404.52	534.22	404.77	534.21	422.38	534.21
422.84	534.2	428.11	534.2	428.55	534.19	433.38	534.19	433.79	534.18
437.14	534.19	438.84	534.21	442.01	534.22	445.32	534.25	448.44	534.26
451.93	534.29	453.25	534.29	455.16	534.31	456.34	534.31	459.73	534.34
463.5	534.36	467.04	534.36	467.26	534.37	471.03	534.37	471.77	534.38
475.09	534.38	475.55	534.39	479.5	534.39	480	534.4	483.07	534.4
483.66	534.41	486.84	534.41	487.21	534.42	491.62	534.42	492.11	534.43
496.03	534.43	496.47	534.44	500.58	534.44	501.15	534.45	505.66	534.45
505.96	534.46	510.37	534.46	510.87	534.47	514.99	534.47	515.45	534.48
519.28	534.48	519.97	534.49	524.03	534.49	524.49	534.5	529.11	534.5
532.02	534.52	535.57	534.52	535.72	534.53	539.68	534.53	540.13	534.54
545.86	534.54	546.32	534.55	549.33	534.55	549.97	534.56	555.36	534.56
555.57	534.57	558.37	534.57	558.88	534.58	566.77	534.58	569.9	534.55
571	534.53	573.9	534.51	576.27	534.48	577.95	534.49	580.2	534.48

581.02 534.53 582.46 534.56 583.4 534.6 585.34 534.63 587.54 534.58
588.64 534.61 589.75 534.49 589.99 534.49 590.52 534.39 591.13 534.34
591.5 534.36 592.9 534.35 593.76 534.38 596.76 534.43 598.19 534.43
601.77 534.49 602.4 534.51 603.2 534.5 604.63 534.41 608.77 534.57
610.01 534.6 611.78 534.62 613.21 534.6 617.36 534.49 618.93 534.48
621.07 534.59 622.46 534.63 623.93 534.69 626.19 534.76 628.68 534.8
629.65 534.79 632.64 534.79 635.37 534.78 639.66 534.84 641.12 534.83
642.72 534.88 646.15 534.95 646.81 534.9 650.38 534.83 650.95 534.72
651.81 534.66 652.53 534.58 653.24 534.56 655.39 534.32 656.06 534.29
658.55 534.37 662.28 534.39 663.97 534.39 664.68 534.34 666.11 534.06
666.83 533.97 669.75 533.76 670.15 533.79 670.4 533.71 671.28 533.87
673.97 534.39 676.83 534.53 678.26 534.47 681.12 534.48 684.75 534.51
686.2 534.51 689.6 534.54 691.56 534.54 692.75 534.58 695.79 534.71
697.44 534.8 698.89 534.81 702.24 534.81 702.91 534.8 704.14 534.82
707.27 534.81 707.94 534.84 709.2 534.85 711.73 534.85 712.35 534.83
715.98 534.8 717.47 534.77 718.89 534.66 721.22 534.42 721.79 534.38
722.52 534.42 723.97 534.54 724.7 534.55 728.03 534.36 729.21 534.31
730.71 534.38 732.6 534.5 733.91 534.52 734.14 534.55 737.44 534.82
738.3 534.84 739.22 534.82 740.2 534.84 740.97 534.83 742.85 534.74
743.58 534.69 745.03 534.68 745.89 534.71 749.68 534.77 750.84 534.72
753.02 534.68 755.2 534.69 755.93 534.74 758.62 534.72 760.29 534.72
760.83 534.7 762.15 534.7 763.92 534.77 766.76 534.86 767.55 534.85
771.18 534.72 772.63 534.7 774.35 534.75 776.25 534.87 777.45 534.91
779.8 534.87 782.07 534.77 783.33 534.76 786.43 534.8 787.88 534.81
792.75 534.95 793.7 535.01 794.89 535.05 798.78 535.11 801.68 535.23
803.86 535.23 804.59 535.22 805.32 535.17 807.49 534.99 810.38 534.86
811.13 534.85 813.47 535.06 814.2 535.1 814.76 535.09 815.48 535.16
816.57 535.19 816.94 535.23 819.12 535.34 819.9 535.35 820.98 535.33
822.76 535.33 825.86 535.36 826.87 535.39 828.04 535.39 830.01 535.41
830.4 535.4 836.55 535.42 838.87 535.52 840.18 535.51 842.67 535.51
843.34 535.5 845.99 535.52 846.71 535.54 848.05 535.48 849.62 535.45
851.07 535.45 852.52 535.35 853.98 535.35 856.83 535.4 857.61 535.4
859.06 535.46 862.69 535.5 867.78 535.53 869.22 535.55 872.31 535.57
874.31 535.6 876.49 535.6 878.72 535.62 880.85 535.65 882.3 535.65
884.41 535.68 889.23 535.71 892.47 535.77 895.11 535.8 896.83 535.83
899.82 535.86 904.82 535.95 907.72 535.99 908.06 536.02 909.18 536.21
912.08 536.78 912.76 536.93 913.94 537.05 915.12 537.13 917.16 537.23
922.98 537.47 923.7 537.51 926.61 537.63 927.33 537.67 931.86 537.86
932.77 537.91 935.32 538.01 939.45 538.11 939.82 538.11 942.58 538.18
945.14 538.23 947.04 538.28 948.06 538.28 950.83 538.32 956.3 538.37
959.29 538.41 960.02 538.41 962.92 538.45 963.65 538.45 968.73 538.51
969.46 538.51 972.36 538.54 974.51 538.57 978.17 538.6 981.8 538.65
982.53 538.65 984.54 538.68 985.44 538.68 992.58 538.76 1018.12 538.76
1018.66 538.77 1038.12 538.77 1043.82 538.83 1044.99 538.85 1049.51 538.89
1050.43 538.91 1052.98 538.93 1056.61 538.98 1057.49 538.98 1063.15 539.04
1068.23 539.1 1068.96 539.1 1071.14 539.13 1072.78 539.14 1074.77 539.17
1075.5 539.17 1077.49 539.2 1079.13 539.21 1082.03 539.25 1082.9 539.25
1084.94 539.28 1087.46 539.3 1089.26 539.33 1095.05 539.39 1096.54 539.39

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	664.68	.03	673.97	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

664.68 673.97 169.75 169.75 169.75 .1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	296.4	534.57	F

CROSS SECTION OUTPUT Profile #10-YR

E.G. Elev (ft)	534.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	534.57	Reach Len. (ft)			
Crit W.S. (ft)	534.57	Flow Area (sq ft)	191.64	5.38	3.10
E.G. Slope (ft/ft)	0.001711	Area (sq ft)	191.64	5.38	3.10
Q Total (cfs)	85.49	Flow (cfs)	77.48	7.60	0.41
Top Width (ft)	433.22	Top Width (ft)	390.81	9.29	33.13
Vel Total (ft/s)	0.43	Avg. Vel. (ft/s)	0.40	1.41	0.13
Max Chl Dpth (ft)	3.63	Hydr. Depth (ft)	0.49	0.58	0.09
Conv. Total (cfs)	2067.0	Conv. (cfs)	1873.3	183.8	9.9
Length Wtd. (ft)		Wetted Per. (ft)	391.42	9.41	33.16
Min Ch El (ft)	533.71	Shear (lb/sq ft)	0.05	0.06	0.01
Alpha	1.78	Stream Power (lb/ft s)	0.02	0.09	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

Warning: Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical
depth). Water surface set to critical depth.

CROSS SECTION OUTPUT Profile #100-YR

E.G. Elev (ft)	534.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	534.72	Reach Len. (ft)			
Crit W.S. (ft)	534.57	Flow Area (sq ft)	254.93	6.81	9.05
E.G. Slope (ft/ft)	0.003256	Area (sq ft)	254.93	6.81	9.05
Q Total (cfs)	173.95	Flow (cfs)	155.74	15.51	2.70
Top Width (ft)	484.54	Top Width (ft)	419.36	9.29	55.89
Vel Total (ft/s)	0.64	Avg. Vel. (ft/s)	0.61	2.28	0.30
Max Chl Dpth (ft)	3.78	Hydr. Depth (ft)	0.61	0.73	0.16
Conv. Total (cfs)	3048.3	Conv. (cfs)	2729.1	271.8	47.3
Length Wtd. (ft)		Wetted Per. (ft)	420.00	9.41	55.95
Min Ch El (ft)	533.71	Shear (lb/sq ft)	0.12	0.15	0.03
Alpha	1.93	Stream Power (lb/ft s)	0.08	0.34	0.01
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #FHA

E.G. Elev (ft)	534.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.100	0.030	0.100

W.S. Elev (ft)	534.82	Reach Len. (ft)			
Crit W.S. (ft)	534.57	Flow Area (sq ft)	294.80	7.68	15.76
E.G. Slope (ft/ft)	0.003256	Area (sq ft)	294.80	7.68	15.76
Q Total (cfs)	217.44	Flow (cfs)	193.80	18.96	4.67
Top Width (ft)	537.34	Top Width (ft)	433.55	9.29	94.50
Vel Total (ft/s)	0.68	Avg. Vel. (ft/s)	0.66	2.47	0.30
Max Chl Dpth (ft)	3.88	Hydr. Depth (ft)	0.68	0.83	0.17
Conv. Total (cfs)	3810.7	Conv. (cfs)	3396.4	332.4	81.9
Length Wtd. (ft)		Wetted Per. (ft)	434.20	9.41	94.58
Min Ch El (ft)	533.71	Shear (lb/sq ft)	0.14	0.17	0.03
Alpha	1.97	Stream Power (lb/ft s)	0.09	0.41	0.01
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

SUMMARY OF MANNING'S N VALUES

River:NB Raritan Trib

Reach	River Sta.	n1	n2	n3
Reach 1	1954	.1	.03	.1
Reach 1	1873	.1	.03	.1
Reach 1	1782	.1	.03	.1
Reach 1	1726	.1	.03	.1
Reach 1	1622	.1	.03	.1
Reach 1	1532	.1	.03	.1
Reach 1	1494	.1	.03	.1
Reach 1	1462	.1	.03	.1
Reach 1	1430	.1	.03	.1
Reach 1	1407	.1	.03	.1

SUMMARY OF REACH LENGTHS

River: NB Raritan Trib

Reach	River Sta.	Left	Channel	Right
Reach 1	1954	99.91	99.91	99.91
Reach 1	1873	79.5	79.5	79.5
Reach 1	1782	71.34	71.34	71.34
Reach 1	1726	128.93	128.93	128.93
Reach 1	1622	83.43	83.43	83.43
Reach 1	1532	37.6	37.6	37.6
Reach 1	1494	31.89	31.89	31.89
Reach 1	1462	32.02	32.02	32.02
Reach 1	1430	87.52	87.52	87.52

Reach 1	1407	169.75	169.75	169.75

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: NB Raritan Trib

Reach	River Sta.	Contr.	Expan.
Reach 1	1954	.1	.3
Reach 1	1873	.1	.3
Reach 1	1782	.1	.3
Reach 1	1726	.1	.3
Reach 1	1622	.1	.3
Reach 1	1532	.1	.3
Reach 1	1494	.1	.3
Reach 1	1462	.1	.3
Reach 1	1430	.1	.3
Reach 1	1407	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	1954	10-YR	74.28	537.73	539.83	539.83	540.42	0.014289	6.14	12.10	10.60	1.01
Reach 1	1954	100-YR	154.79	537.73	540.66	540.66	541.36	0.013072	6.70	23.10	16.84	1.01
Reach 1	1954	FHA	193.49	537.73	540.92	540.92	541.67	0.012889	6.96	27.81	19.03	1.01
Reach 1	1873	10-YR	74.28	536.98	538.89		539.02	0.004090	2.82	26.38	30.26	0.53
Reach 1	1873	100-YR	154.79	536.98	539.36		539.58	0.004599	3.75	41.26	33.52	0.60
Reach 1	1873	FHA	193.49	536.98	539.49		539.77	0.005175	4.24	46.01	41.94	0.64
Reach 1	1782	10-YR	74.28	536.01	537.81	537.81	538.42	0.014336	6.28	11.83	9.92	1.01
Reach 1	1782	100-YR	154.79	536.01	538.71	538.71	539.12	0.006792	5.72	64.32	116.75	0.75
Reach 1	1782	FHA	193.49	536.01	538.89	538.89	539.30	0.006425	5.93	87.46	138.75	0.74
Reach 1	1726	10-YR	74.28	535.20	537.34	537.34	537.57	0.005982	4.51	51.82	150.88	0.68
Reach 1	1726	100-YR	154.79	535.20	537.65	537.65	537.92	0.007001	5.59	104.41	185.79	0.76

Reach 1	1726	FHA	193.49	535.20	537.74	537.74	538.04	0.007867	6.13	121.45
193.93	0.81									
Reach 1	1622	10-YR	85.49	534.85	536.26	535.93	536.32	0.002996	2.71	93.16
328.56	0.48									
Reach 1	1622	100-YR	173.95	534.85	536.54	536.23	536.63	0.003852	3.61	172.29
460.56	0.56									
Reach 1	1622	FHA	217.44	534.85	536.65	536.35	536.75	0.003977	3.87	211.80
500.40	0.58									
Reach 1	1532	10-YR	85.49	535.18	535.89	535.77	535.97	0.006439	2.96	87.57
363.74	0.65									
Reach 1	1532	100-YR	173.95	535.18	536.14	535.97	536.23	0.006166	3.59	157.40
421.97	0.67									
Reach 1	1532	FHA	217.44	535.18	536.23	536.05	536.33	0.006445	3.92	187.37
453.48	0.70									
Reach 1	1494	10-YR	85.49	535.01	535.68	535.37	535.71	0.006497	2.91	101.18
361.31	0.65									
Reach 1	1494	100-YR	173.95	535.01	535.93	535.58	535.98	0.006410	3.64	182.66
478.39	0.68									
Reach 1	1494	FHA	217.44	535.01	536.03	535.61	536.07	0.006328	3.87	216.14
490.66	0.69									
Reach 1	1462	10-YR	85.49	534.53	535.23	535.23	535.40	0.015158	4.04	49.33
247.29	0.97									
Reach 1	1462	100-YR	173.95	534.53	535.47	535.47	535.68	0.013398	4.85	100.98
364.69	0.97									
Reach 1	1462	FHA	217.44	534.53	535.56	535.56	535.78	0.013078	5.13	126.58
416.67	0.97									
Reach 1	1430	10-YR	85.49	534.44	534.91	534.91	534.91	0.001410	0.81	183.68
277.34	0.27									
Reach 1	1430	100-YR	173.95	534.44	535.03	534.91	535.04	0.003694	1.60	220.71
338.11	0.45									
Reach 1	1430	FHA	217.44	534.44	535.14	534.92	535.15	0.004037	1.96	259.79
394.81	0.49									
Reach 1	1407	10-YR	85.49	533.71	534.57	534.57	534.58	0.001711	1.41	200.12
433.22	0.33									
Reach 1	1407	100-YR	173.95	533.71	534.72	534.57	534.74	0.003256	2.28	270.78
484.54	0.47									
Reach 1	1407	FHA	217.44	533.71	534.82	534.57	534.83	0.003256	2.47	318.24
537.34	0.48									

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Existing Conditions

River: NB Raritan Trib Reach: Reach 1 RS: 1954 Profile: 10-YR
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1954 Profile: 100-YR
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1954 Profile: FHA
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1873 Profile: 10-YR
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: NB Raritan Trib Reach: Reach 1 RS: 1782 Profile: 10-YR
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: NB Raritan Trib Reach: Reach 1 RS: 1782 Profile: 100-YR
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1782 Profile: FHA
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1726 Profile: 10-YR
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1726 Profile: 100-YR
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1726 Profile: FHA
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1622 Profile: 10-YR
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1622 Profile: 100-YR
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1622 Profile: FHA
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1532 Profile: 10-YR
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1532 Profile: 100-YR
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1532 Profile: FHA
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1494 Profile: 10-YR
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1494 Profile: 100-YR
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1494 Profile: FHA
Warning:Divided flow computed for this cross-section.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1462 Profile: 10-YR
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1462 Profile: 100-YR
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1462 Profile: FHA
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1430 Profile: 10-YR
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated

water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

River: NB Raritan Trib Reach: Reach 1 RS: 1430 Profile: 100-YR

Warning:Divided flow computed for this cross-section.

River: NB Raritan Trib Reach: Reach 1 RS: 1430 Profile: FHA

Warning:Divided flow computed for this cross-section.

River: NB Raritan Trib Reach: Reach 1 RS: 1407 Profile: 10-YR

Warning:Divided flow computed for this cross-section.

Warning:Slope too steep for slope area to converge during supercritical flow calculations (normal depth is below critical

depth). Water surface set to critical depth.

River: NB Raritan Trib Reach: Reach 1 RS: 1407 Profile: 100-YR

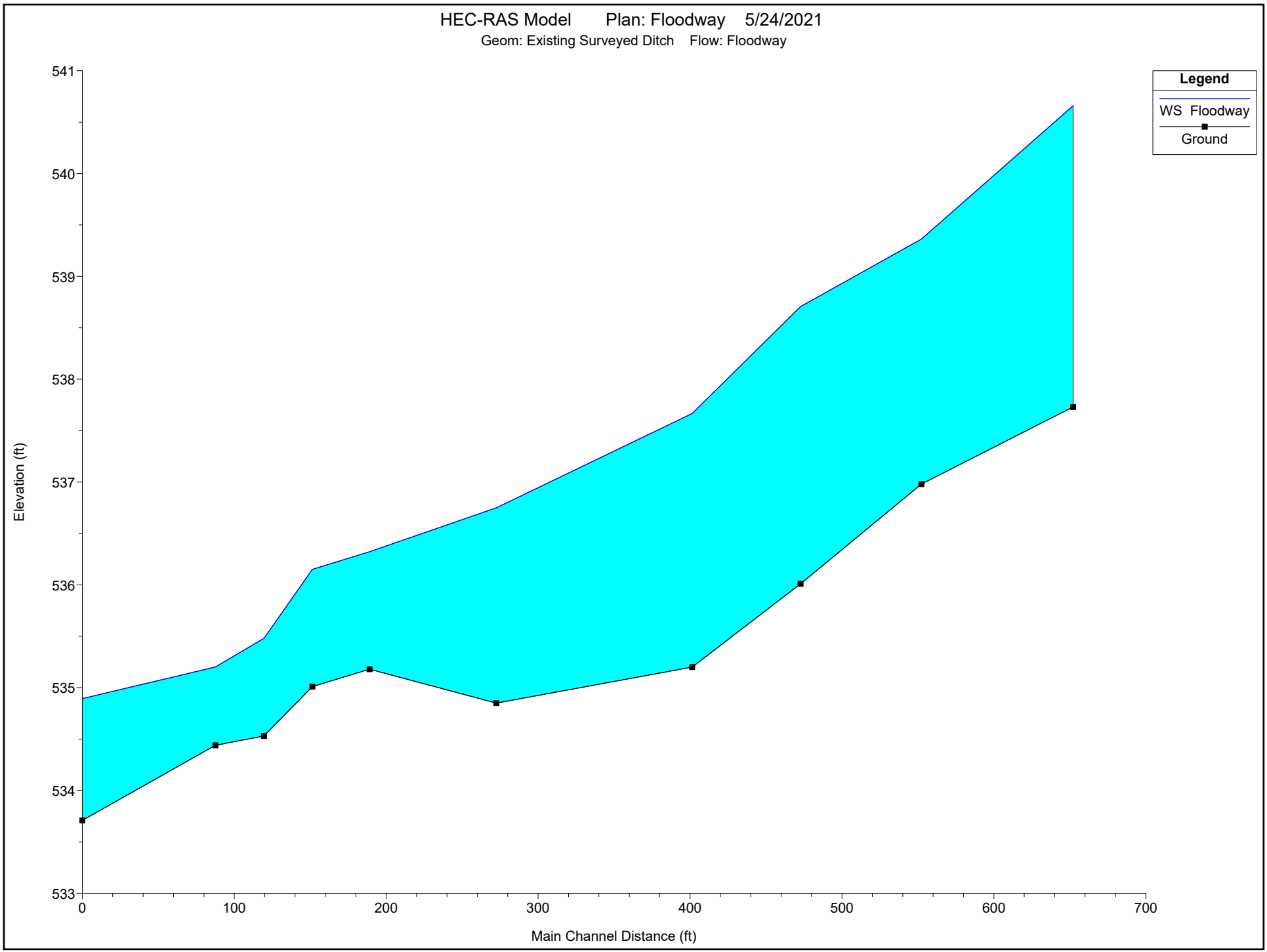
Warning:Divided flow computed for this cross-section.

