HYDRAULIC DESIGN REPORT

Norwich Golf Course
Proposed Golf Cart Bridge Replacement

Norwich Golf Course Cart/Pedestrian Bridge over Trading Cove Brook
City of Norwich & Town of Montville, Connecticut

May 1, 2023

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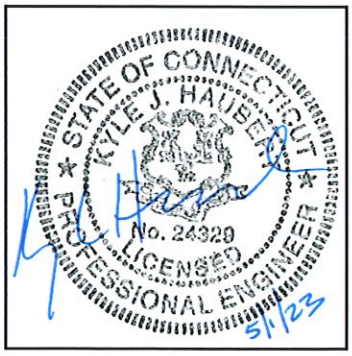

Kyle Haubert, P.E.

May 1, 2023

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ABBREVIATIONS

CF	Cubic Foot
CY	Cubic Yard
Gal.	Gallons
GPD	Gallons per Day
GPM	Gallons per Minute
LF	Linear Foot
LS	Lump Sum
SF	Square Foot
SY	Square Yard
VF	Vertical Foot

1. Narrative

The Norwich Golf Course is owned and operated by the City of Norwich, and is located at 685 New London Turnpike, Norwich, Connecticut. Portions of the course are located in the City of Norwich and the Town of Montville. The Town boundary is located along the centerline of Trading Cove Brook. The golf course is located on the east and west side of Trading Cove Brook. An existing wooden golf cart and pedestrian bridge is located on the property for use by golfers to cross Trading Cove Brook moving from the ninth green to the tenth tee as shown on the bridge replacement plans. The bridge is primarily used by golfers (pedestrians) and golf carts playing the course and occasional maintenance staff with light duty equipment. The Golf Course Authority is contemplating replacing this bridge due to the structural inadequacy and public safety concerns.

A golf cart and pedestrian bridge had been installed in this general located since the golf course was constructed in the early 1920's. A bridge is visible in this location on the 1934 aerial imagery as shown in Figure 5. A call-out for the bridge is not sown on the FEMA mapping and a structure is not shown on the Trading cove Brook Flood profile included in Appendix A; it is assumed that the bridge was not model modeled as part of the FEMA hydraulic analyses.

The existing bridge is an approximately 7-wide wooden construction with eight 4"x4" posts with cross bracing located within the Trading Cove Brook stream channel. The posts are supported in concrete filled 5-gallon buckets resting on the channel bottom. Wood decking and an artificial turf surface are installed over the substructure. Cable tiebacks are attached to the bridge to secure it in place. Photographs of the existing structure are included in Section 5 of this report. The existing bridge provides no upstream detention. Maintenance staff has performed periodic repairs on the existing bridge, but it has become structurally inadequate and is in need of replacement.

The proposed bridge replacement will occur at the same location and will not involve significant re-alignment of the existing golf cart path. The design for the new cart and pedestrian bridge will be a 7-wide structure that will span the Trading Cove Brook stream channel. New pile supported concrete foundations will be constructed on each side of the brook. A prefabricated steel bridge with wood decking will be installed on these foundations spanning the stream channel. Details for the new bridge design are included in the bridge replacement plans. The low chord of the new bridge will follow the slope of the existing bridge sloping from elevation 21.5 to the west and 25.8 to the east. The new bridge design will allow the existing natural stream bottom to remain. The existing timber post obstructions within the channel will be removed.

2. Hydrologic Conditions

The area of concern for this hydrologic study consists of an approximately 13 square mile watershed for Trading Cove Brook located upstream of the existing wood pedestrian and golf cart bridge. Trading Cove Brook watershed is a tributary to the Thames River. Flow through the watershed is primarily north to south. The watershed limits are shown on Figure 1 and Figure 2.

Peak discharge data for Trading Cove Brook was available from the FEMA Flood Insurance Study (FIS) of New London County (April 3, 2020 revision). Trading Cove Brook was studied by detailed methods from the confluence with the Thames River to approximately 300 feet upstream of the confluence with Goldmine Brook in Norwich, CT. The cart/pedestrian bridge location lies within the range of the FIS at approximately 3,000 feet upstream of the confluence with Trading Cove. As indicated in the ConnDOT Drainage Manual, Section 6.1.10 the FEMA FIS discharge rates are an acceptable for analysis where the regulatory floodway is adopted or where FEMA has established discharge for a watercourse. There is regulatory floodway and established discharges for Trading Cove Brook at the project location. An excerpt from FEMA Summary Discharge Table is included in Appendix A.

There also is not any physical evidence or high water marks present to indicate the flow level associated with previous flood events.

The FEMA FIS determined the peak discharge rate for Trading Cove Brook at the Confluence with Trading Cove. The cart/pedestrian bridge is located approximately 3,000 feet up stream of this discharge point. As a conservative measure, and to maintain consistency with the FEMA FIS the peak flow rates for this discharge point will be used. The peak flow rates for the project are summarized in Table 1.

Table 1

	Peak Discharge (cfs)					
Data Source & Location	50% Annual Chance (2-Year)	10% Annual Chance (10-Year)	4% Annual Chance (25-Year)	2% Annual Chance (50-Year)	1% Annual Chance (100-Year)	0.2% Annual Chance (500-Year)
FIS: Trading Cove Brook @ confluence with Trading Cove	480 *	1,240	1,450 *	2,100	2,380	4,000

* Interpolated from Frequency Discharge Plot

3. Hydraulic Conditions

The existing and proposed hydraulics for the bridge have been analyzed using the peak flow rate data was available from the FEMA Flood Insurance Study (FIS) of New London County for Trading Cove Brook as outlined in Section 2.

A FEMA data request was submitted for the existing hydraulic model data for Trading Cove Brook. Existing hydraulic data is not available for this reach of Trading Cove Brook. Data is only available for sections "E" through "M"; the bridge is located midway between sections "C" and "D". A copy of the response from FEMA is included in Appendix A

Since existing cross section data was not available, the cross sections were modeled using field survey data at the bridge and the 2016 Connecticut Statewide LIDAR (1-ft contours) for the surrounding areas. The Connecticut Statewide LIDAR topography meets the standards of the USGS Base Specification 1.2, QL2 meeting 19.6 cm NVA. FEMA Roughness coefficients for the channel and overbank areas are included in Appendix A.

The hydraulic analysis for the existing and proposed conditions have been performed using the Army Corps of Engineers HEC-RAS modeling software. It was assumed that the existing bridge was not modeled as part of the previous FEMA hydraulic analysis. The existing bridge was not included in the existing condition run for the current hydraulic analysis. The existing conditions run is therefore equivalent to the natural run. The HEC-RAS data is included in Appendix B.

The water surface elevations for the existing/natural conditions for the 100-year and 10-year storm events are summarized in Table 2. Average channel velocities for the existing/natural conditions for the 100-year and 10-year storm events are summarized in Table 3. Water surface profile plots are included in Appendix C. Cross section plots are included in Appendix D.

The proposed bridge structure was designed with the intent of allowing floodwaters to pass through the structure without negatively impacting upstream or downstream flood elevations. Due to the ground elevation on the west side of Trading Cove Brook it was not feasible to raise the structure above the flood elevation. The proposed prefabricated steel bridge will be constructed to allow floodwaters to pass through as shown on the bridge replacement plans. The bridge will be fixed to the new foundations to remain secure during a flood event and not float or become dislodged.

The water surface elevations for the proposed conditions are summarized in Table 2. Water surface profile plots are included in Appendix C. Cross section plots are included in Appendix D. The proposed bridge will raise the upstream water elevation a maximum of 0.13-FT (1.6-inches) for

the 100-year storm event. This change in water surface elevation will have no negative impact to the upstream or downstream areas.

Average channel velocities for the existing and proposed conditions are summarized in Table 3 for the 100-year and 10-year storm events. The upstream channel velocities are reduced slightly. The reduction in channel velocity will have no negative affect to the stream channel.

Conclusions

Based on available data, it does not appear that a bridge was modeled as part of the FEMA hydraulic study for Trading Cove Brook. However, a bridge has been in place over Trading Cove Brook in this location since the golf course was constructed in the 1920's. Evidence of a bridge in this location is present on the 1934 aerial as shown on Figure 5. The existing wooden bridge that has been has been in place is constructed with wood posts within the brook channel, creating and obstruction for flow. The proposed bridge creates a negligible rise in the water surface elevations upstream of the bridge (in comparison to the natural condition) that will have no negative impact on Trading Cove Brook or the Surrounding area. The new clear span bridge over the brook will provide improvements to the flow by removing the existing obstructions within the channel.

Table 2 – Water Surface Elevations

Water Surface Elevations: 100-Year Storm				
River Station		Water Surface Elevation		
		Existing / Natural	Proposed	Change (FT)
1177.100	FEMA "D-D"	27.19	27.24	0.05
689.900		25.60	25.73	0.13
679.630		25.50	25.63	0.13
670.310	Bridge			0.00
663.210		25.35	25.35	0.00
648.150		25.22	25.22	0.00
60.180	FEMA "C-C"	21.50	21.50	0.00

Water Surface Elevations: 10-Year Storm				
River Station		Water Surface Elevation		
		Existing / Natural	Proposed	Change (FT)
1177.100	FEMA "D-D"	25.55	25.58	0.03
689.900		24.17	24.27	0.10
679.630		24.10	24.20	0.10
670.310	Bridge			0.00
663.210		23.96	23.96	0.00
648.150		23.86	23.86	0.00
60.180	FEMA "C-C"	20.42	20.42	0.00

Table 3 – Average Channel Velocities

Average Channel Velocity: 100-Year Storm				
River Station		Velocity (FT/S)		
		Existing / Natural	Proposed	Change (FT/S)
1177.100	FEMA "D-D"	2.03	2.01	-0.02
689.900		4.35	4.24	-0.11
679.630		4.60	4.47	-0.13
670.310	Bridge			0.00
663.210		4.65	4.65	0.00
648.150		4.49	4.49	0.00
60.180	FEMA "C-C"	2.40	2.40	0.00

Average Channel Velocity: 10-Year Storm				
River Station		Velocity (FT/S)		
		Existing / Natural	Proposed	Change (FT/S)
1177.100	FEMA "D-D"	1.69	1.67	-0.02
689.900		3.20	3.11	-0.09
679.630		3.36	3.26	-0.10
670.310	Bridge			0.00
663.210		3.57	3.57	0.00
648.150		3.41	3.41	0.00
60.180	FEMA "C-C"	1.97	1.97	0.00

4. Temporary Water Handling

Temporary water handling measures will not be needed during construction. Trading Cove Brook will be allowed to flow through the natural channel during construction. Foundations will be constructed on each side of the brook; access is available from each side without crossing the brook. The prefabricated bridge structure will be installed via a crane and will completely span the brook. The timber posts for the existing bridge will be removed by hand.

5. Site Photographs

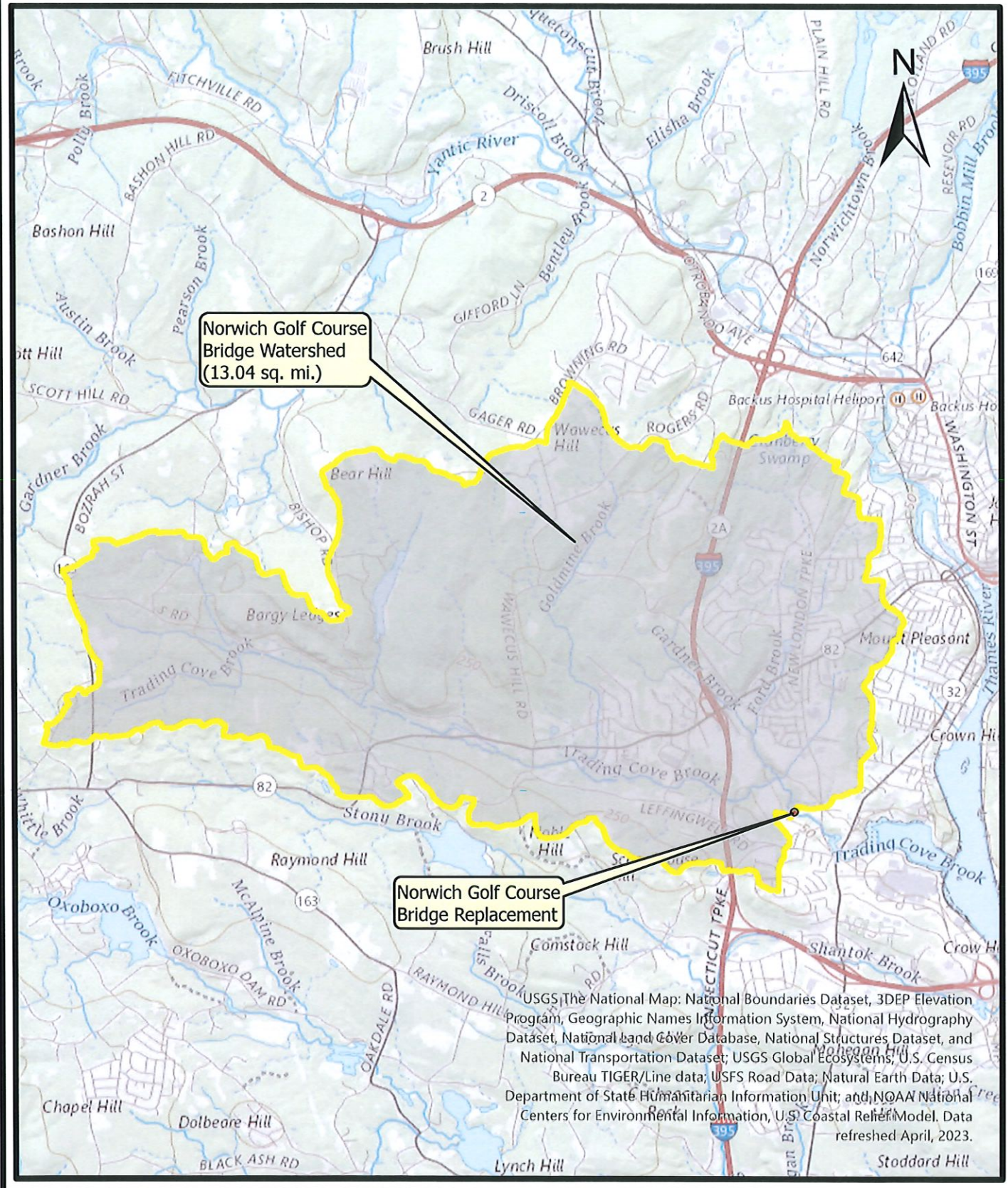
Picture 1: Existing cart/pedestrian bridge looking at upstream side (looking southeast)

Picture 2: Existing cart/pedestrian bridge looking at downstream side (looking northeast)

Picture 3: Trading Cove Brook upstream of the bridge

Picture 4: Trading Cove Brook downstream of the bridge

FIGURES



Green Site Design LLC
CONSULTING CIVIL ENGINEERS

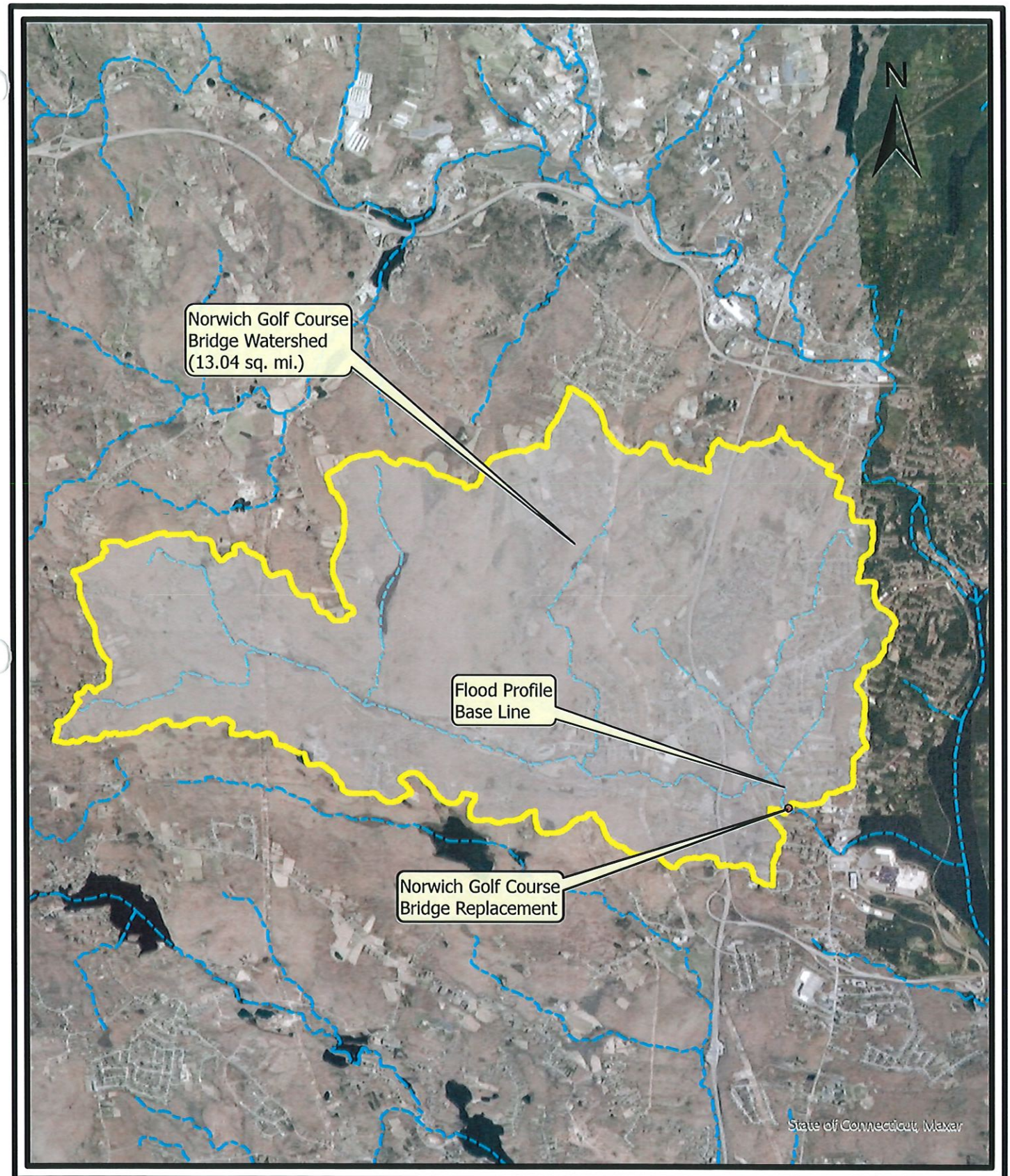
LOCATION & WATERSHED MAP

HYDRAULIC DESIGN REPORT
NORWICH GOLF COURSE BRDIGE
TRADING COVE BROOK

DATE: 4/18/2023

SCALE: 1" = 5,000'

FIGURE
1



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CONSULTING CIVIL ENGINEERS

AERIAL LOCATION & WATERSHED MAP

HYDRAULIC DESIGN REPORT
NORWICH GOLF COURSE BRDIGE
TRADING COVE BROOK

DATE: 4/18/2023

SCALE: 1" = 5,000'

