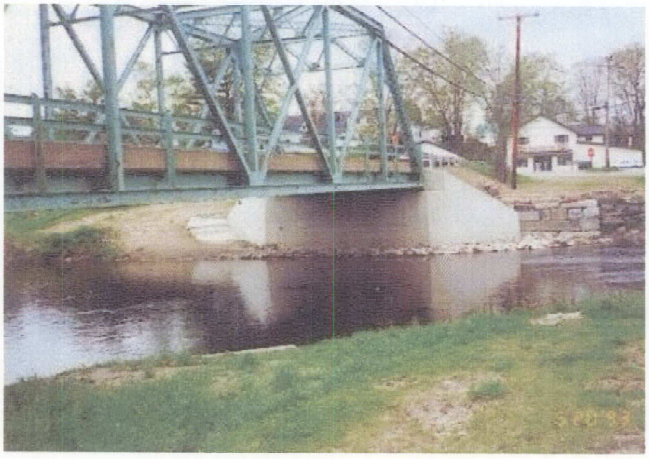
Preliminary Design Report

Village Bridge #2975
over
Kenduskeag Stream

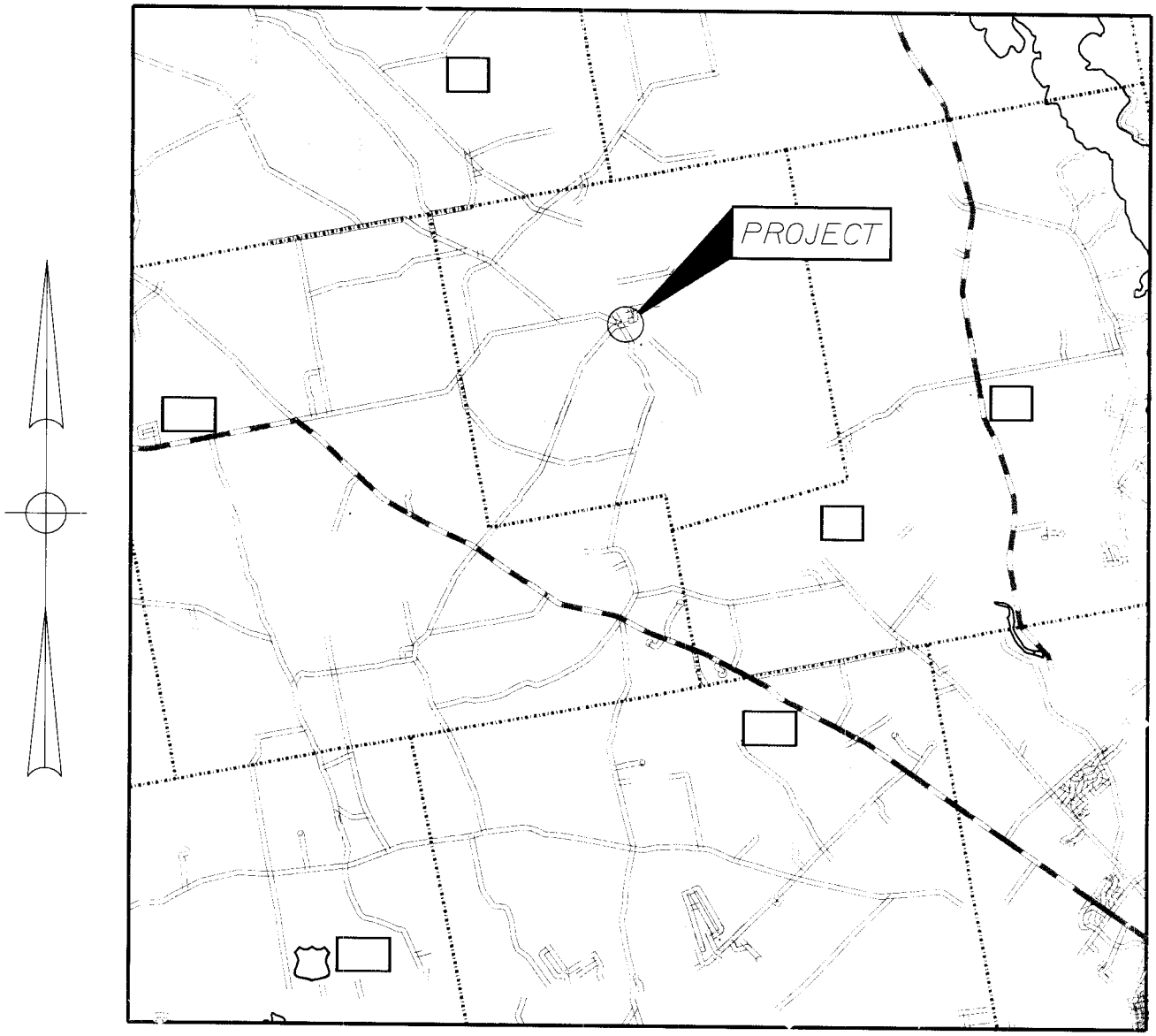
Kenduskeag, Maine

BR-1757(600)X
PIN 017576.00



Maine Department of Transportation

Bridge Program



LOCATION MAP

2 0 2 4

Scale of Miles

KENDUSKEAG
PENOBSCOT COUNTY
VILLAGE BRIDGE
OVER
KENDUSKEAG STREAM
PIN 17576.00

Hydrology and Hydraulics Report

HYDROLOGY

The hydrology information for this site is unusually accurate due to the proximity of a discontinued U.S.G.S. hydraulics gage station. Though recording was stopped at gage #01036500 after 1979, the data from its 25-year service provides excellent reliability. The gage was less than two miles downstream from Village Bridge. Based on a weighted average of the U.S.G.S. regression method for Maine and the area adjusted gage values, Dr. Charles Hebson has prepared the following hydrology data:

SUMMARY OF HYDROLOGY DATA

Drainage Area = 121.2 sq. miles
Design Discharge (Q50) = 6680 c.f.s.
Check Discharge (Q100) = 7590 c.f.s
Ordinary High Water (Q1.1) = 1415 c.f.s.
Ten-year storm discharge (Q10) = 4690 c.f.s.
Twenty five-year storm discharge (Q25) = 5820 c.f.s.
Five hundred- year storm (Q500) = 9780 c.f.s.

HYDRAULICS

HEC-RAS runs were made to simulate the hydraulic characteristics of the existing bridge and two replacement alternates. A third alternate, proposed by local residents, would be much longer on a new heavily skewed alignment. It would require two piers, and would have higher cost, right-of-way, and environmental impacts. No hydraulic analysis has been made of the locally proposed alignment.

The hydraulic design of a bridge replacement at this site is governed by its history of ice jams and ice collision damage. According to Mr. Ken Page, retired MaineDOT Bridge Manager, ice flows reaching the bottom chord occur annually and coincide with ice jams about 850 feet downstream. When phone-interviewed in 2003, Mr. Page also noted that he "thought the bridge would actually go out about five years ago".

Valuable hydraulics data has been furnished to the MaineDOT from the Bangor office of the U.S.D.A. Natural Resources Conservation Service. A "Town of Kenduskeag Floodplain Management Study" was published by the N.R.C.S. on May 24, 2004. Mr. Lew Crosby forwarded N.R.C.S. computer output that provides the only stage elevation for a storm event during an ice jam. The output has data for storm events from Q10 through Q500 with no ice jam, and for Q100 with and without ice. The storm discharge values from the N.R.C.S. are much smaller than the values from the combined gage and regression method noted above. However, the N.R.C.S. data still provides a good basis for a comparative analysis of flow stages. The stream boundary conditions for all analyses have been set by fitting HEC-RAS results for the existing bridge to N.R.C.S. flood stages.

For Q100 flow during an ice jam at the existing bridge, the N.R.C.S. data shows that the ice jam raises the stage elevation about 2.5 to 3.0 feet. The HEC-RAS feature for analyzing ice jams indicates a stage elevation increase of only 0.5 feet. Mr. Page's observations support the greater increase. So, this analysis assumes tailwater values that provide good matches for N.R.C.S. average stage elevations at the existing bridge.

Hydrology and Hydraulics Report

Note that the vertical clearance is calculated to 121.2 feet for the existing structure and 123.3 feet for the proposed. The bottom chord elevation for the existing structure is hand-calculated and appears high by topography shots. The survey indicates that the bottom chord is at elevation 121.0 on the westerly end and lower on the easterly. Note that the bottom of the proposed structure only reaches Elevation 123.3 feet near midstream, at the top of the crest vertical curve. At the ends, the bottom of the outside beam is at Elevation 122.7 feet.

HYDRAULICS SUMMARY

	Existing Bridge, 110 ft. truss 107 ft. Clear Span	Proposed I-Girder 114 ft. Simple Span
Headwater Elev. @ Q10	118.56 ft.	118.54 ft.
Headwater Elev. @ Q25	119.57 ft.	119.55 ft.
Headwater Elev. @ Q50	120.35 ft.	120.32 ft.
Headwater Elev. @ Q100	121.08 ft.	121.05 ft.
Headwater Elev. @ Q500	122.54 ft.	122.49 ft.
Outlet Velocity @ Q50	6.53 f.p.s.	6.38 f.p.s.
Outlet Velocity @ Q100	6.95 f.p.s.	6.79 f.p.s.
Ordinary High Water (Q1.1)	Elev. 114.91 ft.	Elev. 114.91 ft.
Outlet Velocity @ Q1.1	2.88 f.p.s.	2.83 f.p.s.
Freboard at Q50	0.85 ft.	3.0 ft. (at midspan)
Headwater Elev. @ Q10 with Ice	120.32 ft,	120.30 ft.
Headwater Elev. @ Q50 with Ice	122.40 ft.	122.32 ft.

SCOUR

The velocities of the design and check storm events are moderate, from 6.4 to 6.8 f.p.s. for the proposed replacement bridge. Normal riprap treatment would be adequate to resist scour, particularly since the footings would be placed below the existing surface of ledge, which is sound in some places and weathered in others.