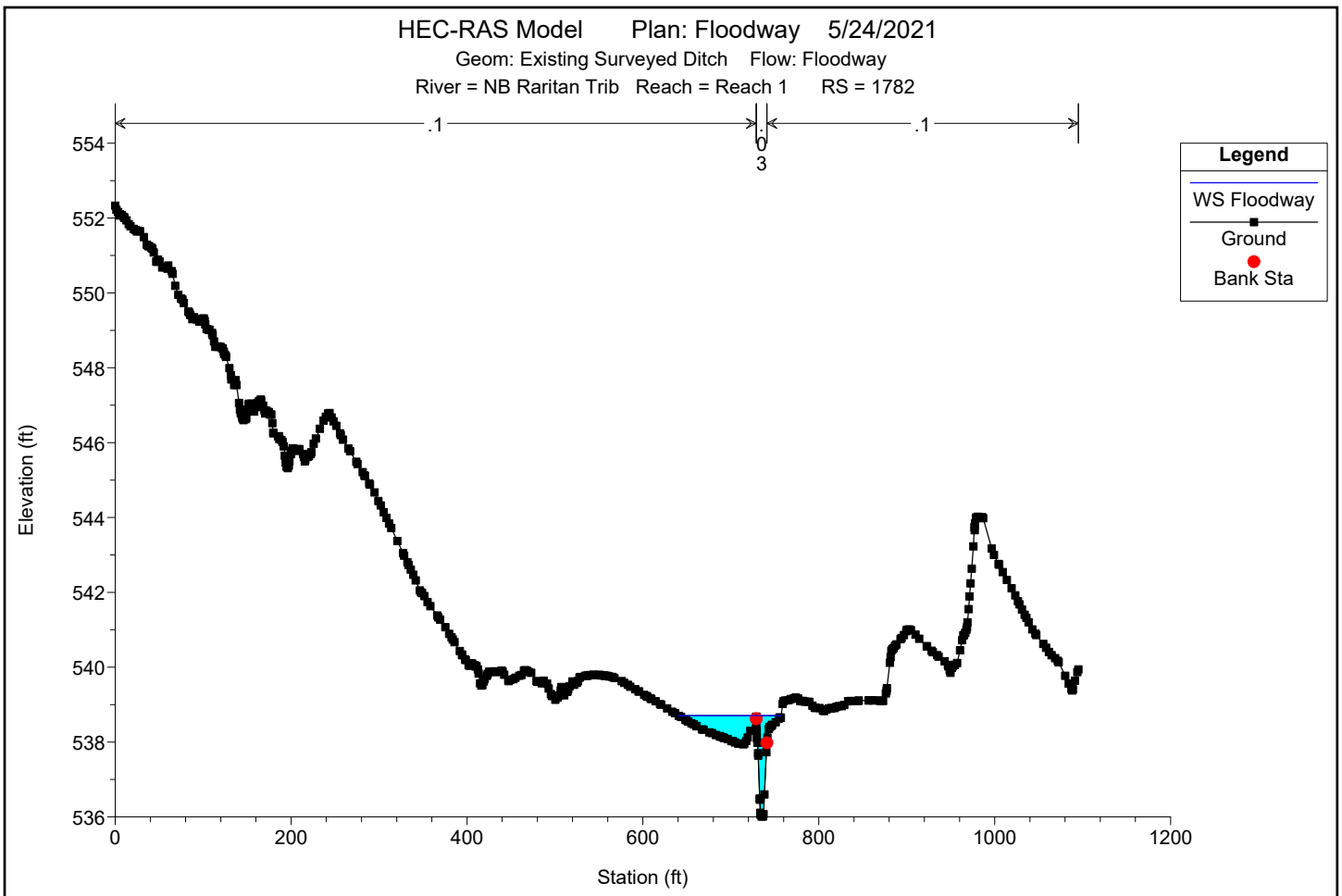
River: NB Raritan Trib Reach: Reach 1 RS: 1407 Profile: FHA

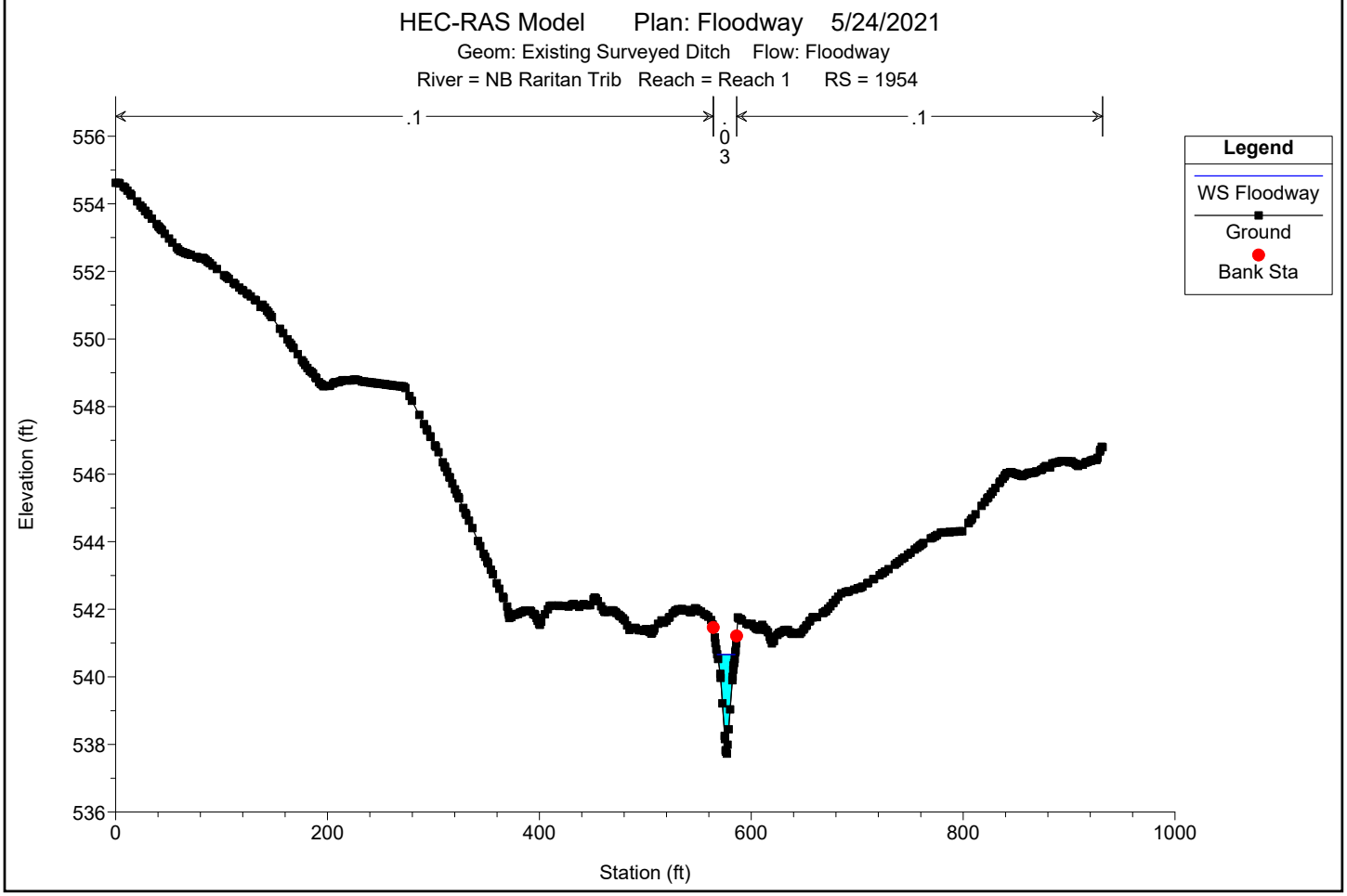
Warning:Divided flow computed for this cross-section.

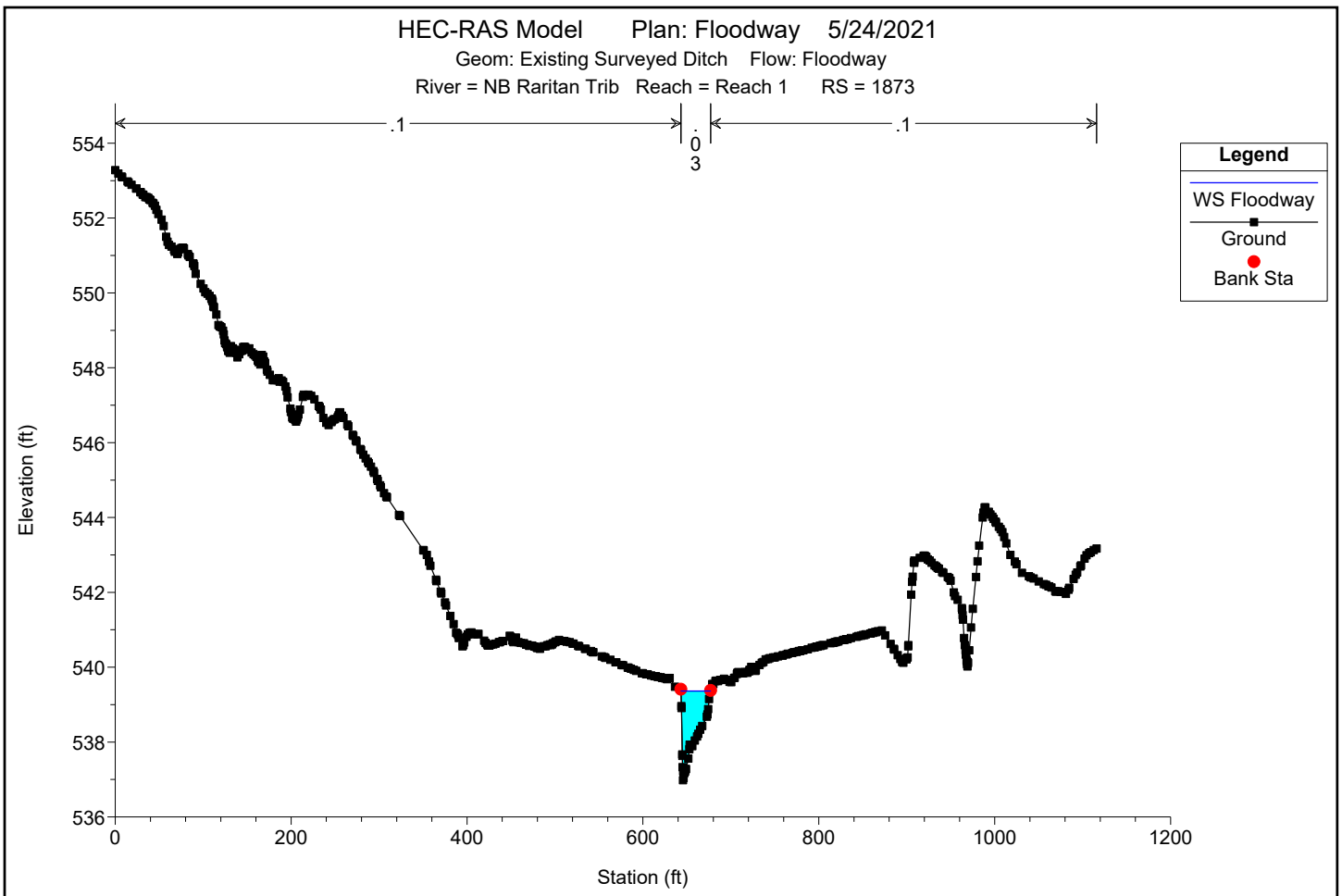
HEC-RAS Plan: Floodway River: NB Raritan Trib Reach: Reach 1 Profile: Floodway

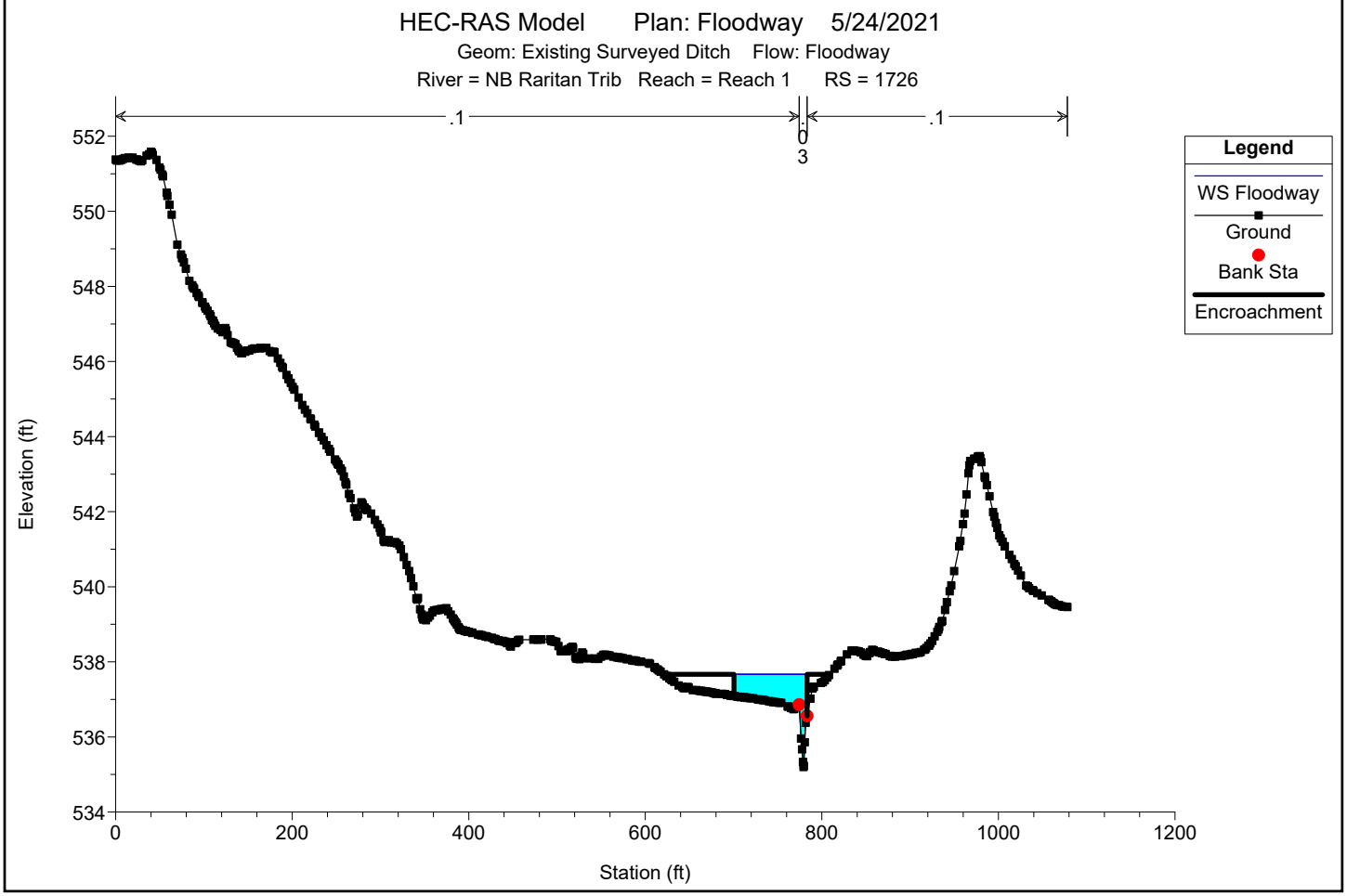
Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Reach 1	1954	Floodway	540.66	0.00	541.36	16.84		154.79		564.15	564.15	586.16	586.16
Reach 1	1873	Floodway	539.36	0.00	539.58	33.53		154.79		643.27	643.27	676.98	676.98
Reach 1	1782	Floodway	538.71	0.00	539.12	116.75	27.17	125.98	1.65	0.00	728.96	741.05	1095.02
Reach 1	1726	Floodway	537.67	0.02	538.03	82.87	61.93	92.86		700.36	774.31	783.23	783.23
Reach 1	1622	Floodway	536.75	0.21	536.90	84.46	16.22	102.36	55.37	795.05	825.03	842.41	879.51
Reach 1	1532	Floodway	536.32	0.18	536.49	111.22	33.22	102.43	38.30	400.39	451.92	474.73	511.61
Reach 1	1494	Floodway	536.15	0.22	536.23	136.96	50.75	38.11	85.09	807.26	885.14	893.63	944.22
Reach 1	1462	Floodway	535.48	0.01	535.87	89.65	3.33	120.80	49.82	535.88	554.84	580.62	627.15
Reach 1	1430	Floodway	535.20	0.17	535.21	359.09	163.63	10.32		594.63	961.79	972.20	972.20
Reach 1	1407	Floodway	534.89	0.20	534.92	412.29	150.81	23.14		257.96	664.68	673.97	673.97

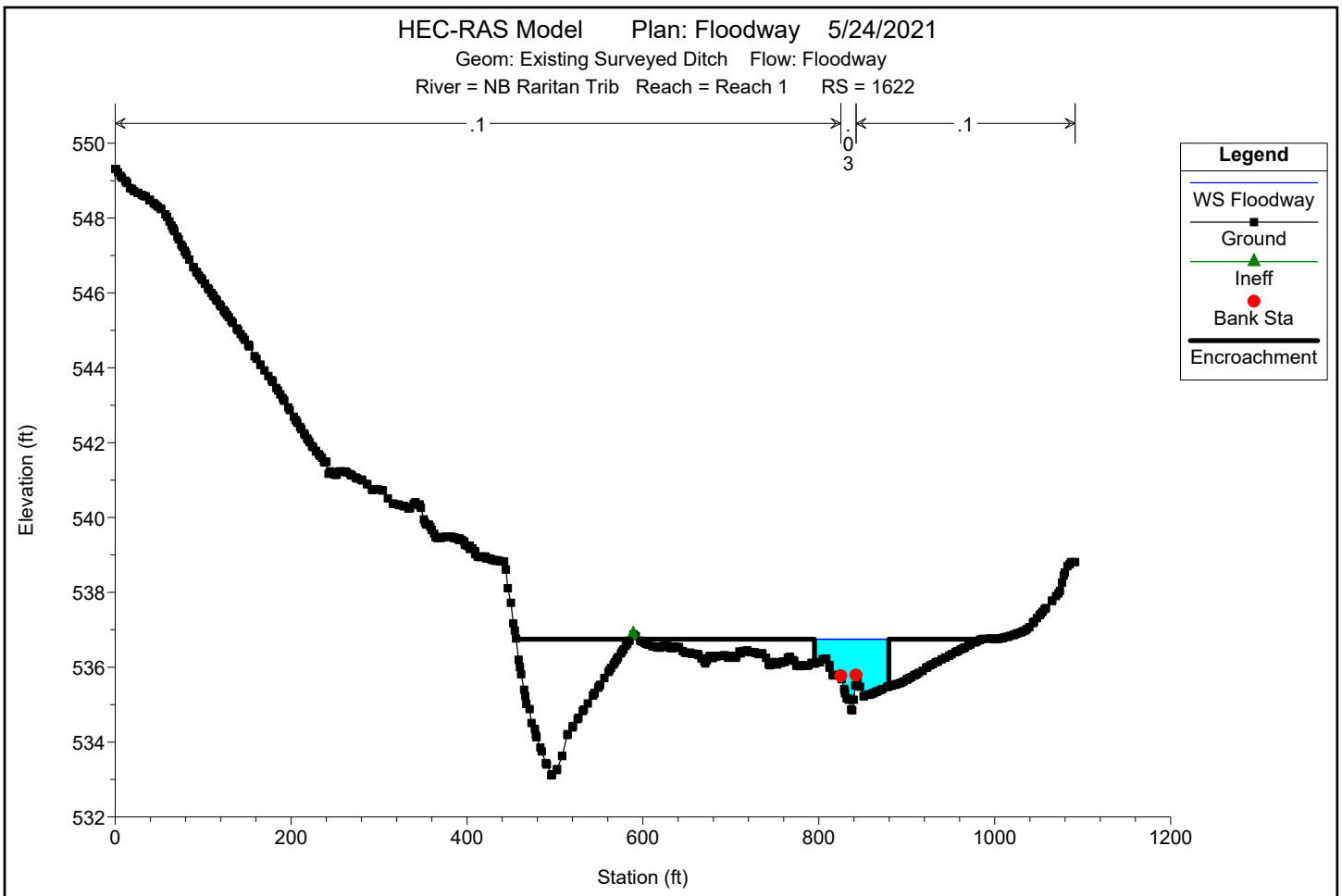

HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
Legend
WS Floodway
Ground
Elevation (ft)
541
540
539
538
537
536
535
534
533
0
100
200
300
400
500
600
700
Main Channel Distance (ft)

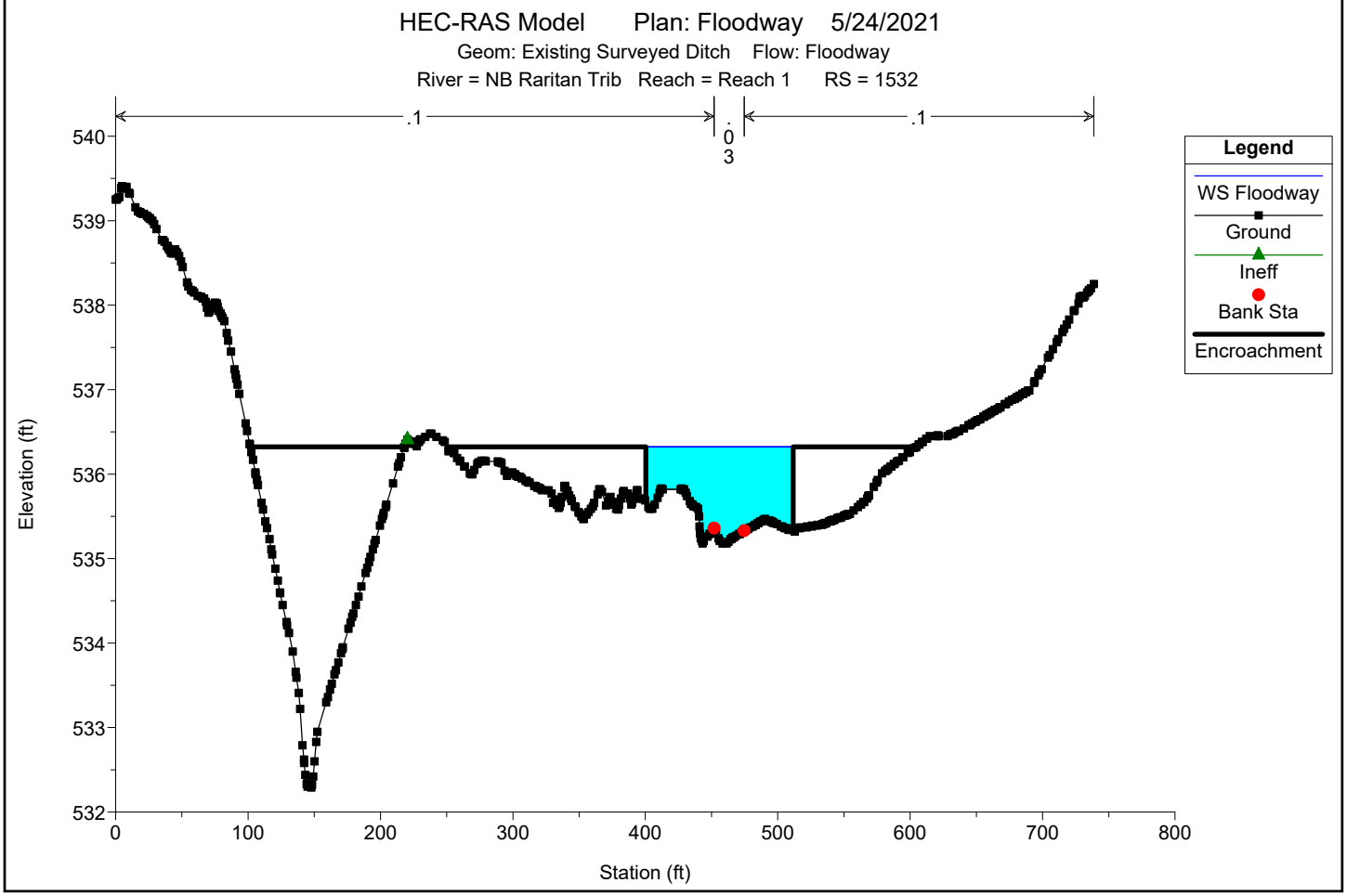

HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
River = NB Raritan Trib Reach = Reach 1 RS = 1782
.1
.03
.1
Legend
WS Floodway
Ground
Bank Sta
Elevation (ft)
554
552
550
548
546
544
542
540
538
536
0
200
400
600
800
1000
1200
Station (ft)

