GRE-68-12.65

PID No. 115388

ODOT District 8

I have completed my review and I have no comments.

LD-51, this H&H report, and LD-50 can be submitted to the local floodplain coordinator

The TAF will need to be reviewed by Tony, but his review won't impact the floodplain coordination.

HYDROLOGY AND HYDRAULICS REPORT

Revised February 2025

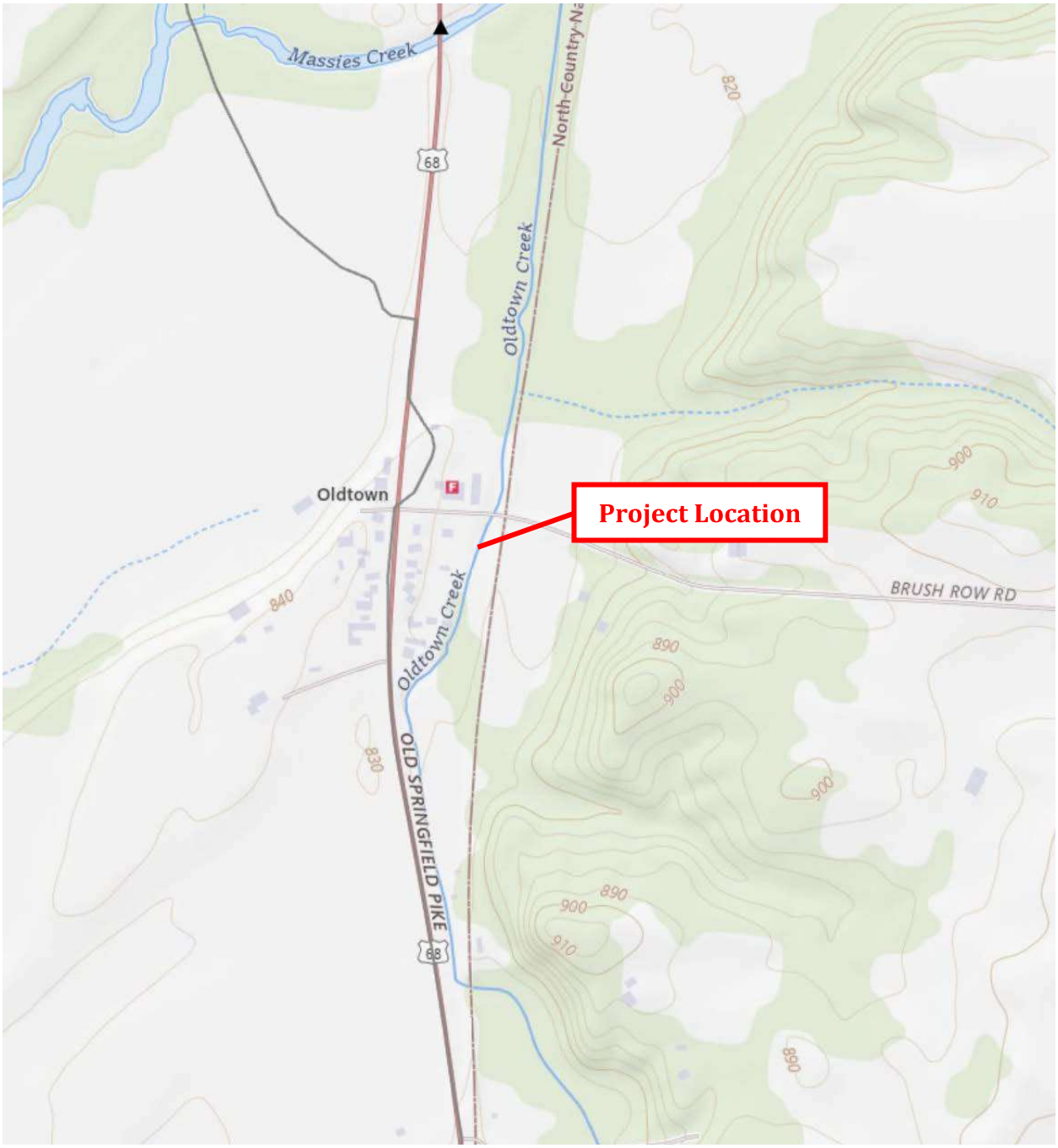
REVIEW COMPLETE

PM	
BRIDGES	
CONSTRUCT	
DRAINAGE	Tami Brehm, P.E. 03/05/2025
ENVIRON	
GEOTECH	
ITS	
MOT	
PAVEMENT	
ROADWAY	
R/W	
SURVEY	
TRAFFIC	
UTILITIES	
OTHER	
OTHER	

6612 Singletree Drive
Columbus, OH 43229
614.656.2424
www.cmtran.com

Table of Contents

I. Location Map



II. Project Description

A. General

This project involves the preparation of construction plans for the construction of a shared use path bridge over US 68 and Oldtown Creek and re-grading of a portion of the existing Little Miami Scenic Trail in Greene County, Ohio. The purpose of this study is to perform a hydraulic analysis on both the existing channel and the proposed structure to estimate the design (20% Annual Exceedance Probability, or AEP) and check (1% AEP) discharge frequency headwater elevations. The proposed bridge is located in Federal Emergency Management Agency (FEMA) Zone AE, indicating it is subject to inundation by the 1% AEP storm event. The bridge location is shown in FIRM 39057C0135E located in Appendix B.

A scour analysis was completed for the design scour (4% AEP) and check scour (2% AEP) storm events.

B. Site Location

This site is located approximately 235 feet south of Brush Row Road in Xenia Township in Greene County, Ohio.

Site coordinates are:
Latitude: 39°43'46.65" N
Longitude: 83°56'12.36" W

C. Existing Conditions

The proposed shared use path bridge will span over US 68 and Oldtown Creek within a Federal Emergency Management Agency (FEMA) regulated floodplain (Zone AE) with a regulatory flood elevation of approximately 831.58 at the proposed structure. The proposed crossing is close to an existing structure on Brush Row Road and upstream of the confluence with Massies Creek. The Flood Insurance Rate Map (FIRM) and portions of the FIS can be seen in Appendix B.

D. Proposed Structure

The proposed structure will be a four-span structure with prefabricated steel trusses for spans 1 and 4 and prestressed concrete I-beams for spans 2 and 3 with concrete abutments and piers supported on cast-in-place reinforced concrete piles. The proposed span lengths are 95'-8", 2 @ 117'-6", and 149'-8" c/c of substructure units with no skew. The toe of curb to toe of curb width will be 15'-0" with a 1'-0" concrete curb and wood railing on both sides.

E. Design Discharge

The ODOT Location and Design Manual (L&D) Volume 2 specifies that a 20% AEP design storm be used for this bicycle pathway. The design will also be checked for the 1% AEP storm. Since L&D 2 does not specify a scour design and check flood associated with a 20% AEP Design storm, the least frequent scour flood parameters (4% AEP Scour design flood and 2% Scour check flood) were used for the shared use path.

F. Geometry

OpenRoads Designer (ORD) was used to create a complex terrain from OSIP imagery, survey, and lidar data. This created the most accurate representation of the waterway and overbanks. Slope break lines were placed to match the 100-year base flood cross sections C-C, D-D, E-E, two known water surface elevations from the FEMA floodplain, and additional cross sections upstream and downstream of the bridges. The ORD model was exported to HEC-RAS to create the geometric data. Carpenter Marty (CM) surveyed the bridge geometry for the Brush Row Road structure, which was added to the geometric data in the existing model.

Hydraulic Data

A. Discharge Calculations and Drainage Area

Since this project is located within a FEMA Zone AE in the Flood Insurance Study, base flood elevations have been determined and are depicted on the FIRM. The FEMA Engineering Library was consulted for electronic files, and it was determined that no files for the effective model were available. Therefore, the existing conditions model is used for determining if the proposed conditions result in an increase in water surface elevations and impacts to other parameters such as velocity.

Peak discharge rates used in the analysis were obtained from the FEMA Flood Insurance Study (FIS) for Oldtown Creek for the 1% and 2% AEP design frequencies. The FIS indicates these peak discharges are taken from the mouth of Oldtown Creek, which is approximately 2,715 feet downstream of this site. These peak discharges are likely conservative for the project site. Since FIS report did not have the 20% AEP and 4% storm event flows, the equivalent discharge flows were calculated according to logarithmic regression using values provided in the FIS report to interpolate between the flows for 10% AEP, 2% AEP, 1% AEP and 0.2% AEP storm events. The FIS report has a drainage basin area of 10.6 square miles at the mouth of Oldtown Creek, which corresponds to the flow used in the modeling. Peak discharges are listed in Table 1. FIS discharges were used for all modeling. Streamstats values taken at the project site are provided for comparison only.

Table 1 – Peak Discharges

Annual Exceedance Probability (AEP)	StreamStats Peak Discharge (cfs)	FIS Peak Discharge from mouth at Oldtown Creek (cfs)
20%	1070	763#
4%	1940	1499#
2%	2370	1740*
1%	2830	2000*

* The FIS discharge used in accordance with L&D 2 1003.1.2
# Equivalent discharge using known FIS discharge values and logarithmic regression

B. Ineffective Flow Areas, Levees, and Obstructions

Ineffective flow areas, levees and obstructions were used in our HEC-RAS model. Ineffective flow areas were identified at each river station in the model. Ineffective flow areas will be used for storage calculations and wetted cross-section parameters, but are not included for active flow. Levees were placed at locations where AEP storm flows would not overtop the existing terrain. Obstructions were placed to model existing structures, such as houses, garages, and barns in the area.

C. HEC-RAS Modeling Parameters

Structure hydraulics for the existing conditions have been calculated using HEC-RAS Version 6.6. The proposed crossing is within a FEMA floodplain with a base flood elevation of 829.1 at Section C-C and 834.0 at Section E-E as set forth from the Floodway Data in the FIS. One boundary condition was used for each of the profiles to analyze steady flow data. The 1% profile used the known FIS water surface elevation boundary conditions for the FIS C-C crossing and the FIS volumetric flow rate. Since the 20% AEP flow did not correspond to an FIS profile, the use of a normal depth boundary condition was used with the calculated equivalent FIS discharge volumetric flow rate. The slope of the energy grade line produced by the 1% AEP was used in the normal depth boundary condition for all other AEP flows.

Manning's "n" values for channel roughness were determined from the FIS for Oldtown Creek. These values ranged from 0.06 at the channel bottom to 0.07 at the left and right overbanks. Additional Manning's values were also used for heavily wooded areas (0.10), asphalt pavement (0.013), low grass (0.03), and crops (0.035) as needed per the aerial imagery and site visits. Once the existing condition model was completed, it was then used for comparison with the proposed condition model. With no electronic data files available to model the effective hydraulic model, the existing condition model will be used as the duplicate effective model, corrected effective model, and pre-project (existing) conditions model.

The proposed bridge is located approximately 150 feet upstream of FIS Section D-D and about 250 feet upstream of the existing bridge at Brush Row Road. Span 4 spans over the floodway as pier 3 and the forward abutment are situated beyond the limits of the floodway. No fill will be added to the floodway, and minimal fill will be added in the floodway fringe at the forward abutment and along the Little Miami Scenic Trail.

III. HES-RAS Results

Results are tabulated in Table 2 and Table 3 below for the 20% AEP and 1% AEP discharge storm events. The table compares the existing channel headwater elevations and velocities with headwater elevations and velocities resulting from the addition of the proposed crossing. The variance is provided between the existing channel conditions and the proposed bridge.

Table 2 – Summary of HEC-RAS Results

River Station	Annual Exceedance Probability	FIS Channel Headwater Elevation	Ex. Channel Headwater Elevation	Prop. Bridge Headwater Elevation	Variance with Ex. Channel (ft)	FIS Channel Velocity (ft/s)	Ex. Bridge Channel Velocity (ft/s)	Prop. Bridge Channel Velocity (ft/s)	Variance with Ex. Channel (ft/s)
1401.06	20%		832.56	832.57	+0.01		1.07	1.06	-0.01
FIS E-E	1%	834.0	833.28	833.27	-0.01	6.8	2.00	2.00	0.00
1109.83	20%		830.54	830.53	-0.01		3.67	3.68	+0.01
	1%		832.07	832.04	-0.03		5.40	5.45	+0.05
796.16	20%		830.07	830.03	-0.04		1.78	1.84	+0.06
	1%		831.68	831.63	-0.05		2.02	2.06	+0.04
703.80	20%		830.02	829.99	-0.03		1.18	1.33	+0.05
	1%		831.63	831.61	-0.02		1.52	1.67	+0.15
679.82	20%		NA	829.98	NA		NA	1.40	NA
BR U	1%		NA	831.59	NA		NA	1.80	NA
Proposed Bridge									
679.82	20%		NA	829.97	NA		NA	1.63	NA
BR D	1%		NA	831.57	NA		NA	2.06	NA
651.58	20%		829.99	829.96	-0.03		1.62	1.58	-0.04
	1%		831.59	831.57	-0.02		2.04	1.94	-0.10
545.13	20%		829.85	829.85	0.00		2.43	2.43	0.00
FIS D-D	1%	831.2	831.38	831.38	0.00	3.3	3.90	3.90	0.00
492.31	20%		829.85	829.85	0.00		1.13	1.13	0.00
	1%		831.40	831.40	0.00		1.57	1.57	0.00
431	20%		829.85	829.85	0.00		6.80	6.80	0.00
BR U	1%		831.40	831.40	0.00		7.30	7.30	0.00
Existing Bridge at Brush Row Road									
431	20%		829.71	829.71	0.00		3.92	3.92	0.00
BR D	1%		830.98	830.98	0.00		5.32	5.32	0.00
394.75	20%		828.17	828.17	0.00		3.99	3.99	0.00
	1%		829.42	829.42	0.00		7.66	7.66	0.00
242.24	20%		827.76	827.76	0.00		2.57	2.57	0.00
FIS C-C	1%	829.1	829.10	829.10	0.00	5.8	3.11	3.11	0.00

Table 3 – Summary of HEC-RAS Bridge Parameter Results

	AEP	Waterway Opening (sq. ft.)	Low Chord Elevation	Clearance (ft)
Existing	20%	NA	NA	NA
	1%			NA
Proposed	20%	6036	833.1	3.1
	1%			1.5

The low chord of the proposed bridge will clear the 20% AEP design storm event and the 1% AEP check storm event. The proposed conditions will not increase the 1% AEP water surface elevation.

IV. Deck Drainage

The bridge deck will drain along the 0.01 cross-slopes of the bridge to the curbs at the north and south sides where it will flow to the west due to the profile grade. Scoping documents called for scuppers to be provided near the end of each span to minimize the spread and flow over the bridge expansion joints. In addition, the spread is to be checked for the 50% AEP flow to ensure there is a minimum 2 feet of dry path along the center of the bridge. A spread analysis was performed with these parameters and it was determined that the required 2 feet of dry path could be met without any scuppers. However, discussions with ODOT indicated scuppers were to be provided.

Accordingly, scuppers will be provided upstation of Pier 3 and the forward abutment to minimize storm runoff over the expansion joints. These scuppers will be located on both sides of the bridge deck and will be per ODOT standard construction drawing GSD-1-19, with the exception that the HSS18x6x3/8 will be oriented with the long axis parallel to the bridge traffic to minimize the impact to the traversable deck. Calculations indicate the spread will be just under 2'-0" at the rear abutment and 4'-8" at the forward abutment, providing 11'-0" and 5'-8" of dry path respectively. Bypass runoff at the forward abutment is estimated to be 0.169 cfs. L&D Volume 2 1103.8.2 recommends providing a flume beyond the limits of the bridge at the forward abutment to accommodate this runoff.

V. Scour Analysis

Since L&D 2 does not specify a scour design and check flood associated with a 20% AEP Design storm, the least frequent scour flood parameters from Table 1008-1 (4% AEP Scour design flood and 2% Scour check flood) were used for the shared use path. The 2% AEP water surface elevation according to HEC-RAS model is 831.34. As such, scour was not evaluated at the rear abutment, nor Pier 1, as the proposed top of slope at those locations is above 831.34. The forward abutment scour depth was estimated using the NCHRP method through the FHWA Hydraulic Toolbox software. Contraction, Pier 2, and Pier 3 scour depths were estimated using the Cohesive Soil method.

Table 4 summarizes the results of the scour analysis for the 4% AEP scour design flood.

Table 4 – 4% AEP Scour Design Results

Location	Local Scour	Contraction Scour	Total Scour	Footing Elevation	Scour Elevation	Scour Below Footing
Rear Abut.	N/A	N/A	N/A	832.73	N/A	N/A
Pier 1	N/A	N/A	N/A	831.00	N/A	N/A
Pier 2	0.00 ft.	0.69 ft.	0.69 ft.	824.00	827.45	N/A
Pier 3	0.00 ft.	0.69 ft.	0.69 ft.	822.75	826.24	N/A
Forward Abut.	0.00 ft.	included	0.00 ft.	823.33	N/A	N/A

Table 5 summarizes the results of the scour analysis for the 2% AEP scour check flood.

Table 5 – 2% AEP Scour Check Results

Location	Local Scour	Contraction Scour	Total Scour	Footing Elevation	Scour Elevation	Scour Below Footing
Rear Abut.	N/A	N/A	N/A	832.73	N/A	N/A
Pier 1	N/A	N/A	N/A	831.00	N/A	N/A
Pier 2	0.00 ft.	0.75 ft.	0.75 ft.	824.00	827.39	N/A
Pier 3	0.00 ft.	0.75 ft.	0.75 ft.	822.75	826.18	N/A
Forward Abut.	0.00 ft.	included	0.00 ft.	823.33	N/A	N/A

The scour analysis and a graphical representation of the results are included in the appendix. The graphical representation shows the channel cross-section at the upstream face of the proposed structure and the associated scour.

According to the L&D 2, Table 1008-1 and Table 1107-1, scour design velocities for the proposed structure require Type C (2 ft. thick) rock channel protection to armor all proposed grading.

VI. Temporary Access Fill (TAF)

The contractor intends to utilize a TAF in Oldtown Creek during the construction of the shared use path bridge. The Special Provisions detail the requirements for a TAF on this project. In addition to the STD (Standard Temporary Discharge) that the Special Provisions require, the scoping documents also require that the 1% AEP be analyzed. Per the scoping documents, the TAF cannot create a rise higher than the ordinary high water mark (OHWM) for the STD flow. In addition, the TAF cannot create any rise in the 1% AEP when compared to the existing conditions.

USGS StreamStats was used to determine the STD flow (2 x 19.3 cfs = 38.6 cfs) to be used in the TAF analysis. The TAF analysis for the 1% AEP utilized the 1% AEP flow (2000 cfs) provided in the FIS. The TAF Exhibit shows a single causeway with stream flows maintained using (2) 42" diameter conduits. It is predicted that the Waterway Special Provisions permit will prohibit in-stream work between April 15th and June 30th. Work within the TAF may occur at any time during the construction project contract limits. Table 6 summarizes the TAF analysis for the STD and 1% AEP flows.

Table 6 – Summary of HEC-RAS Results for TAF Analysis

River Station	Annual Exceedence Probablility	Ex. Channel Headwater Elevation	TAF Headwater Elevation	Variance with Ex. Channel (ft)
796.16	STD	825.35	825.68	+0.33
	1% AEP	831.62	831.61	-0.01
703.80	STD	825.22	825.62	+0.40
	1% AEP	831.59	831.58	-0.01
651.58	STD	825.15	825.15	0.00
	1% AEP	831.55	831.55	0.00
545.13	STD	825.02	825.02	0.00
	1% AEP	831.26	831.26	0.00
492.31	STD	824.99	824.99	0.00
	1% AEP	831.30	831.30	0.00

As shown in the table above, the Temporary Access Fill will not increase the 1% AEP Water Surface Elevation. In addition, the STD AEP Water Surface Elevation will not overtop the proposed TAF elevation of 828.00.

VII. Summary of Results

Both the design (20% AEP) and check (1% AEP) floods clear the low chord of the proposed bridge. The Temporary Access Fill will not increase the 1% AEP water surface elevation. The proposed conditions will not increase the 1% AEP water surface elevation.

There are residential structures located near this site, but none of the structures will be adversely affected since the proposed structure will not increase the footprint of the floodplain.

Appendix A

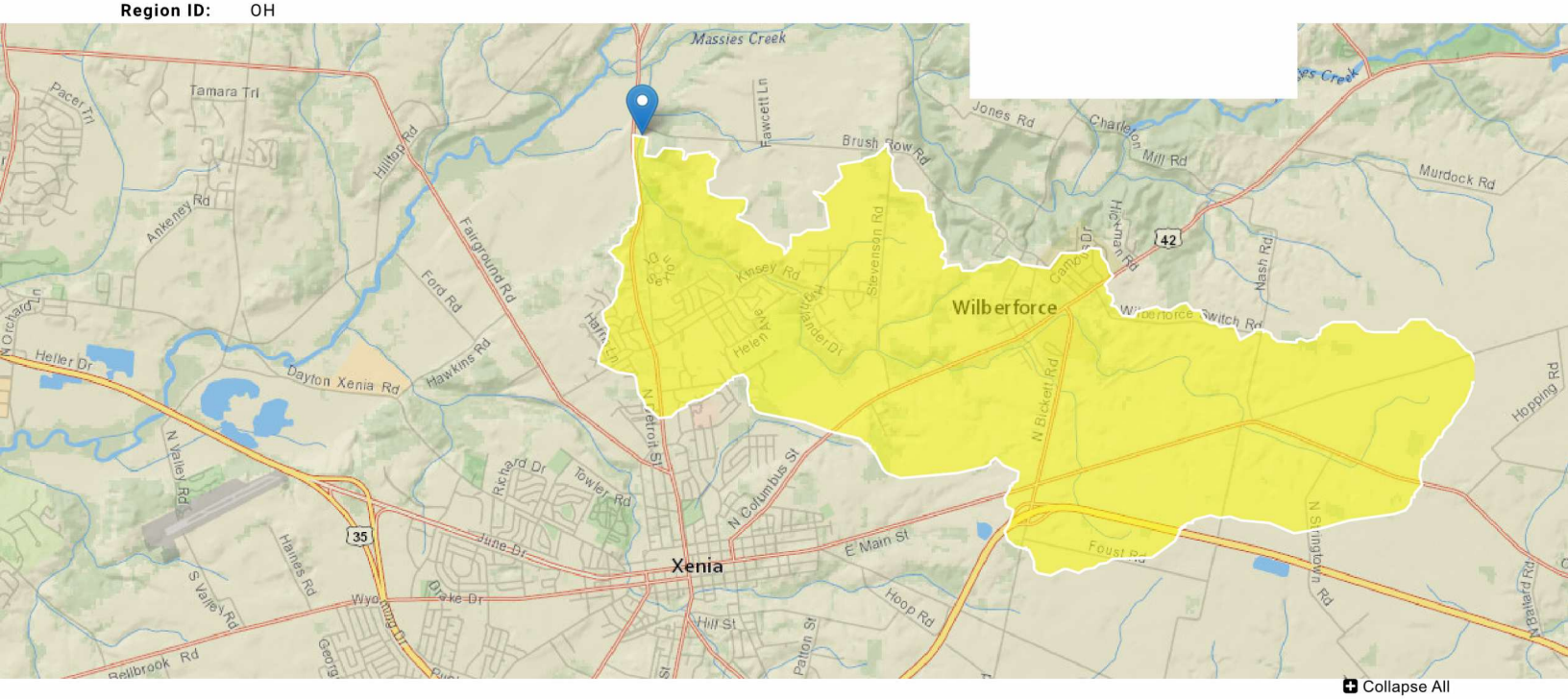
Drainage Area Map and StreamStats Data

Appendix A

CARPENTER MARTY transportation

GRE-68-12.65 StreamStats Report

Region ID: OH



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CSL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	29.4	feet per mi
DRNAREA	Area that drains to a point on a stream	9.62	square miles
FOREST	Percentage of area covered by forest	9.02	percent
LAT_CENT	Latitude of Basin Centroid	39.7052	decimal degrees
LC92STOR	Percentage of water bodies and wetlands determined from the NLCD	0.18	percent
OHREGA	Ohio Region A Indicator	1	dimensionless
OHREGC	Ohio Region C Indicator	0	dimensionless
PRECIPCENT	Mean Annual Precip at Basin Centroid	39	inches
STREAM_VARG	Streamflow variability index as defined in WRIR 02-4068, computed from regional grid	0.44	dimensionless

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Flow Full Model Reg A SIR2019 5018]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CSL1085LFP	Stream Slope 10 and 85 Longest Flow Path	29.4	feet per mi	1.53	516
DRNAREA	Drainage Area	9.62	square miles	0.04	5989
LC92STOR	Percent Storage from NLCD1992	0.18	percent	0	25.35
OHREGA	Ohio Region A Indicator 1 if in A else 0	1	dimensionless	0	1
OHREGC	Ohio Region C Indicator 1 if in C else 0	0	dimensionless	0	1

Peak-Flow Statistics Flow Report [Peak Flow Full Model Reg A SIR2019 5018]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	PIL	PIU	ASEp
50-percent AEP flood	619	ft^3/s	328	1170	40.1
20-percent AEP flood	1070	ft^3/s	592	1930	37.2
10-percent AEP flood	1430	ft^3/s	786	2600	37.6
4-percent AEP flood	1940	ft^3/s	1060	3550	38.1
2-percent AEP flood	2370	ft^3/s	1280	4390	37.8
1-percent AEP flood	2830	ft^3/s	1510	5290	39.6
0.2-percent AEP flood	4030	ft^3/s	2140	7610	40.3

Peak-Flow Statistics Citations

Koltun, G.F.,2019, Flood-frequency estimates for Ohio streamgages based on data through water year 2015 and techniques for estimating flood-frequency characteristics of rural, unregulated Ohio streams: U.S. Geological Survey Scientific Investigations Report 2019–5018, 25 p. (https://dx.doi.org/10.3133/sir20195018)

Monthly Flow Statistics

Monthly Flow Statistics Parameters [Low Flow LatLE 41.2 wri02 4068]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	9.62	square miles	0.12	7422
FOREST	Percent Forest	9.02	percent	0	99.1
LAT_CENT	Latitude of Basin Centroid	39.7052	decimal degrees	38.68	41.2
LC92STOR	Percent Storage from NLCD1992	0.18	percent	0	19
PRECIPCENT	Mean Annual Precip at Basin Centroid	39	inches	34	43.2
STREAM_VARG	Streamflow Variability Index from Grid	0.44	dimensionless	0.25	1.13

Monthly Flow Statistics Flow Report [Low Flow LatLE 41.2 wri02 4068]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	SE	ASEp
January Mean Flow	14.1	ft^3/s	16.6	16.6
February Mean Flow	17.1	ft^3/s	11.9	11.9
March Mean Flow	19.3	ft^3/s	14	14
April Mean Flow	17.6	ft^3/s	11.2	11.2
May Mean Flow	12	ft^3/s	19.5	19.5
June Mean Flow	8.5	ft^3/s	27	27
July Mean Flow	5.32	ft^3/s	28.2	28.2
August Mean Flow	4.16	ft^3/s	36.8	36.8
September Mean Flow	2.52	ft^3/s	43.6	43.6
October Mean Flow	2.5	ft^3/s	50.8	50.8
November Mean Flow	5.02	ft^3/s	37.5	37.5
December Mean Flow	9.83	ft^3/s	21.8	21.8

Monthly Flow Statistics Citations

Koltun, G. F., and Whitehead, M. T.,2002, Techniques for Estimating Selected Streamflow Characteristics of Rural, Unregulated Streams in Ohio: U. S. Geological Survey Water-Resources Investigations Report 02-4068, 50 p (https://pubs.er.usgs.gov/publication/wri024068)

Application Version: 4.25.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

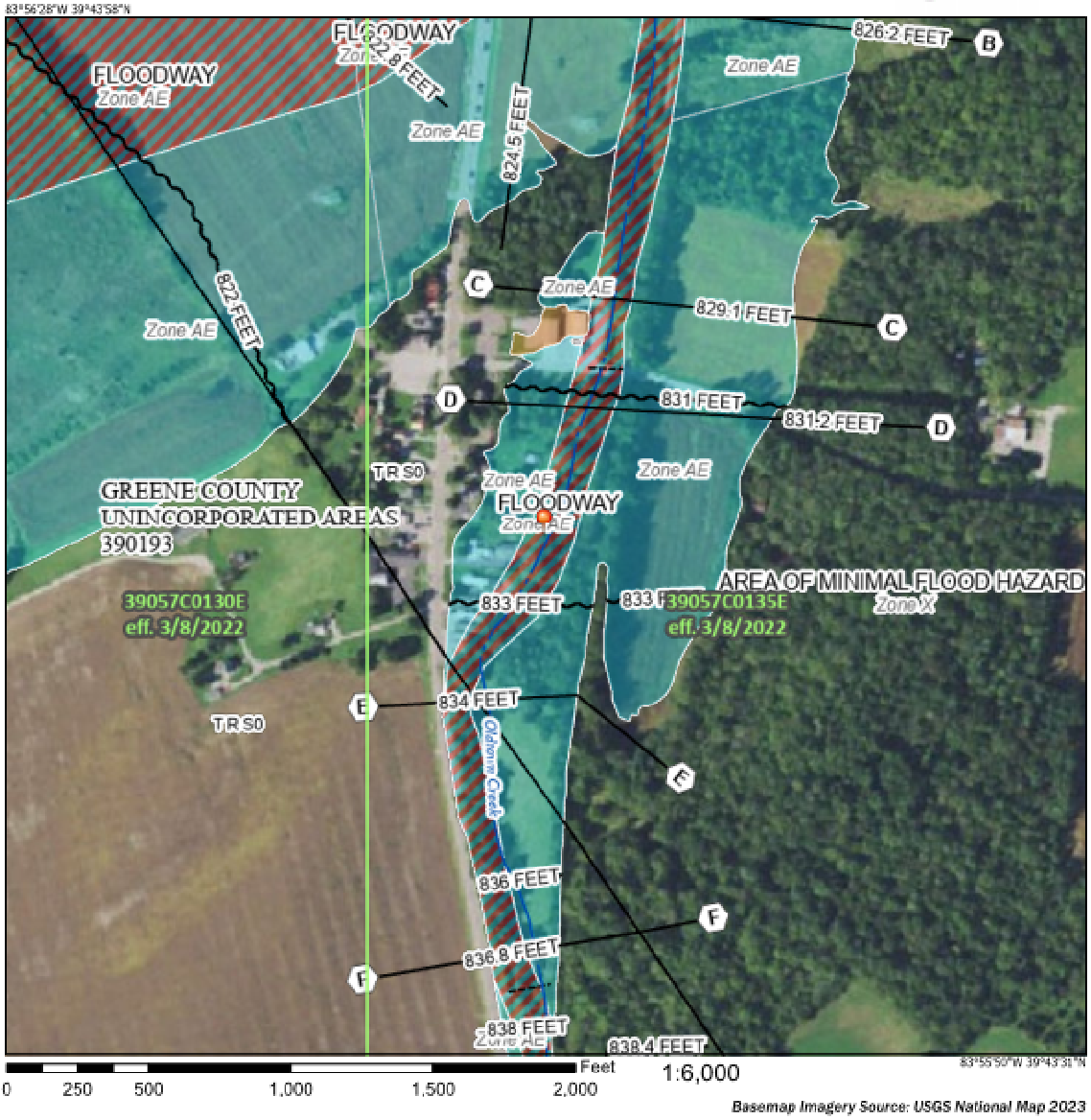
Appendix B

FIRMETTE and Flood Insurance Study Data

CARPENTER MARTY transportation

Appendix B

National Flood Hazard Layer FIRMette



Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/13/2024 at 9:26 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 2

GREENE COUNTY, OHIO

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
BEAVERCREEK, CITY OF	390876
BELLBROOK, CITY OF	390194
BOWERSVILLE, VILLAGE OF *	390948
CEDARVILLE, VILLAGE OF	390607
CENTERVILLE, CITY OF	390408
CLIFTON, VILLAGE OF	390678
FAIRBORN, CITY OF	390195
GREENE COUNTY UNINCORPORATED AREAS	390193
HUBER HEIGHTS, CITY OF*	390884
JAMESTOWN, VILLAGE OF	390881
KETTERING, CITY OF	390412
SPRING VALLEY, VILLAGE OF	390196
XENIA, CITY OF	390197
YELLOW SPRINGS, VILLAGE OF	390640

*No Special Flood Hazard Areas Identified

FEMA

REVISED:

March 8, 2022

FLOOD INSURANCE STUDY NUMBER
39057CV001B
Version Number 2.5.3.5

Table 2: Flooding Sources Included in this FIS Report (*continued*)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Massies Creek	Cedarville, Village of; Greene County (Unincorporated Areas)	Confluence with Little Miami River	Approximately 1,100 feet upstream of US Hwy 42	05090202	10.5	Y	AE	09/01/2018
New Germany Branch	Beavercreek, City of of; Fairborn, City of; Greene County (Unincorporated Areas)	Confluence with Beaver Creek	Approximately 550 feet upstream of US Interstate 675	05090202	1.7	Y	AE	April 1979
New Germany Branch	Beavercreek, City of	Approximately 550 feet upstream of US Interstate 675	Approximately 900 feet upstream of New Germany Trebein Rd	05090202	1.1	Y	AE	01/16/2014
North Branch Little Sugar Creek	Greene County (Unincorporated Areas); Kettering, City of	Approximately 2,100 feet upstream of confluence with Little Sugar Creek	County Boundary	05090202	0.4	Y	AE	April 1979
North Fork Massies Creek	Cedarville, Village of; Greene County (Unincorporated Areas)	Confluence with Massies Creek	James Barber Rd	05090202	1.2	Y	AE	April 1979
North Wilberforce Brook	Greene County (Unincorporated Areas)	Confluence with Massies Creek	Charleton Mill Rd	05090202	0.8	Y	AE	April 1979
Oldtown Creek	Greene County (Unincorporated Areas); Xenia, City of	Confluence with Massies Creek	Federal Rd	05090202	7.2	Y	AE	April 1979
Painters Creek	Greene County (Unincorporated Areas)	Approximately 23,100 feet above Mouth	Hussey Rd	05090202	1.6	Y	AE	April 1979
Possum Run	Bellbrook, City of; Centerville, City of; Greene County (Unincorporated Areas)	Confluence with Little Sugar Creek	Interstate 675	05090202	2.3	Y	AE	December 1976
Ripple Road Brook	Greene County (Unincorporated Areas)	Confluence with Little Miami River	Approximately 2,400 feet upstream of Indian Ripple Rd	05090202	2.3	Y	AE	April 1979

Table 9: Summary of Discharges (*continued*)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
North Fork Massies Creek	At mouth	30.4	2,100	*	3,360	4,150	*	6,300
North Wilberforce Brook	At mouth	3.8	835	*	1,245	1,420	*	1,880
Oldtown Creek	At mouth	10.6	1,180	*	1,740	2,000	*	2,980
Oldtown Creek	Approximately 600 feet downstream of Kinsey Road	7.9	1,060	*	1,550	1,790	*	2,550
Painters Creek	Approximately 400 feet upstream of Spring Valley Paintersville Road	5.8	955	*	1,420	1,630	*	2,240
Possum Run	At mouth	2.4	400[1]	*	600[1]	700[1]	*	2,000[1]
Possum Run	Approximately 200 feet upstream of Belleview Drive	1.4	300	*	400	450	*	1,300
Ripple Road Brook	At mouth	3.8	820	*	1,220	1,400	*	1,830
Shawnee Creek	At confluence with Little Miami River	11.5	1,205	1,535	1,805	2,105	*	2,865
Shawnee Creek	Approximatley 1,100 feet downstream of Towler Road	9.0	1,475	1,985	2,455	2,935	*	4,090
Shawnee Creek	Approximatley 170 feet downstream of the confluence with Shawnee Creek Park Tributary	8.6	1,455	1,960	2,405	2,875	*	4,015

[1] Discharge values for Possum Creek were estimated from Figure 7 which was taken from the 1976 City of Bellbrook Flood Insurance Study

* Data not available

Table 12: Summary of Hydrologic and Hydraulic Analyses (*continued*)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Massies Creek	Confluence with Little Miami River	Approximately 1,100 feet upstream of US Hwy 42	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 5.0 and up	09/01/2018	AE w/ Floodway	Re-delineation of effective stream on 09/01/2018
New Germany Branch	Confluence with Beaver Creek	Approximately 550 feet upstream of US Interstate 675	Regression Equations	HEC-2 4.6.2 (May 1991)	April 1979	AE w/ Floodway	Re-delineation of effective stream on 09/01/2018
New Germany Branch	Approximately 550 feet upstream of US Interstate 675	Approximately 900 feet upstream of New Germany Trebein Rd	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 3.1.1 and up	01/16/2014	AE w/ Floodway	LOMR 13-05-4635P
North Branch Little Sugar Creek	Approximately 2,100 feet upstream of confluence with Little Sugar Creek	County Boundary	Regression Equations	HEC-2 4.6.2 (May 1991)	April 1979	AE w/ Floodway	Re-delineation of effective stream on 09/01/2018
North Fork Massies Creek	Confluence with Massies Creek	James Barber Rd	Regression Equations	HEC-2 4.6.2 (May 1991)	April 1979	AE w/ Floodway	Re-delineation of effective stream on 09/01/2018
North Wilberforce Brook	Confluence with Massies Creek	Charleton Mill Rd	Regression Equations	HEC-2 4.6.2 (May 1991)	April 1979	AE w/ Floodway	Re-delineation of effective stream on 09/01/2018
Oldtown Creek	Confluence with Massies Creek	Federal Rd	Regression Equations	HEC-2 4.6.2 (May 1991)	April 1979	AE w/ Floodway	Re-delineation of effective stream on 09/01/2018
Painters Creek	Approximately 23,100 feet above Mouth	Hussey Rd	Regression Equations	HEC-2 4.6.2 (May 1991)	April 1979	AE w/ Floodway	Re-delineation of effective stream on 09/01/2018
Possum Run	Confluence with Little Sugar Creek	Interstate 675	Regression Equations	HEC-2 4.6.2 (May 1991)	December 1976	AE w/ Floodway	Re-delineation of effective stream on 09/01/2018
Ripple Road Brook	Confluence with Little Miami River	Approximately 2,400 feet upstream of Indian Ripple Rd	Regression Equations	HEC-2 4.6.2 (May 1991)	April 1979	AE w/ Floodway	Re-delineation of effective stream on 09/01/2018
Shawnee Creek	Confluence with Little Miami River	Approximately 1,500 feet upstream of Bickett Rd	HEC-HMS 3.0 and up (Dec 2005)	HEC-RAS 5.0 and up	09/01/2018	AE w/ Floodway	

Table 13: Roughness Coefficients

Flooding Source	Channel “n”	Overbank “n”
Anderson Fork	0.035	0.06-0.8
Beaver Creek	0.04-0.06	0.05-0.07
Brewsters Run	0.03-0.06	0.025-0.15
Caesar Creek	0.06	0.045-0.14
Caesar Creek	0.03-0.06	0.03-0.15
Caeser Creek Tributary No. 2	0.055	0.08-0.15
Estate Brook	0.04	0.06
Fairbrook School Tributary	0.05	0.06
Fairgrounds Road Tributary	0.05	0.06
Glady Run	0.05	0.07
Little Beaver Creek	0.04-0.06	0.06-0.07
Little Miami River	0.045-0.055	0.08-0.12
Little Miami River	0.02-0.07	0.03-0.08
Little Sugar Creek	0.03-0.06	0.025-0.15
Ludlow Creek	0.05-0.06	0.06-0.07
Massies Creek	0.03-0.06	0.025-0.15
New Germany Branch	0.045-0.05	0.05-0.06
North Fork Massies Creek	0.05	0.07
North Wilberforce Brook	0.05	0.07
Oldtown Creek	0.05-0.06	0.06-0.07
Painters Creek	0.03-0.05	0.05-0.07
Possum Run	0.025-0.06	0.035-0.075
Ripple Road Brook	0.05	0.07
Shawnee Creek	0.045-0.07	0.03-0.14
Shawnee Creek Tributary	0.04-0.06	0.04-0.14
Shawnee Park Tributary	0.05-0.07	0.03-0.12
Shawnee Park Tributary	0.035	0.07-0.08
South Branch Caesar Creek	0.035	0.06-0.1
South Branch Caesar Creek	0.045-0.05	0.07
South Fork Massies Creek	0.035	0.06
South Fork Massies Creek	0.05	0.07
South Fork Massies Creek Tributary	0.035	0.06

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	740	66	343	5.8	825.6	823.2 [2]	824.0	0.8
B	1,530	106	488	4.1	826.2	826.2	827.1	0.9
C	2,270	85	343	5.8	829.1	829.1	829.9	0.8
D	2,530	120	605	3.3	831.2	831.2	832.0	0.8
E	3,430	62	293	6.8	834.0	834.0	834.8	0.8
F	4,170	105	595	3.4	836.8	836.8	837.8	1.0
G	4,700	122	887	2.3	838.4	838.4	839.3	0.9
H	5,230	70	417	4.8	838.7	838.7	839.6	0.9
I	5,440	56	234	8.5	839.6	839.6	840.2	0.6
J	5,810	65	421	4.7	842.0	842.0	842.5	0.5
K	6,340	65	382	5.2	843.2	843.2	843.9	0.7
L	6,860	45	248	8.1	845.7	845.7	846.4	0.7
M	8,180	46	305	6.5	851.8	851.8	852.8	1.0
N	9,080	44	237	8.4	859.9	859.9	860.4	0.5
O	11,040	54	247	7.5	878.4	878.4	879.2	0.8
P	11,190	38	188	9.5	882.3	882.3	882.3	0.0
Q	14,470	55	279	6.4	907.9	907.9	908.7	0.8
R	18,220	60	266	6.1	932.4	932.4	932.4	0.0
S	18,320	63	351	4.6	933.1	933.1	933.9	0.8
T	18,900	65	228	7.1	936.6	936.6	936.7	0.1
U	21,170	40	185	8.8	969.6	969.6	969.8	0.2
V	21,810	42	266	6.1	978.9	978.9	979.7	0.8
W	21,960	118	465	3.5	980.0	980.0	980.8	0.8
X	24,600	113	431	3.2	987.0	987.0	987.9	0.9
Y	24,760	68	358	3.9	987.4	987.4	988.3	0.9
Z	26,660	46	237	5.9	994.9	994.9	995.9	1.0

[1] FEET ABOVE MOUTH

[2] WATER SURFACE ELEVATION COMPUTED WITHOUT CONSIDERATION OF 1% ANNUAL CHANCE BACKWATER FROM MASSIES CREEK

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, OHIO

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: OLDTOWN CREEK

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 2 OF 2

GREENE COUNTY, OHIO

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
BEAVERCREEK, CITY OF	390876
BELLBROOK, CITY OF	390194
BOWERSVILLE, VILLAGE OF *	390948
CEDARVILLE, VILLAGE OF	390607
CENTERVILLE, CITY OF	390408
CLIFTON, VILLAGE OF	390678
FAIRBORN, CITY OF	390195
GREENE COUNTY UNINCORPORATED AREAS	390193
HUBER HEIGHTS, CITY OF*	390884
JAMESTOWN, VILLAGE OF	390881
KETTERING, CITY OF	390412
SPRING VALLEY, VILLAGE OF	390196
XENIA, CITY OF	390197
YELLOW SPRINGS, VILLAGE OF	390640

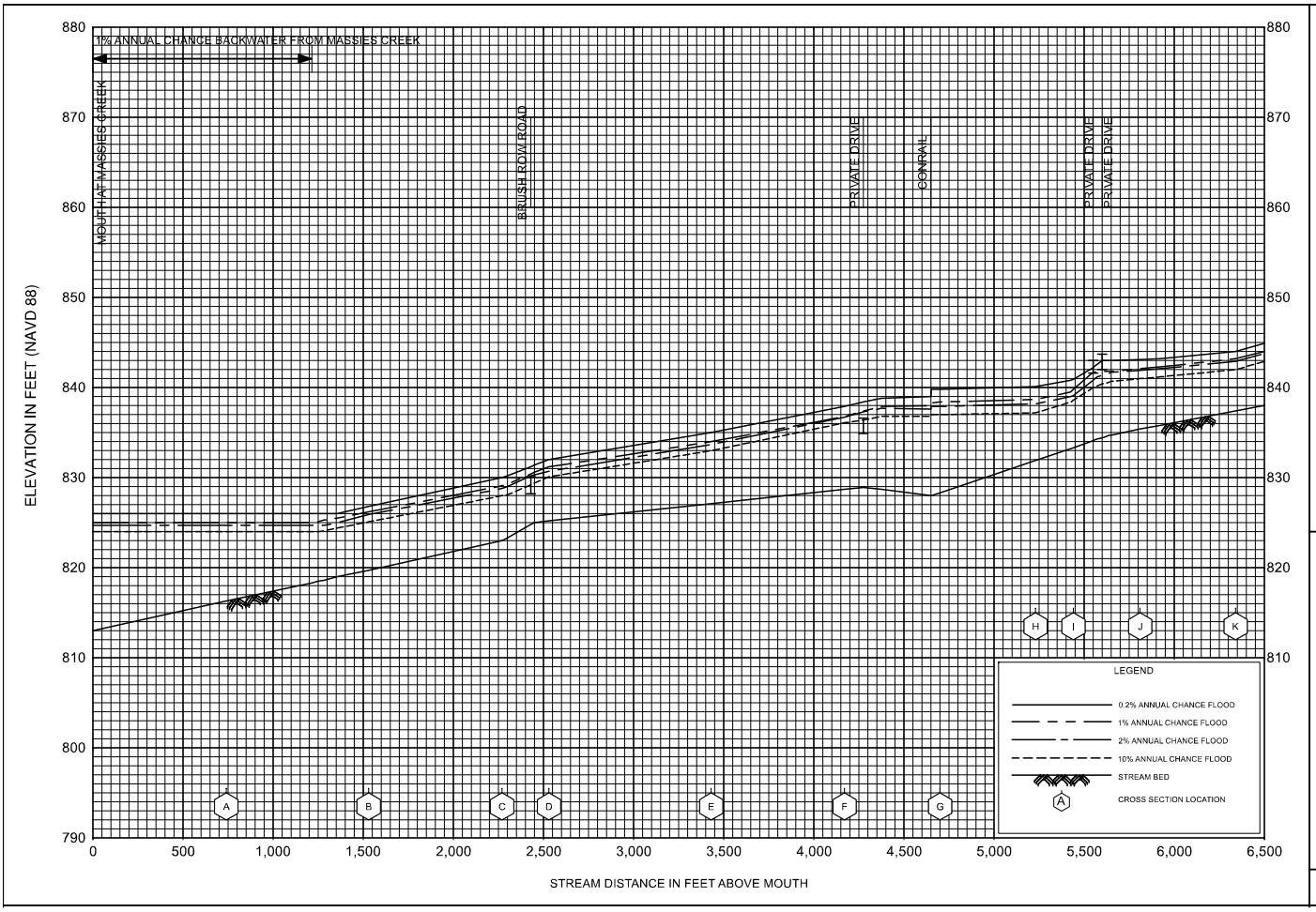
*No Special Flood Hazard Areas Identified

FEMA

REVISED:

March 8, 2022

FLOOD INSURANCE STUDY NUMBER
39057CV002B
Version Number 2.5.3.5



FLOOD PROFILES

OLDTOWN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, OH

AND INCORPORATED AREAS

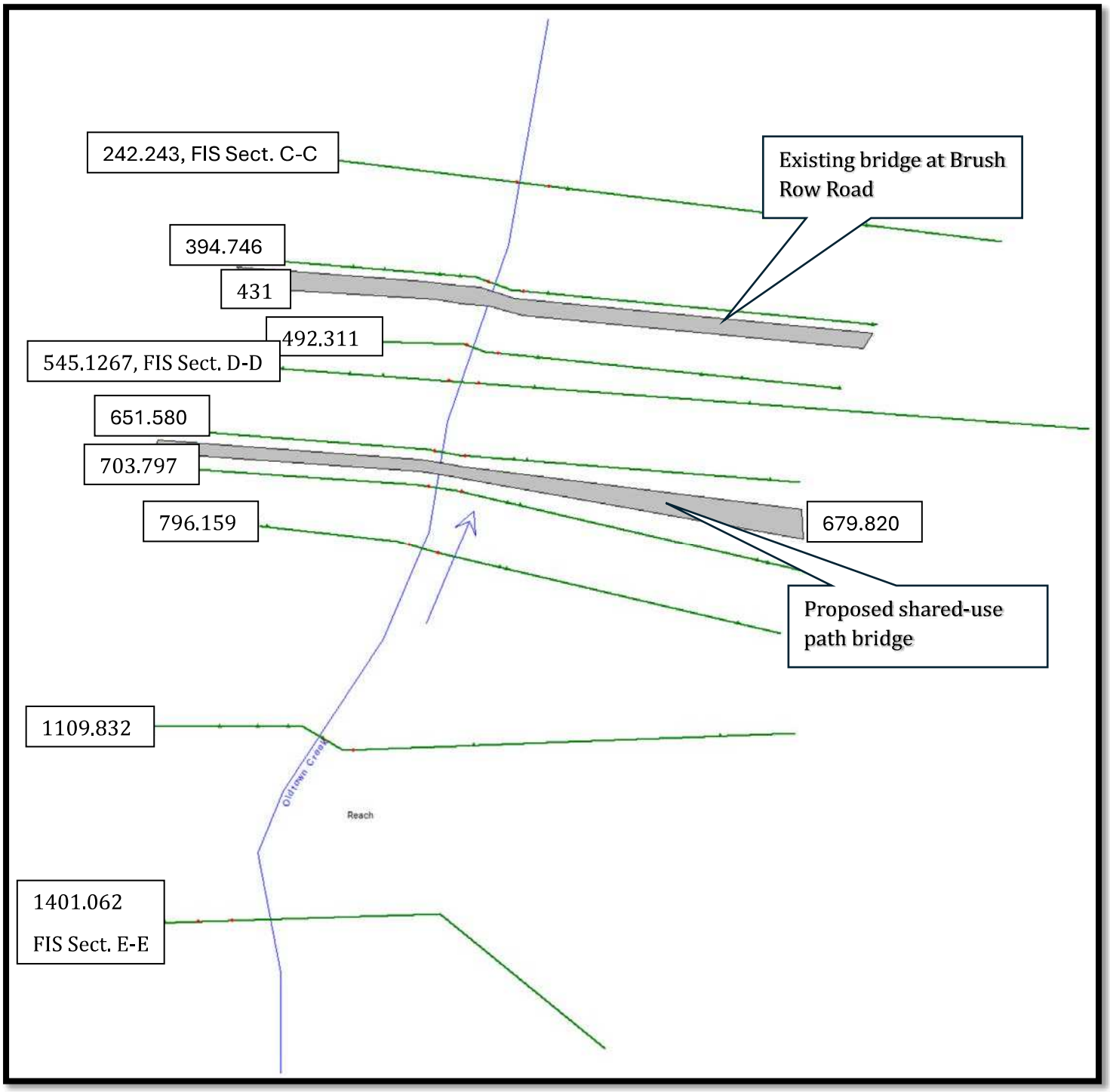
44P

Appendix C
Cross-Section Locations

CARPENTER MARTY transportation

Appendix C

Cross-Section Locations

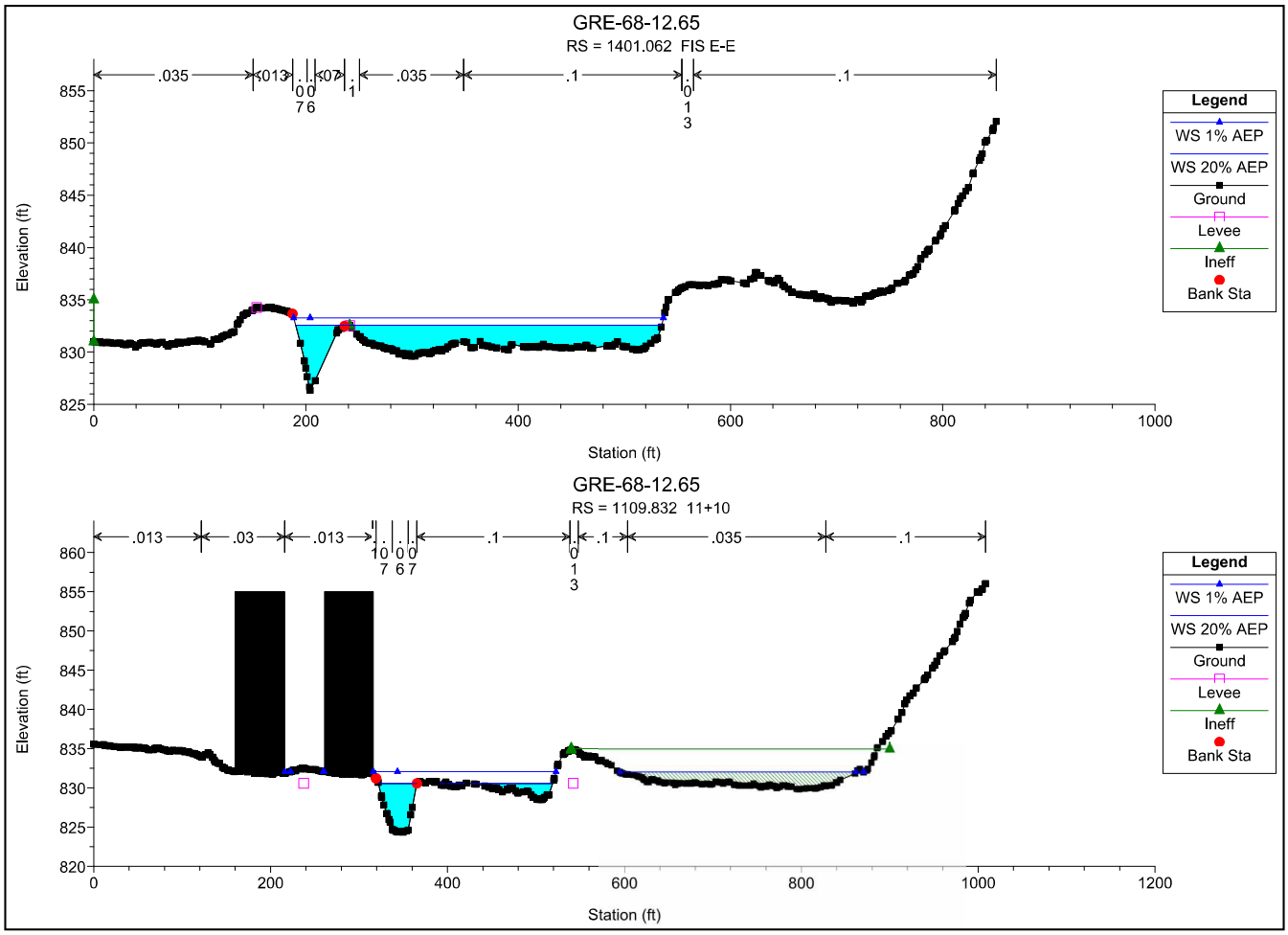


Appendix D

Existing Stream Cross-Sections

CARPENTER MARTY transportation

Appendix D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WS 20% AEP
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Levee
Ineff
Bank Sta
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Station (ft)
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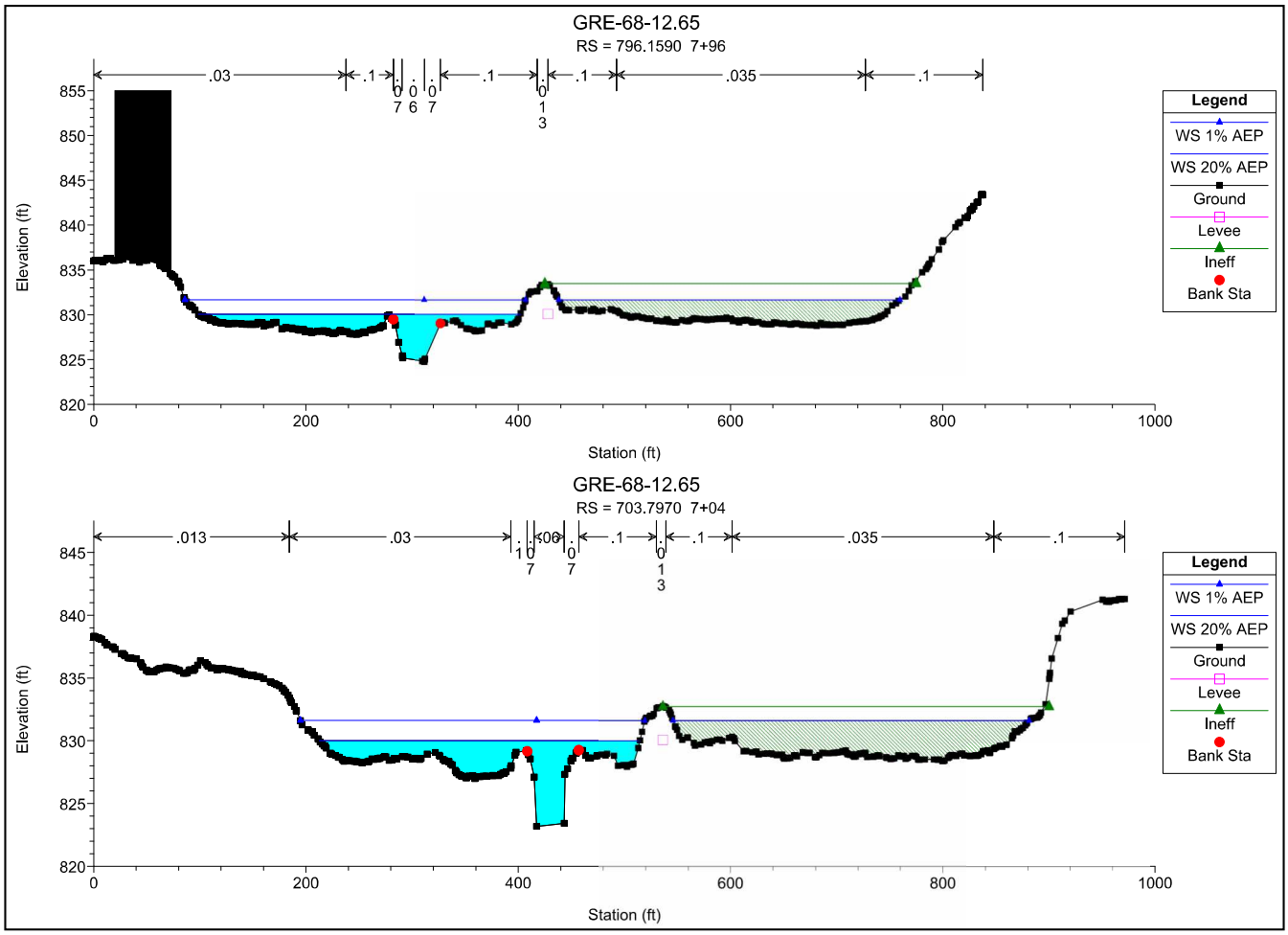
Ground
Levee
Ineff
Bank Sta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Station (ft)
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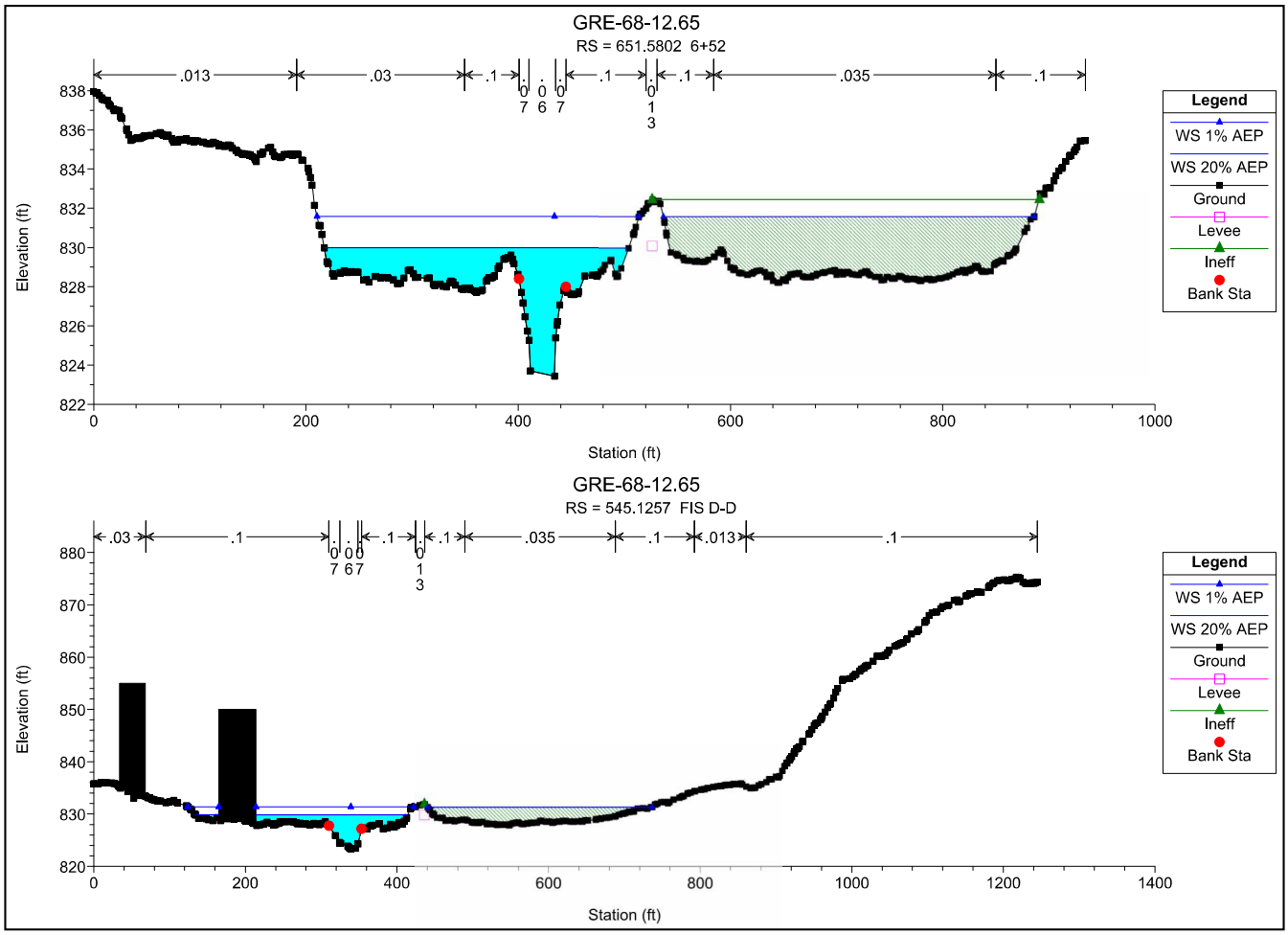
Ground
Levee
Ineff
Bank Sta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1000
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Levee
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840
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820
0
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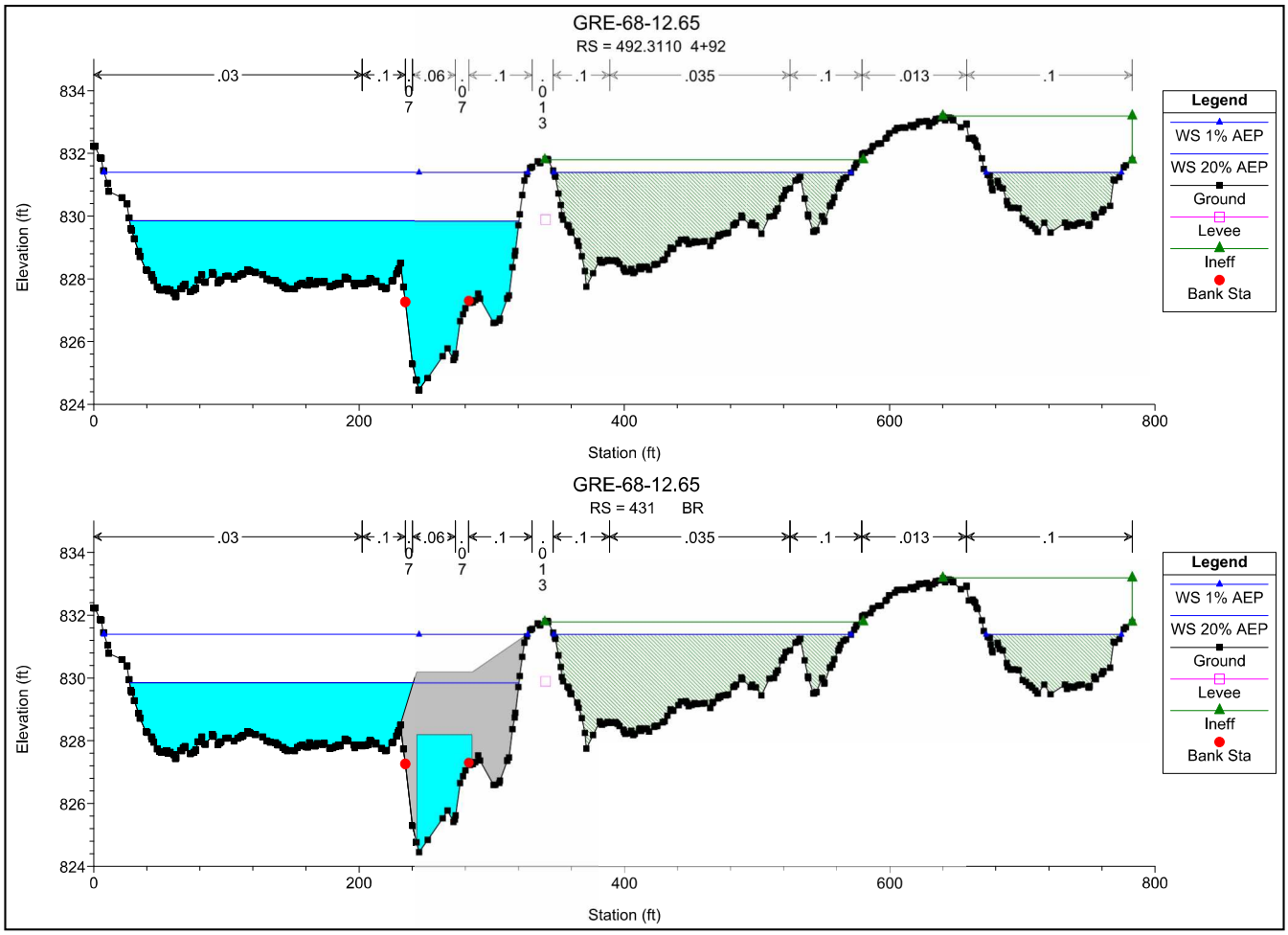
WS 20% AEP
Ground
Levee
Ineff
Bank Sta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Legend
WS 1% AEP
WS 20% AEP
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
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832
830
828
826
824
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200
400
600
800
Station (ft)
GRE-68-12.65
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.07
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Legend
WS 1% AEP
WS 20% AEP
Ground
Levee
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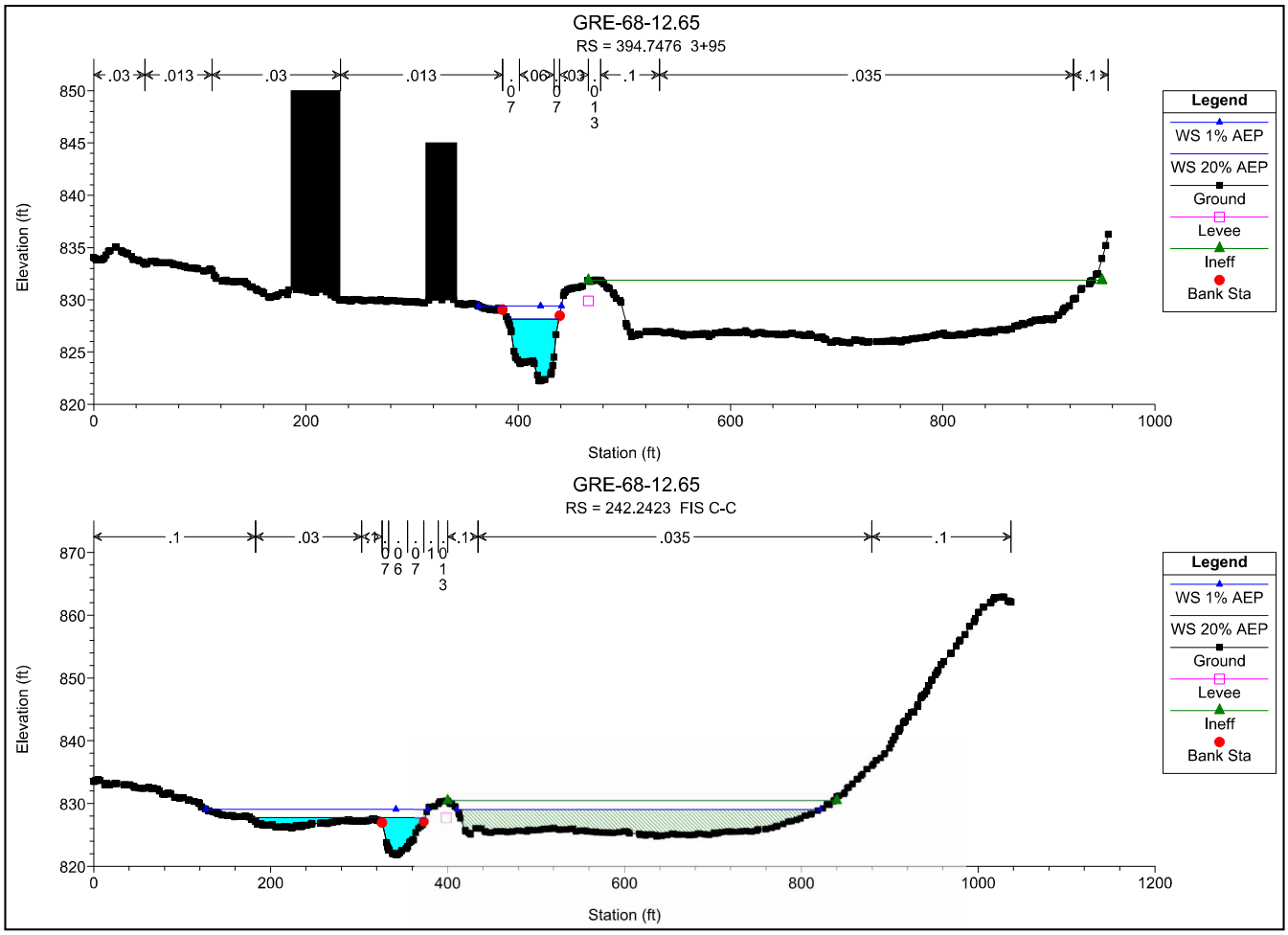
Station (ft)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Station (ft)
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Levee
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Bank Sta
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Station (ft)
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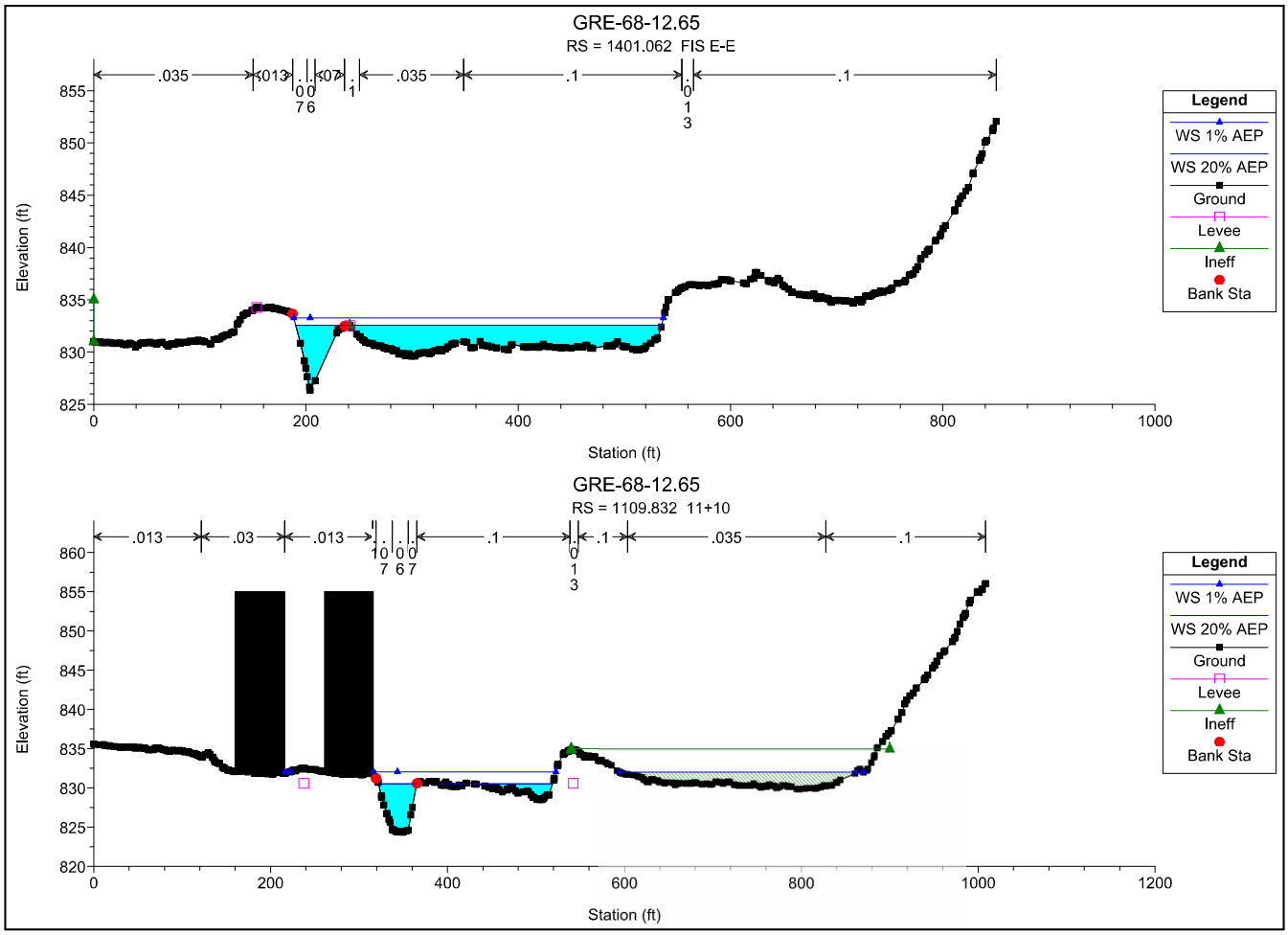
Levee
Ineff
Bank Sta

Appendix E

Proposed Stream Cross-Sections

CARPENTER MARTY transportation

Appendix E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Ground
Levee
Ineff
Bank Sta
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Station (ft)
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Levee
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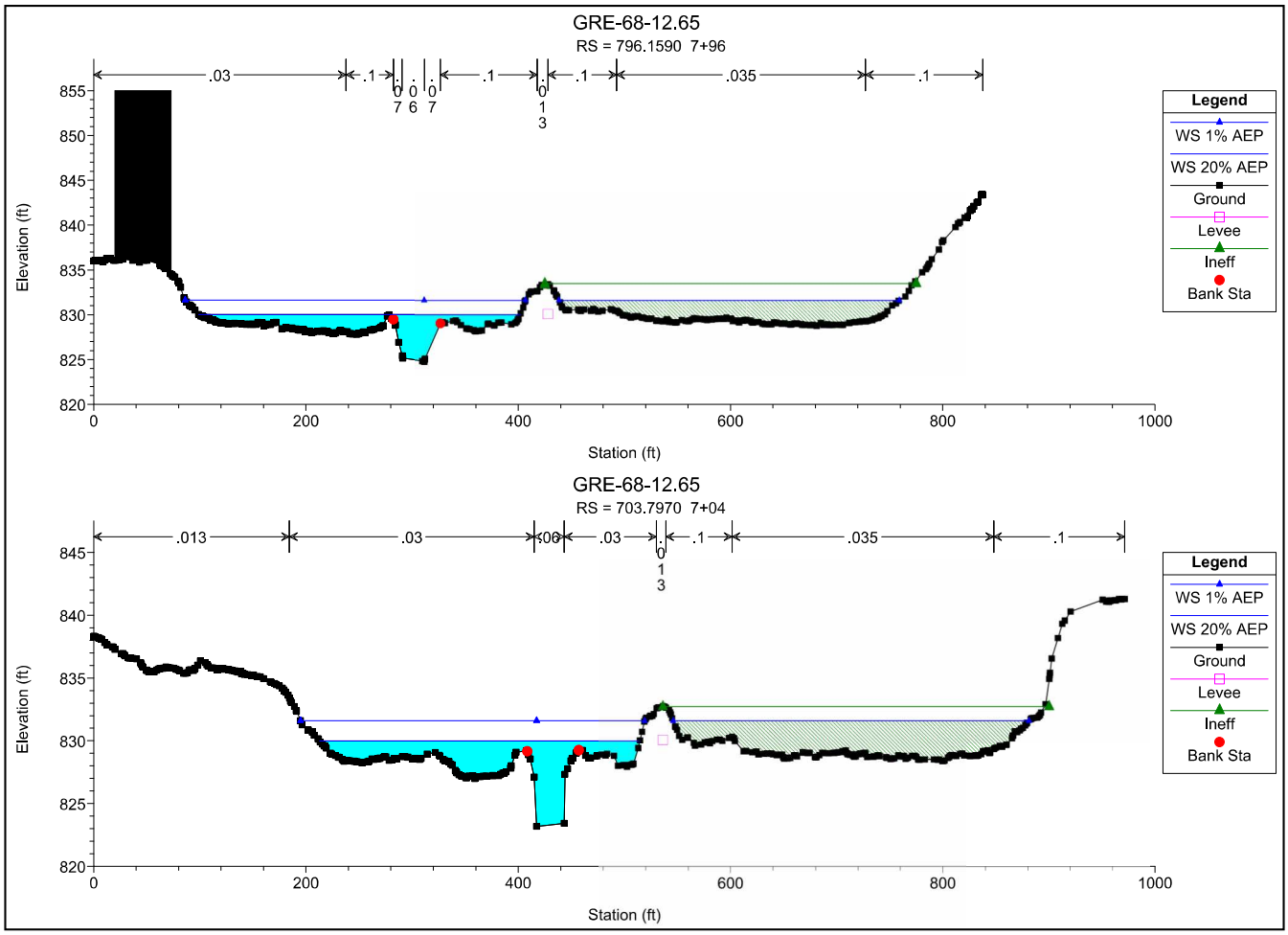
Bank Sta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Station (ft)
Legend
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WS 20% AEP
Ground
Levee
Ineff
Bank Sta
GRE-68-12.65
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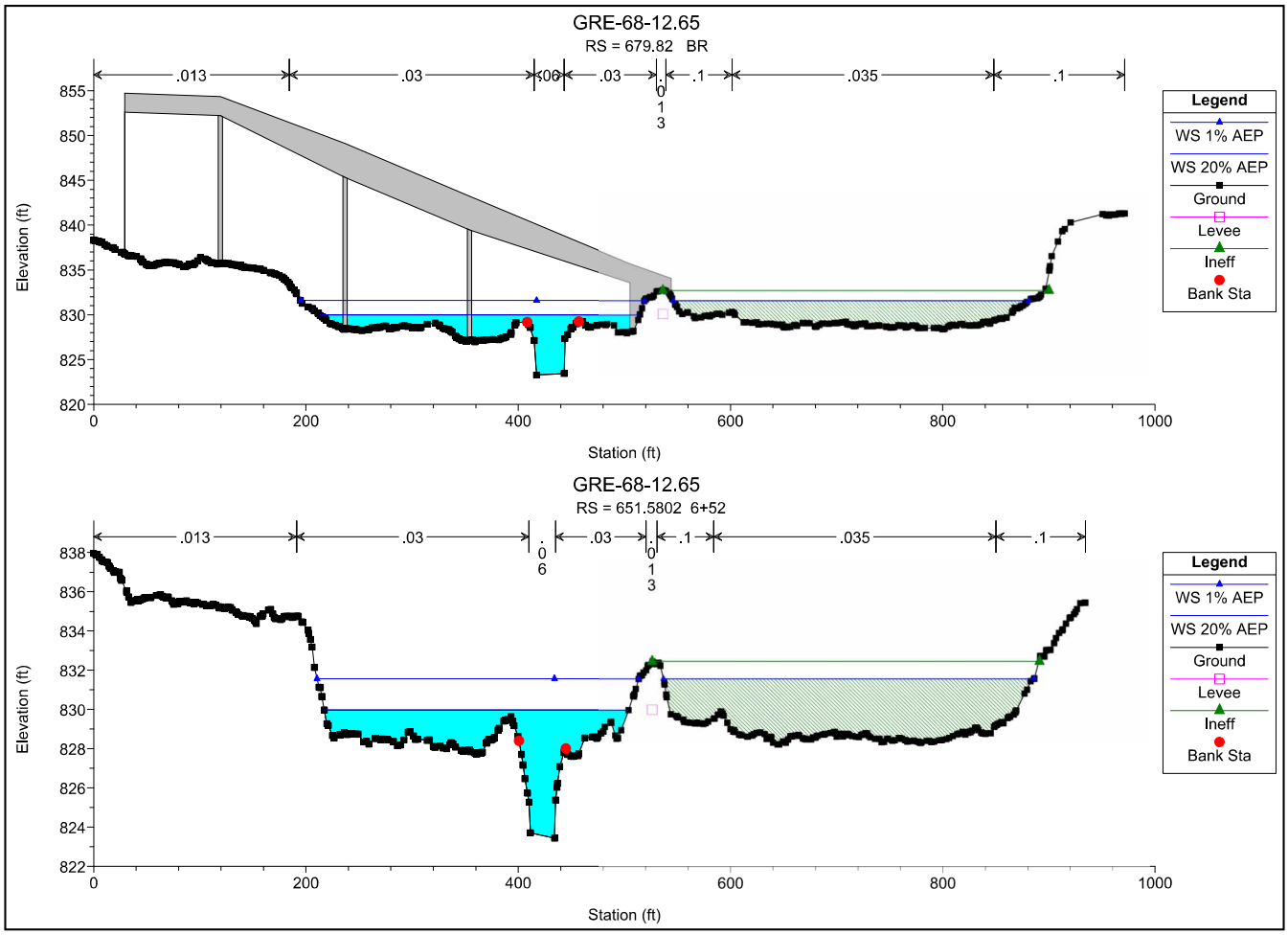
Bank Sta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Levee
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Bank Sta
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Station (ft)
Legend
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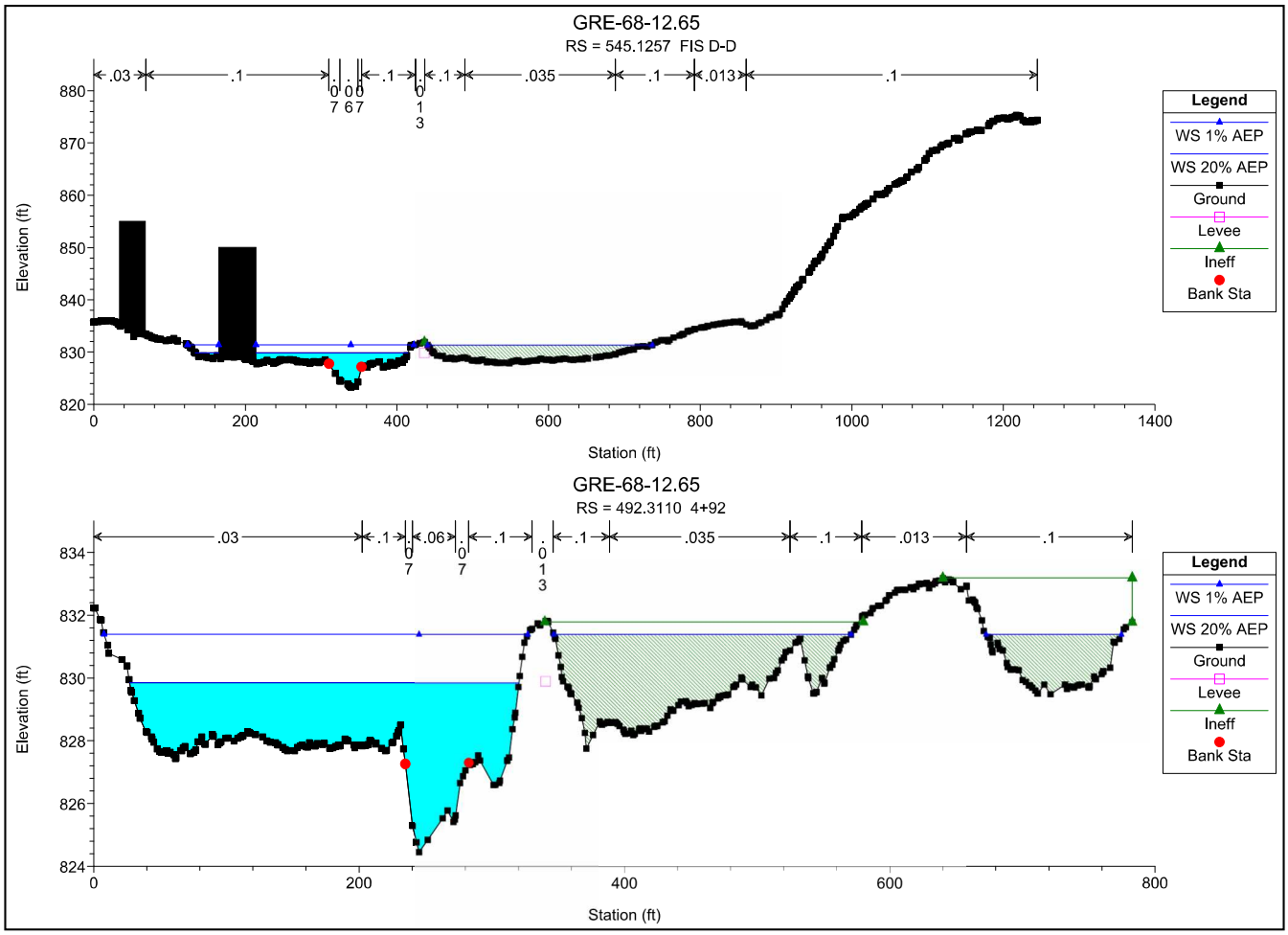
Bank Sta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820
0
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400
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Station (ft)
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WS 20% AEP
Ground
Levee
Ineff
Bank Sta
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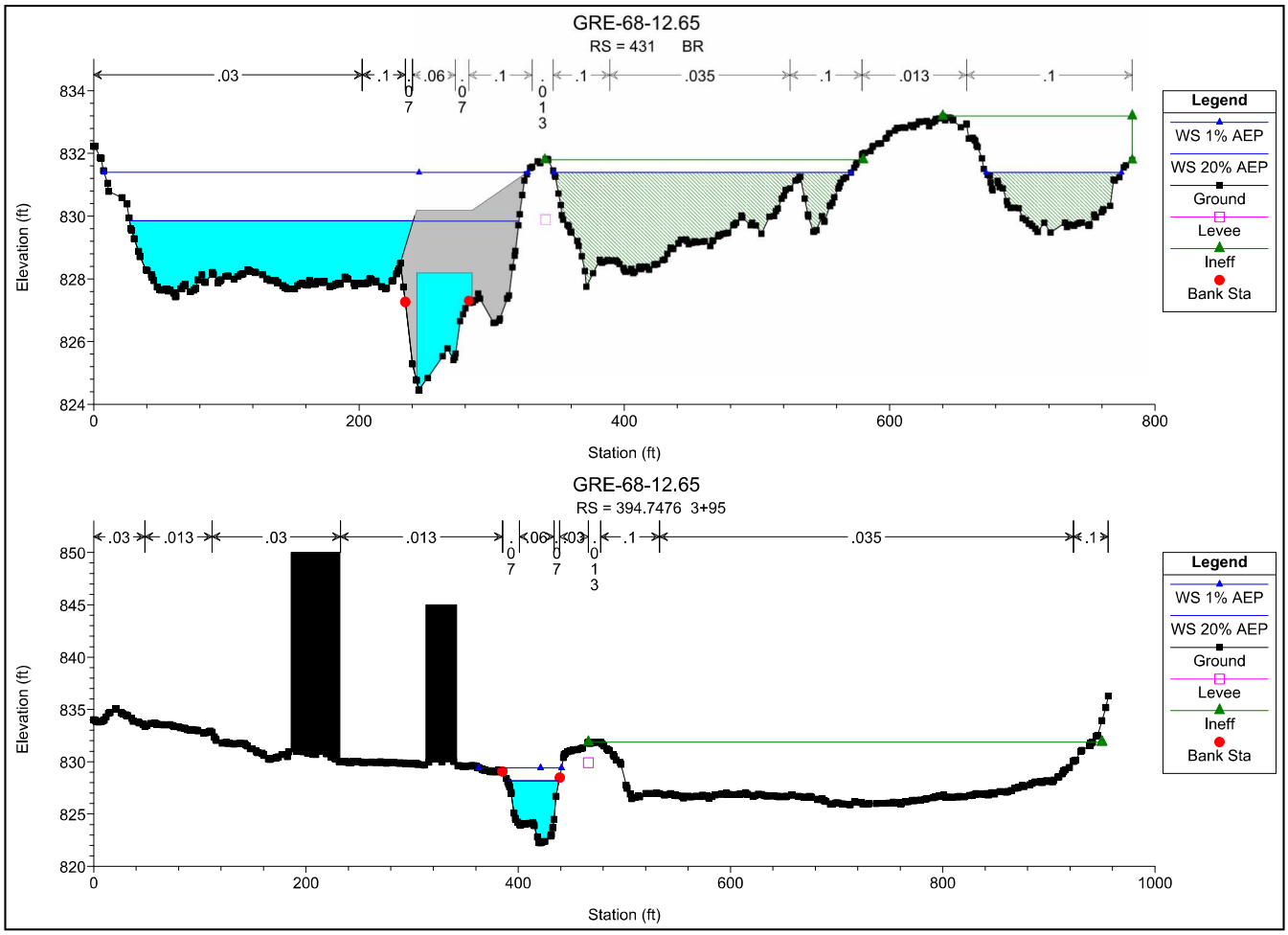
Bank Sta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Station (ft)
Legend
WS 1% AEP
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Bank Sta
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Elevation (ft)
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830
825
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Station (ft)
Legend
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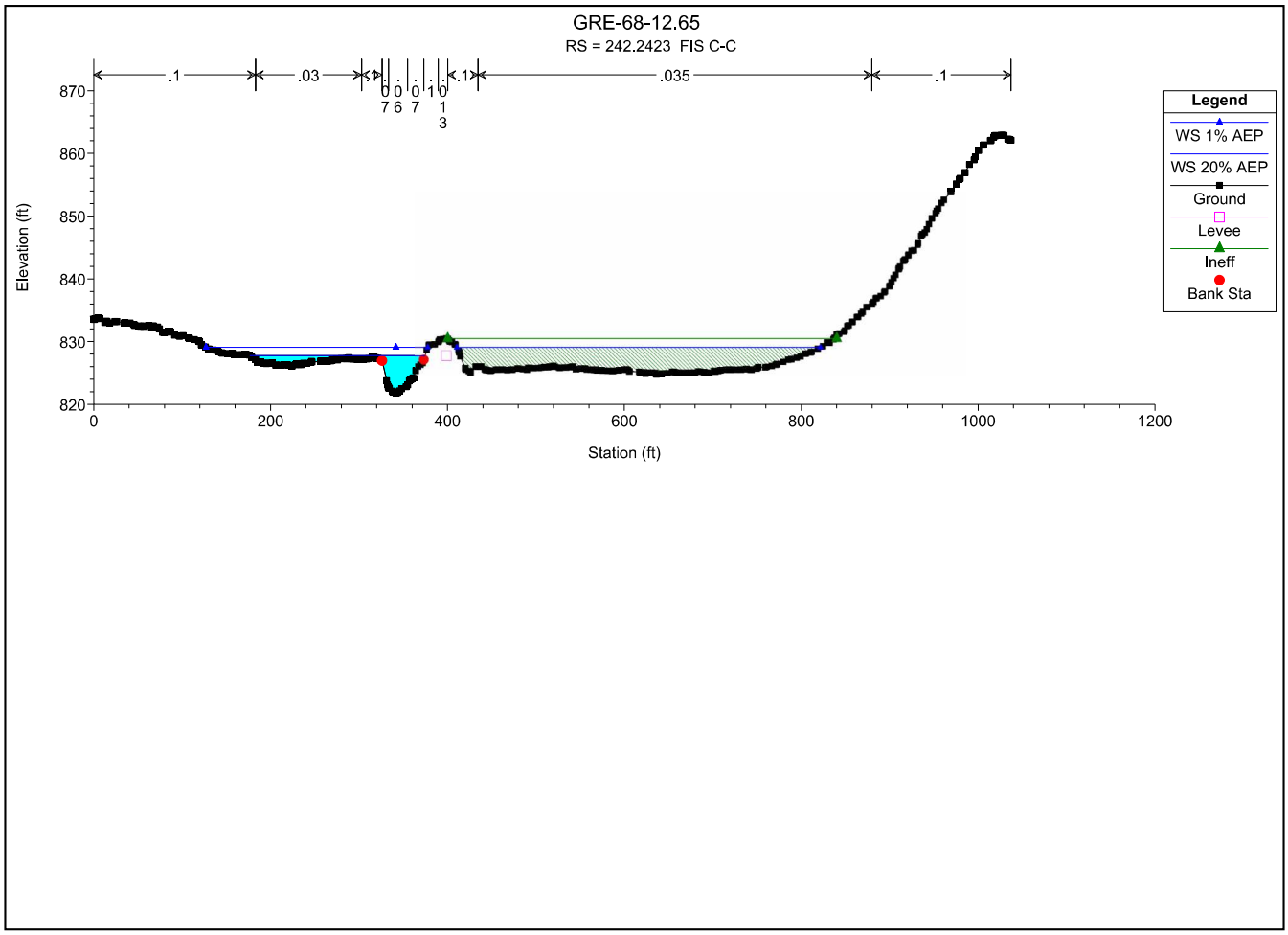
WS 20% AEP
Ground
Levee
Ineff
Bank Sta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840
830
820
0
200
400
600
800
1000
1200
Station (ft)
Legend
WS 1% AEP
WS 20% AEP
Ground
Levee
Ineff
Bank Sta