Note: All elevations are based on the North American Vertical Datum (NAVD) of 1988.

Respectfully submitted,

Robert S. Bulger

Robert S. Bulger, P.E.

Hydrology Data

Project Name:	Kenduskeag	**PIN:**	11041
Stream Name:	Kenduskeag Stream	**Town:**	Kenduskeag
Bridge Name:	Village Bridge	**Bridge No.**	2975
Route No.		**USGS Quad:**	Kenduskeag, W Corinth, Charleston, Garland, Stetson, Dexter, Bradford
Analysis by:	CSH	**Date:**	11/30/2004

Peak Flow Calculations by USGS Regression Equations (Hodgkins, 1999)

Enter data in blue cells only!

	km²	mi²	ac
A	313.88		
W	33.06		

Use just one consistent set of units:
Watershed Area
Wetlands area (by NWI)

Worksheet prepared by:
Charles S. Hebson, PE
Chief Hydrologist
Maine Dept. Transportation
Augusta, ME 04333-0016
207-287-1105
Charles.Hebson@maine.gov

A (km²)	313.880	≃ 121.3 sq. mi.	**Conf Lvl** 0.67
W (%)	10.53		

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Ret Pd T (yr)	Peak Flow Estimate Lower	Q_T (m³/s)	Upper
1.1		40.01	
2	53.12	73.87	102.73
5	77.64	108.26	150.97
10	94.43	132.91	187.08
25	115.51	164.70	234.84
50	131.18	189.09	272.56
100	147.36	214.82	313.16
500	184.42	277.10	416.35

Q_T (ft³/s)	Gage	NRCS
1412.6	1870	
2608.5	3450	
3822.8	4732	
4693.2	5509	3929
5815.6	6498	4126
6676.7	7204	5130
7585.2	7910	5619
9784.4	9500	6725

Reference:

Hodgkins, G., 1999.
Estimating the magnitude of peak flows for streams in Maine for selected recurrence intervals
Water-Resources Investigations Report 99-4008
US Geological Survey, Augusta, Maine

$Q_T = b \times A^a \times 10^{-wW}$

Hydraulic Data

Hydraulic Results at Bridge Sections

Results based on 9 ft./mile effective Streamslope, close match to NRCS data w/out ice

EXISTING BRIDGE

HEC-RAS Plan: ExBrNoTW River: Kenduskeag Reach: Village

River Sta	Profile	Q Total (cfs)	BR Open Area (sq ft)	W.S. Elev (ft)	BR Open Vel (ft/s)
9825	Q1.1	1415	1226.38	114.91	2.88
9825	Q10	4690	1226.38	118.56	5.51
9825	Q25	5820	1226.38	119.57	6.14
9825	Q50	6680	1226.38	120.35	6.53
9825	Q100	7590	1226.38	121.08	6.95
9825	Q500	9780	1226.38	122.54	8.02

PROPOSED STEEL BEAM BRIDGE

HEC-RAS Plan: SteelNoTW River: Kenduskeag Reach: Village

River Sta	Profile	Q Total (cfs)	BR Open Area (sq ft)	W.S. Elev (ft)	BR Open Vel (ft/s)
9825	Q1.1	1415	1404	114.91	2.83
9825	Q10	4690	1404	118.54	5.4
9825	Q25	5820	1404	119.55	6
9825	Q50	6680	1404	120.32	6.38
9825	Q100	7590	1404	121.05	6.79
9825	Q500	9780	1404	122.49	7.82

Results based assumed TW's to correspond to NRCS Q100HW value WITH ICE

EXISTING BRIDGE

HEC-RAS Plan: IcedBridge River: Kenduskeag Reach: Village

River Sta	Profile	Q Total (cfs)	BR Open Area (sq ft)	W.S. Elev (ft)	BR Open Vel (ft/s)
9825	Q1.1	1415	1226.38	116.93	1.99
9825	Q10	4690	1226.38	120.32	4.46
9825	Q25	5820	1226.38	121.54	4.96
9825	Q50	6680	1226.38	122.4	5.45
9825	Q100	7590	1226.38	123.35	6.19
9825	Q500	9780	1226.38	124.89	7.97

PROPOSED STEEL BEAM BRIDGE

HEC-RAS Plan: Steel_IceTW River: Kenduskeag Reach: Village

River Sta	Profile	Q Total (cfs)	BR Open Area (sq ft)	W.S. Elev (ft)	BR Open Vel (ft/s)
9825	Q1.1	1415	1409.75	116.92	1.94
9825	Q10	4690	1409.75	120.3	4.34
9825	Q25	5820	1409.75	121.51	4.82
9825	Q50	6680	1409.75	122.32	5.18
9825	Q100	7590	1409.75	123.24	5.49
9825	Q500	9780	1409.75	124.77	6.94