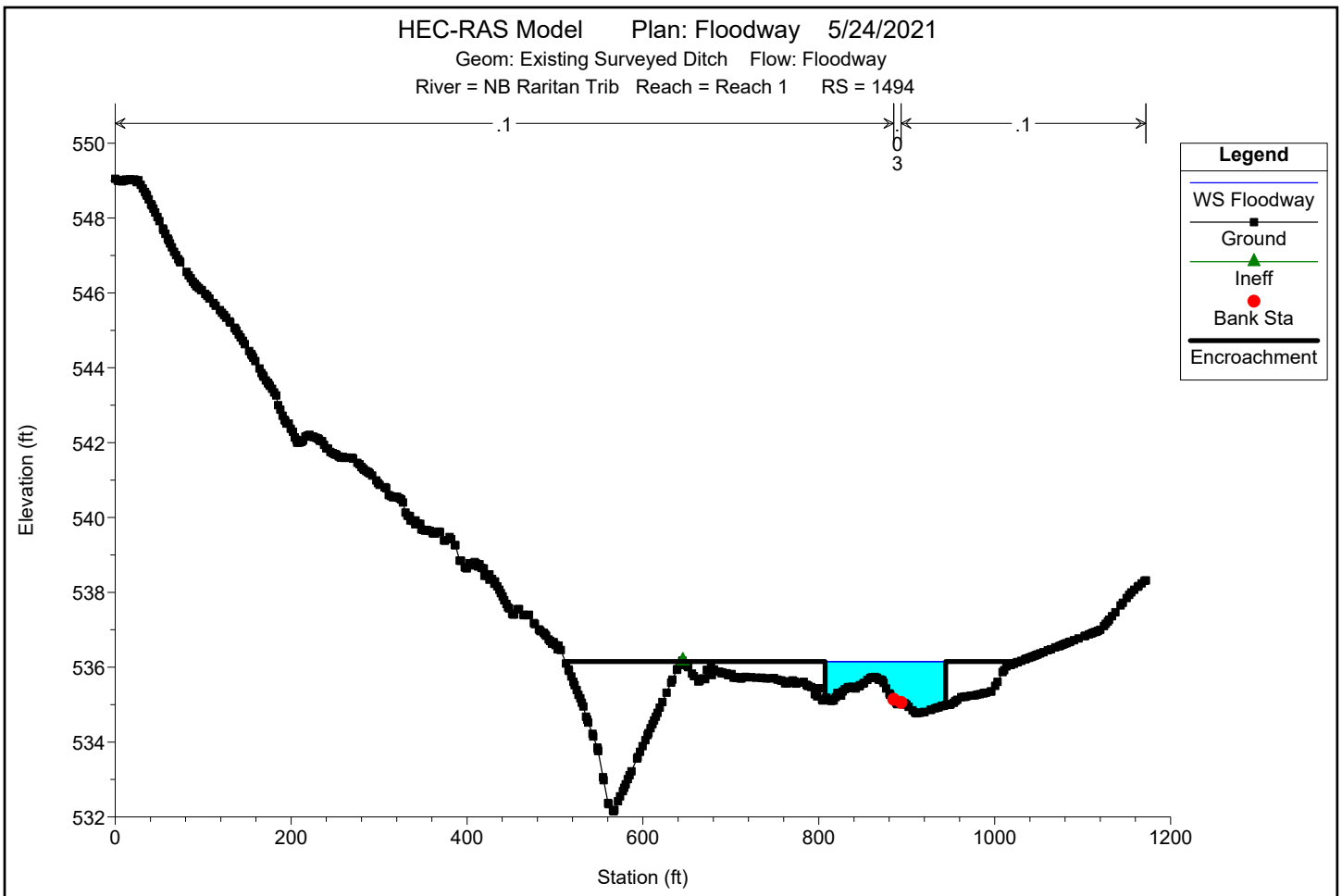

HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
River = NB Raritan Trib Reach = Reach 1 RS = 1954
.1
.03
.1
Legend
WS Floodway
Ground
Bank Sta
Elevation (ft)
556
554
552
550
548
546
544
542
540
538
536
0
200
400
600
800
1000
Station (ft)

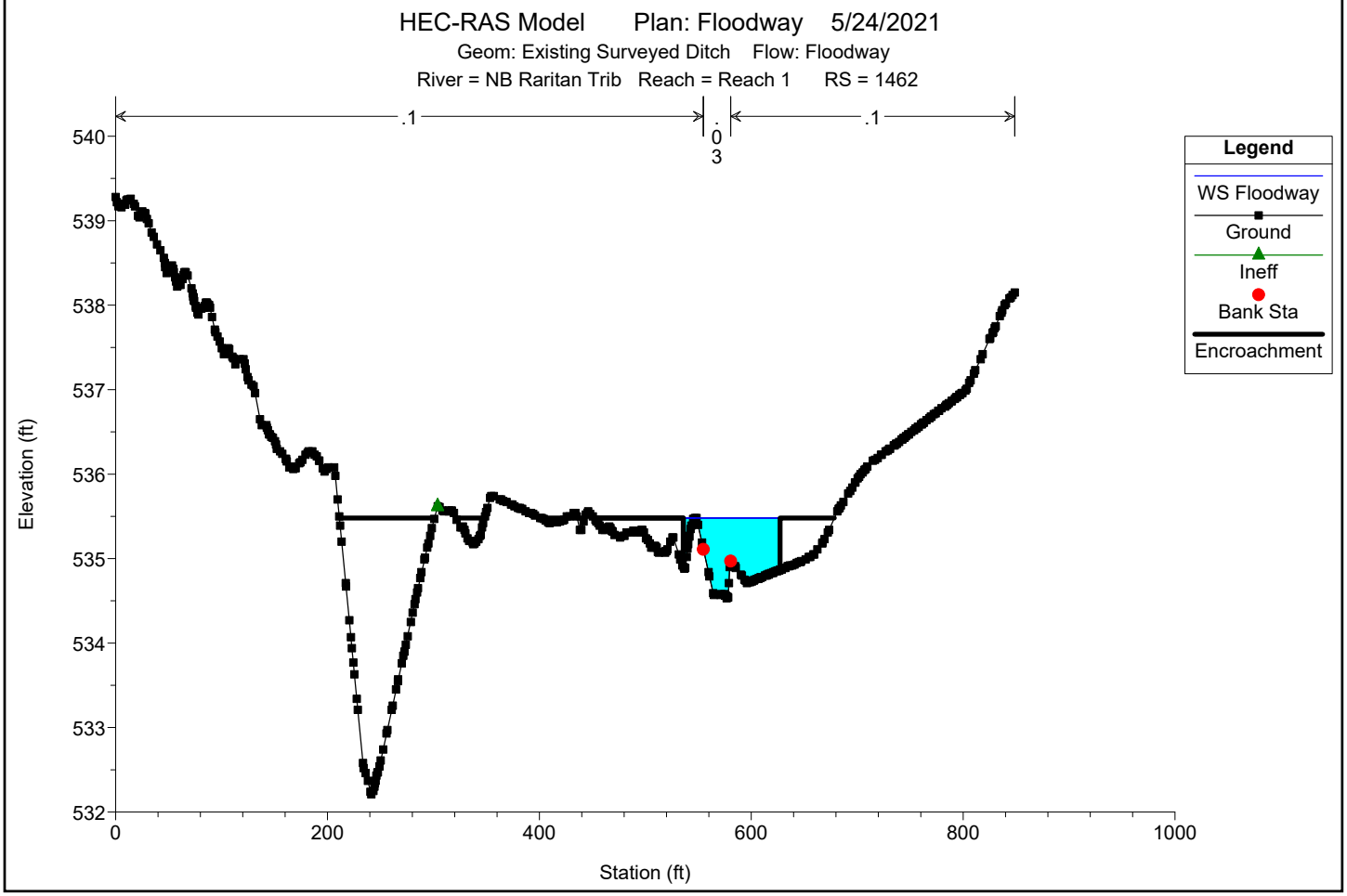

HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
River = NB Raritan Trib Reach = Reach 1 RS = 1873
.1
.03
.1
Legend
WS Floodway
Ground
Bank Sta
Elevation (ft)
554
552
550
548
546
544
542
540
538
536
0
200
400
600
800
1000
1200
Station (ft)

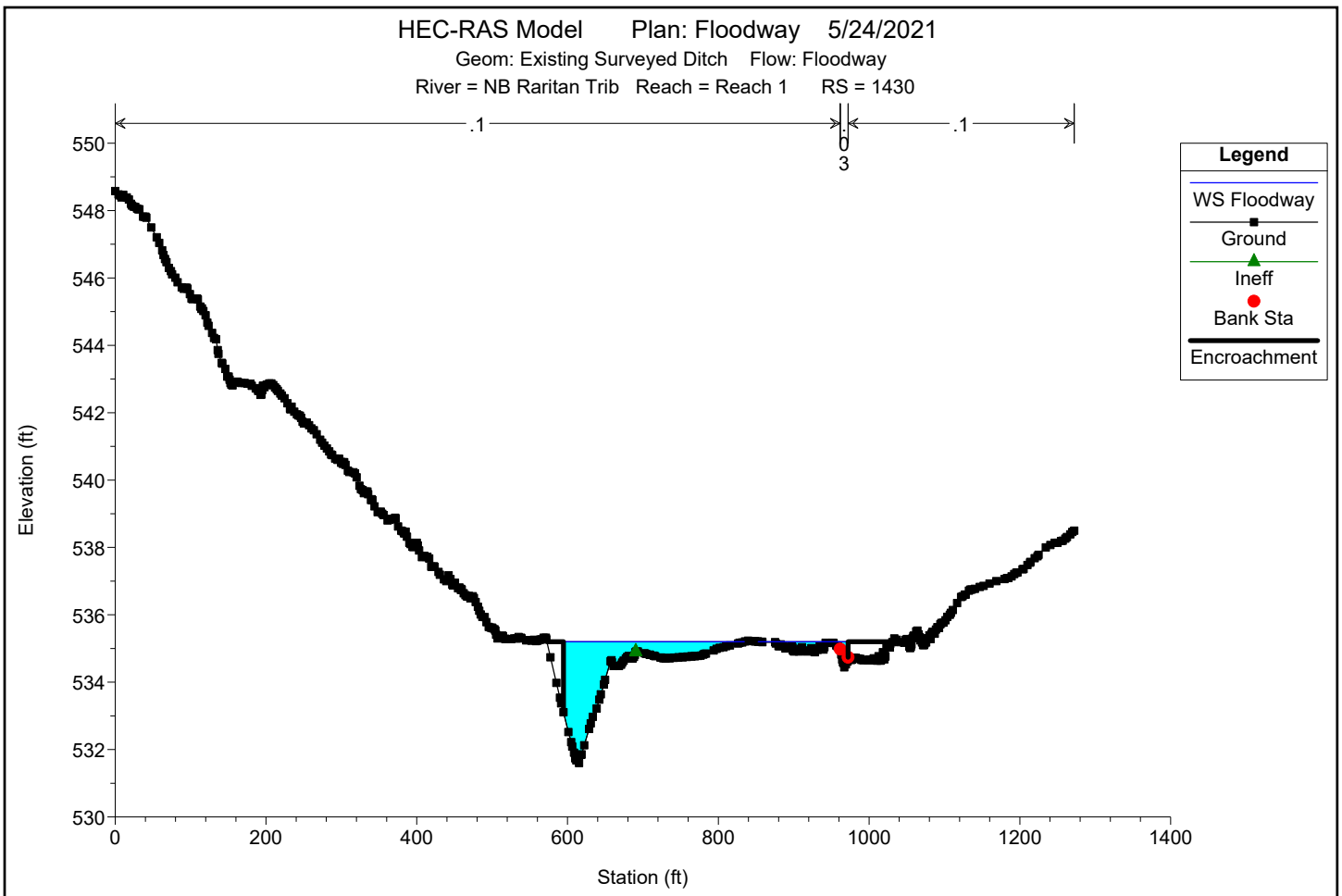

HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
River = NB Raritan Trib Reach = Reach 1 RS = 1726
.1
.03
.1
Legend
WS Floodway
Ground
Bank Sta
Encroachment
Elevation (ft)
552
550
548
546
544
542
540
538
536
534
0
200
400
600
800
1000
1200
Station (ft)

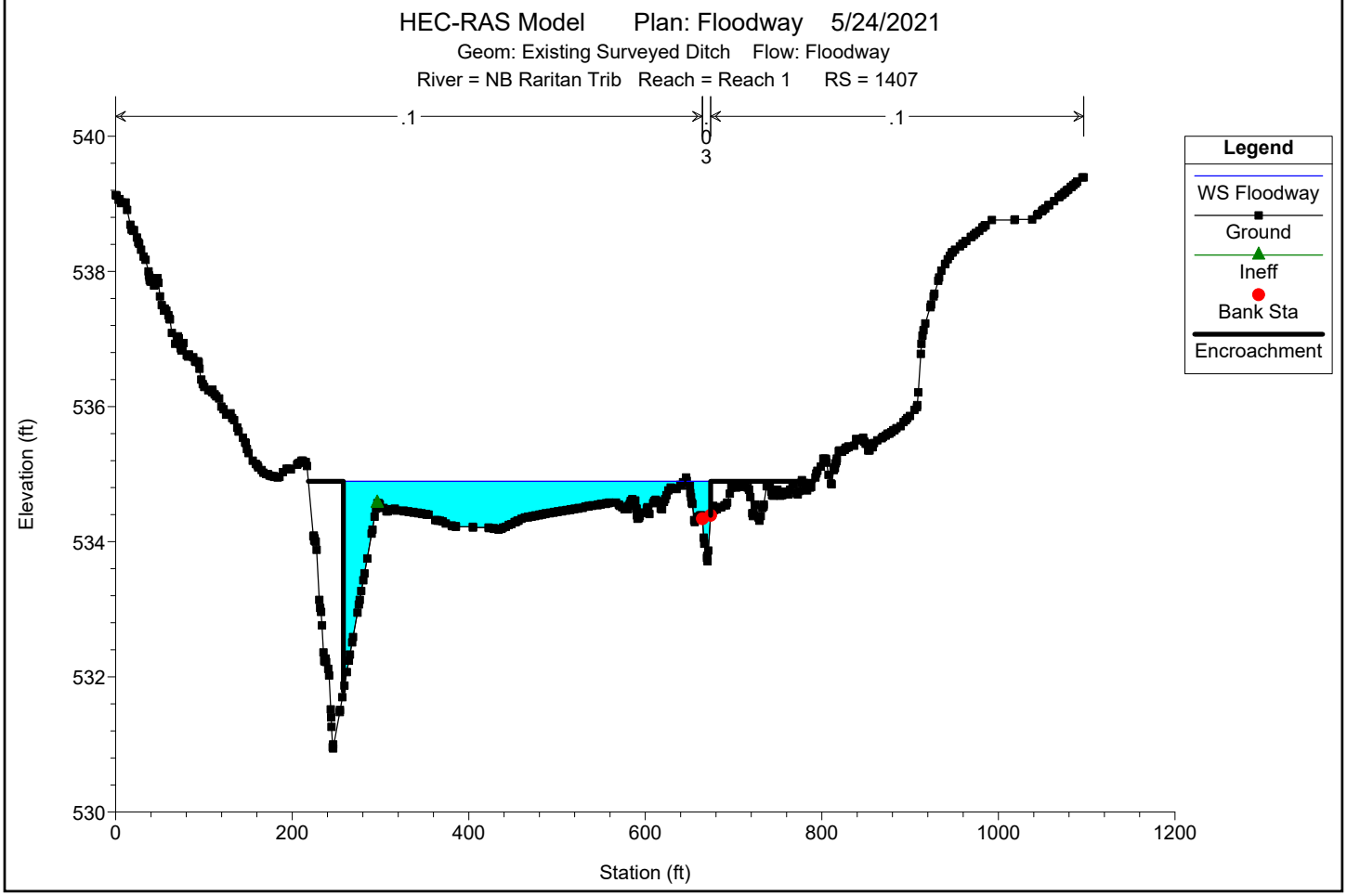

HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
River = NB Raritan Trib Reach = Reach 1 RS = 1622
.1
.03
.1
Legend
WS Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
550
548
546
544
542
540
538
536
534
532
0
200
400
600
800
1000
1200
Station (ft)


HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
River = NB Raritan Trib Reach = Reach 1 RS = 1532
.1
.03
.1
Legend
WS Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
540
539
538
537
536
535
534
533
532
0
100
200
300
400
500
600
700
800
Station (ft)


HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
River = NB Raritan Trib Reach = Reach 1 RS = 1494
.1
.03
.1
Legend
WS Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
550
548
546
544
542
540
538
536
534
532
0
200
400
600
800
1000
1200
Station (ft)


HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
River = NB Raritan Trib Reach = Reach 1 RS = 1462
.1
.03
.1
Legend
WS Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
540
539
538
537
536
535
534
533
532
0
200
400
600
800
1000
Station (ft)


HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
River = NB Raritan Trib Reach = Reach 1 RS = 1430
.1
0
3
.1
Legend
WS Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
550
548
546
544
542
540
538
536
534
532
530
0
200
400
600
800
1000
1200
1400
Station (ft)


HEC-RAS Model Plan: Floodway 5/24/2021
Geom: Existing Surveyed Ditch Flow: Floodway
River = NB Raritan Trib Reach = Reach 1 RS = 1407
.1
0
3
.1
Legend
WS Floodway
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
540
538
536
534
532
530
0
200
400
600
800
1000
1200
Station (ft)

HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X   X XXXXXX  XXXX     XXXX     XX    XXXX
X   X X      X   X    X  X    X X   X
X   X X      X        X  X    X   X  X
XXXXXXX XXXX   X     XXX XXXX   XXXXXX   XXXX
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PROJECT DATA
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Project File : 84-90E Main Street.prj
Run Date and Time: 5/24/2021 6:19:14 PM

Project in English units

Project Description:
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Unit="US_survey_Foot" AcadCode="NJ83F" /></SpatialReference>

PLAN DATA

Plan Title: Floodway
Plan File : C:\Users\mherrmann\Documents_Projects\1934003\Hydraulics\84-90E Main Street.p01

Geometry Title: Existing Surveyed Ditch
Geometry File : C:\Users\mherrmann\Documents_Projects\1934003\Hydraulics\84-90E Main Street.g04

Flow Title : Floodway
Flow File : C:\Users\mherrmann\Documents_Projects\1934003\Hydraulics\84-90E Main Street.f04

Plan Summary Information:
Number of: Cross Sections = 10 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20

Maximum difference tolerance = 0.33
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = NB Raritan Trib Reach = Reach 1

RS	Profile	Method	Value1	Value2
1407	Floodway	4	.2	
1430	Floodway	4	.1	
1462	Floodway	4	.1	
1494	Floodway	4	.2	
1532	Floodway	4	.2	
1622	Floodway	4	.2	
1726	Floodway	4	.1	
1782	Floodway	4	0	
1873	Floodway	4	.2	
1954	Floodway	4	.2	

FLOW DATA

Flow Title: Floodway
Flow File : C:\Users\mherrmann\Documents_Projects\1934003\Hydraulics\84-90E Main Street.f04

Flow Data (cfs)

River	Reach	RS	100-YR	Floodway
NB Raritan Trib	Reach 1	1954	154.79	154.79
NB Raritan Trib	Reach 1	1622	173.95	173.95

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
NB Raritan Trib	Reach 1	100-YR		Normal S = 0.003872
NB Raritan Trib	Reach 1	Floodway		Normal S = 0.003872

GEOMETRY DATA

Geometry Title: Existing Surveyed Ditch
Geometry File : C:\Users\mherrmann\Documents_Projects\1934003\Hydraulics\84-90E Main Street.g04

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1954

INPUT
Description:
Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	554.62	2.68	554.62	3.8	554.6	7.48	554.51	8.96	554.48
11.07	554.39	13.69	554.3	14.85	554.25	20.3	554.07	23.36	553.95
25.19	553.89	27.74	553.79	27.96	553.79	30.25	553.7	31.02	553.68
34.08	553.56	38.68	553.4	40.33	553.33	41.41	553.3	42.53	553.25
43.58	553.22	46.34	553.11	50.4	552.97	53.52	552.85	57.64	552.71
59.04	552.65	60.88	552.6	63.51	552.57	65.48	552.54	66.29	552.54
68.25	552.51	70.84	552.49	76.2	552.42	76.97	552.42	80.03	552.38
82.52	552.4	83.6	552.38	84.82	552.34	86.66	552.3	87.11	552.28
89.01	552.24	91.52	552.17	95.5	552.07	102.24	551.89	103.77	551.86
105.08	551.82	106.83	551.78	111.43	551.66	112.81	551.62	116.79	551.52
119.3	551.45	120.38	551.43	123.82	551.35	124.71	551.32	127.51	551.26
131.34	551.16	132.28	551.14	136.61	550.95	138.23	551.01	138.77	551.01
140.93	550.93	142.83	550.84	144.18	550.79	145.89	550.71	147.42	550.65
155	550.3	158.15	550.17	162.16	549.99	164.27	549.89	165.78	549.83
167.33	549.75	167.98	549.73	171.93	549.55	175.76	549.37	177.29	549.31
178.89	549.23	180.96	549.14	183.12	549.06	184.95	549.02	186.37	548.98
188.53	548.87	189.38	548.84	192	548.72	193.46	548.67	194.9	548.65
196.07	548.6	197.86	548.61	201.38	548.61	202.27	548.62	205.26	548.68
206.4	548.71	207.43	548.72	210.53	548.72	211.56	548.74	213.48	548.76
214.3	548.78	218.41	548.78	218.78	548.77	221.88	548.77	223.57	548.78
224.96	548.8	226.63	548.8	228.07	548.78	229.05	548.78	232.38	548.74
234.67	548.74	234.85	548.73	237.45	548.73	238.14	548.72	239.78	548.72
240.22	548.71	242.24	548.71	242.52	548.7	244.38	548.7	244.59	548.69
246.65	548.69	247.16	548.68	249.64	548.68	249.75	548.67	252.11	548.67
252.7	548.66	254.57	548.66	254.91	548.65	257.04	548.65	257.29	548.64
259.04	548.64	259.51	548.63	261.33	548.63	261.97	548.62	264.44	548.62
265.19	548.61	267.72	548.61	267.96	548.6	270.19	548.6	270.39	548.59
272.12	548.59	273.43	548.55	277.46	548.31	279.68	548.17	286.63	547.75
291.04	547.48	293.6	547.33	294.13	547.29	297.09	547.12	297.31	547.1
301.42	546.85	302.24	546.81	304.71	546.65	308.82	546.35	310.65	546.23
310.96	546.2	312.93	546.07	315.12	545.91	315.4	545.9	317.81	545.72
320.33	545.55	322.06	545.42	323.61	545.32	324.07	545.28	328.2	545
330.19	544.85	331.01	544.8	333.48	544.62	336.77	544.4	342.02	544.02
344.25	543.87	347.45	543.64	348.84	543.55	350.74	543.41	351.56	543.36
354.12	543.17	356.07	543.04	359.78	542.77	362.19	542.61	365.53	542.37
366.22	542.33	369.64	542.08	370.61	541.91	371.29	541.84	371.55	541.74
373.61	541.77	375.68	541.84	377.04	541.84	378.33	541.86	379.81	541.86
381.7	541.9	383.09	541.91	384.44	541.94	386.39	541.96	391.16	541.96
392.19	541.94	394.19	541.86	395.29	541.86	395.94	541.83	397.35	541.74
398.35	541.66	399.74	541.57	400.45	541.54	401.7	541.63	405.28	541.85
408.06	542	409.74	542.1	411.56	542.11	418.14	542.11	418.67	542.1