Appendix F

HEC-RAS Output for Existing Conditions

CARPENTER MARTY transportation

Appendix F

HEC-RAS HEC-RAS 6.6 September 2024
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
```

PROJECT DATA
Project Title: GRE-68-12.65
Project File : GRE-68-12.prj
Run Date and Time: 2/11/2025 11:35:54 AM

Project in English units

PLAN DATA

Plan Title: OldtownCreekExisting_CM edit
Plan File : p:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\HEC-RAS\Ex and Prop\GRE-68-12.p03

Geometry Title: OldtownCreekExisting CM edit
Geometry File : p:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\HEC-RAS\Ex and Prop\GRE-68-12.g04

Flow Title : OldtownCreekFIS
Flow File : p:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\HEC-RAS\Ex and Prop\GRE-68-12.f01

Plan Summary Information:

Number of:	Cross Sections	9	Multiple Openings	=	0
	Culverts	0	Inline Structures	=	0
	Bridges	1	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	= 0.3
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: OldtownCreekFIS
Flow File : p:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\HEC-RAS\Ex and Prop\GRE-68-12.f01

Flow Data (cfs)

River	Reach	RS	20% AEP	4% AEP	2% AEP	1% AEP
Oldtown Creek	Reach	1401.062	763	1499	1740	2000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Oldtown Creek	Reach	20% AEP		Normal S = 0.002156
Oldtown Creek	Reach	4% AEP		Normal S = 0.002156
Oldtown Creek	Reach	2% AEP		Normal S = 0.002156
Oldtown Creek	Reach	1% AEP	Known WS = 834	Known WS = 829.1

GEOMETRY DATA

Geometry Title: OldtownCreekExisting CM edit
Geometry File : p:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\HEC-RAS\Ex and Prop\GRE-68-12.g04

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 1401.062

INPUT
Description: FIS E-E
Station Elevation Data num= 426

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	830.99	.07	830.99	.54	831	2.19	830.98	4.69	830.94
5.59	830.97	6.19	830.93	7.92	830.89	11.29	830.89	12.14	830.93
13.58	830.94	16.1	830.89	18.28	830.83	19.25	830.86	21.48	830.82
22.71	830.86	23.26	830.85	24.86	830.87	28.06	830.75	28.43	830.75
30.07	830.72	30.58	830.71	33.66	830.86	33.99	830.84	34.54	830.81
36.15	830.73	39.51	830.49	39.53	830.49	41.95	830.68	44.12	830.82
45.19	830.87	46.28	830.9	47.62	830.89	48.1	830.9	50.94	830.9
52.09	830.93	53.37	830.92	56.6	830.85	56.77	830.85	58.94	830.76
59.63	830.79	62.48	830.91	64.58	830.93	64.61	830.93	68.09	830.74
69.73	830.6	70.17	830.6	71.82	830.72	73.72	830.83	75.13	830.78
75.95	830.73	76.51	830.76	79.36	830.96	80.48	830.91	81.65	830.86
85.14	830.93	85.2	830.93	87.34	830.91	88.11	830.93	90.7	831.06
91.54	831.04	92.97	831.03	95.51	831.05	96.32	831.06	98.48	831.15
98.55	831.15	101.93	831.07	102.93	831.04	104.29	831	104.8	830.98
109.77	830.77	109.98	830.79	110.53	830.83	113.25	831.19	115.57	831.19

116.75	831.25	118.89	831.26	120.68	831.45	121.14	831.47	122.5	831.56
124.6	831.66	125.36	831.65	126.7	831.64	129.24	831.82	130.24	831.86
130.8	831.88	132.49	831.95	135.42	832.63	135.92	832.74	136.08	832.77
138.16	833.09	140.68	833.49	141.55	833.59	143.76	833.7	143.85	833.71
144.63	833.75	149.06	833.99	149.49	834.03	150.13	834.05	152.88	834.24
153.46	834.28	155.29	834.3	158.56	834.21	164.39	834.25	164.6	834.26
166.75	834.3	167.06	834.29	169.59	834.19	170.09	834.17	170.63	834.16
172.49	834.16	174.07	834.11	175.95	834.05	177.45	834	180.35	833.95
181.63	833.92	183.03	833.86	184.03	833.82	184.92	833.78	187.46	833.65
194.72	830.85	198.71	829.13	199.73	828.46	201.04	827.66	203.13	826.65
203.93	826.35	208.58	827.26	228.96	831.83	230.13	832.09	230.32	832.13
230.37	832.13	233.69	832.27	234.75	832.3	236.42	832.5	241.26	832.54
243.15	832.3	247.69	831.7	250.42	831.49	251.02	831.45	251.44	831.38
253.44	831.17	254.56	831.12	256.26	830.95	259.17	830.84	261.73	830.85
262.73	830.8	264.23	830.66	264.82	830.63	266.06	830.64	269.59	830.6
270.69	830.57	273.06	830.44	274.14	830.4	274.79	830.37	276.51	830.31
278.86	830.32	279.59	830.33	279.88	830.31	280.88	830.24	282.28	830.13
285.57	830.13	287.22	829.87	287.87	829.8	289.27	829.83	291.37	829.89
292.11	829.79	293.5	829.66	296.43	829.85	297.54	829.83	299.28	829.61
302.67	829.62	302.7	829.62	305.08	829.8	306.61	829.87	307.99	829.91
308.67	829.93	310.1	829.93	310.85	829.93	311	829.94	314.13	829.96
315.43	829.92	316.47	829.84	317.91	829.94	319.92	830.1	321.49	830.14
322.07	830.16	322.83	830.19	325.64	830.24	327.65	830.12	327.82	830.11
328.34	830.12	331.38	830.29	333.55	830.49	333.66	830.5	336.9	830.72
338.06	830.77	338.15	830.77	339.18	830.81	339.9	830.85	340.98	830.84
348.57	831	351.54	830.93	355.56	830.43	356.52	830.42	358.85	830.45
363.98	831.02	366.26	830.68	367.94	830.63	371.36	830.58	371.44	830.58
375.09	830.49	379.93	830.41	387.06	830.28	390.01	830.27	390.84	830.22
393.3	830.66	394.38	830.74	404.71	830.51	405.27	830.53	406.16	830.53
408.35	830.44	410.09	830.49	411.74	830.52	413.94	830.48	418.68	830.55
419.52	830.44	420.93	830.55	423.68	830.77	425.4	830.53	429.2	830.52
434.76	830.45	438.39	830.45	440.65	830.39	441.47	830.44	444.21	830.42
449.58	830.39	455.37	830.54	456.27	830.48	460.61	830.49	463.34	830.61
463.97	830.66	464.59	830.65	468.04	830.41	470.15	830.36	483.48	830.59
484.12	830.61	484.74	830.61	488.54	830.55	491.11	830.76	493.56	830.99
498.29	830.58	499.45	830.52	500.73	830.52	501.55	830.54	502.38	830.52
507.68	830.29	508.55	830.27	511.29	830.18	513.16	830.2	513.59	830.22
514.35	830.23	517.06	830.3	517.98	830.32	519.2	830.34	520.44	830.57
524.62	830.86	525.14	830.82	528.32	831.17	528.74	831.18	528.96	831.22
531.11	831.31	531.24	831.36	534.68	832.39	538.02	833.76	539.24	834.31
540.99	834.97	541.26	835	541.99	835.04	547.98	835.69	548.45	835.7
550.28	835.78	551.2	835.92	553.26	836.07	554.16	836.13	555.02	836.19
557.28	836.28	560.65	836.42	561.28	836.42	562.13	836.45	564.11	836.44
565.04	836.42	568.21	836.41	568.3	836.42	568.7	836.41	570.48	836.32
570.89	836.33	574.63	836.43	575.53	836.42	577.68	836.39	578.92	836.35
584.45	836.5	585.46	836.5	587.92	836.54	588.61	836.56	591.4	836.94
595.58	836.93	597.58	836.91	599.91	836.79	600.52	836.81	612.15	836.62
614.8	836.51	618.86	836.97	622.11	837.1	623.58	837.61	624.74	837.62
628.68	837.33	635.46	836.82	635.77	836.86	636.91	836.76	637.95	836.75
641.26	836.64	642.82	836.87	644.67	837.06	646.45	836.87	649.11	836.41
650.67	836.27	654.46	836.02	657.58	835.74	657.85	835.71	658.45	835.71
664.56	835.54	666.3	835.5	667.21	835.49	670.81	835.44	671.41	835.45
672.47	835.44	674.27	835.4	675.09	835.41	678.38	835.55	678.78	835.54
681.25	835.17	682.48	835.11	685.38	835.3	685.77	835.24	687.96	835.14
688.54	835.17	689.98	835.15	691.64	835.08	692.31	835.09	694.18	834.83
695.08	834.75	697.99	834.92	699.27	834.94	701.81	834.96	702.23	834.94
707.24	834.9	708.51	834.92	709.18	834.89	711.44	834.86	713.4	834.85
715.24	834.66	716.01	834.68	720.13	835.02	720.41	835.02	720.65	835
722.96	834.81	724.7	834.95	727.29	835.35	728.66	835.37	730.14	835.33
732.42	835.37	734.32	835.54	736.23	835.66	737.09	835.63	739.44	835.67

741.16	835.84	743.4	835.76	744.12	835.74	748.47	835.88	750.99	836
751.38	835.99	752.51	836.11	756.76	836.6	757.97	836.58	763.66	836.72
764.58	836.82	765.15	836.87	768.35	837.35	769.23	837.4	771.29	837.42
772.2	837.5	774.34	837.86	776.3	838.18	778.91	838.86	779.57	838.96
783.37	839.32	785.21	839.63	786.26	839.75	787	839.86	793.02	840.63
793.64	840.72	797.45	841.13	798.29	841.31	800.38	841.79	802.41	842.1
811.06	843.51	811.42	843.57	811.55	843.59	811.61	843.61	814.56	844.22
816.5	844.69	818.57	844.95	821.62	845.38	824.07	845.72	828.4	847.03
828.59	847.08	828.84	847.14	834.53	848.34	835.69	848.62	837.1	848.97
840.05	850.07	841.43	850.26	846.98	851.19	847.17	851.24	847.64	851.4
850.27	852.05								

Manning's n Values num= 11

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	150.13	.013	187.46	.07	201.04	.06	208.58	.07
236.42	.1	250.42	.035	348.57	.1	554.16	.013	565.04	.1
850.27	.1								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
187.46	236.42	293.81	291.23	319.49	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	0	835	F
241.26	850.27	832.54	F

Left Levee Station= 153.46 Elevation= 834.28
Right Levee Station= 241.26 Elevation= 832.54

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 1109.832

INPUT
Description: 11+10
Station Elevation Data num= 477

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	835.57	1.08	835.55	7.37	835.49	10.99	835.52	13	835.39
13.72	835.39	17.34	835.35	18.52	835.36	23.26	835.26	24.29	835.25
29.91	835.16	31.86	835.2	33.41	835.21	35.16	835.22	36.44	835.22
39.12	835.2	41.1	835.2	41.7	835.22	44.85	835.18	45.13	835.18
46.68	835.07	47.84	835.09	50.42	835.15	51.52	835.16	52.28	835.09
54.55	835.12	55.98	835.08	57	835.05	57.98	835.03	58.87	835.01
61.54	834.88	62.64	834.85	66.99	834.87	67.31	834.88	67.39	834.89
69.23	835.04	71.12	835.06	72.79	835.06	74.66	835	74.8	835
75.13	834.99	78.35	834.9	79.49	834.88	80.3	834.83	82.73	834.73
84.54	834.73	86.01	834.65	89.5	834.81	91.65	834.75	93.73	834.71
95.11	834.74	97.17	834.78	97.72	834.76	100.71	834.7	102.66	834.6
103.05	834.61	106.33	834.65	107.38	834.57	108.21	834.5	111.89	834.37
112.87	834.37	113.9	834.36	116.14	834.25	117.48	834.18	117.74	834.17
119.47	834.08	121.76	833.95	123.05	833.91	125.85	834.19	129.31	834.48
130.66	834.3	131.33	834.19	134.25	833.9	134.89	833.87	136.39	833.54
137.47	833.35	139.83	833.17	142.03	833.12	142.14	833.11	145.56	832.62
147.13	832.55	147.69	832.5	148.17	832.48	151.24	832.26	152.38	832.24
153.35	832.22	156.65	832.18	157.04	832.19	157.29	832.15	159.12	832.07
162.49	832.21	162.76	832.22	164.82	832.09	166.34	832.19	167.23	832.24
173.58	832.04	181.58	831.88	184.84	831.88	186.31	831.81	190.73	831.81
196.07	831.8	199.28	831.85	201.61	831.71	202.72	831.75	204.43	831.91
207.16	831.98	209.5	832.08	210.67	832.04	213.62	831.85	214.52	831.88
216.01	831.89	216.34	831.9	216.49	831.89	216.62	831.89	222.1	832.03
223.3	832.11	225.76	832.27	227.6	832.21	227.96	832.18	228.36	832.17

233.31	832.39	233.65	832.42	236.06	832.51	237.34	832.54	237.52	832.54
239.34	832.43	240.24	832.43	244.86	832.33	244.96	832.32	247.68	832.33
248.7	832.32	250.78	832.32	251.17	832.31	254.41	832.2	256.14	832.17
256.56	832.16	258.25	832.1	260.09	832.05	261.96	832.16	262.27	832.16
263.1	832.14	265.76	832.02	266.81	831.97	267.78	831.93	269.81	831.93
271.5	831.95	272.95	831.88	273.39	831.86	274.01	831.83	277.06	831.9
277.37	831.92	279.11	831.86	281.55	831.75	281.7	831.74	282.78	831.74
284.17	831.81	285.08	831.78	286.78	831.8	288.79	831.8	289.45	831.78
291.2	831.71	294.39	831.8	294.88	831.82	294.97	831.82	295.06	831.81
297.87	831.78	299.23	831.76	301.13	831.77	303	831.64	304.84	831.7
308.92	831.85	309.65	831.88	310.45	831.9	314.14	831.84	315.54	831.8
319.29	831.21	319.46	831.21	319.67	831.17	321.57	830.76	321.75	830.67
325.11	829.02	325.46	828.86	325.58	828.78	328.1	827.82	331.35	826.75
331.46	826.71	331.48	826.7	331.5	826.7	333.7	825.98	335	825.64
337.42	824.72	338.3	824.61	339.7	824.62	341.63	824.44	343.46	824.36
345.51	824.46	346.29	824.46	349.64	824.38	349.65	824.38	353.51	824.51
355.45	824.63	358.65	826.57	360.3	827.51	365.41	830.55	367.8	830.73
368.86	830.8	369.83	830.73	374.77	830.66	379.37	830.85	384.29	830.86
385.66	830.7	387.44	830.85	392.88	830.4	393.58	830.34	395.64	830.32
397.06	830.62	398.32	830.75	401.38	830.43	403.14	830.26	403.83	830.19
408.06	830.15	410.35	830.15	412.91	830.36	414.08	830.3	416.39	830.29
420.92	830.62	421.81	830.62	430.25	830.49	430.49	830.5	430.71	830.5
432.31	830.47	442.16	830.24	446.47	830.07	450.55	829.87	453.84	830.01
455.75	829.94	458.09	829.78	462.19	829.5	467.47	829.82	467.84	829.71
470.14	829.9	471.19	829.94	473.42	829.97	473.63	829.95	474	829.94
476.91	829.62	479.25	829.35	479.81	829.33	485.47	829.5	490.31	829.61
491.41	829.51	494.49	829.07	497.13	828.81	497.33	828.78	497.57	828.77
500.97	828.59	501.48	828.57	502.88	828.51	505.63	828.49	507.23	828.5
508.82	828.7	509.6	828.8	512.61	829.08	514.21	829.08	514.79	829.1
520.02	830.97	520.62	831.16	520.72	831.22	524.38	832.79	524.63	832.9
525.15	833.02	530.67	834.27	532	834.4	532.45	834.46	532.84	834.45
536.33	834.67	537.01	834.74	538.5	834.81	540.18	834.85	542.12	834.89
542.76	834.88	544.35	834.85	545.47	834.78	548.07	834.66	549.99	834.32
550.17	834.29	550.33	834.28	554.01	834.15	555.14	833.92	558.02	833.96
559.83	834.07	561.98	833.91	564.64	833.98	566.61	833.95	570.35	833.58
572.05	833.42	573.75	833.6	574.28	833.54	578.9	833.29	580.85	833.08
581.56	833.09	585.28	832.92	591.48	832.23	594.34	832.1	595.31	831.98
597.25	831.89	597.37	831.9	598.15	831.86	600.95	831.78	601.22	831.8
602.53	831.76	603.33	831.76	603.7	831.75	610.15	831.69	614.31	831.56
615.91	831.46	619.16	831.4	619.54	831.4	621.17	831.17	622.31	831.06
625.11	830.81	626.03	830.82	627.21	830.77	630.01	831.05	631.14	831.14
631.53	831.13	633.18	831.02	635.17	831	637.09	831	637.7	830.93
639.26	830.76	641.4	830.77	645.29	830.61	647.39	830.72	654.75	830.71
655.17	830.69	655.57	830.65	657.3	830.4	660.1	830.56	661.17	830.62
661.63	830.65	667.53	830.63	669.43	830.58	672.94	830.65	675.33	830.59
677.72	830.69	679.46	830.75	680.73	830.67	681.41	830.64	687.43	830.51
687.65	830.51	692.98	830.57	693.57	830.53	696.61	830.51	697.4	830.46
697.83	830.52	699.62	830.54	703.4	830.82	703.51	830.83	703.54	830.83
705.54	830.81	707.86	830.72	709.46	830.76	711.62	830.59	715.52	830.76
717.63	830.84	717.81	830.84	718.08	830.83	719.4	830.74	723.86	830.46
725.06	830.42	727.76	830.39	729.35	830.35	730.74	830.35	733.12	830.32
736.54	830.31	741.75	830.33	742.04	830.33	742.89	830.38	745.99	830.6
747.58	830.4	748.17	830.37	752.67	830.25	754.31	830.09	756.8	830.23
758.17	830.26	758.63	830.27	760.36	830.18	763.11	830.4	764.23	830.47
766.01	830.33	766.44	830.3	767.39	830.3	770.28	830.27	771.7	830.05
772.51	830.02	775.69	830.16	778.58	830.37	780.32	830.37	783.53	830.31
784.78	830.18	788.44	830.2	788.81	830.2	794.47	829.9	797.03	829.87
798.13	829.9	803.2	829.92	805.65	829.98	807.25	829.99	813.48	830.01
815.64	829.95	817.82	830.03	821.77	830.13	824.99	830.33	826.18	830.36
827.77	830.24	833.4	830.33	834.01	830.36	834.43	830.39	839.14	830.76

840.25	830.69	843.97	831.05	860.6	831.87	863.22	832.28	866.18	832.44
869.91	832.03	870.35	832.02	873.91	832.25	874.18	832.28	875.28	832.47
879.07	833.26	882.12	833.95	882.28	834	882.79	834.16	885.56	835.11
886.3	835.2	892.01	835.9	895.69	836.58	898.62	836.9	901.65	837.27
909.58	838.76	914.09	839.6	916.85	840.69	917.1	840.76	919.27	841.2
922.77	841.74	926.65	842.08	930.3	842.74	939.06	843.76	940.08	843.89
940.54	844.04	943.09	844.38	948.65	845.31	950.81	845.65	953.13	846.16
956.61	846.87	960.99	847.28	962.36	847.49	970.89	848.63	972.78	849.06
974.09	849.19	976.29	849.96	979.34	850.89	983.16	851.72	984.46	851.93
985.48	852.26	989.77	853.55	991.28	853.93	998.96	854.95	999.23	854.97
999.49	854.98	1001.3	854.93	1004.05	855.28	1004.69	855.34	1004.84	855.36
1008.28	856.02	1008.38	856.04						

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.013	121.76	.03	216.01	.013	315.54	.1	319.29	.07
337.42	.06	355.45	.07	365.41	.1	538.5	.013	548.07	.1
603.7	.035	827.77	.1	1008.38	.1				

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
319.29	365.41	308.79	313.67	310.72	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
540	900	835	F

Left Levee Station= 237.34 Elevation= 830.6
Right Levee Station= 542.12 Elevation= 830.6
Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
160	216	855	261	316	855

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 796.1590

INPUT
Description: 7+96
Station Elevation Data num= 421

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	836.01	1.45	836.07	2.69	836	3.2	835.99	6.46	836.1
7.7	836.01	8.73	835.91	10.73	836.09	12.12	836.25	12.72	836.27
14.25	836.26	15.61	836.29	18.8	836.08	20.26	836.05	24.07	836.11
27.45	836.21	36.65	836.08	38.65	836.12	43.25	835.87	47.57	836.07
50.18	836.08	62.2	835.63	63.21	835.5	66.04	835.32	67.52	835.15
72.05	834.6	73.39	834.48	74.27	834.32	74.99	834.29	76.28	834.22
79.4	833.75	79.91	833.69	80.29	833.54	81.87	833.07	85.04	831.89
85.44	831.76	85.6	831.72	87.41	831.45	90.35	831.1	91.17	831.01
91.51	830.99	93	830.86	95.35	830.53	98.65	830.04	101.16	829.86
102.53	829.86	103.13	829.76	104.27	829.69	107.27	829.69	108.09	829.65
108.53	829.61	110.04	829.36	112.22	829.42	114.32	829.3	115.62	829.21
117.99	829.15	119.49	829.05	120.88	829.09	121.2	829.11	121.97	829.1
125.2	829.04	126.64	828.97	130.7	829.02	132.48	829.04	132.69	829.04
138.23	829.01	139.81	828.98	141.93	828.94	142.96	828.94	143.86	828.93
146.49	828.94	147.55	828.93	148.97	828.95	149.27	828.95	150.04	828.93
153.19	828.93	154.68	829.14	154.86	829.15	157.28	829.12	158.66	829.1
158.73	829.09	160.48	828.77	161.95	828.86	164.21	828.93	165.63	828.94
166.11	828.9	166.81	828.93	169.73	829.1	171.68	829.14	171.72	829.15
171.81	829.14	177.2	828.42	177.77	828.43	181.06	828.58	181.4	828.58
182.74	828.51	184.17	828.51	186.63	828.52	187.65	828.42	190.82	828.41
192.23	828.38	192.53	828.35	194.04	828.27	197.24	828.37	197.86	828.34

199.42	828.12	199.57	828.12	200.11	828.14	203.47	828.19	204.95	828.04
205.1	828.03	205.31	828.03	207.07	828.06	210.7	828.16	210.87	828.15
211.29	828.15	214.54	828.18	215.31	828.17	216.42	828.23	217.69	828.14
220.1	828.15	221.35	828.01	222	828.02	225.45	827.9	226.18	827.9
227.54	827.97	228.37	828.02	231.44	828.2	231.49	828.2	232.68	828.24
233.03	828.22	234.79	828.13	237.74	828.09	238.94	828.12	241.14	827.9
242.45	827.87	243.93	827.87	244.44	827.85	247.35	827.82	248.08	827.84
249.75	827.92	249.98	827.94	251.03	827.97	253.85	828.07	254.46	828.1
255.56	828.03	260.86	828.29	261.34	828.3	262.29	828.32	264.03	828.36
269.19	828.5	270.84	828.64	272.62	828.79	272.63	828.79	276.57	829.85
277.23	829.88	278.33	830	280.67	829.59	282.37	829.49	284.05	828.92
284.11	828.9	284.25	828.82	287.22	826.93	290.56	825.43	291.12	825.18
309.41	824.86	311.22	824.79	311.34	824.8	311.59	824.98	311.82	825.04
312.07	825.11	326.57	829.05	327.07	829.19	328.71	829.18	330.77	829.09
338.31	829.33	341.05	829.38	342.33	829.19	345.83	828.86	351.07	828.5
351.16	828.49	352.09	828.44	353.87	828.42	357.9	828.31	358.86	828.22
359.77	828.16	362.84	828.22	365.64	828.27	370.99	828.96	371.65	829.01
371.79	829.01	377.07	828.82	377.48	828.84	381.11	829.14	381.65	829.12
384	829.15	393.33	828.95	397.1	829.11	398.65	829.25	399.44	829.47
400.22	829.58	402.19	830.19	404.65	830.84	406.18	831.49	406.23	831.52
406.7	831.62	409.71	832.3	411.42	832.54	412.23	832.6	412.78	832.62
417.56	832.65	418	832.69	420.47	833.11	421.91	833.34	422.64	833.35
423.82	833.29	427.54	833.42	427.79	833.43	427.95	833.42	429.57	833.28
433.37	832.75	433.59	832.71	433.88	832.64	435.51	832.23	436.59	832.03
439.31	831.4	440.83	830.96	441.32	830.83	444.18	830.59	444.97	830.53
445.19	830.51	445.83	830.52	447.82	830.52	456.36	830.61	457.07	830.51
458.72	830.45	458.95	830.44	462.01	830.61	468.44	830.47	468.8	830.48
470.64	830.67	472.4	830.53	475.19	830.37	479.22	830.47	487.09	830.65
488.27	830.57	491.08	830.47	492.79	830.45	494.23	830.35	495.46	830.21
498.31	830.01	499.03	829.94	500.2	829.96	502.52	829.92	505.08	829.8
506.1	829.7	508.44	829.79	510.16	829.85	511.83	829.84	512.13	829.85
512.83	829.83	516.21	829.73	517.08	829.68	518.13	829.67	520.59	829.6
522.2	829.54	523.11	829.58	523.97	829.61	525.22	829.59	529.74	829.35
530.05	829.34	530.12	829.34	531.02	829.33	535.96	829.3	536.14	829.29
539.57	829.5	540.12	829.5	541.15	829.35	542.06	829.22	544.88	829.19
547.62	829.18	547.92	829.16	548.6	829.18	549.33	829.2	554	829.42
557.62	829.33	560.09	829.29	561.54	829.4	564.12	829.51	565.65	829.63
566.04	829.58	566.97	829.59	570.01	829.52	571.01	829.54	572.05	829.54
575.19	829.49	576.08	829.52	576.62	829.5	577.92	829.44	581.55	829.47
581.98	829.5	582.17	829.49	583.97	829.55	585.16	829.52	588	829.61
589.43	829.58	590.09	829.56	593.62	829.57	594.14	829.56	596.1	829.7
599.55	829.6	600.13	829.6	600.67	829.54	602.12	829.31	604.34	829.35
606.2	829.36	607.23	829.26	608.12	829.17	612	829.37	612.12	829.38
612.17	829.38	614.16	829.46	614.62	829.43	618.23	829.38	619.34	829.3
620.23	829.18	620.99	829.15	621.79	829.18	626.34	829.21	630.03	829.04
632.32	828.96	636.34	828.94	638.39	828.94	641.03	829.17	643.22	829.13
644.41	829.07	648.19	829.02	650.41	829.06	654.3	828.98	656.57	828.92
657.3	828.95	660.64	829.07	662.31	829.03	662.67	829.03	663.36	829
666.64	828.98	667.26	828.91	668.76	828.91	670.39	828.9	674.89	828.85
676.79	828.9	680.05	828.84	681.09	828.77	685.03	829.08	685.1	829.08
685.16	829.07	687.22	828.88	690.44	828.93	691.22	828.95	692.29	828.9
693.28	828.88	693.94	828.91	695.9	828.89	699.27	828.91	703.92	828.9
705.45	828.91	705.82	828.9	711.63	829.1	712.01	829.12	716.65	829.18
717.59	829.21	721.68	829.24	723.48	829.31	727.29	829.29	727.54	829.3
727.68	829.29	729.55	829.34	733.42	829.42	733.62	829.42	735.58	829.58
738.61	829.66	739.51	829.69	741.12	829.82	741.5	829.88	742.41	829.9
745.42	830.07	747.72	830.44	752.27	831.04	755.93	831.3	758.41	831.59
764.71	832.06	768.01	832.68	770.53	833.31	773.95	833.75	780.53	834.76
784.11	835.13	785.35	835.34	786.34	835.58	787.38	835.73	789.58	836.24
796.26	837.31	799.36	838.14	800.54	838.34	811.87	839.81	814.27	840.22

814.97	840.22	816.1	840.37	820.41	840.88	821.37	840.84	822.2	840.83
823.27	841.04	825.87	841.62	827.33	841.74	827.68	841.8	829.27	842.1
832.13	842.53	833.19	842.6	836.52	843.34	837.05	843.43	837.44	843.4
837.81	843.38								

Manning's n Values num= 11

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	237.74	.1	282.37	.07	290.56	.06	311.59	.07
326.57	.1	418	.013	427.95	.1	492.79	.035	727.29	.1
837.81	.1								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
282.37	326.57	96.02	92.36	85.26	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
425	775	833.5	F

Right Levee Station= 427.79 Elevation= 830.1

Blocked Obstructions num= 1

Sta L	Sta R	Elev
20	73	855

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 703.7970

INPUT
Description: 7+04
Station Elevation Data num= 478

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	838.34	.56	838.32	1.61	838.29	3.85	838.22	5.42	838.18
6.94	838.11	7.12	838.09	7.53	838.09	10.43	837.83	12.4	837.66
12.57	837.65	17.5	837.49	18.31	837.46	20	837.28	25.9	836.94
27.55	836.96	28.94	836.84	29.41	836.78	32.45	836.62	33.15	836.6
33.74	836.59	34.82	836.6	36.58	836.57	40.35	836.52	44.28	836.21
44.34	836.21	45.01	836.08	45.87	835.91	46.56	835.86	49.79	835.63
49.97	835.61	51.49	835.5	54.24	835.52	55.27	835.53	56.32	835.51
57.02	835.51	59.42	835.63	60.94	835.72	61.67	835.73	62.56	835.75
65.19	835.78	66.38	835.79	66.48	835.8	68.07	835.89	70.38	835.83
72.25	835.81	75.47	835.8	77.58	835.7	79.76	835.64	80.95	835.58
84.67	835.38	86.58	835.38	88.36	835.44	89.68	835.62	90.13	835.63
91.3	835.66	93.94	835.6	95.02	835.74	95.6	835.77	97.94	836.03
100.37	836.37	104.95	836.22	106.69	836.05	107.62	835.98	110.47	835.82
112.24	835.82	115.97	835.66	116.63	835.68	117.7	835.75	121.62	835.77
122.96	835.72	123.23	835.7	126.62	835.69	127.06	835.69	127.29	835.68
128.91	835.65	130.29	835.61	132.57	835.57	133.68	835.56	134.5	835.53
135.65	835.48	138.23	835.53	139.07	835.35	140.64	835.37	141.85	835.29
145.01	835.28	148.71	835.19	150.65	835.25	153.99	835.12	156.97	835.11
159.9	834.96	166.36	834.71	167.19	834.68	170.48	834.57	171.99	834.48
174.87	834.37	177.71	834.2	179.18	834.04	179.52	833.97	181.06	833.85
183.34	833.63	184.36	833.4	185.28	833.15	186.31	833.05	188.97	832.74
190.81	832.42	190.88	832.41	191.14	832.35	194.87	831.62	196.38	831.29
201.92	830.87	202.02	830.86	202.11	830.86	205.91	830.7	206.08	830.68
207.71	830.45	211.25	830.17	211.63	830.15	211.78	830.13	213.33	829.9
215.57	829.75	217.2	829.6	217.82	829.58	219.08	829.41	222.98	829.03
224.19	828.96	227.64	828.83	230.24	828.69	231.2	828.68	234.3	828.51
235.03	828.44	235.86	828.38	238.38	828.45	239.8	828.42	240.87	828.42
241.58	828.39	245.15	828.37	245.42	828.39	245.81	828.36	247.27	828.33
248.28	828.34	252.34	828.27	252.9	828.24	257.72	828.31	258.31	828.33
259.41	828.38	262.31	828.55	262.65	828.53	263.91	828.52	266.59	828.54

267.78	828.57	269.25	828.6	269.55	828.62	269.79	828.63	273.34	828.71
273.99	828.73	275.17	828.72	278.21	828.44	278.84	828.46	279.26	828.46
280.76	828.47	283.29	828.57	284.56	828.58	285.47	828.56	290.6	828.74
292.63	828.76	293.19	828.75	296.11	828.69	300.52	828.54	301.38	828.56
302.89	828.61	303.14	828.62	303.65	828.6	307.01	828.52	307.52	828.53
308.42	828.61	314.27	828.96	321.86	829.07	325.55	828.86	326.23	828.78
329.27	828.5	330.85	828.41	331.11	828.4	334.35	828.35	334.91	828.33
336.65	828.14	337.7	828.04	340.6	827.64	341.74	827.5	342.12	827.44
344.04	827.3	346.13	827.22	346.83	827.16	348.02	827.16	350.57	827.05
351.61	827.05	353.27	827.18	353.99	827.18	357.23	827.22	358.92	827
359.07	827	359.61	827.02	363.01	827.14	364.64	827.14	367.03	827.18
369.17	827.2	370.32	827.2	375.8	827.23	376.22	827.23	381.61	827.22
383.36	827.32	385.55	827.43	386.58	827.41	387.22	827.44	388.64	827.53
392.77	827.82	392.98	827.84	393.54	828.02	396.95	828.85	397.87	829.1
407.84	829.21	408.35	829.2	408.54	829.17	408.61	829.15	409.74	828.89
411.16	828.56	414.98	827.13	417.35	823.18	443.35	823.43	444.13	827.33
446.55	827.78	449.6	828.41	450.6	828.62	451.57	828.62	454.49	829.01
454.6	829.02	454.68	829.03	456.13	829.18	457.14	829.25	460.48	829.23
463.26	828.82	466.27	828.63	468.37	828.63	474.13	828.8	474.33	828.81
478.71	828.93	482.14	828.85	483.56	828.98	490.08	828.83	493.92	828.04
498.66	828.07	499.62	828.1	500.97	828.1	502.37	827.96	506.01	828.11
506.94	828.12	507.78	828.17	508.44	828.2	512.94	829.45	514.47	830.05
516.52	830.74	518.6	831.55	519.77	831.73	520.47	831.84	523.79	831.95
524.31	831.98	524.55	832.01	526.24	832	527.53	832.16	530.23	832.6
531.35	832.65	532.05	832.68	536.14	832.77	537.22	832.73	537.8	832.73
539.09	832.66	541.92	832.47	542.94	832.28	543.76	832.12	544.89	831.82
547.63	831.16	548.2	831.12	549.58	830.89	551.56	830.4	554.39	830.1
559.1	830.27	559.56	830.29	559.73	830.27	565.39	829.85	566.53	829.64
572.13	829.72	575.67	829.89	577.49	829.9	578.84	829.94	580.71	829.83
582.93	830	587.17	830.12	589.85	830.12	592.29	830.01	598.55	830.25
601.4	830.34	603.33	830.22	604.06	830	612.3	829.18	612.58	829.19
614.31	829.2	614.61	829.2	620.38	829.12	623.85	829.15	624.56	829.16
626.32	828.96	626.39	828.95	626.52	828.94	631.96	828.98	634.34	829.01
638.33	829.01	640.14	828.94	643.42	828.88	644.41	828.93	646.79	828.89
648.46	828.93	649.44	828.72	650.33	828.62	653.5	828.63	654.6	828.67
654.85	828.67	656.21	828.65	659.59	828.85	660.85	828.88	662.28	828.78
662.52	828.8	667.91	829.11	668.39	829.07	672.39	829.07	672.49	829.06
672.55	829.07	674.34	829.06	679.27	828.73	680.11	828.7	680.33	828.69
681.02	828.75	683.51	828.88	686.23	829.05	686.95	829.05	692.28	829.03
697.4	829.06	698.4	829.08	699.4	829.09	700.87	829.1	704.41	829.13
705.39	829.2	708.52	829.26	709.68	829.02	710.43	828.94	712.35	828.9
714.6	828.95	715.37	828.82	716.45	828.74	718.03	828.78	720.52	828.95
721.69	828.98	722.49	829.01	725.74	829.05	726.65	829.06	727.28	828.96
728.57	828.73	733.79	828.75	734.67	828.77	735.22	828.8	738.73	828.85
739.3	828.85	740.4	828.8	746.51	828.71	746.75	828.7	747.27	828.65
750.78	828.57	752.13	828.6	752.77	828.61	754.3	828.64	758.04	828.86
758.78	828.78	761.18	828.79	763.07	828.81	763.49	828.77	764.93	828.59
765.99	828.64	767.2	828.68	771.05	828.82	773.74	828.81	775.1	828.74
776.74	828.54	777.15	828.53	778.1	828.52	782.98	828.54	791.56	828.54
795.12	828.53	795.63	828.52	796.37	828.53	799.69	828.42	800.55	828.41
801.69	828.46	804.76	828.66	805.91	828.72	806.64	828.81	807.7	828.86
809.06	828.89	811.85	828.85	812.75	828.81	816.34	828.98	818.29	829
820.06	828.85	825.31	828.81	825.93	828.82	826.02	828.82	826.61	828.83
830.95	828.88	831.91	828.81	833.17	828.84	836.07	828.95	837.67	829.17
838.01	829.16	838.92	829.22	842.11	829.27	843.63	829.08	844.03	829.04
844.63	829.08	848.05	829.36	848.6	829.42	849.97	829.48	853.55	829.61
853.96	829.61	854.2	829.63	855.87	829.55	859.66	829.69	860.11	829.72
865.02	830.22	865.72	830.41	866.11	830.45	867.61	830.79	870	830.71
872.38	830.84	873.44	830.98	875.3	831.04	877.47	831.25	878.63	831.38
879.32	831.46	882.6	831.74	883.31	831.79	883.8	831.81	885.14	831.83

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   888.1  831.85  889.08  831.87  890.43  831.99  891.48  832.08   892.5  832.26
  896.83  832.94  900.24  834.95  900.65  835.23  900.94  835.44  902.53  836.57
  908.38  838.21  912.51  839.35  914.83   839.6  920.35  840.33  950.62  841.26
  954.03   841.1  954.85   841.2  956.48  841.09  957.87  841.17   958.1   841.2
  959.55  841.21  961.58  841.21  962.32  841.22  963.07  841.22  966.13  841.33
  968.09  841.29  968.91  841.33  971.47  841.33

Manning's n Values        num=      12
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013  184.36     .03  392.98      .1  408.35     .07  414.98     .06
  443.35     .07  457.14      .1  530.23    .013  539.09      .1   601.4    .035
  848.05      .1  971.47      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        408.54  457.14            56.86   52.22   53.96              .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  536.14     900  832.73        F
Right Levee     Station=  536.14      Elevation=   830.1

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach              RS: 651.5802

INPUT
Description: 6+52
Station Elevation Data    num=     487
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  837.96    1.96  837.88    2.47   837.9    3.46  837.91    5.36  837.76
    7.39  837.64    7.99  837.58    9.18  837.53   11.78  837.51   12.88  837.49
   14.37  837.33   14.71  837.28   15.53   837.2   18.46  837.07   19.32  836.98
   20.28  837.02    22.4     837   24.05  836.99   25.34  836.69   25.66  836.62
   26.34  836.58   30.89  836.04   31.18  835.97   32.87  835.74   35.19  835.45
    36.5  835.53   36.71  835.51   39.95  835.58   40.66  835.58   41.28   835.6
   42.32  835.55   43.97  835.58   46.14  835.63   47.68  835.68   47.85  835.68
   48.17  835.69   53.26  835.71   53.92  835.71   58.88  835.81   62.55  835.86
   62.72  835.86   62.88  835.85   64.33  835.78   65.46  835.73   68.17  835.68
   69.83  835.72   69.94  835.73   70.24  835.71   73.61  835.54   74.63  835.46
   75.46  835.36   76.77  835.39   79.17  835.39   80.06  835.48   80.89  835.51
   83.15  835.52   85.16  835.47   86.36  835.52   87.42  835.55   91.15  835.43
   91.84  835.45   94.65  835.38   95.76  835.45   96.12  835.44   97.94  835.43
  102.43  835.36   102.9  835.38  103.43  835.37  106.52   835.3  108.43   835.3
  109.61  835.29  112.95  835.37  113.77  835.31  114.84  835.32  117.82  835.25
  118.25  835.18  119.63  835.22  121.52  835.18  123.32  835.15   124.2  835.19
  126.81  835.23  128.97   835.2  130.33  835.08  130.76  835.06   134.1  834.97
  134.58  834.94  134.82  834.94  136.31  834.85  139.48  834.78  140.34  834.79
  140.83  834.75  142.06  834.77  144.71  834.75  145.87  834.75  146.59   834.7
  147.65  834.72  149.39  834.64  151.51  834.57  152.23  834.48  153.19  834.38
  156.64  834.73  157.09  834.77  157.79  834.76  158.81  834.77  159.51  834.87
  164.44  835.06  166.79   835.1  168.89  834.88  170.03   834.7  170.74  834.65
  171.38  834.63  175.99  834.58  177.45  834.63  179.72  834.75  181.44  834.74
  181.61  834.74  182.56  834.75   185.3  834.76  186.21  834.73  187.18  834.69
  188.63  834.72  191.05  834.76  192.25  834.76  192.78  834.74  196.11  834.46
  196.87  834.44  202.06  834.04  202.74  833.88  204.07  833.57  205.77  833.18
  207.94  832.15   212.3  831.14  213.49   831.1  214.81  830.66  217.27  829.97
  219.65  829.27  220.96  829.18  224.95  828.67  226.73  828.54     232  828.69
  232.18  828.73  235.83  828.81  236.35  828.81  237.87  828.74   239.1  828.72
  242.82  828.77  243.48  828.75  246.98  828.74  247.35  828.74  248.89  828.73
  249.04  828.74  254.47  828.34  257.06  828.37  259.18  828.23  265.14  828.52
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265.42	828.53	265.95	828.53	270.85	828.45	272.32	828.49	276.52	828.46
277.47	828.45	282.21	828.36	282.35	828.36	286.25	828.16	286.43	828.15
289	828.18	292.51	828.45	296.15	828.84	297.56	828.82	297.93	828.87
301.25	828.65	303.17	828.46	305.22	828.48	314.23	828.42	315.96	828.45
316.02	828.45	316.25	828.43	319.78	828.12	321.19	828.07	321.58	828.07
321.86	828.08	326.54	828.13	329.33	828.02	332.6	827.99	335.55	828.2
336.66	828.3	337.04	828.27	338.52	828.24	340.98	828.08	346.63	827.91
348.27	827.85	349.54	827.92	351.43	827.89	351.82	827.89	353.51	827.93
354.14	827.93	355.1	827.84	358.59	827.79	359.28	827.77	360.77	827.72
360.83	827.72	364.75	827.78	364.86	827.79	366.39	827.82	369.89	828.28
370.42	828.3	370.76	828.35	372.08	828.47	374.6	828.43	376.04	828.48
377.41	828.55	377.67	828.57	380.99	828.94	382.07	829.04	386.46	829.4
387.32	829.42	388.04	829.44	390.01	829.49	393.2	829.63	394.67	829.39
394.95	829.33	396.11	829.17	399.66	828.63	400.71	828.4	402.89	827.71
404.56	827.18	404.6	827.16	406.27	826.47	408.73	825.73	410.25	825.28
411.51	823.71	434.17	823.44	435.21	825.38	436.49	826.02	436.99	826.23
439.23	827.08	442.92	827.79	445.03	828	445.64	827.93	446.81	827.7
449.71	827.62	450.88	827.61	451.84	827.6	452.6	827.62	456.27	827.64
456.91	827.74	462.58	828.54	462.72	828.54	470.07	828.6	474.05	828.53
474.08	828.53	474.26	828.54	475.29	828.61	478	828.78	479.78	828.88
480.13	828.9	481.48	829.12	486.85	829.35	487.34	829.38	487.66	829.32
491.27	828.68	492.51	828.52	493.92	828.54	496.92	828.95	503.74	829.97
508.14	830.7	508.81	830.67	509.25	830.79	510.62	831.06	513.42	831.56
514.5	831.72	514.89	831.73	516.38	831.75	517.88	831.89	520.38	832
521.78	832.22	522.16	832.27	522.79	832.28	526.29	832.46	527.76	832.34
527.89	832.33	530.75	832.37	532.06	832.39	532.28	832.37	533.85	832.24
537.35	831.4	537.75	831.28	539.31	830.77	539.63	830.65	539.75	830.63
543.58	829.76	548.77	829.68	549.57	829.63	550.39	829.6	555.43	829.49
556.24	829.37	559.28	829.35	561.88	829.33	566.53	829.29	568.55	829.34
571.23	829.29	574.41	829.27	576.46	829.31	578.84	829.39	584.31	829.54
584.64	829.54	584.91	829.55	587.97	829.74	590.68	829.91	591.37	829.87
592.54	829.79	593.47	829.69	596.92	829.33	599.98	829	602.47	828.88
603.39	828.96	604.17	828.86	608.15	828.73	608.35	828.72	608.4	828.72
610.18	828.69	615.74	828.63	616.19	828.62	620.16	828.69	620.39	828.68
620.52	828.68	622.02	828.75	624.51	828.82	628.08	828.83	628.12	828.83
632.22	828.75	634.09	828.52	634.15	828.51	638.02	828.62	638.4	828.58
640.03	828.32	644.17	828.23	645.91	828.23	649.41	828.38	650.66	828.38
651.97	828.31	654.12	828.48	656.21	828.63	656.77	828.65	658.05	828.63
660.47	828.68	663.68	828.71	663.98	828.69	664.5	828.66	668.07	828.54
669.53	828.51	669.95	828.51	671.14	828.49	675.83	828.49	677.47	828.58
680.03	828.58	681.21	828.66	681.87	828.67	686.62	828.72	687.97	828.73
688.9	828.76	693.96	828.81	697.01	828.84	698.13	828.87	698.85	828.78
699.96	828.62	703.26	828.77	704.59	828.76	705.98	828.64	708.57	828.73
710.12	828.77	711.03	828.73	712	828.7	714.56	828.65	718.07	828.62
720.83	828.61	723.09	828.71	724.15	828.73	726.94	828.8	728.28	828.77
728.69	828.79	730.13	828.66	731.78	828.59	736.2	828.51	740.35	828.51
742.2	828.34	744.69	828.36	747.31	828.5	748.2	828.52	752.15	828.43
752.54	828.42	754.22	828.43	754.33	828.44	754.64	828.44	758.56	828.56
759.79	828.54	760.43	828.53	761.5	828.52	764.57	828.45	765.29	828.43
766.53	828.37	768.86	828.4	772	828.4	772.66	828.42	775.62	828.38
776.97	828.36	778.19	828.33	778.84	828.31	779.23	828.31	779.88	828.34
784.96	828.41	786.94	828.41	789.1	828.35	790.77	828.37	791.01	828.37
791.92	828.38	796.5	828.43	797.02	828.43	798.94	828.45	803.18	828.5
805.92	828.56	809.34	828.65	813.32	828.74	814.95	828.77	815.3	828.78
818.53	828.87	819.4	828.87	821.16	828.73	823.93	828.82	825.42	828.88
826.05	828.85	827.27	828.93	830.2	829.07	831.44	829.08	832.35	829.05
833.28	828.96	835.98	828.84	837.36	828.78	838.99	828.78	839.18	828.79
840.08	828.77	845.06	828.8	848.27	829.12	849.17	829.18	850.17	829.22
850.96	829.23	852.4	829.29	855	829.37	856.66	829.32	856.79	829.31
856.87	829.31	860.84	829.57	861.89	829.62	862.6	829.63	863.2	829.64

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   866.7  829.75  868.18  829.86  868.46  829.89  869.03  829.96  876.83  830.82
  879.25  831.01  882.65  831.45  885.84  831.57  885.96  831.57  886.17   831.6
  891.58  832.72  891.97  832.75  895.61  832.71  897.18  833.01  897.65  833.05
  901.18  833.05  901.31  833.06  904.82   833.4   906.6  833.66  909.57  833.91
  912.42  834.04  912.93   834.1  916.04  834.39   919.4  834.66  919.75   834.7
  920.57   834.7  923.55  834.88  924.87  834.98  926.38  835.13  929.49  835.43
   933.8  835.46  934.24  835.46

Manning's n Values        num=      12
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013  191.05     .03  349.54      .1  400.71     .07  410.25     .06
  435.21     .07  445.03      .1  520.38    .013  530.75      .1  584.31    .035
  850.17      .1  934.24      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        400.71  445.03           111.44  106.45  103.86             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
     526     891  832.46       F
Right Levee     Station=     526      Elevation=   830.1

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach              RS: 545.1257

INPUT
Description: FIS D-D
Station Elevation Data    num=     491
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  835.78      .3  835.78    5.33   835.8    6.09  835.82    9.68  836.03
   11.23  835.92   11.42  835.92   15.34  835.98   16.58  835.97   16.84  835.99
   17.43  835.98   23.72  835.97   26.24  835.87   27.16  835.83   29.76  835.72
   31.87  835.51   32.39  835.39   33.55  835.25   35.21  834.95   44.67  834.27
   52.73  833.03   58.36  833.52   64.24  833.57   66.35  833.49   67.14  833.47
   68.68  833.39   71.23  833.13   72.73  833.15   72.92  833.13   73.92  833.07
   76.84  832.84   77.68  832.78   78.67  832.73   80.05  832.69   82.46  832.58
      84  832.52   84.25   832.5   84.62  832.52   88.02  832.47   88.17  832.45
    95.4  832.16   95.42  832.16   98.91  832.25  100.56  832.33  105.52  832.65
     110  832.22  110.71  832.15  110.74  832.14   110.8  832.14  122.04  831.57
  122.79  831.55  123.28  831.41  124.78  831.32  127.77     831  128.53  830.86
   129.2  830.74   132.7  830.04  133.21  829.97  133.53  829.92  134.47  829.78
  138.42  829.18  138.79  829.19  144.74  829.26  148.31  829.04  151.37  828.89
  157.09  828.73  157.74  828.83  162.72  829.36  167.47  828.69  175.72  829.06
  183.28  829.09  185.13     829  189.83  829.12  193.49  829.18  198.71   828.8
  200.86  828.63  204.93  828.77  208.82  828.42  210.45  828.19  214.95  827.75
  218.14  827.88   218.7  827.89  220.06  827.95  223.94  828.08  224.48  828.07
  227.99  828.36  228.82  828.45  234.55  828.18  237.68  827.88  239.21  827.94
  239.69     828  241.96   828.1  244.68  828.32  246.12   828.5  246.49   828.5
  247.28  828.56  253.43   828.5  258.72  828.59  262.73  828.49  263.26  828.49
  267.22  828.35  267.29  828.35  267.37  828.34  268.85  828.15  269.36  828.16
  272.75  828.21  273.03  828.21  274.51  828.12  276.73  828.11  278.54  828.13
  279.85  828.08  280.08  828.06  282.61  828.02  285.29   827.9   285.8  827.92
  286.89  828.01  289.89  828.15  290.52  828.21  291.54  828.18  294.26  828.11
  295.65  828.14  296.48  828.01  297.32  827.94  300.96  828.18  301.42  828.18
  301.87   828.2  302.77  828.18  305.32  828.49  308.77  827.99  310.39  827.76
  318.56  825.89  324.18  824.59   324.7  824.44  326.02  824.45  334.93  823.88
  336.33  823.67  337.71  823.47  339.02  823.31  345.49  823.43  348.58  824.29
  353.25  827.19  353.34  827.24  354.98  827.33  358.17   827.3  359.61  827.29
  360.79  827.12  364.23  827.64  365.01  827.71  365.26  827.72  366.63  827.78
```

368.32	827.86	375.82	828.12	376.53	828.11	376.8	828.1	381.99	827.16
382.23	827.13	387.01	827.34	391.63	828.07	394.48	827.59	395.11	827.62
396.76	827.53	399.61	827.78	400.16	827.91	402.33	828.29	402.91	828.39
406.98	828.06	409.73	828.62	412.15	829.15	412.93	829.34	417.82	830.99
418.53	831.25	418.72	831.28	419.33	831.3	422.8	831.38	424.31	831.43
424.5	831.43	430.19	831.74	430.31	831.74	434.5	831.9	436.11	831.94
436.2	831.94	436.49	831.9	440.2	831.37	441.64	831.03	443.59	830.75
445.87	830.14	446.95	830.17	447.74	829.95	448.81	829.8	452.72	829.35
458.11	829.32	460.23	829.32	463.78	828.76	465.92	828.81	470.92	828.88
471.14	828.89	471.18	828.89	471.66	828.86	473.04	828.79	475.75	828.66
479.08	828.79	484.11	828.9	487.44	828.98	488.48	828.98	488.79	828.99
489.83	828.97	493.13	828.79	498.75	828.5	499	828.49	499.17	828.49
501.22	828.38	503.42	828.41	504.94	828.49	506.22	828.37	506.55	828.33
507.98	828.39	511.66	828.54	512.57	828.56	518.33	828.28	518.59	828.12
519.93	828.13	526.38	828.17	528.79	828.12	528.92	828.12	531.91	827.95
535.98	827.99	536.56	828.01	540.73	828.02	541.65	828.01	547.38	827.93
548.34	827.91	550.74	828.17	553.62	828.32	554.41	828.28	557.56	828.38
558.74	828.44	559.29	828.44	560.49	828.34	564.35	828.18	566.41	828.13
571.37	828.23	572.39	828.27	573.52	828.31	576.7	828.38	578.24	828.39
578.3	828.38	584.24	828.43	584.46	828.43	588.59	828.68	589.35	828.74
590.44	828.78	596.43	828.56	599.62	828.61	600.69	828.63	600.82	828.61
604.97	828.38	606.8	828.48	607.47	828.52	612.71	828.66	614.51	828.63
614.73	828.63	618.81	828.75	620.42	828.75	620.58	828.76	622.2	828.74
628.75	828.6	632.45	828.59	632.65	828.59	633.09	828.61	639.08	828.63
642.94	828.75	644.6	828.62	644.75	828.62	648.95	828.87	649.09	828.87
651.83	828.82	662.2	828.97	663	829.1	667.26	829.13	668.88	829.18
669.13	829.19	675.27	829.36	676.71	829.34	680.06	829.39	686.58	829.56
687.6	829.61	688.31	829.65	692.93	829.95	697.65	830.11	698.58	830.15
701.27	830.26	705.32	830.43	705.85	830.48	707.32	830.49	710.31	830.5
711.66	830.5	712.03	830.58	712.24	830.57	717.33	831.1	724.29	831.17
729.99	831.08	734.83	831.36	736.49	831.37	740.2	831.84	740.78	831.91
743.21	832.02	748.44	832.32	751.44	832.29	752.02	832.34	757.35	832.09
759.43	832.36	764.66	832.82	772.42	833.15	775.43	833.35	776.38	833.45
777.1	833.47	778.24	833.53	783.03	833.93	784.04	834.07	787.36	834.16
792.35	834.41	792.72	834.42	792.89	834.45	801.15	834.69	802.11	834.77
805.31	834.81	805.73	834.78	809.51	835	809.78	835.01	810.04	835.02
817.06	835.22	817.87	835.24	822.59	835.35	826.47	835.44	826.92	835.44
828.04	835.42	832.07	835.56	832.08	835.56	834.27	835.66	839.13	835.64
839.38	835.64	843.55	835.79	844.77	835.83	847.03	835.74	853.74	835.91
853.92	835.9	853.95	835.9	855.39	835.67	860.68	835.31	866.27	835.01
867.12	834.97	869.86	835.12	871.07	835.04	871.56	835.06	872.48	835.14
877.16	835.54	880.76	835.76	887.24	836.15	891	836.66	891.65	836.73
892.93	836.73	894.11	836.71	899.88	837.22	903.02	837.06	904.63	837.33
908.16	838.3	911.11	839.19	914.63	839.76	917.57	840.34	918.74	840.56
920.77	840.98	923.76	841.61	924.61	841.87	927.25	842.43	928.57	842.55
929.34	842.63	930.93	842.89	935.09	843.84	935.25	843.87	935.64	843.97
943.39	845.24	944.76	845.46	947.38	846.14	950.58	846.96	952.6	847.33
954.93	847.48	958.98	848.08	960.27	848.35	961.27	848.76	964.68	849.51
968.21	850.33	971.36	850.93	972.27	851.14	976.07	852.19	979.1	853.34
981.36	854.03	987.45	855.56	988.13	855.71	988.54	855.77	997.19	855.93
1001.29	856.29	1003.73	856.55	1005.44	856.71	1010.65	857.34	1012.64	857.73
1012.95	857.73	1015.91	857.95	1018.25	858.24	1018.81	858.28	1019.34	858.34
1021.43	858.49	1028.17	859.26	1033.42	860.18	1033.5	860.19	1033.63	860.19
1039.29	860.12	1040.84	860.27	1043.84	860.34	1044.53	860.39	1047.23	860.9
1049.42	861.29	1056.54	862.07	1059.7	862.22	1062.34	862.48	1064.34	862.6
1065.08	862.64	1065.78	862.71	1067.83	862.81	1072.41	863.36	1073.17	863.5
1078.67	864.41	1086.37	864.91	1088.04	865.27	1096.42	866.65	1098.47	867.02
1101.79	867.97	1105.76	868.51	1111.15	868.65	1111.41	868.66	1111.74	868.66
1111.77	868.67	1117.24	869.26	1119.57	869.64	1125.88	869.82	1128.02	869.96
1134.92	870.86	1138.91	870.94	1140.89	870.57	1142.19	870.68	1142.53	870.73

1150.67	871.72	1152.27	871.87	1155.83	872.07	1156.94	872.17	1158	872.17
1165.26	872.37	1166.27	872.47	1167.48	872.44	1170.87	872.42	1180.28	873.33
1180.6	873.38	1180.65	873.38	1181.05	873.44	1182.27	873.73	1186.23	874.08
1187.59	874.22	1192.03	874.6	1194.54	874.7	1200.28	874.8	1201.12	874.79
1204.43	874.65	1205.34	874.63	1207.24	874.67	1209.01	874.68	1211.51	874.91
1214.4	874.96	1216.03	875	1216.92	875.32	1219.67	875.27	1221.93	875.15
1225.51	874.39	1228.48	874.15	1229.55	874.13	1230.46	874.05	1230.71	874.02
1236.29	874.02	1237.86	874.28	1240.34	874.22	1240.6	874.1	1243.11	874.25
1244.72	874.37								

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	68.68	.1	310.39	.07	324.7	.06	348.58	.07
353.34	.1	424.5	.013	436.49	.1	489.83	.035	688.31	.1
792.35	.013	860.68	.1	1244.72	.1				

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

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
310.39	353.25		46.6	52.81	53.82	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
436.11	1244.72	831.94	F

Right Levee Station= 436.11 Elevation= 829.9

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
34	68	855	165	214	850

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 492.3110

INPUT
Description: 4+92
Station Elevation Data num= 409

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	832.23	.86	832.23	4.82	831.86	5.64	831.85	7.34	831.45
10.5	831.05	11.25	830.79	21.31	830.59	25.08	830.39	26.64	829.95
27.92	829.6	28.69	829.55	30.56	829.28	33.79	828.88	34.87	828.71
39.47	828.29	40.33	828.27	43.46	828.13	44.04	828.06	45.16	827.95
47.72	827.74	49.6	827.66	50.77	827.64	52.71	827.65	54.66	827.68
55.14	827.68	56.2	827.61	57.75	827.64	60.34	827.55	61.63	827.43
61.79	827.44	62.04	827.45	65.8	827.69	66.39	827.68	67.42	827.78
68.71	827.82	72.84	827.59	73.02	827.59	75.42	827.64	76.85	827.69
76.96	827.71	78.62	827.97	81.47	828.13	83.65	827.9	84.33	827.89
89.61	828.2	90.35	828.14	93.81	827.88	94.78	827.93	96.05	827.97
99.59	828.08	101.03	828.09	101.28	828.09	105.73	827.99	108.62	828.08
110.67	828.13	111.95	828.15	112.14	828.16	112.5	828.17	116.3	828.28
117	828.26	117.89	828.24	121.71	828.21	121.78	828.2	121.87	828.21
127.33	828.13	130.58	828	132.97	827.95	137.08	827.94	138.66	827.88
138.97	827.87	142.6	827.79	144.39	827.73	145.97	827.68	151.47	827.68
153.49	827.79	156.04	827.83	157.01	827.86	160.15	827.81	161.45	827.8
162.59	827.94	166.73	827.83	166.9	827.84	167.14	827.85	168.31	827.91
168.77	827.91	172.41	827.89	172.55	827.89	173.93	827.92	177.75	827.77
178.06	827.76	178.35	827.76	180.3	827.78	182.21	827.82	184.27	827.86
184.94	827.83	185.2	827.84	185.83	827.85	189.45	828.06	190.72	828.01
190.94	828	191.42	827.99	195.94	827.86	196.69	827.78	200.26	827.85
200.85	827.86	201.03	827.85	202.5	827.84	204.99	827.85	206.64	827.88
208.21	828	208.3	828.01	209.08	827.98	212.34	827.9	212.87	827.93
216.96	827.76	219.79	827.68	220.67	827.7	224.79	827.93	225.64	827.95
228.26	828.16	229.6	828.26	230.05	828.32	231.25	828.5	233.51	827.74