Existing No Ice

Existing Bridge, modeled w/kout Ice, Section at Upstream Fascia

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q1.1		
E.G. Elev (ft)	114.97	Element	Left OB		Channel	Right OB
Vel Head (ft)	0.1	Wt. n-Val.			0.025	
W.S. Elev (ft)	114.86	Reach L		24	24	24
Crit W.S. (ft)	111.47	Flow Area (sq ft)			549.52	
E.G. Slope (ft/ft)	0.000273	Area (sq ft)			549.52	
Q Total (cfs)	1415	Flow (cfs)			1415	
Top Width (ft)	106.82	Top Width (ft)			106.82	
Vel Total (ft/s)	2.57	Avg. Vel. (ft/s)			2.57	
Max Chl Dpth (ft)	5.86	Hydr. Depth (ft)			5.14	
Conv. Total (cfs)	85616.8	Conv. (cfs)			85616.8	
Length Wtd. (ft)	24	Wetted Per. (ft)			129.48	
Min Ch El (ft)	109	Shear (lb/sq ft)			0.07	
Alpha	1	Stream Power (lb/ft s)			0.19	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)			10.48	
C & E Loss (ft)	0	Cum SA (acres)			3.16	

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q10		
E.G. Elev (ft)	118.68	Element	Left OB		Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.			0.025	
W.S. Elev (ft)	118.27	Reach L		24	24	24
Crit W.S. (ft)	113.63	Flow Area (sq ft)			913.91	
E.G. Slope (ft/ft)	0.00067	Area (sq ft)			913.91	
Q Total (cfs)	4690	Flow (cfs)			4690	
Top Width (ft)	106.91	Top Width (ft)			106.91	
Vel Total (ft/s)	5.13	Avg. Vel. (ft/s)			5.13	
Max Chl Dpth (ft)	9.27	Hydr. Depth (ft)			8.55	
Conv. Total (cfs)	181223.1	Conv. (cfs)			181223.1	
Length Wtd. (ft)	24	Wetted Per. (ft)			149.98	
Min Ch El (ft)	109	Shear (lb/sq ft)			0.25	
Alpha	1	Stream Power (lb/ft s)			1.31	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)			23.31	
C & E Loss (ft)	0.01	Cum SA (acres)			4.32	

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q25		
E.G. Elev (ft)	119.71	Element	Left OB		Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.			0.025	
W.S. Elev (ft)	119.19	Reach L		24	24	24
Crit W.S. (ft)	114.23	Flow Area (sq ft)			1012.49	
E.G. Slope (ft/ft)	0.000769	Area (sq ft)			1012.49	
Q Total (cfs)	5820	Flow (cfs)			5820	
Top Width (ft)	106.93	Top Width (ft)			106.93	
Vel Total (ft/s)	5.75	Avg. Vel. (ft/s)			5.75	
Max Chl Dpth (ft)	10.19	Hydr. Depth (ft)			9.47	
Conv. Total (cfs)	209821.5	Conv. (cfs)			209821.5	
Length Wtd. (ft)	24	Wetted Per. (ft)			155.52	
Min Ch El (ft)	109	Shear (lb/sq ft)			0.31	
Alpha	1	Stream Power (lb/ft s)			1.8	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)			27.68	
C & E Loss (ft)	0.01	Cum SA (acres)			4.74	

Existing Bridge, modeled w/out Ice, Section at Upstream Fascia

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q50		
E.G. Elev (ft)	120.48	Element Left OB		Channel		Right OB
Vel Head (ft)	0.59	Wt. n-Val.		0.025		
W.S. Elev (ft)	119.9	Reach L	24	24		24
Crit W.S. (ft)	114.67	Flow Area (sq ft)		1087.69		
E.G. Slope (ft/ft)	0.000827	Area (sq ft)		1087.69		
Q Total (cfs)	6680	Flow (cfs)		6680		
Top Width (ft)	106.95	Top Width (ft)		106.95		
Vel Total (ft/s)	6.14	Avg. Vel. (ft/s)		6.14		
Max Chl Dpth (ft)	10.9	Hydr. Depth (ft)		10.17		
Conv. Total (cfs)	232243.7	Conv. (cfs)		232243.7		
Length Wtd. (ft)	24	Wetted Per. (ft)		159.74		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.35		
Alpha	1	Stream Power (lb/ft s)		2.16		
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		31.45		
C & E Loss (ft)	0.01	Cum SA (acres)		5.11		

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q100		
E.G. Elev (ft)	121.22	Element Left OB		Channel		Right OB
Vel Head (ft)	0.67	Wt. n-Val.		0.025		
W.S. Elev (ft)	120.55	Reach L	24	24		24
Crit W.S. (ft)	115.11	Flow Area (sq ft)		1157.71		
E.G. Slope (ft/ft)	0.000896	Area (sq ft)		1157.71		
Q Total (cfs)	7590	Flow (cfs)		7590		
Top Width (ft)	106.97	Top Width (ft)		106.97		
Vel Total (ft/s)	6.56	Avg. Vel. (ft/s)		6.56		
Max Chl Dpth (ft)	11.55	Hydr. Depth (ft)		10.82		
Conv. Total (cfs)	253546.4	Conv. (cfs)		253546.4		
Length Wtd. (ft)	24	Wetted Per. (ft)		163.68		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.4		
Alpha	1	Stream Power (lb/ft s)		2.59		
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		35.18		
C & E Loss (ft)	0.01	Cum SA (acres)		5.52		