FIGURE
2

Green Site Design LLC
CONSULTING CIVIL ENGINEERS

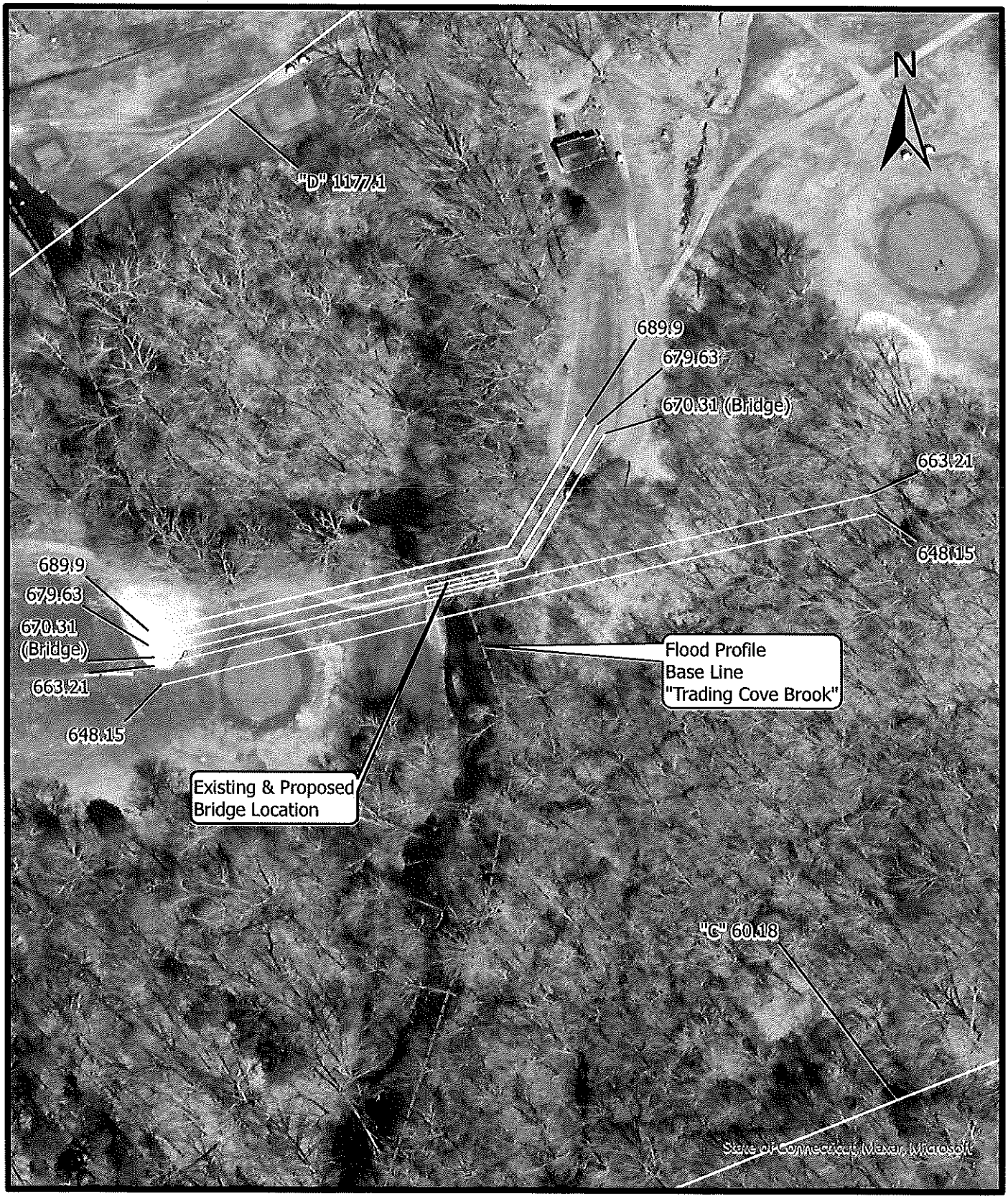
HYDRAULIC SECTION LOCATIONS

HYDRAULIC DESIGN REPORT
NORWICH GOLF COURSE BRDIGE
TRADING COVE BROOK

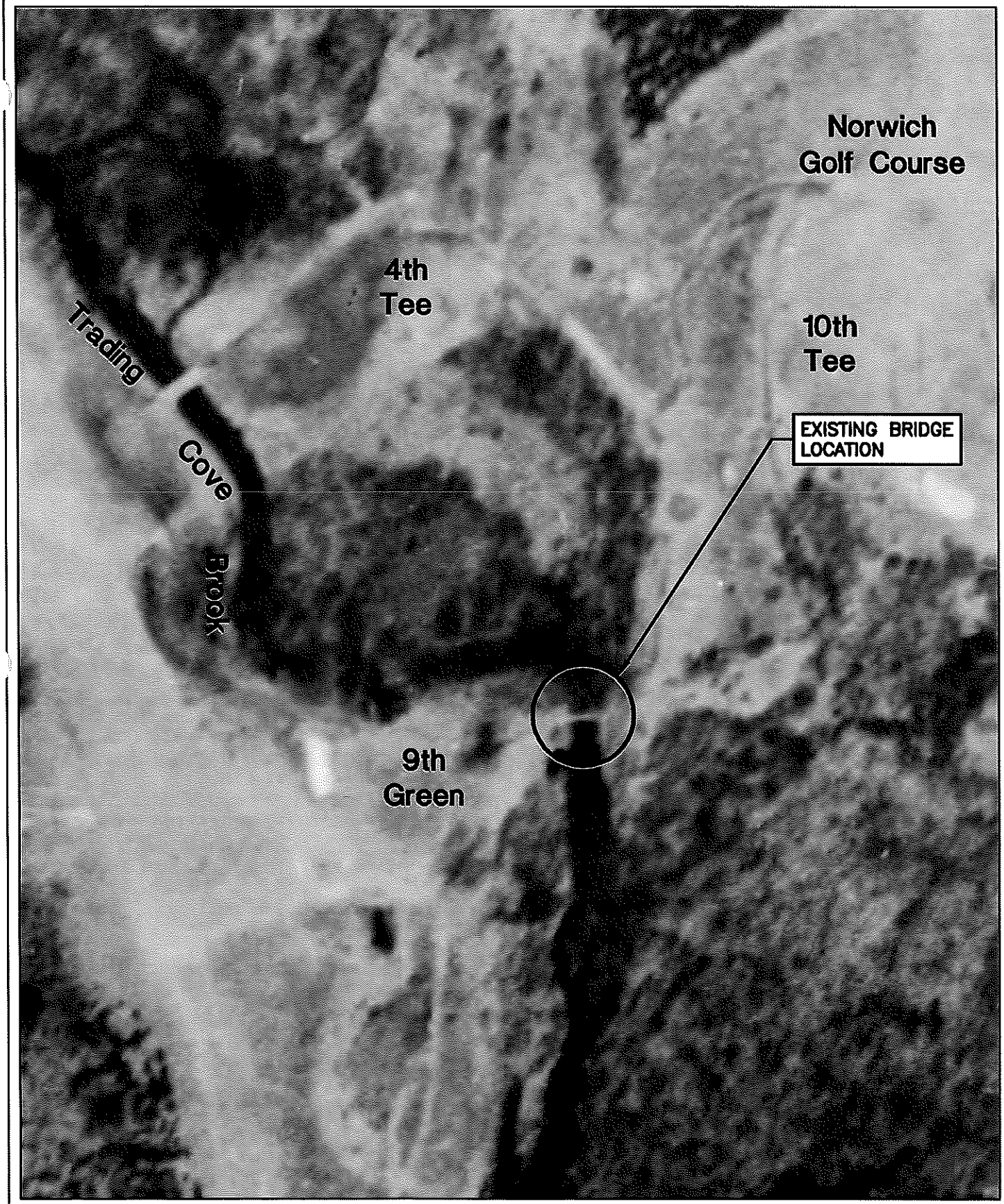
DATE: 4/18/2023

SCALE: 1" = 200'

FIGURE
3



Green Site Design LLC CONSULTING CIVIL ENGINEERS	**HYDRAULIC SECTION LOCATIONS**	FIGURE **4**
	HYDRAULIC DESIGN REPORT NORWICH GOLF COURSE BRDIGE TRADING COVE BROOK	DATE: 4/18/2023 SCALE: 1" = 100'



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1934 AERIAL MAP

Hydraulic Design Report
Norwich Golf Course
Golf Cart & Pedestrian Bridge
Over Trading Cove Brook

DATE: 5/1/2023
SCALE: 1"=200'
PROJ: GSD-65

N

Figure
5

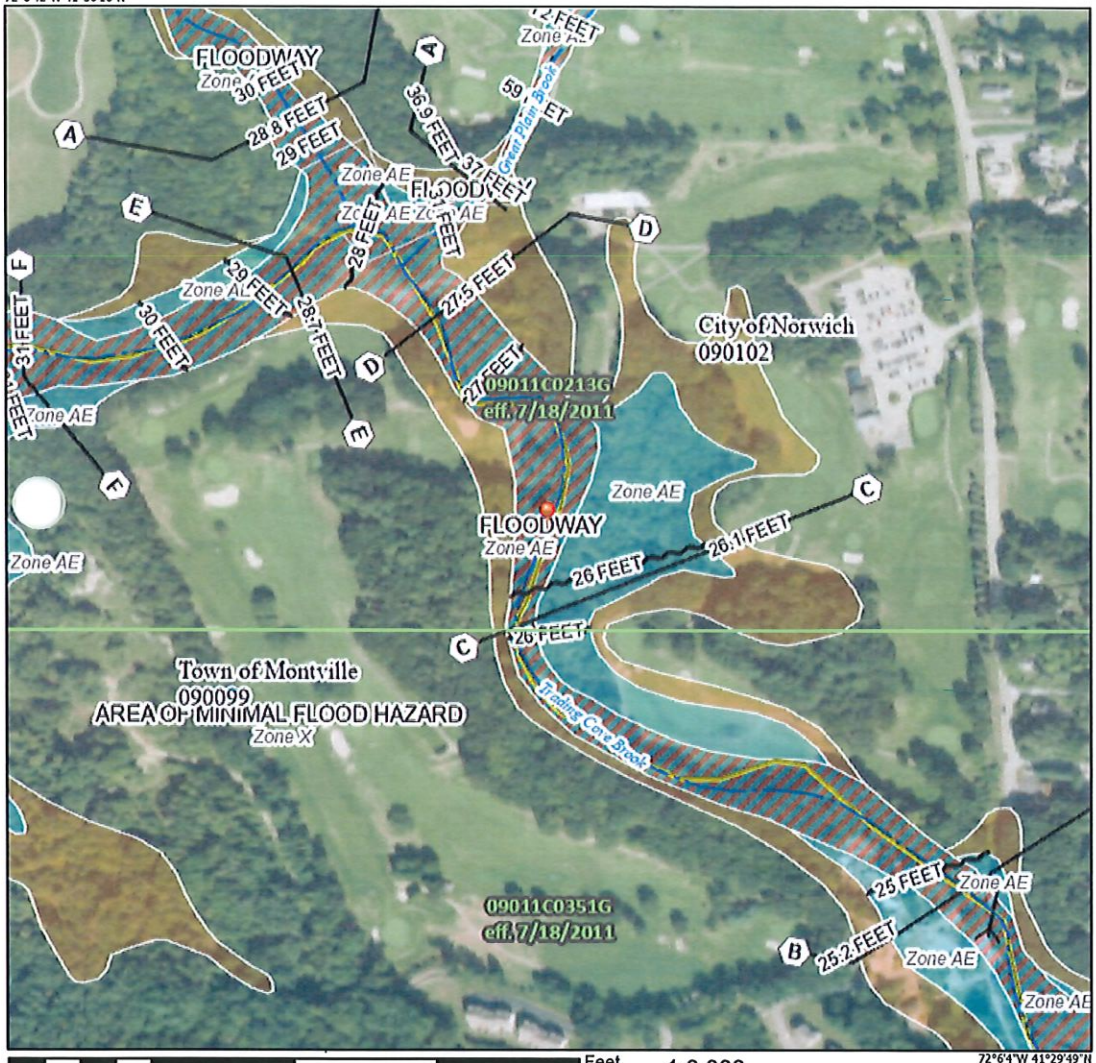
APPENDIX A

FEMA DATA

National Flood Hazard Layer FIRMette

FEMA

72°6'42"W 41°30'16"N



72°6'4"W 41°29'49"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

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
- 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 5/1/2023 at 9:15 AM 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.

From: Library Request
To: K Haubert
Subject: FEMA Data Request
Date: Friday, December 2, 2022 10:46:45 AM

fema-engineeringlibrary@fema.dhs.gov has sent you an attachment(s) using Baker eFTP

Message Text:

We only have data for cross sectins e thru m of Trading Cove Brook. This data has not been updated since the earlyu 1990s and is not available digitally.

Thank you,

Susan

To retrieve your attachment(s), click on the secure link below.
https://eFTP.mbakerintl.com/message/1yxc5zfFa2jCyF6NCv30y6

Access to this information will expire on 2022-12-09

First time user of the Michael Baker Intl. eFTP system? Click this link for assistance with the new user creation process. If you are unable to access this website, contact the Michael Baker IT Support Desk at 1-866-447-6333 or e-mail us at ITServices@mbakerintl.com

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Shunock River	At Rocky Hollow Road (North Stonington)	8	596	*	917	1,165	1,775
Spaulding Pond Brook	At Chestnut Avenue (Norwich)	0.98	140	*	230	300	370
Spaulding Pond Brook	At Mohegan Park Road No. 2 (Norwich)	0.5	85	*	140	180	220
Susquetonscut Brook (Town of Franklin)	At Franklin corporate limits	15.8	1,080	*	1,790	2,180	3,200
Susquetonscut Brook (Town of Franklin)	At Meeting House Hill Road (Franklin)	12.7	930	*	1,540	1,870	2,750
Susquetonscut Brook (Town of Lebanon)	At Franklin-Lebanon corporate limits	10.9	*	*	*	2,470	*
Susquetonscut Brook (Town of Lebanon)	Upstream of Route 207	5.65	*	*	*	1,900	*
Susquetonscut Brook (Town of Lebanon)	Upstream of Chappel Road (Lebanon)	4.41	*	*	*	1,500	*
Susquetonscut Brook (Town of Lebanon)	Upstream of confluence with Burgess Brook	2.53	*	*	*	822	*
Tenmile River	At confluence with Williamantic River	17	*	*	*	3,000	*
Tenmile River	Upstream of confluence with Giffords Brook	6.09	*	*	*	1,500	*
Thames River		*	*	*	*	*	*
Trading Cove Brook	At confluence with Trading Cove	13.4	1,240	*	2,100	2,380	400
Trading Cove Brook	At Connecticut Turnpike (State Route 52)	8.57	900	*	1,540	1,740	2,980
Tributary A	At confluence with Birch Plain Creek	1.39	170	*	270	330	500
Tributary A	At U.S. Route 1	0.90	150	*	250	300	440
Tributary A	At junction at Norwichtown Brook	0.72	160	*	270	350	420
Tributary B (Norwich)	At junction at Yantic River	0.98	240	*	430	560	670

Flooding Source	Channel "n"	Overbank "n"
Norwichtown Brook	0.035 - 0.045	0.050 - 0.085
Oxoboxo Brook	0.009 - 0.060	0.030 - 0.080
Pachaug River	0.020 - 0.050	0.025 - 0.060
Pachaug River (Town of Voluntown)	*	*
Pattagansett River	0.01	0.010 - 0.020
Pawcatuck River	0.025 - 0.055	0.04 - 0.18
Pine Swamp Brook	0.030 - 0.055	0.050 - 0.075
Quinebaug River (Jewett City, Griswold)	0.020 - 0.050	0.035 - 0.085
Quinebaug River (Lisbon)	0.030 - 0.050	0.040 - 0.080
Quinebaug River (Preston)	0.030 - 0.045	0.040 - 0.060
Shetucket River (Lisbon, Preston)	0.050 - 0.080	0.08
Shetucket River (Norwich)	0.040 - 0.060	0.060 - 0.120
Shetucket River (Sprague)	0.030 - 0.080	0.040 - 0.090
Shewville Brook	0.035 - 0.050	0.035 - 0.080
Shunock River (North Stonington)	0.030 - 0.055	0.030 - 0.100
Spaulding Pond Brook	0.040 - 0.060	0.060 - 0.120
Susquetonscut Brook (Town of Franklin)	0.035 - 0.060	0.06 - 0.12
Susquetonscut Brook (Town of Lebanon)	*	*
Ten Mile River	*	*
Thames River	*	*
Trading Cove Brook	0.060 - 0.100	0.080 - 0.120
Tributary A	0.016 - 0.080	0.030 - 0.080
Tributary B	0.040 - 0.060	0.060 - 0.120
Tributary C	0.040 - 0.060	0.060 - 0.120
Tributary D	0.040 - 0.060	0.060 - 0.120
Tributary E	0.040 - 0.060	0.060 - 0.120
Tributary F	0.040 - 0.060	0.060 - 0.120
Whitford Brook (Groton)	0.015 - 0.050	0.030 - 0.090
Whitford Brook (North Stonington)	0.020 - 0.050	0.040 - 0.065
Williams Brook	0.024 - 0.060	0.035 - 0.080
Yantic River (Bozrah)	0.025 - 0.070	0.050 - 0.100
Yantic River (Franklin)	0.035 - 0.060	0.060 - 0.120
Yantic River (Norwich)	0.040 - 0.050	0.025 - 0.100
Yantic River East Channel	0.040 - 0.060	0.060 - 0.120

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	6,067	250	3,420	0.7	25.1	25.1	25.1	0.0
B	7,313	70	790	3.0	25.2	25.2	25.3	0.1
C	8,622	150	1,325	1.8	26.1	26.1	27.0	0.9
D	9,816	200	1,195	2.0	27.5	27.5	28.5	1.0
E	10,312	110	644	2.7	28.7	28.7	29.7	1.0
F	11,067	130	868	2.0	31.0	31.0	31.5	0.5
G	12,239	130	754	2.3	32.8	32.8	33.8	1.0
H	12,714	240	1,429	1.2	40.0	40.0	40.1	0.1
I	13,992	240	830	2.1	40.3	40.3	41.3	1.0
J	14,905	175	670	2.6	45.9	45.9	46.2	0.3
K	15,117	175	780	2.2	46.1	46.1	46.6	0.5
L	15,745	200	976	1.8	47.2	47.2	47.7	0.5
M	16,827	300	897	1.9	56.6	56.6	57.6	1.0
N	18,295	300	787	2.2	66.7	66.7	67.1	0.4

[1]Feet above confluence with Thames River

TABLE 23

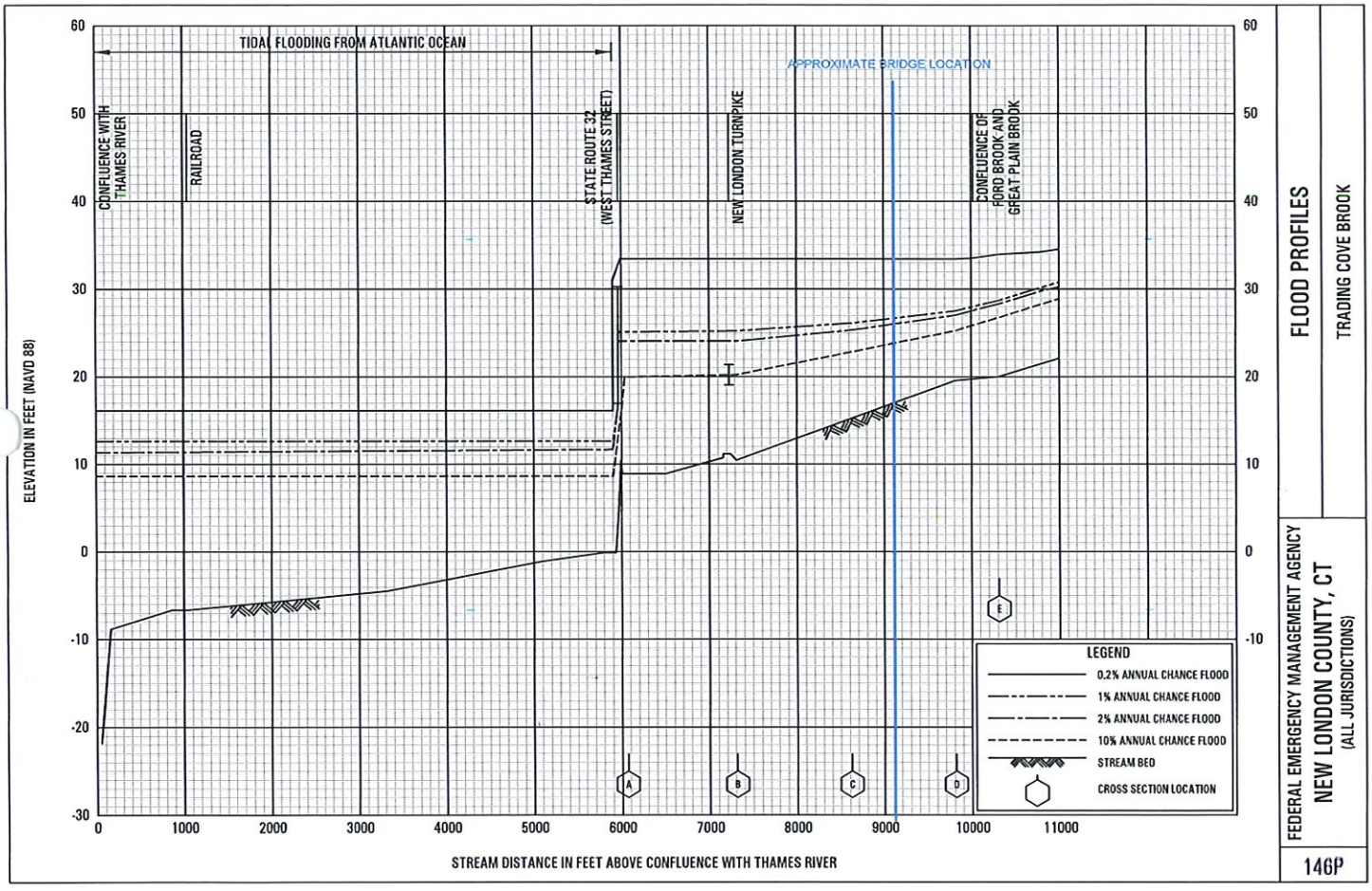
FEDERAL EMERGENCY MANAGEMENT AGENCY

NEW LONDON COUNTY, CONNECTICUT

(ALL JURISDICTIONS)

FLOODWAY DATA

FLOODING SOURCE: TRADING COVE BROOK



FLOOD PROFILES

TRADING COVE BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

NEW LONDON COUNTY, CT

(ALL JURISDICTIONS)