234.86	827.26	240.35	825.29	243.27	824.77	245.18	824.46	251.67	824.85
262.92	825.54	266.58	825.79	271.07	825.42	272.1	825.5	272.66	825.63
276.05	826.66	278.3	826.88	280.01	827.07	282.61	827.31	283.55	827.24
285.71	827.26	287.43	827.33	289.66	827.54	291.02	827.38	301.28	826.6
302.66	826.61	305.65	826.67	306.13	826.74	311.52	827.37	311.72	827.39
313	827.48	315.59	828.38	317.26	828.75	317.69	828.9	320.04	829.72
321.11	830.07	322.97	830.68	324.55	831.14	326.48	831.34	328.86	831.54
329.43	831.55	330.51	831.58	334.59	831.75	334.79	831.75	336.26	831.69
336.62	831.71	340.54	831.83	342.03	831.83	342.2	831.82	342.61	831.79
346.24	831.46	347.49	831.31	348	831.26	350.26	830.73	352.07	830.36
352.83	830.04	353.73	829.9	357.07	829.73	358.03	829.69	359.25	829.52
359.54	829.51	359.97	829.49	364.46	829.22	365.52	829.06	367.85	828.73
370.21	828.26	371.28	827.76	376.33	828.19	381.34	828.62	382.17	828.55
383.02	828.52	384.58	828.56	387.26	828.61	388.52	828.6	388.97	828.58
393.22	828.6	393.28	828.59	393.53	828.58	394.74	828.55	396.18	828.48
399.09	828.36	399.72	828.29	400.66	828.23	401.34	828.24	404.97	828.33
405.72	828.25	406.61	828.19	407.72	828.23	410.89	828.37	411.62	828.4
412.48	828.32	416.05	828.4	416.78	828.39	416.98	828.38	418.48	828.3
422.37	828.45	422.84	828.48	423.8	828.47	424.42	828.48	424.81	828.49
428.85	828.6	428.87	828.6	430.36	828.63	432.34	828.81	434.76	829.01
436.24	828.96	436.82	828.97	440.68	829.14	440.69	829.14	442.49	829.26
446.36	829.27	447.14	829.21	448.37	829.11	450.67	829.15	452.82	829.21
454.19	829.19	454.28	829.18	454.5	829.17	458.81	829.19	460.29	829.21
460.49	829.21	464.67	829.05	466.33	829.21	466.39	829.22	466.9	829.24
470.66	829.36	471.18	829.42	472.33	829.4	474.44	829.45	476.54	829.46
477.38	829.47	478.29	829.48	481.98	829.72	482.63	829.73	483	829.74
484.21	829.8	488.16	830.03	488.58	829.97	488.86	829.97	495.12	829.72
496.33	829.8	499.15	829.71	503.22	829.45	509.26	829.99	512.71	830.01
514.11	830.17	515.58	830.25	518.53	830.57	520.24	830.66	521.47	830.84
524.73	830.89	528.83	831.14	530.87	831.17	531.83	831.26	532.56	831.26
535.75	830.57	538.24	830.06	538.5	830	542.34	829.52	542.84	829.51
544.58	829.56	544.6	829.56	548.83	830.01	550.5	829.83	550.6	829.85
550.7	829.85	554.88	830.35	554.95	830.33	556.6	830.43	558.02	830.61
561.08	830.88	561.88	830.95	562.76	831.07	564.95	831.19	567.11	831.24
570.73	831.39	573.15	831.55	574.44	831.65	574.99	831.71	578.99	831.96
579.48	831.99	581.12	832.02	581.14	832.02	585.56	832.08	586.92	832.21
587.32	832.24	591.22	832.31	591.61	832.32	593.44	832.32	596.83	832.47
597.71	832.5	599.41	832.64	599.83	832.65	603.93	832.73	605.45	832.81
605.53	832.81	606.21	832.82	609.87	832.83	610.26	832.83	611.68	832.82
615.76	832.9	615.94	832.9	616.08	832.89	617.85	832.84	620.27	832.92
621.94	833.02	622.38	833	623.8	833.02	627.65	833.03	627.87	833.04
627.98	833.02	629.69	832.87	632.22	832.99	634.06	833.03	634.83	833.1
637.34	833.12	640.09	833.19	641.02	833.14	641.81	833.06	644.57	833.15
646.01	833.13	647.7	833.07	647.72	833.07	647.74	833.06	653.58	832.84
657.63	832.95	657.8	832.95	657.93	832.92	659.49	832.48	662.47	832.51
663.64	832.45	664.36	832.41	665.31	832.26	666.17	832.21	669.46	831.85
670.82	831.51	673.73	831.32	675.31	831.29	675.97	831.08	676.94	830.88
677.47	830.83	681.12	831.13	681.57	831.06	682.76	830.93	685.18	830.89
688.05	830.49	688.67	830.36	691.08	830.27	692.69	830.28	694.31	830.28
697.09	830.26	700	829.94	702.54	829.88	704.71	829.77	705.77	829.77
707.3	829.7	709.7	829.61	711.17	829.51	711.52	829.51	716.34	829.8
721.11	829.49	732.03	829.8	732.05	829.8	733.59	829.66	735.22	829.74
737.64	829.73	738.81	829.7	739.07	829.72	741.84	829.77	743.22	829.8
744.73	829.8	749.7	829.72	750.16	829.7	750.3	829.71	750.68	829.75
754.01	830.06	754.75	829.99	755.46	829.97	759.75	830.13	760.78	830.2
760.92	830.23	761.15	830.22	766.15	830.34	768.74	831.17	769.54	831.14
773.1	831.25	776.36	831.56	778.07	831.63	782.82	831.79		

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

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      0     .03   202.5      .1  234.86     .07  240.35     .06  272.66     .07
  282.61      .1  330.51    .013  346.24      .1  388.97    .035  524.73      .1
  578.99    .013  657.93      .1  782.82      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        234.86  282.61            95.23   97.56  102.88             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
     340     580   831.8       F
     640  782.82   833.2       F
Right Levee     Station=  340.54      Elevation=   829.9

BRIDGE

RIVER: Oldtown Creek
REACH: Reach              RS: 431

INPUT
Description:
Distance from Upstream XS =      61
Deck/Roadway Width        =    24.3
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     231   828.5     820   243.4   830.2     820   243.5   830.2   828.2
     285   830.2   828.2   285.1   830.2     820     330   831.5     820

Upstream Bridge Cross Section Data
Station Elevation Data    num=     409
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  832.23     .86  832.23    4.82  831.86    5.64  831.85    7.34  831.45
    10.5  831.05   11.25  830.79   21.31  830.59   25.08  830.39   26.64  829.95
   27.92   829.6   28.69  829.55   30.56  829.28   33.79  828.88   34.87  828.71
   39.47  828.29   40.33  828.27   43.46  828.13   44.04  828.06   45.16  827.95
   47.72  827.74    49.6  827.66   50.77  827.64   52.71  827.65   54.66  827.68
   55.14  827.68    56.2  827.61   57.75  827.64   60.34  827.55   61.63  827.43
   61.79  827.44   62.04  827.45    65.8  827.69   66.39  827.68   67.42  827.78
   68.71  827.82   72.84  827.59   73.02  827.59   75.42  827.64   76.85  827.69
   76.96  827.71   78.62  827.97   81.47  828.13   83.65   827.9   84.33  827.89
   89.61   828.2   90.35  828.14   93.81  827.88   94.78  827.93   96.05  827.97
   99.59  828.08  101.03  828.09  101.28  828.09  105.73  827.99  108.62  828.08
  110.67  828.13  111.95  828.15  112.14  828.16   112.5  828.17   116.3  828.28
     117  828.26  117.89  828.24  121.71  828.21  121.78   828.2  121.87  828.21
  127.33  828.13  130.58     828  132.97  827.95  137.08  827.94  138.66  827.88
  138.97  827.87   142.6  827.79  144.39  827.73  145.97  827.68  151.47  827.68
  153.49  827.79  156.04  827.83  157.01  827.86  160.15  827.81  161.45   827.8
  162.59  827.94  166.73  827.83   166.9  827.84  167.14  827.85  168.31  827.91
  168.77  827.91  172.41  827.89  172.55  827.89  173.93  827.92  177.75  827.77
  178.06  827.76  178.35  827.76   180.3  827.78  182.21  827.82  184.27  827.86
  184.94  827.83   185.2  827.84  185.83  827.85  189.45  828.06  190.72  828.01
  190.94     828  191.42  827.99  195.94  827.86  196.69  827.78  200.26  827.85
  200.85  827.86  201.03  827.85   202.5  827.84  204.99  827.85  206.64  827.88
  208.21     828   208.3  828.01  209.08  827.98  212.34   827.9  212.87  827.93
  216.96  827.76  219.79  827.68  220.67   827.7  224.79  827.93  225.64  827.95
  228.26  828.16   229.6  828.26  230.05  828.32  231.25   828.5  233.51  827.74
  234.86  827.26  240.35  825.29  243.27  824.77  245.18  824.46  251.67  824.85
  262.92  825.54  266.58  825.79  271.07  825.42   272.1   825.5  272.66  825.63
  276.05  826.66   278.3  826.88  280.01  827.07  282.61  827.31  283.55  827.24
  285.71  827.26  287.43  827.33  289.66  827.54  291.02  827.38  301.28   826.6
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302.66	826.61	305.65	826.67	306.13	826.74	311.52	827.37	311.72	827.39
313	827.48	315.59	828.38	317.26	828.75	317.69	828.9	320.04	829.72
321.11	830.07	322.97	830.68	324.55	831.14	326.48	831.34	328.86	831.54
329.43	831.55	330.51	831.58	334.59	831.75	334.79	831.75	336.26	831.69
336.62	831.71	340.54	831.83	342.03	831.83	342.2	831.82	342.61	831.79
346.24	831.46	347.49	831.31	348	831.26	350.26	830.73	352.07	830.36
352.83	830.04	353.73	829.9	357.07	829.73	358.03	829.69	359.25	829.52
359.54	829.51	359.97	829.49	364.46	829.22	365.52	829.06	367.85	828.73
370.21	828.26	371.28	827.76	376.33	828.19	381.34	828.62	382.17	828.55
383.02	828.52	384.58	828.56	387.26	828.61	388.52	828.6	388.97	828.58
393.22	828.6	393.28	828.59	393.53	828.58	394.74	828.55	396.18	828.48
399.09	828.36	399.72	828.29	400.66	828.23	401.34	828.24	404.97	828.33
405.72	828.25	406.61	828.19	407.72	828.23	410.89	828.37	411.62	828.4
412.48	828.32	416.05	828.4	416.78	828.39	416.98	828.38	418.48	828.3
422.37	828.45	422.84	828.48	423.8	828.47	424.42	828.48	424.81	828.49
428.85	828.6	428.87	828.6	430.36	828.63	432.34	828.81	434.76	829.01
436.24	828.96	436.82	828.97	440.68	829.14	440.69	829.14	442.49	829.26
446.36	829.27	447.14	829.21	448.37	829.11	450.67	829.15	452.82	829.21
454.19	829.19	454.28	829.18	454.5	829.17	458.81	829.19	460.29	829.21
460.49	829.21	464.67	829.05	466.33	829.21	466.39	829.22	466.9	829.24
470.66	829.36	471.18	829.42	472.33	829.4	474.44	829.45	476.54	829.46
477.38	829.47	478.29	829.48	481.98	829.72	482.63	829.73	483	829.74
484.21	829.8	488.16	830.03	488.58	829.97	488.86	829.97	495.12	829.72
496.33	829.8	499.15	829.71	503.22	829.45	509.26	829.99	512.71	830.01
514.11	830.17	515.58	830.25	518.53	830.57	520.24	830.66	521.47	830.84
524.73	830.89	528.83	831.14	530.87	831.17	531.83	831.26	532.56	831.26
535.75	830.57	538.24	830.06	538.5	830	542.34	829.52	542.84	829.51
544.58	829.56	544.6	829.56	548.83	830.01	550.5	829.83	550.6	829.85
550.7	829.85	554.88	830.35	554.95	830.33	556.6	830.43	558.02	830.61
561.08	830.88	561.88	830.95	562.76	831.07	564.95	831.19	567.11	831.24
570.73	831.39	573.15	831.55	574.44	831.65	574.99	831.71	578.99	831.96
579.48	831.99	581.12	832.02	581.14	832.02	585.56	832.08	586.92	832.21
587.32	832.24	591.22	832.31	591.61	832.32	593.44	832.32	596.83	832.47
597.71	832.5	599.41	832.64	599.83	832.65	603.93	832.73	605.45	832.81
605.53	832.81	606.21	832.82	609.87	832.83	610.26	832.83	611.68	832.82
615.76	832.9	615.94	832.9	616.08	832.89	617.85	832.84	620.27	832.92
621.94	833.02	622.38	833	623.8	833.02	627.65	833.03	627.87	833.04
627.98	833.02	629.69	832.87	632.22	832.99	634.06	833.03	634.83	833.1
637.34	833.12	640.09	833.19	641.02	833.14	641.81	833.06	644.57	833.15
646.01	833.13	647.7	833.07	647.72	833.07	647.74	833.06	653.58	832.84
657.63	832.95	657.8	832.95	657.93	832.92	659.49	832.48	662.47	832.51
663.64	832.45	664.36	832.41	665.31	832.26	666.17	832.21	669.46	831.85
670.82	831.51	673.73	831.32	675.31	831.29	675.97	831.08	676.94	830.88
677.47	830.83	681.12	831.13	681.57	831.06	682.76	830.93	685.18	830.89
688.05	830.49	688.67	830.36	691.08	830.27	692.69	830.28	694.31	830.28
697.09	830.26	700	829.94	702.54	829.88	704.71	829.77	705.77	829.77
707.3	829.7	709.7	829.61	711.17	829.51	711.52	829.51	716.34	829.8
721.11	829.49	732.03	829.8	732.05	829.8	733.59	829.66	735.22	829.74
737.64	829.73	738.81	829.7	739.07	829.72	741.84	829.77	743.22	829.8
744.73	829.8	749.7	829.72	750.16	829.7	750.3	829.71	750.68	829.75
754.01	830.06	754.75	829.99	755.46	829.97	759.75	830.13	760.78	830.2
760.92	830.23	761.15	830.22	766.15	830.34	768.74	831.17	769.54	831.14
773.1	831.25	776.36	831.56	778.07	831.63	782.82	831.79		

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	202.5	.1	234.86	.07	240.35	.06	272.66	.07
282.61	.1	330.51	.013	346.24	.1	388.97	.035	524.73	.1
578.99	.013	657.93	.1	782.82	.1				

Bank Sta: Left Right Coeff Contr. Expan.
234.86 282.61 .3 .5
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
340 580 831.8 F
640 782.82 833.2 F
Right Levee Station= 340.54 Elevation= 829.9

Downstream Deck/Roadway Coordinates
num= 6
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
380 829.21 820 391.9 830.2 820 392 830.2 828.2
433.5 830.2 828.2 433.6 830.2 820 442 830.4 820

Downstream Bridge Cross Section Data
Station Elevation Data num= 487

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	834.02	1.12	833.95	2.93	833.84	3.16	833.82	4.34	833.79
6.93	833.84	8.34	833.87	9.18	833.95	9.92	834.01	11.66	834.29
13.79	834.64	14.93	834.7	15.43	834.7	20.67	835.04	20.84	835.05
21.04	835.05	25.86	834.71	26.31	834.63	27.67	834.57	30.38	834.49
31.64	834.4	31.75	834.39	31.96	834.39	35.84	834.14	37.27	833.87
37.31	833.87	41.91	833.82	42.72	833.7	46.41	833.6	46.73	833.6
46.89	833.57	48.21	833.4	50.02	833.44	53.77	833.67	57.34	833.69
57.79	833.7	59.29	833.58	59.39	833.57	59.76	833.57	64.92	833.54
66.04	833.53	70.45	833.53	71.74	833.54	74.45	833.48	75.32	833.39
75.98	833.36	80.2	833.34	81.73	833.24	85.57	833.19	85.71	833.19
85.95	833.17	88.09	833.07	91.3	833.04	92.61	833.06	92.8	833.07
94.52	833.04	96.85	833.01	97.09	833	98.16	832.96	103.64	832.76
103.97	832.75	105.79	832.76	108.62	832.86	109.75	832.93	111.7	832.82
113.77	832.37	114.98	832.16	115.45	832.05	121.02	831.77	122.81	831.83
124.89	831.89	126.55	831.75	127.57	831.77	131.34	831.74	132.14	831.68
137.33	831.77	137.73	831.76	137.82	831.76	138.01	831.77	141.97	831.74
142.11	831.74	143.43	831.6	144.69	831.49	147.5	831.23	149.14	831.23
153.04	831.02	153.75	830.92	154.66	830.87	158.79	830.81	159.93	830.69
160.24	830.61	164.38	830.28	164.72	830.28	165.84	830.23	166.73	830.24
171.21	830.33	171.52	830.35	172.2	830.38	173.9	830.47	177.18	830.68
182.45	830.49	182.78	830.63	183.79	830.94	191.18	830.98	196.86	830.94
197.65	830.97	197.99	831.01	201.44	830.83	201.57	830.83	206.6	830.72
209.15	830.69	219.33	830.76	223.44	830.46	227.12	830.31	227.78	830.26
231.18	830	232.34	830	232.68	829.98	233.9	830.01	236.76	830.02
237.66	829.99	238.17	829.95	240.5	829.91	242.34	829.89	243.07	829.94
243.74	830.02	244.9	830.03	248.87	830.04	249.45	830.01	252.02	829.97
253.39	829.93	253.73	829.92	254.96	829.91	259.44	829.96	260.5	829.95
261.67	829.97	264.51	829.95	265.79	829.94	266.01	829.93	266.47	829.94
270.18	830	271.5	829.93	271.53	829.93	275.74	829.85	276.03	829.85
277.38	829.92	279.24	829.95	282.4	829.93	282.85	829.92	286.75	829.86
288.01	829.87	288.35	829.87	288.6	829.86	292.5	829.87	293.94	829.81
298.26	829.83	298.89	829.81	299.59	829.78	301.34	829.8	303.74	829.83
304.99	829.78	305.18	829.76	305.73	829.76	310.54	829.69	311.42	829.69
311.5	829.7	315.76	829.97	328.13	830	339.19	830.02	343.23	829.61
343.4	829.6	343.61	829.6	344.94	829.64	347.85	829.55	349.15	829.53
350.35	829.56	350.79	829.57	351.14	829.59	355.01	829.58	356.07	829.63
356.61	829.61	358.23	829.61	360.62	829.57	361.84	829.46	362.41	829.44
363.41	829.39	365.71	829.3	366.38	829.28	368.03	829.19	368.12	829.19
368.35	829.18	372.29	829.15	373.58	829.06	374.02	829.04	375.79	829.06
378.28	829.1	379.04	829	381.34	829.21	382.16	829.2	383.3	829.15
385.08	829.05	385.25	829.06	385.83	829.08	388.77	828.4	390.16	828.08
390.91	827.85	391.71	827.6	393.14	827.08	393.39	826.95	395.97	825.1
397.24	824.59	397.56	824.46	399.55	824.24	401.28	824	401.95	823.91

402.28	823.95	403.3	824.07	406.53	824.04	409.43	824.07	410.3	824.12
413.73	824.18	414.37	824.06	415.14	823.89	417.96	822.8	419.48	822.29
419.66	822.29	420.36	822.26	420.98	822.24	422.37	822.3	425.19	822.39
430.66	822.88	430.96	822.93	431.24	823.03	432.57	823.69	433.57	824.5
435.56	826.68	439.06	828.47	442.61	830.4	443.28	830.68	444.37	830.78
446.54	830.96	448.61	831.05	449.87	831.05	450.28	831.07	452.14	831.14
454.32	831.16	455.53	831.17	455.99	831.15	459.38	831.27	460.44	831.3
465.8	831.83	466.07	831.87	466.19	831.87	467.53	831.75	469.35	831.81
471.88	831.89	473.15	831.88	473.47	831.86	474.25	831.86	477.58	831.88
479	831.72	479.27	831.68	480.72	831.52	483.42	831.24	484.52	831.16
485.02	831.11	485.55	831.06	489.39	830.65	490.15	830.5	492.31	830.17
495.96	829.92	496.82	829.75	501.73	827.73	502.36	827.5	502.55	827.45
505.64	826.92	507.08	826.47	510.03	826.6	512.98	826.73	514.24	826.65
520.14	826.97	520.25	826.97	524.64	826.96	526.64	826.96	530.42	826.99
530.7	826.97	533.13	826.97	537.23	826.85	537.82	826.84	537.87	826.84
538.19	826.82	542.75	826.89	543.73	826.96	547.34	826.8	548.11	826.83
549.5	826.75	550.31	826.75	554.17	826.72	554.54	826.67	555.78	826.53
560.14	826.68	560.28	826.68	561.62	826.64	563.26	826.64	566.08	826.66
567.45	826.7	567.69	826.7	571.98	826.67	572.02	826.67	573.74	826.8
577.56	826.75	578.01	826.75	578.67	826.65	579.61	826.51	582.19	826.66
585.55	826.83	591.39	826.9	591.61	826.9	591.81	826.91	596.03	826.99
597.38	826.86	597.67	826.86	599.52	826.87	606.28	826.87	608.71	826.88
609.57	826.91	613.98	827.05	614.36	827.01	615.5	826.88	616.42	826.87
621.26	826.72	621.52	826.72	623.28	826.78	626.38	826.89	627.61	826.85
629.35	826.86	631.89	826.77	633.6	826.74	633.96	826.73	635.08	826.73
639.62	826.74	641.04	826.74	644.07	826.7	644.95	826.68	645.67	826.65
651.1	826.69	651.69	826.65	652.86	826.71	657.31	826.83	657.76	826.81
658.34	826.81	663.84	826.68	665.1	826.66	669.55	826.59	669.84	826.59
670.41	826.58	674.26	826.71	675.6	826.62	676.38	826.59	681.79	826.4
681.94	826.39	683.49	826.41	686.28	826.46	686.68	826.42	687.92	826.28
689.01	826.24	689.88	826.19	694.07	825.95	696.14	825.94	698.94	826.06
700.18	826.07	701.66	826.06	705.01	825.96	706.31	825.94	711.79	825.91
712.37	825.91	712.44	825.9	712.77	825.92	716.97	826.18	718.2	826.14
721.89	826.11	723.3	826.11	724.77	825.97	728.66	825.93	729.23	825.93
730.84	826	737.36	826	743.02	826.01	747.01	826.02	749.19	826.05
753.37	826.13	754.47	826.06	755.16	826.07	758.78	826.08	760.51	825.97
761.07	825.99	764.98	826.16	767.18	826.16	771.09	826.3	773.2	826.27
774.96	826.32	779.1	826.34	783.36	826.4	783.48	826.41	784.99	826.47
790.93	826.55	792.95	826.62	796.5	826.72	796.77	826.73	800.85	826.83
801.01	826.82	802.55	826.61	802.81	826.61	804.32	826.6	808.44	826.59
809.13	826.59	814.27	826.63	815.82	826.7	820.1	826.66	820.21	826.65
820.58	826.66	825.32	826.78	825.97	826.76	827.97	826.79	829.99	826.86
830.77	826.89	831.58	826.96	836.31	826.91	837.35	826.91	840.06	826.89
841.36	826.95	842.05	826.85	842.9	826.83	845.8	827.01	847.05	827.06
847.77	826.99	848.71	826.92	853.81	827.13	854.23	827.14	854.46	827.14
859.77	827.09	861.12	827.17	864.55	827.24	868.01	827.47	869.59	827.5
870.72	827.52	871.27	827.56	874.94	827.75	876.37	827.64	876.56	827.64
881.97	827.8	884.17	827.93	887.14	828.06	892.28	828.1	892.6	828.03
894.11	828.03	897.39	828.15	897.9	828.18	900.94	828.12	903.51	828.09
904.44	828.23	908.58	828.53	908.8	828.54	909.42	828.56	912.57	828.84
913.62	829.06	914.04	829.14	915.23	829.25	919.09	829.43	919.36	829.42
923.15	830.03	923.45	830.06	924.05	830.1	924.76	830.14	925.08	830.16
930.21	830.98	931.02	831.09	938.26	831.54	938.57	831.56	939.31	831.76
939.56	831.79	941.13	831.87	944.63	832.43	945.89	832.51	949.92	833.94
953.67	835.19	955.91	836.27						

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	48.21	.013	111.7	.03	232.34	.013	385.25	.07
401.28	.06	433.57	.07	439.06	.03	466.07	.013	477.58	.1

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  533.13    .035  923.15      .1  955.91      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        385.25  439.06             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  466.07     950  831.87       F
Right Levee     Station=  466.07      Elevation=   829.9
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
     186     232     850     313     342     845

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =       1
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach              RS: 394.7476

INPUT
Description: 3+95
Station Elevation Data    num=     487
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  834.02    1.12  833.95    2.93  833.84    3.16  833.82    4.34  833.79
    6.93  833.84    8.34  833.87    9.18  833.95    9.92  834.01   11.66  834.29
   13.79  834.64   14.93   834.7   15.43   834.7   20.67  835.04   20.84  835.05
   21.04  835.05   25.86  834.71   26.31  834.63   27.67  834.57   30.38  834.49
   31.64   834.4   31.75  834.39   31.96  834.39   35.84  834.14   37.27  833.87
   37.31  833.87   41.91  833.82   42.72   833.7   46.41   833.6   46.73   833.6
   46.89  833.57   48.21   833.4   50.02  833.44   53.77  833.67   57.34  833.69
   57.79   833.7   59.29  833.58   59.39  833.57   59.76  833.57   64.92  833.54
   66.04  833.53   70.45  833.53   71.74  833.54   74.45  833.48   75.32  833.39
   75.98  833.36    80.2  833.34   81.73  833.24   85.57  833.19   85.71  833.19
   85.95  833.17   88.09  833.07    91.3  833.04   92.61  833.06    92.8  833.07
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94.52	833.04	96.85	833.01	97.09	833	98.16	832.96	103.64	832.76
103.97	832.75	105.79	832.76	108.62	832.86	109.75	832.93	111.7	832.82
113.77	832.37	114.98	832.16	115.45	832.05	121.02	831.77	122.81	831.83
124.89	831.89	126.55	831.75	127.57	831.77	131.34	831.74	132.14	831.68
137.33	831.77	137.73	831.76	137.82	831.76	138.01	831.77	141.97	831.74
142.11	831.74	143.43	831.6	144.69	831.49	147.5	831.23	149.14	831.23
153.04	831.02	153.75	830.92	154.66	830.87	158.79	830.81	159.93	830.69
160.24	830.61	164.38	830.28	164.72	830.28	165.84	830.23	166.73	830.24
171.21	830.33	171.52	830.35	172.2	830.38	173.9	830.47	177.18	830.68
182.45	830.49	182.78	830.63	183.79	830.94	191.18	830.98	196.86	830.94
197.65	830.97	197.99	831.01	201.44	830.83	201.57	830.83	206.6	830.72
209.15	830.69	219.33	830.76	223.44	830.46	227.12	830.31	227.78	830.26
231.18	830	232.34	830	232.68	829.98	233.9	830.01	236.76	830.02
237.66	829.99	238.17	829.95	240.5	829.91	242.34	829.89	243.07	829.94
243.74	830.02	244.9	830.03	248.87	830.04	249.45	830.01	252.02	829.97
253.39	829.93	253.73	829.92	254.96	829.91	259.44	829.96	260.5	829.95
261.67	829.97	264.51	829.95	265.79	829.94	266.01	829.93	266.47	829.94
270.18	830	271.5	829.93	271.53	829.93	275.74	829.85	276.03	829.85
277.38	829.92	279.24	829.95	282.4	829.93	282.85	829.92	286.75	829.86
288.01	829.87	288.35	829.87	288.6	829.86	292.5	829.87	293.94	829.81
298.26	829.83	298.89	829.81	299.59	829.78	301.34	829.8	303.74	829.83
304.99	829.78	305.18	829.76	305.73	829.76	310.54	829.69	311.42	829.69
311.5	829.7	315.76	829.97	328.13	830	339.19	830.02	343.23	829.61
343.4	829.6	343.61	829.6	344.94	829.64	347.85	829.55	349.15	829.53
350.35	829.56	350.79	829.57	351.14	829.59	355.01	829.58	356.07	829.63
356.61	829.61	358.23	829.61	360.62	829.57	361.84	829.46	362.41	829.44
363.41	829.39	365.71	829.3	366.38	829.28	368.03	829.19	368.12	829.19
368.35	829.18	372.29	829.15	373.58	829.06	374.02	829.04	375.79	829.06
378.28	829.1	379.04	829	381.34	829.21	382.16	829.2	383.3	829.15
385.08	829.05	385.25	829.06	385.83	829.08	388.77	828.4	390.16	828.08
390.91	827.85	391.71	827.6	393.14	827.08	393.39	826.95	395.97	825.1
397.24	824.59	397.56	824.46	399.55	824.24	401.28	824	401.95	823.91
402.28	823.95	403.3	824.07	406.53	824.04	409.43	824.07	410.3	824.12
413.73	824.18	414.37	824.06	415.14	823.89	417.96	822.8	419.48	822.29
419.66	822.29	420.36	822.26	420.98	822.24	422.37	822.3	425.19	822.39
430.66	822.88	430.96	822.93	431.24	823.03	432.57	823.69	433.57	824.5
435.56	826.68	439.06	828.47	442.61	830.4	443.28	830.68	444.37	830.78
446.54	830.96	448.61	831.05	449.87	831.05	450.28	831.07	452.14	831.14
454.32	831.16	455.53	831.17	455.99	831.15	459.38	831.27	460.44	831.3
465.8	831.83	466.07	831.87	466.19	831.87	467.53	831.75	469.35	831.81
471.88	831.89	473.15	831.88	473.47	831.86	474.25	831.86	477.58	831.88
479	831.72	479.27	831.68	480.72	831.52	483.42	831.24	484.52	831.16
485.02	831.11	485.55	831.06	489.39	830.65	490.15	830.5	492.31	830.17
495.96	829.92	496.82	829.75	501.73	827.73	502.36	827.5	502.55	827.45
505.64	826.92	507.08	826.47	510.03	826.6	512.98	826.73	514.24	826.65
520.14	826.97	520.25	826.97	524.64	826.96	526.64	826.96	530.42	826.99
530.7	826.97	533.13	826.97	537.23	826.85	537.82	826.84	537.87	826.84
538.19	826.82	542.75	826.89	543.73	826.96	547.34	826.8	548.11	826.83
549.5	826.75	550.31	826.75	554.17	826.72	554.54	826.67	555.78	826.53
560.14	826.68	560.28	826.68	561.62	826.64	563.26	826.64	566.08	826.66
567.45	826.7	567.69	826.7	571.98	826.67	572.02	826.67	573.74	826.8
577.56	826.75	578.01	826.75	578.67	826.65	579.61	826.51	582.19	826.66
585.55	826.83	591.39	826.9	591.61	826.9	591.81	826.91	596.03	826.99
597.38	826.86	597.67	826.86	599.52	826.87	606.28	826.87	608.71	826.88
609.57	826.91	613.98	827.05	614.36	827.01	615.5	826.88	616.42	826.87
621.26	826.72	621.52	826.72	623.28	826.78	626.38	826.89	627.61	826.85
629.35	826.86	631.89	826.77	633.6	826.74	633.96	826.73	635.08	826.73
639.62	826.74	641.04	826.74	644.07	826.7	644.95	826.68	645.67	826.65
651.1	826.69	651.69	826.65	652.86	826.71	657.31	826.83	657.76	826.81
658.34	826.81	663.84	826.68	665.1	826.66	669.55	826.59	669.84	826.59

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  670.41  826.58  674.26  826.71   675.6  826.62  676.38  826.59  681.79   826.4
  681.94  826.39  683.49  826.41  686.28  826.46  686.68  826.42  687.92  826.28
  689.01  826.24  689.88  826.19  694.07  825.95  696.14  825.94  698.94  826.06
  700.18  826.07  701.66  826.06  705.01  825.96  706.31  825.94  711.79  825.91
  712.37  825.91  712.44   825.9  712.77  825.92  716.97  826.18   718.2  826.14
  721.89  826.11   723.3  826.11  724.77  825.97  728.66  825.93  729.23  825.93
  730.84     826  737.36     826  743.02  826.01  747.01  826.02  749.19  826.05
  753.37  826.13  754.47  826.06  755.16  826.07  758.78  826.08  760.51  825.97
  761.07  825.99  764.98  826.16  767.18  826.16  771.09   826.3   773.2  826.27
  774.96  826.32   779.1  826.34  783.36   826.4  783.48  826.41  784.99  826.47
  790.93  826.55  792.95  826.62   796.5  826.72  796.77  826.73  800.85  826.83
  801.01  826.82  802.55  826.61  802.81  826.61  804.32   826.6  808.44  826.59
  809.13  826.59  814.27  826.63  815.82   826.7   820.1  826.66  820.21  826.65
  820.58  826.66  825.32  826.78  825.97  826.76  827.97  826.79  829.99  826.86
  830.77  826.89  831.58  826.96  836.31  826.91  837.35  826.91  840.06  826.89
  841.36  826.95  842.05  826.85   842.9  826.83   845.8  827.01  847.05  827.06
  847.77  826.99  848.71  826.92  853.81  827.13  854.23  827.14  854.46  827.14
  859.77  827.09  861.12  827.17  864.55  827.24  868.01  827.47  869.59   827.5
  870.72  827.52  871.27  827.56  874.94  827.75  876.37  827.64  876.56  827.64
  881.97   827.8  884.17  827.93  887.14  828.06  892.28   828.1   892.6  828.03
  894.11  828.03  897.39  828.15   897.9  828.18  900.94  828.12  903.51  828.09
  904.44  828.23  908.58  828.53   908.8  828.54  909.42  828.56  912.57  828.84
  913.62  829.06  914.04  829.14  915.23  829.25  919.09  829.43  919.36  829.42
  923.15  830.03  923.45  830.06  924.05   830.1  924.76  830.14  925.08  830.16
  930.21  830.98  931.02  831.09  938.26  831.54  938.57  831.56  939.31  831.76
  939.56  831.79  941.13  831.87  944.63  832.43  945.89  832.51  949.92  833.94
  953.67  835.19  955.91  836.27

Manning's n Values        num=      13
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03   48.21    .013   111.7     .03  232.34    .013  385.25     .07
  401.28     .06  433.57     .07  439.06     .03  466.07    .013  477.58      .1
  533.13    .035  923.15      .1  955.91      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        385.25  439.06           158.45  152.51  147.17             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  466.07     950  831.87       F
Right Levee     Station=  466.07      Elevation=   829.9
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
     186     232     850     313     342     845

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach              RS: 242.2423

INPUT
Description: FIS C-C
Station Elevation Data    num=     476
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  833.58     .02  833.58     .65  833.53    2.08  833.64    4.52  833.79
    5.87  833.75     6.9  833.68   12.39  833.03   13.72  833.22   14.29  833.25
   15.25  833.22   18.34  832.98   23.95  833.19   24.16  833.24   26.05   833.2
   34.35  832.99   35.29  833.02   40.93  832.99    45.1  832.72   46.17  832.61
   46.41  832.61   50.67   832.5   52.98  832.46    56.2  832.45   56.49  832.45
   62.16  832.57   65.18  832.37   67.33  832.48   67.43  832.47   67.63  832.49
   72.38  832.32   74.33  832.02   77.74   831.5   79.87  831.45   79.95  831.44
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80.08	831.46	84.09	831.65	85.81	831.62	87.33	831.54	91.62	831.03
96.6	830.91	96.72	830.91	96.87	830.89	97.32	830.9	100.9	830.94
107.18	830.59	107.8	830.56	108.1	830.54	113.76	830.33	118.57	830.13
118.86	830.09	119.76	829.98	121.67	829.52	122.18	829.4	126.44	829.16
129.59	828.81	130.66	828.84	135.38	828.67	137.54	828.62	139.62	828.57
140.41	828.44	140.88	828.4	144.63	828.22	145.32	828.18	151.29	828.07
152.06	828.1	156.81	828.11	158.85	827.91	161.79	827.94	167.85	827.92
170.26	827.97	172.04	827.98	172.81	827.95	176.08	827.86	178.27	827.5
178.46	827.48	178.6	827.47	182.98	827.17	185.15	826.74	185.22	826.72
185.26	826.72	188.71	826.75	191.28	826.59	195.47	826.52	196.57	826.56
197.76	826.56	201.59	826.59	202.01	826.6	205.95	826.26	206.04	826.26
212.19	826.27	215.27	826.33	217.47	826.28	218.46	826.31	218.72	826.33
220.33	826.24	223.94	826.13	224.28	826.12	227.78	826.35	228.56	826.36
229.52	826.45	231.85	826.37	234.13	826.33	235.04	826.34	237.15	826.56
241.16	826.54	245.42	826.69	246.3	826.85	246.95	826.76	256.19	826.87
256.93	826.88	257.19	826.86	258.38	826.88	263.12	826.88	263.93	826.81
264.44	826.83	268.09	826.95	269.46	827.01	269.79	827.05	274.11	827.23
275.6	827.09	277.74	827.27	279.72	827.29	285.08	827.29	285.45	827.27
286.1	827.26	287.14	827.4	288.79	827.46	291.21	827.24	291.48	827.24
292.78	827.23	293.57	827.24	297.05	827.23	297.31	827.21	298.51	827.18
299.71	827.21	302.82	827.24	303.87	827.22	304.3	827.19	305.13	827.18
308.68	827.23	310.85	827.32	314.43	827.49	315.83	827.54	316.66	827.53
318.56	827.46	320.29	827.31	321.5	827.33	321.67	827.31	321.83	827.3
322.49	827.25	324.47	827.07	326.06	826.96	331.24	823.77	332.31	823.1
332.89	822.79	333.5	822.64	334.15	822.59	337.38	822.12	338.25	822
341.72	821.85	342.79	821.89	343.6	821.9	345.65	822.11	345.91	822.14
348.25	822.49	353.13	822.81	355.07	823.12	356.92	823.77	358.48	823.92
359.86	824.1	361.18	824.23	361.83	824.24	364.07	825.38	366.79	826.07
369.33	826.36	371.63	826.62	371.94	826.69	373.05	827.16	376.28	828.71
378.56	829.46	379.32	829.55	384.86	829.6	385.1	829.6	385.23	829.61
389.57	829.99	390.13	830.13	391.05	830.38	394.31	830.41	395.27	830.42
395.55	830.41	398.48	830.53	400.29	830.5	401.55	830.23	402.59	830.02
404.48	830	404.82	829.99	408	829.62	408.78	829.54	412.27	828.6
412.91	828.37	413.06	828.31	414.38	827.69	419.74	825.81	419.81	825.78
419.89	825.75	420.3	825.57	423.76	825.36	425.07	825.3	425.79	825.15
425.91	825.13	431.74	826.08	431.83	826.08	431.9	826.09	432	826.09
432.11	826.1	434.71	826.09	437.17	826.04	438.03	826.06	438.25	826.05
441.77	825.64	442.78	825.54	443.56	825.49	446.1	825.45	448.66	825.38
449.49	825.43	454.66	825.58	455.44	825.58	456.79	825.61	461.28	825.59
462.71	825.6	467.28	825.51	467.62	825.51	471.86	825.57	472.34	825.59
473.37	825.54	479.21	825.74	479.46	825.74	484.95	825.67	489.63	825.57
489.73	825.57	491.32	825.87	496	825.81	497.21	825.8	503.15	825.82
505.79	825.88	508.81	826	509.21	825.97	510.75	825.99	513.75	825.96
514.56	826.01	515.27	826.06	519.69	826.16	519.75	826.16	521.2	826.02
525.98	825.91	527.18	825.83	533.11	825.92	534.46	825.91	539.14	825.98
541.48	826.05	542.03	825.96	545	825.62	545.65	825.65	549.98	825.72
551.21	825.74	555.69	825.76	557.24	825.58	561.9	825.56	565.34	825.51
567.75	825.56	568.18	825.5	569.31	825.44	574.41	825.47	575.38	825.42
580.8	825.41	581.47	825.4	582.95	825.39	585.9	825.37	586.44	825.35
587.49	825.38	593.53	825.47	593.69	825.47	599.49	825.57	599.6	825.58
599.77	825.58	602.27	825.62	604.06	825.53	605.21	825.33	605.57	825.28
616.3	825.25	617.41	825.09	617.87	825.02	622.04	825.14	622.34	825.14
622.45	825.12	623.99	824.95	628.7	825.1	630.09	825.09	630.14	825.08
630.53	825.09	634.78	825.06	636.19	824.83	636.34	824.81	636.49	824.82
641.89	824.87	642.47	824.96	648.56	825.03	653.63	825.24	654.6	825.2
655.44	825.25	657.57	825.15	659.15	825.08	659.41	825.1	660.75	825.05
666.91	825.08	671.87	825.05	672.68	825.03	672.88	825.04	673.25	825.05
675.72	825.04	678.69	825.06	678.83	825.06	679.73	825.09	683.38	825.28
684.46	825.24	684.94	825.24	689.84	825.17	690.25	825.16	692.65	825.12
695.56	825.06	695.83	825.05	701.23	825.4	702.25	825.26	702.75	825.23

706.08	825.32	708.71	825.48	708.9	825.48	714.56	825.54	716.74	825.58
718.92	825.58	719.69	825.57	720.39	825.53	726.25	825.55	732.02	825.58
732.1	825.58	737.23	825.66	737.7	825.66	738.05	825.65	742.09	825.56
743.4	825.57	743.65	825.56	743.79	825.57	749.4	825.71	750.14	825.81
751.09	825.94	751.38	825.96	759.33	825.92	760.75	826.03	766.58	826.15
770.97	826.37	771.93	826.43	772.11	826.44	772.85	826.44	779.51	826.79
785.1	827.16	788.59	827.23	788.62	827.23	794.62	827.46	799.08	827.66
803.8	828.11	805.08	828.12	810.33	828.32	810.54	828.32	811.71	828.42
818.43	828.91	824.39	829.29	828.6	829.87	829.21	829.91	829.46	829.9
831.42	829.83	832	829.87	836.16	830.38	836.58	830.44	837.33	830.63
839.72	831.19	841.54	831.24	842.76	831.32	848.19	831.58	849.1	831.81
851.77	832.52	853.11	832.64	853.52	832.62	857.43	833.14	857.91	833.21
862.73	833.93	862.88	833.93	864.16	833.98	867.44	834.5	869.33	834.76
873.57	835.54	874.67	835.54	879.88	836.08	881.52	836.35	884.01	836.91
884.75	836.95	885.28	836.98	889.71	837.3	893.59	837.89	894.53	838.05
899.4	838.84	899.86	838.93	901.87	839.52	904.25	840.15	906.43	840.69
909.97	841.57	910.25	841.67	910.46	841.73	910.65	841.76	911.67	842.01
915.43	842.9	916.35	842.99	916.69	843.02	916.71	843.02	916.95	843.06
917.6	843.17	920.92	843.79	921.18	843.92	924.61	844.53	927.48	844.61
931.44	845.48	932.04	845.73	935.67	846.9	936.69	847.16	937.11	847.2
939.67	847.44	941.88	847.98	944.36	848.78	947.58	849.65	947.77	849.75
951.75	850.53	952.96	850.89	954.76	851.24	958.36	852.15	961.19	852.64
968.87	853.89	969	853.91	969.07	853.92	969.17	853.94	969.35	853.97
975.35	855.13	978.86	855.89	979.67	856.06	985.08	856.94	990.07	858.23
995.26	858.98	996.82	859.44	1000.27	860.49	1000.68	860.49	1005.76	861.32
1005.78	861.32	1006.35	861.36	1013.88	862.02	1014.64	862.11	1017.57	862.58
1019.04	862.8	1019.76	862.85	1026.25	862.9	1027.48	862.86	1028.17	862.89
1029.3	862.88	1033.6	862.3	1034.86	862.23	1035.15	862.24	1035.8	862.18
1037.25	862.11								

Manning's n Values num= 12

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	182.98	.03	302.82	.1	326.06	.07	333.5	.06
355.07	.07	373.05	.1	389.57	.013	400.29	.1	434.71	.035
879.88	.1	1037.25	.1						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
326.06	373.05	0	0	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
400	840	830.53	F

Right Levee Station= 398.48 Elevation= 827.8

SUMMARY OF MANNING'S N VALUES

River:Oldtown Creek

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8	n9	n10	n11	n12	n13
Reach	1401.062	.035	.013	.07	.06	.07	.1	.035	.1	.013	.1	.1		
Reach	1109.832	.013	.03	.013	.1	.07	.06	.07	.1	.013	.1	.035	.1	.1
Reach	796.1590	.03	.1	.07	.06	.07	.1	.013	.1	.035	.1	.1		
Reach	703.7970	.013	.03	.1	.07	.06	.07	.1	.013	.1	.035	.1	.1	
Reach	651.5802	.013	.03	.1	.07	.06	.07	.1	.013	.1	.035	.1	.1	
Reach	545.1257	.03	.1	.07	.06	.07	.1	.013	.1	.035	.1	.013	.1	.1
Reach	492.3110	.03	.1	.07	.06	.07	.1	.013	.1	.035	.1	.013	.1	.1
Reach	431	Bridge												
Reach	394.7476	.03	.013	.03	.013	.07	.06	.07	.03	.013	.1	.035	.1	.1
Reach	242.2423	.1	.03	.1	.07	.06	.07	.1	.013	.1	.035	.1	.1	

SUMMARY OF REACH LENGTHS

River: Oldtown Creek

Reach	River Sta.	Left	Channel	Right
Reach	1401.062	293.81	291.23	319.49
Reach	1109.832	308.79	313.67	310.72
Reach	796.1590	96.02	92.36	85.26
Reach	703.7970	56.86	52.22	53.96
Reach	651.5802	111.44	106.45	103.86
Reach	545.1257	46.6	52.81	53.82
Reach	492.3110	95.23	97.56	102.88
Reach	431	Bridge		
Reach	394.7476	158.45	152.51	147.17
Reach	242.2423	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Oldtown Creek

Reach	River Sta.	Contr.	Expan.
Reach	1401.062	.1	.3
Reach	1109.832	.1	.3
Reach	796.1590	.1	.3
Reach	703.7970	.1	.3
Reach	651.5802	.1	.3
Reach	545.1257	.1	.3
Reach	492.3110	.3	.5
Reach	431	Bridge	
Reach	394.7476	.3	.5
Reach	242.2423	.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	1401.062	20% AEP	763.00	826.35	832.56	831.38	832.58	0.000635	1.07	728.37	344.83	0.11
Reach	1401.062	1% AEP	2000.00	826.35	833.28	832.55	833.35	0.001736	2.00	976.75	348.43	0.19
Reach	1109.832	20% AEP	763.00	824.36	830.54	827.86	830.73	0.004127	3.67	276.99	160.36	0.31
Reach	1109.832	1% AEP	2000.00	824.36	832.07	830.61	832.40	0.006418	5.40	580.03	483.02	0.40
Reach	796.1590	20% AEP	763.00	824.79	830.07	828.58	830.11	0.001045	1.78	518.75	303.33	0.16
Reach	796.1590	1% AEP	2000.00	824.79	831.68	829.55	831.75	0.000852	2.02	1020.92	642.51	0.15
Reach	703.7970	20% AEP	763.00	823.18	830.02	826.25	830.05	0.000406	1.18	636.07	301.87	0.10
Reach	703.7970	1% AEP	2000.00	823.18	831.63	828.89	831.69	0.000449	1.52	1140.85	659.92	0.11
Reach	651.5802	20% AEP	763.00	823.44	829.99	826.79	830.02	0.000642	1.62	576.28	286.62	0.13
Reach	651.5802	1% AEP	2000.00	823.44	831.59	829.22	831.66	0.000697	2.04	1049.36	652.81	0.14
Reach	545.1257	20% AEP	763.00	823.31	829.85	826.82	829.92	0.001348	2.43	521.81	231.45	0.19
Reach	545.1257	1% AEP	2000.00	823.31	831.38	829.15	831.52	0.002434	3.90	885.26	546.22	0.27
Reach	492.3110	20% AEP	763.00	824.46	829.85	828.03	829.87	0.000345	1.13	688.00	293.44	0.10
Reach	492.3110	1% AEP	2000.00	824.46	831.40	828.71	831.45	0.000442	1.57	1159.34	645.59	0.12
Reach	431		Bridge									
Reach	394.7476	20% AEP	763.00	822.24	828.17	825.84	828.42	0.005140	3.99	191.08	48.70	0.36
Reach	394.7476	1% AEP	2000.00	822.24	829.42	827.94	830.33	0.014849	7.66	262.97	78.10	0.62
Reach	242.2423	20% AEP	763.00	821.85	827.76	825.43	827.85	0.002156	2.57	320.63	197.61	0.23
Reach	242.2423	1% AEP	2000.00	821.85	829.10	827.66	829.26	0.002156	3.11	630.56	661.48	0.24

Profile Output Table - Six XS Bridge

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Reach	545.1257	20% AEP	829.92	829.85	826.82	0.03	0.01	231.45	129.28	526.55	107.16	2.43
Reach	545.1257	1% AEP	831.52	831.38	829.15	0.04	0.03	546.22	554.56	1098.37	347.08	3.90
Reach	492.3110	20% AEP	829.87	829.85	828.03			293.44	487.18	228.96	46.86	1.13
Reach	492.3110	1% AEP	831.45	831.40	828.71			645.59	1454.07	434.73	111.20	1.57
Reach	431 BR U	20% AEP	829.87	829.85	828.20			213.86	41.01	717.95	4.28	6.80
Reach	431 BR U	1% AEP	831.45	831.40	828.82			644.89	774.41	1205.93	20.18	7.30
Reach	431 BR D	20% AEP	829.85	829.70	825.83			45.48	41.01	722.23		3.92
Reach	431 BR D	1% AEP	831.45	830.98	827.93			662.69	774.41	1211.62	14.49	5.32
Reach	394.7476	20% AEP	828.42	828.17	825.84	0.49	0.08	48.70		763.00		3.99
Reach	394.7476	1% AEP	830.33	829.42	827.94	0.70	0.37	78.10	33.79	1963.38	2.83	7.66
Reach	242.2423	20% AEP	827.85	827.76	825.43			197.61	283.60	479.30	0.11	2.57
Reach	242.2423	1% AEP	829.26	829.10	827.66			661.48	1219.80	777.77	2.43	3.11