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q500		
E.G. Elev (ft)	122.68	Element Left OB		Channel		Right OB
Vel Head (ft)	0.91	Wt. n-Val.		0.025		
W.S. Elev (ft)	121.78	Reach L	24	24		24
Crit W.S. (ft)	116.1	Flow Area (sq ft)		1280.47		
E.G. Slope (ft/ft)	0.00215	Area (sq ft)		1280.47		
Q Total (cfs)	9780	Flow (cfs)		9780		
Top Width (ft)		Top Width (ft)				
Vel Total (ft/s)	7.64	Avg. Vel. (ft/s)		7.64		
Max Chl Dpth (ft)	12.78	Hydr. Depth (ft)				
Conv. Total (cfs)	210902.3	Conv. (cfs)		210902.3		
Length Wtd. (ft)	24	Wetted Per. (ft)		277.58		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.62		
Alpha	1	Stream Power (lb/ft s)		4.73		
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		42.95		
C & E Loss (ft)	0.01	Cum SA (acres)		6.38		

Existing No Ice [illegible]

Existing Bridge, modeled w/kout Ice, Section at Downstream Fascia

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q1.1		
E.G. Elev (ft)	114.96	Element Left OB			Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.			0.025	
W.S. Elev (ft)	114.83	Reach L		265.5	265.5	265.5
Crit W.S. (ft)	111.86	Flow Area (sq ft)			491.65	
E.G. Slope (ft/ft)	0.000359	Area (sq ft)			491.65	
Q Total (cfs)	1415	Flow (cfs)			1415	
Top Width (ft)	106.82	Top Width (ft)			106.82	
Vel Total (ft/s)	2.88	Avg. Vel. (ft/s)			2.88	
Max Chl Dpth (ft)	5.13	Hydr. Depth (ft)			4.6	
Conv. Total (cfs)	74724.6	Conv. (cfs)			74724.6	
Length Wtd. (ft)	265.5	Wetted Per. (ft)			120.23	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			0.09	
Alpha	1	Stream Power (lb/ft s)			0.26	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)			10.2	
C & E Loss (ft)	0	Cum SA (acres)			3.1	

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q10		
E.G. Elev (ft)	118.66	Element Left OB			Channel	Right OB
Vel Head (ft)	0.47	Wt. n-Val.			0.025	
W.S. Elev (ft)	118.19	Reach L		265.5	265.5	265.5
Crit W.S. (ft)	114.14	Flow Area (sq ft)			850.53	
E.G. Slope (ft/ft)	0.00078	Area (sq ft)			850.53	
Q Total (cfs)	4690	Flow (cfs)			4690	
Top Width (ft)	106.91	Top Width (ft)			106.91	
Vel Total (ft/s)	5.51	Avg. Vel. (ft/s)			5.51	
Max Chl Dpth (ft)	8.49	Hydr. Depth (ft)			7.96	
Conv. Total (cfs)	167977.5	Conv. (cfs)			167977.5	
Length Wtd. (ft)	265.5	Wetted Per. (ft)			140.42	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			0.29	
Alpha	1	Stream Power (lb/ft s)			1.63	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)			22.83	
C & E Loss (ft)	0.06	Cum SA (acres)			4.27	

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q25		
E.G. Elev (ft)	119.68	Element Left OB			Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.			0.025	
W.S. Elev (ft)	119.1	Reach L		265.5	265.5	265.5
Crit W.S. (ft)	114.74	Flow Area (sq ft)			947.76	
E.G. Slope (ft/ft)	0.000881	Area (sq ft)			947.76	
Q Total (cfs)	5820	Flow (cfs)			5820	
Top Width (ft)	106.93	Top Width (ft)			106.93	
Vel Total (ft/s)	6.14	Avg. Vel. (ft/s)			6.14	
Max Chl Dpth (ft)	9.4	Hydr. Depth (ft)			8.86	
Conv. Total (cfs)	196127.5	Conv. (cfs)			196127.5	
Length Wtd. (ft)	265.5	Wetted Per. (ft)			145.89	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			0.36	
Alpha	1	Stream Power (lb/ft s)			2.19	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)			27.14	
C & E Loss (ft)	0.09	Cum SA (acres)			4.68	

Existing Bridge, modeled w/out Ice, Section at Downstream Fascia

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q50		
E.G. Elev (ft)	120.45	Element Left OB			Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.			0.025	
W.S. Elev (ft)	119.79	Reach L		265.5	265.5	265.5
Crit W.S. (ft)	115.18	Flow Area (sq ft)			1022.23	
E.G. Slope (ft/ft)	0.000936	Area (sq ft)			1022.23	
Q Total (cfs)	6680	Flow (cfs)			6680	
Top Width (ft)	106.95	Top Width (ft)			106.95	
Vel Total (ft/s)	6.53	Avg. Vel. (ft/s)			6.53	
Max Chl Dpth (ft)	10.09	Hydr. Depth (ft)			9.56	
Conv. Total (cfs)	218323.3	Conv. (cfs)			218323.3	
Length Wtd. (ft)	265.5	Wetted Per. (ft)			150.07	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			0.4	
Alpha	1	Stream Power (lb/ft s)			2.6	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)			30.87	
C & E Loss (ft)	0.11	Cum SA (acres)			5.05	