146P

APPENDIX B

HEC-RAS DATA

HEC-RAS River: Trading Cove Bro Reach: RiverCL

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)	
RiverCL	1177.1	10% Annual Chanc	Existing Plan	1240.00	20.00	25.55		25.57	0.001465	1.69	1103.03	370.40	0.13
RiverCL	1177.1	10% Annual Chanc	Proposed	1240.00	20.00	25.58		25.60	0.001423	1.67	1114.74	371.46	0.13
RiverCL	1177.1	2% Annual Chance	Existing Plan	2100.00	20.00	26.84		26.87	0.001462	1.98	1606.17	407.20	0.14
RiverCL	1177.1	2% Annual Chance	Proposed	2100.00	20.00	26.89		26.92	0.001412	1.93	1625.85	408.48	0.13
RiverCL	1177.1	1% Annual Chance	Existing Plan	2380.00	20.00	27.19		27.22	0.001471	2.03	1750.41	417.10	0.14
RiverCL	1177.1	1% Annual Chance	Proposed	2380.00	20.00	27.24		27.27	0.001422	2.01	1771.79	418.91	0.14
RiverCL	1177.1	0.2% Annual Chan	Existing Plan	4000.00	20.00	28.86		28.91	0.001525	2.40	2507.63	470.87	0.15
RiverCL	1177.1	0.2% Annual Chan	Proposed	4000.00	20.00	28.92		28.97	0.001473	2.37	2535.57	471.14	0.14
RiverCL	689.9	10% Annual Chanc	Existing Plan	1240.00	18.96	24.17		24.28	0.006089	3.20	497.93	136.26	0.26
RiverCL	689.9	10% Annual Chanc	Proposed	1240.00	18.96	24.27		24.37	0.005623	3.11	510.81	136.65	0.25
RiverCL	689.9	2% Annual Chance	Existing Plan	2100.00	18.96	25.31		25.49	0.007519	4.09	658.52	143.33	0.30
RiverCL	689.9	2% Annual Chance	Proposed	2100.00	18.96	25.43		25.60	0.006939	3.99	674.09	144.07	0.29
RiverCL	689.9	1% Annual Chance	Existing Plan	2380.00	18.96	25.60		25.81	0.007974	4.35	699.31	145.13	0.31
RiverCL	689.9	1% Annual Chance	Proposed	2380.00	18.96	25.73		25.92	0.007375	4.24	717.58	145.90	0.30
RiverCL	689.9	0.2% Annual Chan	Existing Plan	4000.00	18.96	27.00		27.34	0.010219	5.64	907.65	152.92	0.36
RiverCL	689.9	0.2% Annual Chan	Proposed	4000.00	18.96	27.14		27.46	0.009592	5.53	928.76	154.51	0.35
RiverCL	679.63	10% Annual Chanc	Existing Plan	1240.00	18.92	24.10		24.22	0.006080	3.36	485.94	132.68	0.27
RiverCL	679.63	10% Annual Chanc	Proposed	1240.00	18.92	24.20	21.76	24.31	0.005593	3.26	499.22	132.96	0.26
RiverCL	679.63	2% Annual Chance	Existing Plan	2100.00	18.92	25.21		25.41	0.007712	4.32	638.55	138.74	0.31
RiverCL	679.63	2% Annual Chance	Proposed	2100.00	18.92	25.34	22.44	25.52	0.007078	4.20	654.60	139.24	0.30
RiverCL	679.63	1% Annual Chance	Existing Plan	2380.00	18.92	25.50		25.72	0.008208	4.60	676.80	139.86	0.32
RiverCL	679.63	1% Annual Chance	Proposed	2380.00	18.92	25.63	22.64	25.84	0.007550	4.47	695.50	140.38	0.31
RiverCL	679.63	0.2% Annual Chan	Existing Plan	4000.00	18.92	26.85		27.23	0.010836	6.01	869.93	146.56	0.38
RiverCL	679.63	0.2% Annual Chan	Proposed	4000.00	18.92	27.00	23.61	27.36	0.010063	5.86	891.71	147.38	0.37
RiverCL	663.21	10% Annual Chanc	Existing Plan	1240.00	18.97	23.98		24.10	0.007629	3.57	445.77	128.17	0.29
RiverCL	663.21	10% Annual Chanc	Proposed	1240.00	18.97	23.98		24.10	0.007629	3.57	445.77	128.17	0.29
RiverCL	663.21	2% Annual Chance	Existing Plan	2100.00	18.97	25.05		25.27	0.008922	4.44	636.61	216.19	0.33
RiverCL	663.21	2% Annual Chance	Proposed	2100.00	18.97	25.05		25.27	0.008922	4.44	636.62	216.19	0.33
RiverCL	663.21	1% Annual Chance	Existing Plan	2380.00	18.97	25.35		25.58	0.009175	4.65	702.15	234.01	0.33
RiverCL	663.21	1% Annual Chance	Proposed	2380.00	18.97	25.35		25.58	0.009175	4.65	702.15	234.01	0.33
RiverCL	663.21	0.2% Annual Chan	Existing Plan	4000.00	18.97	26.73		27.03	0.009920	5.55	1039.63	252.50	0.36
RiverCL	663.21	0.2% Annual Chan	Proposed	4000.00	18.97	26.73		27.03	0.009920	5.55	1039.63	252.50	0.36
RiverCL	648.15	10% Annual Chanc	Existing Plan	1240.00	18.85	23.86		23.99	0.007201	3.41	453.90	155.67	0.28
RiverCL	648.15	10% Annual Chanc	Proposed	1240.00	18.85	23.86		23.99	0.007201	3.41	453.90	155.67	0.28
RiverCL	648.15	2% Annual Chance	Existing Plan	2100.00	18.85	24.93		25.13	0.008445	4.26	650.25	202.87	0.32
RiverCL	648.15	2% Annual Chance	Proposed	2100.00	18.85	24.93		25.13	0.008444	4.26	650.26	202.87	0.32
RiverCL	648.15	1% Annual Chance	Existing Plan	2380.00	18.85	25.22		25.44	0.008800	4.49	715.62	238.78	0.33
RiverCL	648.15	1% Annual Chance	Proposed	2380.00	18.85	25.22		25.44	0.008800	4.49	715.62	238.78	0.33
RiverCL	648.15	0.2% Annual Chan	Existing Plan	4000.00	18.85	26.59		26.89	0.009590	5.40	1053.09	255.94	0.35
RiverCL	648.15	0.2% Annual Chan	Proposed	4000.00	18.85	26.59		26.89	0.009590	5.40	1053.09	255.94	0.35
RiverCL	60.18	10% Annual Chanc	Existing Plan	1240.00	17.00	20.42	18.89	20.46	0.005009	1.97	808.74	384.44	0.22
RiverCL	60.18	10% Annual Chanc	Proposed	1240.00	17.00	20.42	18.89	20.46	0.005009	1.97	808.74	384.44	0.22
RiverCL	60.18	2% Annual Chance	Existing Plan	2100.00	17.00	21.27	19.26	21.32	0.005003	2.32	1151.48	417.20	0.23
RiverCL	60.18	2% Annual Chance	Proposed	2100.00	17.00	21.27	19.25	21.32	0.005003	2.32	1151.45	417.20	0.23
RiverCL	60.18	1% Annual Chance	Existing Plan	2380.00	17.00	21.50	19.36	21.56	0.005001	2.40	1250.47	423.46	0.23
RiverCL	60.18	1% Annual Chance	Proposed	2380.00	17.00	21.50	19.36	21.56	0.005001	2.40	1250.47	423.46	0.23
RiverCL	60.18	0.2% Annual Chan	Existing Plan	4000.00	17.00	22.77	19.82	22.85	0.005005	2.83	1832.66	514.68	0.24
RiverCL	60.18	0.2% Annual Chan	Proposed	4000.00	17.00	22.77	19.82	22.85	0.005005	2.83	1832.66	514.68	0.24

HEC-RAS Plan: Proposed River: Trading Cove Bro Reach: RiverCL

Reach	River Sta	Profile	E.G. US.	Min El Prs	BR Open Area	Prs O WS	Q Total	Min El Weir Flow	Q Weir	Delta EG	BR Sluice Coef
			(ft)	(ft)	(sq ft)	(ft)	(cfs)	(ft)	(cfs)	(ft)	
RiverCL	670.31	10% Annual Chanc	24.31	25.45	133.55		1240.00	20.43		0.21	
RiverCL	670.31	2% Annual Chance	25.52	25.45	133.55		2100.00	20.43		0.26	
RiverCL	670.31	1% Annual Chance	25.84	25.45	133.55		2380.00	20.43		0.26	
RiverCL	670.31	0.2% Annual Chan	27.36	25.45	133.55		4000.00	20.43		0.32	

HEC-RAS HEC-RAS 6.3.1 September 2022
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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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: Trading Cove Brook
Project File : TradingCoveBrook.prj
Run Date and Time: 5/1/2023 4:02:48 PM

Project in English units

PLAN DATA

Plan Title: Proposed
Plan File : y:\PROJECTS\65 - Norwich Golf Course Bridge\Studies-Calculations\HEC-RAS\Final\TradingCoveBrook.p03

Geometry Title: Proposed Conditions
Geometry File : y:\PROJECTS\65 - Norwich Golf Course Bridge\Studies-Calculations\HEC-RAS\Final\TradingCoveBrook.g01

Flow Title : FEMA FIS
Flow File : y:\PROJECTS\65 - Norwich Golf Course Bridge\Studies-Calculations\HEC-RAS\Final\TradingCoveBrook.f01

Plan Summary Information:

Number of:	Cross Sections	6	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: FEMA FIS
Flow File : y:\PROJECTS\65 - Norwich Golf Course Bridge\Studies-Calculations\HEC-RAS\Final\TradingCoveBrook.f01

Flow Data (cfs)

River	Reach	RS	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Trading Cove Bro	RiverCL	1177.1	1240	2100	2380	4000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Trading Cove Bro	RiverCL	10% Annual Chance		Normal S = 0.005
Trading Cove Bro	RiverCL	2% Annual Chance		Normal S = 0.005
Trading Cove Bro	RiverCL	1% Annual Chance		Normal S = 0.005
Trading Cove Bro	RiverCL	0.2% Annual Chance		Normal S = 0.005

GEOMETRY DATA

Geometry Title: Proposed Conditions
Geometry File : y:\PROJECTS\65 - Norwich Golf Course Bridge\Studies-Calculations\HEC-RAS\Final\TradingCoveBrook.g01

CROSS SECTION

RIVER: Trading Cove Bro
REACH: RiverCL RS: 1177.1

INPUT

Description:
Station Elevation Data num= 344

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	28.78	7.27	28.04	7.5	28	7.89	27.96	8.7	27.86
9.32	27.78	13.8	27	21.5	26.05	21.94	26	22.4	25.95
30.56	25	31.45	24.88	37.65	24	37.95	23.95	43.2	23
49.52	22.45	49.78	22.42	50.08	22.39	50.8	22.33	51.72	22.25
52.25	22.21	52.84	22.16	53.49	22.11	54.18	22.06	54.92	22.01
55.04	22	61.94	22	69.58	21.71	75.47	21.48	76.85	21.45
77.23	21.45	78.8	21.44	79.35	21.43	83.53	21.33	83.71	21.33
83.89	21.34	90.67	21.28	95.69	21.25	96.34	21.25	98.32	21.27
100.59	21.29	101.07	21.29	106.87	21.38	118.55	21.59	122.11	21.64
137.43	22	141.16	22	144.79	22.01	152.18	22	152.33	22
153.88	21.36	155.32	21	157.03	20.2	157.42	20.03	157.5	20
159.72	20	166.7	20.01	170.35	20.01	175.78	20	188.59	20
189.26	20.05	189.31	20.05	189.41	20.06	190.59	20.16	194.67	20.49
200.56	21	202.73	21.55	202.87	21.57	203.02	21.58	203.2	21.59
203.38	21.6	203.74	21.61	203.99	21.67	206.64	21.65	207.06	21.71
207.21	21.73	212.03	21.95	214.61	21.92	218.83	22	219.48	22
224.73	22.01	224.94	22.01	231.31	22	235.87	22	263.81	22.92
265.01	22.96	265.57	22.96	267.49	22.97	267.5	22.97	272.13	23
282.03	23	286.15	23.31	287.36	23.34	288.03	23.38	288.64	23.41
289.21	23.42	294.57	23.64	298.24	23.68	299.45	23.7	300.54	23.71
304.08	23.75	304.95	23.77	305.47	23.77	310.91	23.92	310.99	23.92
311.87	23.94	312.17	23.94	312.71	23.95	313.84	23.97	316.93	23.99
317.41	24	343.99	24	346.66	24.01	347.96	24.01	350.15	24.15
356.33	24.57	356.43	24.57	363.51	24.66	363.61	24.66	368.7	24.75
375.54	24.89	379.42	24.99	380.08	24.99	380.24	25	392.85	25.42
394.22	25.47	395.39	25.52	395.73	25.53	396.05	25.54	407.59	26
422.7	26.86	425.36	27	427.21	27.1	439.04	27.5	443.79	27.64
444.66	27.69	444.83	27.68	445.5	27.71	445.8	27.71	446.09	27.7
446.27	27.71	446.45	27.72	446.68	27.71	446.87	27.71	447.06	27.72
448.25	27.72	450.83	27.7	451.24	27.7	451.44	27.69	451.64	27.69
451.83	27.68	453.4	27.62	454.27	27.59	455.78	27.6	458.44	27.58
461.11	27.61	466.23	28	468.76	28.45	470.96	28.88	471.46	29
473.14	29.51	474.83	30	475.05	30.05	478.86	31	480.5	31.43
482.79	32	485.08	32.7	485.92	33	486.3	33.15	488.86	34
490.13	34.38	491.99	35	493.7	35.51	495.29	36	497.57	36.7
498.52	37	499.86	37.52	500.5	37.78	500.99	38	501.98	38.33
503.85	39	504.53	39.25	506.28	40	507.03	40.3	508.93	41
511.05	41.84	511.46	42	512.84	42.55	513.95	43	514.48	43.26
516.22	44	517.33	44.53	518.34	45	520.22	45.99	520.24	46
520.48	46.09	521.96	46.66	522.93	47	523.32	47.14	526.18	48
529.37	48.93	529.67	49	534.39	49.8	535.48	50	540.19	50.04
558.35	50.17	573.27	50.07	577.1	50.04	577.65	50.04	578.02	50.03
578.57	50.03	579.71	50.02	580.32	50.04	580.53	50.04	580.74	50.03
581.23	50.01	581.33	50.01	581.64	50	585.96	49.97	586.35	49.97
586.4	49.96	587.34	49.96	589.14	49.95	590.99	49.95	591.1	49.94
591.95	49.94	593.88	49.92	593.99	49.91	594.13	49.91	595.85	49.89
597.96	49.88	598.58	49.88	610.13	49.5	610.31	49.47	610.55	49.43
610.69	49.41	610.91	49.41	611.03	49.4	614.73	49.03	614.94	49.01
615.02	49	615.16	49	615.24	48.99	615.62	48.99	615.76	48.98
616.2	48.98	617.36	48.96	618.69	48.95	618.91	48.95	620.12	48.96
622.12	48.83	622.6	48.82	622.84	48.82	625.23	48.72	625.81	48.7
628.3	48.59	628.92	48.57	629.52	48.54	629.7	48.53	629.86	48.52
630.01	48.51	633.59	48.42	638.87	48.19	642.43	48.01	643.11	48

652.6	47.14	653.98	47	655.79	46.9	656.13	46.88	666.01	46.32
667.01	46.28	669.94	46.16	671.23	46.12	671.72	46.1	671.78	46.1
672.59	46.07	672.61	46.07	673.17	46.05	673.21	46.04	673.49	46.04
673.77	46.03	674.07	46.02	674.46	46.02	675.02	46.01	682.61	46.01
683.37	46	683.93	46	684.79	45.97	685.58	45.93	686.7	45.88
689.57	45.7	689.76	45.69	690.07	45.69	692.64	45.55	693.61	45.54
694.39	45.51	694.67	45.51	695.76	45.52	696.42	45.51	697.1	45.5
702.75	45.38	708.16	45.17	708.37	45.18	708.59	45.18	709.07	45.22
709.68	45.19	710.56	45.18	711.22	45.18	711.65	45.19	712.05	45.2
712.4	45.22	718.32	45.67	718.71	45.7	720.06	45.81	720.47	45.84
720.57	45.85	720.99	45.85	721.46	45.87	721.98	45.88	723.03	45.89
723.71	45.87	728.56	45.82	729.41	45.78	730.09	45.74	739.56	45
740.63	44.86	740.92	44.83	743.21	44.71	748.81	44.31	749.34	44.28
749.93	44.22	750.56	44.14	750.69	44.13	750.85	44.1	751.46	44
752.74	43.77	756.94	43	760	42.56	760.39	42.51	760.66	42.49
760.96	42.47	761.5	42.41	762.54	42.37	764.75	42.26		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	152.18	.1	207.06	.12

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
152.18	207.06	487.2	487.2	.1	.3

CROSS SECTION OUTPUT Profile #10% Annual Chanc

E.G. Elev (ft)	25.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.120	0.100	0.120
W.S. Elev (ft)	25.58	Reach Len. (ft)	487.20	487.20	487.20
Crit W.S. (ft)		Flow Area (sq ft)	439.65	284.68	390.41
E.G. Slope (ft/ft)	0.001423	Area (sq ft)	439.65	284.68	390.41
Q Total (cfs)	1240.00	Flow (cfs)	470.25	475.11	294.64
Top Width (ft)	371.46	Top Width (ft)	126.60	54.88	189.98
Vel Total (ft/s)	1.11	Avg. Vel. (ft/s)	1.07	1.67	0.75
Max Chl Dpth (ft)	5.58	Hydr. Depth (ft)	3.47	5.19	2.06
Conv. Total (cfs)	32877.1	Conv. (cfs)	12468.0	12597.1	7812.0
Length Wtd. (ft)	487.20	Wetted Per. (ft)	126.85	55.39	190.06
Min Ch El (ft)	20.00	Shear (lb/sq ft)	0.31	0.46	0.18
Alpha	1.32	Stream Power (lb/ft s)	0.33	0.76	0.14
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)	6.27	5.50	6.29
C & E Loss (ft)	0.01	Cum SA (acres)	1.88	1.38	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2% Annual Chance

E.G. Elev (ft)	26.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.120	0.100	0.120
W.S. Elev (ft)	26.89	Reach Len. (ft)	487.20	487.20	487.20
Crit W.S. (ft)		Flow Area (sq ft)	612.30	356.40	657.16
E.G. Slope (ft/ft)	0.001412	Area (sq ft)	612.30	356.40	657.16
Q Total (cfs)	2100.00	Flow (cfs)	770.07	688.39	641.53
Top Width (ft)	408.48	Top Width (ft)	137.46	54.88	216.14
Vel Total (ft/s)	1.29	Avg. Vel. (ft/s)	1.26	1.93	0.98
Max Chl Dpth (ft)	6.89	Hydr. Depth (ft)	4.45	6.49	3.04
Conv. Total (cfs)	55884.0	Conv. (cfs)	20492.8	18319.1	17072.1
Length Wtd. (ft)	487.20	Wetted Per. (ft)	137.79	55.39	216.25
Min Ch El (ft)	20.00	Shear (lb/sq ft)	0.39	0.57	0.27
Alpha	1.26	Stream Power (lb/ft s)	0.49	1.10	0.26
Frctn Loss (ft)	1.31	Cum Volume (acre-ft)	8.58	6.96	10.10
C & E Loss (ft)	0.01	Cum SA (acres)	1.98	1.41	4.05

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

CROSS SECTION OUTPUT Profile #1% Annual Chance

E.G. Elev (ft)	27.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.120	0.100	0.120
W.S. Elev (ft)	27.24	Reach Len. (ft)	487.20	487.20	487.20
Crit W.S. (ft)		Flow Area (sq ft)	661.27	375.77	734.75
E.G. Slope (ft/ft)	0.001422	Area (sq ft)	661.27	375.77	734.75
Q Total (cfs)	2380.00	Flow (cfs)	868.83	754.59	756.58
Top Width (ft)	418.91	Top Width (ft)	139.76	54.88	224.27
Vel Total (ft/s)	1.34	Avg. Vel. (ft/s)	1.31	2.01	1.03
Max Chl Dpth (ft)	7.24	Hydr. Depth (ft)	4.73	6.85	3.28
Conv. Total (cfs)	63109.3	Conv. (cfs)	23038.4	20009.0	20061.9
Length Wtd. (ft)	487.20	Wetted Per. (ft)	140.12	55.39	224.39
Min Ch El (ft)	20.00	Shear (lb/sq ft)	0.42	0.60	0.29
Alpha	1.24	Stream Power (lb/ft s)	0.55	1.21	0.30
Frctn Loss (ft)	1.34	Cum Volume (acre-ft)	9.21	7.36	11.29
C & E Loss (ft)	0.02	Cum SA (acres)	2.00	1.42	4.39

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

CROSS SECTION OUTPUT Profile #0.2% Annual Chan

E.G. Elev (ft)	28.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.120	0.100	0.120
W.S. Elev (ft)	28.92	Reach Len. (ft)	487.20	487.20	487.20
Crit W.S. (ft)		Flow Area (sq ft)	906.69	468.14	1160.73
E.G. Slope (ft/ft)	0.001473	Area (sq ft)	906.69	468.14	1160.73
Q Total (cfs)	4000.00	Flow (cfs)	1412.62	1107.85	1479.53

Top Width (ft)	471.14	Top Width (ft)	152.18	54.88 264.08
Vel Total (ft/s)	1.58	Avg. Vel. (ft/s)	1.56	2.37 1.27
Max Chl Dpth (ft)	8.92	Hydr. Depth (ft)	5.96	8.53 4.40
Conv. Total (cfs)	104206.4	Conv. (cfs)	36801.1	28861.4 38544.0
Length Wtd. (ft)	487.20	Wetted Per. (ft)	152.79	55.39 264.31
Min Ch El (ft)	20.00	Shear (lb/sq ft)	0.55	0.78 0.40
Alpha	1.21	Stream Power (lb/ft s)	0.85	1.84 0.51
Frctn Loss (ft)	1.48	Cum Volume (acre-ft)	12.35	9.39 18.03
C & E Loss (ft)	0.03	Cum SA (acres)	2.22	1.47 5.20

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

CROSS SECTION

RIVER: Trading Cove Bro
REACH: RiverCL RS: 689.9

INPUT
Description:
Station Elevation Data num= 119

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	29	3.94	29	15.33	28.99	26.47	29	28.84	29
31.43	28.8	32.23	28.7	32.47	28.71	32.85	28.65	32.96	28.66
33.79	28.49	33.99	28.49	34.51	28.39	34.61	28.38	35.12	28.29
35.21	28.28	35.54	28.22	35.92	28.15	35.98	28.15	36.84	28
36.91	28	37.1	27.99	37.49	27.99	39.2	27.97	39.65	27.97
40.28	27.96	41.54	27.96	43.97	27.87	51.68	27.66	59.64	27.81
64.77	27.96	66.45	27.97	71.22	28	74.63	28.38	75.44	28.4
75.85	28.41	76.12	28.41	80.22	28.62	82.42	28.68	84.14	28.68
85.27	28.7	87.7	28.65	90.16	28.67	94.39	28.54	107.23	28
107.31	28	107.62	27.96	117.55	27	120.14	26.45	121.55	26
122.71	25.77	126.4	25	128.33	24.68	128.93	24.57	129.13	24.53
129.88	24.34	130.41	24.24	130.44	24.23	130.96	23.92	132.26	23.79
133.49	23.92	136.5	23.5	140.17	22.92	146.2	21.88	150.86	21.47
157.14	20.73	157.35	20.71	157.71	20.68	158.04	20.65	158.33	20.62
160.19	20.47	165.43	20.67	175.22	20.7	180.13	20.61	188	20.54
198.83	20.57	206.79	20.42	219.73	19.73	223.4	19.6	225.53	19.63

230.68	19.55	231.11	18.96	232.75	19	234.42	19	240.82	18.99
246.14	18.99	260.12	18.99	265.82	23.417	273.37	29.28	280.17	31.63
280.52	31.71	289.49	33.49	304.7	35.43	308.87	35.69	321.29	37.39
322.83	37.58	325.01	37.84	326.54	38.21	329.73	38.93	329.81	38.94
330.25	39	331.13	39.1	331.9	39.2	332.52	39.29	332.77	39.32
332.92	39.34	333.09	39.36	333.29	39.39	335.15	39.67	335.89	39.78
337.34	40	337.82	40.05	338.5	40.13	339.13	40.18	339.27	40.19
347.14	41	347.33	41.02	353.64	42	393.77	42		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	230.68	.1	265.82	.12

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
230.68	265.82	10.27	10.27	.1	.3