425.53 542.1 427.48 542.08 430.77 542.14 432.45 542.16 434.41 542.12
437.61 542.07 441.74 542.15 441.98 542.14 445.27 542.12 446.98 542.13
447.93 542.12 451.04 542.3 452.06 542.35 453.09 542.33 453.49 542.3
455.17 542.24 458.25 542.09 460.08 541.99 461.34 541.93 462.08 541.92
464.44 541.92 468.3 541.97 469.95 541.96 471.77 541.92 472.69 541.89
474.89 541.84 475.71 541.81 476.82 541.79 478.68 541.73 479 541.73
480.65 541.67 482.83 541.52 485.07 541.39 488.36 541.44 490.52 541.45
491.13 541.43 493.81 541.38 495.46 541.39 495.72 541.38 498.75 541.36
500.39 541.41 501.58 541.41 503.84 541.33 505.71 541.28 506.34 541.3
507.73 541.37 508.62 541.43 511.96 541.57 515.2 541.67 517.41 541.62
517.67 541.6 520.09 541.66 522.22 541.75 522.94 541.77 525.71 541.88
527.54 541.92 528.41 541.96 529.19 541.96 530.83 542 532.62 541.99
534.6 542.01 536.59 541.96 538.24 541.96 539.54 541.98 540.39 541.97
541.82 541.92 543.18 541.91 544.82 541.95 546.98 542.03 548.11 542.02
550.07 541.97 552.58 541.93 555.52 541.86 557.29 541.83 559.36 541.78
562.1 541.68 563.49 541.55 564.15 541.46 564.44 541.44 565.56 541.17
566.19 541 567.01 540.82 567.82 540.67 568.71 540.53 570.74 540.09
571.08 539.97 572.71 539.22 574.88 538.25 575.16 538.16 575.83 537.83
575.97 537.79 576.95 537.73 577.6 537.99 578.67 538.45 580.1 539.04
582.14 539.9 582.49 540 582.94 540.21 583.3 540.34 583.79 540.41
584.37 540.53 584.93 540.73 585.24 540.78 585.75 540.99 585.79 541.05
586.16 541.21 587.37 541.76 588.18 541.73 590.12 541.71 591.26 541.67
595.48 541.58 597.34 541.55 598.78 541.55 600.35 541.57 602.35 541.5
603.94 541.46 604.56 541.43 606 541.41 607.65 541.4 608.46 541.43
609.13 541.49 610.33 541.54 611.78 541.46 613.22 541.4 614.32 541.38
615.76 541.32 617.38 541.19 618.19 541.1 619.52 540.99 621.43 541.06
624.71 541.24 626.14 541.3 626.76 541.3 628.18 541.33 629.49 541.34
630.92 541.38 632.32 541.39 634.57 541.39 636.81 541.32 637.81 541.28
638.82 541.27 640.66 541.3 643.84 541.29 645.85 541.27 647.37 541.32
649.2 541.4 650.11 541.43 651.82 541.51 652.49 541.53 654.9 541.64
655.59 541.66 657.91 541.76 658.51 541.77 661.99 541.77 667.47 541.89
668.39 541.9 669.97 541.94 670.79 541.95 672.66 542.02 674.79 542.09
677.01 542.18 677.53 542.19 679.72 542.28 682.1 542.37 685.05 542.47
689.07 542.51 690.07 542.51 691.24 542.53 692.15 542.53 697.11 542.58
700.37 542.62 701.29 542.62 703.16 542.64 704.94 542.67 709.51 542.77
710.43 542.78 715.2 542.89 715.91 542.9 721.23 543.01 723.25 543.06
724.14 543.07 726.25 543.12 729.62 543.19 735.53 543.32 737.3 543.37
739.67 543.42 742.41 543.49 744.46 543.53 747.9 543.62 750.37 543.67
754.29 543.77 756.74 543.82 758.86 543.87 759.78 543.9 761.42 543.93
762.52 543.96 769.46 544.1 771.25 544.12 773.52 544.16 775.31 544.2
779.06 544.27 781.52 544.27 781.71 544.28 787.19 544.28 787.55 544.29
791.76 544.29 792.45 544.3 796.33 544.3 796.6 544.31 799.15 544.31
805.22 544.55 805.25 544.56 807.4 544.64 808.48 544.69 811.73 544.81
817.47 545.06 820.4 545.17 822.83 545.28 823.78 545.31 826.06 545.41
827.98 545.48 830.47 545.59 834.3 545.74 835.06 545.78 837.36 545.86
839.07 545.93 839.65 545.97 840.98 546.03 841.95 546.03 844.19 546.06
845.77 546.06 847.48 546.03 849.48 546.01 850.36 546.01 851.81 545.98
852.65 545.98 854.68 545.95 856.14 545.94 858.01 545.98 860.48 546.01
861.83 546.04 862.49 546.03 864.13 546.03 864.61 546.04 866.46 546.04
867.69 546.05 869.14 546.08 873.47 546.12 874.56 546.14 876.36 546.2
878.1 546.24 879.42 546.2 880.7 546.21 882.14 546.2 884.31 546.32
886.88 546.34 888.73 546.34 890.59 546.37 892.97 546.39 895.14 546.39
895.48 546.38 898.91 546.38 900.07 546.35 901.72 546.36 902.37 546.38
903.9 546.34 906.19 546.3 907.05 546.27 908.48 546.24 911.39 546.29

913.07 546.28 915.37 546.34 916.57 546.36 917.66 546.36 920.28 546.4
921.13 546.4 922.33 546.42 923.99 546.43 925.47 546.42 926.07 546.43
926.84 546.48 929.13 546.67 929.56 546.72 930.88 546.81 931.69 546.8

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .1 564.15 .03 586.16 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
564.15 586.16 99.91 99.91 99.91 .1 .3

CROSS SECTION OUTPUT Profile #Floodway

E.G. Elev (ft)	541.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.70	Wt. n-Val.		0.030	
W.S. Elev (ft)	540.66	Reach Len. (ft)	99.91	99.91	99.91
Crit W.S. (ft)	540.66	Flow Area (sq ft)		23.10	
E.G. Slope (ft/ft)	0.013072	Area (sq ft)		23.10	
Q Total (cfs)	154.79	Flow (cfs)		154.79	
Top Width (ft)	16.84	Top Width (ft)		16.84	
Vel Total (ft/s)	6.70	Avg. Vel. (ft/s)		6.70	
Max Chl Dpth (ft)	2.93	Hydr. Depth (ft)		1.37	
Conv. Total (cfs)	1353.8	Conv. (cfs)		1353.8	
Length Wtd. (ft)	99.91	Wetted Per. (ft)		17.95	
Min Ch El (ft)	537.73	Shear (lb/sq ft)		1.05	
Alpha	1.00	Stream Power (lb/ft s)		7.04	
Frctn Loss (ft)	0.72	Cum Volume (acre-ft)	0.89	0.32	0.25
C & E Loss (ft)	0.14	Cum SA (acres)	1.43	0.25	0.24

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1873

INPUT
Description:
Station Elevation Data num= 492
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

0 553.28 3.46 553.19 7.25 553.11 7.85 553.09 13.99 552.98
15.11 552.95 18.6 552.89 23.8 552.79 24.1 552.79 28.59 552.69
29 552.69 31.23 552.63 32.01 552.62 34.2 552.56 35.69 552.56
37.57 552.54 38.8 552.5 40.15 552.48 42.38 552.41 43.4 552.39
45.18 552.33 46.84 552.22 49.07 552.11 52.78 551.96 55.01 551.79
57.98 551.5 59.47 551.37 61.16 551.28 63.93 551.24 66.78 551.15
67.65 551.1 70.62 551.04 71.36 551.08 72.1 551.16 73.59 551.17
75.08 551.2 76.89 551.21 78.13 551.19 82.52 551.04 83.25 551
84.72 550.96 88.45 550.79 89.11 550.78 89.94 550.72 91.49 550.51
97.1 550.24 100.34 550.12 102.29 550.02 104.97 549.98 107.21 549.92
109.26 549.85 110 549.84 110.07 549.8 110.75 549.77 111.49 549.64
112.37 549.62 115.07 549.42 117.44 549.14 118.92 549.1 119.27 549.11
120.69 549.08 122.64 548.99 123.38 548.89 124.25 548.73 124.87 548.66
126.35 548.63 127.1 548.56 127.84 548.53 128.46 548.45 129.33 548.45
130.07 548.4 130.76 548.42 131.55 548.58 133.03 548.51 133.78 548.52
136.01 548.48 137.42 548.4 138.99 548.28 140.91 548.36 142.7 548.45
144.28 548.46 145.4 548.55 146.85 548.56 147.9 548.55 151.02 548.48
152.36 548.52 154.99 548.41 157.19 548.36 159.05 548.33 160.54 548.29
162.02 548.19 162.95 548.15 165 548.09 165.74 548.15 166.74 548.34
168.17 548.3 169.45 548.17 170.37 548.13 172.36 547.95 173.17 547.9
175.73 547.81 179.1 547.67 180.6 547.67 181.34 547.69 182.83 547.69
184.32 547.67 185.94 547.72 186.95 547.63 189.12 547.66 190.86 547.62
193.47 547.5 195.06 547.38 196.07 547.21 199.12 546.91 199.73 546.82
201.29 546.67 202.14 546.64 204.59 546.61 205.63 546.56 205.81 546.61
206.5 546.62 207.37 546.67 208.23 546.75 209.98 546.88 213.31 547.22
214.31 547.28 219.53 547.28 222.84 547.25 226.49 547.16 231.36 546.98
232.57 546.95 233.79 546.88 236.63 546.66 239.87 546.53 242.71 546.47
245.75 546.55 246.47 546.58 248.39 546.62 249.95 546.63 252.85 546.68
253.86 546.73 254.87 546.81 255.69 546.81 257.77 546.72 259.51 546.66
263.85 546.48 265.01 546.44 269.93 546.21 270.8 546.18 273.41 546.06
274.28 546.03 278.62 545.83 279.49 545.8 282.1 545.68 284.71 545.58
287.32 545.49 288.18 545.45 290.79 545.36 293.4 545.24 294.26 545.19
297.74 545.03 298.61 544.98 301.22 544.86 302.08 544.81 305.54 544.65
308.17 544.56 309.04 544.54 322.6 544.07 323.78 544.04 350.17 543.13
350.75 543.12 354.23 543 356.83 542.82 358.28 542.71 364.65 542.34
365.18 542.3 370.05 542.02 370.73 541.97 374.92 541.73 376.13 541.65
381 541.37 384.65 541.15 387.68 540.92 388.98 540.9 389.85 540.86
390.68 540.78 394.78 540.56 395.79 540.59 396.81 540.66 399.41 540.81
400.86 540.88 402.84 540.92 404.92 540.93 407.76 540.88 412.01 540.88
413.03 540.89 419.39 540.71 421.09 540.65 422.87 540.61 423.58 540.58
425.47 540.58 427.17 540.6 429.82 540.61 432.43 540.63 436.34 540.67
437.36 540.67 440.25 540.7 441.12 540.7 448.51 540.84 449.81 540.81
451.5 540.71 452.78 540.67 454.59 540.77 455.61 540.79 458.49 540.67
461.1 540.65 464.73 540.64 467.18 540.6 468.79 540.6 470.66 540.57
471.53 540.58 474.14 540.58 476.74 540.55 478.48 540.54 479.94 540.51
482.98 540.49 486.84 540.56 489.28 540.56 491.51 540.59 494.14 540.61
494.99 540.59 496.73 540.61 497.6 540.64 500.22 540.67 501.07 540.69
504.55 540.73 508.89 540.7 510.63 540.7 513.24 540.68 516.71 540.67
520.19 540.63 521.06 540.63 526.27 540.57 527.59 540.56 534.09 540.49
534.96 540.49 540.76 540.43 542.72 540.4 543.65 540.4 553.21 540.29
556.19 540.27 557.4 540.25 563.07 540.2 568.85 540.13 569.72 540.13
575.65 540.06 577.54 540.05 582.75 539.99 583.62 539.99 586.23 539.96
589.71 539.93 592.31 539.9 598.76 539.84 599.89 539.84 603.6 539.81
605.4 539.81 609.35 539.78 613.07 539.76 614.63 539.76 616.89 539.74

620.31 539.73 621.92 539.71 625.22 539.7 627.38 539.68 629.42 539.71
630.45 539.71 636.48 539.48 643.27 539.41 643.73 538.96 643.94 538.91
644.77 537.67 644.8 537.63 645.04 537.33 645.53 536.98 645.77 537.22
646.14 537.04 647.03 537.17 647.79 537.25 647.82 537.21 648.54 537.28
648.96 537.28 651.56 537.56 652.75 537.81 653.06 537.93 656.13 537.89
659.09 538.04 661.56 538.15 662.93 538.22 665.12 538.33 667.38 538.43
672.57 538.68 673.41 538.74 674.16 538.88 675.23 539.15 676.98 539.38
678.69 539.55 680 539.55 682.39 539.63 683.21 539.64 685.47 539.63
687.73 539.66 692.12 539.69 694.89 539.66 698.45 539.61 700.49 539.6
703.65 539.71 704.32 539.72 706.9 539.82 707.39 539.85 708.55 539.87
712.69 539.84 714.02 539.84 716.33 539.87 717.78 539.87 718.64 539.85
720.62 539.89 721.13 539.93 723.19 540.01 724.97 540 726.13 539.97
727.95 539.9 728.34 539.92 732.63 540.06 735.07 540.12 736.92 540.14
739.49 540.21 742.37 540.22 744.22 540.24 748.07 540.26 749.86 540.26
753.61 540.29 758.61 540.31 759.22 540.32 763.3 540.34 764.85 540.36
769.85 540.38 771.69 540.4 774.85 540.41 777.23 540.43 778.95 540.43
780.84 540.45 782.38 540.45 787.53 540.48 791.82 540.52 795.25 540.53
797.33 540.55 798.68 540.55 801.08 540.57 802.33 540.57 804.23 540.59
805.54 540.59 813.26 540.64 816.44 540.65 818.05 540.67 819.26 540.67
820.98 540.69 822.32 540.69 827.63 540.73 829 540.73 831.06 540.75
832.71 540.75 836.42 540.78 842.88 540.81 844.92 540.83 847.97 540.84
850.14 540.86 851.86 540.86 853.57 540.88 858.72 540.9 860.44 540.92
861.85 540.92 863.87 540.94 865.26 540.94 867.29 540.96 871.59 540.98
875.43 540.85 881.53 540.62 885.31 540.49 885.6 540.47 889.77 540.32
892.72 540.22 894.7 540.14 896.02 540.12 899.77 540.21 899.89 540.24
901.01 540.26 901.61 540.56 901.88 540.59 904.93 541.94 906.01 542.28
906.75 542.42 907.98 542.8 908.47 542.79 908.51 542.85 914.76 542.92
919.17 542.98 920.48 542.98 922.25 542.95 923.91 542.88 926 542.85
928.32 542.79 931.63 542.72 933.49 542.69 935.06 542.65 936.46 542.63
940.21 542.54 941.54 542.52 946.63 542.41 948.48 542.38 949.73 542.31
953.48 542 954.92 541.9 957.82 541.8 962.51 541.58 962.9 541.54
963.37 541.39 963.92 541.27 965.08 540.78 965.97 540.59 966.8 540.45
967.22 540.34 967.66 540.33 967.99 540.18 968.47 540.08 968.51 540.14
969 540.02 969.37 540.14 969.72 540.11 970.97 540.45 973.07 541.06
975.11 541.56 978.81 542.41 980.52 542.83 982.29 543.25 986.3 544
987.21 544.13 988.46 544.27 989.1 544.24 989.35 544.27 993.24 544.15
995.1 544.08 997.2 544.02 998.72 543.96 1000.95 543.89 1001.55 543.86
1004.7 543.75 1006.64 543.69 1008.67 543.61 1010.71 543.48 1013.12 543.31
1017.83 543 1022.91 542.82 1024.68 542.75 1030.93 542.52 1038.85 542.43
1040.92 542.4 1044.27 542.37 1050 542.29 1055.91 542.22 1058.41 542.2
1061.15 542.16 1062.01 542.16 1064.42 542.13 1068.87 542.03 1069.65 542.02
1072.15 542.03 1074.88 542.01 1078.85 542.01 1080.9 541.96 1083.94 542.07
1084.64 542.12 1089.64 542.36 1092.14 542.47 1093.75 542.53 1097.27 542.69
1098.18 542.72 1102.13 542.9 1104.28 542.99 1107.33 543.05 1109.19 543.07
1112.62 543.13 1115.8 543.17

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	643.27	.03	676.98	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
643.27	676.98	79.5	79.5	79.5	.1	.3

CROSS SECTION OUTPUT Profile #Floodway

E.G. Elev (ft)	539.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.030	
W.S. Elev (ft)	539.36	Reach Len. (ft)	79.50	79.50	79.50
Crit W.S. (ft)		Flow Area (sq ft)		41.26	
E.G. Slope (ft/ft)	0.004598	Area (sq ft)		41.26	
Q Total (cfs)	154.79	Flow (cfs)		154.79	
Top Width (ft)	33.53	Top Width (ft)		33.53	
Vel Total (ft/s)	3.75	Avg. Vel. (ft/s)		3.75	
Max Chl Dpth (ft)	2.38	Hydr. Depth (ft)		1.23	
Conv. Total (cfs)	2282.7	Conv. (cfs)		2282.7	
Length Wtd. (ft)	79.50	Wetted Per. (ft)		34.96	
Min Ch El (ft)	536.98	Shear (lb/sq ft)		0.34	
Alpha	1.00	Stream Power (lb/ft s)		1.27	
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	0.89	0.25	0.25
C & E Loss (ft)	0.02	Cum SA (acres)	1.43	0.20	0.24

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1782

INPUT
Description:
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	552.33	1.33	552.22	3.27	552.16	4.4	552.07	5.16	552.1
7.6	552.08	9.79	552.03	10.52	552	12.82	551.94	15.32	551.84
17.41	551.78	20.86	551.71	22.82	551.68	24.55	551.64	25.83	551.66
28.05	551.65	32.49	551.49	35.79	551.29	37.32	551.25	38.52	551.25
41.15	551.21	42.23	551.18	43.76	551.08	46.56	550.84	47.64	550.83
48.72	550.89	50.33	550.84	53.39	550.68	55.21	550.69	57.99	550.68
59.52	550.65	60.28	550.73	64.11	550.58	65.13	550.51	68.2	550.19
71.77	549.95	74.69	549.85	76.36	549.82	77.94	549.73	83.25	549.5
84.43	549.47	85.42	549.41	87.68	549.3	89.38	549.35	92.8	549.29
95.5	549.23	98.56	549.31	100.66	549.32	101.63	549.25	102.39	549.16
103.87	549.04	105.72	549.02	107.15	549.02	110.05	548.93	110.81	548.87
112.34	548.7	113.87	548.56	116.89	548.56	116.94	548.57	119.66	548.56
121.53	548.52	122.32	548.52	123.39	548.43	123.83	548.37	125.36	548.33
126.01	548.29	129.88	547.99	131.48	547.8	132.04	547.69	135.23	547.54
136.37	547.66	136.84	547.67	137.98	547.54	140.7	547.06	141.78	546.88
142.2	546.88	142.61	546.79	143.73	546.75	144.46	546.67	144.5	546.72
145.03	546.64	145.83	546.6	146.79	546.67	147.56	546.68	148.15	546.63
149.09	546.66	150.44	546.85	151.39	547.02	152.15	547.04	154.77	547.04
156.75	546.99	158.01	546.83	159.22	546.96	160.18	547.03	160.57	547.02
161.54	547.06	163.42	547.11	165.59	547.15	165.93	547.12	166.6	546.95
168.23	546.99	169.76	546.86	170.29	546.84	170.53	546.78	171.29	546.79
172.01	546.85	173.59	546.81	174.62	546.82	175.89	546.75	177.42	546.75
178.57	546.52	179.65	546.27	179.86	546.25	185.04	546.17	186.15	546.17
186.6	546.1	188.9	546.07	190.33	546.02	191.56	545.9	192.73	545.65
193.72	545.47	194.8	545.36	196.11	545.32	196.56	545.37	197.32	545.39
197.96	545.5	199.62	545.69	200.57	545.78	201.67	545.85	202.52	545.84

204.24 545.79 205.29 545.78 206.84 545.82 207.66 545.8 208.1 545.83
209.42 545.82 213.44 545.7 214.51 545.62 215.47 545.5 216.22 545.55
218.52 545.62 220.2 545.64 222.22 545.7 223.15 545.74 225.6 545.97
228.21 546.11 232.77 546.37 236.95 546.59 239.45 546.69 241.96 546.78
243.62 546.79 246 546.67 248.23 546.57 251.32 546.45 255.6 546.25
256.46 546.2 259.03 546.08 265.02 545.84 267.05 545.77 274.15 545.49
275.51 545.43 281.29 545.21 283.35 545.12 283.86 545.11 288.74 544.91
289.62 544.88 294.85 544.67 299.27 544.44 301.84 544.32 305.26 544.14
308.44 543.99 311.25 543.84 313.82 543.72 320.67 543.37 327.25 543.05
328.51 542.98 332.27 542.8 333.49 542.73 336.08 542.61 338.88 542.47
341.66 542.32 346.35 542.05 347.76 542 348.92 541.98 351.49 541.9
355.07 541.74 358.34 541.63 366.13 541.38 367.39 541.33 369.47 541.27
375.24 541.07 379.74 540.89 382.31 540.8 383.69 540.74 385.74 540.67
391.73 540.43 394.3 540.34 394.57 540.32 397.72 540.21 398.58 540.19
401.7 540.05 402.86 540.04 404.57 540.1 405.77 540.1 407.14 540.06
409.01 540.05 409.71 540.02 410.86 540.03 412.28 539.94 413.13 539.83
414.84 539.57 416.3 539.51 417.41 539.52 419.13 539.62 420.07 539.69
422.55 539.77 423.41 539.82 425.08 539.88 427.69 539.88 430.59 539.89
432.61 539.87 436.37 539.88 439.35 539.91 440.53 539.88 442.24 539.8
446.78 539.66 447.38 539.63 449.09 539.66 452.68 539.68 455.08 539.72
459.36 539.77 461.93 539.79 464.79 539.91 466.21 539.92 468.35 539.9
470.23 539.87 472.93 539.85 479.04 539.63 480.06 539.61 483.11 539.61
485.05 539.57 487.18 539.64 491.04 539.56 492.81 539.43 495.32 539.28
496.57 539.23 500.34 539.13 502.84 539.19 503.03 539.21 504.74 539.24
506.45 539.38 507.31 539.47 508.55 539.44 509.02 539.37 509.12 539.41
509.88 539.36 510.59 539.25 512.88 539.35 513.3 539.34 514.13 539.39
514.16 539.35 515.01 539.41 516.64 539.49 519.74 539.62 520.76 539.55
521.66 539.53 524.83 539.58 526.14 539.63 527.93 539.72 528.71 539.74
534.2 539.77 536.71 539.77 537.04 539.78 539.84 539.79 543.26 539.79
543.88 539.8 550.51 539.8 552.68 539.78 556.11 539.78 556.38 539.77
559.29 539.77 561.79 539.75 565.45 539.74 567.57 539.71 575.8 539.63
578.77 539.58 582.84 539.53 585.62 539.48 591.21 539.41 595.05 539.35
595.66 539.35 601.48 539.26 604.05 539.23 604.91 539.21 608.61 539.17
609.45 539.15 614.47 539.09 619.4 539.01 620.74 539 627.61 538.9
633.29 538.81 636.58 538.77 640.81 538.7 643.43 538.67 648.34 538.59
648.98 538.59 651.14 538.55 651.77 538.55 655.09 538.5 657.99 538.47
660.88 538.42 667.14 538.34 669 538.33 675.56 538.26 678.63 538.24
682.93 538.19 687.05 538.16 688.44 538.14 690.88 538.13 692.12 538.11
696.24 538.08 700.5 538.03 702.37 538.02 704.67 537.99 708.27 537.96
710.83 537.96 714.06 537.94 715.28 537.96 717.36 538.03 719.06 538.12
722.08 538.3 728.13 538.63 728.33 538.65 728.86 538.4 728.88 538.68
728.96 538.62 729.43 538.3 729.64 538.1 730.4 537.98 730.87 537.7
731.15 537.64 732.72 536.49 732.87 536.46 733.42 536.11 733.82 536.06
734.18 536.08 734.87 536.01 735.69 536.04 736.44 536.01 737.11 536.07
738.21 536.6 740.4 537.73 740.98 537.96 741.05 537.98 741.5 538.12
743.24 538.35 744 538.4 745.89 538.43 746.89 538.46 750.9 538.53
754.38 538.62 755.34 538.66 756.86 538.65 758.91 539.02 759.87 539.09
761.67 539.11 765.64 539.12 767.91 539.15 771.85 539.17 773.86 539.19
776.29 539.16 778.98 539.1 780.17 539.09 782.05 539.1 784.1 539.08
787.72 539.08 789.4 539.07 792.75 538.97 795.27 538.92 796.39 538.91
800.78 538.91 804.72 538.84 806.17 538.83 808.67 538.87 811.2 538.9
813.93 538.9 814.56 538.91 817.99 538.91 819.94 538.94 822.62 538.96
826.09 538.96 828.82 538.99 833.26 539.09 836.28 539.1 844.75 539.1
845.48 539.11 856.49 539.11 857.31 539.12 860.91 539.12 861.26 539.11