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q100		
E.G. Elev (ft)	121.19	Element Left OB			Channel	Right OB
Vel Head (ft)	0.75	Wt. n-Val.			0.025	
W.S. Elev (ft)	120.44	Reach L		265.5	265.5	265.5
Crit W.S. (ft)	115.62	Flow Area (sq ft)			1091.34	
E.G. Slope (ft/ft)	0.001005	Area (sq ft)			1091.34	
Q Total (cfs)	7590	Flow (cfs)			7590	
Top Width (ft)	106.97	Top Width (ft)			106.97	
Vel Total (ft/s)	6.95	Avg. Vel. (ft/s)			6.95	
Max Chl Dpth (ft)	10.74	Hydr. Depth (ft)			10.2	
Conv. Total (cfs)	239361.1	Conv. (cfs)			239361.1	
Length Wtd. (ft)	265.5	Wetted Per. (ft)			153.96	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			0.44	
Alpha	1	Stream Power (lb/ft s)			3.09	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)			34.56	
C & E Loss (ft)	0.13	Cum SA (acres)			5.46	

Plan: ExBrNoTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q500		
E.G. Elev (ft)	122.63	Element Left OB			Channel	Right OB
Vel Head (ft)	1	Wt. n-Val.			0.025	
W.S. Elev (ft)	121.64	Reach L		265.5	265.5	265.5
Crit W.S. (ft)	116.61	Flow Area (sq ft)			1219.55	
E.G. Slope (ft/ft)	0.001225	Area (sq ft)			1219.55	
Q Total (cfs)	9780	Flow (cfs)			9780	
Top Width (ft)	107	Top Width (ft)			107	
Vel Total (ft/s)	8.02	Avg. Vel. (ft/s)			8.02	
Max Chl Dpth (ft)	11.94	Hydr. Depth (ft)			11.4	
Conv. Total (cfs)	279392.5	Conv. (cfs)			279392.5	
Length Wtd. (ft)	265.5	Wetted Per. (ft)			161.16	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			0.58	
Alpha	1	Stream Power (lb/ft s)			4.64	
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)			42.26	
C & E Loss (ft)	0.2	Cum SA (acres)			6.35	

Detailed Profile Existing No Tw

HEC-RAS Plan: ExBrNoTW River: Kenduskeag Reach: Village

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)
Village	10000	Q1.1	1415	108.8	115.03		115.13	0.00019	2.42
Village	10000	Q10	4690	108.8	118.64		119	0.00042	4.84
Village	10000	Q25	5820	108.8	119.61		120.07	0.000471	5.42
Village	10000	Q50	6680	108.8	120.35		120.87	0.000498	5.8
Village	10000	Q100	7590	108.8	121.04		121.64	0.000529	6.19
Village	10000	Q500	9780	108.8	122.4		123.19	0.000624	7.12
Village	9894	Q1.1	1415	108.4	115.03		115.06	0.000068	1.35
Village	9894	Q10	4690	108.4	118.75		118.83	0.000112	2.36
Village	9894	Q25	5820	108.4	119.76		119.87	0.000116	2.57
Village	9894	Q50	6680	108.4	120.54		120.65	0.000118	2.69
Village	9894	Q100	7590	108.4	121.27		121.4	0.000121	2.81
Village	9894	Q500	9780	108.4	122.74		122.89	0.000132	3.1
Village	9865.5	Q1.1	1415	109	114.98		115.02	0.000141	1.74
Village	9865.5	Q10	4690	109	118.66		118.78	0.000184	2.78
Village	9865.5	Q25	5820	109	119.68		119.81	0.000181	2.97
Village	9865.5	Q50	6680	109	120.45		120.6	0.000181	3.07
Village	9865.5	Q100	7590	109	121.18		121.34	0.000185	3.17
Village	9865.5	Q500	9780	109	122.65		122.83	0.000196	3.41
Village	9841.5	Q1.1	1415	109	114.91	111.5	114.97	0.000186	1.97
Village	9841.5	Q10	4690	109	118.56	113.54	118.71	0.000243	3.11
Village	9841.5	Q25	5820	109	119.57	114.06	119.74	0.000241	3.3
Village	9841.5	Q50	6680	109	120.35	114.42	120.53	0.000241	3.39
Village	9841.5	Q100	7590	109	121.08	114.78	121.27	0.000249	3.48
Village	9841.5	Q500	9780	109	122.54	115.53	122.75	0.000256	3.68
Village	9825		Bridge						
Village	9807.7	Q1.1	1415	109.7	114.74		114.86	0.000352	2.77
Village	9807.7	Q10	4690	109.7	118.15		118.42	0.000558	4.18
Village	9807.7	Q25	5820	109.7	119.12		119.42	0.000524	4.34
Village	9807.7	Q50	6680	109.7	119.87		120.17	0.000481	4.39
Village	9807.7	Q100	7590	109.7	120.57		120.88	0.000478	4.47
Village	9807.7	Q500	9780	109.7	121.89		122.23	0.000536	4.69
Village	9785.13	Q1.1	1415	110	114.56		114.72	0.000786	3.24
Village	9785.13	Q10	4690	110	118		118.28	0.000576	4.19
Village	9785.13	Q25	5820	110	118.98		119.27	0.000565	4.31
Village	9785.13	Q50	6680	110	119.75		120.04	0.000522	4.3
Village	9785.13	Q100	7590	110	120.46		120.75	0.000494	4.33
Village	9785.13	Q500	9780	110	121.78		122.09	0.00047	4.52
Village	9728.2	Q1.1	1415	109	114.14		114.46	0.001395	4.53
Village	9728.2	Q10	4690	109	117.38		118.03	0.00149	6.45
Village	9728.2	Q25	5820	109	118.35		119.03	0.00141	6.6
Village	9728.2	Q50	6680	109	119.16		119.81	0.001305	6.51
Village	9728.2	Q100	7590	109	119.88		120.53	0.00123	6.48
Village	9728.2	Q500	9780	109	121.2		121.89	0.00116	6.65