CROSS SECTION OUTPUT Profile #10% Annual Chanc

E.G. Elev (ft)	24.37	Element	Left OB	Channel
Vel Head (ft)	0.10	Wt. n-Val.	0.120	0.100
W.S. Elev (ft)	24.27	Reach Len. (ft)	10.27	10.27
Crit W.S. (ft)		Flow Area (sq ft)	337.68	172.66
E.G. Slope (ft/ft)	0.005623	Area (sq ft)	337.68	172.66
Q Total (cfs)	1240.00	Flow (cfs)	702.12	537.67
Top Width (ft)	136.65	Top Width (ft)	100.41	35.14
Vel Total (ft/s)	2.43	Avg. Vel. (ft/s)	2.08	3.11
Max Chl Dpth (ft)	5.31	Hydr. Depth (ft)	3.36	4.91
Conv. Total (cfs)	16535.6	Conv. (cfs)	9362.9	7169.9
Length Wtd. (ft)	10.27	Wetted Per. (ft)	100.78	36.96
Min Ch El (ft)	18.96	Shear (lb/sq ft)	1.18	1.64
Alpha	1.13	Stream Power (lb/ft s)	2.45	5.11
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	1.93	2.94
C & E Loss (ft)	0.00	Cum SA (acres)	0.61	0.88

Right OB
0.120
10.27
0.46
0.46
0.21
1.09
0.45
0.42
2.8
1.39
0.12
0.05
4.10
2.28

CROSS SECTION OUTPUT Profile #2% Annual Chance

E.G. Elev (ft)	25.60	Element	Left OB	Channel

Right OB				
Vel Head (ft)	0.17	Wt. n-Val.	0.120	0.100
0.120				
W.S. Elev (ft)	25.43	Reach Len. (ft)	10.27	10.27
10.27				
Crit W.S. (ft)		Flow Area (sq ft)	457.94	213.55
2.61				
E.G. Slope (ft/ft)	0.006939	Area (sq ft)	457.94	213.55
2.61				
Q Total (cfs)	2100.00	Flow (cfs)	1246.54	851.15
2.31				
Top Width (ft)	144.07	Top Width (ft)	106.34	35.14
2.59				
Vel Total (ft/s)	3.12	Avg. Vel. (ft/s)	2.72	3.99
0.89				
Max Chl Dpth (ft)	6.47	Hydr. Depth (ft)	4.31	6.08
1.01				
Conv. Total (cfs)	25209.1	Conv. (cfs)	14963.8	10217.5
27.7				
Length Wtd. (ft)	10.27	Wetted Per. (ft)	106.82	36.96
3.28				
Min Ch El (ft)	18.96	Shear (lb/sq ft)	1.86	2.50
0.34				
Alpha	1.12	Stream Power (lb/ft s)	5.06	9.98
0.30				
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	2.59	3.77
6.41				
C & E Loss (ft)	0.00	Cum SA (acres)	0.62	0.91
2.83				

CROSS SECTION OUTPUT Profile #1% Annual Chance

E.G. Elev (ft)	25.92	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.19	Wt. n-Val.	0.120	0.100
0.120				
W.S. Elev (ft)	25.73	Reach Len. (ft)	10.27	10.27
10.27				
Crit W.S. (ft)		Flow Area (sq ft)	490.05	224.09
3.45				
E.G. Slope (ft/ft)	0.007375	Area (sq ft)	490.05	224.09
3.45				
Q Total (cfs)	2380.00	Flow (cfs)	1425.72	950.83
3.45				
Top Width (ft)	145.90	Top Width (ft)	107.78	35.14
2.98				
Vel Total (ft/s)	3.32	Avg. Vel. (ft/s)	2.91	4.24
1.00				
Max Chl Dpth (ft)	6.77	Hydr. Depth (ft)	4.55	6.38
1.16				
Conv. Total (cfs)	27713.4	Conv. (cfs)	16601.5	11071.8
40.2				
Length Wtd. (ft)	10.27	Wetted Per. (ft)	108.29	36.96

3.77				
Min Ch El (ft)	18.96	Shear (lb/sq ft)	2.08	2.79
0.42				
Alpha	1.11	Stream Power (lb/ft s)	6.06	11.85
0.42				
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	2.77	4.00
7.16				
C & E Loss (ft)	0.00	Cum SA (acres)	0.62	0.92
3.11				

CROSS SECTION OUTPUT Profile #0.2% Annual Chan

E.G. Elev (ft)	27.46	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.32	Wt. n-Val.	0.120	0.100
0.120				
W.S. Elev (ft)	27.14	Reach Len. (ft)	10.27	10.27
10.27				
Crit W.S. (ft)		Flow Area (sq ft)	646.20	273.63
8.93				
E.G. Slope (ft/ft)	0.009592	Area (sq ft)	646.20	273.63
8.93				
Q Total (cfs)	4000.00	Flow (cfs)	2473.29	1512.72
14.00				
Top Width (ft)	154.51	Top Width (ft)	114.58	35.14
4.79				
Vel Total (ft/s)	4.31	Avg. Vel. (ft/s)	3.83	5.53
1.57				
Max Chl Dpth (ft)	8.18	Hydr. Depth (ft)	5.64	7.79
1.86				
Conv. Total (cfs)	40842.3	Conv. (cfs)	25253.7	15445.7
142.9				
Length Wtd. (ft)	10.27	Wetted Per. (ft)	115.25	36.96
6.07				
Min Ch El (ft)	18.96	Shear (lb/sq ft)	3.36	4.43
0.88				
Alpha	1.11	Stream Power (lb/ft s)	12.85	24.51
1.38				
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	3.67	5.25
11.48				
C & E Loss (ft)	0.00	Cum SA (acres)	0.73	0.97
3.70				

CROSS SECTION

RIVER: Trading Cove Bro
REACH: RiverCL RS: 679.63

INPUT
Description:

Station Elevation Data num= 156

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	29	24.33	29	27.29	29.11	29.52	29.13	30.37	29.1
32.59	29	36.4	28.57	47.02	28	47.41	28	52.58	27.98
53.25	27.98	56.22	27.97	58.87	27.95	60.47	27.95	67.52	28
71.2	28.49	71.32	28.51	71.63	28.56	72	28.61	72.26	28.65
72.62	28.71	75.43	29	91.48	29	102.43	28.36	105.75	28
106.32	27.98	107.41	27.96	112.7	27.62	116.76	27.41	119.62	27
122.7	26.28	123.74	26	124.35	25.82	126.84	25	129.82	24.5
130.77	24.39	131.69	23.9	132.57	23.85	133.88	23.7	136.08	23.51
140.75	22.72	148.19	21.69	148.39	21.67	149.15	21.6	149.34	21.59
150.25	21.51	151.02	21.44	152.72	21.28	154.25	21.15	159.4	20.72
160.61	20.62	161.43	20.55	162.05	20.5	162.53	20.46	162.82	20.45
163.09	20.45	163.32	20.44	163.54	20.44	163.74	20.43	163.94	20.43
164.12	20.42	164.48	20.42	164.65	20.41	165	20.41	177.81	20.59
178.28	20.59	178.75	20.58	179.2	20.58	184.32	20.42	198.38	20.47
206.59	20.59	207.77	20.35	208.49	20.23	217.21	19.72	220.24	19.61
225.18	19.5	226.34	18.96	226.55	18.92	230.99	19	231.5	19
233.67	18.99	242.83	18.98	243.15	18.98	249.03	18.99	250.88	18.99
252.74	19	256.02	19	261.09	20.66	264.47	24.65	265.38	25.72
267.49	27.37	270.45	28.4	282.42	30.83	283.24	30.9	284.08	30.96
284.97	30.99	285.29	31	296.39	35.59	297.92	36.22	298.37	36.4
298.59	36.49	298.72	36.54	298.81	36.58	298.87	36.6	298.93	36.62
298.96	36.63	298.99	36.64	299.02	36.64	299.05	36.65	299.07	36.65
299.1	36.66	299.12	36.66	299.15	36.67	302.75	36.96	318.5	37.97
318.99	38.03	319.05	38.04	319.33	38.07	319.88	38.14	329.55	39.32
341.75	40.6	344.34	40.86	344.7	41	345.92	41	346.12	41.01
346.39	41.01	346.6	41.02	347.27	41.04	348.49	41.09	348.6	41.09
350.17	41.1	354.81	41.68	355.04	41.71	355.33	41.74	355.67	41.77
357	41.86	357.2	41.88	357.42	41.9	357.66	41.92	357.93	41.95
358.25	41.97	358.3	41.97	358.6	41.98	358.91	42	360.55	42
361.06	41.99	361.32	41.98	361.8	41.96	361.82	41.96	365.01	41.77
365.05	41.78	373.72	41.96	375.24	41.99	375.58	41.99	375.71	42
400.96	42								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	225.18	.1	261.09	.12

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
225.18	261.09	16.42	16.42	.1	.3

CROSS SECTION OUTPUT Profile #10% Annual Chanc

E.G. Elev (ft)	24.31	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.11	Wt. n-Val.	0.120	0.100
0.120				
W.S. Elev (ft)	24.20	Reach Len. (ft)	5.20	5.20
5.20				
Crit W.S. (ft)	21.76	Flow Area (sq ft)	311.27	182.65
5.30				
E.G. Slope (ft/ft)	0.005593	Area (sq ft)	311.27	182.65
5.30				
Q Total (cfs)	1240.00	Flow (cfs)	638.63	596.00

5.37				
Top Width (ft)	132.96	Top Width (ft)	94.05	35.91
3.00				
Vel Total (ft/s)	2.48	Avg. Vel. (ft/s)	2.05	3.26
1.01				
Max Chl Dpth (ft)	5.28	Hydr. Depth (ft)	3.31	5.09
1.77				
Conv. Total (cfs)	16580.5	Conv. (cfs)	8539.4	7969.3
71.8				
Length Wtd. (ft)	5.20	Wetted Per. (ft)	94.39	36.30
4.64				
Min Ch El (ft)	18.92	Shear (lb/sq ft)	1.15	1.76
0.40				
Alpha	1.18	Stream Power (lb/ft s)	2.36	5.73
0.40				
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	1.85	2.90
4.10				
C & E Loss (ft)	0.00	Cum SA (acres)	0.59	0.87
2.28				

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

CROSS SECTION OUTPUT Profile #2% Annual Chance

E.G. Elev (ft)	25.52	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.19	Wt. n-Val.	0.120	0.100
0.120				
W.S. Elev (ft)	25.34	Reach Len. (ft)	5.20	5.20
5.20				
Crit W.S. (ft)	22.44	Flow Area (sq ft)	421.72	223.61
9.27				
E.G. Slope (ft/ft)	0.007078	Area (sq ft)	421.72	223.61
9.27				
Q Total (cfs)	2100.00	Flow (cfs)	1147.86	939.42
12.73				
Top Width (ft)	139.24	Top Width (ft)	99.37	35.91
3.97				
Vel Total (ft/s)	3.21	Avg. Vel. (ft/s)	2.72	4.20
1.37				
Max Chl Dpth (ft)	6.42	Hydr. Depth (ft)	4.24	6.23
2.34				
Conv. Total (cfs)	24960.4	Conv. (cfs)	13643.3	11165.9
151.3				
Length Wtd. (ft)	5.20	Wetted Per. (ft)	99.86	36.30
6.13				
Min Ch El (ft)	18.92	Shear (lb/sq ft)	1.87	2.72
0.67				
Alpha	1.16	Stream Power (lb/ft s)	5.08	11.44
0.92				
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	2.49	3.72

6.41					
C & E Loss (ft)	0.00	Cum SA (acres)	0.59	0.90	
2.83					

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

CROSS SECTION OUTPUT Profile #1% Annual Chance

E.G. Elev (ft)	25.84	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.21	Wt. n-Val.	0.120	0.100	
0.120					
W.S. Elev (ft)	25.63	Reach Len. (ft)	5.20	5.20	
5.20					
Crit W.S. (ft)	22.64	Flow Area (sq ft)	450.91	234.12	
10.47					
E.G. Slope (ft/ft)	0.007550	Area (sq ft)	450.91	234.12	
10.47					
Q Total (cfs)	2380.00	Flow (cfs)	1317.19	1047.36	
15.45					
Top Width (ft)	140.38	Top Width (ft)	100.26	35.91	
4.21					
Vel Total (ft/s)	3.42	Avg. Vel. (ft/s)	2.92	4.47	
1.48					
Max Chl Dpth (ft)	6.71	Hydr. Depth (ft)	4.50	6.52	
2.48					
Conv. Total (cfs)	27390.5	Conv. (cfs)	15159.1	12053.6	
177.8					
Length Wtd. (ft)	5.20	Wetted Per. (ft)	100.80	36.30	
6.52					
Min Ch El (ft)	18.92	Shear (lb/sq ft)	2.11	3.04	
0.76					
Alpha	1.16	Stream Power (lb/ft s)	6.16	13.60	
1.12					
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	2.66	3.95	
7.16					
C & E Loss (ft)	0.00	Cum SA (acres)	0.59	0.91	
3.11					

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

CROSS SECTION OUTPUT Profile #0.2% Annual Chan

E.G. Elev (ft)	27.36	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.36	Wt. n-Val.	0.120	0.100	

0.120				
W.S. Elev (ft)	27.00	Reach Len. (ft)	5.20	5.20
5.20				
Crit W.S. (ft)	23.61	Flow Area (sq ft)	591.19	283.15
17.37				
E.G. Slope (ft/ft)	0.010063	Area (sq ft)	591.19	283.15
17.37				
Q Total (cfs)	4000.00	Flow (cfs)	2305.75	1660.07
34.18				
Top Width (ft)	147.38	Top Width (ft)	105.55	35.91
5.92				
Vel Total (ft/s)	4.49	Avg. Vel. (ft/s)	3.90	5.86
1.97				
Max Chl Dpth (ft)	8.08	Hydr. Depth (ft)	5.60	7.89
2.93				
Conv. Total (cfs)	39874.6	Conv. (cfs)	22985.2	16548.6
340.7				
Length Wtd. (ft)	5.20	Wetted Per. (ft)	106.26	36.30
8.71				
Min Ch El (ft)	18.92	Shear (lb/sq ft)	3.50	4.90
1.25				
Alpha	1.15	Stream Power (lb/ft s)	13.63	28.73
2.47				
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	3.52	5.18
11.48				
C & E Loss (ft)	0.00	Cum SA (acres)	0.70	0.96
3.70				

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

BRIDGE

RIVER: Trading Cove Bro
REACH: RiverCL RS: 670.31

INPUT
Description:
Distance from Upstream XS = 5.2
Deck/Roadway Width = 8
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 235

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	29.01		.13	29		15.82	29	
22.07	29.66		23.25	29.83		23.51	29.86	
24.05	29.92		24.65	29.97		24.68	29.97	
24.98	29.99		24.99	29.99		25.21	30	
27.49	30		27.81	29.98		28.11	29.97	
28.41	29.94		29.38	29.78		29.95	29.7	
30.45	29.62		30.88	29.56		31.52	29.45	
33.78	29		36.28	28.74		36.67	28.71	

37.42	28.65		44.85	28.03	46.77	28	
51.71	27.99		51.8	27.99	52.01	27.98	
52.68	27.98		54.67	27.97	55.86	27.97	
58.41	27.98		58.73	27.99	60.16	27.99	
61.7	28		73.43	28.9	74.53	29	
101.88	29		102.02	28.99	102.03	28.99	
102.03	28.98		102.04	28.98	104.92	28.75	
107.39	28.62		110.78	28.42	111.39	28.38	
112.09	28.33		113.22	28.22	115.35	28	
115.37	28		115.43	27.98	120.26	27	
121.97	26.51		123.54	26.07	123.79	26	
125.63	25.51		127.32	25.07	127.59	25	
127.8	25		129.1	24.85	131.28	23.68	
133.39	23.55		136.53	23.21	141.77	22.75	
146.18	22		146.62	21.96	147.64	21.88	
148.84	21.78		150.26	21.66	151.92	21.53	
153.86	21.38		156.08	21.21	156.19	21.2	
157.98	21.06		158.11	21.06	159.23	21.01	
159.44	21		160.47	20.96	160.76	20.96	
161.7	20.92		162.05	20.91	162.92	20.88	
163.33	20.87		164.13	20.85	164.59	20.84	
165.33	20.81		165.83	20.81	166.53	20.78	
167.06	20.78		167.72	20.76	168.28	20.75	
168.91	20.73		169.49	20.72	170.09	20.71	
170.69	20.7		171.27	20.68	171.83	20.66	
172.45	20.66		173	20.64	173.62	20.64	
174.18	20.62		174.8	20.61	175.36	20.59	
175.97	20.59		182.73	20.39	188.3	20.13	
199.46	20.36		212.55	20.81	212.97	20.81	20.01
266.29	26.37	25.57	266.34	26.39	266.36	26.39	
270.1	26.71		271.06	26.9	272.09	27.13	
273.26	27.37		274.11	27.55	275.52	27.83	
276.15	27.97		277.85	28.31	278.23	28.39	
280.27	28.79		280.36	28.8	280.91	28.91	
281.58	29.25		282.29	29.64	282.67	29.81	
284.31	30.58		285.62	31.23	288.45	32.44	
290.04	32.26		291.48	32.2	293.1	32.17	
294.93	32.15		296.9	32.17	296.97	32.16	
298.58	31.96		298.77	32	298.79	32	
300.78	32.37		300.99	32.41	301.24	32.47	
303.14	32.82		303.5	32.88	304.77	33.06	
305.24	33.13		306.4	33.3	306.97	33.39	
308.03	33.54		308.99	33.68	309.65	33.78	
310.54	33.91		311.26	34.02	312.09	34.14	
312.87	34.26		313.65	34.37	314.47	34.5	
315.21	34.61		316.07	34.74	316.79	34.84	
317.67	34.98		318.37	35.08	319.27	35.21	
319.95	35.31		320.86	35.45	321.54	35.55	
322.45	35.68		323.15	35.78	324.04	35.92	
324.75	36.02		325.63	36.15	326.37	36.25	
327.21	36.38		338.62	37.62	351.74	38.91	
351.99	39.22		352.08	39.49	353.41	39.75	
353.77	39.85		355.91	39.88	356.24	39.89	
356.46	39.89		356.96	39.91	357.03	39.91	
357.48	39.93		357.68	39.94	358.07	39.96	
358.78	39.96		358.95	39.97	359.04	39.97	

359.08	39.98	359.26	39.98	359.32	39.99
359.4	39.99	359.42	40	359.47	40
359.61	40.04	359.66	40.05	360.12	40.17
362.82	40.68	363.34	40.79	363.59	40.85
363.74	40.88	364.51	41	364.53	41
364.79	41.02	365.24	41.06	365.27	41.06
366.79	41.14	366.86	41.14	367.29	41.16
367.33	41.16	367.52	41.18	367.61	41.17
367.75	41.19	367.88	41.2	368	41.21
368.7	41.17	368.85	41.18	370.9	41.23
374.28	41.3	374.76	41.32	375.25	41.34
375.73	41.36	377	41.42	384.59	41.96
385.4	41.96	385.97	41.97	389.12	41.97
390.01	41.98	391.02	41.98	396.05	42
406.07	42				

Upstream Bridge Cross Section Data

Station Elevation Data num= 156

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	29	24.33	29	27.29	29.11	29.52	29.13	30.37	29.1
32.59	29	36.4	28.57	47.02	28	47.41	28	52.58	27.98
53.25	27.98	56.22	27.97	58.87	27.95	60.47	27.95	67.52	28
71.2	28.49	71.32	28.51	71.63	28.56	72	28.61	72.26	28.65
72.62	28.71	75.43	29	91.48	29	102.43	28.36	105.75	28
106.32	27.98	107.41	27.96	112.7	27.62	116.76	27.41	119.62	27
122.7	26.28	123.74	26	124.35	25.82	126.84	25	129.82	24.5
130.77	24.39	131.69	23.9	132.57	23.85	133.88	23.7	136.08	23.51
140.75	22.72	148.19	21.69	148.39	21.67	149.15	21.6	149.34	21.59
150.25	21.51	151.02	21.44	152.72	21.28	154.25	21.15	159.4	20.72
160.61	20.62	161.43	20.55	162.05	20.5	162.53	20.46	162.82	20.45
163.09	20.45	163.32	20.44	163.54	20.44	163.74	20.43	163.94	20.43
164.12	20.42	164.48	20.42	164.65	20.41	165	20.41	177.81	20.59
178.28	20.59	178.75	20.58	179.2	20.58	184.32	20.42	198.38	20.47
206.59	20.59	207.77	20.35	208.49	20.23	217.21	19.72	220.24	19.61
225.18	19.5	226.34	18.96	226.55	18.92	230.99	19	231.5	19
233.67	18.99	242.83	18.98	243.15	18.98	249.03	18.99	250.88	18.99
252.74	19	256.02	19	261.09	20.66	264.47	24.65	265.38	25.72
267.49	27.37	270.45	28.4	282.42	30.83	283.24	30.9	284.08	30.96
284.97	30.99	285.29	31	296.39	35.59	297.92	36.22	298.37	36.4
298.59	36.49	298.72	36.54	298.81	36.58	298.87	36.6	298.93	36.62
298.96	36.63	298.99	36.64	299.02	36.64	299.05	36.65	299.07	36.65
299.1	36.66	299.12	36.66	299.15	36.67	302.75	36.96	318.5	37.97
318.99	38.03	319.05	38.04	319.33	38.07	319.88	38.14	329.55	39.32
341.75	40.6	344.34	40.86	344.7	41	345.92	41	346.12	41.01
346.39	41.01	346.6	41.02	347.27	41.04	348.49	41.09	348.6	41.09
350.17	41.1	354.81	41.68	355.04	41.71	355.33	41.74	355.67	41.77
357	41.86	357.2	41.88	357.42	41.9	357.66	41.92	357.93	41.95
358.25	41.97	358.3	41.97	358.6	41.98	358.91	42	360.55	42
361.06	41.99	361.32	41.98	361.8	41.96	361.82	41.96	365.01	41.77
365.05	41.78	373.72	41.96	375.24	41.99	375.58	41.99	375.71	42
400.96	42								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	225.18	.1	261.09	.12