Appendix G

HEC-RAS Output for Proposed Bridge

CARPENTER MARTY transportation

Appendix G

HEC-RAS HEC-RAS 6.6 September 2024
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
```

PROJECT DATA
Project Title: GRE-68-12.65
Project File : GRE-68-12.prj
Run Date and Time: 2/11/2025 11:37:21 AM

Project in English units

PLAN DATA

Plan Title: OldtownCreekProp_CM edit
Plan File : p:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\HEC-RAS\Ex and Prop\GRE-68-12.p04

Geometry Title: OldtownCreekProposed CM edit
Geometry File : p:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\HEC-RAS\Ex and Prop\GRE-68-12.g03

Flow Title : OldtownCreekFIS
Flow File : p:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\HEC-RAS\Ex and Prop\GRE-68-12.f01

Plan Summary Information:

Number of:	Cross Sections	= 9	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 2	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	= 0.3
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: OldtownCreekFIS
Flow File : p:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\HEC-RAS\Ex and Prop\GRE-68-12.f01

Flow Data (cfs)

River	Reach	RS	20% AEP	4% AEP	2% AEP	1% AEP
Oldtown Creek	Reach	1401.062	763	1499	1740	2000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Oldtown Creek	Reach	20% AEP		Normal S = 0.002156
Oldtown Creek	Reach	4% AEP		Normal S = 0.002156
Oldtown Creek	Reach	2% AEP		Normal S = 0.002156
Oldtown Creek	Reach	1% AEP	Known WS = 834	Known WS = 829.1

GEOMETRY DATA

Geometry Title: OldtownCreekProposed CM edit
Geometry File : p:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\HEC-RAS\Ex and Prop\GRE-68-12.g03

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 1401.062

INPUT
Description: FIS E-E
Station Elevation Data num= 426

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	830.99	.07	830.99	.54	831	2.19	830.98	4.69	830.94
5.59	830.97	6.19	830.93	7.92	830.89	11.29	830.89	12.14	830.93
13.58	830.94	16.1	830.89	18.28	830.83	19.25	830.86	21.48	830.82
22.71	830.86	23.26	830.85	24.86	830.87	28.06	830.75	28.43	830.75
30.07	830.72	30.58	830.71	33.66	830.86	33.99	830.84	34.54	830.81
36.15	830.73	39.51	830.49	39.53	830.49	41.95	830.68	44.12	830.82
45.19	830.87	46.28	830.9	47.62	830.89	48.1	830.9	50.94	830.9
52.09	830.93	53.37	830.92	56.6	830.85	56.77	830.85	58.94	830.76
59.63	830.79	62.48	830.91	64.58	830.93	64.61	830.93	68.09	830.74
69.73	830.6	70.17	830.6	71.82	830.72	73.72	830.83	75.13	830.78
75.95	830.73	76.51	830.76	79.36	830.96	80.48	830.91	81.65	830.86
85.14	830.93	85.2	830.93	87.34	830.91	88.11	830.93	90.7	831.06
91.54	831.04	92.97	831.03	95.51	831.05	96.32	831.06	98.48	831.15
98.55	831.15	101.93	831.07	102.93	831.04	104.29	831	104.8	830.98
109.77	830.77	109.98	830.79	110.53	830.83	113.25	831.19	115.57	831.19

116.75	831.25	118.89	831.26	120.68	831.45	121.14	831.47	122.5	831.56
124.6	831.66	125.36	831.65	126.7	831.64	129.24	831.82	130.24	831.86
130.8	831.88	132.49	831.95	135.42	832.63	135.92	832.74	136.08	832.77
138.16	833.09	140.68	833.49	141.55	833.59	143.76	833.7	143.85	833.71
144.63	833.75	149.06	833.99	149.49	834.03	150.13	834.05	152.88	834.24
153.46	834.28	155.29	834.3	158.56	834.21	164.39	834.25	164.6	834.26
166.75	834.3	167.06	834.29	169.59	834.19	170.09	834.17	170.63	834.16
172.49	834.16	174.07	834.11	175.95	834.05	177.45	834	180.35	833.95
181.63	833.92	183.03	833.86	184.03	833.82	184.92	833.78	187.46	833.65
194.72	830.85	198.71	829.13	199.73	828.46	201.04	827.66	203.13	826.65
203.93	826.35	208.58	827.26	228.96	831.83	230.13	832.09	230.32	832.13
230.37	832.13	233.69	832.27	234.75	832.3	236.42	832.5	241.26	832.54
243.15	832.3	247.69	831.7	250.42	831.49	251.02	831.45	251.44	831.38
253.44	831.17	254.56	831.12	256.26	830.95	259.17	830.84	261.73	830.85
262.73	830.8	264.23	830.66	264.82	830.63	266.06	830.64	269.59	830.6
270.69	830.57	273.06	830.44	274.14	830.4	274.79	830.37	276.51	830.31
278.86	830.32	279.59	830.33	279.88	830.31	280.88	830.24	282.28	830.13
285.57	830.13	287.22	829.87	287.87	829.8	289.27	829.83	291.37	829.89
292.11	829.79	293.5	829.66	296.43	829.85	297.54	829.83	299.28	829.61
302.67	829.62	302.7	829.62	305.08	829.8	306.61	829.87	307.99	829.91
308.67	829.93	310.1	829.93	310.85	829.93	311	829.94	314.13	829.96
315.43	829.92	316.47	829.84	317.91	829.94	319.92	830.1	321.49	830.14
322.07	830.16	322.83	830.19	325.64	830.24	327.65	830.12	327.82	830.11
328.34	830.12	331.38	830.29	333.55	830.49	333.66	830.5	336.9	830.72
338.06	830.77	338.15	830.77	339.18	830.81	339.9	830.85	340.98	830.84
348.57	831	351.54	830.93	355.56	830.43	356.52	830.42	358.85	830.45
363.98	831.02	366.26	830.68	367.94	830.63	371.36	830.58	371.44	830.58
375.09	830.49	379.93	830.41	387.06	830.28	390.01	830.27	390.84	830.22
393.3	830.66	394.38	830.74	404.71	830.51	405.27	830.53	406.16	830.53
408.35	830.44	410.09	830.49	411.74	830.52	413.94	830.48	418.68	830.55
419.52	830.44	420.93	830.55	423.68	830.77	425.4	830.53	429.2	830.52
434.76	830.45	438.39	830.45	440.65	830.39	441.47	830.44	444.21	830.42
449.58	830.39	455.37	830.54	456.27	830.48	460.61	830.49	463.34	830.61
463.97	830.66	464.59	830.65	468.04	830.41	470.15	830.36	483.48	830.59
484.12	830.61	484.74	830.61	488.54	830.55	491.11	830.76	493.56	830.99
498.29	830.58	499.45	830.52	500.73	830.52	501.55	830.54	502.38	830.52
507.68	830.29	508.55	830.27	511.29	830.18	513.16	830.2	513.59	830.22
514.35	830.23	517.06	830.3	517.98	830.32	519.2	830.34	520.44	830.57
524.62	830.86	525.14	830.82	528.32	831.17	528.74	831.18	528.96	831.22
531.11	831.31	531.24	831.36	534.68	832.39	538.02	833.76	539.24	834.31
540.99	834.97	541.26	835	541.99	835.04	547.98	835.69	548.45	835.7
550.28	835.78	551.2	835.92	553.26	836.07	554.16	836.13	555.02	836.19
557.28	836.28	560.65	836.42	561.28	836.42	562.13	836.45	564.11	836.44
565.04	836.42	568.21	836.41	568.3	836.42	568.7	836.41	570.48	836.32
570.89	836.33	574.63	836.43	575.53	836.42	577.68	836.39	578.92	836.35
584.45	836.5	585.46	836.5	587.92	836.54	588.61	836.56	591.4	836.94
595.58	836.93	597.58	836.91	599.91	836.79	600.52	836.81	612.15	836.62
614.8	836.51	618.86	836.97	622.11	837.1	623.58	837.61	624.74	837.62
628.68	837.33	635.46	836.82	635.77	836.86	636.91	836.76	637.95	836.75
641.26	836.64	642.82	836.87	644.67	837.06	646.45	836.87	649.11	836.41
650.67	836.27	654.46	836.02	657.58	835.74	657.85	835.71	658.45	835.71
664.56	835.54	666.3	835.5	667.21	835.49	670.81	835.44	671.41	835.45
672.47	835.44	674.27	835.4	675.09	835.41	678.38	835.55	678.78	835.54
681.25	835.17	682.48	835.11	685.38	835.3	685.77	835.24	687.96	835.14
688.54	835.17	689.98	835.15	691.64	835.08	692.31	835.09	694.18	834.83
695.08	834.75	697.99	834.92	699.27	834.94	701.81	834.96	702.23	834.94
707.24	834.9	708.51	834.92	709.18	834.89	711.44	834.86	713.4	834.85
715.24	834.66	716.01	834.68	720.13	835.02	720.41	835.02	720.65	835
722.96	834.81	724.7	834.95	727.29	835.35	728.66	835.37	730.14	835.33
732.42	835.37	734.32	835.54	736.23	835.66	737.09	835.63	739.44	835.67

741.16	835.84	743.4	835.76	744.12	835.74	748.47	835.88	750.99	836
751.38	835.99	752.51	836.11	756.76	836.6	757.97	836.58	763.66	836.72
764.58	836.82	765.15	836.87	768.35	837.35	769.23	837.4	771.29	837.42
772.2	837.5	774.34	837.86	776.3	838.18	778.91	838.86	779.57	838.96
783.37	839.32	785.21	839.63	786.26	839.75	787	839.86	793.02	840.63
793.64	840.72	797.45	841.13	798.29	841.31	800.38	841.79	802.41	842.1
811.06	843.51	811.42	843.57	811.55	843.59	811.61	843.61	814.56	844.22
816.5	844.69	818.57	844.95	821.62	845.38	824.07	845.72	828.4	847.03
828.59	847.08	828.84	847.14	834.53	848.34	835.69	848.62	837.1	848.97
840.05	850.07	841.43	850.26	846.98	851.19	847.17	851.24	847.64	851.4
850.27	852.05								

Manning's n Values num= 11

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	150.13	.013	187.46	.07	201.04	.06	208.58	.07
236.42	.1	250.42	.035	348.57	.1	554.16	.013	565.04	.1
850.27	.1								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
187.46	236.42	293.81	291.23	319.49	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	0	835	F
241.26	850.27	832.54	F

Left Levee Station= 153.46 Elevation= 834.28
Right Levee Station= 241.26 Elevation= 832.54

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 1109.832

INPUT
Description: 11+10
Station Elevation Data num= 477

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	835.57	1.08	835.55	7.37	835.49	10.99	835.52	13	835.39
13.72	835.39	17.34	835.35	18.52	835.36	23.26	835.26	24.29	835.25
29.91	835.16	31.86	835.2	33.41	835.21	35.16	835.22	36.44	835.22
39.12	835.2	41.1	835.2	41.7	835.22	44.85	835.18	45.13	835.18
46.68	835.07	47.84	835.09	50.42	835.15	51.52	835.16	52.28	835.09
54.55	835.12	55.98	835.08	57	835.05	57.98	835.03	58.87	835.01
61.54	834.88	62.64	834.85	66.99	834.87	67.31	834.88	67.39	834.89
69.23	835.04	71.12	835.06	72.79	835.06	74.66	835	74.8	835
75.13	834.99	78.35	834.9	79.49	834.88	80.3	834.83	82.73	834.73
84.54	834.73	86.01	834.65	89.5	834.81	91.65	834.75	93.73	834.71
95.11	834.74	97.17	834.78	97.72	834.76	100.71	834.7	102.66	834.6
103.05	834.61	106.33	834.65	107.38	834.57	108.21	834.5	111.89	834.37
112.87	834.37	113.9	834.36	116.14	834.25	117.48	834.18	117.74	834.17
119.47	834.08	121.76	833.95	123.05	833.91	125.85	834.19	129.31	834.48
130.66	834.3	131.33	834.19	134.25	833.9	134.89	833.87	136.39	833.54
137.47	833.35	139.83	833.17	142.03	833.12	142.14	833.11	145.56	832.62
147.13	832.55	147.69	832.5	148.17	832.48	151.24	832.26	152.38	832.24
153.35	832.22	156.65	832.18	157.04	832.19	157.29	832.15	159.12	832.07
162.49	832.21	162.76	832.22	164.82	832.09	166.34	832.19	167.23	832.24
173.58	832.04	181.58	831.88	184.84	831.88	186.31	831.81	190.73	831.81
196.07	831.8	199.28	831.85	201.61	831.71	202.72	831.75	204.43	831.91
207.16	831.98	209.5	832.08	210.67	832.04	213.62	831.85	214.52	831.88
216.01	831.89	216.34	831.9	216.49	831.89	216.62	831.89	222.1	832.03
223.3	832.11	225.76	832.27	227.6	832.21	227.96	832.18	228.36	832.17

233.31	832.39	233.65	832.42	236.06	832.51	237.34	832.54	237.52	832.54
239.34	832.43	240.24	832.43	244.86	832.33	244.96	832.32	247.68	832.33
248.7	832.32	250.78	832.32	251.17	832.31	254.41	832.2	256.14	832.17
256.56	832.16	258.25	832.1	260.09	832.05	261.96	832.16	262.27	832.16
263.1	832.14	265.76	832.02	266.81	831.97	267.78	831.93	269.81	831.93
271.5	831.95	272.95	831.88	273.39	831.86	274.01	831.83	277.06	831.9
277.37	831.92	279.11	831.86	281.55	831.75	281.7	831.74	282.78	831.74
284.17	831.81	285.08	831.78	286.78	831.8	288.79	831.8	289.45	831.78
291.2	831.71	294.39	831.8	294.88	831.82	294.97	831.82	295.06	831.81
297.87	831.78	299.23	831.76	301.13	831.77	303	831.64	304.84	831.7
308.92	831.85	309.65	831.88	310.45	831.9	314.14	831.84	315.54	831.8
319.29	831.21	319.46	831.21	319.67	831.17	321.57	830.76	321.75	830.67
325.11	829.02	325.46	828.86	325.58	828.78	328.1	827.82	331.35	826.75
331.46	826.71	331.48	826.7	331.5	826.7	333.7	825.98	335	825.64
337.42	824.72	338.3	824.61	339.7	824.62	341.63	824.44	343.46	824.36
345.51	824.46	346.29	824.46	349.64	824.38	349.65	824.38	353.51	824.51
355.45	824.63	358.65	826.57	360.3	827.51	365.41	830.55	367.8	830.73
368.86	830.8	369.83	830.73	374.77	830.66	379.37	830.85	384.29	830.86
385.66	830.7	387.44	830.85	392.88	830.4	393.58	830.34	395.64	830.32
397.06	830.62	398.32	830.75	401.38	830.43	403.14	830.26	403.83	830.19
408.06	830.15	410.35	830.15	412.91	830.36	414.08	830.3	416.39	830.29
420.92	830.62	421.81	830.62	430.25	830.49	430.49	830.5	430.71	830.5
432.31	830.47	442.16	830.24	446.47	830.07	450.55	829.87	453.84	830.01
455.75	829.94	458.09	829.78	462.19	829.5	467.47	829.82	467.84	829.71
470.14	829.9	471.19	829.94	473.42	829.97	473.63	829.95	474	829.94
476.91	829.62	479.25	829.35	479.81	829.33	485.47	829.5	490.31	829.61
491.41	829.51	494.49	829.07	497.13	828.81	497.33	828.78	497.57	828.77
500.97	828.59	501.48	828.57	502.88	828.51	505.63	828.49	507.23	828.5
508.82	828.7	509.6	828.8	512.61	829.08	514.21	829.08	514.79	829.1
520.02	830.97	520.62	831.16	520.72	831.22	524.38	832.79	524.63	832.9
525.15	833.02	530.67	834.27	532	834.4	532.45	834.46	532.84	834.45
536.33	834.67	537.01	834.74	538.5	834.81	540.18	834.85	542.12	834.89
542.76	834.88	544.35	834.85	545.47	834.78	548.07	834.66	549.99	834.32
550.17	834.29	550.33	834.28	554.01	834.15	555.14	833.92	558.02	833.96
559.83	834.07	561.98	833.91	564.64	833.98	566.61	833.95	570.35	833.58
572.05	833.42	573.75	833.6	574.28	833.54	578.9	833.29	580.85	833.08
581.56	833.09	585.28	832.92	591.48	832.23	594.34	832.1	595.31	831.98
597.25	831.89	597.37	831.9	598.15	831.86	600.95	831.78	601.22	831.8
602.53	831.76	603.33	831.76	603.7	831.75	610.15	831.69	614.31	831.56
615.91	831.46	619.16	831.4	619.54	831.4	621.17	831.17	622.31	831.06
625.11	830.81	626.03	830.82	627.21	830.77	630.01	831.05	631.14	831.14
631.53	831.13	633.18	831.02	635.17	831	637.09	831	637.7	830.93
639.26	830.76	641.4	830.77	645.29	830.61	647.39	830.72	654.75	830.71
655.17	830.69	655.57	830.65	657.3	830.4	660.1	830.56	661.17	830.62
661.63	830.65	667.53	830.63	669.43	830.58	672.94	830.65	675.33	830.59
677.72	830.69	679.46	830.75	680.73	830.67	681.41	830.64	687.43	830.51
687.65	830.51	692.98	830.57	693.57	830.53	696.61	830.51	697.4	830.46
697.83	830.52	699.62	830.54	703.4	830.82	703.51	830.83	703.54	830.83
705.54	830.81	707.86	830.72	709.46	830.76	711.62	830.59	715.52	830.76
717.63	830.84	717.81	830.84	718.08	830.83	719.4	830.74	723.86	830.46
725.06	830.42	727.76	830.39	729.35	830.35	730.74	830.35	733.12	830.32
736.54	830.31	741.75	830.33	742.04	830.33	742.89	830.38	745.99	830.6
747.58	830.4	748.17	830.37	752.67	830.25	754.31	830.09	756.8	830.23
758.17	830.26	758.63	830.27	760.36	830.18	763.11	830.4	764.23	830.47
766.01	830.33	766.44	830.3	767.39	830.3	770.28	830.27	771.7	830.05
772.51	830.02	775.69	830.16	778.58	830.37	780.32	830.37	783.53	830.31
784.78	830.18	788.44	830.2	788.81	830.2	794.47	829.9	797.03	829.87
798.13	829.9	803.2	829.92	805.65	829.98	807.25	829.99	813.48	830.01
815.64	829.95	817.82	830.03	821.77	830.13	824.99	830.33	826.18	830.36
827.77	830.24	833.4	830.33	834.01	830.36	834.43	830.39	839.14	830.76

840.25	830.69	843.97	831.05	860.6	831.87	863.22	832.28	866.18	832.44
869.91	832.03	870.35	832.02	873.91	832.25	874.18	832.28	875.28	832.47
879.07	833.26	882.12	833.95	882.28	834	882.79	834.16	885.56	835.11
886.3	835.2	892.01	835.9	895.69	836.58	898.62	836.9	901.65	837.27
909.58	838.76	914.09	839.6	916.85	840.69	917.1	840.76	919.27	841.2
922.77	841.74	926.65	842.08	930.3	842.74	939.06	843.76	940.08	843.89
940.54	844.04	943.09	844.38	948.65	845.31	950.81	845.65	953.13	846.16
956.61	846.87	960.99	847.28	962.36	847.49	970.89	848.63	972.78	849.06
974.09	849.19	976.29	849.96	979.34	850.89	983.16	851.72	984.46	851.93
985.48	852.26	989.77	853.55	991.28	853.93	998.96	854.95	999.23	854.97
999.49	854.98	1001.3	854.93	1004.05	855.28	1004.69	855.34	1004.84	855.36
1008.28	856.02	1008.38	856.04						

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.013	121.76	.03	216.01	.013	315.54	.1	319.29	.07
337.42	.06	355.45	.07	365.41	.1	538.5	.013	548.07	.1
603.7	.035	827.77	.1	1008.38	.1				

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
319.29	365.41	308.79	313.67	310.72	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
540	900	835	F

Left Levee Station= 237.34 Elevation= 830.6
Right Levee Station= 542.12 Elevation= 830.6
Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
160	216	855	261	316	855

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 796.1590

INPUT
Description: 7+96
Station Elevation Data num= 421

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	836.01	1.45	836.07	2.69	836	3.2	835.99	6.46	836.1
7.7	836.01	8.73	835.91	10.73	836.09	12.12	836.25	12.72	836.27
14.25	836.26	15.61	836.29	18.8	836.08	20.26	836.05	24.07	836.11
27.45	836.21	36.65	836.08	38.65	836.12	43.25	835.87	47.57	836.07
50.18	836.08	62.2	835.63	63.21	835.5	66.04	835.32	67.52	835.15
72.05	834.6	73.39	834.48	74.27	834.32	74.99	834.29	76.28	834.22
79.4	833.75	79.91	833.69	80.29	833.54	81.87	833.07	85.04	831.89
85.44	831.76	85.6	831.72	87.41	831.45	90.35	831.1	91.17	831.01
91.51	830.99	93	830.86	95.35	830.53	98.65	830.04	101.16	829.86
102.53	829.86	103.13	829.76	104.27	829.69	107.27	829.69	108.09	829.65
108.53	829.61	110.04	829.36	112.22	829.42	114.32	829.3	115.62	829.21
117.99	829.15	119.49	829.05	120.88	829.09	121.2	829.11	121.97	829.1
125.2	829.04	126.64	828.97	130.7	829.02	132.48	829.04	132.69	829.04
138.23	829.01	139.81	828.98	141.93	828.94	142.96	828.94	143.86	828.93
146.49	828.94	147.55	828.93	148.97	828.95	149.27	828.95	150.04	828.93
153.19	828.93	154.68	829.14	154.86	829.15	157.28	829.12	158.66	829.1
158.73	829.09	160.48	828.77	161.95	828.86	164.21	828.93	165.63	828.94
166.11	828.9	166.81	828.93	169.73	829.1	171.68	829.14	171.72	829.15
171.81	829.14	177.2	828.42	177.77	828.43	181.06	828.58	181.4	828.58
182.74	828.51	184.17	828.51	186.63	828.52	187.65	828.42	190.82	828.41
192.23	828.38	192.53	828.35	194.04	828.27	197.24	828.37	197.86	828.34

199.42	828.12	199.57	828.12	200.11	828.14	203.47	828.19	204.95	828.04
205.1	828.03	205.31	828.03	207.07	828.06	210.7	828.16	210.87	828.15
211.29	828.15	214.54	828.18	215.31	828.17	216.42	828.23	217.69	828.14
220.1	828.15	221.35	828.01	222	828.02	225.45	827.9	226.18	827.9
227.54	827.97	228.37	828.02	231.44	828.2	231.49	828.2	232.68	828.24
233.03	828.22	234.79	828.13	237.74	828.09	238.94	828.12	241.14	827.9
242.45	827.87	243.93	827.87	244.44	827.85	247.35	827.82	248.08	827.84
249.75	827.92	249.98	827.94	251.03	827.97	253.85	828.07	254.46	828.1
255.56	828.03	260.86	828.29	261.34	828.3	262.29	828.32	264.03	828.36
269.19	828.5	270.84	828.64	272.62	828.79	272.63	828.79	276.57	829.85
277.23	829.88	278.33	830	280.67	829.59	282.37	829.49	284.05	828.92
284.11	828.9	284.25	828.82	287.22	826.93	290.56	825.43	291.12	825.17
309.41	824.86	311.22	824.79	311.34	824.8	311.59	824.98	311.82	825.04
312.07	825.11	326.57	829.05	327.07	829.19	328.71	829.18	330.77	829.09
338.31	829.33	341.05	829.38	342.33	829.19	345.83	828.86	351.07	828.5
351.16	828.49	352.09	828.44	353.87	828.42	357.9	828.31	358.86	828.22
359.77	828.16	362.84	828.22	365.64	828.27	370.99	828.96	371.65	829.01
371.79	829.01	377.07	828.82	377.48	828.84	381.11	829.14	381.65	829.12
384	829.15	393.33	828.95	397.1	829.11	398.65	829.25	399.44	829.47
400.22	829.58	402.19	830.19	404.65	830.84	406.18	831.49	406.23	831.52
406.7	831.62	409.71	832.3	411.42	832.54	412.23	832.6	412.78	832.62
417.56	832.65	418	832.69	420.47	833.11	421.91	833.34	422.64	833.35
423.82	833.29	427.54	833.42	427.79	833.43	427.95	833.42	429.57	833.28
433.37	832.75	433.59	832.71	433.88	832.64	435.51	832.23	436.59	832.03
439.31	831.4	440.83	830.96	441.32	830.83	444.18	830.59	444.97	830.53
445.19	830.51	445.83	830.52	447.82	830.52	456.36	830.61	457.07	830.51
458.72	830.45	458.95	830.44	462.01	830.61	468.44	830.47	468.8	830.48
470.64	830.67	472.4	830.53	475.19	830.37	479.22	830.47	487.09	830.65
488.27	830.57	491.08	830.47	492.79	830.45	494.23	830.35	495.46	830.21
498.31	830.01	499.03	829.94	500.2	829.96	502.52	829.92	505.08	829.8
506.1	829.7	508.44	829.79	510.16	829.85	511.83	829.84	512.13	829.85
512.83	829.83	516.21	829.73	517.08	829.68	518.13	829.67	520.59	829.6
522.2	829.54	523.11	829.58	523.97	829.61	525.22	829.59	529.74	829.35
530.05	829.34	530.12	829.34	531.02	829.33	535.96	829.3	536.14	829.29
539.57	829.5	540.12	829.5	541.15	829.35	542.06	829.22	544.88	829.19
547.62	829.18	547.92	829.16	548.6	829.18	549.33	829.2	554	829.42
557.62	829.33	560.09	829.29	561.54	829.4	564.12	829.51	565.65	829.63
566.04	829.58	566.97	829.59	570.01	829.52	571.01	829.54	572.05	829.54
575.19	829.49	576.08	829.52	576.62	829.5	577.92	829.44	581.55	829.47
581.98	829.5	582.17	829.49	583.97	829.55	585.16	829.52	588	829.61
589.43	829.58	590.09	829.56	593.62	829.57	594.14	829.56	596.1	829.7
599.55	829.6	600.13	829.6	600.67	829.54	602.12	829.31	604.34	829.35
606.2	829.36	607.23	829.26	608.12	829.17	612	829.37	612.12	829.38
612.17	829.38	614.16	829.46	614.62	829.43	618.23	829.38	619.34	829.3
620.23	829.18	620.99	829.15	621.79	829.18	626.34	829.21	630.03	829.04
632.32	828.96	636.34	828.94	638.39	828.94	641.03	829.17	643.22	829.13
644.41	829.07	648.19	829.02	650.41	829.06	654.3	828.98	656.57	828.92
657.3	828.95	660.64	829.07	662.31	829.03	662.67	829.03	663.36	829
666.64	828.98	667.26	828.91	668.76	828.91	670.39	828.9	674.89	828.85
676.79	828.9	680.05	828.84	681.09	828.77	685.03	829.08	685.1	829.08
685.16	829.07	687.22	828.88	690.44	828.93	691.22	828.95	692.29	828.9
693.28	828.88	693.94	828.91	695.9	828.89	699.27	828.91	703.92	828.9
705.45	828.91	705.82	828.9	711.63	829.1	712.01	829.12	716.65	829.18
717.59	829.21	721.68	829.24	723.48	829.31	727.29	829.29	727.54	829.3
727.68	829.29	729.55	829.34	733.42	829.42	733.62	829.42	735.58	829.58
738.61	829.66	739.51	829.69	741.12	829.82	741.5	829.88	742.41	829.9
745.42	830.07	747.72	830.44	752.27	831.04	755.93	831.3	758.41	831.59
764.71	832.06	768.01	832.68	770.53	833.31	773.95	833.75	780.53	834.76
784.11	835.13	785.35	835.34	786.34	835.58	787.38	835.73	789.58	836.24
796.26	837.31	799.36	838.14	800.54	838.34	811.87	839.81	814.27	840.22

814.97	840.22	816.1	840.37	820.41	840.88	821.37	840.84	822.2	840.83
823.27	841.04	825.87	841.62	827.33	841.74	827.68	841.8	829.27	842.1
832.13	842.53	833.19	842.6	836.52	843.34	837.05	843.43	837.44	843.4
837.81	843.38								

Manning's n Values num= 11

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	237.74	.1	282.37	.07	290.56	.06	311.59	.07
326.57	.1	418	.013	427.95	.1	492.79	.035	727.29	.1
837.81	.1								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
282.37	326.57	96.02	92.36	85.26	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
425	775	833.5	F

Right Levee Station= 427.79 Elevation= 830.1

Blocked Obstructions num= 1

Sta L	Sta R	Elev
20	73	855

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 703.7970

INPUT
Description: 7+04
Station Elevation Data num= 478

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	838.34	.56	838.32	1.61	838.29	3.85	838.22	5.42	838.18
6.94	838.11	7.12	838.09	7.53	838.09	10.43	837.83	12.4	837.66
12.57	837.65	17.5	837.49	18.31	837.46	20	837.28	25.9	836.94
27.55	836.96	28.94	836.84	29.41	836.78	32.45	836.62	33.15	836.6
33.74	836.59	34.82	836.6	36.58	836.57	40.35	836.52	44.28	836.21
44.34	836.21	45.01	836.08	45.87	835.91	46.56	835.86	49.79	835.63
49.97	835.61	51.49	835.5	54.24	835.52	55.27	835.53	56.32	835.51
57.02	835.51	59.42	835.63	60.94	835.72	61.67	835.73	62.56	835.75
65.19	835.78	66.38	835.79	66.48	835.8	68.07	835.89	70.38	835.83
72.25	835.81	75.47	835.8	77.58	835.7	79.76	835.64	80.95	835.58
84.67	835.38	86.58	835.38	88.36	835.44	89.68	835.62	90.13	835.63
91.3	835.66	93.94	835.6	95.02	835.74	95.6	835.77	97.94	836.03
100.37	836.37	104.95	836.22	106.69	836.05	107.62	835.98	110.47	835.82
112.24	835.82	115.97	835.66	116.63	835.68	117.7	835.75	121.62	835.77
122.96	835.72	123.23	835.7	126.62	835.69	127.06	835.69	127.29	835.68
128.91	835.65	130.29	835.61	132.57	835.57	133.68	835.56	134.5	835.53
135.65	835.48	138.23	835.53	139.07	835.35	140.64	835.37	141.85	835.29
145.01	835.28	148.71	835.19	150.65	835.25	153.99	835.12	156.97	835.11
159.9	834.96	166.36	834.71	167.19	834.68	170.48	834.57	171.99	834.48
174.87	834.37	177.71	834.2	179.18	834.04	179.52	833.97	181.06	833.85
183.34	833.63	184.36	833.4	185.28	833.15	186.31	833.05	188.97	832.74
190.81	832.42	190.88	832.41	191.14	832.35	194.87	831.62	196.38	831.29
201.92	830.87	202.02	830.86	202.11	830.86	205.91	830.7	206.08	830.68
207.71	830.45	211.25	830.17	211.63	830.15	211.78	830.13	213.33	829.9
215.57	829.75	217.2	829.6	217.82	829.58	219.08	829.41	222.98	829.03
224.19	828.96	227.64	828.83	230.24	828.69	231.2	828.68	234.3	828.51
235.03	828.44	235.86	828.38	238.38	828.45	239.8	828.42	240.87	828.42
241.58	828.39	245.15	828.37	245.42	828.39	245.81	828.36	247.27	828.33
248.28	828.34	252.34	828.27	252.9	828.24	257.72	828.31	258.31	828.33
259.41	828.38	262.31	828.55	262.65	828.53	263.91	828.52	266.59	828.54

267.78	828.57	269.25	828.6	269.55	828.62	269.79	828.63	273.34	828.71
273.99	828.73	275.17	828.72	278.21	828.44	278.84	828.46	279.26	828.46
280.76	828.47	283.29	828.57	284.56	828.58	285.47	828.56	290.6	828.74
292.63	828.76	293.19	828.75	296.11	828.69	300.52	828.54	301.38	828.56
302.89	828.61	303.14	828.62	303.65	828.6	307.01	828.52	307.52	828.53
308.42	828.61	314.27	828.96	321.86	829.07	325.55	828.86	326.23	828.78
329.27	828.5	330.85	828.41	331.11	828.4	334.35	828.35	334.91	828.33
336.65	828.14	337.7	828.04	340.6	827.64	341.74	827.5	342.12	827.44
344.04	827.3	346.13	827.22	346.83	827.16	348.02	827.16	350.57	827.05
351.61	827.05	353.27	827.18	353.99	827.18	357.23	827.22	358.92	827
359.07	827	359.61	827.02	363.01	827.14	364.64	827.14	367.03	827.18
369.17	827.2	370.32	827.2	375.8	827.23	376.22	827.23	381.61	827.22
383.36	827.32	385.55	827.43	386.58	827.41	387.22	827.44	388.64	827.53
392.77	827.82	392.98	827.84	393.54	828.02	396.95	828.85	397.87	829.1
407.84	829.21	408.35	829.2	408.54	829.17	408.61	829.15	409.74	828.89
411.16	828.56	414.98	827.13	417.35	823.18	443.35	823.43	444.13	827.33
446.55	827.78	449.6	828.41	450.6	828.62	451.57	828.62	454.49	829.01
454.6	829.02	454.68	829.03	456.13	829.18	457.14	829.25	460.48	829.23
463.26	828.82	466.27	828.63	468.37	828.63	474.13	828.8	474.33	828.81
478.71	828.93	482.14	828.85	483.56	828.98	490.08	828.83	493.92	828.04
498.66	828.07	499.62	828.1	500.97	828.1	502.37	827.96	506.01	828.11
506.94	828.12	507.78	828.17	508.44	828.2	512.94	829.45	514.47	830.05
516.52	830.74	518.6	831.55	519.77	831.73	520.47	831.84	523.79	831.95
524.31	831.98	524.55	832.01	526.24	832	527.53	832.16	530.23	832.6
531.35	832.65	532.05	832.68	536.14	832.77	537.22	832.73	537.8	832.73
539.09	832.66	541.92	832.47	542.94	832.28	543.76	832.12	544.89	831.82
547.63	831.16	548.2	831.12	549.58	830.89	551.56	830.4	554.39	830.1
559.1	830.27	559.56	830.29	559.73	830.27	565.39	829.85	566.53	829.64
572.13	829.72	575.67	829.89	577.49	829.9	578.84	829.94	580.71	829.83
582.93	830	587.17	830.12	589.85	830.12	592.29	830.01	598.55	830.25
601.4	830.34	603.33	830.22	604.06	830	612.3	829.18	612.58	829.19
614.31	829.2	614.61	829.2	620.38	829.12	623.85	829.15	624.56	829.16
626.32	828.96	626.39	828.95	626.52	828.94	631.96	828.98	634.34	829.01
638.33	829.01	640.14	828.94	643.42	828.88	644.41	828.93	646.79	828.89
648.46	828.93	649.44	828.72	650.33	828.62	653.5	828.63	654.6	828.67
654.85	828.67	656.21	828.65	659.59	828.85	660.85	828.88	662.28	828.78
662.52	828.8	667.91	829.11	668.39	829.07	672.39	829.07	672.49	829.06
672.55	829.07	674.34	829.06	679.27	828.73	680.11	828.7	680.33	828.69
681.02	828.75	683.51	828.88	686.23	829.05	686.95	829.05	692.28	829.03
697.4	829.06	698.4	829.08	699.4	829.09	700.87	829.1	704.41	829.13
705.39	829.2	708.52	829.26	709.68	829.02	710.43	828.94	712.35	828.9
714.6	828.95	715.37	828.82	716.45	828.74	718.03	828.78	720.52	828.95
721.69	828.98	722.49	829.01	725.74	829.05	726.65	829.06	727.28	828.96
728.57	828.73	733.79	828.75	734.67	828.77	735.22	828.8	738.73	828.85
739.3	828.85	740.4	828.8	746.51	828.71	746.75	828.7	747.27	828.65
750.78	828.57	752.13	828.6	752.77	828.61	754.3	828.64	758.04	828.86
758.78	828.78	761.18	828.79	763.07	828.81	763.49	828.77	764.93	828.59
765.99	828.64	767.2	828.68	771.05	828.82	773.74	828.81	775.1	828.74
776.74	828.54	777.15	828.53	778.1	828.52	782.98	828.54	791.56	828.54
795.12	828.53	795.63	828.52	796.37	828.53	799.69	828.42	800.55	828.41
801.69	828.46	804.76	828.66	805.91	828.72	806.64	828.81	807.7	828.86
809.06	828.89	811.85	828.85	812.75	828.81	816.34	828.98	818.29	829
820.06	828.85	825.31	828.81	825.93	828.82	826.02	828.82	826.61	828.83
830.95	828.88	831.91	828.81	833.17	828.84	836.07	828.95	837.67	829.17
838.01	829.16	838.92	829.22	842.11	829.27	843.63	829.08	844.03	829.04
844.63	829.08	848.05	829.36	848.6	829.42	849.97	829.48	853.55	829.61
853.96	829.61	854.2	829.63	855.87	829.55	859.66	829.69	860.11	829.72
865.02	830.22	865.72	830.41	866.11	830.45	867.61	830.79	870	830.71
872.38	830.84	873.44	830.98	875.3	831.04	877.47	831.25	878.63	831.38
879.32	831.46	882.6	831.74	883.31	831.79	883.8	831.81	885.14	831.83

888.1	831.85	889.08	831.87	890.43	831.99	891.48	832.08	892.5	832.26
896.83	832.94	900.24	834.95	900.65	835.23	900.94	835.44	902.53	836.57
908.38	838.21	912.51	839.35	914.83	839.6	920.35	840.33	950.62	841.26
954.03	841.1	954.85	841.2	956.48	841.09	957.87	841.17	958.1	841.2
959.55	841.21	961.58	841.21	962.32	841.22	963.07	841.22	966.13	841.33
968.09	841.29	968.91	841.33	971.47	841.33				

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.013	184.36	.03	414.98	.06	443.35	.03	530.23	.013
539.09	.1	601.4	.035	848.05	.1	971.47	.1		

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
408.54	457.14	56.86	52.22	53.96	.3	.5

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
536.14	900	832.73	F

Right Levee Station= 536.14 Elevation= 830.1

BRIDGE

RIVER: Oldtown Creek
REACH: Reach RS: 679.82

INPUT
Description:
Distance from Upstream XS = 19.3
Deck/Roadway Width = 17
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
29.21	854.71	852.59	119.21	854.33	852.21	236.71	849.09	845.32
354.21	843.21	839.45	505.06	835.72	833.6	505.07	835.72	820
544.09	834.09	820	544.1	834.09	820			

Upstream Bridge Cross Section Data
Station Elevation Data num= 478

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	838.34	.56	838.32	1.61	838.29	3.85	838.22	5.42	838.18
6.94	838.11	7.12	838.09	7.53	838.09	10.43	837.83	12.4	837.66
12.57	837.65	17.5	837.49	18.31	837.46	20	837.28	25.9	836.94
27.55	836.96	28.94	836.84	29.41	836.78	32.45	836.62	33.15	836.6
33.74	836.59	34.82	836.6	36.58	836.57	40.35	836.52	44.28	836.21
44.34	836.21	45.01	836.08	45.87	835.91	46.56	835.86	49.79	835.63
49.97	835.61	51.49	835.5	54.24	835.52	55.27	835.53	56.32	835.51
57.02	835.51	59.42	835.63	60.94	835.72	61.67	835.73	62.56	835.75
65.19	835.78	66.38	835.79	66.48	835.8	68.07	835.89	70.38	835.83
72.25	835.81	75.47	835.8	77.58	835.7	79.76	835.64	80.95	835.58
84.67	835.38	86.58	835.38	88.36	835.44	89.68	835.62	90.13	835.63
91.3	835.66	93.94	835.6	95.02	835.74	95.6	835.77	97.94	836.03
100.37	836.37	104.95	836.22	106.69	836.05	107.62	835.98	110.47	835.82
112.24	835.82	115.97	835.66	116.63	835.68	117.7	835.75	121.62	835.77
122.96	835.72	123.23	835.7	126.62	835.69	127.06	835.69	127.29	835.68
128.91	835.65	130.29	835.61	132.57	835.57	133.68	835.56	134.5	835.53
135.65	835.48	138.23	835.53	139.07	835.35	140.64	835.37	141.85	835.29
145.01	835.28	148.71	835.19	150.65	835.25	153.99	835.12	156.97	835.11
159.9	834.96	166.36	834.71	167.19	834.68	170.48	834.57	171.99	834.48
174.87	834.37	177.71	834.2	179.18	834.04	179.52	833.97	181.06	833.85
183.34	833.63	184.36	833.4	185.28	833.15	186.31	833.05	188.97	832.74

190.81	832.42	190.88	832.41	191.14	832.35	194.87	831.62	196.38	831.29
201.92	830.87	202.02	830.86	202.11	830.86	205.91	830.7	206.08	830.68
207.71	830.45	211.25	830.17	211.63	830.15	211.78	830.13	213.33	829.9
215.57	829.75	217.2	829.6	217.82	829.58	219.08	829.41	222.98	829.03
224.19	828.96	227.64	828.83	230.24	828.69	231.2	828.68	234.3	828.51
235.03	828.44	235.86	828.38	238.38	828.45	239.8	828.42	240.87	828.42
241.58	828.39	245.15	828.37	245.42	828.39	245.81	828.36	247.27	828.33
248.28	828.34	252.34	828.27	252.9	828.24	257.72	828.31	258.31	828.33
259.41	828.38	262.31	828.55	262.65	828.53	263.91	828.52	266.59	828.54
267.78	828.57	269.25	828.6	269.55	828.62	269.79	828.63	273.34	828.71
273.99	828.73	275.17	828.72	278.21	828.44	278.84	828.46	279.26	828.46
280.76	828.47	283.29	828.57	284.56	828.58	285.47	828.56	290.6	828.74
292.63	828.76	293.19	828.75	296.11	828.69	300.52	828.54	301.38	828.56
302.89	828.61	303.14	828.62	303.65	828.6	307.01	828.52	307.52	828.53
308.42	828.61	314.27	828.96	321.86	829.07	325.55	828.86	326.23	828.78
329.27	828.5	330.85	828.41	331.11	828.4	334.35	828.35	334.91	828.33
336.65	828.14	337.7	828.04	340.6	827.64	341.74	827.5	342.12	827.44
344.04	827.3	346.13	827.22	346.83	827.16	348.02	827.16	350.57	827.05
351.61	827.05	353.27	827.18	353.99	827.18	357.23	827.22	358.92	827
359.07	827	359.61	827.02	363.01	827.14	364.64	827.14	367.03	827.18
369.17	827.2	370.32	827.2	375.8	827.23	376.22	827.23	381.61	827.22
383.36	827.32	385.55	827.43	386.58	827.41	387.22	827.44	388.64	827.53
392.77	827.82	392.98	827.84	393.54	828.02	396.95	828.85	397.87	829.1
407.84	829.21	408.35	829.2	408.54	829.17	408.61	829.15	409.74	828.89
411.16	828.56	414.98	827.13	417.35	823.276	443.35	823.43	444.13	827.33
446.55	827.78	449.6	828.41	450.6	828.62	451.57	828.62	454.49	829.01
454.6	829.02	454.68	829.03	456.13	829.18	457.14	829.25	460.48	829.23
463.26	828.82	466.27	828.63	468.37	828.63	474.13	828.8	474.33	828.81
478.71	828.93	482.14	828.85	483.56	828.98	490.08	828.83	493.92	828.04
498.66	828.07	499.62	828.1	500.97	828.1	502.37	827.96	506.01	828.11
506.94	828.12	507.78	828.17	508.44	828.2	512.94	829.45	514.47	830.05
516.52	830.74	518.6	831.55	519.77	831.73	520.47	831.84	523.79	831.95
524.31	831.98	524.55	832.01	526.24	832	527.53	832.16	530.23	832.6
531.35	832.65	532.05	832.68	536.14	832.77	537.22	832.73	537.8	832.73
539.09	832.66	541.92	832.47	542.94	832.28	543.76	832.12	544.89	831.82
547.63	831.16	548.2	831.12	549.58	830.89	551.56	830.4	554.39	830.1
559.1	830.27	559.56	830.29	559.73	830.27	565.39	829.85	566.53	829.64
572.13	829.72	575.67	829.89	577.49	829.9	578.84	829.94	580.71	829.83
582.93	830	587.17	830.12	589.85	830.12	592.29	830.01	598.55	830.25
601.4	830.34	603.33	830.22	604.06	830	612.3	829.18	612.58	829.19
614.31	829.2	614.61	829.2	620.38	829.12	623.85	829.15	624.56	829.16
626.32	828.96	626.39	828.95	626.52	828.94	631.96	828.98	634.34	829.01
638.33	829.01	640.14	828.94	643.42	828.88	644.41	828.93	646.79	828.89
648.46	828.93	649.44	828.72	650.33	828.62	653.5	828.63	654.6	828.67
654.85	828.67	656.21	828.65	659.59	828.85	660.85	828.88	662.28	828.78
662.52	828.8	667.91	829.11	668.39	829.07	672.39	829.07	672.49	829.06
672.55	829.07	674.34	829.06	679.27	828.73	680.11	828.7	680.33	828.69
681.02	828.75	683.51	828.88	686.23	829.05	686.95	829.05	692.28	829.03
697.4	829.06	698.4	829.08	699.4	829.09	700.87	829.1	704.41	829.13
705.39	829.2	708.52	829.26	709.68	829.02	710.43	828.94	712.35	828.9
714.6	828.95	715.37	828.82	716.45	828.74	718.03	828.78	720.52	828.95
721.69	828.98	722.49	829.01	725.74	829.05	726.65	829.06	727.28	828.96
728.57	828.73	733.79	828.75	734.67	828.77	735.22	828.8	738.73	828.85
739.3	828.85	740.4	828.8	746.51	828.71	746.75	828.7	747.27	828.65
750.78	828.57	752.13	828.6	752.77	828.61	754.3	828.64	758.04	828.86
758.78	828.78	761.18	828.79	763.07	828.81	763.49	828.77	764.93	828.59
765.99	828.64	767.2	828.68	771.05	828.82	773.74	828.81	775.1	828.74
776.74	828.54	777.15	828.53	778.1	828.52	782.98	828.54	791.56	828.54
795.12	828.53	795.63	828.52	796.37	828.53	799.69	828.42	800.55	828.41
801.69	828.46	804.76	828.66	805.91	828.72	806.64	828.81	807.7	828.86

809.06	828.89	811.85	828.85	812.75	828.81	816.34	828.98	818.29	829
820.06	828.85	825.31	828.81	825.93	828.82	826.02	828.82	826.61	828.83
830.95	828.88	831.91	828.81	833.17	828.84	836.07	828.95	837.67	829.17
838.01	829.16	838.92	829.22	842.11	829.27	843.63	829.08	844.03	829.04
844.63	829.08	848.05	829.36	848.6	829.42	849.97	829.48	853.55	829.61
853.96	829.61	854.2	829.63	855.87	829.55	859.66	829.69	860.11	829.72
865.02	830.22	865.72	830.41	866.11	830.45	867.61	830.79	870	830.71
872.38	830.84	873.44	830.98	875.3	831.04	877.47	831.25	878.63	831.38
879.32	831.46	882.6	831.74	883.31	831.79	883.8	831.81	885.14	831.83
888.1	831.85	889.08	831.87	890.43	831.99	891.48	832.08	892.5	832.26
896.83	832.94	900.24	834.95	900.65	835.23	900.94	835.44	902.53	836.57
908.38	838.21	912.51	839.35	914.83	839.6	920.35	840.33	950.62	841.26
954.03	841.1	954.85	841.2	956.48	841.09	957.87	841.17	958.1	841.2
959.55	841.21	961.58	841.21	962.32	841.22	963.07	841.22	966.13	841.33
968.09	841.29	968.91	841.33	971.47	841.33				

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.013	184.36	.03	414.98	.06	443.35	.03	530.23	.013
539.09	.1	601.4	.035	848.05	.1	971.47	.1		

Bank Sta: Left Right Coeff Contr. Expan.

408.54 457.14 .3 .5

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
536.14	900	832.73	F

Right Levee Station= 536.14 Elevation= 830.1

Downstream Deck/Roadway Coordinates

num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
16.49	854.71	852.59	106.49	854.33	852.21	223.99	849.09	845.32
341.49	843.21	839.45	491.78	835.72	833.6	491.79	835.72	820
563.22	834.09	820	563.23	834.09	820			

Downstream Bridge Cross Section Data

Station Elevation Data num= 487

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	837.96	1.96	837.88	2.47	837.9	3.46	837.91	5.36	837.76
7.39	837.64	7.99	837.58	9.18	837.53	11.78	837.51	12.88	837.49
14.37	837.33	14.71	837.28	15.53	837.2	18.46	837.07	19.32	836.98
20.28	837.02	22.4	837	24.05	836.99	25.34	836.69	25.66	836.62
26.34	836.58	30.89	836.04	31.18	835.97	32.87	835.74	35.19	835.45
36.5	835.53	36.71	835.51	39.95	835.58	40.66	835.58	41.28	835.6
42.32	835.55	43.97	835.58	46.14	835.63	47.68	835.68	47.85	835.68
48.17	835.69	53.26	835.71	53.92	835.71	58.88	835.81	62.55	835.86
62.72	835.86	62.88	835.85	64.33	835.78	65.46	835.73	68.17	835.68
69.83	835.72	69.94	835.73	70.24	835.71	73.61	835.54	74.63	835.46
75.46	835.36	76.77	835.39	79.17	835.39	80.06	835.48	80.89	835.51
83.15	835.52	85.16	835.47	86.36	835.52	87.42	835.55	91.15	835.43
91.84	835.45	94.65	835.38	95.76	835.45	96.12	835.44	97.94	835.43
102.43	835.36	102.9	835.38	103.43	835.37	106.52	835.3	108.43	835.3
109.61	835.29	112.95	835.37	113.77	835.31	114.84	835.32	117.82	835.25
118.25	835.18	119.63	835.22	121.52	835.18	123.32	835.15	124.2	835.19
126.81	835.23	128.97	835.2	130.33	835.08	130.76	835.06	134.1	834.97
134.58	834.94	134.82	834.94	136.31	834.85	139.48	834.78	140.34	834.79
140.83	834.75	142.06	834.77	144.71	834.75	145.87	834.75	146.59	834.7
147.65	834.72	149.39	834.64	151.51	834.57	152.23	834.48	153.19	834.38
156.64	834.73	157.09	834.77	157.79	834.76	158.81	834.77	159.51	834.87
164.44	835.06	166.79	835.1	168.89	834.88	170.03	834.7	170.74	834.65

171.38	834.63	175.99	834.58	177.45	834.63	179.72	834.75	181.44	834.74
181.61	834.74	182.56	834.75	185.3	834.76	186.21	834.73	187.18	834.69
188.63	834.72	191.05	834.76	192.25	834.76	192.78	834.74	196.11	834.46
196.87	834.44	202.06	834.04	202.74	833.88	204.07	833.57	205.77	833.18
207.94	832.15	212.3	831.14	213.49	831.1	214.81	830.66	217.27	829.97
219.65	829.27	220.96	829.18	224.95	828.67	226.73	828.54	232	828.69
232.18	828.73	235.83	828.81	236.35	828.81	237.87	828.74	239.1	828.72
242.82	828.77	243.48	828.75	246.98	828.74	247.35	828.74	248.89	828.73
249.04	828.74	254.47	828.34	257.06	828.37	259.18	828.23	265.14	828.52
265.42	828.53	265.95	828.53	270.85	828.45	272.32	828.49	276.52	828.46
277.47	828.45	282.21	828.36	282.35	828.36	286.25	828.16	286.43	828.15
289	828.18	292.51	828.45	296.15	828.84	297.56	828.82	297.93	828.87
301.25	828.65	303.17	828.46	305.22	828.48	314.23	828.42	315.96	828.45
316.02	828.45	316.25	828.43	319.78	828.12	321.19	828.07	321.58	828.07
321.86	828.08	326.54	828.13	329.33	828.02	332.6	827.99	335.55	828.2
336.66	828.3	337.04	828.27	338.52	828.24	340.98	828.08	346.63	827.91
348.27	827.85	349.54	827.92	351.43	827.89	351.82	827.89	353.51	827.93
354.14	827.93	355.1	827.84	358.59	827.79	359.28	827.77	360.77	827.72
360.83	827.72	364.75	827.78	364.86	827.79	366.39	827.82	369.89	828.28
370.42	828.3	370.76	828.35	372.08	828.47	374.6	828.43	376.04	828.48
377.41	828.55	377.67	828.57	380.99	828.94	382.07	829.04	386.46	829.4
387.32	829.42	388.04	829.44	390.01	829.49	393.2	829.63	394.67	829.39
394.95	829.33	396.11	829.17	399.66	828.63	400.71	828.4	402.89	827.71
404.56	827.18	404.6	827.16	406.27	826.47	408.73	825.73	410.25	825.28
411.51	823.71	434.17	823.36	435.21	825.38	436.49	826.02	436.99	826.23
439.23	827.08	442.92	827.79	445.03	828	445.64	827.93	446.81	827.7
449.71	827.62	450.88	827.61	451.84	827.6	452.6	827.62	456.27	827.64