Village	9662	Q1.1	1415	109	113.97		114.21	0.00115	3.97
Village	9662	Q10	4690	109	117.23		117.78	0.001023	5.92
Village	9662	Q25	5820	109	118.19		118.8	0.000989	6.27
Village	9662	Q50	6680	109	118.97		119.6	0.000993	6.37
Village	9662	Q100	7590	109	119.68		120.33	0.001	6.49
Village	9662	Q500	9780	109	120.93		121.68	0.001073	6.95
Village	9547	Q1.1	1415	109	113.69	112.15	114.04	0.001706	4.73
Village	9547	Q10	4690	109	116.78	114.82	117.6	0.001704	7.25
Village	9547	Q25	5820	109	117.73	115.41	118.62	0.001708	7.59
Village	9547	Q50	6680	109	118.54	115.86	119.43	0.001708	7.55
Village	9547	Q100	7590	109	119.29	116.34	120.16	0.001706	7.51
Village	9547	Q500	9780	109	120.61	117.4	121.51	0.001706	7.63

Flow Area (sq ft)	Top Width (ft)	Froude #
585.48	106.45	0.18
969.87	106.8	0.28
1073.54	106.89	0.3
1152.29	106.97	0.31
1226.77	107.03	0.32
1372.74	108.3	0.35
1046.22	227.24	0.11
1983.92	270.73	0.15
2264.04	279.07	0.16
2483.06	288.75	0.16
2699.48	299.39	0.17
3154.11	322.28	0.17
813.72	209.98	0.16
1687.26	262.26	0.19
1959.23	272.53	0.2
2174.45	287.48	0.2
2392.92	306.6	0.2
2869.4	344.54	0.21
717.11	188.26	0.18
1507.84	243.76	0.22
1762.8	258.77	0.22
1968.61	277.9	0.22
2182.5	303.93	0.23
2660.06	349.1	0.23
511.33	129.84	0.25
1122.55	217.24	0.32
1341.81	234.17	0.32
1521.23	244.63	0.31
1697.62	264.53	0.31
2085.29	329.56	0.33
436.62	160.15	0.35
1119.12	221	0.33
1351.45	252.5	0.33
1553.2	274.1	0.32
1753.25	293.89	0.31
2165.04	328.19	0.31
312.23	105.1	0.46
726.92	150.7	0.52
881.41	169.64	0.51
1025.47	190.38	0.49
1170.58	209.58	0.48
1470.49	243.04	0.48

356.21	126.22	0.42
792.79	140.4	0.44
928.64	146.55	0.44
1049.32	162.4	0.44
1169.5	176.85	0.44
1406.72	202.38	0.46
299.22	107.63	0.5
646.5	120.94	0.55
767.05	134.84	0.56
884.19	157.35	0.56
1011.27	182.59	0.56
1281.82	227.23	0.57

Existing Bridge, modeled w/ TW for Ice, Section at Upstream Fascia

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR U	Profile: Q1.1		
E.G. Elev (ft)	116.95	Element Left OB		Channel		Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.025		
W.S. Elev (ft)	116.9	Reach L	24	24	24	
Crit W.S. (ft)	111.47	Flow Area (sq ft)		766.68		
E.G. Slope (ft/ft)	0.000102	Area (sq ft)		766.68		
Q Total (cfs)	1415	Flow (cfs)		1415		
Top Width (ft)	106.87	Top Width (ft)		106.87		
Vel Total (ft/s)	1.85	Avg. Vel. (ft/s)		1.85		
Max Chl Dpth (ft)	7.9	Hydr. Depth (ft)		7.17		
Conv. Total (cfs)	140443.6	Conv. (cfs)		140443.6		
Length Wtd. (ft)	24	Wetted Per. (ft)		141.7		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.03		
Alpha	1	Stream Power (lb/ft s)		0.06		
Frctn Loss (ft)	0	Cum Volume (acre-ft)		18.74		
C & E Loss (ft)	0	Cum SA (acres)		4.03		