Bank Sta: Left Right Coeff Contr. Expan.
225.18 261.09 .1 .3

Downstream Deck/Roadway Coordinates
num= 235

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	29.01		.13	29		15.82	29	
22.07	29.66		23.25	29.83		23.51	29.86	
24.05	29.92		24.65	29.97		24.68	29.97	
24.98	29.99		24.99	29.99		25.21	30	
27.49	30		27.81	29.98		28.11	29.97	
28.41	29.94		29.38	29.78		29.95	29.7	
30.45	29.62		30.88	29.56		31.52	29.45	
33.78	29		36.28	28.74		36.67	28.71	
37.42	28.65		44.85	28.03		46.77	28	
51.71	27.99		51.8	27.99		52.01	27.98	
52.68	27.98		54.67	27.97		55.86	27.97	
58.41	27.98		58.73	27.99		60.16	27.99	
61.7	28		73.43	28.9		74.53	29	
101.88	29		102.02	28.99		102.03	28.99	
102.03	28.98		102.04	28.98		104.92	28.75	
107.39	28.62		110.78	28.42		111.39	28.38	
112.09	28.33		113.22	28.22		115.35	28	
115.37	28		115.43	27.98		120.26	27	
121.97	26.51		123.54	26.07		123.79	26	
125.63	25.51		127.32	25.07		127.59	25	
127.8	25		129.1	24.85		131.28	23.68	
133.39	23.55		136.53	23.21		141.77	22.75	
146.18	22		146.62	21.96		147.64	21.88	
148.84	21.78		150.26	21.66		151.92	21.53	
153.86	21.38		156.08	21.21		156.19	21.2	
157.98	21.06		158.11	21.06		159.23	21.01	
159.44	21		160.47	20.96		160.76	20.96	
161.7	20.92		162.05	20.91		162.92	20.88	
163.33	20.87		164.13	20.85		164.59	20.84	
165.33	20.81		165.83	20.81		166.53	20.78	
167.06	20.78		167.72	20.76		168.28	20.75	
168.91	20.73		169.49	20.72		170.09	20.71	
170.69	20.7		171.27	20.68		171.83	20.66	
172.45	20.66		173	20.64		173.62	20.64	
174.18	20.62		174.8	20.61		175.36	20.59	
175.97	20.59		182.73	20.39		188.3	20.13	
199.46	20.36		212.55	20.81		212.97	20.81	20.01
266.29	26.37	25.57	266.34	26.39		266.36	26.39	
270.1	26.71		271.06	26.9		272.09	27.13	
273.26	27.37		274.11	27.55		275.52	27.83	
276.15	27.97		277.85	28.31		278.23	28.39	
280.27	28.79		280.36	28.8		280.91	28.91	
281.58	29.25		282.29	29.64		282.67	29.81	
284.31	30.58		285.62	31.23		288.45	32.44	
290.04	32.26		291.48	32.2		293.1	32.17	
294.93	32.15		296.9	32.17		296.97	32.16	
298.58	31.96		298.77	32		298.79	32	
300.78	32.37		300.99	32.41		301.24	32.47	
303.14	32.82		303.5	32.88		304.77	33.06	
305.24	33.13		306.4	33.3		306.97	33.39	

308.03	33.54	308.99	33.68	309.65	33.78
310.54	33.91	311.26	34.02	312.09	34.14
312.87	34.26	313.65	34.37	314.47	34.5
315.21	34.61	316.07	34.74	316.79	34.84
317.67	34.98	318.37	35.08	319.27	35.21
319.95	35.31	320.86	35.45	321.54	35.55
322.45	35.68	323.15	35.78	324.04	35.92
324.75	36.02	325.63	36.15	326.37	36.25
327.21	36.38	338.62	37.62	351.74	38.91
351.99	39.22	352.08	39.49	353.41	39.75
353.77	39.85	355.91	39.88	356.24	39.89
356.46	39.89	356.96	39.91	357.03	39.91
357.48	39.93	357.68	39.94	358.07	39.96
358.78	39.96	358.95	39.97	359.04	39.97
359.08	39.98	359.26	39.98	359.32	39.99
359.4	39.99	359.42	40	359.47	40
359.61	40.04	359.66	40.05	360.12	40.17
362.82	40.68	363.34	40.79	363.59	40.85
363.74	40.88	364.51	41	364.53	41
364.79	41.02	365.24	41.06	365.27	41.06
366.79	41.14	366.86	41.14	367.29	41.16
367.33	41.16	367.52	41.18	367.61	41.17
367.75	41.19	367.88	41.2	368	41.21
368.7	41.17	368.85	41.18	370.9	41.23
374.28	41.3	374.76	41.32	375.25	41.34
375.73	41.36	377	41.42	384.59	41.96
385.4	41.96	385.97	41.97	389.12	41.97
390.01	41.98	391.02	41.98	396.05	42
406.07	42				

Downstream Bridge Cross Section Data
Station Elevation Data num= 227

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	29.61	.07	29.61	.19	29.6	.61	29.58	3.41	29.42
5.01	29.37	5.38	29.36	5.73	29.36	6.1	29.35	6.29	29.35
8.06	29.4	8.4	29.4	8.79	29.41	10.61	29.46	12.85	29.6
13.22	29.62	13.86	29.67	14.97	29.75	17.1	30	27.04	30
27.37	29.95	27.9	29.87	28.74	29.73	29.35	29.62	30.51	29.41
31.14	29.29	32.65	29	34.83	28.8	40.03	28.2	40.67	28.13
41.83	28	42.9	28	48.91	27.99	49.13	27.99	54.08	28
56.05	28	56.2	28.01	56.33	28.01	56.86	28.02	57.47	28.02
59.86	28.17	63.67	28.35	63.78	28.35	67.3	28.54	74.92	28.99
75.82	29	111.03	29	114.63	28.66	118.3	28	120.18	27.58
122.62	27	124.43	26.51	126.38	26	128.82	25.35	130.33	23.86
130.97	23.52	134.02	23.33	138.59	22.83	146.2	22.16	146.91	22.04
146.98	22.03	147.15	22.02	147.34	22	147.57	21.99	147.84	21.96
148.15	21.94	148.51	21.91	148.92	21.88	149.23	21.87	149.56	21.85
161.98	20.68	162.68	20.66	163.41	20.65	164.18	20.63	164.99	20.62
165.82	20.6	166.67	20.58	167.55	20.56	168.43	20.53	169.32	20.51
170.21	20.48	171.1	20.46	171.97	20.43	172.82	20.4	179.37	20.41
188.59	20	194.67	20.23	207.41	20.67	208.59	20.31	213.61	20.03
217.88	19.44	225.06	18.99	226.25	18.99	229.46	18.98	229.83	18.98
234.54	18.97	237.1	18.97	240.35	18.98	244.48	18.98	247.44	18.99
248.88	18.99	251.77	19	256.86	22.58	257.78	23.54	259.06	24.42
266.46	27.06	270.29	29.32	271	29.43	271.48	29.61	271.83	29.75
280.42	33.08	280.81	33.24	281.11	33.36	281.34	33.46	281.53	33.55

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  281.68   33.62  281.79   33.68  284.16   34.69  304.87   40.49  307.03   40.72
  316.65   39.35  317.03   39.18  317.55   38.95  318.72   38.43  322.25   39.87
  323.53   39.91  324.85      40  325.92      40  328.35   39.26  329.54      39
  333.05   38.17  333.67   38.16   344.6   38.07  344.87   38.07  345.07   38.08
  346.83   38.04  346.97   38.05  347.02   38.05  347.06   38.04  347.99      38
  353.32   37.58  357.88   37.48  358.62   37.45   359.5   37.45   360.7   37.48
  361.53   37.48  361.99   37.46  372.57      37   372.7   36.99  372.85   36.98
  378.88   36.53  381.25   36.39  385.21    36.3  385.53   36.26   386.6   36.19
  387.32   36.11  388.57      36  392.29   35.45  397.59      35  400.41   34.73
  403.93   34.39  404.76   34.28  406.49   34.05  406.65   34.03  406.82      34
  410.21   33.37  412.19      33  412.34   32.97   412.4   32.96  415.46   32.26
  416.42      32  419.31   31.18  419.99      31  421.46   30.68  425.11      30
   429.4   29.39   431.9      29  433.17   28.79  437.58      28  439.15   27.74
  439.34    27.7  443.23      27  447.45   26.15  447.91   26.02  447.99      26
  448.74    25.9  449.16   25.85  449.86   25.77  450.45   25.71  450.71   25.68
  457.38      25  457.49   24.98  457.98   24.94  465.22   24.18  465.99   24.13
  467.53      24  488.54      24  489.41   24.01  490.27   24.03  490.28   24.03
   490.7   24.04  491.77   24.07  500.32    24.3  504.72   24.44  506.61   24.49
  508.44   24.54  509.99   24.58  512.26   24.65  513.48   24.69  516.28   24.77
  517.12   24.79  520.46   24.89  520.87    24.9  524.33      25  540.18      25
  542.91   25.13  543.92   25.13  544.14   25.14   545.5   25.14  545.75   25.15
  545.99   25.15  546.18   25.16  546.42   25.16  546.64   25.17  547.23   25.17
  553.16   25.28  555.18   25.32

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .12  217.88      .1  256.86     .12

Bank Sta: Left   Right    Coeff Contr.   Expan.
        217.88  256.86             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 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
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

BRIDGE OUTPUT  Profile #10% Annual Chanc
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E.G. US. (ft)	24.31	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	24.20	E.G. Elev (ft)	24.27	24.14
Q Total (cfs)	1240.00	W.S. Elev (ft)	24.15	24.00
Q Bridge (cfs)	421.78	Crit W.S. (ft)	22.01	21.94
Q Weir (cfs)		Max Chl Dpth (ft)	5.23	5.03
Weir Sta Lft (ft)		Vel Total (ft/s)	2.74	3.01
Weir Sta Rgt (ft)		Flow Area (sq ft)	453.32	412.01
Weir Submerg		Froude # Chl	0.21	0.24
Weir Max Depth (ft)		Specif Force (cu ft)	1034.29	931.06
Min El Weir Flow (ft)	20.43	Hydr Depth (ft)	3.62	3.43
Min El Prs (ft)	25.45	W.P. Total (ft)	207.27	198.22
Delta EG (ft)	0.21	Conv. Total (cfs)	10572.9	9318.4
Delta WS (ft)	0.23	Top Width (ft)	125.16	120.08
BR Open Area (sq ft)	133.55	Frctn Loss (ft)	0.12	0.04
BR Open Vel (ft/s)	3.24	C & E Loss (ft)	0.00	0.00
BR Sluice Coef		Shear Total (lb/sq ft)	1.88	2.30
BR Sel Method	Energy only	Power Total (lb/ft s)	5.14	6.92

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

BRIDGE OUTPUT Profile #2% Annual Chance

E.G. US. (ft)	25.52	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	25.34	E.G. Elev (ft)	25.47	25.31
Q Total (cfs)	2100.00	W.S. Elev (ft)	25.27	25.09
Q Bridge (cfs)	470.46	Crit W.S. (ft)	22.69	22.59
Q Weir (cfs)		Max Chl Dpth (ft)	6.35	6.12

Weir Sta Lft (ft)		Vel Total (ft/s)	3.53 3.52
Weir Sta Rgt (ft)		Flow Area (sq ft)	595.73 597.11
Weir Submerg		Froude # Chl	0.25 0.27
Weir Max Depth (ft)		Specif Force (cu ft)	1746.46 1602.91
Min El Weir Flow (ft)	20.43	Hydr Depth (ft)	4.56 2.84
Min El Prs (ft)	25.45	W.P. Total (ft)	235.09 308.12
Delta EG (ft)	0.26	Conv. Total (cfs)	15674.7 14835.6
Delta WS (ft)	0.28	Top Width (ft)	130.75 210.37
BR Open Area (sq ft)	133.55	Frctn Loss (ft)	0.15 0.04
BR Open Vel (ft/s)	3.52	C & E Loss (ft)	0.00 0.00
BR Sluice Coef		Shear Total (lb/sq ft)	2.84 2.42
BR Sel Method	Energy only	Power Total (lb/ft s)	10.01 8.53

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

BRIDGE OUTPUT Profile #1% Annual Chance

E.G. US. (ft)	25.84	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	25.63	E.G. Elev (ft)	25.78	25.62
Q Total (cfs)	2380.00	W.S. Elev (ft)	25.55	25.38
Q Bridge (cfs)	483.66	Crit W.S. (ft)	22.85	22.77
Q Weir (cfs)		Max Chl Dpth (ft)	6.63	6.41
Weir Sta Lft (ft)		Vel Total (ft/s)	3.76	3.60
Weir Sta Rgt (ft)		Flow Area (sq ft)	633.03	661.86
Weir Submerg		Froude # Chl	0.26	0.28
Weir Max Depth (ft)		Specif Force (cu ft)	1970.27	1828.55
Min El Weir Flow (ft)	20.43	Hydr Depth (ft)	4.76	2.88
Min El Prs (ft)	25.45	W.P. Total (ft)	240.97	327.55

Delta EG (ft)	0.26	Conv. Total (cfs)	17209.1 16808.5
Delta WS (ft)	0.29	Top Width (ft)	132.94 229.60
BR Open Area (sq ft)	133.55	Frctn Loss (ft)	0.16 0.04
BR Open Vel (ft/s)	3.62	C & E Loss (ft)	0.00 0.00
BR Sluice Coef		Shear Total (lb/sq ft)	3.14 2.53
BR Sel Method	Energy only	Power Total (lb/ft s)	11.79 9.09

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

BRIDGE OUTPUT Profile #0.2% Annual Chan

E.G. US. (ft)	27.36	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	27.00	E.G. Elev (ft)	27.28	27.08
Q Total (cfs)	4000.00	W.S. Elev (ft)	26.88	26.79
Q Bridge (cfs)	534.29	Crit W.S. (ft)	23.72	23.76
Q Weir (cfs)		Max Chl Dpth (ft)	7.96	7.82
Weir Sta Lft (ft)		Vel Total (ft/s)	4.87	3.98
Weir Sta Rgt (ft)		Flow Area (sq ft)	821.04	1004.84
Weir Submerg		Froude # Chl	0.31	0.27
Weir Max Depth (ft)		Specif Force (cu ft)	3274.66	3237.18
Min El Weir Flow (ft)	20.43	Hydr Depth (ft)	5.62	3.97
Min El Prs (ft)	25.45	W.P. Total (ft)	254.64	353.02
Delta EG (ft)	0.32	Conv. Total (cfs)	25958.2	29483.5
Delta WS (ft)	0.27	Top Width (ft)	146.20	253.20
BR Open Area (sq ft)	133.55	Frctn Loss (ft)	0.17	0.04
BR Open Vel (ft/s)	4.00	C & E Loss (ft)	0.03	0.00
BR Sluice Coef		Shear Total (lb/sq ft)	4.78	3.27
BR Sel Method	Energy only	Power Total (lb/ft s)	23.29	13.02

CROSS SECTION

RIVER: Trading Cove Bro
REACH: RiverCL RS: 663.21

INPUT
Description:
Station Elevation Data num= 227

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	29.61	.07	29.61	.19	29.6	.61	29.58	3.41	29.42
5.01	29.37	5.38	29.36	5.73	29.36	6.1	29.35	6.29	29.35
8.06	29.4	8.4	29.4	8.79	29.41	10.61	29.46	12.85	29.6
13.22	29.62	13.86	29.67	14.97	29.75	17.1	30	27.04	30
27.37	29.95	27.9	29.87	28.74	29.73	29.35	29.62	30.51	29.41
31.14	29.29	32.65	29	34.83	28.8	40.03	28.2	40.67	28.13
41.83	28	42.9	28	48.91	27.99	49.13	27.99	54.08	28
56.05	28	56.2	28.01	56.33	28.01	56.86	28.02	57.47	28.02
59.86	28.17	63.67	28.35	63.78	28.35	67.3	28.54	74.92	28.99
75.82	29	111.03	29	114.63	28.66	118.3	28	120.18	27.58
122.62	27	124.43	26.51	126.38	26	128.82	25.35	130.33	23.86
130.97	23.52	134.02	23.33	138.59	22.83	146.2	22.16	146.91	22.04
146.98	22.03	147.15	22.02	147.34	22	147.57	21.99	147.84	21.96
148.15	21.94	148.51	21.91	148.92	21.88	149.23	21.87	149.56	21.85
161.98	20.68	162.68	20.66	163.41	20.65	164.18	20.63	164.99	20.62
165.82	20.6	166.67	20.58	167.55	20.56	168.43	20.53	169.32	20.51
170.21	20.48	171.1	20.46	171.97	20.43	172.82	20.4	179.37	20.41
188.59	20	194.67	20.23	207.41	20.67	208.59	20.31	213.61	20.03
217.88	19.44	225.06	18.99	226.25	18.99	229.46	18.98	229.83	18.98
234.54	18.97	237.1	18.97	240.35	18.98	244.48	18.98	247.44	18.99
248.88	18.99	251.77	19	256.86	22.58	257.78	23.54	259.06	24.42
266.46	27.06	270.29	29.32	271	29.43	271.48	29.61	271.83	29.75
280.42	33.08	280.81	33.24	281.11	33.36	281.34	33.46	281.53	33.55
281.68	33.62	281.79	33.68	284.16	34.69	304.87	40.49	307.03	40.72
316.65	39.35	317.03	39.18	317.55	38.95	318.72	38.43	322.25	39.87
323.53	39.91	324.85	40	325.92	40	328.35	39.26	329.54	39
333.05	38.17	333.67	38.16	344.6	38.07	344.87	38.07	345.07	38.08
346.83	38.04	346.97	38.05	347.02	38.05	347.06	38.04	347.99	38
353.32	37.58	357.88	37.48	358.62	37.45	359.5	37.45	360.7	37.48
361.53	37.48	361.99	37.46	372.57	37	372.7	36.99	372.85	36.98
378.88	36.53	381.25	36.39	385.21	36.3	385.53	36.26	386.6	36.19
387.32	36.11	388.57	36	392.29	35.45	397.59	35	400.41	34.73
403.93	34.39	404.76	34.28	406.49	34.05	406.65	34.03	406.82	34
410.21	33.37	412.19	33	412.34	32.97	412.4	32.96	415.46	32.26
416.42	32	419.31	31.18	419.99	31	421.46	30.68	425.11	30
429.4	29.39	431.9	29	433.17	28.79	437.58	28	439.15	27.74
439.34	27.7	443.23	27	447.45	26.15	447.91	26.02	447.99	26
448.74	25.9	449.16	25.85	449.86	25.77	450.45	25.71	450.71	25.68
457.38	25	457.49	24.98	457.98	24.94	465.22	24.18	465.99	24.13
467.53	24	488.54	24	489.41	24.01	490.27	24.03	490.28	24.03
490.7	24.04	491.77	24.07	500.32	24.3	504.72	24.44	506.61	24.49
508.44	24.54	509.99	24.58	512.26	24.65	513.48	24.69	516.28	24.77
517.12	24.79	520.46	24.89	520.87	24.9	524.33	25	540.18	25

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  542.91   25.13  543.92   25.13  544.14   25.14   545.5   25.14  545.75   25.15
  545.99   25.15  546.18   25.16  546.42   25.16  546.64   25.17  547.23   25.17
  553.16   25.28  555.18   25.32

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .12  217.88      .1  256.86     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        217.88  256.86             15.06   15.06   15.06             .1       .3

CROSS SECTION OUTPUT  Profile #10% Annual Chanc


  E.G. Elev (ft)             24.10    Element                 Left OB    Channel
Right OB
  Vel Head (ft)               0.14    Wt. n-Val.               0.120      0.100
0.120
  W.S. Elev (ft)             23.96    Reach Len. (ft)          15.06      15.06
15.06
  Crit W.S. (ft)                      Flow Area (sq ft)       261.50     183.31
0.96
  E.G. Slope (ft/ft)      0.007629    Area (sq ft)            261.50     183.31
0.96
  Q Total (cfs)            1240.00    Flow (cfs)              584.39     654.99
0.62
  Top Width (ft)            128.17    Top Width (ft)           87.65      38.98
1.54
  Vel Total (ft/s)            2.78    Avg. Vel. (ft/s)         2.23       3.57
0.65
  Max Chl Dpth (ft)           4.99    Hydr. Depth (ft)         2.98       4.70
0.63
  Conv. Total (cfs)        14196.7    Conv. (cfs)             6690.7     7498.9
7.1
  Length Wtd. (ft)            15.06   Wetted Per. (ft)         88.04      40.13
2.08
  Min Ch El (ft)              18.97    Shear (lb/sq ft)         1.41       2.18
0.22
  Alpha                        1.18    Stream Power (lb/ft s)   3.16       7.77
0.14
  Frctn Loss (ft)             0.11    Cum Volume (acre-ft)     1.75       2.83
4.10
  C & E Loss (ft)             0.00    Cum SA (acres)           0.56       0.86
2.28