456.91	827.74	462.58	828.54	462.72	828.54	470.07	828.6	474.05	828.53
474.08	828.53	474.26	828.54	475.29	828.61	478	828.78	479.78	828.88
480.13	828.9	481.48	829.12	486.85	829.35	487.34	829.38	487.66	829.32
491.27	828.68	492.51	828.52	493.92	828.54	496.92	828.95	503.74	829.97
508.14	830.7	508.81	830.67	509.25	830.79	510.62	831.06	513.42	831.56
514.5	831.72	514.89	831.73	516.38	831.75	517.88	831.89	520.38	832
521.78	832.22	522.16	832.27	522.79	832.28	526.29	832.46	527.76	832.34
527.89	832.33	530.75	832.37	532.06	832.39	532.28	832.37	533.85	832.24
537.35	831.4	537.75	831.28	539.31	830.77	539.63	830.65	539.75	830.63
543.58	829.76	548.77	829.68	549.57	829.63	550.39	829.6	555.43	829.49
556.24	829.37	559.28	829.35	561.88	829.33	566.53	829.29	568.55	829.34
571.23	829.29	574.41	829.27	576.46	829.31	578.84	829.39	584.31	829.54
584.64	829.54	584.91	829.55	587.97	829.74	590.68	829.91	591.37	829.87
592.54	829.79	593.47	829.69	596.92	829.33	599.98	829	602.47	828.88
603.39	828.96	604.17	828.86	608.15	828.73	608.35	828.72	608.4	828.72
610.18	828.69	615.74	828.63	616.19	828.62	620.16	828.69	620.39	828.68
620.52	828.68	622.02	828.75	624.51	828.82	628.08	828.83	628.12	828.83
632.22	828.75	634.09	828.52	634.15	828.51	638.02	828.62	638.4	828.58
640.03	828.32	644.17	828.23	645.91	828.23	649.41	828.38	650.66	828.38
651.97	828.31	654.12	828.48	656.21	828.63	656.77	828.65	658.05	828.63
660.47	828.68	663.68	828.71	663.98	828.69	664.5	828.66	668.07	828.54
669.53	828.51	669.95	828.51	671.14	828.49	675.83	828.49	677.47	828.58
680.03	828.58	681.21	828.66	681.87	828.67	686.62	828.72	687.97	828.73
688.9	828.76	693.96	828.81	697.01	828.84	698.13	828.87	698.85	828.78
699.96	828.62	703.26	828.77	704.59	828.76	705.98	828.64	708.57	828.73
710.12	828.77	711.03	828.73	712	828.7	714.56	828.65	718.07	828.62
720.83	828.61	723.09	828.71	724.15	828.73	726.94	828.8	728.28	828.77
728.69	828.79	730.13	828.66	731.78	828.59	736.2	828.51	740.35	828.51
742.2	828.34	744.69	828.36	747.31	828.5	748.2	828.52	752.15	828.43
752.54	828.42	754.22	828.43	754.33	828.44	754.64	828.44	758.56	828.56
759.79	828.54	760.43	828.53	761.5	828.52	764.57	828.45	765.29	828.43
766.53	828.37	768.86	828.4	772	828.4	772.66	828.42	775.62	828.38
776.97	828.36	778.19	828.33	778.84	828.31	779.23	828.31	779.88	828.34

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  784.96  828.41  786.94  828.41   789.1  828.35  790.77  828.37  791.01  828.37
  791.92  828.38   796.5  828.43  797.02  828.43  798.94  828.45  803.18   828.5
  805.92  828.56  809.34  828.65  813.32  828.74  814.95  828.77   815.3  828.78
  818.53  828.87   819.4  828.87  821.16  828.73  823.93  828.82  825.42  828.88
  826.05  828.85  827.27  828.93   830.2  829.07  831.44  829.08  832.35  829.05
  833.28  828.96  835.98  828.84  837.36  828.78  838.99  828.78  839.18  828.79
  840.08  828.77  845.06   828.8  848.27  829.12  849.17  829.18  850.17  829.22
  850.96  829.23   852.4  829.29     855  829.37  856.66  829.32  856.79  829.31
  856.87  829.31  860.84  829.57  861.89  829.62   862.6  829.63   863.2  829.64
   866.7  829.75  868.18  829.86  868.46  829.89  869.03  829.96  876.83  830.82
  879.25  831.01  882.65  831.45  885.84  831.57  885.96  831.57  886.17   831.6
  891.58  832.72  891.97  832.75  895.61  832.71  897.18  833.01  897.65  833.05
  901.18  833.05  901.31  833.06  904.82   833.4   906.6  833.66  909.57  833.91
  912.42  834.04  912.93   834.1  916.04  834.39   919.4  834.66  919.75   834.7
  920.57   834.7  923.55  834.88  924.87  834.98  926.38  835.13  929.49  835.43
   933.8  835.46  934.24  835.46

Manning's n Values        num=       9
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013  191.05     .03  410.25     .06  435.21     .03  520.38    .013
  530.75      .1  584.31    .035  850.17      .1  934.24      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        400.71  445.03             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
     526     891  832.46       F
Right Levee     Station=     526      Elevation=     830

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  3

Pier Data
Pier Station     Upstream= 119.208    Downstream=  106.49
Upstream     num=       2
    Width   Elev    Width   Elev
       4     820       4     854
Downstream     num=       2
    Width   Elev    Width   Elev
       4     820       4     854

Pier Data
Pier Station     Upstream= 236.708    Downstream=  223.99
Upstream     num=       2
    Width   Elev    Width   Elev
       4     820       4     848
Downstream     num=       2
    Width   Elev    Width   Elev
       4     820       4     848

Pier Data
Pier Station     Upstream= 354.209    Downstream=  341.49
Upstream     num=       2
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```
    Width   Elev    Width   Elev
       4     820       4     842
Downstream     num=       2
    Width   Elev    Width   Elev
       4     820       4     842

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =       2
       Yarnell                KVal =    1.25
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach              RS: 651.5802

INPUT
Description: 6+52
Station Elevation Data    num=     487
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  837.96    1.96  837.88    2.47   837.9    3.46  837.91    5.36  837.76
    7.39  837.64    7.99  837.58    9.18  837.53   11.78  837.51   12.88  837.49
   14.37  837.33   14.71  837.28   15.53   837.2   18.46  837.07   19.32  836.98
   20.28  837.02    22.4     837   24.05  836.99   25.34  836.69   25.66  836.62
   26.34  836.58   30.89  836.04   31.18  835.97   32.87  835.74   35.19  835.45
    36.5  835.53   36.71  835.51   39.95  835.58   40.66  835.58   41.28   835.6
   42.32  835.55   43.97  835.58   46.14  835.63   47.68  835.68   47.85  835.68
   48.17  835.69   53.26  835.71   53.92  835.71   58.88  835.81   62.55  835.86
   62.72  835.86   62.88  835.85   64.33  835.78   65.46  835.73   68.17  835.68
   69.83  835.72   69.94  835.73   70.24  835.71   73.61  835.54   74.63  835.46
   75.46  835.36   76.77  835.39   79.17  835.39   80.06  835.48   80.89  835.51
   83.15  835.52   85.16  835.47   86.36  835.52   87.42  835.55   91.15  835.43
   91.84  835.45   94.65  835.38   95.76  835.45   96.12  835.44   97.94  835.43
  102.43  835.36   102.9  835.38  103.43  835.37  106.52   835.3  108.43   835.3
  109.61  835.29  112.95  835.37  113.77  835.31  114.84  835.32  117.82  835.25
  118.25  835.18  119.63  835.22  121.52  835.18  123.32  835.15   124.2  835.19
  126.81  835.23  128.97   835.2  130.33  835.08  130.76  835.06   134.1  834.97
  134.58  834.94  134.82  834.94  136.31  834.85  139.48  834.78  140.34  834.79
  140.83  834.75  142.06  834.77  144.71  834.75  145.87  834.75  146.59   834.7
  147.65  834.72  149.39  834.64  151.51  834.57  152.23  834.48  153.19  834.38
  156.64  834.73  157.09  834.77  157.79  834.76  158.81  834.77  159.51  834.87
  164.44  835.06  166.79   835.1  168.89  834.88  170.03   834.7  170.74  834.65
  171.38  834.63  175.99  834.58  177.45  834.63  179.72  834.75  181.44  834.74
  181.61  834.74  182.56  834.75   185.3  834.76  186.21  834.73  187.18  834.69
  188.63  834.72  191.05  834.76  192.25  834.76  192.78  834.74  196.11  834.46
  196.87  834.44  202.06  834.04  202.74  833.88  204.07  833.57  205.77  833.18
  207.94  832.15   212.3  831.14  213.49   831.1  214.81  830.66  217.27  829.97
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219.65	829.27	220.96	829.18	224.95	828.67	226.73	828.54	232	828.69
232.18	828.73	235.83	828.81	236.35	828.81	237.87	828.74	239.1	828.72
242.82	828.77	243.48	828.75	246.98	828.74	247.35	828.74	248.89	828.73
249.04	828.74	254.47	828.34	257.06	828.37	259.18	828.23	265.14	828.52
265.42	828.53	265.95	828.53	270.85	828.45	272.32	828.49	276.52	828.46
277.47	828.45	282.21	828.36	282.35	828.36	286.25	828.16	286.43	828.15
289	828.18	292.51	828.45	296.15	828.84	297.56	828.82	297.93	828.87
301.25	828.65	303.17	828.46	305.22	828.48	314.23	828.42	315.96	828.45
316.02	828.45	316.25	828.43	319.78	828.12	321.19	828.07	321.58	828.07
321.86	828.08	326.54	828.13	329.33	828.02	332.6	827.99	335.55	828.2
336.66	828.3	337.04	828.27	338.52	828.24	340.98	828.08	346.63	827.91
348.27	827.85	349.54	827.92	351.43	827.89	351.82	827.89	353.51	827.93
354.14	827.93	355.1	827.84	358.59	827.79	359.28	827.77	360.77	827.72
360.83	827.72	364.75	827.78	364.86	827.79	366.39	827.82	369.89	828.28
370.42	828.3	370.76	828.35	372.08	828.47	374.6	828.43	376.04	828.48
377.41	828.55	377.67	828.57	380.99	828.94	382.07	829.04	386.46	829.4
387.32	829.42	388.04	829.44	390.01	829.49	393.2	829.63	394.67	829.39
394.95	829.33	396.11	829.17	399.66	828.63	400.71	828.4	402.89	827.71
404.56	827.18	404.6	827.16	406.27	826.47	408.73	825.73	410.25	825.28
411.51	823.71	434.17	823.44	435.21	825.38	436.49	826.02	436.99	826.23
439.23	827.08	442.92	827.79	445.03	828	445.64	827.93	446.81	827.7
449.71	827.62	450.88	827.61	451.84	827.6	452.6	827.62	456.27	827.64
456.91	827.74	462.58	828.54	462.72	828.54	470.07	828.6	474.05	828.53
474.08	828.53	474.26	828.54	475.29	828.61	478	828.78	479.78	828.88
480.13	828.9	481.48	829.12	486.85	829.35	487.34	829.38	487.66	829.32
491.27	828.68	492.51	828.52	493.92	828.54	496.92	828.95	503.74	829.97
508.14	830.7	508.81	830.67	509.25	830.79	510.62	831.06	513.42	831.56
514.5	831.72	514.89	831.73	516.38	831.75	517.88	831.89	520.38	832
521.78	832.22	522.16	832.27	522.79	832.28	526.29	832.46	527.76	832.34
527.89	832.33	530.75	832.37	532.06	832.39	532.28	832.37	533.85	832.24
537.35	831.4	537.75	831.28	539.31	830.77	539.63	830.65	539.75	830.63
543.58	829.76	548.77	829.68	549.57	829.63	550.39	829.6	555.43	829.49
556.24	829.37	559.28	829.35	561.88	829.33	566.53	829.29	568.55	829.34
571.23	829.29	574.41	829.27	576.46	829.31	578.84	829.39	584.31	829.54
584.64	829.54	584.91	829.55	587.97	829.74	590.68	829.91	591.37	829.87
592.54	829.79	593.47	829.69	596.92	829.33	599.98	829	602.47	828.88
603.39	828.96	604.17	828.86	608.15	828.73	608.35	828.72	608.4	828.72
610.18	828.69	615.74	828.63	616.19	828.62	620.16	828.69	620.39	828.68
620.52	828.68	622.02	828.75	624.51	828.82	628.08	828.83	628.12	828.83
632.22	828.75	634.09	828.52	634.15	828.51	638.02	828.62	638.4	828.58
640.03	828.32	644.17	828.23	645.91	828.23	649.41	828.38	650.66	828.38
651.97	828.31	654.12	828.48	656.21	828.63	656.77	828.65	658.05	828.63
660.47	828.68	663.68	828.71	663.98	828.69	664.5	828.66	668.07	828.54
669.53	828.51	669.95	828.51	671.14	828.49	675.83	828.49	677.47	828.58
680.03	828.58	681.21	828.66	681.87	828.67	686.62	828.72	687.97	828.73
688.9	828.76	693.96	828.81	697.01	828.84	698.13	828.87	698.85	828.78
699.96	828.62	703.26	828.77	704.59	828.76	705.98	828.64	708.57	828.73
710.12	828.77	711.03	828.73	712	828.7	714.56	828.65	718.07	828.62
720.83	828.61	723.09	828.71	724.15	828.73	726.94	828.8	728.28	828.77
728.69	828.79	730.13	828.66	731.78	828.59	736.2	828.51	740.35	828.51
742.2	828.34	744.69	828.36	747.31	828.5	748.2	828.52	752.15	828.43
752.54	828.42	754.22	828.43	754.33	828.44	754.64	828.44	758.56	828.56
759.79	828.54	760.43	828.53	761.5	828.52	764.57	828.45	765.29	828.43
766.53	828.37	768.86	828.4	772	828.4	772.66	828.42	775.62	828.38
776.97	828.36	778.19	828.33	778.84	828.31	779.23	828.31	779.88	828.34
784.96	828.41	786.94	828.41	789.1	828.35	790.77	828.37	791.01	828.37
791.92	828.38	796.5	828.43	797.02	828.43	798.94	828.45	803.18	828.5
805.92	828.56	809.34	828.65	813.32	828.74	814.95	828.77	815.3	828.78
818.53	828.87	819.4	828.87	821.16	828.73	823.93	828.82	825.42	828.88
826.05	828.85	827.27	828.93	830.2	829.07	831.44	829.08	832.35	829.05

833.28	828.96	835.98	828.84	837.36	828.78	838.99	828.78	839.18	828.79
840.08	828.77	845.06	828.8	848.27	829.12	849.17	829.18	850.17	829.22
850.96	829.23	852.4	829.29	855	829.37	856.66	829.32	856.79	829.31
856.87	829.31	860.84	829.57	861.89	829.62	862.6	829.63	863.2	829.64
866.7	829.75	868.18	829.86	868.46	829.89	869.03	829.96	876.83	830.82
879.25	831.01	882.65	831.45	885.84	831.57	885.96	831.57	886.17	831.6
891.58	832.72	891.97	832.75	895.61	832.71	897.18	833.01	897.65	833.05
901.18	833.05	901.31	833.06	904.82	833.4	906.6	833.66	909.57	833.91
912.42	834.04	912.93	834.1	916.04	834.39	919.4	834.66	919.75	834.7
920.57	834.7	923.55	834.88	924.87	834.98	926.38	835.13	929.49	835.43
933.8	835.46	934.24	835.46						

Manning's n Values num= 9

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.013	191.05	.03	410.25	.06	435.21	.03	520.38	.013
530.75	.1	584.31	.035	850.17	.1	934.24	.1		

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

400.71	445.03	111.44	106.45	103.86	.3	.5

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
526	891	832.46	F

Right Levee Station= 526 Elevation= 830

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 545.1257

INPUT
Description: FIS D-D
Station Elevation Data num= 491

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	835.78	.3	835.78	5.33	835.8	6.09	835.82	9.68	836.03
11.23	835.92	11.42	835.92	15.34	835.98	16.58	835.97	16.84	835.99
17.43	835.98	23.72	835.97	26.24	835.87	27.16	835.83	29.76	835.72
31.87	835.51	32.39	835.39	33.55	835.25	35.21	834.95	44.67	834.27
52.73	833.03	58.36	833.52	64.24	833.57	66.35	833.49	67.14	833.47
68.68	833.39	71.23	833.13	72.73	833.15	72.92	833.13	73.92	833.07
76.84	832.84	77.68	832.78	78.67	832.73	80.05	832.69	82.46	832.58
84	832.52	84.25	832.5	84.62	832.52	88.02	832.47	88.17	832.45
95.4	832.16	95.42	832.16	98.91	832.25	100.56	832.33	105.52	832.65
110	832.22	110.71	832.15	110.74	832.14	110.8	832.14	122.04	831.57
122.79	831.55	123.28	831.41	124.78	831.32	127.77	831	128.53	830.86
129.2	830.74	132.7	830.04	133.21	829.97	133.53	829.92	134.47	829.78
138.42	829.18	138.79	829.19	144.74	829.26	148.31	829.04	151.37	828.89
157.09	828.73	157.74	828.83	162.72	829.36	167.47	828.69	175.72	829.06
183.28	829.09	185.13	829	189.83	829.12	193.49	829.18	198.71	828.8
200.86	828.63	204.93	828.77	208.82	828.42	210.45	828.19	214.95	827.75
218.14	827.88	218.7	827.89	220.06	827.95	223.94	828.08	224.48	828.07
227.99	828.36	228.82	828.45	234.55	828.18	237.68	827.88	239.21	827.94
239.69	828	241.96	828.1	244.68	828.32	246.12	828.5	246.49	828.5
247.28	828.56	253.43	828.5	258.72	828.59	262.73	828.49	263.26	828.49
267.22	828.35	267.29	828.35	267.37	828.34	268.85	828.15	269.36	828.16
272.75	828.21	273.03	828.21	274.51	828.12	276.73	828.11	278.54	828.13
279.85	828.08	280.08	828.06	282.61	828.02	285.29	827.9	285.8	827.92
286.89	828.01	289.89	828.15	290.52	828.21	291.54	828.18	294.26	828.11
295.65	828.14	296.48	828.01	297.32	827.94	300.96	828.18	301.42	828.18
301.87	828.2	302.77	828.18	305.32	828.49	308.77	827.99	310.39	827.76
318.56	825.89	324.18	824.59	324.7	824.44	326.02	824.45	334.93	823.88

336.33	823.67	337.71	823.47	339.02	823.31	345.49	823.43	348.58	824.29
353.25	827.19	353.34	827.24	354.98	827.33	358.17	827.3	359.61	827.29
360.79	827.12	364.23	827.64	365.01	827.71	365.26	827.72	366.63	827.78
368.32	827.86	375.82	828.12	376.53	828.11	376.8	828.1	381.99	827.16
382.23	827.13	387.01	827.34	391.63	828.07	394.48	827.59	395.11	827.62
396.76	827.53	399.61	827.78	400.16	827.91	402.33	828.29	402.91	828.39
406.98	828.06	409.73	828.62	412.15	829.15	412.93	829.34	417.82	830.99
418.53	831.25	418.72	831.28	419.33	831.3	422.8	831.38	424.31	831.43
424.5	831.43	430.19	831.74	430.31	831.74	434.5	831.9	436.11	831.94
436.2	831.94	436.49	831.9	440.2	831.37	441.64	831.03	443.59	830.75
445.87	830.14	446.95	830.17	447.74	829.95	448.81	829.8	452.72	829.35
458.11	829.32	460.23	829.32	463.78	828.76	465.92	828.81	470.92	828.88
471.14	828.89	471.18	828.89	471.66	828.86	473.04	828.79	475.75	828.66
479.08	828.79	484.11	828.9	487.44	828.98	488.48	828.98	488.79	828.99
489.83	828.97	493.13	828.79	498.75	828.5	499	828.49	499.17	828.49
501.22	828.38	503.42	828.41	504.94	828.49	506.22	828.37	506.55	828.33
507.98	828.39	511.66	828.54	512.57	828.56	518.33	828.28	518.59	828.12
519.93	828.13	526.38	828.17	528.79	828.12	528.92	828.12	531.91	827.95
535.98	827.99	536.56	828.01	540.73	828.02	541.65	828.01	547.38	827.93
548.34	827.91	550.74	828.17	553.62	828.32	554.41	828.28	557.56	828.38
558.74	828.44	559.29	828.44	560.49	828.34	564.35	828.18	566.41	828.13
571.37	828.23	572.39	828.27	573.52	828.31	576.7	828.38	578.24	828.39
578.3	828.38	584.24	828.43	584.46	828.43	588.59	828.68	589.35	828.74
590.44	828.78	596.43	828.56	599.62	828.61	600.69	828.63	600.82	828.61
604.97	828.38	606.8	828.48	607.47	828.52	612.71	828.66	614.51	828.63
614.73	828.63	618.81	828.75	620.42	828.75	620.58	828.76	622.2	828.74
628.75	828.6	632.45	828.59	632.65	828.59	633.09	828.61	639.08	828.63
642.94	828.75	644.6	828.62	644.75	828.62	648.95	828.87	649.09	828.87
651.83	828.82	662.2	828.97	663	829.1	667.26	829.13	668.88	829.18
669.13	829.19	675.27	829.36	676.71	829.34	680.06	829.39	686.58	829.56
687.6	829.61	688.31	829.65	692.93	829.95	697.65	830.11	698.58	830.15
701.27	830.26	705.32	830.43	705.85	830.48	707.32	830.49	710.31	830.5
711.66	830.5	712.03	830.58	712.24	830.57	717.33	831.1	724.29	831.17
729.99	831.08	734.83	831.36	736.49	831.37	740.2	831.84	740.78	831.91
743.21	832.02	748.44	832.32	751.44	832.29	752.02	832.34	757.35	832.09
759.43	832.36	764.66	832.82	772.42	833.15	775.43	833.35	776.38	833.45
777.1	833.47	778.24	833.53	783.03	833.93	784.04	834.07	787.36	834.16
792.35	834.41	792.72	834.42	792.89	834.45	801.15	834.69	802.11	834.77
805.31	834.81	805.73	834.78	809.51	835	809.78	835.01	810.04	835.02
817.06	835.22	817.87	835.24	822.59	835.35	826.47	835.44	826.92	835.44
828.04	835.42	832.07	835.56	832.08	835.56	834.27	835.66	839.13	835.64
839.38	835.64	843.55	835.79	844.77	835.83	847.03	835.74	853.74	835.91
853.92	835.9	853.95	835.9	855.39	835.67	860.68	835.31	866.27	835.01
867.12	834.97	869.86	835.12	871.07	835.04	871.56	835.06	872.48	835.14
877.16	835.54	880.76	835.76	887.24	836.15	891	836.66	891.65	836.73
892.93	836.73	894.11	836.71	899.88	837.22	903.02	837.06	904.63	837.33
908.16	838.3	911.11	839.19	914.63	839.76	917.57	840.34	918.74	840.56
920.77	840.98	923.76	841.61	924.61	841.87	927.25	842.43	928.57	842.55
929.34	842.63	930.93	842.89	935.09	843.84	935.25	843.87	935.64	843.97
943.39	845.24	944.76	845.46	947.38	846.14	950.58	846.96	952.6	847.33
954.93	847.48	958.98	848.08	960.27	848.35	961.27	848.76	964.68	849.51
968.21	850.33	971.36	850.93	972.27	851.14	976.07	852.19	979.1	853.34
981.36	854.03	987.45	855.56	988.13	855.71	988.54	855.77	997.19	855.93
1001.29	856.29	1003.73	856.55	1005.44	856.71	1010.65	857.34	1012.64	857.73
1012.95	857.73	1015.91	857.95	1018.25	858.24	1018.81	858.28	1019.34	858.34
1021.43	858.49	1028.17	859.26	1033.42	860.18	1033.5	860.19	1033.63	860.19
1039.29	860.12	1040.84	860.27	1043.84	860.34	1044.53	860.39	1047.23	860.9
1049.42	861.29	1056.54	862.07	1059.7	862.22	1062.34	862.48	1064.34	862.6
1065.08	862.64	1065.78	862.71	1067.83	862.81	1072.41	863.36	1073.17	863.5
1078.67	864.41	1086.37	864.91	1088.04	865.27	1096.42	866.65	1098.47	867.02

1101.79	867.97	1105.76	868.51	1111.15	868.65	1111.41	868.66	1111.74	868.66
1111.77	868.67	1117.24	869.26	1119.57	869.64	1125.88	869.82	1128.02	869.96
1134.92	870.86	1138.91	870.94	1140.89	870.57	1142.19	870.68	1142.53	870.73
1150.67	871.72	1152.27	871.87	1155.83	872.07	1156.94	872.17	1158	872.17
1165.26	872.37	1166.27	872.47	1167.48	872.44	1170.87	872.42	1180.28	873.33
1180.6	873.38	1180.65	873.38	1181.05	873.44	1182.27	873.73	1186.23	874.08
1187.59	874.22	1192.03	874.6	1194.54	874.7	1200.28	874.8	1201.12	874.79
1204.43	874.65	1205.34	874.63	1207.24	874.67	1209.01	874.68	1211.51	874.91
1214.4	874.96	1216.03	875	1216.92	875.32	1219.67	875.27	1221.93	875.15
1225.51	874.39	1228.48	874.15	1229.55	874.13	1230.46	874.05	1230.71	874.02
1236.29	874.02	1237.86	874.28	1240.34	874.22	1240.6	874.1	1243.11	874.25
1244.72	874.37								

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	68.68	.1	310.39	.07	324.7	.06	348.58	.07
353.34	.1	424.5	.013	436.49	.1	489.83	.035	688.31	.1
792.35	.013	860.68	.1	1244.72	.1				

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
310.39	353.25	46.6	52.81	53.82	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
436.11	1244.72	831.94	F

Right Levee Station= 436.11 Elevation= 829.9

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
34	68	855	165	214	850

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 492.3110

INPUT
Description: 4+92
Station Elevation Data num= 409

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	832.23	.86	832.23	4.82	831.86	5.64	831.85	7.34	831.45
10.5	831.05	11.25	830.79	21.31	830.59	25.08	830.39	26.64	829.95
27.92	829.6	28.69	829.55	30.56	829.28	33.79	828.88	34.87	828.71
39.47	828.29	40.33	828.27	43.46	828.13	44.04	828.06	45.16	827.95
47.72	827.74	49.6	827.66	50.77	827.64	52.71	827.65	54.66	827.68
55.14	827.68	56.2	827.61	57.75	827.64	60.34	827.55	61.63	827.43
61.79	827.44	62.04	827.45	65.8	827.69	66.39	827.68	67.42	827.78
68.71	827.82	72.84	827.59	73.02	827.59	75.42	827.64	76.85	827.69
76.96	827.71	78.62	827.97	81.47	828.13	83.65	827.9	84.33	827.89
89.61	828.2	90.35	828.14	93.81	827.88	94.78	827.93	96.05	827.97
99.59	828.08	101.03	828.09	101.28	828.09	105.73	827.99	108.62	828.08
110.67	828.13	111.95	828.15	112.14	828.16	112.5	828.17	116.3	828.28
117	828.26	117.89	828.24	121.71	828.21	121.78	828.2	121.87	828.21
127.33	828.13	130.58	828	132.97	827.95	137.08	827.94	138.66	827.88
138.97	827.87	142.6	827.79	144.39	827.73	145.97	827.68	151.47	827.68
153.49	827.79	156.04	827.83	157.01	827.86	160.15	827.81	161.45	827.8
162.59	827.94	166.73	827.83	166.9	827.84	167.14	827.85	168.31	827.91
168.77	827.91	172.41	827.89	172.55	827.89	173.93	827.92	177.75	827.77
178.06	827.76	178.35	827.76	180.3	827.78	182.21	827.82	184.27	827.86
184.94	827.83	185.2	827.84	185.83	827.85	189.45	828.06	190.72	828.01
190.94	828	191.42	827.99	195.94	827.86	196.69	827.78	200.26	827.85
200.85	827.86	201.03	827.85	202.5	827.84	204.99	827.85	206.64	827.88

208.21	828	208.3	828.01	209.08	827.98	212.34	827.9	212.87	827.93
216.96	827.76	219.79	827.68	220.67	827.7	224.79	827.93	225.64	827.95
228.26	828.16	229.6	828.26	230.05	828.32	231.25	828.5	233.51	827.74
234.86	827.26	240.35	825.29	243.27	824.77	245.18	824.46	251.67	824.85
262.92	825.54	266.58	825.79	271.07	825.42	272.1	825.5	272.66	825.63
276.05	826.66	278.3	826.88	280.01	827.07	282.61	827.31	283.55	827.24
285.71	827.26	287.43	827.33	289.66	827.54	291.02	827.38	301.28	826.6
302.66	826.61	305.65	826.67	306.13	826.74	311.52	827.37	311.72	827.39
313	827.48	315.59	828.38	317.26	828.75	317.69	828.9	320.04	829.72
321.11	830.07	322.97	830.68	324.55	831.14	326.48	831.34	328.86	831.54
329.43	831.55	330.51	831.58	334.59	831.75	334.79	831.75	336.26	831.69
336.62	831.71	340.54	831.83	342.03	831.83	342.2	831.82	342.61	831.79
346.24	831.46	347.49	831.31	348	831.26	350.26	830.73	352.07	830.36
352.83	830.04	353.73	829.9	357.07	829.73	358.03	829.69	359.25	829.52
359.54	829.51	359.97	829.49	364.46	829.22	365.52	829.06	367.85	828.73
370.21	828.26	371.28	827.76	376.33	828.19	381.34	828.62	382.17	828.55
383.02	828.52	384.58	828.56	387.26	828.61	388.52	828.6	388.97	828.58
393.22	828.6	393.28	828.59	393.53	828.58	394.74	828.55	396.18	828.48
399.09	828.36	399.72	828.29	400.66	828.23	401.34	828.24	404.97	828.33
405.72	828.25	406.61	828.19	407.72	828.23	410.89	828.37	411.62	828.4
412.48	828.32	416.05	828.4	416.78	828.39	416.98	828.38	418.48	828.3
422.37	828.45	422.84	828.48	423.8	828.47	424.42	828.48	424.81	828.49
428.85	828.6	428.87	828.6	430.36	828.63	432.34	828.81	434.76	829.01
436.24	828.96	436.82	828.97	440.68	829.14	440.69	829.14	442.49	829.26
446.36	829.27	447.14	829.21	448.37	829.11	450.67	829.15	452.82	829.21
454.19	829.19	454.28	829.18	454.5	829.17	458.81	829.19	460.29	829.21
460.49	829.21	464.67	829.05	466.33	829.21	466.39	829.22	466.9	829.24
470.66	829.36	471.18	829.42	472.33	829.4	474.44	829.45	476.54	829.46
477.38	829.47	478.29	829.48	481.98	829.72	482.63	829.73	483	829.74
484.21	829.8	488.16	830.03	488.58	829.97	488.86	829.97	495.12	829.72
496.33	829.8	499.15	829.71	503.22	829.45	509.26	829.99	512.71	830.01
514.11	830.17	515.58	830.25	518.53	830.57	520.24	830.66	521.47	830.84
524.73	830.89	528.83	831.14	530.87	831.17	531.83	831.26	532.56	831.26
535.75	830.57	538.24	830.06	538.5	830	542.34	829.52	542.84	829.51
544.58	829.56	544.6	829.56	548.83	830.01	550.5	829.83	550.6	829.85
550.7	829.85	554.88	830.35	554.95	830.33	556.6	830.43	558.02	830.61
561.08	830.88	561.88	830.95	562.76	831.07	564.95	831.19	567.11	831.24
570.73	831.39	573.15	831.55	574.44	831.65	574.99	831.71	578.99	831.96
579.48	831.99	581.12	832.02	581.14	832.02	585.56	832.08	586.92	832.21
587.32	832.24	591.22	832.31	591.61	832.32	593.44	832.32	596.83	832.47
597.71	832.5	599.41	832.64	599.83	832.65	603.93	832.73	605.45	832.81
605.53	832.81	606.21	832.82	609.87	832.83	610.26	832.83	611.68	832.82
615.76	832.9	615.94	832.9	616.08	832.89	617.85	832.84	620.27	832.92
621.94	833.02	622.38	833	623.8	833.02	627.65	833.03	627.87	833.04
627.98	833.02	629.69	832.87	632.22	832.99	634.06	833.03	634.83	833.1
637.34	833.12	640.09	833.19	641.02	833.14	641.81	833.06	644.57	833.15
646.01	833.13	647.7	833.07	647.72	833.07	647.74	833.06	653.58	832.84
657.63	832.95	657.8	832.95	657.93	832.92	659.49	832.48	662.47	832.51
663.64	832.45	664.36	832.41	665.31	832.26	666.17	832.21	669.46	831.85
670.82	831.51	673.73	831.32	675.31	831.29	675.97	831.08	676.94	830.88
677.47	830.83	681.12	831.13	681.57	831.06	682.76	830.93	685.18	830.89
688.05	830.49	688.67	830.36	691.08	830.27	692.69	830.28	694.31	830.28
697.09	830.26	700	829.94	702.54	829.88	704.71	829.77	705.77	829.77
707.3	829.7	709.7	829.61	711.17	829.51	711.52	829.51	716.34	829.8
721.11	829.49	732.03	829.8	732.05	829.8	733.59	829.66	735.22	829.74
737.64	829.73	738.81	829.7	739.07	829.72	741.84	829.77	743.22	829.8
744.73	829.8	749.7	829.72	750.16	829.7	750.3	829.71	750.68	829.75
754.01	830.06	754.75	829.99	755.46	829.97	759.75	830.13	760.78	830.2
760.92	830.23	761.15	830.22	766.15	830.34	768.74	831.17	769.54	831.14
773.1	831.25	776.36	831.56	778.07	831.63	782.82	831.79		

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	202.5	.1	234.86	.07	240.35	.06	272.66	.07
282.61	.1	330.51	.013	346.24	.1	388.97	.035	524.73	.1
578.99	.013	657.93	.1	782.82	.1				

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
234.86	282.61	95.23	97.56	102.88	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
340	580	831.8	F
640	782.82	833.2	F

Right Levee Station= 340.54 Elevation= 829.9

BRIDGE

RIVER: Oldtown Creek
REACH: Reach RS: 431

INPUT
Description:
Distance from Upstream XS = 61
Deck/Roadway Width = 24.3
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 6

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
231	828.5	820	243.4	830.2	820	243.5	830.2	828.2
285	830.2	828.2	285.1	830.2	820	330	831.5	820

Upstream Bridge Cross Section Data
Station Elevation Data num= 409

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	832.23	.86	832.23	4.82	831.86	5.64	831.85	7.34	831.45
10.5	831.05	11.25	830.79	21.31	830.59	25.08	830.39	26.64	829.95
27.92	829.6	28.69	829.55	30.56	829.28	33.79	828.88	34.87	828.71
39.47	828.29	40.33	828.27	43.46	828.13	44.04	828.06	45.16	827.95
47.72	827.74	49.6	827.66	50.77	827.64	52.71	827.65	54.66	827.68
55.14	827.68	56.2	827.61	57.75	827.64	60.34	827.55	61.63	827.43
61.79	827.44	62.04	827.45	65.8	827.69	66.39	827.68	67.42	827.78
68.71	827.82	72.84	827.59	73.02	827.59	75.42	827.64	76.85	827.69
76.96	827.71	78.62	827.97	81.47	828.13	83.65	827.9	84.33	827.89
89.61	828.2	90.35	828.14	93.81	827.88	94.78	827.93	96.05	827.97
99.59	828.08	101.03	828.09	101.28	828.09	105.73	827.99	108.62	828.08
110.67	828.13	111.95	828.15	112.14	828.16	112.5	828.17	116.3	828.28
117	828.26	117.89	828.24	121.71	828.21	121.78	828.2	121.87	828.21
127.33	828.13	130.58	828	132.97	827.95	137.08	827.94	138.66	827.88
138.97	827.87	142.6	827.79	144.39	827.73	145.97	827.68	151.47	827.68
153.49	827.79	156.04	827.83	157.01	827.86	160.15	827.81	161.45	827.8
162.59	827.94	166.73	827.83	166.9	827.84	167.14	827.85	168.31	827.91
168.77	827.91	172.41	827.89	172.55	827.89	173.93	827.92	177.75	827.77
178.06	827.76	178.35	827.76	180.3	827.78	182.21	827.82	184.27	827.86
184.94	827.83	185.2	827.84	185.83	827.85	189.45	828.06	190.72	828.01
190.94	828	191.42	827.99	195.94	827.86	196.69	827.78	200.26	827.85
200.85	827.86	201.03	827.85	202.5	827.84	204.99	827.85	206.64	827.88
208.21	828	208.3	828.01	209.08	827.98	212.34	827.9	212.87	827.93
216.96	827.76	219.79	827.68	220.67	827.7	224.79	827.93	225.64	827.95
228.26	828.16	229.6	828.26	230.05	828.32	231.25	828.5	233.51	827.74
234.86	827.26	240.35	825.29	243.27	824.77	245.18	824.46	251.67	824.85

262.92	825.54	266.58	825.79	271.07	825.42	272.1	825.5	272.66	825.63
276.05	826.66	278.3	826.88	280.01	827.07	282.61	827.31	283.55	827.24
285.71	827.26	287.43	827.33	289.66	827.54	291.02	827.38	301.28	826.6
302.66	826.61	305.65	826.67	306.13	826.74	311.52	827.37	311.72	827.39
313	827.48	315.59	828.38	317.26	828.75	317.69	828.9	320.04	829.72
321.11	830.07	322.97	830.68	324.55	831.14	326.48	831.34	328.86	831.54
329.43	831.55	330.51	831.58	334.59	831.75	334.79	831.75	336.26	831.69
336.62	831.71	340.54	831.83	342.03	831.83	342.2	831.82	342.61	831.79
346.24	831.46	347.49	831.31	348	831.26	350.26	830.73	352.07	830.36
352.83	830.04	353.73	829.9	357.07	829.73	358.03	829.69	359.25	829.52
359.54	829.51	359.97	829.49	364.46	829.22	365.52	829.06	367.85	828.73
370.21	828.26	371.28	827.76	376.33	828.19	381.34	828.62	382.17	828.55
383.02	828.52	384.58	828.56	387.26	828.61	388.52	828.6	388.97	828.58
393.22	828.6	393.28	828.59	393.53	828.58	394.74	828.55	396.18	828.48
399.09	828.36	399.72	828.29	400.66	828.23	401.34	828.24	404.97	828.33
405.72	828.25	406.61	828.19	407.72	828.23	410.89	828.37	411.62	828.4
412.48	828.32	416.05	828.4	416.78	828.39	416.98	828.38	418.48	828.3
422.37	828.45	422.84	828.48	423.8	828.47	424.42	828.48	424.81	828.49
428.85	828.6	428.87	828.6	430.36	828.63	432.34	828.81	434.76	829.01
436.24	828.96	436.82	828.97	440.68	829.14	440.69	829.14	442.49	829.26
446.36	829.27	447.14	829.21	448.37	829.11	450.67	829.15	452.82	829.21
454.19	829.19	454.28	829.18	454.5	829.17	458.81	829.19	460.29	829.21
460.49	829.21	464.67	829.05	466.33	829.21	466.39	829.22	466.9	829.24
470.66	829.36	471.18	829.42	472.33	829.4	474.44	829.45	476.54	829.46
477.38	829.47	478.29	829.48	481.98	829.72	482.63	829.73	483	829.74
484.21	829.8	488.16	830.03	488.58	829.97	488.86	829.97	495.12	829.72
496.33	829.8	499.15	829.71	503.22	829.45	509.26	829.99	512.71	830.01
514.11	830.17	515.58	830.25	518.53	830.57	520.24	830.66	521.47	830.84
524.73	830.89	528.83	831.14	530.87	831.17	531.83	831.26	532.56	831.26
535.75	830.57	538.24	830.06	538.5	830	542.34	829.52	542.84	829.51
544.58	829.56	544.6	829.56	548.83	830.01	550.5	829.83	550.6	829.85
550.7	829.85	554.88	830.35	554.95	830.33	556.6	830.43	558.02	830.61
561.08	830.88	561.88	830.95	562.76	831.07	564.95	831.19	567.11	831.24
570.73	831.39	573.15	831.55	574.44	831.65	574.99	831.71	578.99	831.96
579.48	831.99	581.12	832.02	581.14	832.02	585.56	832.08	586.92	832.21
587.32	832.24	591.22	832.31	591.61	832.32	593.44	832.32	596.83	832.47
597.71	832.5	599.41	832.64	599.83	832.65	603.93	832.73	605.45	832.81
605.53	832.81	606.21	832.82	609.87	832.83	610.26	832.83	611.68	832.82
615.76	832.9	615.94	832.9	616.08	832.89	617.85	832.84	620.27	832.92
621.94	833.02	622.38	833	623.8	833.02	627.65	833.03	627.87	833.04
627.98	833.02	629.69	832.87	632.22	832.99	634.06	833.03	634.83	833.1
637.34	833.12	640.09	833.19	641.02	833.14	641.81	833.06	644.57	833.15
646.01	833.13	647.7	833.07	647.72	833.07	647.74	833.06	653.58	832.84
657.63	832.95	657.8	832.95	657.93	832.92	659.49	832.48	662.47	832.51
663.64	832.45	664.36	832.41	665.31	832.26	666.17	832.21	669.46	831.85
670.82	831.51	673.73	831.32	675.31	831.29	675.97	831.08	676.94	830.88
677.47	830.83	681.12	831.13	681.57	831.06	682.76	830.93	685.18	830.89
688.05	830.49	688.67	830.36	691.08	830.27	692.69	830.28	694.31	830.28
697.09	830.26	700	829.94	702.54	829.88	704.71	829.77	705.77	829.77
707.3	829.7	709.7	829.61	711.17	829.51	711.52	829.51	716.34	829.8
721.11	829.49	732.03	829.8	732.05	829.8	733.59	829.66	735.22	829.74
737.64	829.73	738.81	829.7	739.07	829.72	741.84	829.77	743.22	829.8
744.73	829.8	749.7	829.72	750.16	829.7	750.3	829.71	750.68	829.75
754.01	830.06	754.75	829.99	755.46	829.97	759.75	830.13	760.78	830.2
760.92	830.23	761.15	830.22	766.15	830.34	768.74	831.17	769.54	831.14
773.1	831.25	776.36	831.56	778.07	831.63	782.82	831.79		

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	202.5	.1	234.86	.07	240.35	.06	272.66	.07

282.61	.1	330.51	.013	346.24	.1	388.97	.035	524.73	.1		
578.99	.013	657.93	.1	782.82	.1						

Bank Sta: Left Right Coeff Contr. Expan.
234.86 282.61 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
340	580	831.8	F
640	782.82	833.2	F

Right Levee Station= 340.54 Elevation= 829.9

Downstream Deck/Roadway Coordinates
num= 6

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
380	829.21	820	391.9	830.2	820	392	830.2	828.2
433.5	830.2	828.2	433.6	830.2	820	442	830.4	820

Downstream Bridge Cross Section Data
Station Elevation Data num= 487

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	834.02	1.12	833.95	2.93	833.84	3.16	833.82	4.34	833.79
6.93	833.84	8.34	833.87	9.18	833.95	9.92	834.01	11.66	834.29
13.79	834.64	14.93	834.7	15.43	834.7	20.67	835.04	20.84	835.05
21.04	835.05	25.86	834.71	26.31	834.63	27.67	834.57	30.38	834.49
31.64	834.4	31.75	834.39	31.96	834.39	35.84	834.14	37.27	833.87
37.31	833.87	41.91	833.82	42.72	833.7	46.41	833.6	46.73	833.6
46.89	833.57	48.21	833.4	50.02	833.44	53.77	833.67	57.34	833.69
57.79	833.7	59.29	833.58	59.39	833.57	59.76	833.57	64.92	833.54
66.04	833.53	70.45	833.53	71.74	833.54	74.45	833.48	75.32	833.39
75.98	833.36	80.2	833.34	81.73	833.24	85.57	833.19	85.71	833.19
85.95	833.17	88.09	833.07	91.3	833.04	92.61	833.06	92.8	833.07
94.52	833.04	96.85	833.01	97.09	833	98.16	832.96	103.64	832.76
103.97	832.75	105.79	832.76	108.62	832.86	109.75	832.93	111.7	832.82
113.77	832.37	114.98	832.16	115.45	832.05	121.02	831.77	122.81	831.83
124.89	831.89	126.55	831.75	127.57	831.77	131.34	831.74	132.14	831.68
137.33	831.77	137.73	831.76	137.82	831.76	138.01	831.77	141.97	831.74
142.11	831.74	143.43	831.6	144.69	831.49	147.5	831.23	149.14	831.23
153.04	831.02	153.75	830.92	154.66	830.87	158.79	830.81	159.93	830.69
160.24	830.61	164.38	830.28	164.72	830.28	165.84	830.23	166.73	830.24
171.21	830.33	171.52	830.35	172.2	830.38	173.9	830.47	177.18	830.68
182.45	830.49	182.78	830.63	183.79	830.94	191.18	830.98	196.86	830.94
197.65	830.97	197.99	831.01	201.44	830.83	201.57	830.83	206.6	830.72
209.15	830.69	219.33	830.76	223.44	830.46	227.12	830.31	227.78	830.26
231.18	830	232.34	830	232.68	829.98	233.9	830.01	236.76	830.02
237.66	829.99	238.17	829.95	240.5	829.91	242.34	829.89	243.07	829.94
243.74	830.02	244.9	830.03	248.87	830.04	249.45	830.01	252.02	829.97
253.39	829.93	253.73	829.92	254.96	829.91	259.44	829.96	260.5	829.95
261.67	829.97	264.51	829.95	265.79	829.94	266.01	829.93	266.47	829.94
270.18	830	271.5	829.93	271.53	829.93	275.74	829.85	276.03	829.85
277.38	829.92	279.24	829.95	282.4	829.93	282.85	829.92	286.75	829.86
288.01	829.87	288.35	829.87	288.6	829.86	292.5	829.87	293.94	829.81
298.26	829.83	298.89	829.81	299.59	829.78	301.34	829.8	303.74	829.83
304.99	829.78	305.18	829.76	305.73	829.76	310.54	829.69	311.42	829.69
311.5	829.7	315.76	829.97	328.13	830	339.19	830.02	343.23	829.61
343.4	829.6	343.61	829.6	344.94	829.64	347.85	829.55	349.15	829.53
350.35	829.56	350.79	829.57	351.14	829.59	355.01	829.58	356.07	829.63
356.61	829.61	358.23	829.61	360.62	829.57	361.84	829.46	362.41	829.44
363.41	829.39	365.71	829.3	366.38	829.28	368.03	829.19	368.12	829.19
368.35	829.18	372.29	829.15	373.58	829.06	374.02	829.04	375.79	829.06
378.28	829.1	379.04	829	381.34	829.21	382.16	829.2	383.3	829.15

385.08	829.05	385.25	829.06	385.83	829.08	388.77	828.4	390.16	828.08
390.91	827.85	391.71	827.6	393.14	827.08	393.39	826.95	395.97	825.1
397.24	824.59	397.56	824.46	399.55	824.24	401.28	824	401.95	823.91
402.28	823.95	403.3	824.07	406.53	824.04	409.43	824.07	410.3	824.12
413.73	824.18	414.37	824.06	415.14	823.89	417.96	822.8	419.48	822.29
419.66	822.29	420.36	822.26	420.98	822.24	422.37	822.3	425.19	822.39
430.66	822.88	430.96	822.93	431.24	823.03	432.57	823.69	433.57	824.5
435.56	826.68	439.06	828.47	442.61	830.4	443.28	830.68	444.37	830.78
446.54	830.96	448.61	831.05	449.87	831.05	450.28	831.07	452.14	831.14
454.32	831.16	455.53	831.17	455.99	831.15	459.38	831.27	460.44	831.3
465.8	831.83	466.07	831.87	466.19	831.87	467.53	831.75	469.35	831.81
471.88	831.89	473.15	831.88	473.47	831.86	474.25	831.86	477.58	831.88
479	831.72	479.27	831.68	480.72	831.52	483.42	831.24	484.52	831.16
485.02	831.11	485.55	831.06	489.39	830.65	490.15	830.5	492.31	830.17
495.96	829.92	496.82	829.75	501.73	827.73	502.36	827.5	502.55	827.45
505.64	826.92	507.08	826.47	510.03	826.6	512.98	826.73	514.24	826.65
520.14	826.97	520.25	826.97	524.64	826.96	526.64	826.96	530.42	826.99
530.7	826.97	533.13	826.97	537.23	826.85	537.82	826.84	537.87	826.84
538.19	826.82	542.75	826.89	543.73	826.96	547.34	826.8	548.11	826.83
549.5	826.75	550.31	826.75	554.17	826.72	554.54	826.67	555.78	826.53
560.14	826.68	560.28	826.68	561.62	826.64	563.26	826.64	566.08	826.66
567.45	826.7	567.69	826.7	571.98	826.67	572.02	826.67	573.74	826.8
577.56	826.75	578.01	826.75	578.67	826.65	579.61	826.51	582.19	826.66
585.55	826.83	591.39	826.9	591.61	826.9	591.81	826.91	596.03	826.99
597.38	826.86	597.67	826.86	599.52	826.87	606.28	826.87	608.71	826.88
609.57	826.91	613.98	827.05	614.36	827.01	615.5	826.88	616.42	826.87
621.26	826.72	621.52	826.72	623.28	826.78	626.38	826.89	627.61	826.85
629.35	826.86	631.89	826.77	633.6	826.74	633.96	826.73	635.08	826.73
639.62	826.74	641.04	826.74	644.07	826.7	644.95	826.68	645.67	826.65
651.1	826.69	651.69	826.65	652.86	826.71	657.31	826.83	657.76	826.81
658.34	826.81	663.84	826.68	665.1	826.66	669.55	826.59	669.84	826.59
670.41	826.58	674.26	826.71	675.6	826.62	676.38	826.59	681.79	826.4
681.94	826.39	683.49	826.41	686.28	826.46	686.68	826.42	687.92	826.28
689.01	826.24	689.88	826.19	694.07	825.95	696.14	825.94	698.94	826.06
700.18	826.07	701.66	826.06	705.01	825.96	706.31	825.94	711.79	825.91
712.37	825.91	712.44	825.9	712.77	825.92	716.97	826.18	718.2	826.14
721.89	826.11	723.3	826.11	724.77	825.97	728.66	825.93	729.23	825.93
730.84	826	737.36	826	743.02	826.01	747.01	826.02	749.19	826.05
753.37	826.13	754.47	826.06	755.16	826.07	758.78	826.08	760.51	825.97
761.07	825.99	764.98	826.16	767.18	826.16	771.09	826.3	773.2	826.27
774.96	826.32	779.1	826.34	783.36	826.4	783.48	826.41	784.99	826.47
790.93	826.55	792.95	826.62	796.5	826.72	796.77	826.73	800.85	826.83
801.01	826.82	802.55	826.61	802.81	826.61	804.32	826.6	808.44	826.59
809.13	826.59	814.27	826.63	815.82	826.7	820.1	826.66	820.21	826.65
820.58	826.66	825.32	826.78	825.97	826.76	827.97	826.79	829.99	826.86
830.77	826.89	831.58	826.96	836.31	826.91	837.35	826.91	840.06	826.89
841.36	826.95	842.05	826.85	842.9	826.83	845.8	827.01	847.05	827.06
847.77	826.99	848.71	826.92	853.81	827.13	854.23	827.14	854.46	827.14
859.77	827.09	861.12	827.17	864.55	827.24	868.01	827.47	869.59	827.5
870.72	827.52	871.27	827.56	874.94	827.75	876.37	827.64	876.56	827.64
881.97	827.8	884.17	827.93	887.14	828.06	892.28	828.1	892.6	828.03
894.11	828.03	897.39	828.15	897.9	828.18	900.94	828.12	903.51	828.09
904.44	828.23	908.58	828.53	908.8	828.54	909.42	828.56	912.57	828.84
913.62	829.06	914.04	829.14	915.23	829.25	919.09	829.43	919.36	829.42
923.15	830.03	923.45	830.06	924.05	830.1	924.76	830.14	925.08	830.16
930.21	830.98	931.02	831.09	938.26	831.54	938.57	831.56	939.31	831.76
939.56	831.79	941.13	831.87	944.63	832.43	945.89	832.51	949.92	833.94
953.67	835.19	955.91	836.27						