869.15 539.11 869.91 539.1 873.09 539.1 876.27 539.3 877.04 539.37
877.46 539.44 880.82 540.12 881.66 540.27 882.42 540.44 883.61 540.48
884.93 540.51 886.69 540.57 888.37 540.61 892.81 540.75 894.13 540.78
896.75 540.86 899.39 540.96 900.11 541 902.62 541.01 904.65 540.99
909.91 540.87 914.17 540.76 922.75 540.56 923.06 540.56 928.31 540.44
929.63 540.4 934.5 540.32 936.2 540.28 943.07 540.16 946.72 540.06
947.08 540.03 948.04 540.02 948.75 539.92 949.35 539.92 949.59 539.85
951.27 539.98 952.33 540.03 953.79 540.06 954.62 540.06 957.24 540.11
960.5 540.45 963.01 540.72 964.35 540.85 965.13 540.86 966.44 540.92
967.76 541 968.45 541.07 969.07 541.2 970.39 541.55 971.4 541.89
972.54 542.24 973.92 542.63 975.65 543.23 976.96 543.74 977.27 543.66
977.66 543.84 978.69 544 980.74 544.02 985.66 544.01 986.88 543.98
996.56 543.17 999.08 543 1004.29 542.76 1004.95 542.74 1009.14 542.54
1013.78 542.33 1019.21 542.11 1023.4 541.92 1026.45 541.76 1028.24 541.68
1030.87 541.54 1033.99 541.4 1035.98 541.32 1038.5 541.2 1042.7 541.01
1046.28 540.9 1047.3 540.86 1055.27 540.62 1058.48 540.52 1061.64 540.41
1064.71 540.32 1068.69 540.24 1071.63 540.17 1072.78 540.13 1080.08 539.77
1084.17 539.56 1087.14 539.42 1088.27 539.38 1088.82 539.41 1091.31 539.64
1093.98 539.87 1095.02 539.94

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	728.96	.03	741.05	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
728.96	741.05	71.34	71.34	.1	.3

CROSS SECTION OUTPUT Profile #Floodway

E.G. Elev (ft)	539.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	538.71	Reach Len. (ft)	71.34	71.34	71.34
Crit W.S. (ft)	538.71	Flow Area (sq ft)	38.65	22.04	3.64
E.G. Slope (ft/ft)	0.006792	Area (sq ft)	38.65	22.04	3.64
Q Total (cfs)	154.79	Flow (cfs)	27.17	125.98	1.65
Top Width (ft)	116.75	Top Width (ft)	88.54	12.09	16.12
Vel Total (ft/s)	2.41	Avg. Vel. (ft/s)	0.70	5.72	0.45
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)	0.44	1.82	0.23
Conv. Total (cfs)	1878.2	Conv. (cfs)	329.6	1528.5	20.0
Length Wtd. (ft)	71.34	Wetted Per. (ft)	88.90	13.30	16.17
Min Ch El (ft)	536.01	Shear (lb/sq ft)	0.18	0.70	0.10
Alpha	4.61	Stream Power (lb/ft s)	0.13	4.02	0.04
Frctn Loss (ft)	0.58	Cum Volume (acre-ft)	0.86	0.19	0.25
C & E Loss (ft)	0.02	Cum SA (acres)	1.35	0.15	0.23

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated

water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1726

INPUT
Description:
Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	551.38	1.37	551.35	4.13	551.35	6.57	551.37	8.55	551.4
10.63	551.42	14.29	551.42	14.7	551.43	19.22	551.43	23.37	551.38
24.45	551.38	26.48	551.35	28.64	551.33	30.13	551.36	35.01	551.48
37.9	551.52	39.88	551.59	41.01	551.56	42.05	551.5	46.2	551.37
49.63	551.17	50.8	551.11	52.88	550.98	53.46	550.93	57.76	550.5
58.57	550.41	61.01	550.17	63.45	549.91	69.95	549.11	74.01	548.85
75.25	548.76	75.63	548.75	77.33	548.64	79.4	548.47	83.55	548.15
86.67	548.03	87.7	547.98	88.93	547.94	91.8	547.82	93.51	547.76
94.32	547.72	98.08	547.58	98.39	547.56	101.19	547.46	102.23	547.41
104.07	547.35	106.51	547.26	107.59	547.21	108.95	547.1	110.53	547.08
111.39	547.02	113.01	546.95	115.45	546.88	116.76	546.88	118.84	546.84
121.14	546.78	121.95	546.8	122.76	546.86	124.02	546.89	125.06	546.83
126.82	546.7	130.07	546.52	131.29	546.5	132.51	546.5	133.18	546.48
134.14	546.48	135.76	546.46	137.39	546.37	139.01	546.32	139.59	546.28
140.67	546.27	142.26	546.22	143.07	546.22	143.48	546.26	146.85	546.26
148.76	546.29	151.2	546.29	154.45	546.33	156.89	546.34	157.23	546.35
163.58	546.35	164.2	546.36	170.75	546.36	174.37	546.28	176.95	546.24
178.83	546.26	180.06	546.25	183.7	546.08	186.54	545.96	188.58	545.86
189.41	545.83	193.45	545.64	195.62	545.55	195.89	545.53	198.33	545.43
200.59	545.32	202.33	545.25	207.04	545.04	211.33	544.84	214.36	544.72
217.17	544.62	220.58	544.48	221.26	544.46	224.88	544.32	225.96	544.27
230.26	544.11	230.3	544.1	233.12	543.99	235.64	543.9	238.75	543.77
241.56	543.67	243.17	543.6	248.55	543.39	250	543.34	251.33	543.28
252.34	543.25	254.69	543.15	256.34	543.09	258.45	542.94	260.39	542.78
261.26	542.72	264.36	542.47	265.95	542.36	270.07	542.09	271.58	541.98
273.3	541.87	274.38	541.92	278.4	542.25	279.4	542.22	280.02	542.18
281.9	542.11	283.78	542.07	284.71	542.04	289.44	541.95	293.75	541.78
296.44	541.66	299.13	541.56	300.45	541.48	300.66	541.45	303.43	541.25
304.41	541.2	305.35	541.19	307.73	541.21	309.47	541.24	311.92	541.18
315.48	541.17	316.61	541.19	318.49	541.16	321.5	541.1	323.18	541
326.51	540.79	329.74	540.58	332.48	540.42	334.63	540.23	337.25	540.01
340.54	539.69	341.54	539.66	342.55	539.7	344.75	539.4	346.63	539.26
347.55	539.18	348.5	539.13	351.57	539.11	354	539.18	356.01	539.23
358.58	539.32	360.46	539.37	362.61	539.37	363.51	539.38	365.6	539.38
367.27	539.39	368.61	539.41	371.61	539.4	372.62	539.42	374.62	539.43
376.65	539.35	379.46	539.26	381.98	539.16	383.06	539.13	384.15	539.08
385.65	539.04	386.65	538.99	388.65	538.92	389.51	538.88	390.72	538.85
393.82	538.84	395.67	538.82	397.04	538.82	398.68	538.8	400.27	538.8
403.69	538.78	403.85	538.77	410.42	538.73	411.71	538.73	413.71	538.71
415.11	538.71	418.57	538.68	419.8	538.68	421.68	538.66	426.37	538.64
428.75	538.61	430.12	538.61	433.42	538.57	434.85	538.56	438.37	538.56

439.76 538.54 441.59 538.54 443.37 538.5 445.31 538.51 446.53 538.43
447.69 538.41 450.73 538.52 452.06 538.52 452.84 538.5 454.03 538.52
455.61 538.57 457.2 538.59 473.05 538.59 473.74 538.6 477.08 538.6
477.81 538.59 481.77 538.59 482.3 538.6 492.08 538.6 492.87 538.59
493.66 538.55 495.25 538.56 496.24 538.54 498.42 538.54 499.21 538.53
501.59 538.42 503.97 538.29 504.76 538.28 510.31 538.28 511.11 538.29
511.49 538.32 513.06 538.34 513.48 538.31 514.92 538.32 515.86 538.38
517.45 538.4 518.24 538.37 520.62 538.14 521.41 538.09 522.44 538.1
523 538.08 525.44 538.07 526.49 538.1 526.96 538.15 528.55 538.25
529.65 538.21 535.68 538.09 542.81 538.09 543.33 538.08 546.78 538.08
549.95 538.14 552.16 538.17 552.8 538.19 554.9 538.19 555.29 538.18
557.32 538.18 559.46 538.17 563.75 538.14 567.8 538.12 569.77 538.12
570.18 538.11 572.15 538.11 572.49 538.1 574.52 538.1 578.49 538.07
580.31 538.07 585.01 538.04 587.21 538.04 587.52 538.03 589.7 538.03
592.69 538.01 594.88 538.01 595.14 538 603.86 537.97 605.34 537.95
610.2 537.86 610.99 537.84 613.82 537.8 615.19 537.77 617.33 537.74
621.3 537.67 623.67 537.62 624.11 537.62 627.24 537.56 628.8 537.54
630.02 537.51 632.76 537.47 637.69 537.37 641.91 537.33 643.29 537.3
645.39 537.3 646.66 537.32 648.25 537.33 649.04 537.31 653.77 537.25
658.02 537.25 660.93 537.23 663.21 537.23 663.28 537.22 665.69 537.22
666.34 537.21 668.86 537.21 669.47 537.2 671.7 537.2 672.03 537.19
674.16 537.19 676.27 537.18 678.01 537.16 679.96 537.16 680.11 537.15
687.48 537.15 687.89 537.14 690.26 537.14 692.35 537.12 694.23 537.12
696.61 537.1 698.98 537.1 699.05 537.09 701.36 537.09 704.31 537.07
707.47 537.07 707.7 537.06 711.7 537.06 712.46 537.05 714.85 537.05
715.63 537.04 718.8 537.04 719.04 537.03 722.2 537.03 727.34 537
729.57 537 729.9 536.99 732.72 536.99 733.07 536.98 735.16 536.98
739.85 536.95 741.79 536.95 742.19 536.94 744.55 536.94 744.96 536.93
747.68 536.93 748.13 536.92 750.77 536.92 751.14 536.91 754.04 536.91
761.16 536.81 762.02 536.81 764.87 536.77 765.65 536.77 767.83 536.74
768.72 536.75 771.46 536.81 774.31 536.86 774.37 536.86 776.43 535.96
777.48 535.67 778.52 535.33 778.81 535.33 779.17 535.2 779.57 535.23
780.61 535.86 781.66 536.38 783.23 536.56 786.95 537.02 789.19 537.29
790.28 537.33 790.82 537.33 798.95 537.44 801.08 537.46 803.26 537.51
805.52 537.58 806.16 537.59 808.06 537.65 814.19 537.82 817.34 537.9
818.13 537.93 821.28 538.01 821.67 538.03 828.37 538.2 833.7 538.3
836.25 538.3 836.9 538.29 839.4 538.29 841.77 538.28 844.13 538.25
847.28 538.19 849.65 538.16 851.33 538.15 853.9 538.23 854.53 538.26
857.07 538.32 858.88 538.31 863.04 538.27 864.14 538.27 865.52 538.25
866.58 538.25 868.18 538.23 869.35 538.23 870.92 538.21 872.15 538.21
876.96 538.16 878.02 538.16 879.25 538.14 882.74 538.14 883.37 538.15
889.89 538.15 890.62 538.16 894.04 538.17 896.09 538.19 899.39 538.19
901.44 538.21 903.23 538.21 906.38 538.24 909.89 538.24 911.9 538.26
915.84 538.32 917.02 538.33 918.2 538.37 920.45 538.43 921.51 538.43
922.93 538.49 925.03 538.56 927.66 538.68 930.81 538.8 932.08 538.86
933.04 538.93 935.54 539.06 936.41 539.09 939.45 539.38 941.58 539.59
944.75 539.88 946.57 540.04 949.72 540.42 955.47 541.08 956.82 541.22
959.97 541.67 961.66 541.95 963.77 542.46 965.88 543.02 966.94 543.23
967.99 543.35 972.57 543.41 973.1 543.41 976.72 543.47 978.56 543.48
979.51 543.43 980.67 543.32 984.39 542.94 984.9 542.9 986.76 542.71
989.91 542.41 993.93 541.99 995.33 541.87 997.13 541.7 998.74 541.57
1000.94 541.37 1002.52 541.29 1004.63 541.2 1007.08 541.08 1007.25 541.08
1012.36 540.85 1015.13 540.74 1017.96 540.61 1019.57 540.55 1022.22 540.43
1025.37 540.3 1031.38 540.03 1033.25 540.01 1034.83 539.96 1038.79 539.91

1039.55 539.89 1044.06 539.83 1049.01 539.77 1056.73 539.65 1057.35 539.65
1059.9 539.61 1061.23 539.58 1062.83 539.56 1064.13 539.53 1066.24 539.51
1068.71 539.51 1071.86 539.48 1074.04 539.47 1076.81 539.47 1078.07 539.46

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .1 774.31 .03 783.23 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
774.31 783.23 128.93 128.93 128.93 .1 .3

CROSS SECTION OUTPUT Profile #Floodway

E.G. Elev (ft)	538.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.	0.100	0.030	
W.S. Elev (ft)	537.67	Reach Len. (ft)	128.93	128.93	128.93
Crit W.S. (ft)	537.67	Flow Area (sq ft)	53.00	15.06	
E.G. Slope (ft/ft)	0.009742	Area (sq ft)	53.00	15.06	
Q Total (cfs)	154.79	Flow (cfs)	61.93	92.86	
Top Width (ft)	82.87	Top Width (ft)	73.95	8.92	
Vel Total (ft/s)	2.27	Avg. Vel. (ft/s)	1.17	6.16	
Max Chl Dpth (ft)	2.47	Hydr. Depth (ft)	0.72	1.69	
Conv. Total (cfs)	1568.3	Conv. (cfs)	627.5	940.8	
Length Wtd. (ft)	128.93	Wetted Per. (ft)	74.53	10.64	
Min Ch El (ft)	535.20	Shear (lb/sq ft)	0.43	0.86	
Alpha	4.51	Stream Power (lb/ft s)	0.51	5.31	
Frctn Loss (ft)	0.71	Cum Volume (acre-ft)	0.78	0.16	0.24
C & E Loss (ft)	0.06	Cum SA (acres)	1.21	0.14	0.22

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1622

INPUT
Description:
Station Elevation Data num= 492
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

0 549.31 .82 549.31 3.15 549.22 5.86 549.13 7.65 549.08
11.43 549 12.15 548.98 12.49 548.96 13.46 548.94 16.65 548.8
19.13 548.78 21.15 548.72 25.41 548.68 25.77 548.67 26.09 548.67
30.15 548.62 32.4 548.59 34.65 548.58 38.73 548.49 39.04 548.48
39.39 548.48 43.65 548.4 45.68 548.36 48.15 548.31 51.36 548.26
52.32 548.24 57.16 548.1 58.95 548.03 61.66 547.91 64 547.8
65.59 547.73 66.16 547.7 67.35 547.65 70.66 547.5 72.23 547.43
75.16 547.29 76.63 547.23 78.86 547.13 79.66 547.09 81.33 547.02
84.16 546.89 88.66 546.69 89.27 546.69 92.14 546.57 93.16 546.54
95.31 546.46 97.66 546.39 98.78 546.35 101.9 546.25 102.16 546.24
105.41 546.13 106.66 546.09 109.29 546 111.16 545.94 112.05 545.91
114.54 545.83 115.66 545.79 118.69 545.69 120.16 545.64 123.28 545.54
124.66 545.5 125.32 545.47 127.17 545.41 129.17 545.35 131.96 545.25
133.67 545.2 138.17 545.05 138.6 545.04 139.81 545 142.67 544.9
145.24 544.82 147.17 544.75 151.24 544.62 151.67 544.6 151.87 544.6
152.45 544.57 158.51 544.31 160.67 544.24 165.08 544.08 165.22 544.08
169.67 543.93 174.17 543.78 177.72 543.67 178.42 543.65 179.2 543.62
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192.17 543.12 196.68 542.94 198.33 542.87 202.99 542.69 204.97 542.61
205.68 542.59 207.16 542.53 210.18 542.42 211.61 542.36 214.68 542.25
215.62 542.21 218.24 542.11 219.18 542.08 221.15 542.01 223.68 541.91
224.88 541.88 228.18 541.76 228.26 541.78 231.52 541.69 232.68 541.65
235.13 541.6 237.18 541.5 238.16 541.47 239.46 541.49 240.12 541.49
242.51 541.17 244.28 541.23 245.95 541.21 248.69 541.16 250.28 541.14
251.77 541.14 254.87 541.23 256.27 541.23 257.6 541.22 261.04 541.23
262.27 541.22 263.43 541.2 267.22 541.16 268.27 541.13 269.26 541.12
273.4 541.07 274.27 541.05 275.09 541.04 279.57 541.01 280.26 541.01
280.92 540.99 286.26 540.89 286.74 540.89 291.93 540.75 292.26 540.74
292.57 540.74 298.11 540.76 298.4 540.75 303.31 540.73 304.28 540.72
310.06 540.51 315.89 540.37 316.25 540.37 316.64 540.36 321.71 540.35
322.82 540.33 327.54 540.31 328.25 540.3 328.99 540.3 333.37 540.24
334.24 540.24 335.17 540.26 339.2 540.37 341.35 540.41 345.03 540.33
346.24 540.35 347.53 540.26 350.86 539.95 352.24 539.86 353.7 539.81
356.68 539.81 358.24 539.75 359.88 539.67 362.51 539.57 364.23 539.48
366.06 539.45 368.34 539.48 370.23 539.45 374.17 539.47 376.23 539.49
382.23 539.49 384.59 539.45 385.82 539.47 388.22 539.44 390.77 539.4
391.65 539.44 394.22 539.4 396.94 539.36 397.48 539.27 400.22 539.24
403.12 539.25 403.31 539.16 406.22 539.17 409.14 539.1 409.3 539.02
412.22 538.95 414.97 538.94 415.48 538.96 418.21 538.95 420.79 538.96
421.65 538.91 424.21 538.91 426.62 538.9 427.83 538.87 430.21 538.86
432.45 538.84 434.01 538.86 436.21 538.84 438.28 538.83 440.19 538.83
442.2 538.82 444.11 538.61 446.36 538.11 449.94 537.72 452.54 537.17
454.2 536.98 455.76 536.77 458.72 536.2 460.2 536 461.59 535.81
464.9 535.4 466.19 535.23 467.42 535.02 471.07 534.88 473.25 534.51
477.25 534.35 478.19 534.19 479.08 534.13 483.43 533.85 484.9 533.75
489.6 533.44 490.19 533.41 490.73 533.4 495.78 533.11 496.18 533.11
496.56 533.14 501.96 533.25 502.39 533.28 508.14 533.63 508.22 533.63
514.05 534.19 514.31 534.21 519.87 534.39 520.49 534.43 525.7 534.61
526.67 534.65 531.53 534.83 532.85 534.87 537.36 535.03 543.19 535.24
544.17 535.28 545.2 535.31 549.02 535.45 550.16 535.49 551.38 535.53
556.16 535.71 560.67 535.87 562.16 535.92 563.73 535.98 566.5 536.07
568.16 536.13 569.91 536.2 570.62 536.22 571.88 536.27 574.92 536.37
576.19 536.42 578.02 536.48 580.5 536.57 582.22 536.63 584.81 536.71
589.12 536.86 589.52 536.88 591.76 536.83 596.82 536.71 597.73 536.7

599.05 536.68 602.04 536.64 604.12 536.62 606.35 536.6 610.66 536.56
611.42 536.56 614.97 536.55 615.63 536.53 618.72 536.52 619.28 536.53
620.08 536.53 623.59 536.57 626.02 536.56 627.89 536.57 630.59 536.52
632.2 536.51 633.32 536.51 636.51 536.55 639.5 536.53 640.62 536.54
641.11 536.52 645.13 536.43 647.92 536.39 649.44 536.38 651.62 536.38
653.75 536.39 655.22 536.36 658.05 536.36 662.36 536.35 662.52 536.34
663.38 536.32 666.67 536.23 669.82 536.15 670.98 536.1 672.65 536.18
675.29 536.29 677.12 536.3 679.6 536.24 683.17 536.29 683.91 536.29
684.42 536.3 691.72 536.3 692.52 536.32 693.68 536.3 696.83 536.25
699.02 536.3 701.14 536.3 704.2 536.27 705.45 536.25 706.32 536.29
709.76 536.42 711.13 536.37 714.07 536.43 714.71 536.43 718.37 536.45
720.92 536.41 722.68 536.4 726.99 536.4 728.22 536.38 731.3 536.35
735 536.37 735.61 536.37 735.74 536.36 739.92 536.25 742.82 536.08
744.23 536.05 746.26 536.07 748.53 536.14 750.12 536.12 752.84 536.07
756.77 536.12 757.42 536.12 758.88 536.15 761.46 536.14 764.71 536.25
765.77 536.24 767.29 536.28 770.08 536.19 772.01 536.17 774.39 536.04
777.8 536.03 778.69 536.05 779.31 536.04 782.75 536.04 783 536.05
786.61 536.04 787.31 536.05 788.31 536.05 791.62 536.12 793.91 536.1
795.93 536.1 800.24 536.13 801.21 536.14 804.55 536.22 806.63 536.21
807.88 536.23 808.5 536.23 812 536.06 812.26 535.99 815.59 535.8
816.34 535.78 822.69 535.78 825.03 535.77 825.94 535.68 828.73 535.42
829.38 535.38 829.79 535.3 831.63 535.17 833.72 535.16 834.02 535.13
836.89 534.87 838.07 534.85 839.93 535.13 841.34 535.51 842.41 535.79
843.99 535.7 846.76 535.48 850.99 535.23 851.14 535.22 855.45 535.26
858.18 535.27 859.04 535.28 861.57 535.3 862.58 535.31 865.32 535.34
865.91 535.35 866.81 535.36 870.24 535.39 872.46 535.42 877.85 535.47
878.91 535.49 879.6 535.49 882.82 535.51 883.25 535.51 886.74 535.53
887.59 535.54 888.89 535.55 891.92 535.57 893.89 535.59 896.26 535.62
899.92 535.67 900.59 535.68 901.03 535.68 903.06 535.71 904.93 535.73
908.17 535.78 909.27 535.79 910.96 535.81 913.6 535.85 917.94 535.9
922 535.98 922.28 535.99 923.3 536 926.61 536.05 929.6 536.08
933.03 536.13 935.28 536.15 939.62 536.21 943.54 536.25 944.07 536.26
948.29 536.31 951.03 536.35 955.11 536.4 956.97 536.42 958.17 536.43
961.3 536.47 963.79 536.5 965.31 536.52 965.64 536.52 966.14 536.53
969.97 536.58 972.45 536.61 977.18 536.66 978.65 536.68 979.6 536.69
982.98 536.72 984.03 536.74 986.74 536.76 993.88 536.76 995.99 536.77
999.25 536.75 1001.02 536.75 1004.27 536.76 1004.66 536.77 1008.16 536.77
1009 536.78 1010.29 536.79 1013.34 536.81 1015.31 536.81 1017.67 536.84
1021.33 536.86 1022.01 536.87 1022.45 536.87 1024.51 536.89 1026.34 536.91
1029.59 536.93 1030.68 536.94 1032.36 536.96 1035.02 536.98 1036.73 537.02
1039.35 537.07 1043.4 537.18 1043.88 537.2 1044.75 537.22 1048.02 537.31
1051.02 537.39 1052.36 537.43 1054.44 537.48 1056.7 537.55 1058.16 537.58
1064.99 537.77 1065.47 537.78 1069.71 537.9 1072.45 537.97 1074.04 538.04
1076.51 538.26 1078.38 538.45 1079.59 538.53 1082.71 538.7 1085.24 538.75
1086.73 538.81 1091.34 538.81