CROSS SECTION OUTPUT  Profile #2% Annual Chance


  E.G. Elev (ft)             25.27    Element                 Left OB    Channel
Right OB
  Vel Head (ft)               0.21    Wt. n-Val.               0.120      0.100
0.120
  W.S. Elev (ft)             25.05    Reach Len. (ft)          15.06      15.06
15.06
```

Crit W.S. (ft)		Flow Area (sq ft)	357.74	225.84 53.04
E.G. Slope (ft/ft)	0.008922	Area (sq ft)	357.74	225.84 53.04
Q Total (cfs)	2100.00	Flow (cfs)	1053.11	1002.92 43.97
Top Width (ft)	216.19	Top Width (ft)	88.76	38.98 88.45
Vel Total (ft/s)	3.30	Avg. Vel. (ft/s)	2.94	4.44 0.83
Max Chl Dpth (ft)	6.08	Hydr. Depth (ft)	4.03	5.79 0.60
Conv. Total (cfs)	22232.2	Conv. (cfs)	11149.0	10617.7 465.5
Length Wtd. (ft)	15.06	Wetted Per. (ft)	89.60	40.13 89.31
Min Ch El (ft)	18.97	Shear (lb/sq ft)	2.22	3.13 0.33
Alpha	1.27	Stream Power (lb/ft s)	6.55	13.92 0.27
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	2.34	3.64 6.39
C & E Loss (ft)	0.00	Cum SA (acres)	0.56	0.89 2.81

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #1% Annual Chance

E.G. Elev (ft)	25.58	Element	Left OB	Channel Right OB
Vel Head (ft)	0.23	Wt. n-Val.	0.120	0.100 0.120
W.S. Elev (ft)	25.35	Reach Len. (ft)	15.06	15.06 15.06
Crit W.S. (ft)		Flow Area (sq ft)	383.61	237.18 81.37
E.G. Slope (ft/ft)	0.009175	Area (sq ft)	383.61	237.18 81.37
Q Total (cfs)	2380.00	Flow (cfs)	1195.96	1103.52 80.51
Top Width (ft)	234.01	Top Width (ft)	89.06	38.98 105.98
Vel Total (ft/s)	3.39	Avg. Vel. (ft/s)	3.12	4.65 0.99
Max Chl Dpth (ft)	6.38	Hydr. Depth (ft)	4.31	6.08 0.77
Conv. Total (cfs)	24847.6	Conv. (cfs)	12486.1	11521.0 840.6
Length Wtd. (ft)	15.06	Wetted Per. (ft)	90.01	40.13 106.93
Min Ch El (ft)	18.97	Shear (lb/sq ft)	2.44	3.39 0.44

Alpha	1.30	Stream Power (lb/ft s)	7.61	15.75 0.43
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	2.50	3.87 7.14
C & E Loss (ft)	0.00	Cum SA (acres)	0.56	0.90 3.10

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION OUTPUT Profile #0.2% Annual Chan

E.G. Elev (ft)	27.03	Element	Left OB	Channel Right OB
Vel Head (ft)	0.31	Wt. n-Val.	0.120	0.100 0.120
W.S. Elev (ft)	26.73	Reach Len. (ft)	15.06	15.06 15.06
Crit W.S. (ft)		Flow Area (sq ft)	510.34	291.08 238.21
E.G. Slope (ft/ft)	0.009920	Area (sq ft)	510.34	291.08 238.21
Q Total (cfs)	4000.00	Flow (cfs)	1925.28	1614.29 460.43
Top Width (ft)	252.50	Top Width (ft)	94.26	38.98 119.27
Vel Total (ft/s)	3.85	Avg. Vel. (ft/s)	3.77	5.55 1.93
Max Chl Dpth (ft)	7.76	Hydr. Depth (ft)	5.41	7.47 2.00
Conv. Total (cfs)	40160.9	Conv. (cfs)	19330.3	16207.8 4622.8
Length Wtd. (ft)	15.06	Wetted Per. (ft)	95.39	40.13 121.96
Min Ch El (ft)	18.97	Shear (lb/sq ft)	3.31	4.49 1.21
Alpha	1.33	Stream Power (lb/ft s)	12.50	24.91 2.34
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	3.32	5.08 11.44
C & E Loss (ft)	0.00	Cum SA (acres)	0.66	0.95 3.68

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: Trading Cove Bro
REACH: RiverCL RS: 648.15

INPUT
Description:
Station Elevation Data num= 181

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	29.84	1.84	29.9	2.64	29.91	3.14	29.92	3.64	29.92
4.14	29.91	5.2	29.94	11.52	29.85	11.9	29.84	12.32	29.83
14.11	29.73	18.73	29.6	19.89	29.5	20.38	29.45	20.69	29.43
21.12	29.4	24.33	29	31.5	28.5	38.02	28	40.09	27.99
40.59	27.99	42.26	28	43.42	28	43.6	28.01	45.96	28.12
47.82	28.22	49.25	28.28	52.86	28.49	59.37	28.79	62.15	28.99
62.29	29	114.81	29	118.05	28.4	120	28	123.14	27.41
125.17	27	128.12	26.41	130	26	130.18	25.77	130.24	25.55
130.3	23.16	133.21	22.98	135.39	22.84	143	22.02	145.8	21.77
156.47	20.76	165.5	20.13	185.65	20.1	189.75	20.03	194.8	19.83
208.59	19.8	217.34	19.3	229.2	18.95	233.68	18.96	238.15	18.98
239.66	18.98	241.93	18.99	243.7	18.99	245.46	19	245.95	18.85
253.23	21.79	253.37	21.91	253.56	22.09	253.85	22.22	262.67	28.21
265.29	28.75	270.71	30.42	280.99	33.02	283.73	34.04	290.35	35.89
305.03	36.61	306.54	36.65	308.06	36.69	310.62	36.75	311.86	36.78
312.2	37.33	312.33	37.33	312.45	37.31	312.58	37.28	314.58	37
318.88	36.52	319.23	36.51	321.16	36.51	321.56	36.5	321.83	36.48
322.13	36.46	322.8	36.4	323.52	36.33	326.14	36	328.16	35.63
329.67	35.34	329.99	35.29	330.84	35.14	331.83	35	331.94	34.99
333.24	34.88	336.79	34.62	341.95	34.32	342.54	34.23	342.78	34.21
342.88	34.19	343.72	34	346.14	33.52	347.13	33.36	347.44	33.31
347.61	33.29	348.28	33.22	348.54	33.21	349.51	33.14	350.66	33.11
354.53	33	358	32.9	358.11	32.9	358.8	32.84	359.98	32.65
361.96	32.35	362.52	32.3	362.77	32.27	363.74	32.23	369.12	32
371.59	31.91	371.69	31.9	371.81	31.89	378.74	31.95	379.29	31.95
380.16	31.92	380.77	31.88	381.62	31.8	381.74	31.79	381.89	31.78
384.42	31.48	387.03	31.19	387.26	31.17	388.52	31.05	389.23	31
389.54	30.98	389.64	30.98	396.53	30.82	396.62	30.82	397.25	30.74
398.79	30.63	404.32	30	407.71	29.65	407.9	29.62	412.06	29.28
412.51	29.23	413.25	29.15	414.34	29	414.62	28.97	416.72	28.64
420.55	28.06	421.08	28	424.45	27.64	425.17	27.56	428.72	27
434.04	26.38	436.02	26.19	437.7	26	439.85	25.79	440.19	25.76
440.54	25.72	440.75	25.7	441.44	25.62	445.99	25	446.48	24.94
451.44	24	452.61	23.93	452.62	23.93	459.37	23.7	463.78	23.61
472.46	23.71	484.79	23.86	485.96	23.89	485.99	23.89	490.09	24
494.88	24	497.2	24.08	499.71	24.17	505.39	24.37	523.84	25
555.18	25								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	208.59	.1	253.23	.12

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
208.59	253.23	587.97	587.97	.1	.3

CROSS SECTION OUTPUT Profile #10% Annual Chanc

E.G. Elev (ft)	23.99	Element		Left OB	Channel

Right OB					
Vel Head (ft)	0.13	Wt. n-Val.	0.120	0.100	0.120
W.S. Elev (ft)	23.86	Reach Len. (ft)	587.97	587.97	587.97
Crit W.S. (ft)		Flow Area (sq ft)	245.64	201.34	6.93
E.G. Slope (ft/ft)	0.007201	Area (sq ft)	245.64	201.34	6.93
Q Total (cfs)	1240.00	Flow (cfs)	549.29	686.78	3.93
Top Width (ft)	155.67	Top Width (ft)	78.31	44.64	32.72
Vel Total (ft/s)	2.73	Avg. Vel. (ft/s)	2.24	3.41	0.57
Max Chl Dpth (ft)	5.01	Hydr. Depth (ft)	3.14	4.51	0.21
Conv. Total (cfs)	14612.2	Conv. (cfs)	6472.9	8093.1	46.3
Length Wtd. (ft)	587.97	Wetted Per. (ft)	79.13	45.25	33.37
Min Ch El (ft)	18.85	Shear (lb/sq ft)	1.40	2.00	0.09
Alpha	1.16	Stream Power (lb/ft s)	3.12	6.82	0.05
Frctn Loss (ft)	3.50	Cum Volume (acre-ft)	1.66	2.77	4.10
C & E Loss (ft)	0.03	Cum SA (acres)	0.53	0.85	2.27

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2% Annual Chance

E.G. Elev (ft)	25.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.120	0.100	0.120
W.S. Elev (ft)	24.93	Reach Len. (ft)	587.97	587.97	587.97
Crit W.S. (ft)		Flow Area (sq ft)	329.80	249.31	71.16
E.G. Slope (ft/ft)	0.008444	Area (sq ft)	329.80	249.31	71.16
Q Total (cfs)	2100.00	Flow (cfs)	963.22	1061.87	74.91
Top Width (ft)	202.87	Top Width (ft)	78.33	44.64	79.89
Vel Total (ft/s)	3.23	Avg. Vel. (ft/s)	2.92	4.26	1.05

Max Chl Dpth (ft)	6.08	Hydr. Depth (ft)	4.21	5.58
0.89				
Conv. Total (cfs)	22852.5	Conv. (cfs)	10481.9	11555.4
815.2				
Length Wtd. (ft)	587.97	Wetted Per. (ft)	80.20	45.25
80.99				
Min Ch El (ft)	18.85	Shear (lb/sq ft)	2.17	2.90
0.46				
Alpha	1.26	Stream Power (lb/ft s)	6.33	12.37
0.49				
Frctn Loss (ft)	3.76	Cum Volume (acre-ft)	2.23	3.56
6.37				
C & E Loss (ft)	0.04	Cum SA (acres)	0.53	0.87
2.78				

Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

CROSS SECTION OUTPUT Profile #1% Annual Chance

E.G. Elev (ft)	25.44	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.23	Wt. n-Val.	0.120	0.100
0.120				
W.S. Elev (ft)	25.22	Reach Len. (ft)	587.97	587.97
587.97				
Crit W.S. (ft)		Flow Area (sq ft)	352.09	262.01
101.51				
E.G. Slope (ft/ft)	0.008800	Area (sq ft)	352.09	262.01
101.51				
Q Total (cfs)	2380.00	Flow (cfs)	1094.00	1177.66
108.34				
Top Width (ft)	238.78	Top Width (ft)	78.34	44.64
115.80				
Vel Total (ft/s)	3.33	Avg. Vel. (ft/s)	3.11	4.49
1.07				
Max Chl Dpth (ft)	6.37	Hydr. Depth (ft)	4.49	5.87
0.88				
Conv. Total (cfs)	25370.2	Conv. (cfs)	11661.8	12553.5
1154.9				
Length Wtd. (ft)	587.97	Wetted Per. (ft)	80.49	45.25
117.22				
Min Ch El (ft)	18.85	Shear (lb/sq ft)	2.40	3.18
0.48				