```
Manning's n Values        num=      13
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03   48.21    .013   111.7     .03  232.34    .013  385.25     .07
  401.28     .06  433.57     .07  439.06     .03  466.07    .013  477.58      .1
  533.13    .035  923.15      .1  955.91      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        385.25  439.06             .3       .5
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
  466.07     950  831.87       F
Right Levee     Station=  466.07      Elevation=   829.9
Blocked Obstructions     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
     186     232     850     313     342     845

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =       1
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach              RS: 394.7476

INPUT
Description: 3+95
Station Elevation Data    num=     487
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  834.02    1.12  833.95    2.93  833.84    3.16  833.82    4.34  833.79
    6.93  833.84    8.34  833.87    9.18  833.95    9.92  834.01   11.66  834.29
   13.79  834.64   14.93   834.7   15.43   834.7   20.67  835.04   20.84  835.05
   21.04  835.05   25.86  834.71   26.31  834.63   27.67  834.57   30.38  834.49
   31.64   834.4   31.75  834.39   31.96  834.39   35.84  834.14   37.27  833.87
   37.31  833.87   41.91  833.82   42.72   833.7   46.41   833.6   46.73   833.6
   46.89  833.57   48.21   833.4   50.02  833.44   53.77  833.67   57.34  833.69
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57.79	833.7	59.29	833.58	59.39	833.57	59.76	833.57	64.92	833.54
66.04	833.53	70.45	833.53	71.74	833.54	74.45	833.48	75.32	833.39
75.98	833.36	80.2	833.34	81.73	833.24	85.57	833.19	85.71	833.19
85.95	833.17	88.09	833.07	91.3	833.04	92.61	833.06	92.8	833.07
94.52	833.04	96.85	833.01	97.09	833	98.16	832.96	103.64	832.76
103.97	832.75	105.79	832.76	108.62	832.86	109.75	832.93	111.7	832.82
113.77	832.37	114.98	832.16	115.45	832.05	121.02	831.77	122.81	831.83
124.89	831.89	126.55	831.75	127.57	831.77	131.34	831.74	132.14	831.68
137.33	831.77	137.73	831.76	137.82	831.76	138.01	831.77	141.97	831.74
142.11	831.74	143.43	831.6	144.69	831.49	147.5	831.23	149.14	831.23
153.04	831.02	153.75	830.92	154.66	830.87	158.79	830.81	159.93	830.69
160.24	830.61	164.38	830.28	164.72	830.28	165.84	830.23	166.73	830.24
171.21	830.33	171.52	830.35	172.2	830.38	173.9	830.47	177.18	830.68
182.45	830.49	182.78	830.63	183.79	830.94	191.18	830.98	196.86	830.94
197.65	830.97	197.99	831.01	201.44	830.83	201.57	830.83	206.6	830.72
209.15	830.69	219.33	830.76	223.44	830.46	227.12	830.31	227.78	830.26
231.18	830	232.34	830	232.68	829.98	233.9	830.01	236.76	830.02
237.66	829.99	238.17	829.95	240.5	829.91	242.34	829.89	243.07	829.94
243.74	830.02	244.9	830.03	248.87	830.04	249.45	830.01	252.02	829.97
253.39	829.93	253.73	829.92	254.96	829.91	259.44	829.96	260.5	829.95
261.67	829.97	264.51	829.95	265.79	829.94	266.01	829.93	266.47	829.94
270.18	830	271.5	829.93	271.53	829.93	275.74	829.85	276.03	829.85
277.38	829.92	279.24	829.95	282.4	829.93	282.85	829.92	286.75	829.86
288.01	829.87	288.35	829.87	288.6	829.86	292.5	829.87	293.94	829.81
298.26	829.83	298.89	829.81	299.59	829.78	301.34	829.8	303.74	829.83
304.99	829.78	305.18	829.76	305.73	829.76	310.54	829.69	311.42	829.69
311.5	829.7	315.76	829.97	328.13	830	339.19	830.02	343.23	829.61
343.4	829.6	343.61	829.6	344.94	829.64	347.85	829.55	349.15	829.53
350.35	829.56	350.79	829.57	351.14	829.59	355.01	829.58	356.07	829.63
356.61	829.61	358.23	829.61	360.62	829.57	361.84	829.46	362.41	829.44
363.41	829.39	365.71	829.3	366.38	829.28	368.03	829.19	368.12	829.19
368.35	829.18	372.29	829.15	373.58	829.06	374.02	829.04	375.79	829.06
378.28	829.1	379.04	829	381.34	829.21	382.16	829.2	383.3	829.15
385.08	829.05	385.25	829.06	385.83	829.08	388.77	828.4	390.16	828.08
390.91	827.85	391.71	827.6	393.14	827.08	393.39	826.95	395.97	825.1
397.24	824.59	397.56	824.46	399.55	824.24	401.28	824	401.95	823.91
402.28	823.95	403.3	824.07	406.53	824.04	409.43	824.07	410.3	824.12
413.73	824.18	414.37	824.06	415.14	823.89	417.96	822.8	419.48	822.29
419.66	822.29	420.36	822.26	420.98	822.24	422.37	822.3	425.19	822.39
430.66	822.88	430.96	822.93	431.24	823.03	432.57	823.69	433.57	824.5
435.56	826.68	439.06	828.47	442.61	830.4	443.28	830.68	444.37	830.78
446.54	830.96	448.61	831.05	449.87	831.05	450.28	831.07	452.14	831.14
454.32	831.16	455.53	831.17	455.99	831.15	459.38	831.27	460.44	831.3
465.8	831.83	466.07	831.87	466.19	831.87	467.53	831.75	469.35	831.81
471.88	831.89	473.15	831.88	473.47	831.86	474.25	831.86	477.58	831.88
479	831.72	479.27	831.68	480.72	831.52	483.42	831.24	484.52	831.16
485.02	831.11	485.55	831.06	489.39	830.65	490.15	830.5	492.31	830.17
495.96	829.92	496.82	829.75	501.73	827.73	502.36	827.5	502.55	827.45
505.64	826.92	507.08	826.47	510.03	826.6	512.98	826.73	514.24	826.65
520.14	826.97	520.25	826.97	524.64	826.96	526.64	826.96	530.42	826.99
530.7	826.97	533.13	826.97	537.23	826.85	537.82	826.84	537.87	826.84
538.19	826.82	542.75	826.89	543.73	826.96	547.34	826.8	548.11	826.83
549.5	826.75	550.31	826.75	554.17	826.72	554.54	826.67	555.78	826.53
560.14	826.68	560.28	826.68	561.62	826.64	563.26	826.64	566.08	826.66
567.45	826.7	567.69	826.7	571.98	826.67	572.02	826.67	573.74	826.8
577.56	826.75	578.01	826.75	578.67	826.65	579.61	826.51	582.19	826.66
585.55	826.83	591.39	826.9	591.61	826.9	591.81	826.91	596.03	826.99
597.38	826.86	597.67	826.86	599.52	826.87	606.28	826.87	608.71	826.88
609.57	826.91	613.98	827.05	614.36	827.01	615.5	826.88	616.42	826.87
621.26	826.72	621.52	826.72	623.28	826.78	626.38	826.89	627.61	826.85

629.35	826.86	631.89	826.77	633.6	826.74	633.96	826.73	635.08	826.73
639.62	826.74	641.04	826.74	644.07	826.7	644.95	826.68	645.67	826.65
651.1	826.69	651.69	826.65	652.86	826.71	657.31	826.83	657.76	826.81
658.34	826.81	663.84	826.68	665.1	826.66	669.55	826.59	669.84	826.59
670.41	826.58	674.26	826.71	675.6	826.62	676.38	826.59	681.79	826.4
681.94	826.39	683.49	826.41	686.28	826.46	686.68	826.42	687.92	826.28
689.01	826.24	689.88	826.19	694.07	825.95	696.14	825.94	698.94	826.06
700.18	826.07	701.66	826.06	705.01	825.96	706.31	825.94	711.79	825.91
712.37	825.91	712.44	825.9	712.77	825.92	716.97	826.18	718.2	826.14
721.89	826.11	723.3	826.11	724.77	825.97	728.66	825.93	729.23	825.93
730.84	826	737.36	826	743.02	826.01	747.01	826.02	749.19	826.05
753.37	826.13	754.47	826.06	755.16	826.07	758.78	826.08	760.51	825.97
761.07	825.99	764.98	826.16	767.18	826.16	771.09	826.3	773.2	826.27
774.96	826.32	779.1	826.34	783.36	826.4	783.48	826.41	784.99	826.47
790.93	826.55	792.95	826.62	796.5	826.72	796.77	826.73	800.85	826.83
801.01	826.82	802.55	826.61	802.81	826.61	804.32	826.6	808.44	826.59
809.13	826.59	814.27	826.63	815.82	826.7	820.1	826.66	820.21	826.65
820.58	826.66	825.32	826.78	825.97	826.76	827.97	826.79	829.99	826.86
830.77	826.89	831.58	826.96	836.31	826.91	837.35	826.91	840.06	826.89
841.36	826.95	842.05	826.85	842.9	826.83	845.8	827.01	847.05	827.06
847.77	826.99	848.71	826.92	853.81	827.13	854.23	827.14	854.46	827.14
859.77	827.09	861.12	827.17	864.55	827.24	868.01	827.47	869.59	827.5
870.72	827.52	871.27	827.56	874.94	827.75	876.37	827.64	876.56	827.64
881.97	827.8	884.17	827.93	887.14	828.06	892.28	828.1	892.6	828.03
894.11	828.03	897.39	828.15	897.9	828.18	900.94	828.12	903.51	828.09
904.44	828.23	908.58	828.53	908.8	828.54	909.42	828.56	912.57	828.84
913.62	829.06	914.04	829.14	915.23	829.25	919.09	829.43	919.36	829.42
923.15	830.03	923.45	830.06	924.05	830.1	924.76	830.14	925.08	830.16
930.21	830.98	931.02	831.09	938.26	831.54	938.57	831.56	939.31	831.76
939.56	831.79	941.13	831.87	944.63	832.43	945.89	832.51	949.92	833.94
953.67	835.19	955.91	836.27						

Manning's n Values num= 13

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	48.21	.013	111.7	.03	232.34	.013	385.25	.07
401.28	.06	433.57	.07	439.06	.03	466.07	.013	477.58	.1
533.13	.035	923.15	.1	955.91	.1				

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
385.25	439.06	158.45	152.51 147.17	.3	.5

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
466.07	950	831.87	F

Right Levee Station= 466.07 Elevation= 829.9

Blocked Obstructions num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
186	232	850	313	342	845

CROSS SECTION

RIVER: Oldtown Creek
REACH: Reach RS: 242.2423

INPUT
Description: FIS C-C
Station Elevation Data num= 476

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	833.58	.02	833.58	.65	833.53	2.08	833.64	4.52	833.79
5.87	833.75	6.9	833.68	12.39	833.03	13.72	833.22	14.29	833.25
15.25	833.22	18.34	832.98	23.95	833.19	24.16	833.24	26.05	833.2

34.35	832.99	35.29	833.02	40.93	832.99	45.1	832.72	46.17	832.61
46.41	832.61	50.67	832.5	52.98	832.46	56.2	832.45	56.49	832.45
62.16	832.57	65.18	832.37	67.33	832.48	67.43	832.47	67.63	832.49
72.38	832.32	74.33	832.02	77.74	831.5	79.87	831.45	79.95	831.44
80.08	831.46	84.09	831.65	85.81	831.62	87.33	831.54	91.62	831.03
96.6	830.91	96.72	830.91	96.87	830.89	97.32	830.9	100.9	830.94
107.18	830.59	107.8	830.56	108.1	830.54	113.76	830.33	118.57	830.13
118.86	830.09	119.76	829.98	121.67	829.52	122.18	829.4	126.44	829.16
129.59	828.81	130.66	828.84	135.38	828.67	137.54	828.62	139.62	828.57
140.41	828.44	140.88	828.4	144.63	828.22	145.32	828.18	151.29	828.07
152.06	828.1	156.81	828.11	158.85	827.91	161.79	827.94	167.85	827.92
170.26	827.97	172.04	827.98	172.81	827.95	176.08	827.86	178.27	827.5
178.46	827.48	178.6	827.47	182.98	827.17	185.15	826.74	185.22	826.72
185.26	826.72	188.71	826.75	191.28	826.59	195.47	826.52	196.57	826.56
197.76	826.56	201.59	826.59	202.01	826.6	205.95	826.26	206.04	826.26
212.19	826.27	215.27	826.33	217.47	826.28	218.46	826.31	218.72	826.33
220.33	826.24	223.94	826.13	224.28	826.12	227.78	826.35	228.56	826.36
229.52	826.45	231.85	826.37	234.13	826.33	235.04	826.34	237.15	826.56
241.16	826.54	245.42	826.69	246.3	826.85	246.95	826.76	256.19	826.87
256.93	826.88	257.19	826.86	258.38	826.88	263.12	826.88	263.93	826.81
264.44	826.83	268.09	826.95	269.46	827.01	269.79	827.05	274.11	827.23
275.6	827.09	277.74	827.27	279.72	827.29	285.08	827.29	285.45	827.27
286.1	827.26	287.14	827.4	288.79	827.46	291.21	827.24	291.48	827.24
292.78	827.23	293.57	827.24	297.05	827.23	297.31	827.21	298.51	827.18
299.71	827.21	302.82	827.24	303.87	827.22	304.3	827.19	305.13	827.18
308.68	827.23	310.85	827.32	314.43	827.49	315.83	827.54	316.66	827.53
318.56	827.46	320.29	827.31	321.5	827.33	321.67	827.31	321.83	827.3
322.49	827.25	324.47	827.07	326.06	826.96	331.24	823.77	332.31	823.1
332.89	822.79	333.5	822.64	334.15	822.59	337.38	822.12	338.25	822
341.72	821.85	342.79	821.89	343.6	821.9	345.65	822.11	345.91	822.14
348.25	822.49	353.13	822.81	355.07	823.12	356.92	823.77	358.48	823.92
359.86	824.1	361.18	824.23	361.83	824.24	364.07	825.38	366.79	826.07
369.33	826.36	371.63	826.62	371.94	826.69	373.05	827.16	376.28	828.71
378.56	829.46	379.32	829.55	384.86	829.6	385.1	829.6	385.23	829.61
389.57	829.99	390.13	830.13	391.05	830.38	394.31	830.41	395.27	830.42
395.55	830.41	398.48	830.53	400.29	830.5	401.55	830.23	402.59	830.02
404.48	830	404.82	829.99	408	829.62	408.78	829.54	412.27	828.6
412.91	828.37	413.06	828.31	414.38	827.69	419.74	825.81	419.81	825.78
419.89	825.75	420.3	825.57	423.76	825.36	425.07	825.3	425.79	825.15
425.91	825.13	431.74	826.08	431.83	826.08	431.9	826.09	432	826.09
432.11	826.1	434.71	826.09	437.17	826.04	438.03	826.06	438.25	826.05
441.77	825.64	442.78	825.54	443.56	825.49	446.1	825.45	448.66	825.38
449.49	825.43	454.66	825.58	455.44	825.58	456.79	825.61	461.28	825.59
462.71	825.6	467.28	825.51	467.62	825.51	471.86	825.57	472.34	825.59
473.37	825.54	479.21	825.74	479.46	825.74	484.95	825.67	489.63	825.57
489.73	825.57	491.32	825.87	496	825.81	497.21	825.8	503.15	825.82
505.79	825.88	508.81	826	509.21	825.97	510.75	825.99	513.75	825.96
514.56	826.01	515.27	826.06	519.69	826.16	519.75	826.16	521.2	826.02
525.98	825.91	527.18	825.83	533.11	825.92	534.46	825.91	539.14	825.98
541.48	826.05	542.03	825.96	545	825.62	545.65	825.65	549.98	825.72
551.21	825.74	555.69	825.76	557.24	825.58	561.9	825.56	565.34	825.51
567.75	825.56	568.18	825.5	569.31	825.44	574.41	825.47	575.38	825.42
580.8	825.41	581.47	825.4	582.95	825.39	585.9	825.37	586.44	825.35
587.49	825.38	593.53	825.47	593.69	825.47	599.49	825.57	599.6	825.58
599.77	825.58	602.27	825.62	604.06	825.53	605.21	825.33	605.57	825.28
616.3	825.25	617.41	825.09	617.87	825.02	622.04	825.14	622.34	825.14
622.45	825.12	623.99	824.95	628.7	825.1	630.09	825.09	630.14	825.08
630.53	825.09	634.78	825.06	636.19	824.83	636.34	824.81	636.49	824.82
641.89	824.87	642.47	824.96	648.56	825.03	653.63	825.24	654.6	825.2
655.44	825.25	657.57	825.15	659.15	825.08	659.41	825.1	660.75	825.05

666.91	825.08	671.87	825.05	672.68	825.03	672.88	825.04	673.25	825.05
675.72	825.04	678.69	825.06	678.83	825.06	679.73	825.09	683.38	825.28
684.46	825.24	684.94	825.24	689.84	825.17	690.25	825.16	692.65	825.12
695.56	825.06	695.83	825.05	701.23	825.4	702.25	825.26	702.75	825.23
706.08	825.32	708.71	825.48	708.9	825.48	714.56	825.54	716.74	825.58
718.92	825.58	719.69	825.57	720.39	825.53	726.25	825.55	732.02	825.58
732.1	825.58	737.23	825.66	737.7	825.66	738.05	825.65	742.09	825.56
743.4	825.57	743.65	825.56	743.79	825.57	749.4	825.71	750.14	825.81
751.09	825.94	751.38	825.96	759.33	825.92	760.75	826.03	766.58	826.15
770.97	826.37	771.93	826.43	772.11	826.44	772.85	826.44	779.51	826.79
785.1	827.16	788.59	827.23	788.62	827.23	794.62	827.46	799.08	827.66
803.8	828.11	805.08	828.12	810.33	828.32	810.54	828.32	811.71	828.42
818.43	828.91	824.39	829.29	828.6	829.87	829.21	829.91	829.46	829.9
831.42	829.83	832	829.87	836.16	830.38	836.58	830.44	837.33	830.63
839.72	831.19	841.54	831.24	842.76	831.32	848.19	831.58	849.1	831.81
851.77	832.52	853.11	832.64	853.52	832.62	857.43	833.14	857.91	833.21
862.73	833.93	862.88	833.93	864.16	833.98	867.44	834.5	869.33	834.76
873.57	835.54	874.67	835.54	879.88	836.08	881.52	836.35	884.01	836.91
884.75	836.95	885.28	836.98	889.71	837.3	893.59	837.89	894.53	838.05
899.4	838.84	899.86	838.93	901.87	839.52	904.25	840.15	906.43	840.69
909.97	841.57	910.25	841.67	910.46	841.73	910.65	841.76	911.67	842.01
915.43	842.9	916.35	842.99	916.69	843.02	916.71	843.02	916.95	843.06
917.6	843.17	920.92	843.79	921.18	843.92	924.61	844.53	927.48	844.61
931.44	845.48	932.04	845.73	935.67	846.9	936.69	847.16	937.11	847.2
939.67	847.44	941.88	847.98	944.36	848.78	947.58	849.65	947.77	849.75
951.75	850.53	952.96	850.89	954.76	851.24	958.36	852.15	961.19	852.64
968.87	853.89	969	853.91	969.07	853.92	969.17	853.94	969.35	853.97
975.35	855.13	978.86	855.89	979.67	856.06	985.08	856.94	990.07	858.23
995.26	858.98	996.82	859.44	1000.27	860.49	1000.68	860.49	1005.76	861.32
1005.78	861.32	1006.35	861.36	1013.88	862.02	1014.64	862.11	1017.57	862.58
1019.04	862.8	1019.76	862.85	1026.25	862.9	1027.48	862.86	1028.17	862.89
1029.3	862.88	1033.6	862.3	1034.86	862.23	1035.15	862.24	1035.8	862.18
1037.25	862.11								

Manning's n Values num= 12

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	182.98	.03	302.82	.1	326.06	.07	333.5	.06
355.07	.07	373.05	.1	389.57	.013	400.29	.1	434.71	.035
879.88	.1	1037.25	.1						

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
326.06	373.05	0	0	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
400	840	830.53	F

Right Levee Station= 398.48 Elevation= 827.8

SUMMARY OF MANNING'S N VALUES

River:Oldtown Creek

Reach	River Sta.	n1	n2	n3	n4	n5	n6	n7	n8	n9	n10	n11	n12	n13
Reach	1401.062	.035	.013	.07	.06	.07	.1	.035	.1	.013	.1	.1		
Reach	1109.832	.013	.03	.013	.1	.07	.06	.07	.1	.013	.1	.035	.1	.1
Reach	796.1590	.03	.1	.07	.06	.07	.1	.013	.1	.035	.1	.1		
Reach	703.7970	.013	.03	.06	.03	.013	.1	.035	.1	.1				
Reach	679.82	Bridge												
Reach	651.5802	.013	.03	.06	.03	.013	.1	.035	.1	.1				
Reach	545.1257	.03	.1	.07	.06	.07	.1	.013	.1	.035	.1	.013	.1	.1
Reach	492.3110	.03	.1	.07	.06	.07	.1	.013	.1	.035	.1	.013	.1	.1
Reach	431	Bridge												
Reach	394.7476	.03	.013	.03	.013	.07	.06	.07	.03	.013	.1	.035	.1	.1
Reach	242.2423	.1	.03	.1	.07	.06	.07	.1	.013	.1	.035	.1	.1	

SUMMARY OF REACH LENGTHS

River: Oldtown Creek

Reach	River Sta.	Left	Channel	Right
Reach	1401.062	293.81	291.23	319.49
Reach	1109.832	308.79	313.67	310.72
Reach	796.1590	96.02	92.36	85.26
Reach	703.7970	56.86	52.22	53.96
Reach	679.82	Bridge		
Reach	651.5802	111.44	106.45	103.86
Reach	545.1257	46.6	52.81	53.82
Reach	492.3110	95.23	97.56	102.88
Reach	431	Bridge		
Reach	394.7476	158.45	152.51	147.17
Reach	242.2423	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Oldtown Creek

Reach	River Sta.	Contr.	Expan.
Reach	1401.062	.1	.3
Reach	1109.832	.1	.3
Reach	796.1590	.1	.3
Reach	703.7970	.3	.5
Reach	679.82	Bridge	
Reach	651.5802	.3	.5
Reach	545.1257	.1	.3
Reach	492.3110	.3	.5
Reach	431	Bridge	
Reach	394.7476	.3	.5
Reach	242.2423	.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	1401.062	20% AEP	763.00	826.35	832.57	831.38	832.59	0.000630	1.06	730.01	344.85	0.11
Reach	1401.062	1% AEP	2000.00	826.35	833.27	832.55	833.34	0.001749	2.00	974.48	348.40	0.19
Reach	1109.832	20% AEP	763.00	824.36	830.53	827.86	830.72	0.004165	3.68	275.30	159.18	0.31
Reach	1109.832	1% AEP	2000.00	824.36	832.04	830.61	832.38	0.006566	5.45	574.80	480.73	0.41
Reach	796.1590	20% AEP	763.00	824.79	830.03	828.58	830.07	0.001127	1.84	505.98	302.80	0.16
Reach	796.1590	1% AEP	2000.00	824.79	831.63	829.55	831.71	0.000890	2.06	1007.09	641.26	0.15
Reach	703.7970	20% AEP	763.00	823.18	829.99	826.25	830.02	0.000287	1.33	627.54	301.61	0.11
Reach	703.7970	1% AEP	2000.00	823.18	831.61	828.92	831.66	0.000302	1.67	1133.61	659.31	0.12
Reach	679.82		Bridge									
Reach	651.5802	20% AEP	763.00	823.44	829.96	826.79	829.99	0.000348	1.58	570.35	286.42	0.13
Reach	651.5802	1% AEP	2000.00	823.44	831.57	829.20	831.63	0.000356	1.94	1043.75	652.40	0.13
Reach	545.1257	20% AEP	763.00	823.31	829.85	826.82	829.92	0.001348	2.43	521.81	231.45	0.19
Reach	545.1257	1% AEP	2000.00	823.31	831.38	829.15	831.52	0.002434	3.90	885.25	546.21	0.27
Reach	492.3110	20% AEP	763.00	824.46	829.85	828.03	829.87	0.000345	1.13	688.00	293.44	0.10
Reach	492.3110	1% AEP	2000.00	824.46	831.40	828.71	831.45	0.000442	1.57	1159.32	645.59	0.12
Reach	431		Bridge									
Reach	394.7476	20% AEP	763.00	822.24	828.17	825.84	828.42	0.005140	3.99	191.08	48.70	0.36
Reach	394.7476	1% AEP	2000.00	822.24	829.42	827.94	830.33	0.014848	7.66	262.98	78.10	0.62
Reach	242.2423	20% AEP	763.00	821.85	827.76	825.43	827.85	0.002156	2.57	320.63	197.61	0.23
Reach	242.2423	1% AEP	2000.00	821.85	829.10	827.66	829.26	0.002156	3.11	630.56	661.48	0.24

Profile Output Table - Six XS Bridge

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Reach	796.1590	20% AEP	830.07	830.03	828.58	0.05	0.01	302.80	402.36	314.96	45.68	1.84
Reach	796.1590	1% AEP	831.71	831.63	829.55	0.05	0.01	641.26	1325.40	498.80	175.79	2.06
Reach	703.7970	20% AEP	830.02	829.99	826.25	0.01	0.00	301.61	393.34	292.52	77.15	1.33
Reach	703.7970	1% AEP	831.66	831.61	828.92	0.01	0.00	659.31	1209.84	498.72	291.44	1.67
Reach	679.82 BR U	20% AEP	830.01	829.98	826.28	0.01	0.00	284.29	389.41	306.56	67.03	1.40
Reach	679.82 BR U	1% AEP	831.65	831.59	829.01	0.01	0.00	302.07	1209.41	533.84	256.75	1.80
Reach	679.82 BR D	20% AEP	830.00	829.97	826.77	0.01	0.00	266.51	320.41	354.73	87.85	1.63
Reach	679.82 BR D	1% AEP	831.64	831.57	829.19	0.01	0.00	273.36	1106.43	595.24	298.32	2.06
Reach	651.5802	20% AEP	829.99	829.96	826.79	0.07	0.01	286.42	328.50	341.74	92.76	1.58
Reach	651.5802	1% AEP	831.63	831.57	829.20	0.08	0.03	652.40	1114.13	556.21	329.67	1.94
Reach	545.1257	20% AEP	829.92	829.85	826.82	0.03	0.01	231.45	129.28	526.55	107.16	2.43
Reach	545.1257	1% AEP	831.52	831.38	829.15	0.04	0.03	546.21	554.55	1098.37	347.08	3.90
Reach	492.3110	20% AEP	829.87	829.85	828.03			293.44	487.18	228.96	46.86	1.13
Reach	492.3110	1% AEP	831.45	831.40	828.71			645.59	1454.06	434.73	111.21	1.57
Reach	431 BR U	20% AEP	829.87	829.85	828.20			213.86	41.01	717.95	4.28	6.80
Reach	431 BR U	1% AEP	831.45	831.40	828.82			644.88	774.36	1205.98	20.18	7.30
Reach	431 BR D	20% AEP	829.85	829.70	825.83			45.48	41.01	722.23		3.92
Reach	431 BR D	1% AEP	831.45	830.97	827.93			662.31	774.36	1211.67	14.49	5.33
Reach	394.7476	20% AEP	828.42	828.17	825.84	0.49	0.08	48.70		763.00		3.99
Reach	394.7476	1% AEP	830.33	829.42	827.94	0.70	0.37	78.10	33.80	1963.37	2.83	7.66
Reach	242.2423	20% AEP	827.85	827.76	825.43			197.61	283.60	479.30	0.11	2.57
Reach	242.2423	1% AEP	829.26	829.10	827.66			661.48	1219.80	777.77	2.43	3.11

Appendix H
Scupper Analysis

CARPENTER MARTY transportation

Appendix H

SCUPPER ANALYSIS ON VERTICAL CURVE

WD Job Number = **003-GRE-68-12.65**
Description = **GRE.68 Pedestrian Bridge Over US 68 and Oldtown Creek**
By = **JPG** Checked By = **BWR**
Date = **1/28/2025** Date = **1/28/2025**

CARPENTER MARTY transportation

Spreadsheet updated: 10/22/2019

Spread Width T	Longitudinal Grade S	Cross Slope S_x	Contributing Bridge Width W	Pavement Coefficient C	Manning's Coefficient n	Rainfall Intensity i
6.50 ft.	0.0403 ft./ft.	0.0100 ft./ft.	7.50 ft.	0.9	0.015	4.1 in./hour

T = Bridge shoulder width + allowable spread of flow on the traveled lane *Table 1103-1 L&D 2*
T = 0.00 ft. + 6.50 ft. = 6.50 ft.

g_1 = 4.03% Slope of Tangent L_c = 142.51 Length of curve
g_2 = -4.96% Slope of Tangent
$X_{HP} = L_{E1}$ = 63.88 ft. L_{E2} = 78.63 ft.

L = 96 ft. Length of Bridge from start of curb to end of curb

W = 7.50 ft. Amount of deck drainage flowing from high side to low side transversely

C = 0.9 *Section 1101.2.3, Table 1101-2 L&D Manual Volume 2*

n = 0.015 Concrete
0.018 Bituminuous
n = 0.015

Design Frequency *Section 1103.2, L&D Manual Volume 2*
Frequency = 2 years

Intensity Zone *Table 1101-3, L&D Manual Volume 2*
Intensity Zone = C

t_0 from sheet flow = 0.99 minutes *Section 1101.2.2, L&D Manual Volume 2*
k = intercept coeff. = 0.619 *Table 1101-1*

t_s from shallow concentrated flow = 0.39 minutes *Section 1101.2.2, L&D Manual Volume 2* V = 4.08 fps

Calculated Time of Concentration t_c = 1.38 minutes *Section 1101.2.2, L&D Manual Volume 2*

5.00 minutes Per HEC 12 Document, t_c cannot be less than 5 minutes for Bridge Deck Drainage
10.00 minutes Per L&D Manual, Section 1103.3
Method Used = L Enter "H" for tc based on Hec 12 document, Enter "L" for tc based on L&D Manual
Use t_c = 10.00 minutes

i = $a/(t+b)^c$ *Based on Rainfall Intensity-Duration Frequency curves obtained from United States Weather Service Technical Paper #40 Rainfall Frequency Atlas of the United States*
a = 56.229 *with Figure 1101-3, L&D Volume 2, 2 year frequency, intensity zone* C
b = 10 *with Figure 1101-3, L&D Volume 2, 2 year frequency, intensity zone* C
c = 0.876 *L&D Volume 2, 2 year frequency, intensity zone* C

i = 4.1 in./hour *calculated* i = 4.1 in./hour *based on figure 1101-2*

Ignore Side Flow?	y	*Can Be Ignored for High Flows and Small Rectangular Inlets, More Conservative if Ignored*
L =	48.10 ft.	Distance to Beginning of VC to first scupper/beginning of curb
L_1 =	71.26 ft.	Distance to First Scupper From Beginning of Curb

Rear Abutment

	15.78 ft.	Distance from high point to first scupper/beginning of curb
S_{L1} =	0.0100 ft./ft.	Longitudinal Slope for This Section
S_{x1} =	0.0100 ft./ft.	Cross Slope for This Section
L_g =	0.00 ft.	Length of the Inlet Parallel to the Flow
W =	0.00 ft.	The width of the inlet
Q_1 =	0.010 cfs	Accumulated Q Along L_1
E_o =	0.000	Ratio of Frontal Flow to Total Gutter Flow, *HEC 21 Equ. #8*
V =	0.531 ft/s	Gutter Velocity, *HEC 21 Equ. #5*
R_s =	0.000	Side Flow Intercept Efficiency, *HEC 21 Equ. #7*
R_f =	1.000	Frontal Flow Capture Fraction, *HEC 21 Equ. #9, Usually Assume Splash over Velocity > Gutter Velocity Unless You Have Grating Splash over Velocity Information*
E =	0.00%	Efficiency, *HEC 21 Equ. #6*
Q_i =	0.000 cfs	Intercepted Flow
Q_{b1} =	0.010 cfs	Bypassed Q
T (spread before scupper) =	1.94 ft.	**Spread OK, No Scuppers Required**
T (spread after scupper) =	1.94 ft.	
	can increase L	

End Vertical Curve

L_2 =	80.22 ft.	Distance to high point to scupper/end of curb
	144.10 ft.	Distance from beginning of curve to this location
S_{L2} =	0.0506 ft./ft.	Longitudinal Slope for This Section
S_{x2} =	0.0100 ft./ft.	Cross Slope for This Section
L_g =	0.00 ft.	Length of the Inlet Parallel to the Flow
W =	0.00 ft.	The width of the inlet
Q_2 =	0.051 cfs	Accumulated Q Along L_2, *HEC 21 Equ. #4 & 22a*
E_o =	0.000	Ratio of Frontal Flow to Total Gutter Flow, *HEC 21 Equ. #8*
V =	1.469 ft/s	Gutter Velocity, *HEC 21 Equ. #5*
R_s =	0.000	Side Flow Intercept Efficiency, *HEC 21 Equ. #7*
R_f =	1.000	Frontal Flow Capture Fraction, *HEC 21 Equ. #9, Usually Assume Splash over Velocity > Gutter Velocity Unless You Have Grating Splash over Velocity Information*
E =	0.00%	Efficiency, *HEC 21 Equ. #6*
Q_i =	0.000 cfs	Intercepted Flow
Q_{b2} =	0.051 cfs	Bypassed Q
T (spread before scupper) =	2.63 ft.	**Spread OK, No Scuppers Required**
T (spread after scupper) =	2.63 ft.	
	can increase L	

SCUPPER ANALYSIS , SCUPPER AT PIER 3 AND FORWARD ABUTMENT

Job Number = 003-GRE-68-12.65
Description = GRE.68 Pedestrian Bridge Over US 68 and Oldtown Creek
By = JPG Checked = BWR
Date = 1/28/2025 Date = 1/28/2025

CARPENTER MARTY transportation

Spreadsheet updated: 10/22/2019

Spread Width T	Longitudinal Grade S	Cross Slope S_x	Contributing Bridge Width W	Pavement Coefficient C	Manning's Coefficient n	Rainfall Intensity i
6.50 ft.	0.0496 ft./ft.	0.0100 ft./ft.	7.50 ft.	0.9	0.015	4.1 in./hour

T = Bridge shoulder width + allowable spread of flow on the traveled lane *Table 1103-1 L&D 2*
T = 0.00 ft. + 6.50 ft. = 6.50 ft.

S = 0.0496 ft./ft. Use grade near low end of bridge if on a vertical curve

L = 211.15 ft. Length of Bridge from start of curb to end of curb

W = 7.50 ft. Amount of deck drainage flowing from high side to low side transversely

C = 0.9 *Section 1101.2.3, Table 1101-2 L&D Manual Volume 2*

n = 0.015 Concrete
0.018 Bituminuous
n = 0.015

Design Frequency *Section 1103.2, L&D Manual Volume 2*
Frequency = 2 years

Intensity Zone *Table 1101-3, L&D Manual Volume 2*
Intensity Zone = C

t_0 from sheet flow = 0.99 minutes *Section 1101.2.2, L&D Manual Volume 2*
k = intercept coeff. = 0.619 *Table 1101-1*

t_s from shallow concentrated flow = 0.78 minutes *Section 1101.2.2, L&D Manual Volume 2* V = 4.52 fps

Calculated Time of Concentration t_c = 1.76 minutes *Section 1101.2.2, L&D Manual Volume 2*

5.00 minutes Per HEC 12 Document, t_c cannot be less than 5 minutes for Bridge Deck Drainage
10.00 minutes Per L&D Manual, Section 1103.3
Method Used = L Enter "H" for tc based on HEC 21 document, Enter "L" for tc based on L&D Manual
Use t_c = 10.00 minutes

i = $a/(t+b)^c$ *Based on Rainfall Intensity-Duration Frequency curves obtained from United States Weather Service Technical Paper #40 Rainfall Frequency Atlas of the United States*

a = 56.229 *with Figure 1101-3, L&D Volume 2, 2 year frequency, intensity zone* C
b = 10 *with Figure 1101-3, L&D Volume 2, 2 year frequency, intensity zone* C
c = 0.876 *with Figure 1101-3, L&D Volume 2, 2 year frequency, intensity zone* C

i = 4.1 in./hour *calculated* i = 4.1 in./hour *based on figure 1101-2*

Length of bridge not requiring scuppers = L = $(0.56/C*n)\ (S_x^{1.67}*S^{0.5}*T^{2.67}/\ i\ *W)$ *FHWA HEC 21 Document (equ. # 22a)*

L= 885.76 ft.

Bridge length including length of parapet on turn back wingwalls = 211 ft.

Hence, scuppers not required!

Ignore Side Flow?	y	*Can Be Ignored for High Flows and Small Rectangular Inlets, More Conservative if Ignored*

Run #1 (Vertical Curve)

Q_{b1} =	0.051 cfs	
T (spread before scupper) =	2.63 ft.	
T (spread after scupper) =	2.63 ft.	

Run #2 (End of Vertical Curve to Pier 2)

L_2 =	93.82 ft.	Distance of span - VC on span
S_{L2} =	0.0496 ft./ft.	Longitudinal Slope for This Section
S_{x2} =	0.0100 ft./ft.	Cross Slope for This Section
L_g =	0.00 ft.	Length of the Inlet Parallel to the Flow
W =	0.00 ft.	The width of the inlet
Q_2 =	0.060 cfs	Accumulated Q Along L_1
Q_{bcurve} =	0.051 cfs	
Q1 + Q_2 =	0.111 cfs	
E_o =	0.000	Ratio of Frontal Flow to Total Gutter Flow, *HEC 21 Equ. #8*
V =	1.771 ft/s	Gutter Velocity, *HEC 21 Equ. #5*
R_s =	0.000	Side Flow Intercept Efficiency, *HEC 21 Equ. #7*
R_f =	1.000	Frontal Flow Capture Fraction, *HEC 21 Equ. #9, Usually Assume Splash over Velocity > Gutter Velocity Unless You Have Grating Splash over Velocity Information*
E =	0.00%	Efficiency, *HEC 21 Equ. #6*
Q_i =	0.000 cfs	Intercepted Flow
Q_{b2} =	0.111 cfs	Bypassed Q
T (spread before scupper) =	3.53 ft.	
T (spread after scupper) =	3.53 ft.	
	can increase L	

Run #3 (Pier 2 to Scupper Before Pier 3)

Span=	117.50 ft.	Length of Bridge Span 3
Scupper offset=	5.17 ft.	Offset of Scupper to End of Bridge Span
L_3 =	112.33 ft.	Length to next scupper
S_{L3} =	0.0496 ft./ft.	Longitudinal Slope for This Section
S_{x3} =	0.0100 ft./ft.	Cross Slope for This Section
L_g =	1.50 ft.	Length of the Inlet Parallel to the Flow
W =	0.50 ft.	The width of the inlet
Q_3 =	0.071 cfs	Accumulated Q Along L_2, *HEC 21 Equ. #4 & 22a*
Q_{b2} + Q_3 =	0.182 cfs	
E_o =	0.283	Ratio of Frontal Flow to Total Gutter Flow, *HEC 21 Equ. #8*
V =	2.007 ft/s	Gutter Velocity, *HEC 21 Equ. #5*
R_s =	0.046	Side Flow Intercept Efficiency, *HEC 21 Equ. #7*
R_f =	1.000	Frontal Flow Capture Fraction, *HEC 21 Equ. #9, Usually Assume Splash over Velocity > Gutter Velocity Unless You Have Grating Splash over Velocity Information*
E =	28.33%	Efficiency, *HEC 21 Equ. #6*
Q_i =	0.052 cfs	Intercepted Flow
Q_{b3} =	0.130 cfs	Bypassed Q
T (spread before scupper) =	4.26 ft.	
T (spread after scupper) =	3.76 ft.	
	can increase L	

Run #4 (Scupper Before Pier 3 to Last Scupper)

Span=	149.67 ft.	Length of Bridge Span 3
Scupper offset=	5.00 ft.	Offset of Scupper to End of Bridge Span
L_{34} =	149.84 ft.	Length to next scupper
S_{L34} =	0.0496 ft./ft.	Longitudinal Slope for This Section
S_{x34} =	0.0100 ft./ft.	Cross Slope for This Section
L_g =	1.50 ft.	Length of the Inlet Parallel to the Flow
W =	0.50 ft.	The width of the inlet
Q_4 =	0.095 cfs	Accumulated Q Along L_3, *HEC 21 Equ. #4 & 22a*
$Q_{b3} + Q_4$ =	0.226 cfs	
E_o =	0.263	Ratio of Frontal Flow to Total Gutter Flow, *HEC 21 Equ. #8*
V =	2.118 ft/s	Gutter Velocity, *HEC 21 Equ. #5*
R_s =	0.042	Side Flow Intercept Efficiency, *HEC 21 Equ. #7*
R_f =	1.000	Frontal Flow Capture Fraction, *HEC 21 Equ. #9, Usually Assume Splash over Velocity > Gutter Velocity Unless You Have Grating Splash over Velocity Information*
E =	26.34%	Efficiency, *HEC 21 Equ. #6*
Q_i =	0.059 cfs	Intercepted Flow
Q_{b4} =	0.166 cfs	Bypassed Q
T (spread before scupper) =	4.62 ft.	
T (spread after scupper) =	4.12 ft.	
	can increase L	

Forward Abutment (Last scupper to End of Bridge)

L_{fwd} =	5.00 ft.	Offset of Scupper to End of Bridge Span
S_{Lfwd} =	0.0496 ft./ft.	Longitudinal Slope for This Section
S_{xfwd} =	0.0100 ft./ft.	Cross Slope for This Section
L_g =	0.00 ft.	Length of the Inlet Parallel to the Flow
W =	0.00 ft.	The width of the inlet
Q_{fwd} =	0.003 cfs	Accumulated Q Along L_3, *HEC 21 Equ. #4 & 22a*
$Q_{b4} + Q_{fwd}$ =	0.169 cfs	
E_o =	0.000	Ratio of Frontal Flow to Total Gutter Flow, *HEC 21 Equ. #8*
V =	1.971 ft/s	Gutter Velocity, *HEC 21 Equ. #5*
R_s =	0.000	Side Flow Intercept Efficiency, *HEC 21 Equ. #7*
R_f =	1.000	Frontal Flow Capture Fraction, *HEC 21 Equ. #9, Usually Assume Splash over Velocity > Gutter Velocity Unless You Have Grating Splash over Velocity Information*
E =	0.00%	Efficiency, *HEC 21 Equ. #6*
Q_i =	0.000 cfs	Intercepted Flow
Q_{bfwd} =	0.169 cfs	Bypassed Q
T (spread before scupper) =	4.15 ft.	
T (spread after scupper) =	4.15 ft.	
	can increase L	

Appendix I
Scour Analysis

CARPENTER MARTY transportation

Appendix I

CARPENTER MARTY transportation

6612 Singletree Dr
Columbus, OH 43229
(614) 656-2424

Forward Abutment Scour Analysis (Design Flood, Q4%)

Calculated By:	BWR	Date:	2/11/2025	Job No.:	115388
Checked By:	JPG	Date:	2/12/2025	Bridge No.:	GRE-BK80020-00.492
Project:	GRE-68-12.65			SFN:	2926107

Input

V =	0.73	ft/s	Local velocity (HEC-RAS: V1 from LOB or ROB as applicable from Contraction Tab)
y =	2.14	ft	Upstream Flow Depth (HEC-RAS: Y1 from LOB or ROB as applicable from Contraction Tab)
y_o =	2.42	ft	Flow Depth prior to Scour at Abutment (HEC-RAS: Y0 for Channel from Contraction Tab)
Q_1 =	1.57	cfs/ft	Unit Discharge Upstream in Main Channel (HEC-RAS: Q1/W1 from LOB or ROB as applicable from Contraction Tab)
Q_2 =	3.76	cfs/ft	Unit Discharge in Constricted Channel (HEC-RAS: Q2/W2 from Channel from Contraction Tab)
n=	0.060		Manning's n for the channel

Note: "From:" elevation should be the toe of embankment for spill-through type abutments

Soil Boring: B-004-0-23				Depth	Depth of Bed Material, d	D50 provided	Type	D50 equivalent	Water Content, w	Particles <75μm, F	Plasticity Index, PI	N60	Unconfined compressive strength, qu	Critical shear stress, τ	Critical shear stress, τ	Use y_0=
SS-X	Bed Material 1	From:	827.33	0.00 ft	6.33 ft	0.008 mm	Cohesive	19.057 mm	27	82	24	16	4000 psf	19.057 Pa	0.398 psf	2.42 ft
		To:	821.00	6.33 ft												
SS-X	Bed Material 2	From:	821.00	6.33 ft	3.00 ft	0.017 mm	Cohesive	259.051 mm	6	76	18	22	5500 psf	259.051 Pa	5.412 psf	8.75 ft
		To:	818.00	9.33 ft												
SS-X	Bed Material 3	From:	818.00	9.33 ft	3.00 ft	2.000 mm	Cohesionless	2.000 mm	11	16	4	39	9750 psf	2.000 Pa	0.042 psf	11.75 ft
		To:	815.00	12.33 ft												
SS-X	Bed Material 4	From:	815.00	12.33 ft	3.00 ft	2.000 mm	Cohesionless	2.000 mm	14	14	4	47	11750 psf	2.000 Pa	0.042 psf	14.75 ft
		To:	812.00	15.33 ft												

= SI + CL from GRADATION

Bed Material 1	ys=	-0.850 ft	Abutment scour depth (Scour Hole Depth from Hydraulic Toolbox)	**Scour ends in Bed Material 1** 0.00 ft
Bed Material 2	ys=		Abutment scour depth (Scour Hole Depth from Hydraulic Toolbox)	0.00 ft
Bed Material 3	ys=		Abutment scour depth (Scour Hole Depth from Hydraulic Toolbox)	0.00 ft
Bed Material 4	ys=		Abutment scour depth (Scour Hole Depth from Hydraulic Toolbox)	0.00 ft

Total Abutment Scour

Total Scour Depth = **0.00 ft**

Abutment Scour

Computation Method: NCHRP

Parameter	Value	Units	Notes
Input Parameters			
Scour Condition	Compute		
Scour Condition Location	Compute		
Abutment Type (k1)	Spill-throug...		
Angle of Embankment to Flow (k2)	90.00	degrees	0º is downstream, 90º is perpendicular to flow, 180º is upstream
Centerline Length of Embankment	20.00	ft	Used to calculate Projected Length of Embankment (L)
Projected Length of Embankment (L)	20.00	ft	projected normal to flow
Width of Flood Plain (Bf)	300.00	ft	projected normal to flow
Unit Discharge, Upstream in Active, Approach Overbank Area (q1)	1.57	cfs/ft	
Unit Discharge in Constricted Area (q2)	3.76	cfs/ft	
D50 (D50)	19.057010	mm	0.2 mm is the lower limit for cohesive material
Upstream Flow Depth (y1)	2.14	ft	
Define Shear Stress of Floodplain			
Flow Depth prior to Scour (y0)	2.42	ft	Depth at Abutment Toe
Results			
q2 / q1	2.39		
Average Velocity Upstream (V)	0.73	ft/s	
Critical Velocity above which Bed Materal of Size D and Smaller will be Transported (Dm)	5.03	ft/s	Used in contraction scour calculations
Scour Condition	Clear Water		
Embankment Length (L)/Floodplain Width (Bf) Ratio	0.07		
Scour Condition	b (Overbank)		
Amplification Factor (alpha A or alpha B)	1.80		
Flow Depth including Contraction Scour (yc)	0.87	ft	
Maximum Flow Depth including Abutment Scour (ymax)	1.57	ft	
Scour Hole Depth (ys)	-0.85	ft	Negative values imply 'zero' scour depth
Scour Hole			
Angle of Repose (theta)	44.00	degrees	
Ratio of Bottom Width of Scour Hole to Scour Hole Depth	0.00		1.0 means the bottom width will be equal to scour hole depth

CARPENTER MARTY transportation

6612 Singletree Dr
Columbus, OH 43229
(614) 656-2424

Forward Abutment Scour Analysis (Check Flood, Q2%)

Calculated By:	BWR	Date:	2/11/2025
Checked By:	JPG	Date:	2/12/2025
Project:	GRE-68-12.65		

Job No.:	115388
Bridge No.:	GRE-BK80020-00.492
SFN:	2926107

Input

V =	0.79	ft/s	Local velocity (HEC-RAS: V1 from LOB or ROB as applicable from Contraction Tab)
y =	2.39	ft	Upstream Flow Depth (HEC-RAS: Y1 from LOB or ROB as applicable from Contraction Tab)
y_o =	2.69	ft	Flow Depth prior to Scour at Abutment (HEC-RAS: Y0 for Channel from Contraction Tab)
Q_1 =	1.87	cfs/ft	Unit Discharge Upstream in Main Channel (HEC-RAS: Q1/W1 from LOB or ROB as applicable from Contraction Tab)
Q_2 =	4.53	cfs/ft	Unit Discharge in Constricted Channel (HEC-RAS: Q2/W2 from Channel from Contraction Tab)
n=	0.060		Manning's n for the channel

Note: "From:" elevation should be the toe of embankment for spill-through type abutments

Soil Boring: B-004-0-23

				Depth	Depth of Bed Material, d	D50 provided	Type	D50 equivalent	Water Content, w	Particles <75μm, F	Plasticity Index, PI	N60	Unconfined compressive strength, qu	Critical shear stress, τ	Critical shear stress, τ	Use y_0=
SS-X	Bed Material 1	From:	827.33	0.00 ft	6.33 ft	0.008 mm	Cohesive	19.057 mm	27	82	24	16	4000 psf	19.057 Pa	0.398 psf	2.69 ft
		To:	821.00	6.33 ft												
SS-X	Bed Material 2	From:	821.00	6.33 ft	3.00 ft	0.017 mm	Cohesive	259.051 mm	6	76	18	22	5500 psf	259.051 Pa	5.412 psf	9.02 ft
		To:	818.00	9.33 ft												
SS-X	Bed Material 3	From:	818.00	9.33 ft	3.00 ft	2.000 mm	Cohesionless	2.000 mm	11	16	4	39	9750 psf	2.000 Pa	0.042 psf	12.02 ft
		To:	815.00	12.33 ft												
SS-X	Bed Material 4	From:	815.00	12.33 ft	3.00 ft	2.000 mm	Cohesionless	2.000 mm	14	14	4	47	11750 psf	2.000 Pa	0.042 psf	15.02 ft
		To:	812.00	15.33 ft												

= SI + CL from GRADATION

Bed Material 1	ys=	-0.870 ft	Abutment scour depth (Scour Hole Depth from Hydraulic Toolbox)	**Scour ends in Bed Material 1** 0.00 ft
Bed Material 2	ys=		Abutment scour depth (Scour Hole Depth from Hydraulic Toolbox)	0.00 ft
Bed Material 3	ys=		Abutment scour depth (Scour Hole Depth from Hydraulic Toolbox)	0.00 ft
Bed Material 4	ys=		Abutment scour depth (Scour Hole Depth from Hydraulic Toolbox)	0.00 ft

Total Abutment Scour

Total Scour Depth = **0.00 ft**

1 Abutment Scour

Computation Method: NCHRP

Parameter	Value	Units	Notes
Input Parameters			
Scour Condition	Compute		
Scour Condition Location	Compute		
Abutment Type (k1)	Spill-throug...		
Angle of Embankment to Flow (k2)	90.00	degrees	0º is downstream, 90º is perpendicular to flow, 180º is upstream
Centerline Length of Embankment	20.00	ft	Used to calculate Projected Length of Embankment (L)
Projected Length of Embankment (L)	20.00	ft	projected normal to flow
Width of Flood Plain (BF)	300.00	ft	projected normal to flow
Unit Discharge, Upstream in Active, Approach Overbank Area (q1)	1.87	cfs/ft	
Unit Discharge in Constricted Area (q2)	4.53	cfs/ft	
D50 (D50)	19.057010	mm	0.2 mm is the lower limit for cohesive material
Upstream Flow Depth (y1)	2.39	ft	
Define Shear Stress of Floodplain			
Flow Depth prior to Scour (y0)	2.69	ft	Depth at Abutment Toe
Results			
q2 / q1	2.42		
Average Velocity Upstream (V)	0.78	ft/s	
Critical Velocity above which Bed Material of Size D and Smaller will be Transported (Dm)	5.13	ft/s	Used in contraction scour calculations
Scour Condition	Clear Water		
Embankment Length (L)/Floodplain Width (BF) Ratio	0.07		
Scour Condition	b (Overbank)		
Amplification Factor (alpha A or alpha B)	1.79		
Flow Depth Including Contraction Scour (yc)	1.02	ft	
Maximum Flow Depth Including Abutment Scour (ymax)	1.82	ft	
Scour Hole Depth (ys)	-0.87	ft	Negative values imply 'zero' scour depth
Scour Hole			
Angle of Repose (theta)	44.00	degrees	
Ratio of Bottom Width of Scour Hole to Scour Hole Depth	0.00		1.0 means the bottom width will be equal to scour hole depth