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .1 825.03 .03 842.41 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
825.03 842.41 83.43 83.43 83.43 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent

0 588.96 536.88 F

CROSS SECTION OUTPUT Profile #Floodway

E.G. Elev (ft)	536.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	536.75	Reach Len. (ft)	83.43	83.43	83.43
Crit W.S. (ft)	536.22	Flow Area (sq ft)	22.18	26.01	50.69
E.G. Slope (ft/ft)	0.003729	Area (sq ft)	22.18	26.01	50.69
Q Total (cfs)	173.95	Flow (cfs)	16.22	102.36	55.37
Top Width (ft)	84.46	Top Width (ft)	29.98	17.38	37.10
Vel Total (ft/s)	1.76	Avg. Vel. (ft/s)	0.73	3.93	1.09
Max Chl Dpth (ft)	3.64	Hydr. Depth (ft)	0.74	1.50	1.37
Conv. Total (cfs)	2848.6	Conv. (cfs)	265.6	1676.2	906.8
Length Wtd. (ft)	83.43	Wetted Per. (ft)	30.65	17.53	38.38
Min Ch El (ft)	534.85	Shear (lb/sq ft)	0.17	0.35	0.31
Alpha	3.08	Stream Power (lb/ft s)	0.12	1.36	0.34
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)	0.67	0.10	0.17
C & E Loss (ft)	0.00	Cum SA (acres)	1.06	0.10	0.16

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1532

INPUT
Description:
Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	539.25	.95	539.25	1.7	539.27	2.86	539.28	4.19	539.39
4.51	539.38	4.86	539.41	5.86	539.4	8.25	539.4	10.13	539.33
10.67	539.32	14.98	539.16	16.89	539.11	18.55	539.1	18.9	539.09
20.38	539.08	21.46	539.08	23.62	539.06	24.7	539.04	25.92	539.03
26.03	539.02	27.68	539	29.02	538.96	30.71	538.9	34.94	538.77
35.94	538.77	36.94	538.75	38.73	538.7	39.13	538.7	39.81	538.67
41.01	538.65	41.74	538.62	43.05	538.61	43.81	538.64	44.96	538.66
45.68	538.63	46.62	538.62	47.97	538.58	49.43	538.52	50.61	538.45
53.85	538.27	54.93	538.22	56.91	538.18	58.17	538.17	59.25	538.15
62.01	538.11	64.4	538.1	65.72	538.08	66.8	538.08	68.14	538.04
68.96	537.97	70.04	537.91	71.12	537.93	71.89	537.96	72.82	537.97
74.04	538.01	75.04	538.03	76.52	538.02	76.57	537.98	77.05	537.98
78.05	537.93	79.37	537.9	79.76	537.87	80.84	537.85	82.06	537.81
83.89	537.67	84.99	537.58	87.07	537.45	89.67	537.24	90.55	537.18
91.08	537.13	92.08	537.06	93.41	536.95	98.11	536.6	99.19	536.51
101.11	536.36	101.35	536.35	102.43	536.26	103.7	536.17	105.57	536.02
105.67	536	106.75	535.93	107.45	535.87	110.25	535.66	111.19	535.58
113.06	535.44	114.3	535.36	116.14	535.23	117.54	535.11	118.15	535.05
120.55	534.88	122.42	534.74	124.02	534.6	124.29	534.59	126.04	534.45
128.97	534.25	129.42	534.21	130.84	534.12	133.74	533.9	135.9	533.66
136.45	533.59	138.33	533.41	139.26	533.22	141.13	532.79	142.21	532.62

142.37 532.58 143.21 532.44 144.22 532.33 144.53 532.34 144.88 532.3
146.22 532.31 147.68 532.29 147.77 532.32 148.23 532.32 149.23 532.42
150.23 532.6 151.43 532.83 152.36 532.95 158.91 533.3 160.26 533.36
161.81 533.45 163.26 533.52 165.27 533.63 166.4 533.68 168.2 533.77
170.14 533.88 171.28 533.93 171.52 533.95 175.76 534.17 177.3 534.24
178.56 534.31 179.5 534.35 181.37 534.45 183.4 534.55 185.56 534.67
188.79 534.83 189.87 534.89 191.33 534.96 192.34 535.02 194.19 535.11
195.41 535.18 196.35 535.22 199.59 535.39 201.02 535.47 201.96 535.51
202.36 535.54 203.91 535.61 204.37 535.64 209.45 535.89 213.19 536.09
214.12 536.13 215.4 536.2 217.87 536.32 217.94 536.31 218.8 536.36
220.41 536.41 222.41 536.39 222.55 536.38 224.4 536.36 225.35 536.36
227.43 536.33 228.74 536.39 229.1 536.38 229.82 536.41 230.43 536.41
233.78 536.44 237.37 536.48 238.45 536.48 242.2 536.44 247.09 536.4
248.48 536.38 251.41 536.28 251.49 536.27 252.49 536.28 254.49 536.28
255.3 536.25 255.73 536.25 257.89 536.19 259.98 536.15 260.05 536.16
263.28 536.09 263.72 536.09 267.46 536.01 268.4 536 269.53 536
270.84 536.05 273.08 536.12 274.01 536.14 276.24 536.16 278.69 536.16
279.48 536.15 288.58 536.15 288.99 536.14 290.59 536.14 291.35 536.13
293.66 536.04 295.54 535.98 299.61 536.02 301.61 536 302.62 535.98
303.96 535.97 305.39 535.97 306.63 535.95 309.57 535.92 310.51 535.92
311.64 535.9 312.64 535.9 316.12 535.86 317.06 535.86 318.34 535.84
319.42 535.84 320.66 535.83 321.96 535.81 326.85 535.81 329.27 535.77
330.33 535.66 331.65 535.7 333.12 535.64 334.6 535.6 335.31 535.62
336.02 535.66 336.96 535.73 338.86 535.86 339.04 535.84 339.52 535.86
341 535.8 341.24 535.8 342.42 535.75 343.84 535.71 344.44 535.68
346.69 535.62 347.4 535.61 349.54 535.55 350.25 535.54 351.67 535.5
353.09 535.47 353.62 535.47 355.63 535.52 357.23 535.55 358.83 535.59
360.43 535.62 361.31 535.66 363.87 535.76 365.15 535.82 365.9 535.82
367.32 535.79 370.28 535.63 372.3 535.69 373.01 535.72 373.72 535.73
375.4 535.67 376.42 535.64 377.28 535.64 377.97 535.59 379.41 535.58
380.13 535.63 381.55 535.71 382.97 535.78 383.68 535.8 385.65 535.76
386.94 535.77 388.22 535.71 389.37 535.64 390.08 535.66 390.82 535.73
391.51 535.73 392.93 535.71 393.64 535.81 394.02 535.81 395.62 535.71
397.91 535.71 399.75 535.69 402.31 535.61 403.52 535.59 405.21 535.59
407.16 535.64 409.29 535.72 410.72 535.78 411.43 535.82 412.14 535.83
413.21 535.82 426.66 535.82 427.6 535.83 428.5 535.81 429.2 535.82
430.5 535.78 431.35 535.74 433.48 535.68 434.35 535.65 435.63 535.64
436.33 535.62 438.46 535.61 439.88 535.59 440.58 535.5 440.87 535.38
441.29 535.3 441.76 535.24 442.71 535.21 443.27 535.18 444.12 535.21
446.96 535.26 448.37 535.29 449.28 535.3 450.79 535.33 451.92 535.36
452.62 535.36 453.33 535.34 455.3 535.24 456.18 535.21 458.29 535.18
461.33 535.18 462.83 535.2 464.33 535.23 464.99 535.23 465.84 535.25
466.82 535.25 468.25 535.27 470.41 535.29 471.32 535.29 472.57 535.31
473.59 535.31 474.73 535.33 475.45 535.33 476.88 535.35 477.6 535.35
479.04 535.37 481.2 535.38 482.64 535.4 483.45 535.4 484.79 535.42
485.51 535.42 486.84 535.44 487.67 535.44 489.11 535.46 490.51 535.47
493 535.45 494.14 535.45 494.21 535.44 495.43 535.44 495.58 535.43
496.64 535.43 497.02 535.42 499.34 535.41 502.35 535.38 503.49 535.38
505.13 535.36 506.4 535.36 508.17 535.34 510.68 535.34 512.84 535.32
515.23 535.36 517 535.36 517.16 535.37 521.74 535.37 522.12 535.38
525.61 535.38 525.76 535.39 529.49 535.39 530.1 535.4 533.37 535.4
533.7 535.41 535.14 535.41 535.47 535.42 536.68 535.42 538.73 535.44
539.95 535.44 540.17 535.45 541.61 535.45 541.72 535.46 543.05 535.46
545 535.48 546.39 535.48 546.64 535.49 548.08 535.49 550.03 535.51

551.24 535.51 551.68 535.52 552.76 535.52 553.11 535.53 554.55 535.53
557.31 535.57 560.52 535.61 562.46 535.64 562.91 535.64 564.59 535.67
565.34 535.67 567.5 535.71 568.27 535.74 568.94 535.75 572.53 535.85
574.69 535.9 575.51 535.93 578.8 536.01 581.16 536.04 581.88 536.04
582.79 536.06 583.32 536.06 585.21 536.09 585.86 536.09 587.63 536.12
588.35 536.12 590.07 536.15 591.54 536.16 594.11 536.2 594.83 536.2
598.22 536.25 599.77 536.26 603.17 536.31 604.63 536.32 606.33 536.35
607.05 536.35 608.82 536.38 609.48 536.38 612.09 536.42 612.81 536.42
614.81 536.45 620.4 536.45 620.72 536.46 621.61 536.45 628.24 536.45
630.01 536.47 631.5 536.47 631.77 536.48 632.94 536.48 634.38 536.5
635.82 536.51 637.07 536.51 640.6 536.54 644.13 536.58 645.17 536.58
646.61 536.6 648.76 536.62 649.52 536.62 650.73 536.64 652.96 536.65
655.24 536.68 655.96 536.68 657.39 536.7 658.26 536.7 659.55 536.72
660.44 536.72 661.65 536.74 663.56 536.75 663.87 536.76 666.02 536.77
667.46 536.79 668.18 536.79 671.36 536.83 672.39 536.83 674.65 536.86
676.85 536.88 678.97 536.89 680.41 536.91 681.22 536.91 682.56 536.93
684.61 536.95 685.44 536.95 686.88 536.97 687.6 536.97 689.04 536.99
690.04 536.99 693.58 537.08 694.07 537.1 696.84 537.17 697.67 537.2
699.26 537.24 704 537.38 705.33 537.41 707.7 537.48 710.61 537.56
711.75 537.6 715.04 537.68 716.25 537.72 718.3 537.77 720.06 537.83
723.59 537.93 724.28 537.94 727.13 538.02 727.87 538.08 728.38 538.1
729.6 538.1 730.03 538.11 730.81 538.09 731.47 538.11 732.02 538.11
733.62 538.15 735.02 538.17 735.06 538.18 736.5 538.2 738.68 538.25

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	451.92	.03	474.73	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
451.92	474.73	37.6	37.6	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	220.32	536.41	F

CROSS SECTION OUTPUT Profile #Floodway

E.G. Elev (ft)	536.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	536.32	Reach Len. (ft)	37.60	37.60	37.60
Crit W.S. (ft)	536.11	Flow Area (sq ft)	35.66	24.43	34.14
E.G. Slope (ft/ft)	0.006541	Area (sq ft)	35.66	24.43	34.14
Q Total (cfs)	173.95	Flow (cfs)	33.22	102.43	38.30
Top Width (ft)	111.22	Top Width (ft)	51.53	22.81	36.88
Vel Total (ft/s)	1.85	Avg. Vel. (ft/s)	0.93	4.19	1.12
Max Chl Dpth (ft)	4.03	Hydr. Depth (ft)	0.69	1.07	0.93
Conv. Total (cfs)	2150.9	Conv. (cfs)	410.8	1266.5	473.5
Length Wtd. (ft)	37.60	Wetted Per. (ft)	52.24	22.81	37.87
Min Ch El (ft)	535.18	Shear (lb/sq ft)	0.28	0.44	0.37
Alpha	3.17	Stream Power (lb/ft s)	0.26	1.83	0.41
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	0.61	0.05	0.09
C & E Loss (ft)	0.03	Cum SA (acres)	0.98	0.06	0.09

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1494

INPUT
Description:
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	549.05	2.8	549	3.71	549	5.53	549.02	7.54	548.98
10.03	549	12.29	549.03	14.98	549.01	16.35	549.03	17.03	549.03
19.09	549.02	21.77	549.03	22.66	549.02	24.44	548.96	26.51	549.01
28.98	548.89	31.26	548.79	33.9	548.7	35.3	548.63	36	548.6
38.11	548.5	40.74	548.37	41.62	548.34	43.36	548.25	45.48	548.15
47.93	548.03	50.23	547.92	54.25	547.72	54.97	547.68	57.14	547.58
59.71	547.45	60.57	547.41	62.27	547.32	64.46	547.22	66.89	547.1
69.2	547.01	71.73	546.9	73.2	546.85	73.94	546.82	81.19	546.56
83.43	546.47	85.84	546.39	88.17	546.3	90.65	546.24	92.15	546.19
92.91	546.17	95.19	546.13	97.65	546.08	98.47	546.07	102.4	545.97
104.79	545.92	107.14	545.85	111.88	545.73	114.22	545.66	119.02	545.54
121.37	545.47	123.74	545.41	126.11	545.34	130.06	545.24	130.85	545.21
135.6	545.07	136.38	545.05	137.93	544.99	140.34	544.89	142.69	544.81
145.08	544.72	147.39	544.63	152.27	544.45	154.57	544.37	155.33	544.33
156.85	544.27	159.31	544.18	164.05	543.98	166.31	543.86	167.96	543.79
168.79	543.76	171.29	543.66	173.54	543.6	174.28	543.57	175.77	543.52
178.28	543.44	180.6	543.34	183.02	543.26	185.22	543	187.76	542.88
190.32	542.72	192.51	542.61	193.23	542.58	194.68	542.51	197.25	542.51
199.55	542.37	201.99	542.29	204.14	542.14	205.87	542.08	206.74	542
209.35	542	211.48	542.02	212.19	542.03	213.6	542.06	216.22	542.16
218.5	542.19	220.96	542.21	223.05	542.16	224.82	542.16	225.71	542.15
228.37	542.13	230.45	542.11	231.14	542.1	232.51	542.05	235.19	542.04
237.46	541.94	239.93	541.85	241.97	541.84	244.68	541.75	247.4	541.72
249.42	541.69	250.09	541.69	251.43	541.68	254.16	541.63	256.41	541.6
258.9	541.62	260.89	541.59	262.72	541.6	269.04	541.6	270.34	541.57
275.36	541.46	277.88	541.42	279.8	541.35	281.68	541.31	282.62	541.28
285.45	541.24	287.36	541.21	287.99	541.21	289.26	541.18	292.1	541.12
296.85	540.99	298.72	540.92	300.63	540.87	306.33	540.81	306.95	540.81
308.17	540.78	311.07	540.6	313.26	540.57	315.82	540.54	317.63	540.56
319.58	540.54	320.56	540.55	323.5	540.51	325.3	540.48	327.09	540.4
330.04	540.13	332.22	540.05	334.03	540.04	335.06	540.04	335.53	539.92
338.31	539.91	341.15	539.82	341.52	539.92	344.32	539.84	346.77	539.83
347.98	539.68	350.33	539.67	352.39	539.65	354.43	539.67	356.34	539.65
358.01	539.64	360.89	539.58	362.35	539.57	363.63	539.57	367.35	539.62
368.36	539.62	369.25	539.61	373.81	539.39	374.87	539.38	380.26	539.48
381.97	539.42	386.1	539.26	386.72	539.26	391.72	538.85	392.4	538.85
393.18	538.84	397.34	538.67	398.41	538.66	399.64	538.64	402.96	538.78
404.42	538.76	406.09	538.72	408.58	538.81	410.43	538.77	412.55	538.69
414.2	538.75	416.44	538.65	419.01	538.64	419.82	538.44	422.45	538.44
425.44	538.48	425.47	538.34	428.46	538.36	431.06	538.23	431.92	538.29
434.47	538.16	436.68	538.07	438.38	537.98	440.48	537.89	442.3	537.79
444.84	537.69	446.49	537.6	447.92	537.57	451.3	537.43	452.5	537.41
453.54	537.41	457.75	537.55	459.16	537.55	464.21	537.4	464.78	537.39

468.61 537.39 470.4 537.4 476.02 537.18 477.13 537.15 481.64 537.01
482.55 536.99 483.58 536.96 487.26 536.92 488.56 536.88 490.04 536.84
492.88 536.74 494.56 536.7 496.5 536.63 498.5 536.67 500.57 536.59
502.96 536.48 504.12 536.58 506.58 536.46 512.59 536.1 515.36 535.94
515.87 535.9 518.6 535.75 520.98 535.61 522.33 535.52 524.61 535.39
526.6 535.26 528.79 535.17 530.62 535.05 532.22 534.95 535.24 534.68
536.63 534.6 537.84 534.52 542.64 534.22 543.46 534.15 548.16 533.85
548.65 533.81 549.08 533.76 554.62 533.06 555.24 532.98 560.32 532.37
561.07 532.34 565.94 532.17 566.68 532.15 567.53 532.19 571.56 532.42
573.99 532.55 577.18 532.69 578.7 532.78 580.45 532.87 582.8 533.01
584.71 533.11 586.91 533.22 593.36 533.56 594.04 533.6 596.73 533.74
599.66 533.89 602.74 534.05 605.28 534.19 606.28 534.24 608.75 534.37
610.9 534.48 612.74 534.58 614.76 534.68 616.52 534.78 619.19 534.92
622.14 535.07 626.78 535.32 632.11 535.59 633.38 535.67 638.57 535.93
639 535.95 641.88 536.06 644.62 536.17 645.02 536.17 650.23 536.04
651.48 536 655.85 535.83 657.94 535.76 662.83 535.62 664.4 535.63
667.09 535.69 668.84 535.7 670.85 535.68 672.71 535.93 674.85 535.9
677.31 536.03 678.33 535.79 680.86 535.94 686.87 535.88 689.57 535.84
690.23 535.86 692.88 535.83 695.19 535.84 696.68 535.79 698.89 535.79
700.81 535.82 703.14 535.72 704.9 535.74 706.43 535.71 709.6 535.73
710.91 535.7 712.05 535.7 716.06 535.74 716.92 535.74 717.67 535.73
723.29 535.73 728.51 535.72 734.95 535.72 735.43 535.71 740.15 535.7
744.53 535.7 748.88 535.71 753.04 535.67 756.7 535.65 758.01 535.64
761.55 535.57 764.52 535.57 765.81 535.59 767.35 535.62 770.07 535.65
772.35 535.62 774.32 535.56 776.69 535.59 780.17 535.59 782.84 535.61
786.03 535.53 787.09 535.5 787.99 535.5 791.35 535.47 795.36 535.28
795.81 535.28 798.13 535.22 799.86 535.44 803.63 535.13 804.12 535.13
804.7 535.11 808.38 535.19 811.46 535.13 812.64 535.15 814.04 535.1
816.89 535.11 819.28 535.2 821.15 535.31 823.38 535.28 825.41 535.24
827.1 535.35 829.66 535.41 832.72 535.46 833.92 535.47 834.92 535.44
838.18 535.48 842.06 535.43 846.3 535.49 846.69 535.52 850.57 535.56
851.4 535.58 855.2 535.66 858.39 535.71 860.33 535.73 863.73 535.74
866.06 535.72 868 535.67 869.68 535.67 870.48 535.67 872.27 535.65
873.67 535.58 876.54 535.43 880.21 535.3 880.82 535.27 881.29 535.26
885.09 535.13 885.14 535.14 888.05 535.05 888.9 535.03 889.36 535.01
889.94 535.02 893.63 535.06 896.51 535.03 897.9 535.03 899.67 535
902.17 534.94 906.45 534.85 909.41 534.79 910.72 534.77 911.74 534.77
914.99 534.78 919.14 534.8 920.16 534.8 926.97 534.86 927.8 534.86
932.08 534.9 934.59 534.92 936.35 534.93 939.42 534.96 940.62 534.97
942.2 534.97 944.89 534.99 948.33 535 949.16 535 949.81 535.01
953.43 535.05 955.17 535.1 957.43 535.13 961.98 535.2 965.04 535.21
966.25 535.21 967.79 535.22 972.66 535.24 974.79 535.24 977.52 535.25
980.27 535.27 983.34 535.28 987.25 535.3 987.89 535.31 990.18 535.32
995.5 535.35 996.15 535.35 1000.42 535.5 1003.12 535.61 1008.96 535.87
1010.73 535.92 1013.24 536.02 1017.51 536.06 1018.34 536.06 1021.78 536.09
1025.19 536.13 1025.96 536.13 1026.17 536.14 1030.32 536.17 1034.59 536.21
1035.9 536.23 1038.87 536.25 1041.19 536.27 1043.14 536.29 1045.63 536.31
1047.41 536.33 1048.8 536.34 1051.68 536.37 1055.36 536.4 1060.2 536.45
1064.03 536.48 1068.77 536.53 1073.04 536.56 1074.82 536.58 1077.31 536.6
1079.26 536.62 1081.58 536.64 1084.55 536.67 1085.85 536.68 1090.13 536.72
1095.22 536.77 1102.1 536.83 1102.94 536.84 1107.21 536.88 1109.72 536.9
1111.48 536.92 1113.75 536.94 1115.76 536.95 1117.33 536.97 1120.03 537
1124.3 537.1 1126.27 537.16 1128.57 537.22 1130.04 537.27 1133.26 537.36
1137.12 537.47 1143.07 537.65 1145.67 537.72 1149.95 537.85 1152.87 537.93

1155.27 538 1158.5 538.07 1162.68 538.15 1163.41 538.17 1167.05 538.24
1170.42 538.31 1171.82 538.32

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .1 885.14 .03 893.63 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
885.14 893.63 31.89 31.89 31.89 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
0 645.36 536.18 F