Alpha	1.31	Stream Power (lb/ft s)	7.47	14.30
0.51				
Frctn Loss (ft)	3.82	Cum Volume (acre-ft)	2.38	3.78
7.11				
C & E Loss (ft)	0.05	Cum SA (acres)	0.53	0.88
3.06				

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

CROSS SECTION OUTPUT Profile #0.2% Annual Chan

E.G. Elev (ft)	26.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.	0.120	0.100	0.120
W.S. Elev (ft)	26.59	Reach Len. (ft)	587.97	587.97	587.97
Crit W.S. (ft)		Flow Area (sq ft)	460.41	323.17	269.51
E.G. Slope (ft/ft)	0.009590	Area (sq ft)	460.41	323.17	269.51
Q Total (cfs)	4000.00	Flow (cfs)	1733.38	1743.91	522.70
Top Width (ft)	255.94	Top Width (ft)	81.35	44.64	129.95
Vel Total (ft/s)	3.80	Avg. Vel. (ft/s)	3.76	5.40	1.94
Max Chl Dpth (ft)	7.74	Hydr. Depth (ft)	5.66	7.24	2.07
Conv. Total (cfs)	40847.0	Conv. (cfs)	17700.9	17808.4	5337.7
Length Wtd. (ft)	587.97	Wetted Per. (ft)	84.16	45.25	133.24
Min Ch El (ft)	18.85	Shear (lb/sq ft)	3.28	4.28	1.21
Alpha	1.34	Stream Power (lb/ft s)	12.33	23.07	2.35
Frctn Loss (ft)	3.97	Cum Volume (acre-ft)	3.15	4.97	11.35
C & E Loss (ft)	0.07	Cum SA (acres)	0.63	0.93	3.64

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

CROSS SECTION

RIVER: Trading Cove Bro

REACH: RiverCL RS: 60.18

INPUT
Description:
Station Elevation Data num= 386

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	22.42	12.28	22.1	12.52	22.1	15.63	22	16.15	22
23.32	21.01	23.34	21.01	23.4	21	23.46	20.98	26.5	20
28.87	19.65	34.38	19	35.97	18.93	36.37	18.91	40.58	18.75
40.84	18.74	43.87	18.64	43.97	18.63	45.45	18.6	45.54	18.59
46.2	18.58	46.83	18.57	48.18	18.57	48.27	18.56	51.58	18.59
51.65	18.59	53.61	18.38	57.12	18	58.04	18	58.53	17.83
60.11	17.38	61.51	17	96.55	17	104.12	17.78	105.9	18
131.65	18	136.25	18.23	136.32	18.24	136.48	18.24	137.28	18.28
138.01	18.31	138.2	18.31	138.29	18.32	143.11	18.46	143.35	18.46
143.48	18.47	143.6	18.46	143.85	18.46	145.27	18.52	146.03	18.53
146.74	18.55	147.19	18.54	147.61	18.53	147.86	18.54	147.98	18.54
148.3	18.55	150.69	18.49	151.19	18.51	151.4	18.52	151.49	18.52
157.29	18.47	162.67	18.48	162.84	18.49	172.92	18.49	183.2	18.46
183.4	18.46	183.8	18.45	184.01	18.45	184.45	18.44	184.66	18.44
184.98	18.43	185.21	18.43	185.37	18.42	185.78	18.42	186.27	18.41
186.62	18.41	186.85	18.4	187.27	18.4	188.05	18.38	193.76	18.29
202.1	18.09	203.31	18.05	204.4	18	241.31	18	241.91	18.01
245.09	18	320.52	18	325.87	18.12	325.91	18.12	330.29	18.18
330.35	18.18	337.91	18.43	355.53	19	366.86	19	369.14	19.09
369.29	19.09	370.24	19.13	370.54	19.15	370.89	19.15	371.21	19.17
371.47	19.18	372.68	19.22	373.36	19.25	373.8	19.27	374.3	19.29
375.05	19.32	375.27	19.33	376.47	19.4	376.75	19.41	386.06	19.87
391.29	20.1	395.82	20.2	399.5	20.27	406	20.38	409.26	20.41
411.99	20.48	412.28	20.48	417.71	20.63	419.2	20.63	421.07	20.6
422	20.63	422.31	20.63	435.4	20.99	435.67	21	439.24	21.32
441.72	21.45	445.33	21.58	446.39	21.6	447.73	21.59	447.94	21.6
452.04	21.71	452.14	21.71	452.23	21.72	452.32	21.72	452.4	21.73
452.48	21.74	452.56	21.75	452.63	21.76	452.81	21.79	453.13	21.85
453.19	21.86	453.24	21.87	453.38	21.88	453.55	21.88	453.72	21.89
454.09	21.88	458.01	22	463.63	22.3	467.21	22.42	468.04	22.44
469.19	22.43	474	22.45	478.49	22.34	479.94	22.37	480.39	22.39
483.89	22.54	485.39	22.66	485.86	22.69	486.12	22.7	487.26	22.69
489.78	22.63	490.55	22.64	492.31	22.67	497.86	22.54	498.62	22.53
502.35	22.37	503.07	22.37	504.3	22.41	505.39	22.41	507.4	22.52
507.73	22.55	507.82	22.55	512.83	22.61	513.13	22.63	513.53	22.66
513.76	22.68	513.86	22.69	516.38	22.94	516.95	22.94	517.72	22.96
518.27	22.97	519.33	23	519.38	23.01	523.68	23.05	524.51	23.04
527.97	23	538.74	23	539.08	23.05	539.38	23.1	539.98	23.09
540.23	23.11	545.36	23.45	547.69	23.6	555.94	23.69	560.98	23.75
561.21	23.75	565.98	23.72	569.76	23.72	573.57	23.73	573.72	23.73
576.04	23.74	576.11	23.73	576.19	23.73	582.82	23.83	591.46	23.96
591.94	23.97	591.96	23.97	593.05	23.99	593.32	24	599.1	24
600.84	24.01	604.36	24.01	604.56	24.02	605.64	24.02	609.97	24.18
619.19	24.5	620.96	24.55	621.65	24.57	625.69	24.71	626.47	24.73
627.23	24.76	628.87	24.8	630.22	24.85	631.07	24.88	634.51	24.99
636.62	25	637.85	25.19	637.97	25.22	638.34	25.3	638.61	25.37
638.88	25.45	640.31	26	642.45	26.96	642.58	27	642.69	27.05
644.94	28	646.44	28.68	647.16	29	649.52	29.78	650.25	30
652.18	30.67	653.04	31	653.78	31.21	653.93	31.24	656.12	32
659.14	32.58	659.85	32.71	660.58	32.88	661.08	33	663.43	33.55

665.39	34	665.81	34.06	665.92	34.07	670.04	34.62	677.2	35
682.84	35.71	683.33	35.79	684.95	36	690.53	36.6	691.2	36.68
692.92	36.85	694.22	37	697.39	37.34	699.53	37.53	700.18	37.6
700.47	37.63	700.6	37.65	700.71	37.66	700.81	37.68	701.36	37.75
701.7	37.79	703.79	38	708.69	38.74	710.05	38.95	710.4	39
711.05	39.06	711.07	39.07	712.35	39.17	713.83	39.28	714.21	39.31
715.92	39.41	716.86	39.47	722.28	39.74	724.38	39.86	726.68	40
735.84	40.22	738.45	40.3	743.27	40.4	744.63	40.43	745.87	40.45
748.93	40.46	749.4	40.47	750.6	40.49	752.91	40.52	753.48	40.53
754.13	40.54	755.39	40.58	758.58	40.58	760.39	40.62	760.61	40.62
760.83	40.63	763.07	40.64	763.42	40.63	763.93	40.63	766.11	40.65
766.65	40.64	767.01	40.63	767.5	40.62	767.88	40.62	768.33	40.61
768.49	40.61	769.5	40.57	769.58	40.58	769.78	40.57	769.85	40.57
775.13	40.45	778.56	40.37	778.89	40.38	786.26	40.43	796.6	40.53
797.67	40.54	801.54	40.6	804.98	40.65	807.74	40.68	808.16	40.68
808.37	40.69	811.31	40.72	811.51	40.72	813.35	40.73	821.96	41
905.24	41	918.04	41.01	936.63	41.01	942.1	41	944.85	41
954.18	41.17	954.22	41.17	961.95	41.1	961.98	41.1	967.98	41.03
967.99	41.03	969.76	41	974.71	40.86	976.55	40.82	979.2	40.76
979.61	40.74	988.31	40.59	991.94	40.44	994.38	40.42	994.74	40.42
996.9	40.44	999.26	40.31	999.44	40.31	1000.05	40.28	1000.21	40.28
1002.31	40.21	1003.08	40.19	1004.66	40.15	1013.09	40.1	1013.24	40.1
1015.72	40.01	1015.99	40.01	1016.22	40	1016.71	40	1016.88	39.99
1016.9	39.99	1017.66	39.95	1018.68	39.88	1018.8	39.88	1018.84	39.87
1018.92	39.87	1025.12	39.46	1026.9	39.45	1028.84	39.42	1039.01	39.08
1039.36	39.07	1039.51	39.06	1039.73	39.06	1039.97	39.05	1041.34	39.01
1041.91	39	1042.01	39	1042.18	38.99	1042.89	38.97	1043.28	38.95
1046.97	38.85								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	12.52	.1	105.9	.12

Bank Sta: Left	Right	Coeff Contr.	Expan.
12.52	105.9	.1	.3

CROSS SECTION OUTPUT Profile #10% Annual Chanc

E.G. Elev (ft)	20.46	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.04	Wt. n-Val.		0.100
0.120				
W.S. Elev (ft)	20.42	Reach Len. (ft)		
Crit W.S. (ft)	18.89	Flow Area (sq ft)		208.58
600.16				
E.G. Slope (ft/ft)	0.005009	Area (sq ft)		208.58
600.16				
Q Total (cfs)	1240.00	Flow (cfs)		411.89
828.11				
Top Width (ft)	384.44	Top Width (ft)		80.70
303.74				
Vel Total (ft/s)	1.53	Avg. Vel. (ft/s)		1.97
1.38				
Max Chl Dpth (ft)	3.42	Hydr. Depth (ft)		2.58

1.98			
Conv. Total (cfs)	17519.7	Conv. (cfs)	5819.4
11700.3			
Length Wtd. (ft)		Wetted Per. (ft)	81.07
303.80			
Min Ch El (ft)	17.00	Shear (lb/sq ft)	0.80
0.62			
Alpha	1.09	Stream Power (lb/ft s)	1.59
0.85			
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

CROSS SECTION OUTPUT Profile #2% Annual Chance

E.G. Elev (ft)	21.32	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.06	Wt. n-Val.		0.100
0.120				
W.S. Elev (ft)	21.27	Reach Len. (ft)		
Crit W.S. (ft)	19.25	Flow Area (sq ft)		278.28
873.18				
E.G. Slope (ft/ft)	0.005003	Area (sq ft)		278.28
873.18				
Q Total (cfs)	2100.00	Flow (cfs)		645.26
1454.74				
Top Width (ft)	417.20	Top Width (ft)		84.45
332.76				
Vel Total (ft/s)	1.82	Avg. Vel. (ft/s)		2.32
1.67				
Max Chl Dpth (ft)	4.27	Hydr. Depth (ft)		3.30
2.62				
Conv. Total (cfs)	29688.9	Conv. (cfs)		9122.4
20566.4				
Length Wtd. (ft)		Wetted Per. (ft)		84.92
332.84				
Min Ch El (ft)	17.00	Shear (lb/sq ft)		1.02
0.82				
Alpha	1.07	Stream Power (lb/ft s)		2.37
1.37				
Frctn Loss (ft)		Cum Volume (acre-ft)		
C & E Loss (ft)		Cum SA (acres)		

CROSS SECTION OUTPUT Profile #1% Annual Chance

E.G. Elev (ft)	21.56	Element	Left OB	Channel

Right OB					
Vel Head (ft)	0.06	Wt. n-Val.			0.100