CARPENTER MARTY transportation

6612 Singletree Dr
Columbus, OH 43229
(614) 656-2424

Bridge Contraction Scour Analysis (Design Flood, Q4%)

Calculated By:	BWR	Date:	2/11/2025	Job No.:	115388
Checked By:	JPG	Date:	2/12/2025	Bridge No.:	GRE-BK80020-00.492
Project:	GRE-68-12.65			SFN:	2926107

Input

V =	1.92	ft/s	Local velocity (HEC-RAS: V1 from Channel from Contraction Tab)
y =	4.97	ft	Upstream Flow Depth (HEC-RAS: Y1 from Channel from Contraction Tab)
y_0 =	5.58	ft	Flow Depth prior to Scour at Abutment (HEC-RAS: Y0 for Channel from Contraction Tab)
Q_1 =	9.54	cfs/ft	Unit Discharge Upstream in Main Channel (HEC-RAS: Q1/W1 from Channel from Contraction Tab)
Q_2 =	9.12	cfs/ft	Unit Discharge in Constricted Channel (HEC-RAS: Q2/W2 from Channel from Contraction Tab)
n=	0.060		Manning's n for the channel
D=	24	hours	Duration of flow
W=	44.20	ft	Channel width at approach section (HEC-RAS: W1 from Channel from Contraction Tab)
Q=	1499	cfs	Determined from logarithmic regression from FIS flows

Note: "From:" elevation should be the toe of embankment for spill-through type abutments

Soil Boring: B-003-1-24

			Depth	Depth of Bed Material, d	D50 provided	Type	D50 equivalent	Water Content, w	Particles <75μm, F	Plasticity Index, PI	N60	Unconfined compressive strength, qu	Critical shear stress, τ	Critical shear stress, τ	Use y_0=	Duration of flow	Average Velocity
SS-X	Bed Material 1	From: 826.93	0.00 ft	2.50 ft	0.021 mm	Cohesive	7.727 mm	25	77	14	9	2250 psf	7.727 Pa	0.161 psf	5.58 ft	24.00 hrs*	1.92 ft/s
		To: 824.43	2.50 ft														
SS-X	Bed Material 2	From: 824.43	2.50 ft	1.50 ft	0.073 mm	Cohesive	14.305 mm	14	50	15	16	4000 psf	14.305 Pa	0.299 psf	8.08 ft	0.00 hrs	4.20 ft/s
		To: 822.93	4.00 ft														
SS-X	Bed Material 3	From: 822.93	4.00 ft	1.50 ft	0.024 mm	Cohesive	15.121 mm	21	68	15	30	7500 psf	15.121 Pa	0.316 psf	9.58 ft	24.00 hrs	4.79 ft/s
		To: 821.43	5.50 ft														
SS-X	Bed Material 4	From: 821.43	5.50 ft	3.00 ft	0.435 mm	Cohesionless	0.435 mm	11	34	4	42	10500 psf	0.435 Pa	0.009 psf	11.08 ft	0.00 hrs	4.79 ft/s
		To: 818.43	8.50 ft														

= SI + CL from GRADATION

* Use Hydraulic Toolbox to solve for Duration of flow required to scour this layer

Bed Material 1	ys=	0.690 ft	Contraction scour depth (Scour Hole Depth from Hydraulic Toolbox)	**Scour ends in Bed Material 1**
Bed Material 2	ys=		Contraction scour depth (Scour Hole Depth from Hydraulic Toolbox)	
Bed Material 3	ys=		Contraction scour depth (Scour Hole Depth from Hydraulic Toolbox)	
Bed Material 4	ys=		Contraction scour depth (Scour Hole Depth from Hydraulic Toolbox)	

0.69 ft Scour depth
0.00 ft
0.00 ft
0.00 ft

CARPENTER MARTY transportation

6612 Singletree Dr
Columbus, OH 43229
(614) 656-2424

Bridge Contraction Scour Analysis (Design Flood, Q4%)

Calculated By:	BWR	Date:	2/11/2025	Job No.:	115388
Checked By:	JPG	Date:	2/12/2025	Bridge No.:	GRE-BK80020-00.492
Project:	GRE-68-12.65			SFN:	2926107

Contraction Scour

Contraction Scour Depth = 0.69 ft

Contraction Scour

Computation Method: Cohesive Soil

Parameter	Value	Units	Notes
Pressure Scour Method			
Compute Pressure Scour (Vertical Contraction Scour)			
Input Parameters			
Input Parameters for Cohesive Scour			
Average Depth Upstream (y)	4.97	ft	
Average Velocity in Contracted Section (V2)	1.92	ft/s	
Critical Shear Stress (tau c)	0.16	lb/ft^2	
Density of Water (delta)	1.94	slug/ft^3	
Manning's n (n)	0.0600		
Depth Prior to Scour in Contracted Section (y0)	5.58	ft	
Time Rate of Scour			
Unit Weight of Water (gamma w)	62.400	lb/ft^3	
Duration of Flow (t)	24.000	hr	
Results			
Results for Cohesive Scour			
Scour Depth	0.69	ft	Negative values imply 'zero' scour depth
Recommendations			
Recommended Scour Condition	Cohesive		Determined by comparing scour depths (including long-term degradation
Recommended Scour Depth	0.69	ft	Negative values imply 'zero' scour depth
Results of Flow Event			
Scour Depth from Flow Event (y(t))	0.61	ft	

CARPENTER MARTY transportation

6612 Singletree Dr
Columbus, OH 43229
(614) 656-2424

Bridge Contraction Scour Analysis (Check Flood, Q2%)

Calculated By:	BWR	Date:	2/11/2025	Job No.:	115388
Checked By:	JPG	Date:	2/12/2025	Bridge No.:	GRE-BK80020-00.492
Project:	GRE-68-12.65			SFN:	2926107

Input

V =	1.98	ft/s	Local velocity (HEC-RAS: V1 from Channel from Contraction Tab)
y =	5.23	ft	Upstream Flow Depth (HEC-RAS: Y1 from Channel from Contraction Tab)
y_0 =	5.85	ft	Flow Depth prior to Scour at Abutment (HEC-RAS: Y0 for Channel from Contraction Tab)
Q_1 =	10.38	cfs/ft	Unit Discharge Upstream in Main Channel (HEC-RAS: Q1/W1 from Channel from Contraction Tab)
Q_2 =	10.03	cfs/ft	Unit Discharge in Constricted Channel (HEC-RAS: Q2/W2 from Channel from Contraction Tab)
n=	0.060		Manning's n for the channel
D=	24	hours	Duration of flow
W=	44.20	ft	Channel width at approach section (HEC-RAS: W1 from Channel from Contraction Tab)
Q=	1740	cfs	Determined from logarithmic regression from FIS flows

Note: "From:" elevation should be the toe of embankment for spill-through type abutments

Soil Boring: B-003-1-24

				Depth	Depth of Bed Material, d	D50 provided	Type	D50 equivalent	Water Content, w	Particles <75μm, F	Plasticity Index, PI	N60	Unconfined compressive strength, qu	Critical shear stress, τ	Critical shear stress, τ	Use y_0=	Duration of flow	Average Velocity
SS-X	Bed Material 1	From:	826.93	0.00 ft	2.50 ft	0.021 mm	Cohesive	7.727 mm	25	77	14	9	2250 psf	7.727 Pa	0.161 psf	5.85 ft	24.00 hrs*	1.98 ft/s
		To:	824.43	2.50 ft														
SS-X	Bed Material 2	From:	824.43	2.50 ft	1.50 ft	0.073 mm	Cohesive	14.305 mm	14	50	15	16	4000 psf	14.305 Pa	0.299 psf	8.35 ft	0.00 hrs	4.71 ft/s
		To:	822.93	4.00 ft														
SS-X	Bed Material 3	From:	822.93	4.00 ft	1.50 ft	0.024 mm	Cohesive	15.121 mm	21	68	15	30	7500 psf	15.121 Pa	0.316 psf	9.85 ft	24.00 hrs	5.36 ft/s
		To:	821.43	5.50 ft														
SS-X	Bed Material 4	From:	821.43	5.50 ft	3.00 ft	0.435 mm	Cohesionless	0.435 mm	11	34	4	42	10500 psf	0.435 Pa	0.009 psf	11.35 ft	0.00 hrs	5.36 ft/s
		To:	818.43	8.50 ft														

= SI + CL from GRADATION

* Use Hydraulic Toolbox to solve for Duration of flow required to scour this layer

Bed Material 1	ys=	0.750 ft	Contraction scour depth (Scour Hole Depth from Hydraulic Toolbox)	**Scour ends in Bed Material 1**
Bed Material 2	ys=		Contraction scour depth (Scour Hole Depth from Hydraulic Toolbox)	
Bed Material 3	ys=		Contraction scour depth (Scour Hole Depth from Hydraulic Toolbox)	
Bed Material 4	ys=		Contraction scour depth (Scour Hole Depth from Hydraulic Toolbox)	

0.75 ft	Scour depth
0.00 ft	
0.00 ft	
0.00 ft	

CARPENTER MARTY transportation

6612 Singletree Dr
Columbus, OH 43229
(614) 656-2424

Bridge Contraction Scour Analysis (Check Flood, Q2%)

Calculated By:	BWR	Date:	2/11/2025	Job No.:	115388
Checked By:	JPG	Date:	2/12/2025	Bridge No.:	GRE-BK80020-00.492
Project:	GRE-68-12.65			SFN:	2926107

Contraction Scour

Contraction Scour Depth = 0.75 ft

Contraction Scour

Computation Method: Cohesive Soil

Parameter	Value	Units	Notes
Pressure Scour Method			
Compute Pressure Scour (Vertical Contraction Scour)	☐		
Input Parameters			
Input Parameters for Cohesive Scour			
Average Depth Upstream (y)	5.23	ft	
Average Velocity in Contracted Section (V2)	1.98	ft/s	
Critical Shear Stress (tau c)	0.16	lb/ft^2	
Density of Water (delta)	1.94	slug/ft^3	
Manning's n (n)	0.0600		
Depth Prior to Scour in Contracted Section (y0)	5.85	ft	
Time Rate of Scour			
Unit Weight of Water (gamma w)	62.400	lb/ft^3	
Duration of Flow (t)	24.000	hr	
Results			
Results for Cohesive Scour			
Scour Depth	0.75	ft	Negative values imply 'zero' scour depth
Recommendations			
Recommended Scour Condition	Cohesive		Determined by comparing scour depths (including long-term degradation
Recommended Scour Depth	0.75	ft	Negative values imply 'zero' scour depth
Results of Flow Event			
Scour Depth from Flow Event (y(t))	0.65	ft	

CARPENTER MARTY transportation

6612 Singletree Dr
Columbus, OH 43229
(614) 656-2424

Bridge Pier 2 Scour Analysis (Design Flood, Q4%)

Calculated By: BWR Date: 2/12/2025
Checked By: JPG Date: 2/12/2025
Project: GRE-68-12.65

Job No.: 115388
Bridge No.: GRE-BK80020-00.492
SFN: 2926107

Input

V =	1.80	ft/s	Local velocity (HEC-RAS: V1 from Channel from Pier Tab)
y =	3.33	ft	Upstream Flow Depth (HEC-RAS: Y1 from Channel from Pier Tab)
y_o =	5.58	ft	Flow Depth prior to Scour at Abutment (HEC-RAS: Y0 for Channel from Contraction Tab)
Q_1 =	9.54	cfs/ft	Unit Discharge Upstream in Main Channel (HEC-RAS: Q1/W1 from Channel from Contraction Tab)
Q_2 =	9.12	cfs/ft	Unit Discharge in Constricted Channel (HEC-RAS: Q2/W2 from Channel from Contraction Tab)
n=	0.030		Manning's n for the channel
D=	24	hours	Duration of flow
W=	44.20	ft	Channel width at approach section (HEC-RAS: W1 from Channel from Contraction Tab)
Q=	1499	cfs	Determined from logarithmic regression from FIS flows

Note: "From:" elevation should be the channel surface elevation at the flowline

Pier Properties

Pier Angle of attack	0	degrees	
Pier Shape	Square Nose	K=	1.7
Pier Width	4	ft	
Pier Length	13	ft	

Soil Boring: B-002-1-24

				Depth	Depth of Bed Material, d	D50 provided	Type	D50 equivalent	Water Content, w	Particles <75μm, F	Plasticity Index, PI	N60	Unconfined compressive strength, qu	Critical shear stress, τ_c	Critical shear stress, τ	Erosion Category, EC	β	α	Use y=i	Critical soil velocity, Vc	Bed Shear Stress, τ	ż, ft/hr	Time to completely scour	Duration remaining	Average Velocity
SS-X	Bed Material 1	From:	828.14	0.00 ft	5.00 ft	0.148 mm	Cohesive	2.714 mm	25	44	16	7	1750 psf	2.714 Pa	0.057 psf	2.63	-1.466	2.504	5.58 ft	1.99 ft/s	0.105 psf	0.0063	789.749 hrs		1.80 ft/s
		To:	823.14	5.00 ft																					
SS-X	Bed Material 2	From:	823.14	5.00 ft	2.00 ft	0.081 mm	Cohesive	9.598 mm	21	49	17	33	8250 psf	9.598 Pa	0.201 psf	4.18	-2.958	1.221	10.58 ft	4.16 ft/s	0.084 psf	0.0000	100506.905 hrs	-765.75 hrs	3.21 ft/s
		To:	821.14	7.00 ft																					
SS-X	Bed Material 3	From:	821.14	7.00 ft	5.00 ft	0.931 mm	Cohesionless	0.931 mm	13	29	4	13	3250 psf	0.931 Pa	0.019 psf	2.16	-0.467	3.107	12.58 ft	1.33 ft/s	0.080 psf	0.0718	69.607 hrs	-100482.90 hrs	4.47 ft/s
		To:	816.14	12.00 ft																					
SS-X	Bed Material 4	From:	816.14	12.00 ft	2.50 ft	0.050 mm	Cohesive	1.767 mm	22	63	4	19	4750 psf	1.767 Pa	0.037 psf	3.67	-2.716	1.562	17.58 ft	1.94 ft/s	0.071 psf	0.0000	58209.544 hrs	-45.61 hrs	3.21 ft/s
		To:	813.64	14.50 ft																					

= SI + CL from GRADATION

Bed Material 1	ys=	0.000 ft
Bed Material 2	ys=	
Bed Material 3	ys=	
Bed Material 4	ys=	

Scour ends in Bed Material 1 0.00 ft
0.00 ft
0.00 ft
0.00 ft

Pier Scour

Pier Scour Depth = **0.00 ft**

CARPENTER MARTY transportation

6612 Singletree Dr
Columbus, OH 43229
(614) 656-2424

Bridge Pier 2 Scour Analysis (Check Flood, Q2%)

Calculated By: BWR Date: 2/12/2025
Checked By: JPG Date: 2/12/2025
Project: GRE-68-12.65

Job No.: 115388
Bridge No.: GRE-BK80020-00.492
SFN: 2926107

Input

V =	1.92	ft/s	Local velocity (HEC-RAS: V1 from Channel from Pier Tab)
y =	3.60	ft	Upstream Flow Depth (HEC-RAS: Y1 from Channel from Pier Tab)
y_o =	5.85	ft	Flow Depth prior to Scour at Abutment (HEC-RAS: Y0 for Channel from Contraction Tab)
Q_1 =	10.38	cfs/ft	Unit Discharge Upstream in Main Channel (HEC-RAS: Q1/W1 from Channel from Contraction Tab)
Q_2 =	10.03	cfs/ft	Unit Discharge in Constricted Channel (HEC-RAS: Q2/W2 from Channel from Contraction Tab)
n=	0.030		Manning's n for the channel
D=	24	hours	Duration of flow
W=	44.20	ft	Channel width at approach section (HEC-RAS: W1 from Channel from Contraction Tab)
Q=	1740	cfs	Determined from logarithmic regression from FIS flows

Note: "From:" elevation should be the channel surface elevation at the flowline

Pier Properties

Pier Angle of attack	0	degrees	
Pier Shape	Square Nose	K=	1.7
Pier Width	4	ft	
Pier Length	13	ft	

Soil Boring: B-002-1-24

				Depth	Depth of Bed Material, d	D50 provided	Type	D50 equivalent	Water Content, w	Particles <75μm, F	Plasticity Index, PI	N60	Unconfined compressive strength, qu	Critical shear stress, τ_c	Critical shear stress, τ	Erosion Category, EC	β	α	Use y=s	Critical soil velocity, V_c	Bed Shear Stress, τ	ż, ft/hr	Time to completely scour	Duration remaining	Average Velocity
SS-X	Bed Material 1	From:	828.14	0.00 ft	5.00 ft	0.148 mm	Cohesive	2.714 mm	25	44	16	7	1750 psf	2.714 Pa	0.057 psf	2.63	-1.466	2.504	5.85 ft	2.00 ft/s	0.117 psf	0.0084	594.638 hrs		1.92 ft/s
		To:	823.14	5.00 ft																					
SS-X	Bed Material 2	From:	823.14	5.00 ft	2.00 ft	0.081 mm	Cohesive	9.598 mm	21	49	17	33	8250 psf	9.598 Pa	0.201 psf	4.18	-2.958	1.221	10.85 ft	4.18 ft/s	0.095 psf	0.0000	86739.213 hrs	-570.64 hrs	3.63 ft/s
		To:	821.14	7.00 ft																					
SS-X	Bed Material 3	From:	821.14	7.00 ft	5.00 ft	0.931 mm	Cohesionless	0.931 mm	13	29	4	13	3250 psf	0.931 Pa	0.019 psf	2.16	-0.467	3.107	12.85 ft	1.34 ft/s	0.090 psf	0.1049	47.648 hrs	-86715.21 hrs	5.01 ft/s
		To:	816.14	12.00 ft																					
SS-X	Bed Material 4	From:	816.14	12.00 ft	2.50 ft	0.050 mm	Cohesive	1.767 mm	22	63	4	19	4750 psf	1.767 Pa	0.037 psf	3.67	-2.716	1.562	17.85 ft	1.95 ft/s	0.081 psf	0.0001	47958.808 hrs	-23.65 hrs	3.63 ft/s
		To:	813.64	14.50 ft																					

= SI + CL from GRADATION

Bed Material 1	ys=	0.000 ft
Bed Material 2	ys=	
Bed Material 3	ys=	
Bed Material 4	ys=	

Scour ends in Bed Material 1 0.00 ft
0.00 ft
0.00 ft
0.00 ft

Pier Scour

Pier Scour Depth = **0.00 ft**

CARPENTER MARTY transportation

6612 Singletree Dr
Columbus, OH 43229
(614) 656-2424

Bridge Pier 3 Scour Analysis (Design Flood, Q4%)

Calculated By: BWR Date: 2/12/2025
Checked By: JPG Date: 2/12/2025
Project: GRE-68-12.65

Job No.: 115388
Bridge No.: GRE-BK80020-00.492
SFN: 2926107

Input

V =	1.80	ft/s	Local velocity (HEC-RAS: V1 from Channel from Pier Tab)
y =	3.33	ft	Upstream Flow Depth (HEC-RAS: Y1 from Channel from Pier Tab)
y_0 =	5.58	ft	Flow Depth prior to Scour at Abutment (HEC-RAS: Y0 for Channel from Contraction Tab)
Q_1 =	9.54	cfs/ft	Unit Discharge Upstream in Main Channel (HEC-RAS: Q1/W1 from Channel from Contraction Tab)
Q_2 =	9.12	cfs/ft	Unit Discharge in Constricted Channel (HEC-RAS: Q2/W2 from Channel from Contraction Tab)
n=	0.030		Manning's n for the channel
D=	24	hours	Duration of flow
W=	44.20	ft	Channel width at approach section (HEC-RAS: W1 from Channel from Contraction Tab)
Q=	1495	cfs	Determined from logarithmic regression from FIS flows

Note: "From:" elevation should be the channel surface elevation at the flowline

Pier Properties

Pier Angle of attack	0	degrees	
Pier Shape	Square Nose	K=	1.7
Pier Width	4	ft	
Pier Length	13	ft	

Soil Boring: B-003-1-24

				Depth	Depth of Bed Material, d	D50 provided	Type	D50 equivalent	Water Content, w	Particles <75μm, F	Plasticity Index, PI	N60	Unconfined compressive strength, qu	Critical shear stress, τ	Critical shear stress, τ	Erosion Category, EC	β	α	Use y_0=	Critical soil velocity, V_c	Bed Shear Stress, τ	ż, ft/hr	Time to completely scour	Duration remaining	Average Velocity
SS-X	Bed Material 1	From:	826.93	0.00 ft	2.50 ft	0.021 mm	Cohesive	7.727 mm	25	77	14	9	2250 psf	7.727 Pa	0.161 psf	2.87	-1.852	2.251	5.58 ft	3.36 ft/s	0.105 psf	0.0017	1446.284 hrs		1.80 ft/s
		To:	824.43	2.50 ft																					
SS-X	Bed Material 2	From:	824.43	2.50 ft	1.50 ft	0.073 mm	Cohesive	14.305 mm	14	50	15	16	4000 psf	14.305 Pa	0.299 psf	3.48	-2.571	1.704	8.08 ft	4.86 ft/s	0.092 psf	0.0001	13512.625 hrs	-1422.28 hrs	4.20 ft/s
		To:	822.93	4.00 ft																					
SS-X	Bed Material 3	From:	822.93	4.00 ft	1.50 ft	0.024 mm	Cohesive	15.121 mm	21	68	15	30	7500 psf	15.121 Pa	0.316 psf	4.11	-2.937	1.266	9.58 ft	5.14 ft/s	0.087 psf	0.0000	64624.286 hrs	-13488.62 hrs	4.79 ft/s
		To:	821.43	5.50 ft																					
SS-X	Bed Material 4	From:	821.43	5.50 ft	3.00 ft	0.435 mm	Cohesionless	0.435 mm	11	34	4	42	10500 psf	0.435 Pa	0.009 psf	1.77	0.704	3.768	11.08 ft	0.89 ft/s	0.083 psf	3.0259	0.991 hrs	-64600.29 hrs	4.79 ft/s
		To:	818.43	8.50 ft																					

= SI + CL from GRADATION

Bed Material 1	ys=	0.000 ft	**Scour ends in Bed Material 1** 0.00 ft
Bed Material 2	ys=		0.00 ft
Bed Material 3	ys=		0.00 ft
Bed Material 4	ys=		0.00 ft

Pier Scour

Pier Scour Depth = 0.00 ft

CARPENTER MARTY transportation

6612 Singletree Dr
Columbus, OH 43229
(614) 656-2424

Bridge Pier 3 Scour Analysis (Check Flood, Q2%)

Calculated By: BWR Date: 2/12/2025
Checked By: JPG Date: 2/12/2025
Project: GRE-68-12.65

Job No.: 115388
Bridge No.: GRE-BK80020-00.492
SFN: 2926107

Input

V =	1.92	ft/s	Local velocity (HEC-RAS: V1 from Channel from Pier Tab)
y =	3.60	ft	Upstream Flow Depth (HEC-RAS: Y1 from Channel from Pier Tab)
y_0 =	5.85	ft	Flow Depth prior to Scour at Abutment (HEC-RAS: Y0 for Channel from Contraction Tab)
Q_1 =	10.38	cfs/ft	Unit Discharge Upstream in Main Channel (HEC-RAS: Q1/W1 from Channel from Contraction Tab)
Q_2 =	10.03	cfs/ft	Unit Discharge in Constricted Channel (HEC-RAS: Q2/W2 from Channel from Contraction Tab)
n=	0.030		Manning's n for the channel
D=	24	hours	Duration of flow
W=	44.20	ft	Channel width at approach section (HEC-RAS: W1 from Channel from Contraction Tab)
Q=	1740	cfs	Determined from logarithmic regression from FIS flows

Note: "From:" elevation should be the channel surface elevation at the flowline

Pier Properties

Pier Angle of attack	0	degrees	
Pier Shape	Square Nose	K=	1.7
Pier Width	4	ft	
Pier Length	13	ft	

Soil Boring: B-003-1-24

				Depth	Depth of Bed Material, d	D50 provided	Type	D50 equivalent	Water Content, w	Particles <75μm, F	Plasticity Index, PI	N60	Unconfined compressive strength, qu	Critical shear stress, τ	Critical shear stress, τ	Erosion Category, EC	β	α	Use y0=	Critical soil velocity, V_c	Bed Shear Stress, τ	ż, ft/hr	Time to completely scour	Duration remaining	Average Velocity
SS-X	Bed Material 1	From:	826.93	0.00 ft	2.50 ft	0.021 mm	Cohesive	7.727 mm	25	77	14	9	2250 psf	7.727 Pa	0.161 psf	2.87	-1.852	2.251	5.85 ft	3.38 ft/s	0.117 psf	0.0022	1120.637 hrs		1.92 ft/s
		To:	824.43	2.50 ft																					
SS-X	Bed Material 2	From:	824.43	2.50 ft	1.50 ft	0.073 mm	Cohesive	14.305 mm	14	50	15	16	4000 psf	14.305 Pa	0.299 psf	3.48	-2.571	1.704	8.35 ft	4.88 ft/s	0.104 psf	0.0001	11049.556 hrs	-1096.64 hrs	4.71 ft/s
		To:	822.93	4.00 ft																					
SS-X	Bed Material 3	From:	822.93	4.00 ft	1.50 ft	0.024 mm	Cohesive	15.121 mm	21	68	15	30	7500 psf	15.121 Pa	0.316 psf	4.11	-2.937	1.266	9.85 ft	5.16 ft/s	0.098 psf	0.0000	55528.869 hrs	-11025.56 hrs	5.36 ft/s
		To:	821.43	5.50 ft																					
SS-X	Bed Material 4	From:	821.43	5.50 ft	3.00 ft	0.435 mm	Cohesionless	0.435 mm	11	34	4	42	10500 psf	0.435 Pa	0.009 psf	1.77	0.704	3.768	11.35 ft	0.90 ft/s	0.094 psf	4.7750	0.628 hrs	-55504.87 hrs	5.36 ft/s
		To:	818.43	8.50 ft																					

= SI + CL from GRADATION

Bed Material 1	ys=	0.000 ft	**Scour ends in Bed Material 1** 0.00 ft
Bed Material 2	ys=		0.00 ft
Bed Material 3	ys=		0.00 ft
Bed Material 4	ys=		0.00 ft

Pier Scour

Pier Scour Depth = 0.00 ft

GRE-BK80020-00.492

MODEL: CLX_RW_1 - Plan 1 [Sheet] PAPERSIZE: 11x8.5 (in.) DATE: 2/12/2025 TIME: 8:50:08 AM USER: brussell
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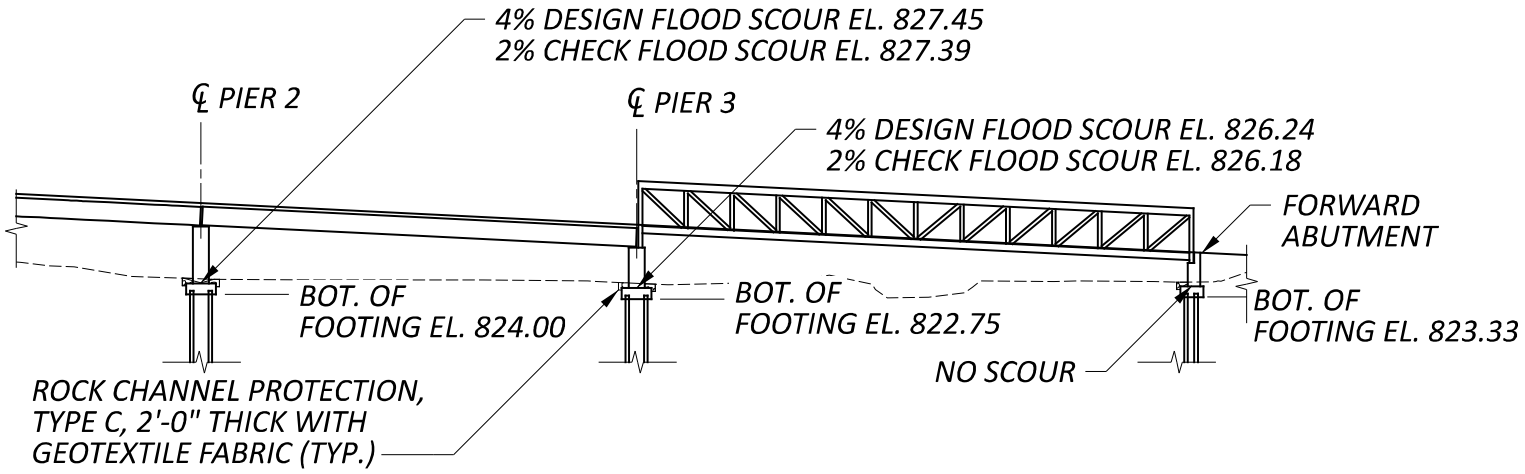


SHEET	PROJECT ID	REVIEWER	DESIGNER	DESIGN AGENCY
P.0 / TOTAL 0	115388	GDJ 1-23-2025	BWR	CARPENTER MARTY Transportation

SCOUR PLOT

Appendix J
ODOT TAF Checklist and Worksheet

CARPENTER MARTY transportation

Appendix J

Temporary Construction, Access and Dewatering Activities Checklist

The purpose of this form is to aid the Office of Environmental Services - Waterway Permits Unit (OES-WPU) in the Permit Determination and Special Provisions processes. This form shall be completed by the project designer for each aquatic resource and reflect the anticipated temporary fill activities in the aquatic resource (including streams, impounded streams, lakes, reservoirs, rivers). If the type and amount of temporary fill is unknown, assume a reasonable and logical worst-case scenario of what could be needed. A complete copy of this form shall be provided to the District Environmental Coordinator (DEC) to be included in the Permit Determination Request submitted to OES-WPU.

CRS:	GRE-68-12.85	PID:	115388
Aquatic resource name*	Oldtown Creek		

*Provide stationing if more than one location on the same aquatic resource will be impacted

1. **During the construction of this project, the following fill activities in the aquatic resource are anticipated: (check all that apply)**

☐	Temporary bridge or structure (CMS Item 502)
☐	Cofferdams (temporary dewatering)
☐	Demolition and debris (intentional fill)
☒	Causeways and work pads

2. **ODOT requires that the temporary activity accommodates a minimum flow equal to twice the maximum mean monthly flow without creating a rise in backwater above the OHWM. This flow is the Standard Temporary Discharge (STD).**

Yes	Is U.S. Geological Survey Stream Stats data available for this location?
38.6 cfs	Provide the minimum flow (cfs) to be maintained throughout construction for this location

3. **The method that will most likely be implemented by the Contractor to maintain this flow will be: (check all that apply)**

☒	Conduits (Provide hydraulic calculations when the STD is 10 cfs or greater)
☐	Open channel(s)/temporary bridge (Provide hydraulic calculations when the STD is 10 cfs or greater)
☐	Pump around (No hydraulic calculations required for cofferdams with pump around scenarios)
Yes	Verify if the project meet flow requirements outlined in the Location & Design Manual Vol. 2 Section 1010? Attach hydraulic calculations when specified above.

4. **Additional information**

11 months	Provide the proposed duration (weeks, months or years) of temporary fill in the aquatic resource. *Note: temporary fill in a water of the U.S. longer than 2 years may be considered permanent by the USACE*
No	Will temporary fill occur within a flowage easement of a federal flood control facility? *This item only applies to federal flood control facilities. Flowage easements associated with these facilities can occur several miles away from the facility. If uncertain that the project is in a flowage easement area, please consult the district's real estate office for assistance.*

Click on the link below to access ODOT's Waterway Permits manual, guidance, and other resources:

https://www.transportation.ohio.gov/wps/portal/gov/odot/programs/waterway-permits-program/waterway-permits

TAF DESIGN WORKSHEET

January 23, 2025

Project:	GRE.68-BK80020-00.492	**PID:**	115388
PERFORMED BY:	JPG	**DATE:**	1/23/2025
CHECKED BY:	BWR	**DATE:**	1/23/2025
SUBJECT:	Pedestrian bridge over US-68 and Old Town Creek		
STREAM:	Old Town Creek		

TAF DESIGN

STREAM CHARACTERISTICS AT PROPOSED TAF LOCATION (NO TAF INSTALLED)

Is StreamStats data for the site available?	Yes
Is the stream's flow influenced by hydraulic controlling features (i.e. dams)?	No
Basin drainage area (mi^2)	9.62
Ordinary High Water Mark elevation [OHWM] (ft)	826.96
Top of bank elevation (ft)	828.80
50% AEP flow water surface elevation (ft)	827.49
OHWM flow rate [without TAF] (cfs)	190
Maximum mean monthly flow (cfs)	19.3
2x maximum mean monthly flow (cfs)	38.6
2x maximum mean monthly flow water surface elevation (ft)	825.22

Tier 1 TAF Analysis

Proposed TAF obstruction	Full Channel
For partial TAFs: minimum channel opening width (ft) at the OHWM elevation	
Calculated backwater elevation (ft) with the TAF in place.	
Does the site pass two-times highest monthly flow without backwater rise above OHWM with TAF in place?	Yes

End Analysis: Proceed to TAF Stability section and Summary.

After verifying OHWM, does the site pass 2x highest monthly flow?	N/A

Tier 2 TAF Analysis

Do not complete this section, analysis complete.

Calculated backwater elevation	
Modified height of TAF (backwater elevation+1' freeboard)	1
Calculated backwater from modified TAF height	
Calculated freeboard	1

TAF Design acceptable (greater than 0.5-feet)

Is the TAF height acceptable based on viability considerations?	

Proceed to Tier 3 TAF Design

Final top of TAF elevation (ft)	1.0

OHIO DEPARTMENT OF TRANSPORTATION

TAF DESIGN WORKSHEET

January 23, 2025

Tier 3 TAF Analysis

Complete if adjusted STD is necessary

Initial height of TAF (1' above OHWM or necessary to facilitate construction)	
Calculated STD (flow producing WSE equal to height of TAF)	
Is historical waterway flow available (USGS Gage data availability)?	
Does probability of exceedance of STD facilitate the project schedule?	

TAF STABILITY- Based on Bureau of Reclamation

Suggested rock sizing and corresponding Manning's n based on hydraulic analysis velocities

Note: Sizing based on velocity due to unavailability of accurate point shear in 1D models

Velocity at edge of TAF corresponding to 20% AEP flow (ft/s)	1.9
Suggested dumped rock size	ODOT Type D (n=0.035)

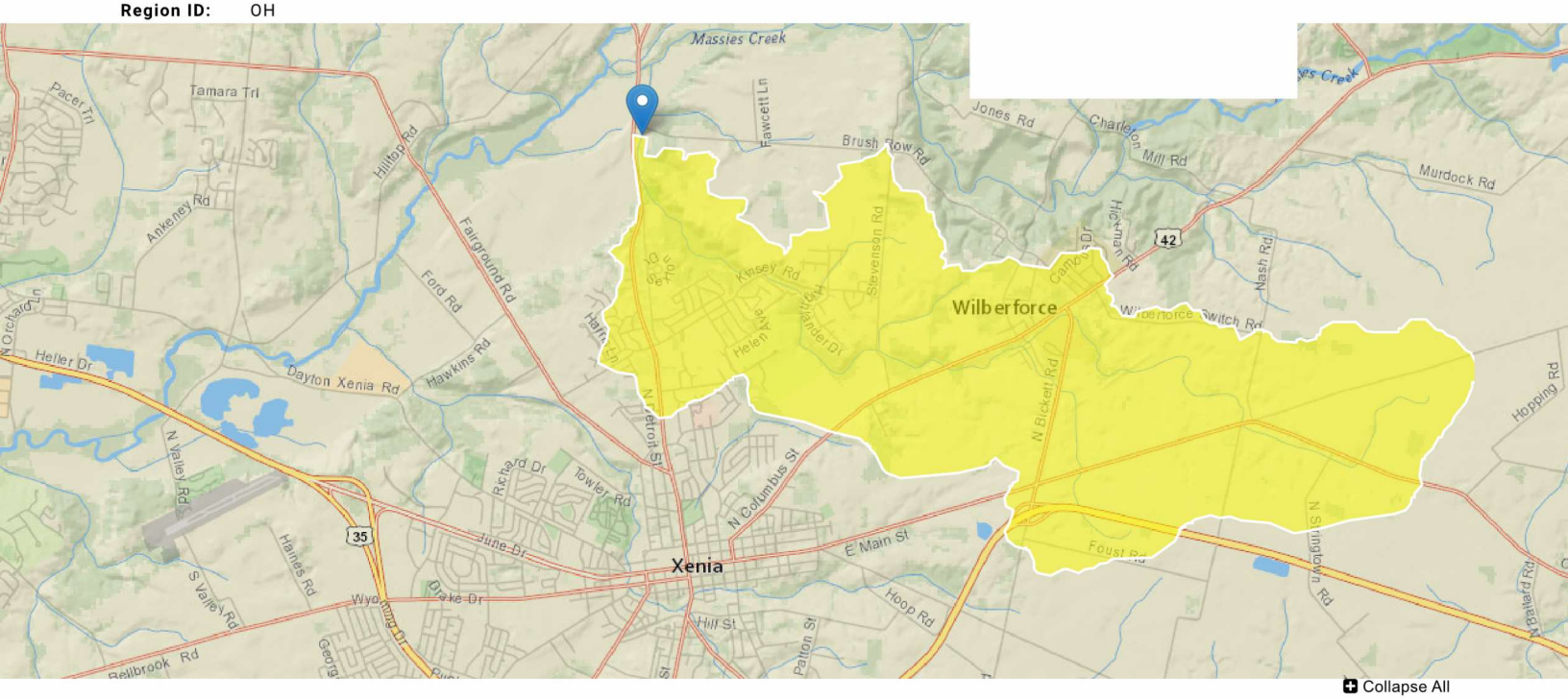
Our analysis shows type D rock is required; however, the water permit only allows the use of type B at minimum. Type B will be provided.

SUMMARY

Streamflow data source	Stream Stats
Stream contains hydraulic controlling features?	No
Top of TAF elevation (ft)	827.96
Partial TAF: minimum channel opening width (ft) at the OHWM elevation:	N/A
Suggested size for TAF dumped rock:	ODOT Type D (n=0.035)
Suggested HEC-RAS scoping (1D or 2D)	1D Hydraulic Model

GRE-68-12.65 StreamStats Report

Region ID: OH



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CSL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	29.4	feet per mi
DRNAREA	Area that drains to a point on a stream	9.62	square miles
FOREST	Percentage of area covered by forest	9.02	percent
LAT_CENT	Latitude of Basin Centroid	39.7052	decimal degrees
LC92STOR	Percentage of water bodies and wetlands determined from the NLCD	0.18	percent
OHREGA	Ohio Region A Indicator	1	dimensionless
OHREGC	Ohio Region C Indicator	0	dimensionless
PRECIPCENT	Mean Annual Precip at Basin Centroid	39	inches
STREAM_VARG	Streamflow variability index as defined in WRIR 02-4068, computed from regional grid	0.44	dimensionless

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Flow Full Model Reg A SIR2019 5018]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CSL1085LFP	Stream Slope 10 and 85 Longest Flow Path	29.4	feet per mi	1.53	516
DRNAREA	Drainage Area	9.62	square miles	0.04	5989
LC92STOR	Percent Storage from NLCD1992	0.18	percent	0	25.35
OHREGA	Ohio Region A Indicator 1 if in A else 0	1	dimensionless	0	1
OHREGC	Ohio Region C Indicator 1 if in C else 0	0	dimensionless	0	1

Peak-Flow Statistics Flow Report [Peak Flow Full Model Reg A SIR2019 5018]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	PIL	PIU	ASEp
50-percent AEP flood	619	ft^3/s	328	1170	40.1
20-percent AEP flood	1070	ft^3/s	592	1930	37.2
10-percent AEP flood	1430	ft^3/s	786	2600	37.6
4-percent AEP flood	1940	ft^3/s	1060	3550	38.1
2-percent AEP flood	2370	ft^3/s	1280	4390	37.8
1-percent AEP flood	2830	ft^3/s	1510	5290	39.6
0.2-percent AEP flood	4030	ft^3/s	2140	7610	40.3

Peak-Flow Statistics Citations

Koltun, G.F.,2019, Flood-frequency estimates for Ohio streamgages based on data through water year 2015 and techniques for estimating flood-frequency characteristics of rural, unregulated Ohio streams: U.S. Geological Survey Scientific Investigations Report 2019–5018, 25 p. (https://dx.doi.org/10.3133/sir20195018)

Monthly Flow Statistics

Monthly Flow Statistics Parameters [Low Flow LatLE 41.2 wri02 4068]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	9.62	square miles	0.12	7422
FOREST	Percent Forest	9.02	percent	0	99.1
LAT_CENT	Latitude of Basin Centroid	39.7052	decimal degrees	38.68	41.2
LC92STOR	Percent Storage from NLCD1992	0.18	percent	0	19
PRECIPCENT	Mean Annual Precip at Basin Centroid	39	inches	34	43.2
STREAM_VARG	Streamflow Variability Index from Grid	0.44	dimensionless	0.25	1.13

Monthly Flow Statistics Flow Report [Low Flow LatLE 41.2 wri02 4068]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error, PC: Percent Correct, RMSE: Root Mean Squared Error, PseudoR^2: Pseudo R Squared (other -- see report)

Statistic	Value	Unit	SE	ASEp
January Mean Flow	14.1	ft^3/s	16.6	16.6
February Mean Flow	17.1	ft^3/s	11.9	11.9
March Mean Flow	19.3	ft^3/s	14	14
April Mean Flow	17.6	ft^3/s	11.2	11.2
May Mean Flow	12	ft^3/s	19.5	19.5
June Mean Flow	8.5	ft^3/s	27	27
July Mean Flow	5.32	ft^3/s	28.2	28.2
August Mean Flow	4.16	ft^3/s	36.8	36.8
September Mean Flow	2.52	ft^3/s	43.6	43.6
October Mean Flow	2.5	ft^3/s	50.8	50.8
November Mean Flow	5.02	ft^3/s	37.5	37.5
December Mean Flow	9.83	ft^3/s	21.8	21.8

Use 38.6 cfs for analysis

Monthly Flow Statistics Citations

Koltun, G. F., and Whitehead, M. T.,2002, Techniques for Estimating Selected Streamflow Characteristics of Rural, Unregulated Streams in Ohio: U. S. Geological Survey Water-Resources Investigations Report 02-4068, 50 p (https://pubs.er.usgs.gov/publication/wri024068)

Application Version: 4.25.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1

HEC-RAS River: Oldtown Creek Reach: Reach

Reach	River Sta	Profile	Plan	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	796.1598	STD	Exist_CM edit	38.60	823.48	825.35	824.19	825.36	0.001005	0.94	41.01	27.53	0.14
Reach	796.1598	STD	PropTAF_CM edit	38.60	823.48	825.68	824.19	825.69	0.000540	0.77	50.18	28.18	0.10
Reach	796.1598	1% AEP	Exist_CM edit	2000.00	823.48	831.62	829.80	831.69	0.000815	2.07	1038.92	320.43	0.15
Reach	796.1598	1% AEP	PropTAF_CM edit	2000.00	823.48	831.61	829.80	831.68	0.000824	2.08	1035.45	320.31	0.15
Reach	703.7970	STD	Exist_CM edit	38.60	823.18	825.22	824.25	825.24	0.001848	1.13	34.03	27.57	0.18
Reach	703.7970	STD	PropTAF_CM edit	38.60	823.18	825.62	824.25	825.63	0.000754	0.86	45.07	27.86	0.12
Reach	703.7970	1% AEP	Exist_CM edit	2000.00	823.18	831.59	829.42	831.64	0.000330	1.41	1262.37	328.39	0.09
Reach	703.7970	1% AEP	PropTAF_CM edit	2000.00	823.18	831.58	829.42	831.63	0.000334	1.42	1258.70	328.21	0.09
Reach	651.5802	STD	Exist_CM edit	38.60	823.44	825.15	824.04	825.16	0.001120	1.01	38.24	26.70	0.15
Reach	651.5802	STD	PropTAF_CM edit	38.60	823.44	825.15	824.04	825.16	0.001120	1.01	38.24	26.70	0.15
Reach	651.5802	1% AEP	Exist_CM edit	2000.00	823.44	831.55	829.16	831.61	0.000628	2.20	1132.86	306.29	0.14
Reach	651.5802	1% AEP	PropTAF_CM edit	2000.00	823.44	831.55	829.08	831.61	0.000628	2.20	1132.86	306.29	0.14
Reach	545.1257	STD	Exist_CM edit	38.60	823.35	825.02	824.04	825.04	0.001168	0.94	41.05	31.76	0.15
Reach	545.1257	STD	PropTAF_CM edit	38.60	823.35	825.02	824.04	825.04	0.001168	0.94	41.05	31.76	0.15
Reach	545.1257	1% AEP	Exist_CM edit	2000.00	823.35	831.26	828.70	831.44	0.003073	4.23	805.15	249.71	0.28
Reach	545.1257	1% AEP	PropTAF_CM edit	2000.00	823.35	831.26	828.70	831.44	0.003073	4.23	805.15	249.71	0.28
Reach	492.3110	STD	Exist_CM edit	38.60	822.61	824.99	823.46	825.00	0.000458	0.70	54.99	32.27	0.09
Reach	492.3110	STD	PropTAF_CM edit	38.60	822.61	824.99	823.46	825.00	0.000458	0.70	54.99	32.27	0.09
Reach	492.3110	1% AEP	Exist_CM edit	2000.00	822.61	831.30	828.25	831.36	0.000469	1.77	1105.75	323.41	0.12
Reach	492.3110	1% AEP	PropTAF_CM edit	2000.00	822.61	831.30	828.25	831.36	0.000469	1.77	1105.75	323.41	0.12

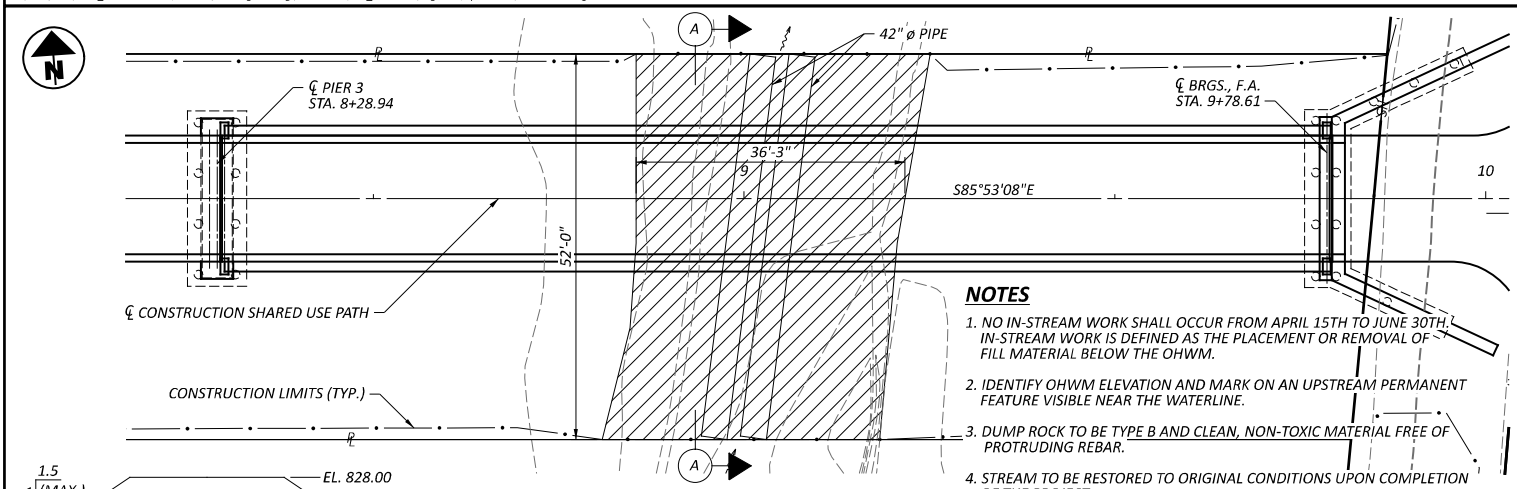
Appendix K
TAF Exhibit

CARPENTER MARTY transportation

Appendix K

GRE-BK80020-00.492

MODEL: Sheet PAPERSIZE: 11x8.5 (in.) DATE: 2/7/2025 TIME: 10:18:45 AM USER: BRussell
P:\DBP\EAG\0003_GRE-68-12.65\115388\400-Engineering\Structures\SFN_2926107\EngData\Hydraulics\TAF EXHIBIT.dgn



PLAN

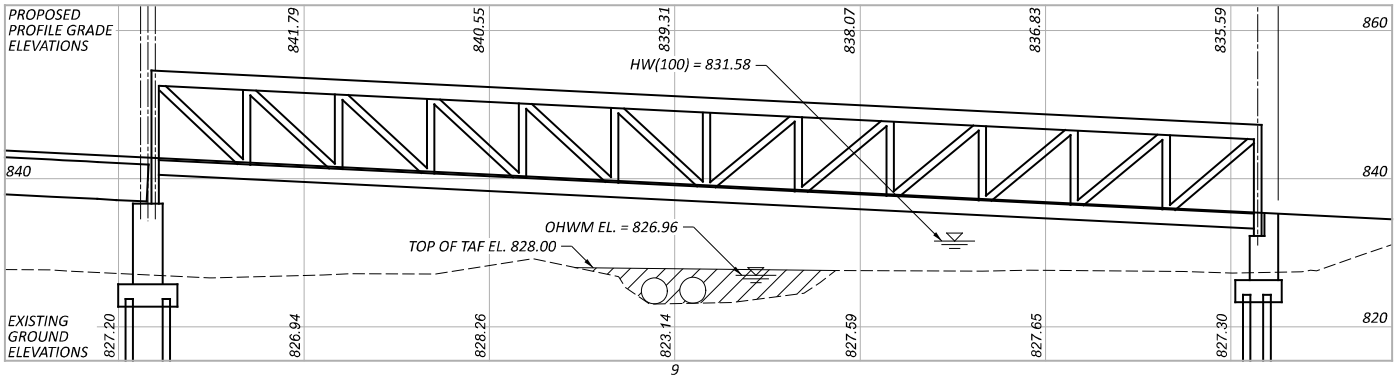
SECTION

NOTES

1. NO IN-STREAM WORK SHALL OCCUR FROM APRIL 15TH TO JUNE 30TH. IN-STREAM WORK IS DEFINED AS THE PLACEMENT OR REMOVAL OF FILL MATERIAL BELOW THE OHWM.
2. IDENTIFY OHWM ELEVATION AND MARK ON AN UPSTREAM PERMANENT FEATURE VISIBLE NEAR THE WATERLINE.
3. DUMP ROCK TO BE TYPE B AND CLEAN, NON-TOXIC MATERIAL FREE OF PROTRUDING REBAR.
4. STREAM TO BE RESTORED TO ORIGINAL CONDITIONS UPON COMPLETION OF THE PROJECT.

LEGEND

▨ - TEMPORARY ACCESS FILL



PROFILE ALONG ℄ CONSTRUCTION SHARED USE PATH

SHEET	PROJECT ID	REVIEWER	DESIGNER	DESIGN AGENCY
P.0 / TOTAL 0	115388	GDJ 1-23-2025	BWR	CARPENTER MARTY transportation

TEMPORARY STREAM CROSSING DETAILS