CROSS SECTION OUTPUT Profile #Floodway

E.G. Elev (ft)	536.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	536.15	Reach Len. (ft)	31.89	31.89	31.89
Crit W.S. (ft)	535.65	Flow Area (sq ft)	55.42	9.29	63.84
E.G. Slope (ft/ft)	0.006081	Area (sq ft)	55.42	9.29	63.84
Q Total (cfs)	173.95	Flow (cfs)	50.75	38.11	85.09
Top Width (ft)	136.96	Top Width (ft)	77.88	8.49	50.59
Vel Total (ft/s)	1.35	Avg. Vel. (ft/s)	0.92	4.10	1.33
Max Chl Dpth (ft)	4.00	Hydr. Depth (ft)	0.71	1.09	1.26
Conv. Total (cfs)	2230.7	Conv. (cfs)	650.8	488.7	1091.1
Length Wtd. (ft)	31.89	Wetted Per. (ft)	78.90	8.49	51.76
Min Ch El (ft)	535.01	Shear (lb/sq ft)	0.27	0.42	0.47
Alpha	2.62	Stream Power (lb/ft s)	0.24	1.70	0.62
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)	0.57	0.03	0.05
C & E Loss (ft)	0.03	Cum SA (acres)	0.92	0.05	0.05

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1462

INPUT
Description:
Station Elevation Data num= 490
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 539.28 1.08 539.22 2.5 539.19 2.66 539.17 5.53 539.16
5.64 539.19 6.69 539.2 8.78 539.19 10.09 539.24 11.29 539.25
13.21 539.25 14.17 539.26 17.15 539.2 18.2 539.17 21.1 539.06
22.38 539.04 24.1 539.09 25.1 539.11 26.64 539.08 27.6 539.09
28.11 539.08 29.52 539.02 31.11 538.97 33.89 538.86 35.98 538.81
39.07 538.72 42.26 538.65 45.4 538.56 46.44 538.5 46.79 538.45
48.13 538.38 49.13 538.39 53.13 538.47 54.47 538.43 54.81 538.39

56.13 538.33 56.9 538.28 58.13 538.22 59.26 538.24 60.04 538.27
61.18 538.24 63.1 538.31 64.06 538.36 65.02 538.39 66.14 538.39
67.9 538.35 71.55 538.2 72.7 538.14 73.15 538.1 73.64 538.09
73.66 538.06 74.15 538.05 75.57 537.99 75.73 537.97 77.15 537.91
78.15 537.89 79.41 537.96 80.97 537.96 81.16 537.97 83.25 537.97
84.21 537.99 85.15 538.03 86.2 538.03 87.09 538.01 88.29 538
89.16 537.97 90.93 537.86 93.52 537.71 94.17 537.68 96.17 537.63
98.17 537.57 100.17 537.49 102.18 537.42 103.4 537.42 106.07 537.49
107.18 537.48 110.11 537.39 111.07 537.37 112.99 537.3 117.19 537.36
120.67 537.36 121.77 537.31 122.81 537.24 124.51 537.15 125.46 537.11
128.2 537.06 130.26 537.04 131.66 536.96 136.21 536.65 137.94 536.58
142.21 536.58 142.73 536.55 143.74 536.52 144.78 536.47 145.61 536.47
146.87 536.44 148.49 536.43 150.41 536.39 151.37 536.35 152.11 536.3
155.24 536.27 157.34 536.24 160.47 536.18 160.96 536.18 161.52 536.15
163.84 536.08 165.71 536.09 167.68 536.06 169.89 536.07 173.24 536.13
174.4 536.14 176.17 536.17 179.19 536.23 181.11 536.25 182.07 536.27
185.58 536.27 187.83 536.23 189.85 536.21 191.96 536.16 192.27 536.16
195.5 536.07 197.14 536.03 198.99 536.06 200.84 536.08 206.32 536.08
207.34 535.98 209.54 535.7 211 535.5 211.93 535.39 213.34 535.2
217.23 534.71 217.47 534.67 220.52 534.27 222.09 534.07 223.02 533.94
224.39 533.77 225.39 533.63 227.64 533.34 228.56 533.21 233.42 532.58
234.1 532.52 235.95 532.46 238.1 532.37 240.44 532.24 241.39 532.21
243.34 532.25 244.27 532.3 244.69 532.34 245.46 532.37 246.11 532.43
247.04 532.47 247.47 532.47 249.08 532.54 250.18 532.61 252.58 532.74
255.67 532.93 256.5 532.97 260.52 533.21 261.52 533.26 264.59 533.45
266.44 533.55 266.66 533.57 270.14 533.76 271.56 533.85 272.56 533.9
273.83 533.98 275.68 534.08 278.59 534.25 280.3 534.36 282.15 534.46
283.07 534.52 284.61 534.6 285.33 534.65 287.53 534.77 288.63 534.84
291.39 534.99 291.92 535.01 294.12 535.13 295.22 535.18 296.93 535.27
298.51 535.36 300.71 535.47 304.01 535.62 305.69 535.61 308.4 535.57
309.87 535.56 314.49 535.56 314.72 535.57 317.19 535.57 317.26 535.56
319.39 535.54 321.88 535.46 325.58 535.37 327.08 535.37 327.77 535.38
329.27 535.34 330.2 535.3 332.05 535.24 333.67 535.21 335.1 535.21
336.96 535.19 337.59 535.17 338.81 535.18 339.44 535.2 340.36 535.2
342.45 535.23 343.83 535.27 344.65 535.28 345.91 535.37 346.85 535.42
348.68 535.5 349.6 535.55 350.85 535.6 353.44 535.72 354.54 535.74
356.99 535.74 362.54 535.7 363.9 535.7 365.91 535.68 369.01 535.67
373.21 535.64 374.55 535.64 376.4 535.62 379.8 535.6 381.63 535.6
381.94 535.59 383.79 535.59 386.99 535.56 390.26 535.54 392.11 535.54
394.08 535.53 395.8 535.51 400.67 535.48 402.27 535.48 404.12 535.47
405.96 535.45 407.27 535.45 408.36 535.43 408.74 535.44 409.66 535.42
410.07 535.43 416.53 535.43 417.05 535.44 419.35 535.44 419.82 535.45
422.12 535.45 423.32 535.46 425.9 535.5 428.48 535.5 432.35 535.54
433.93 535.54 435.35 535.5 438.19 535.34 439.62 535.34 441.75 535.44
443.8 535.52 445.38 535.54 446.01 535.56 447.82 535.53 450.4 535.5
452.98 535.46 453.83 535.44 455.55 535.42 456.84 535.39 459.42 535.35
459.52 535.34 461.65 535.34 463.07 535.35 463.78 535.37 465.42 535.37
465.97 535.38 467.16 535.36 468.05 535.33 469.14 535.32 470.89 535.28
476.18 535.25 477.06 535.27 480.23 535.27 482.26 535.31 486.21 535.31
488.66 535.33 490.79 535.33 492.22 535.31 492.9 535.32 494.49 535.32
495.77 535.31 496.48 535.34 497.19 535.34 498.61 535.31 500.68 535.24
502.41 535.22 504.3 535.18 505.58 535.13 507.16 535.13 508.42 535.15
509.28 535.15 510.7 535.13 511.91 535.08 512.83 535.07 518.73 535.07
519.23 535.09 520.02 535.09 520.86 535.11 523.49 535.2 525.62 535.25

526.47 535.25 531.63 535.05 532.92 534.99 534.86 534.92 536.29 534.9
536.79 534.88 537.71 534.89 539.13 535.02 539.84 535.12 540.43 535.17
541.26 535.27 541.65 535.26 542.68 535.35 543.39 535.39 545.18 535.47
546.76 535.48 548.39 535.48 549.68 535.4 553.55 535.19 554.84 535.11
559.74 534.84 560.45 534.79 564.01 534.59 564.72 534.57 571.12 534.57
571.6 534.58 574.67 534.58 575.28 534.56 576.09 534.56 576.86 534.53
577.51 534.55 578.22 534.54 578.94 534.71 579.65 534.9 580.62 534.97
581.61 534.95 584.62 534.91 585.33 534.89 590.16 534.81 591.12 534.8
593.52 534.75 594.57 534.74 595.87 534.71 597.09 534.72 598.84 534.72
599.04 534.73 600.62 534.73 600.97 534.74 602.54 534.74 603.1 534.75
605.12 534.76 606.66 534.76 606.96 534.77 608.54 534.77 608.79 534.78
610.28 534.78 612.86 534.8 614.48 534.8 614.88 534.81 616.61 534.81
616.73 534.82 618.74 534.83 620.6 534.83 620.87 534.84 622.8 534.85
624.46 534.85 624.82 534.86 626.56 534.86 627.04 534.87 628.69 534.87
630.72 534.89 632.3 534.89 634.38 534.91 636.07 534.91 636.51 534.92
638.68 534.92 640.78 534.93 642.91 534.95 644.98 534.96 646.56 534.96
647.17 534.97 651.31 534.99 654.28 535.02 655.7 535.02 658.55 535.05
659.47 535.05 662.4 535.11 667.01 535.18 667.15 535.19 669.21 535.23
672.17 535.31 673.49 535.34 681.2 535.56 682.49 535.59 683.43 535.6
684.58 535.63 686.98 535.67 691.51 535.77 693.38 535.8 695.38 535.84
697.96 535.9 698.35 535.9 700.42 535.95 701.83 535.97 703.12 536
705.17 536.02 706.76 536.05 707.98 536.06 709.56 536.09 714.68 536.16
716.83 536.17 719.43 536.19 722.46 536.23 723.23 536.23 726.78 536.27
728.93 536.28 730.19 536.3 731.05 536.3 734.6 536.34 735.35 536.34
736.64 536.36 737.45 536.36 739.58 536.38 741.8 536.41 742.63 536.41
743.84 536.43 744.77 536.43 745.98 536.45 747.94 536.47 748.82 536.47
751.11 536.5 753.8 536.52 755.22 536.54 755.98 536.54 757.27 536.56
758.06 536.56 760.19 536.59 761.14 536.59 762.2 536.61 763.04 536.61
765.37 536.64 768.01 536.66 769.43 536.68 770.16 536.68 772.28 536.71
774.03 536.72 776.46 536.75 777.29 536.75 779.63 536.78 783.06 536.8
784.22 536.82 785.07 536.82 786.49 536.84 789.13 536.86 789.34 536.87
792.18 536.89 793.37 536.91 794.31 536.91 796.44 536.94 797.24 536.94
798.53 536.96 799.29 536.96 802.13 536.99 803.39 537.01 805.69 537.08
807.11 537.11 810.14 537.19 811.37 537.23 816.58 537.36 818.48 537.42
824.88 537.6 825.56 537.61 827.72 537.67 828.43 537.68 829.85 537.73
830.77 537.75 834.63 537.87 836.25 537.91 836.96 537.94 839.09 538
840.52 538.02 843.66 538.08 844.95 538.09 846.59 538.12 848.75 538.15

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	554.84	.03	580.62	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
554.84	580.62	32.02	32.02	32.02	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	303.86	535.62	F

CROSS SECTION OUTPUT Profile #Floodway

E.G. Elev (ft)	535.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.39	Wt. n-Val.	0.100	0.030	0.100
W.S. Elev (ft)	535.48	Reach Len. (ft)	32.02	32.02	32.02
Crit W.S. (ft)	535.48	Flow Area (sq ft)	4.16	20.34	31.31

E.G. Slope (ft/ft)	0.019794	Area (sq ft)	4.16	20.34	31.31
Q Total (cfs)	173.95	Flow (cfs)	3.33	120.80	49.82
Top Width (ft)	89.65	Top Width (ft)	17.33	25.78	46.53
Vel Total (ft/s)	3.12	Avg. Vel. (ft/s)	0.80	5.94	1.59
Max Chl Dpth (ft)	3.27	Hydr. Depth (ft)	0.24	0.79	0.67
Conv. Total (cfs)	1236.4	Conv. (cfs)	23.7	858.6	354.1
Length Wtd. (ft)	32.02	Wetted Per. (ft)	17.94	25.84	47.15
Min Ch El (ft)	534.53	Shear (lb/sq ft)	0.29	0.97	0.82
Alpha	2.60	Stream Power (lb/ft s)	0.23	5.78	1.31
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	0.55	0.02	0.01
C & E Loss (ft)	0.11	Cum SA (acres)	0.89	0.03	0.02

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical
depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1430

INPUT
Description:
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	548.58	4.23	548.48	6.42	548.45	8.19	548.39	10.64	548.47
15.32	548.39	18	548.33	20.86	548.2	22.22	548.15	24.32	548.12
26.47	548.11	28.78	548.06	30.37	548.04	31.95	548.04	36.95	547.82
39.15	547.81	40.11	547.82	41.16	547.79	47.79	547.5	54.92	547.21
58.34	547.04	62.22	546.82	64.12	546.68	66.01	546.56	67.94	546.47
71.14	546.3	73.8	546.2	75.52	546.11	79.81	546.01	82.65	545.87
88.19	545.72	90.79	545.68	92.94	545.71	94.85	545.71	95.91	545.68
99.07	545.52	101.17	545.39	102.45	545.37	105.62	545.39	108.54	545.39
109.62	545.36	112.73	545.15	114.33	545.08	114.86	545.1	116.96	545.02
119.88	544.89	122.17	544.67	123.74	544.58	128.45	544.37	130.97	544.22
133.81	544.18	135.91	543.86	136.96	543.75	141.17	543.48	142.05	543.46
146.02	543.3	148.54	543.07	150.41	543.07	151.7	542.98	152.75	542.88
153.94	542.83	155.52	542.81	159.83	542.91	161.86	542.92	163.28	542.9
167.13	542.88	171.7	542.88	175.32	542.86	179.28	542.86	181.18	542.8
186.32	542.72	188	542.73	188.79	542.71	189.58	542.65	190.37	542.65
192.72	542.53	193.81	542.54	195.13	542.67	195.92	542.8	196.71	542.8
198.02	542.76	200.67	542.83	201.46	542.82	204.34	542.87	207.01	542.87
209.6	542.82	211.92	542.75	214.14	542.7	215.72	542.65	219.08	542.57

221.02 542.51 224.43 542.43 228.39 542.28 231.71 542.12 232.36 542.1
233.94 542.18 237.51 542.03 241.07 541.95 242.98 541.92 245.03 541.91
246.61 541.85 248.55 541.73 250.31 541.68 251.71 541.68 253.97 541.71
257.11 541.63 260.24 541.53 263.38 541.48 267.21 541.36 271.96 541.2
274.36 541.11 277.5 541.02 280.64 540.94 283.78 540.85 286.45 540.76
287.8 540.74 291.62 540.64 294.76 540.6 295.93 540.63 296.98 540.63
299.47 540.54 299.68 540.51 302.06 540.48 302.85 540.53 303.64 540.53
305.4 540.45 308.56 540.28 310.45 540.24 315.93 540.23 318.03 540.2
320.14 540.08 323.9 539.83 325.82 539.73 328.2 539.7 329.78 539.61
330.67 539.64 332.42 539.66 334.54 539.66 335.56 539.58 339.29 539.41
340.3 539.43 341.27 539.4 344.05 539.22 348.07 539.05 352.21 539.06
354.11 539 356.18 538.96 361.15 538.8 364.17 538.82 366.12 538.85
369.19 538.85 371.21 538.88 372.09 538.86 375.23 538.62 379.25 538.5
381.04 538.48 383.03 538.42 384.15 538.42 385.15 538.47 387 538.32
390.15 538.14 391.97 538.1 394.34 538.02 395.35 538.01 397.15 538.07
399.37 538.09 399.93 538.14 401.38 538.06 403.15 537.91 406.89 537.71
408.15 537.75 409.87 537.75 412.15 537.72 414.15 537.72 416.47 537.67
419.15 537.43 420.15 537.42 422.79 537.44 423.79 537.42 428.76 537.27
430.56 537.19 436.15 537.05 439.15 537 442.15 537.17 444.67 537.06
447.15 536.9 448.15 536.87 449.15 536.94 450.67 536.95 454.7 536.79
456.6 536.81 458.58 536.74 458.72 536.77 459.73 536.75 462.15 536.64
464.55 536.58 466.77 536.54 469.15 536.56 471.15 536.49 474.15 536.55
475.82 536.5 478.15 536.38 481.15 536.24 482.86 536.12 484.87 536.01
486.89 535.94 490.15 535.93 492.39 535.78 495.37 535.64 497.95 535.62
499.96 535.62 500.34 535.6 503.15 535.57 504.32 535.53 505.15 535.41
507.15 535.3 513.26 535.38 514.26 535.37 517.06 535.29 518.07 535.28
525.19 535.28 529.14 535.3 532.15 535.3 535.14 535.34 538.19 535.32
539.11 535.3 545.08 535.24 548.25 535.25 552.27 535.23 553.15 535.25
555.29 535.26 558 535.22 560.32 535.23 563.15 535.26 565.15 535.27
568.37 535.32 571.15 535.32 571.92 535.27 577.42 534.74 585.15 533.98
589.82 533.54 591.5 533.37 594.52 533.11 601.15 532.52 604.73 532.22
606.15 532.09 608.6 531.91 610.15 531.74 611.69 531.68 615.15 531.6
618.15 531.84 618.65 531.86 622.15 532.13 628.59 532.61 630.73 532.78
633.56 532.97 638.53 533.22 642.15 533.48 644.15 533.64 648.15 533.93
649.84 534.07 657.16 534.62 658.16 534.65 658.9 534.59 660.91 534.48
668.36 534.48 670.97 534.52 672.33 534.58 674.32 534.64 677.3 534.7
679.02 534.75 681.16 534.78 684.26 534.75 685.05 534.71 686.06 534.7
688.07 534.75 689.23 534.81 690.08 534.89 691.09 534.91 693.21 534.91
702.15 534.86 704.15 534.84 709.12 534.82 709.16 534.81 714.22 534.79
716.24 534.77 723.28 534.73 725.03 534.73 727.01 534.71 730 534.7
730.16 534.71 735.35 534.71 735.96 534.72 741.16 534.72 741.38 534.73
746.9 534.73 747.16 534.74 752.45 534.74 752.86 534.75 758.48 534.75
758.83 534.76 764.16 534.76 764.52 534.77 768.77 534.77 769.16 534.78
773.16 534.78 776.53 534.79 780.07 534.82 781.38 534.84 783.61 534.85
793.72 534.94 797.75 534.99 801.82 535.02 806.97 535.04 810.51 535.07
815.47 535.09 826.13 535.15 828.21 535.17 831.75 535.18 835.53 535.21
839.5 535.23 841.67 535.22 848.44 535.22 848.75 535.21 852.29 535.21
852.91 535.2 857.95 535.2 858.46 535.19 875.27 535.19 876.36 535.15
879.74 535.07 881.31 535.07 882.72 535.12 885.43 535.08 889.1 535
894.06 535.05 897.62 535.06 898.3 535.03 898.92 534.94 900.27 534.91
901.14 534.92 904.31 534.92 907.01 534.91 908.92 534.99 911.04 535.04
914.99 534.92 917.26 534.91 919.57 534.94 923.54 535.01 926.62 534.91
928.25 534.89 931.64 534.96 934.45 535.06 937.66 534.99 939.65 534.97
940.78 535.04 942.34 535.17 951.71 535.17 952.95 535.16 956.39 535.09

957.96 535.07 958.69 535.05 961.79 534.98 963.09 534.83 963.6 534.81
964.39 534.67 965.02 534.69 965.35 534.59 966.44 534.56 967.15 534.44
968.89 534.54 969.28 534.53 970.45 534.63 971.41 534.61 972.2 534.74
973.57 534.73 976.11 534.66 977.41 534.67 979.82 534.72 982.62 534.72
984.9 534.7 985.67 534.7 988.45 534.69 989.87 534.66 992.31 534.65
998.55 534.65 1000.52 534.67 1001.23 534.65 1004.8 534.65 1006.06 534.71
1007.62 534.65 1010.46 534.64 1012.61 534.77 1014.17 534.65 1015.43 534.64
1016.14 534.66 1018.27 534.89 1020.38 534.68 1021.11 534.78 1021.68 534.76
1022.98 535.06 1023.95 535.07 1025.1 535.13 1026.66 535.11 1027.5 535.03
1028.05 535.14 1030.8 535.19 1033.4 535.3 1036.73 535.26 1041.21 535.19
1046.67 535.17 1048.52 535.26 1050.08 535.28 1053.2 535.06 1054.48 535.01
1055.54 535.05 1056.33 535.12 1057.89 535.31 1058.74 535.37 1059.45 535.38
1062.57 535.51 1064.13 535.53 1065.7 535.42 1066.55 535.34 1067.24 535.33
1067.97 535.24 1070.1 535.18 1070.81 535.3 1071.52 535.1 1072.23 535.19
1072.94 535.1 1073.65 535.15 1074.36 535.27 1075.78 535.18 1076.49 535.29
1077.91 535.3 1080.04 535.39 1081.58 535.28 1082.91 535.44 1084.18 535.49
1085.01 535.49 1087.14 535.44 1088.56 535.56 1090.68 535.63 1092.82 535.61
1094.6 535.72 1095.9 535.76 1098.59 535.77 1101.34 535.84 1103.71 535.94
1107.02 536 1108.44 536.06 1110.98 536.14 1116.73 536.35 1122.1 536.53
1124.06 536.55 1126.9 536.6 1128.15 536.6 1132.36 536.72 1134.4 536.75
1136.26 536.75 1140.39 536.77 1146.78 536.83 1151.89 536.86 1159.7 536.93
1168.75 537 1179.68 537.06 1182.99 537.09 1184.8 537.09 1189.05 537.14
1192.63 537.21 1195.3 537.25 1196.86 537.26 1203.58 537.35 1205 537.36
1209.97 537.48 1213.52 537.55 1214.03 537.57 1219.59 537.68 1223.4 537.74
1224.8 537.78 1234.33 538 1240.58 538.07 1246.18 538.14 1249.95 538.14
1254.63 538.19 1256.83 538.2 1260.38 538.26 1262.56 538.31 1266.77 538.39
1269.61 538.46 1272.13 538.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	961.79	.03	972.2	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
961.79 972.2 87.52 87.52 87.52 .1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	690.54	534.91	F

CROSS SECTION OUTPUT Profile #Floodway

E.G. Elev (ft)	535.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.100	0.030	
W.S. Elev (ft)	535.20	Reach Len. (ft)	87.52	87.52	87.52
Crit W.S. (ft)	534.92	Flow Area (sq ft)	230.12	5.83	
E.G. Slope (ft/ft)	0.002951	Area (sq ft)	230.12	5.83	
Q Total (cfs)	173.95	Flow (cfs)	163.63	10.32	
Top Width (ft)	359.09	Top Width (ft)	348.68	10.41	
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)	0.71	1.77	
Max Chl Dpth (ft)	3.60	Hydr. Depth (ft)	0.66	0.56	
Conv. Total (cfs)	3202.0	Conv. (cfs)	3012.0	190.0	
Length Wtd. (ft)	87.52	Wetted Per. (ft)	351.01	10.94	
Min Ch El (ft)	534.44	Shear (lb/sq ft)	0.12	0.10	
Alpha	1.22	Stream Power (lb/ft s)	0.09	0.17	
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	0.47	0.01	

C & E Loss (ft) 0.00 Cum SA (acres) 0.76 0.02

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: NB Raritan Trib
REACH: Reach 1 RS: 1407