0.120					
W.S. Elev (ft)	21.50	Reach Len. (ft)			
Crit W.S. (ft)	19.36	Flow Area (sq ft)			298.39
952.09					
E.G. Slope (ft/ft)	0.005001	Area (sq ft)			298.39
952.09					
Q Total (cfs)	2380.00	Flow (cfs)			715.07
1664.93					
Top Width (ft)	423.46	Top Width (ft)			86.15
337.30					
Vel Total (ft/s)	1.90	Avg. Vel. (ft/s)			2.40
1.75					
Max Chl Dpth (ft)	4.50	Hydr. Depth (ft)			3.46
2.82					
Conv. Total (cfs)	33653.4	Conv. (cfs)			10111.1
23542.3					
Length Wtd. (ft)		Wetted Per. (ft)			86.65
337.40					
Min Ch El (ft)	17.00	Shear (lb/sq ft)			1.08
0.88					
Alpha	1.07	Stream Power (lb/ft s)			2.58
1.54					
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #0.2% Annual Chan

E.G. Elev (ft)	22.85	Element	Left OB	Channel	
Right OB					
Vel Head (ft)	0.08	Wt. n-Val.	0.120	0.100	
0.120					
W.S. Elev (ft)	22.77	Reach Len. (ft)			
Crit W.S. (ft)	19.82	Flow Area (sq ft)	6.44	413.93	
1412.29					
E.G. Slope (ft/ft)	0.005005	Area (sq ft)	6.44	413.93	
1412.29					
Q Total (cfs)	4000.00	Flow (cfs)	3.55	1169.77	
2826.68					
Top Width (ft)	514.68	Top Width (ft)	12.52	93.38	
408.78					
Vel Total (ft/s)	2.18	Avg. Vel. (ft/s)	0.55	2.83	
2.00					
Max Chl Dpth (ft)	5.77	Hydr. Depth (ft)	0.51	4.43	
3.45					
Conv. Total (cfs)	56541.7	Conv. (cfs)	50.2	16535.2	
39956.3					
Length Wtd. (ft)		Wetted Per. (ft)	12.88	93.91	

408.93				
Min Ch El (ft)	17.00	Shear (lb/sq ft)	0.16	1.38
1.08				
Alpha	1.08	Stream Power (lb/ft s)	0.09	3.89
2.16				
Frctn Loss (ft)		Cum Volume (acre-ft)		
C & E Loss (ft)		Cum SA (acres)		

SUMMARY OF MANNING'S N VALUES

River:Trading Cove Bro

Reach	River Sta.	n1	n2	n3
RiverCL	1177.1	.12	.1	.12
RiverCL	689.9	.12	.1	.12
RiverCL	679.63	.12	.1	.12
RiverCL	670.31	Bridge		
RiverCL	663.21	.12	.1	.12
RiverCL	648.15	.12	.1	.12
RiverCL	60.18	.12	.1	.12

SUMMARY OF REACH LENGTHS

River: Trading Cove Bro

Reach	River Sta.	Left	Channel	Right
RiverCL	1177.1	487.2	487.2	487.2
RiverCL	689.9	10.27	10.27	10.27
RiverCL	679.63	16.42	16.42	16.42
RiverCL	670.31	Bridge		
RiverCL	663.21	15.06	15.06	15.06
RiverCL	648.15	587.97	587.97	587.97
RiverCL	60.18			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Trading Cove Bro

Reach	River Sta.	Contr.	Expan.
RiverCL	1177.1	.1	.3
RiverCL	689.9	.1	.3

RiverCL	679.63		.1	.3
RiverCL	670.31	Bridge		
RiverCL	663.21		.1	.3
RiverCL	648.15		.1	.3
RiverCL	60.18		.1	.3

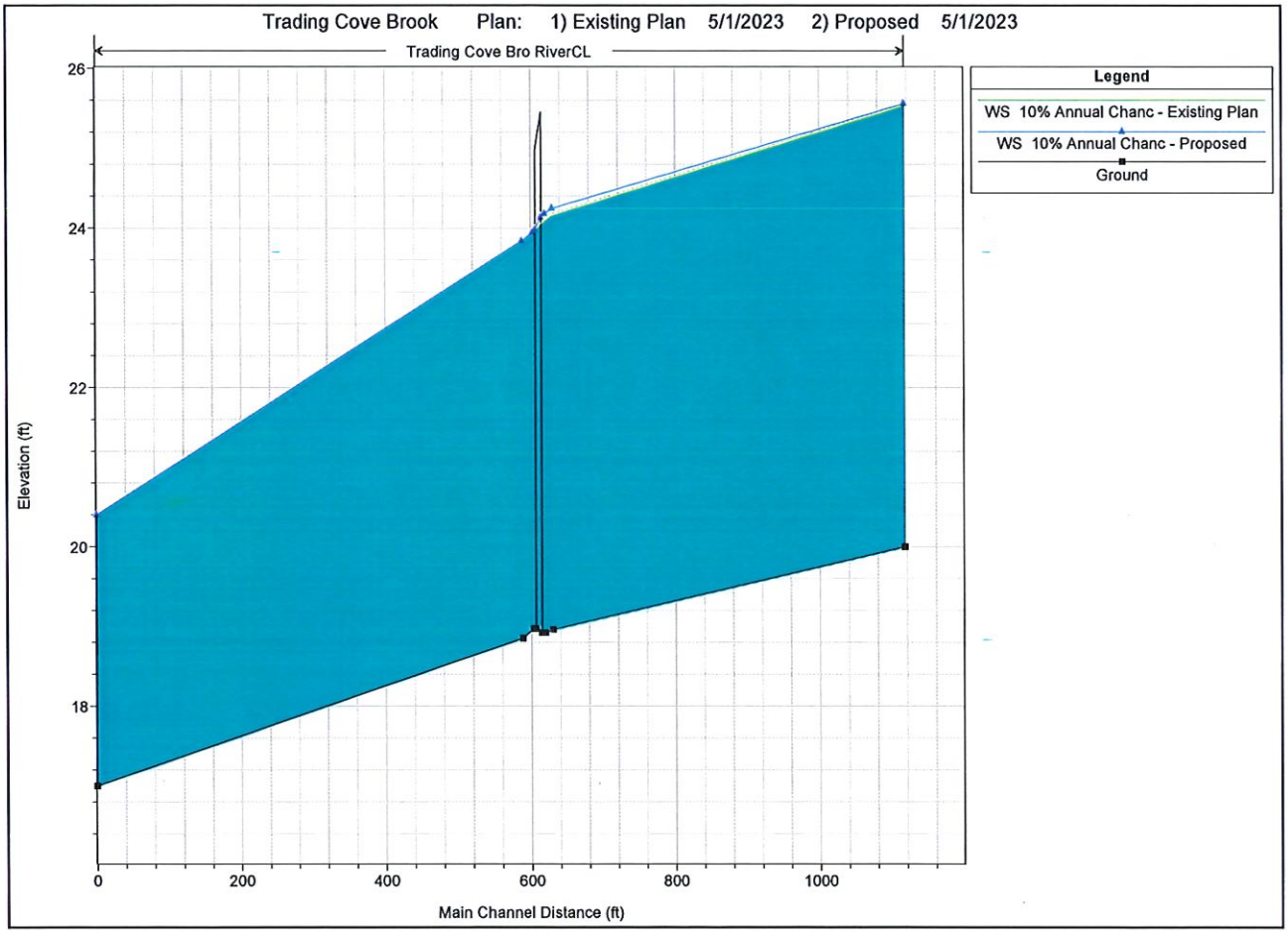
Profile Output Table - Standard Table 1

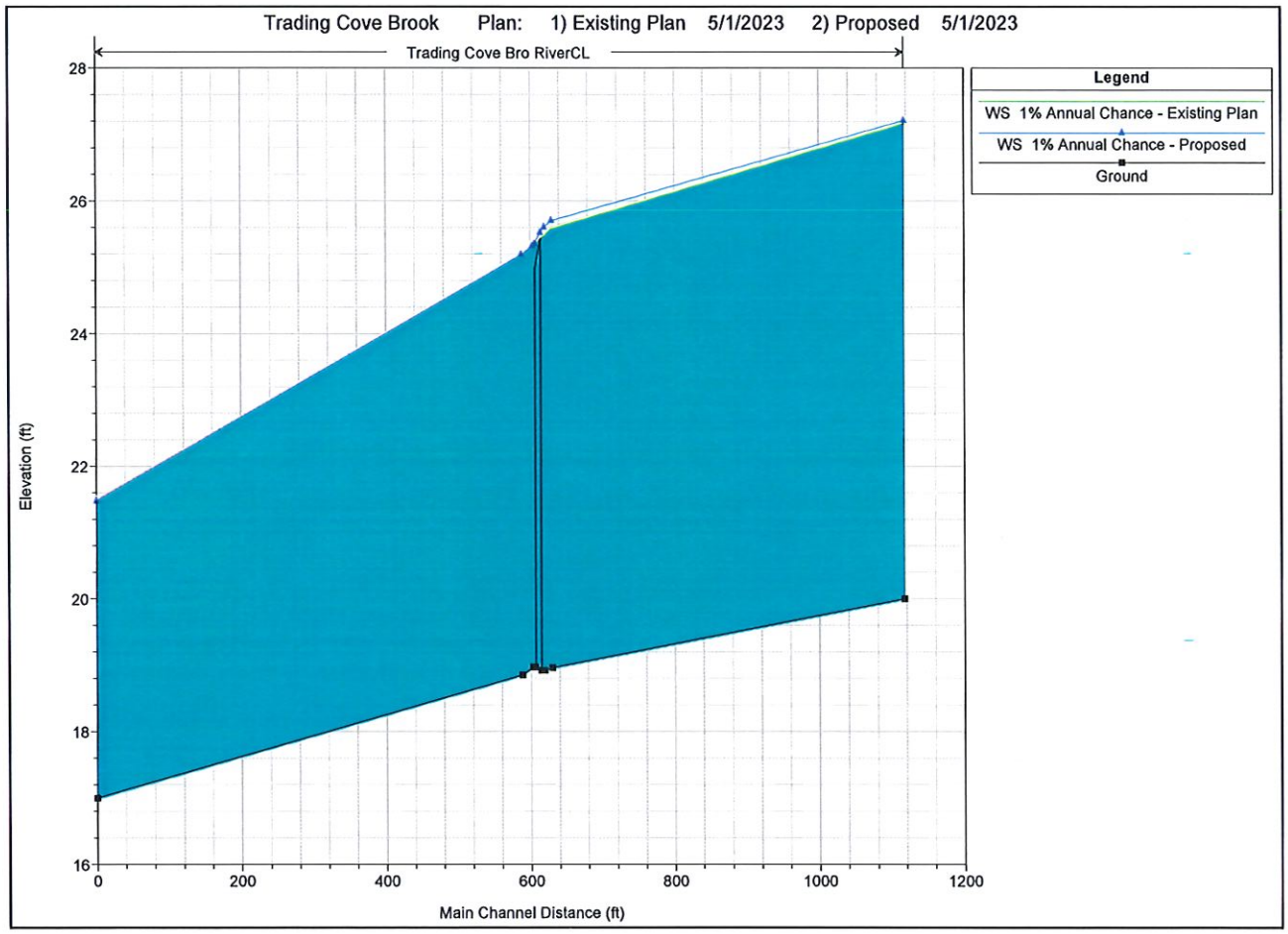
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
RiverCL	1177.1	10% Annual Chanc	1240.00	20.00	25.58	25.60	0.001423	1.67	1114.74	371.46		0.13
RiverCL	1177.1	2% Annual Chance	2100.00	20.00	26.89	26.92	0.001412	1.93	1625.85	408.48		0.13
RiverCL	1177.1	1% Annual Chance	2380.00	20.00	27.24	27.27	0.001422	2.01	1771.79	418.91		0.14
RiverCL	1177.1	0.2% Annual Chan	4000.00	20.00	28.92	28.97	0.001473	2.37	2535.57	471.14		0.14
RiverCL	689.9	10% Annual Chanc	1240.00	18.96	24.27	24.37	0.005623	3.11	510.81	136.65		0.25
RiverCL	689.9	2% Annual Chance	2100.00	18.96	25.43	25.60	0.006939	3.99	674.09	144.07		0.29
RiverCL	689.9	1% Annual Chance	2380.00	18.96	25.73	25.92	0.007375	4.24	717.58	145.90		0.30
RiverCL	689.9	0.2% Annual Chan	4000.00	18.96	27.14	27.46	0.009592	5.53	928.76	154.51		0.35
RiverCL	679.63	10% Annual Chanc	1240.00	18.92	24.20	21.76	24.31	0.005593	3.26	499.22	132.96	0.26
RiverCL	679.63	2% Annual Chance	2100.00	18.92	25.34	22.44	25.52	0.007078	4.20	654.60	139.24	0.30
RiverCL	679.63	1% Annual Chance	2380.00	18.92	25.63	22.64	25.84	0.007550	4.47	695.50	140.38	0.31
RiverCL	679.63	0.2% Annual Chan	4000.00	18.92	27.00	23.61	27.36	0.010063	5.86	891.71	147.38	0.37
RiverCL	670.31	Bridge										
RiverCL	663.21	10% Annual Chanc	1240.00	18.97	23.96	24.10	0.007629	3.57	445.77	128.17		0.29
RiverCL	663.21	2% Annual Chance	2100.00	18.97	25.05	25.27	0.008922	4.44	636.62	216.19		0.33
RiverCL	663.21	1% Annual Chance	2380.00	18.97	25.35	25.58	0.009175	4.65	702.15	234.01		0.33

RiverCL	663.21	0.2% Annual Chan	4000.00	18.97	26.73		
27.03	0.009920	5.55	1039.63	252.50	0.36		
RiverCL	648.15	10% Annual Chanc	1240.00	18.85	23.86		
23.99	0.007201	3.41	453.90	155.67	0.28		
RiverCL	648.15	2% Annual Chance	2100.00	18.85	24.93		
25.13	0.008444	4.26	650.26	202.87	0.32		
RiverCL	648.15	1% Annual Chance	2380.00	18.85	25.22		
25.44	0.008800	4.49	715.62	238.78	0.33		
RiverCL	648.15	0.2% Annual Chan	4000.00	18.85	26.59		
26.89	0.009590	5.40	1053.09	255.94	0.35		
RiverCL	60.18	10% Annual Chanc	1240.00	17.00	20.42		
18.89	20.46	0.005009	1.97	808.74	384.44	0.22	
RiverCL	60.18	2% Annual Chance	2100.00	17.00	21.27		
19.25	21.32	0.005003	2.32	1151.45	417.20	0.23	
RiverCL	60.18	1% Annual Chance	2380.00	17.00	21.50		
19.36	21.56	0.005001	2.40	1250.47	423.46	0.23	
RiverCL	60.18	0.2% Annual Chan	4000.00	17.00	22.77		
19.82	22.85	0.005005	2.83	1832.66	514.68	0.24	

APPENDIX C

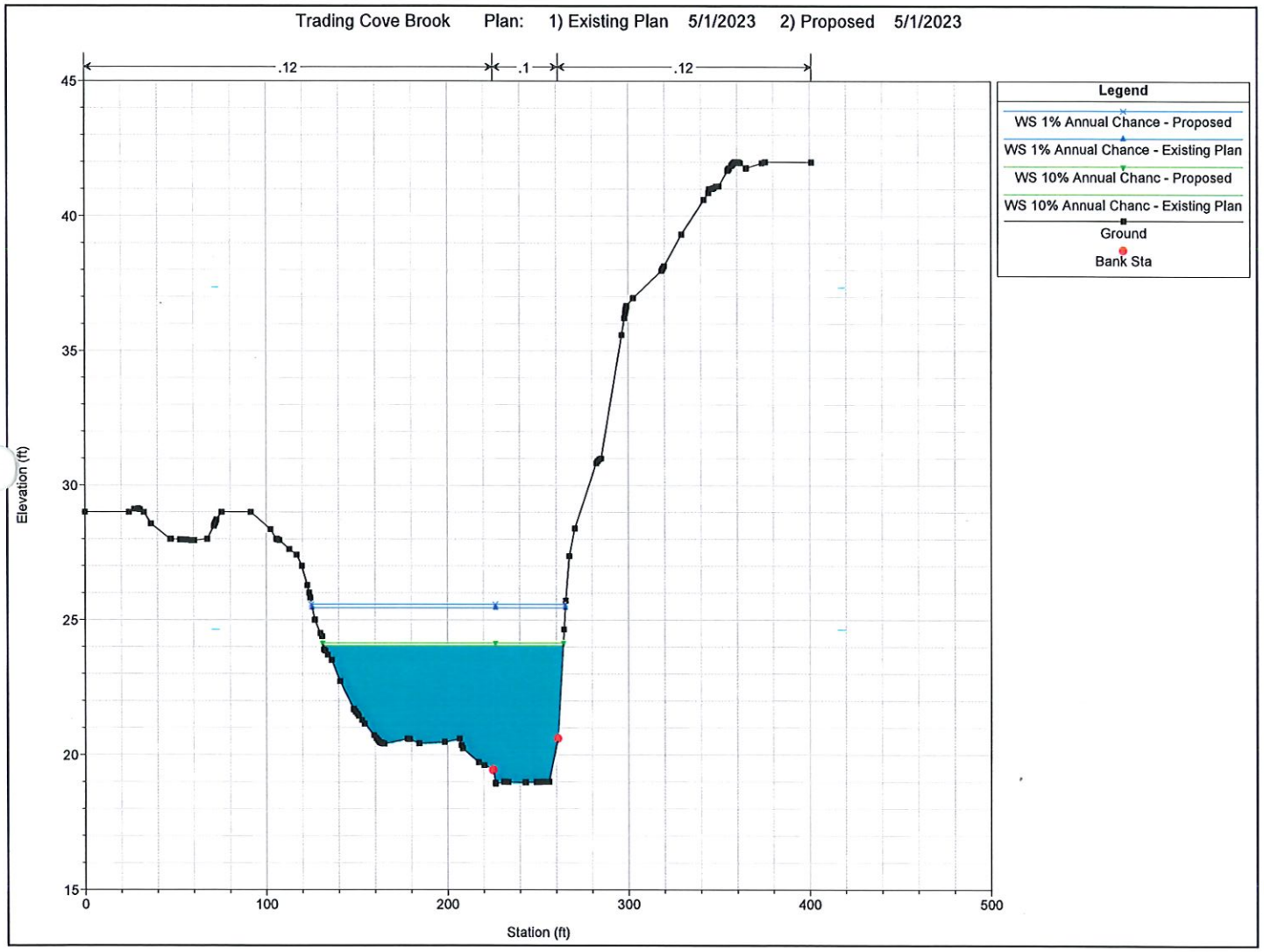
WATER SURFACE PROFILE PLOTS

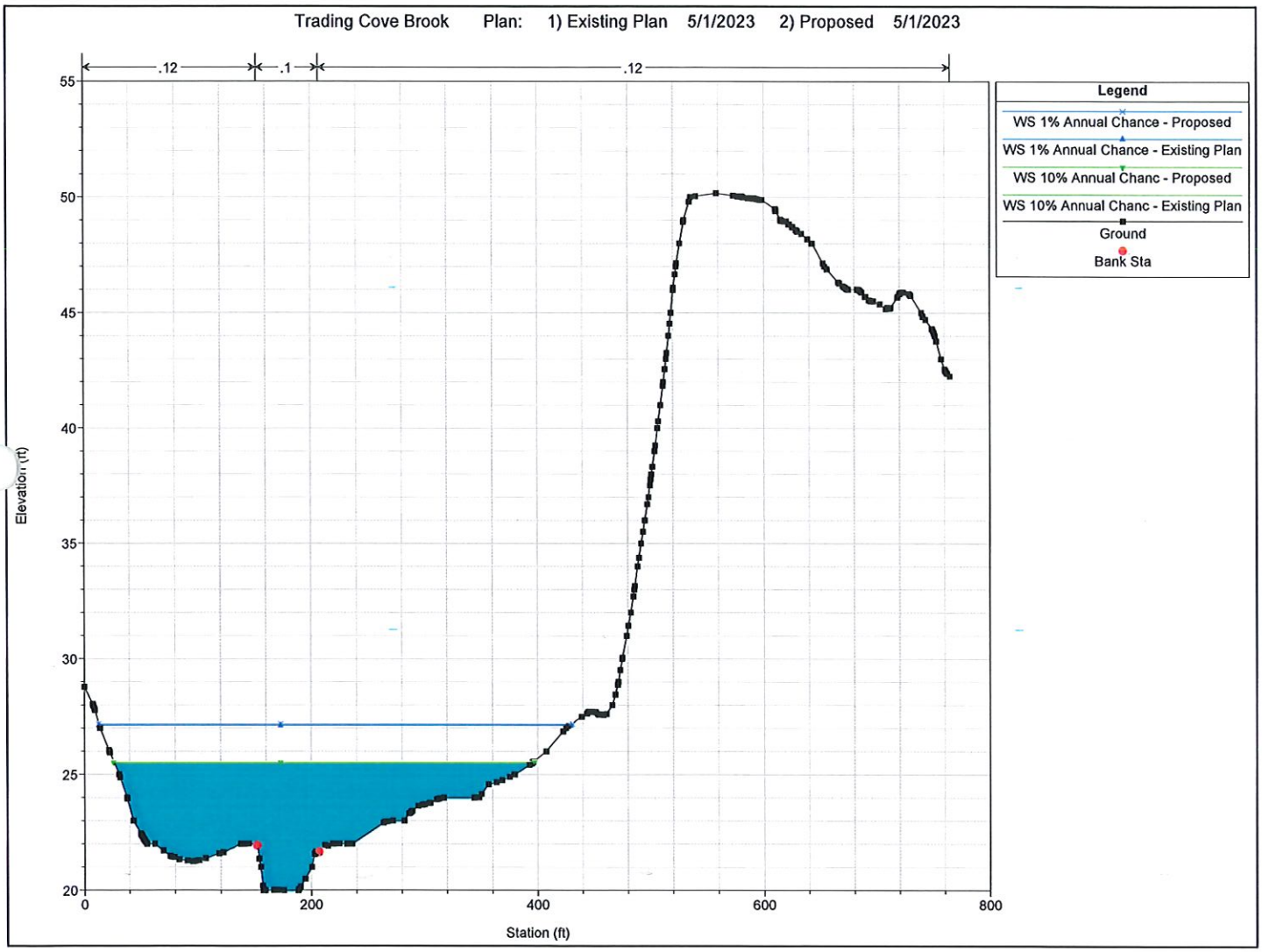

Trading Cove Brook Plan: 1) Existing Plan 5/1/2023 2) Proposed 5/1/2023
Trading Cove Bro RiverCL
Legend
WS 10% Annual Chanc - Existing Plan
WS 10% Annual Chanc - Proposed
Ground
Elevation (ft)
26
24
22
20
18
0
200
400
600
800
1000
Main Channel Distance (ft)

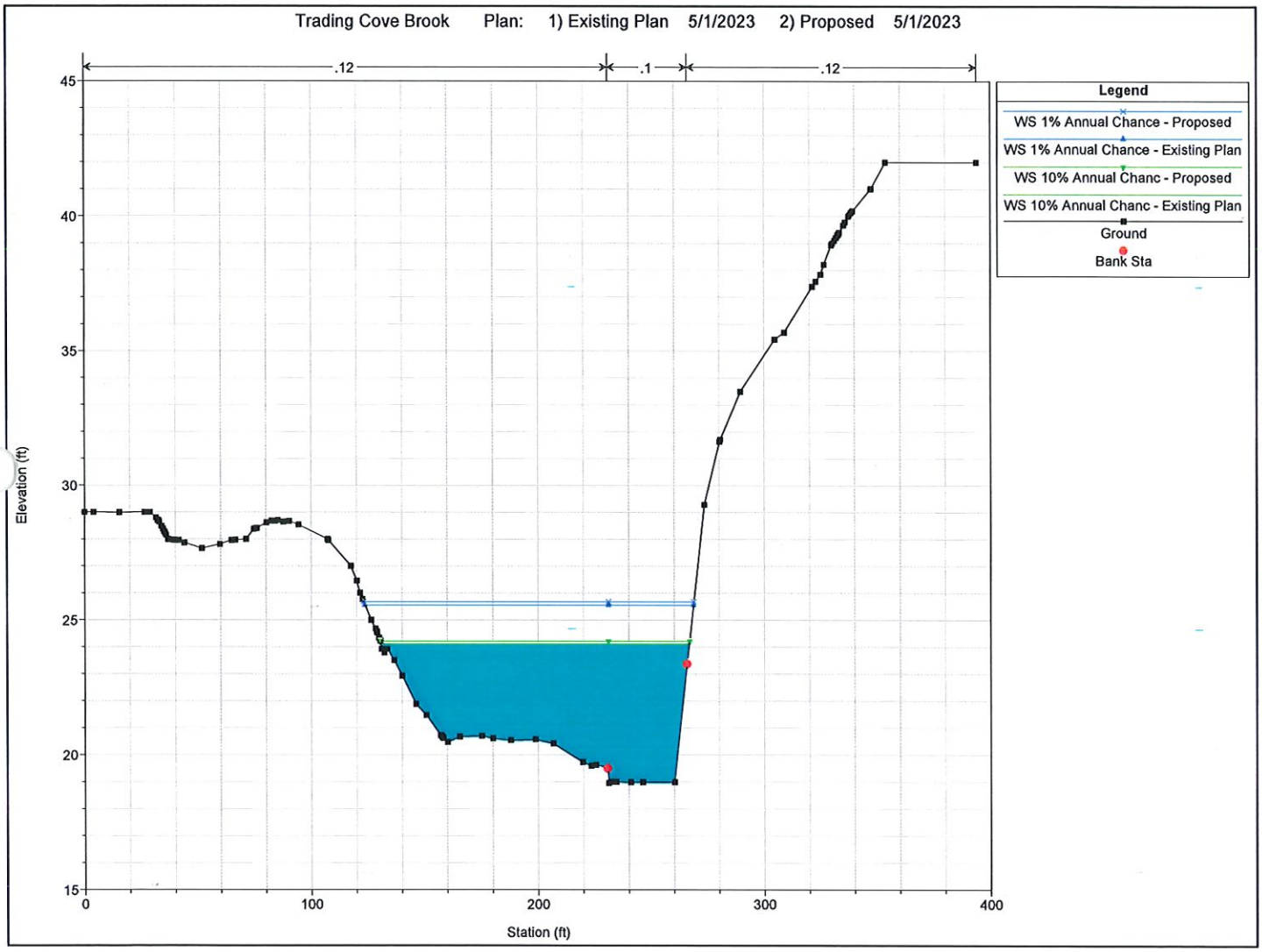

Trading Cove Brook Plan: 1) Existing Plan 5/1/2023 2) Proposed 5/1/2023
Trading Cove Bro RiverCL
Legend
WS 1% Annual Chance - Existing Plan
WS 1% Annual Chance - Proposed
Ground
Elevation (ft)
28
26
24
22
20
18
16
0
200
400
600
800
1000
1200
Main Channel Distance (ft)

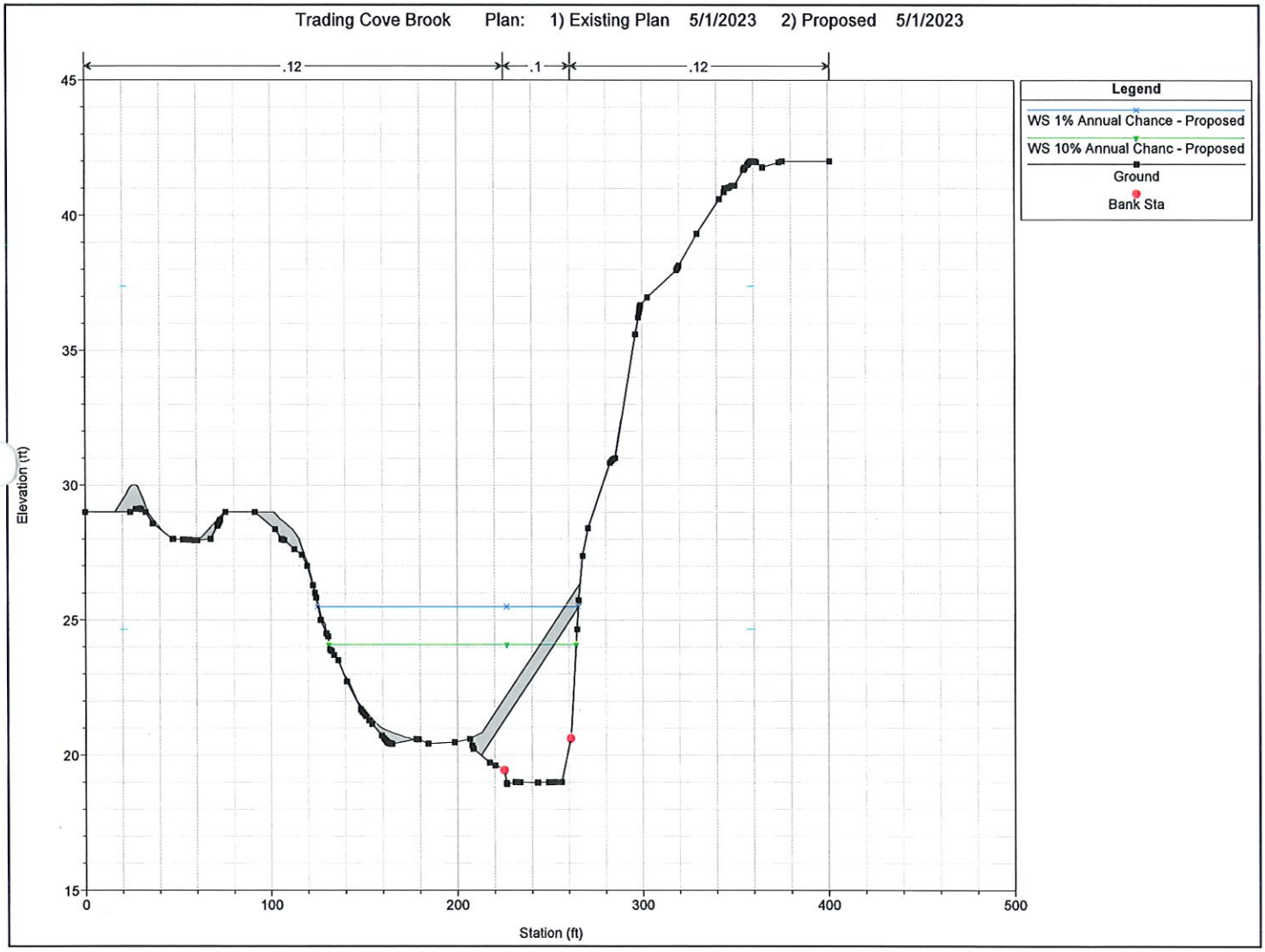
APPENDIX D

CROSS SECTION PLOTS


Trading Cove Brook Plan: 1) Existing Plan 5/1/2023 2) Proposed 5/1/2023
.12
.1
.12
45
40
35
30
25
20
15
Elevation (ft)
0
100
200
300
400
500
Station (ft)
Legend
WS 1% Annual Chance - Proposed
WS 1% Annual Chance - Existing Plan
WS 10% Annual Chanc - Proposed
WS 10% Annual Chanc - Existing Plan
Ground
Bank Sta


Trading Cove Brook Plan: 1) Existing Plan 5/1/2023 2) Proposed 5/1/2023
.12
.1
.12
Legend
WS 1% Annual Chance - Proposed
WS 1% Annual Chance - Existing Plan
WS 10% Annual Chanc - Proposed
WS 10% Annual Chanc - Existing Plan
Ground
Bank Sta
Elevation (ft)
55
50
45
40
35
30
25
20
0
200
400
600
800
Station (ft)


Trading Cove Brook Plan: 1) Existing Plan 5/1/2023 2) Proposed 5/1/2023
.12
.1
.12
45
40
35
30
25
20
15
Elevation (ft)
0
100
200
300
400
Station (ft)
Legend
WS 1% Annual Chance - Proposed
WS 1% Annual Chance - Existing Plan
WS 10% Annual Chanc - Proposed
WS 10% Annual Chanc - Existing Plan
Ground
Bank Sta


Trading Cove Brook Plan: 1) Existing Plan 5/1/2023 2) Proposed 5/1/2023
.12
.1
.12
Legend
WS 1% Annual Chance - Proposed
WS 10% Annual Chanc - Proposed
Ground
Bank Sta
Elevation (ft)
Station (ft)
45
40
35
30
25
20
15
0
100
200
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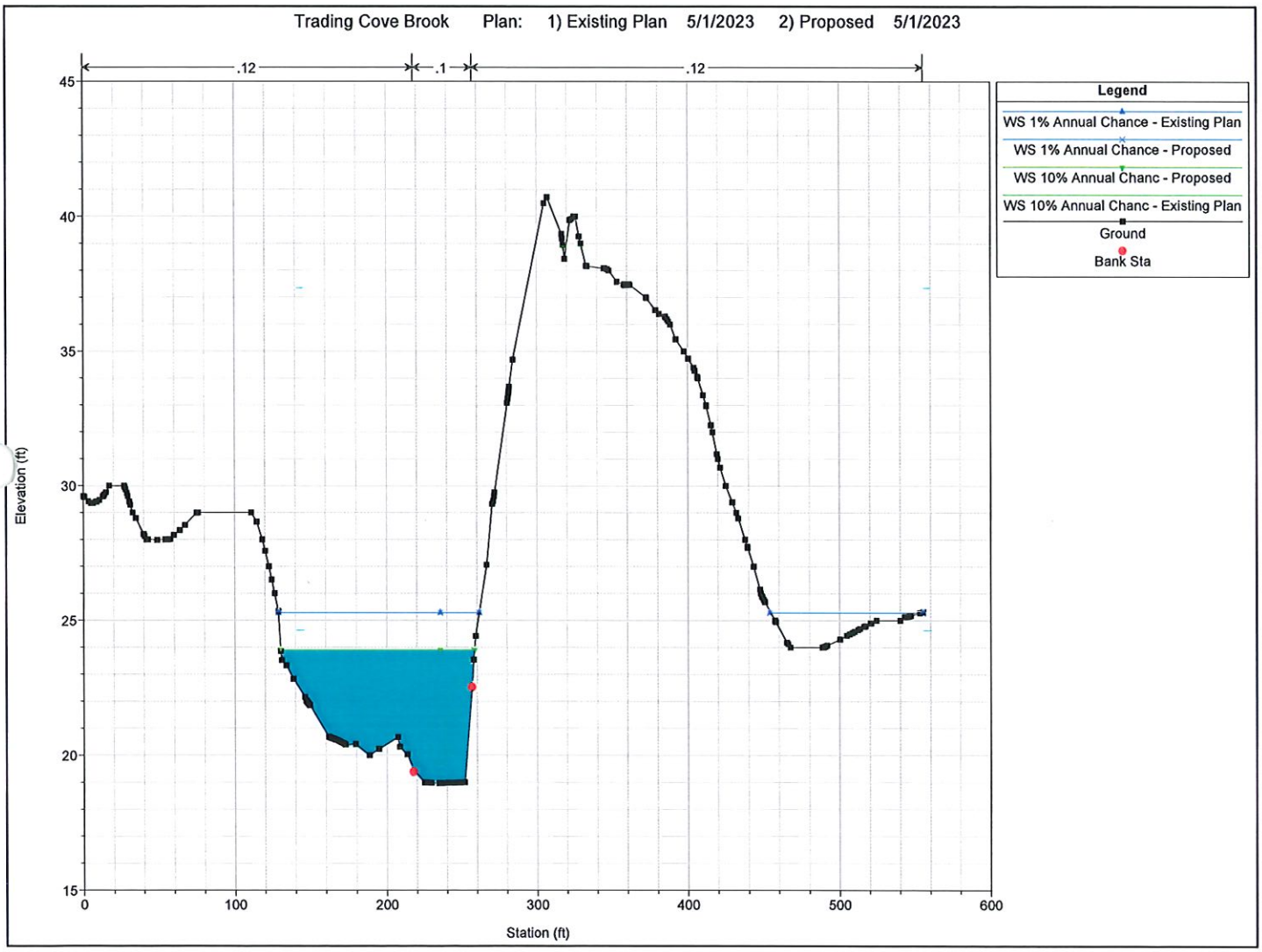
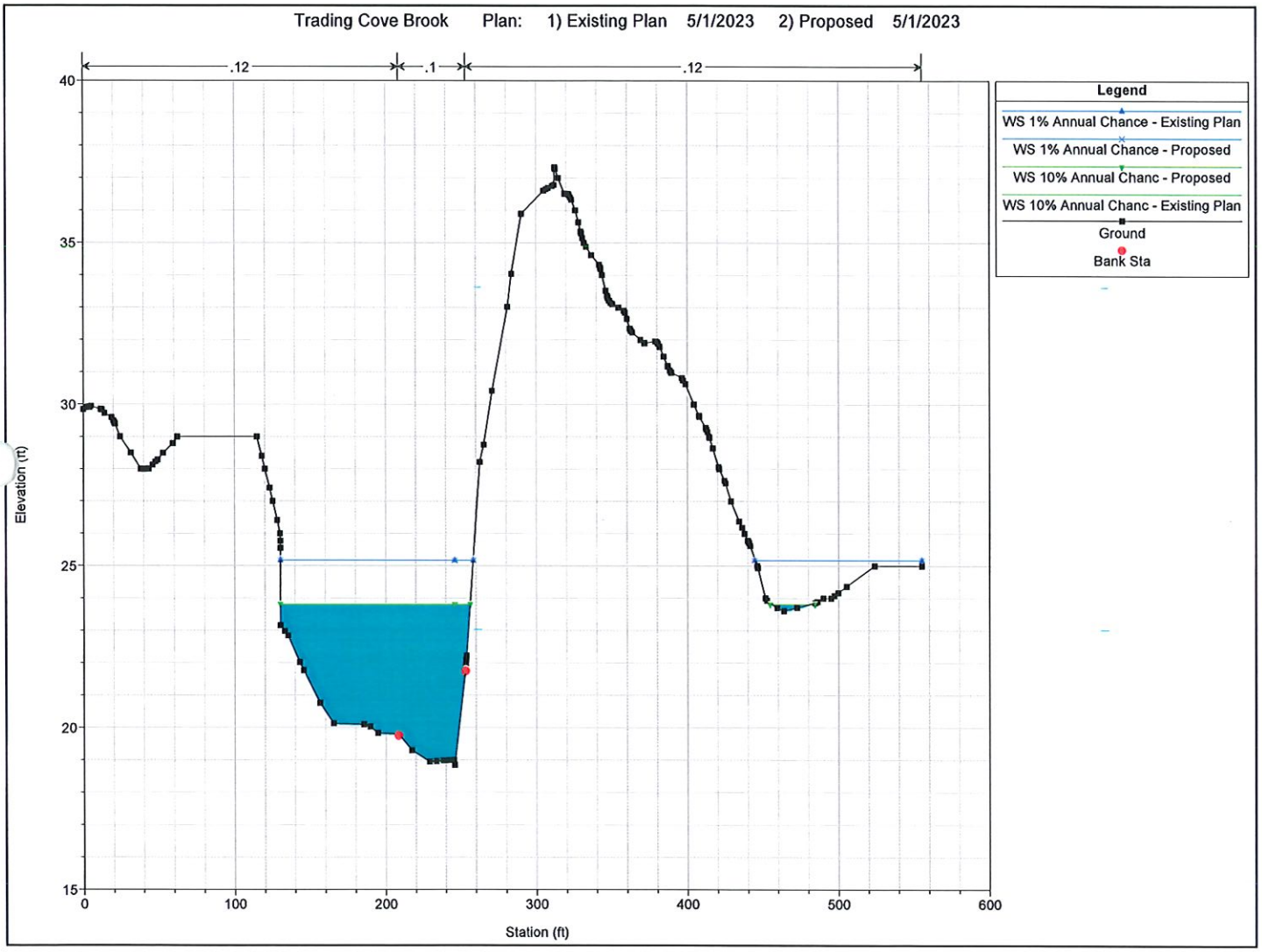
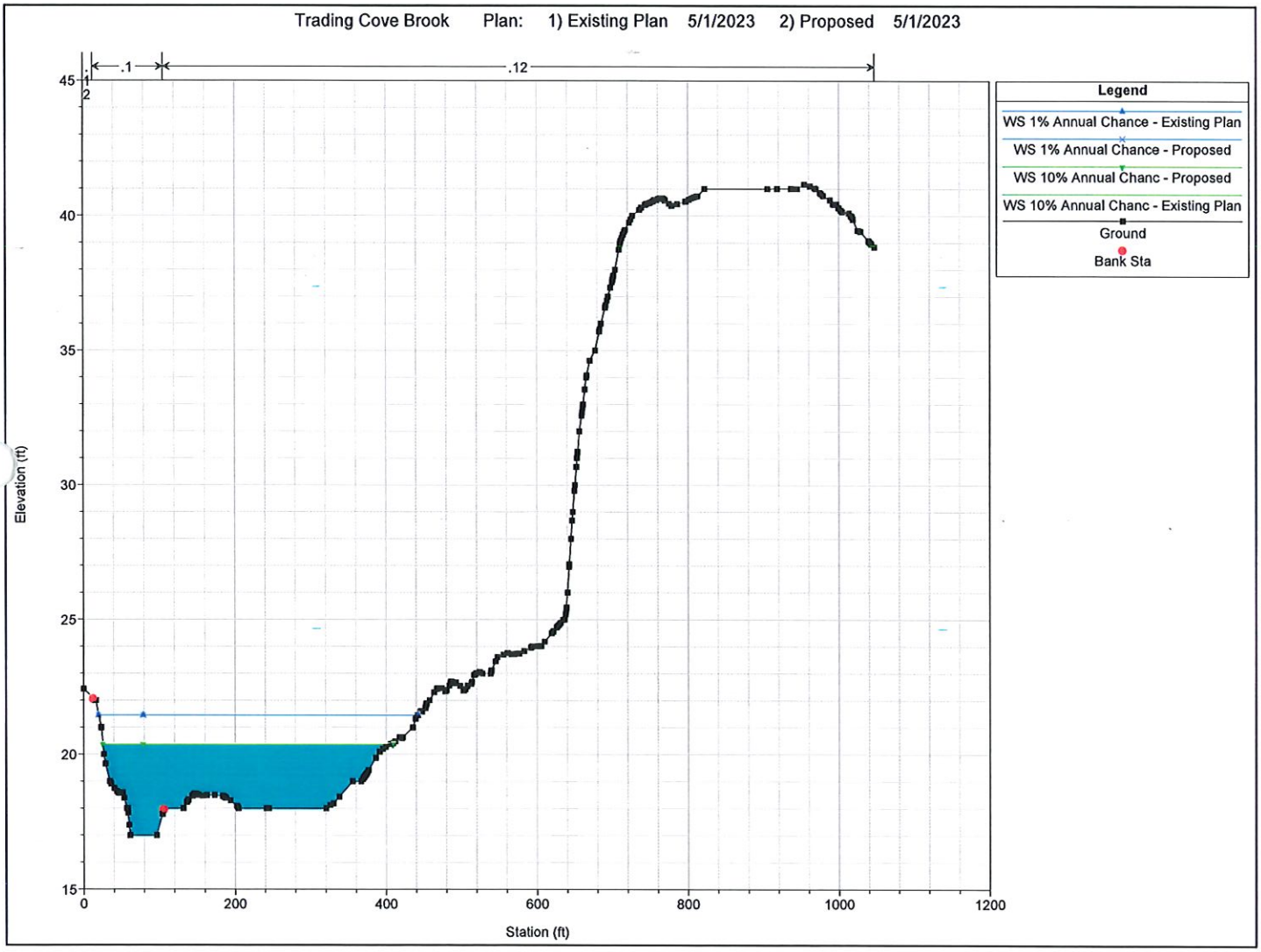
400
500


Trading Cove Brook Plan: 1) Existing Plan 5/1/2023 2) Proposed 5/1/2023
.12
.1
.12
Legend
WS 1% Annual Chance - Existing Plan
WS 1% Annual Chance - Proposed
WS 10% Annual Chanc - Proposed
WS 10% Annual Chanc - Existing Plan
Ground
Bank Sta
Elevation (ft)
45
40
35
30
25
20
15
0
100
200
300
400
500
600
Station (ft)


Trading Cove Brook Plan: 1) Existing Plan 5/1/2023 2) Proposed 5/1/2023
.12
.1
.12
Legend
WS 1% Annual Chance - Existing Plan
WS 1% Annual Chance - Proposed
WS 10% Annual Chanc - Proposed
WS 10% Annual Chanc - Existing Plan
Ground
Bank Sta
Elevation (ft)
Station (ft)
40
35
30
25
20
15
0
100
200
300
400
500
600


Trading Cove Brook Plan: 1) Existing Plan 5/1/2023 2) Proposed 5/1/2023
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45
40
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0
200
400
600
800
1000
1200
Elevation (ft)
Station (ft)
Legend
WS 1% Annual Chance - Existing Plan
WS 1% Annual Chance - Proposed
WS 10% Annual Chanc - Proposed
WS 10% Annual Chanc - Existing Plan
Ground
Bank Sta