INPUT
Description:
Station Elevation Data num= 490

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	539.13	.96	539.12	3.37	539.06	4.4	539.07	6.09	539.01
6.92	539.02	11.21	539.02	12.92	538.91	16.61	538.69	18.05	538.62
19.76	538.6	20.78	538.61	24.03	538.5	25.55	538.43	26.59	538.41
28.83	538.32	31.71	538.22	33.92	538.17	37.17	538	37.69	537.94
38.43	537.91	38.55	537.87	39.4	537.85	41.11	537.85	43.47	537.79
44.53	537.8	46.75	537.89	47.25	537.9	48.51	537.83	50.21	537.63
52.22	537.5	54.78	537.42	55.63	537.45	57.36	537.42	59.85	537.35
60.76	537.3	61.41	537.29	63.63	537.09	67.42	536.93	69.3	537.02
70.58	537.04	71.59	537.01	72.72	536.92	73.72	536.86	74.65	536.83
75.67	536.85	76.99	536.94	80.4	536.76	81.78	536.74	82.97	536.77
87.89	536.73	89.92	536.67	90.94	536.66	93.22	536.67	94.07	536.65
94.94	536.56	97.02	536.4	98.59	536.33	100.41	536.29	104.97	536.24
108.62	536.23	109.53	536.21	109.65	536.25	112.1	536.18	113.91	536.15
117.12	536.12	119.73	536	122.3	535.96	125.17	535.88	127.77	535.88
130.19	535.9	132.05	535.83	134.15	535.8	137.65	535.69	139.24	535.63
144.18	535.54	146.62	535.47	147.28	535.46	148.74	535.37	150.56	535.31
155.32	535.2	158.77	535.15	160.59	535.13	161.5	535.1	165.38	535.06
167.39	535.02	170.62	535	172.44	535	174.26	534.98	176.43	534.97
179.1	534.97	179.45	534.96	183.58	534.95	185.48	534.96	189.5	535.03
193.66	535.08	196.54	535.08	198.55	535.07	205.59	535.14	206.59	535.16
208.6	535.17	210.46	535.2	211.92	535.2	215.29	535.18	216.64	535.12
223.9	534.08	224.41	534.09	225.02	534.02	225.32	534.05	225.69	534.01
226.7	534	227.7	533.88	230.62	533.14	231.75	533.02	232.62	532.96
233.73	532.76	235.35	532.36	236.26	532.24	236.75	532.23	237.75	532.27
238.47	532.22	240.71	532.12	241.83	532.02	243.56	531.52	244.07	531.4
244.47	531.26	245.8	530.96	246.29	531	246.31	530.94	253.84	531.48
254.15	531.51	256.85	531.7	259.06	531.87	261.79	532.07	264.23	532.24
265.35	532.33	267.91	532.51	268.92	532.59	273.94	532.95	275.47	533.07
276.55	533.14	278.2	533.27	280.53	533.43	281.85	533.53	285	533.75
289.99	534.12	290.97	534.18	293.35	534.37	295.05	534.49	296.44	534.57
298.26	534.57	299.17	534.55	303.43	534.5	306.79	534.45	308.29	534.45
312.39	534.48	314.67	534.48	316.16	534.49	317.99	534.46	326.22	534.46
326.52	534.45	331.44	534.45	331.99	534.44	337.27	534.44	337.46	534.43
342.3	534.43	342.64	534.42	346.58	534.42	347.12	534.41	351.6	534.41
352.05	534.4	354.36	534.4	362.08	534.32	364.41	534.32	364.82	534.31
367.55	534.31	370.45	534.3	373.93	534.27	380.72	534.24	381.23	534.23
385.19	534.23	385.33	534.22	404.52	534.22	404.77	534.21	422.38	534.21
422.84	534.2	428.11	534.2	428.55	534.19	433.38	534.19	433.79	534.18
437.14	534.19	438.84	534.21	442.01	534.22	445.32	534.25	448.44	534.26

451.93 534.29 453.25 534.29 455.16 534.31 456.34 534.31 459.73 534.34
463.5 534.36 467.04 534.36 467.26 534.37 471.03 534.37 471.77 534.38
475.09 534.38 475.55 534.39 479.5 534.39 480 534.4 483.07 534.4
483.66 534.41 486.84 534.41 487.21 534.42 491.62 534.42 492.11 534.43
496.03 534.43 496.47 534.44 500.58 534.44 501.15 534.45 505.66 534.45
505.96 534.46 510.37 534.46 510.87 534.47 514.99 534.47 515.45 534.48
519.28 534.48 519.97 534.49 524.03 534.49 524.49 534.5 529.11 534.5
532.02 534.52 535.57 534.52 535.72 534.53 539.68 534.53 540.13 534.54
545.86 534.54 546.32 534.55 549.33 534.55 549.97 534.56 555.36 534.56
555.57 534.57 558.37 534.57 558.88 534.58 566.77 534.58 569.9 534.55
571 534.53 573.9 534.51 576.27 534.48 577.95 534.49 580.2 534.48
581.02 534.53 582.46 534.56 583.4 534.6 585.34 534.63 587.54 534.58
588.64 534.61 589.75 534.49 589.99 534.49 590.52 534.39 591.13 534.34
591.5 534.36 592.9 534.35 593.76 534.38 596.76 534.43 598.19 534.43
601.77 534.49 602.4 534.51 603.2 534.5 604.63 534.41 608.77 534.57
610.01 534.6 611.78 534.62 613.21 534.6 617.36 534.49 618.93 534.48
621.07 534.59 622.46 534.63 623.93 534.69 626.19 534.76 628.68 534.8
629.65 534.79 632.64 534.79 635.37 534.78 639.66 534.84 641.12 534.83
642.72 534.88 646.15 534.95 646.81 534.9 650.38 534.83 650.95 534.72
651.81 534.66 652.53 534.58 653.24 534.56 655.39 534.32 656.06 534.29
658.55 534.37 662.28 534.39 663.97 534.39 664.68 534.34 666.11 534.06
666.83 533.97 669.75 533.76 670.15 533.79 670.4 533.71 671.28 533.87
673.97 534.39 676.83 534.53 678.26 534.47 681.12 534.48 684.75 534.51
686.2 534.51 689.6 534.54 691.56 534.54 692.75 534.58 695.79 534.71
697.44 534.8 698.89 534.81 702.24 534.81 702.91 534.8 704.14 534.82
707.27 534.81 707.94 534.84 709.2 534.85 711.73 534.85 712.35 534.83
715.98 534.8 717.47 534.77 718.89 534.66 721.22 534.42 721.79 534.38
722.52 534.42 723.97 534.54 724.7 534.55 728.03 534.36 729.21 534.31
730.71 534.38 732.6 534.5 733.91 534.52 734.14 534.55 737.44 534.82
738.3 534.84 739.22 534.82 740.2 534.84 740.97 534.83 742.85 534.74
743.58 534.69 745.03 534.68 745.89 534.71 749.68 534.77 750.84 534.72
753.02 534.68 755.2 534.69 755.93 534.74 758.62 534.72 760.29 534.72
760.83 534.7 762.15 534.7 763.92 534.77 766.76 534.86 767.55 534.85
771.18 534.72 772.63 534.7 774.35 534.75 776.25 534.87 777.45 534.91
779.8 534.87 782.07 534.77 783.33 534.76 786.43 534.8 787.88 534.81
792.75 534.95 793.7 535.01 794.89 535.05 798.78 535.11 801.68 535.23
803.86 535.23 804.59 535.22 805.32 535.17 807.49 534.99 810.38 534.86
811.13 534.85 813.47 535.06 814.2 535.1 814.76 535.09 815.48 535.16
816.57 535.19 816.94 535.23 819.12 535.34 819.9 535.35 820.98 535.33
822.76 535.33 825.86 535.36 826.87 535.39 828.04 535.39 830.01 535.41
830.4 535.4 836.55 535.42 838.87 535.52 840.18 535.51 842.67 535.51
843.34 535.5 845.99 535.52 846.71 535.54 848.05 535.48 849.62 535.45
851.07 535.45 852.52 535.35 853.98 535.35 856.83 535.4 857.61 535.4
859.06 535.46 862.69 535.5 867.78 535.53 869.22 535.55 872.31 535.57
874.31 535.6 876.49 535.6 878.72 535.62 880.85 535.65 882.3 535.65
884.41 535.68 889.23 535.71 892.47 535.77 895.11 535.8 896.83 535.83
899.82 535.86 904.82 535.95 907.72 535.99 908.06 536.02 909.18 536.21
912.08 536.78 912.76 536.93 913.94 537.05 915.12 537.13 917.16 537.23
922.98 537.47 923.7 537.51 926.61 537.63 927.33 537.67 931.86 537.86
932.77 537.91 935.32 538.01 939.45 538.11 939.82 538.11 942.58 538.18
945.14 538.23 947.04 538.28 948.06 538.28 950.83 538.32 956.3 538.37
959.29 538.41 960.02 538.41 962.92 538.45 963.65 538.45 968.73 538.51
969.46 538.51 972.36 538.54 974.51 538.57 978.17 538.6 981.8 538.65
982.53 538.65 984.54 538.68 985.44 538.68 992.58 538.76 1018.12 538.76

1018.66 538.77 1038.12 538.77 1043.82 538.83 1044.99 538.85 1049.51 538.89
1050.43 538.91 1052.98 538.93 1056.61 538.98 1057.49 538.98 1063.15 539.04
1068.23 539.1 1068.96 539.1 1071.14 539.13 1072.78 539.14 1074.77 539.17
1075.5 539.17 1077.49 539.2 1079.13 539.21 1082.03 539.25 1082.9 539.25
1084.94 539.28 1087.46 539.3 1089.26 539.33 1095.05 539.39 1096.54 539.39

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	664.68	.03	673.97	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
664.68 673.97 169.75 169.75 169.75 .1 .3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	296.4	534.57	F

CROSS SECTION OUTPUT Profile #Floodway

E.G. Elev (ft)	534.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.100	0.030	
W.S. Elev (ft)	534.89	Reach Len. (ft)			
Crit W.S. (ft)	534.57	Flow Area (sq ft)	234.51	8.39	
E.G. Slope (ft/ft)	0.003874	Area (sq ft)	234.51	8.39	
Q Total (cfs)	173.95	Flow (cfs)	150.81	23.14	
Top Width (ft)	412.29	Top Width (ft)	403.00	9.29	
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.64	2.76	
Max Chl Dpth (ft)	3.95	Hydr. Depth (ft)	0.58	0.90	
Conv. Total (cfs)	2794.9	Conv. (cfs)	2423.1	371.8	
Length Wtd. (ft)		Wetted Per. (ft)	406.29	9.91	
Min Ch El (ft)	533.71	Shear (lb/sq ft)	0.14	0.20	
Alpha	2.67	Stream Power (lb/ft s)	0.09	0.56	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

SUMMARY OF MANNING'S N VALUES

River:NB Raritan Trib

Reach	River Sta.	n1	n2	n3
Reach 1	1954	.1	.03	.1
Reach 1	1873	.1	.03	.1
Reach 1	1782	.1	.03	.1
Reach 1	1726	.1	.03	.1
Reach 1	1622	.1	.03	.1
Reach 1	1532	.1	.03	.1
Reach 1	1494	.1	.03	.1
Reach 1	1462	.1	.03	.1
Reach 1	1430	.1	.03	.1

Reach 1	1407	.1	.03	.1

SUMMARY OF REACH LENGTHS

River: NB Raritan Trib

Reach	River Sta.	Left	Channel	Right
Reach 1	1954	99.91	99.91	99.91
Reach 1	1873	79.5	79.5	79.5
Reach 1	1782	71.34	71.34	71.34
Reach 1	1726	128.93	128.93	128.93
Reach 1	1622	83.43	83.43	83.43
Reach 1	1532	37.6	37.6	37.6
Reach 1	1494	31.89	31.89	31.89
Reach 1	1462	32.02	32.02	32.02
Reach 1	1430	87.52	87.52	87.52
Reach 1	1407	169.75	169.75	169.75

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: NB Raritan Trib

Reach	River Sta.	Contr.	Expan.
Reach 1	1954	.1	.3
Reach 1	1873	.1	.3
Reach 1	1782	.1	.3
Reach 1	1726	.1	.3
Reach 1	1622	.1	.3
Reach 1	1532	.1	.3
Reach 1	1494	.1	.3
Reach 1	1462	.1	.3
Reach 1	1430	.1	.3
Reach 1	1407	.1	.3

Profile Output Table - Encroachment 1

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
Reach 1	1954	Floodway	540.66	0.00	541.36	16.84	154.79	564.15		564.15	586.16	586.16	
Reach 1	1873	Floodway	539.36	0.00	539.58	33.53	154.79	643.27		643.27	676.98	676.98	
Reach 1	1782	Floodway	538.71	0.00	539.12	116.75	27.17	125.98	1.65	0.00			

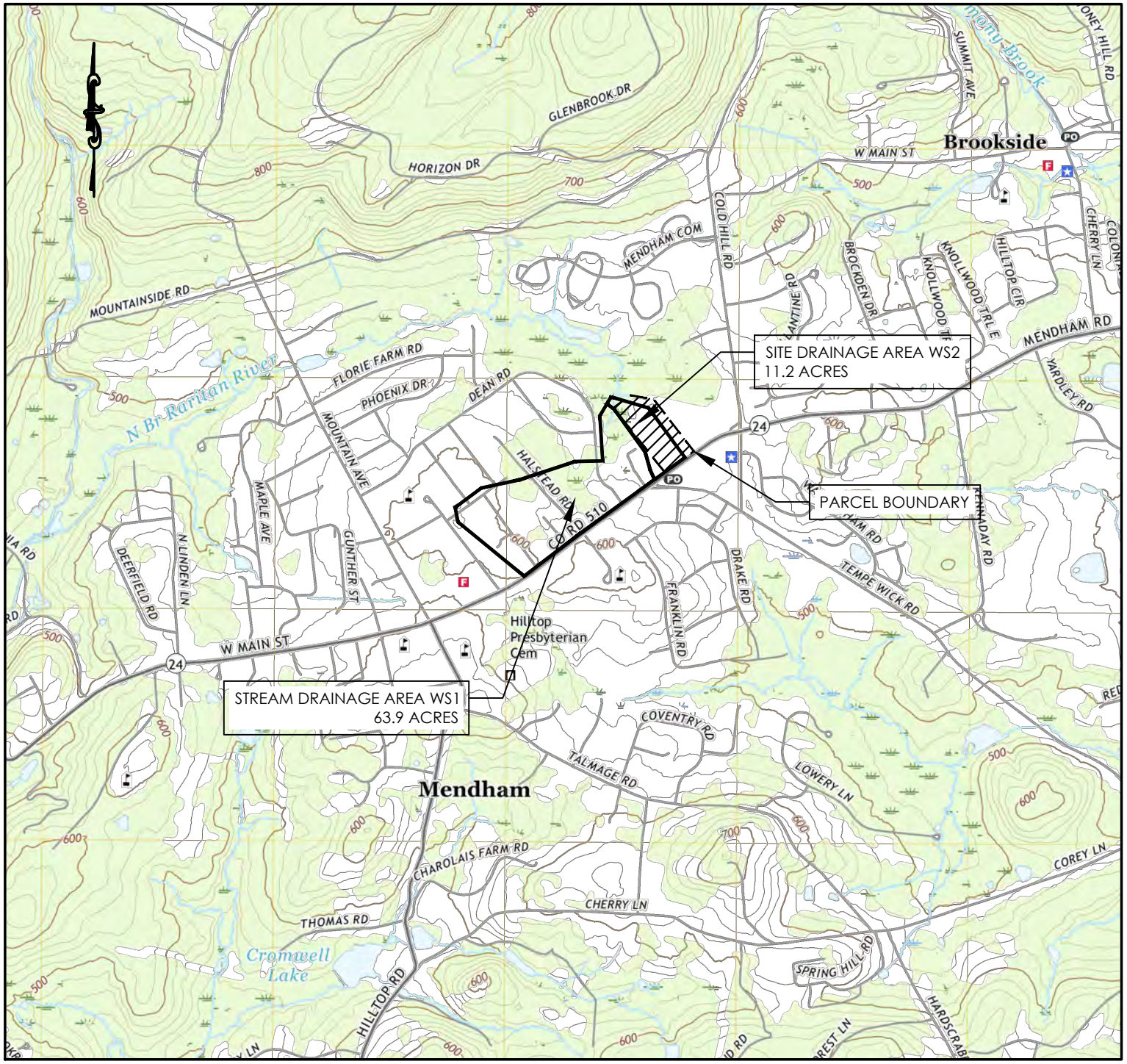
728.96 741.05 1095.02
Reach 1 1726 Floodway 537.67 0.02 538.03 82.87 61.93 92.86 700.36
774.31 783.23 783.23
Reach 1 1622 Floodway 536.75 0.21 536.90 84.46 16.22 102.36 55.37 795.05
825.03 842.41 879.51
Reach 1 1532 Floodway 536.32 0.18 536.49 111.22 33.22 102.43 38.30 400.39
451.92 474.73 511.61
Reach 1 1494 Floodway 536.15 0.22 536.23 136.96 50.75 38.11 85.09 807.26
885.14 893.63 944.22
Reach 1 1462 Floodway 535.48 0.01 535.87 89.65 3.33 120.80 49.82 535.88
554.84 580.62 627.15
Reach 1 1430 Floodway 535.20 0.17 535.21 359.09 163.63 10.32 594.63
961.79 972.20 972.20
Reach 1 1407 Floodway 534.89 0.20 534.92 412.29 150.81 23.14 257.96
664.68 673.97 673.97

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Floodway

River: NB Raritan Trib Reach: Reach 1 RS: 1954 Profile: Floodway
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1782 Profile: Floodway
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1726 Profile: Floodway
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: NB Raritan Trib Reach: Reach 1 RS: 1622 Profile: Floodway
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1532 Profile: Floodway
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1494 Profile: Floodway
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1462 Profile: Floodway
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: NB Raritan Trib Reach: Reach 1 RS: 1430 Profile: Floodway
Warning:Divided flow computed for this cross-section.
River: NB Raritan Trib Reach: Reach 1 RS: 1407 Profile: Floodway
Warning:Divided flow computed for this cross-section.

APPENDIX C: MAPS



CALL BEFORE YOU DIG!

NEW JERSEY LAW REQUIRES
3 WORKING DAYS NOTICE FOR
CONSTRUCTION PHASE AND 10 WORKING
DAYS IN DESIGN STAGE - STOP CALL
NEW JERSEY ONE CALL SYSTEM, INC.
REFERENCE NEW JERSEY TITLE 48, CHPT. 2, ARTICLE 9

1-800-272-1000

STATE OF NEW JERSEY CERTIFICATE OF AUTH. NO.: 24GA27976800

PROJECT NOTES

DATE	DESCRIPTION

REVISIONS

DATE

PROJECT NAME/LOCATION:

BLOCK 801, LOT 20
84-90 EAST MAIN STREET, MENDHAM BOROUGH

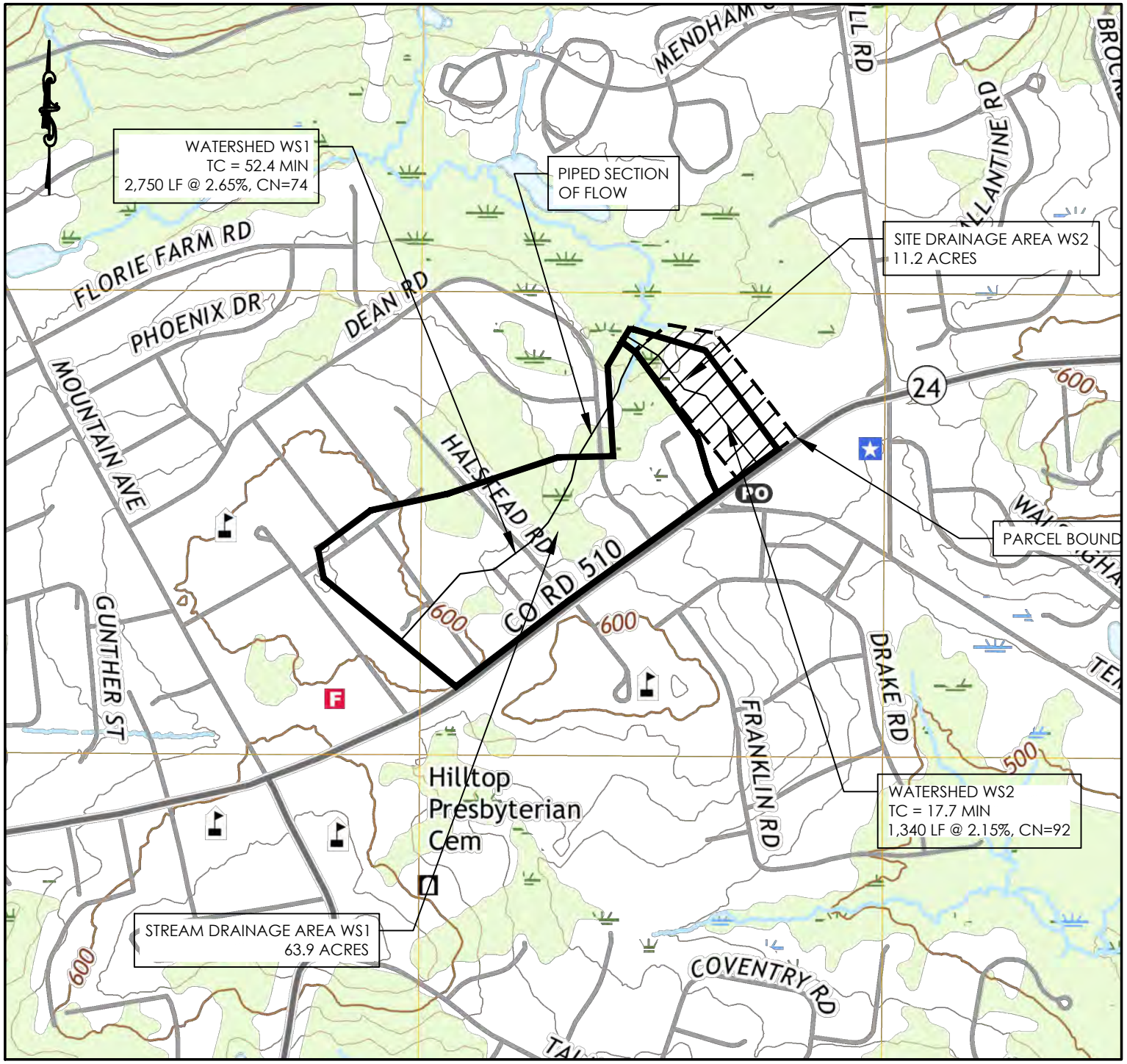
DRAWING NAME:

USGS MAP
WATERSHEDS
MENDHAM QUADRANGLE

DATE:	05/24/2021
PROJECT NO.:	1934.003
SCALE:	1" = 2,000'
DRAWN BY:	MH
CHECKED BY:	MH

SHEET NO.

1 OF 1



CALL BEFORE YOU DIG!

NEW JERSEY LAW REQUIRES 3 WORKING DAYS NOTICE FOR CONSTRUCTION PHASE AND 10 WORKING DAYS IN DESIGN STAGE - STOP CALL
NEW JERSEY ONE CALL SYSTEM, INC.
REFERENCE NEW JERSEY TITLE 48, CHPT. 2, ARTICLE 9
1-800-272-1000

STATE OF NEW JERSEY CERTIFICATE OF AUTH. NO.: 24GA27976800

PROJECT NOTES

DATE	DESCRIPTION

REVISIONS

DATE

PROJECT NAME/LOCATION:

BLOCK 801, LOT 20
84-90 EAST MAIN STREET, MENDHAM BOROUGH

DRAWING NAME:

USGS MAP
WATERSHEDS WITH TC PATHS
MENDHAM QUADRANGLE

DATE:	05/24/2021
PROJECT NO.:	1934.003
SCALE:	1" = 1,000'
DRAWN BY:	MH
CHECKED BY:	MH

SHEET NO.

1 OF 1