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR U	Profile: Q10		
E.G. Elev (ft)	120.39	Element Left OB		Channel		Right OB
Vel Head (ft)	0.28	Wt. n-Val.		0.025		
W.S. Elev (ft)	120.12	Reach L	24	24	24	
Crit W.S. (ft)	113.63	Flow Area (sq ft)		1111.07		
E.G. Slope (ft/ft)	0.000384	Area (sq ft)		1111.07		
Q Total (cfs)	4690	Flow (cfs)		4690		
Top Width (ft)	106.96	Top Width (ft)		106.96		
Vel Total (ft/s)	4.22	Avg. Vel. (ft/s)		4.22		
Max Chl Dpth (ft)	11.12	Hydr. Depth (ft)		10.39		
Conv. Total (cfs)	239313.5	Conv. (cfs)		239313.5		
Length Wtd. (ft)	24	Wetted Per. (ft)		161.06		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.17		
Alpha	1	Stream Power (lb/ft s)		0.7		
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		33.23		
C & E Loss (ft)	0	Cum SA (acres)		5.29		

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR U	Profile: Q25		
E.G. Elev (ft)	121.61	Element Left OB		Channel		Right OB
Vel Head (ft)	0.35	Wt. n-Val.		0.025		
W.S. Elev (ft)	121.26	Reach L	24	24	24	
Crit W.S. (ft)	114.23	Flow Area (sq ft)		1233.73		
E.G. Slope (ft/ft)	0.000441	Area (sq ft)		1233.73		
Q Total (cfs)	5820	Flow (cfs)		5820		
Top Width (ft)	106.99	Top Width (ft)		106.99		
Vel Total (ft/s)	4.72	Avg. Vel. (ft/s)		4.72		
Max Chl Dpth (ft)	12.26	Hydr. Depth (ft)		11.53		
Conv. Total (cfs)	277097	Conv. (cfs)		277097		
Length Wtd. (ft)	24	Wetted Per. (ft)		167.95		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.2		
Alpha	1	Stream Power (lb/ft s)		0.95		
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		39.87		
C & E Loss (ft)	0	Cum SA (acres)		6		

Existing Bridge, modeled w/ TW for Ice, Section at Upstream Fascia

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR U	Profile: Q50		
E.G. Elev (ft)	122.47	Element Left OB		Channel		Right OB
Vel Head (ft)	0.42	Wt. n-Val.		0.025		
W.S. Elev (ft)	122.05	Reach L	24	24		24
Crit W.S. (ft)	114.67	Flow Area (sq ft)		1280.47		
E.G. Slope (ft/ft)	0.001003	Area (sq ft)		1280.47		
Q Total (cfs)	6680	Flow (cfs)		6680		
Top Width (ft)		Top Width (ft)				
Vel Total (ft/s)	5.22	Avg. Vel. (ft/s)		5.22		
Max Chl Dpth (ft)	13.05	Hydr. Depth (ft)				
Conv. Total (cfs)	210902.3	Conv. (cfs)		210902.3		
Length Wtd. (ft)	24	Wetted Per. (ft)		277.58		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.29		
Alpha	1	Stream Power (lb/ft s)		1.51		
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		44.67		
C & E Loss (ft)	0	Cum SA (acres)		6.15		

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR U	Profile: Q100		
E.G. Elev (ft)	123.41	Element Left OB		Channel		Right OB
Vel Head (ft)	0.55	Wt. n-Val.		0.025		
W.S. Elev (ft)	122.86	Reach L	24	24		24
Crit W.S. (ft)	115.11	Flow Area (sq ft)		1280.47		
E.G. Slope (ft/ft)	0.001295	Area (sq ft)		1280.47		
Q Total (cfs)	7590	Flow (cfs)		7590		
Top Width (ft)		Top Width (ft)				
Vel Total (ft/s)	5.93	Avg. Vel. (ft/s)		5.93		
Max Chl Dpth (ft)	13.86	Hydr. Depth (ft)				
Conv. Total (cfs)	210902.3	Conv. (cfs)		210902.3		
Length Wtd. (ft)	24	Wetted Per. (ft)		277.58		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.37		
Alpha	1	Stream Power (lb/ft s)		2.21		
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		50.45		
C & E Loss (ft)	0	Cum SA (acres)		6.72		

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR U	Profile: Q500		
E.G. Elev (ft)	124.94	Element Left OB		Channel		Right OB
Vel Head (ft)	0.9	Wt. n-Val.		0.025		0.045
W.S. Elev (ft)	124.03	Reach L	24	24		24
Crit W.S. (ft)	116.1	Flow Area (sq ft)		1280.47		5.66
E.G. Slope (ft/ft)	0.002149	Area (sq ft)		1280.47		5.66
Q Total (cfs)	9780	Flow (cfs)		9775.88		4.12
Top Width (ft)	16.55	Top Width (ft)				16.55
Vel Total (ft/s)	7.6	Avg. Vel. (ft/s)		7.63		0.73
Max Chl Dpth (ft)	15.03	Hydr. Depth (ft)				0.34
Conv. Total (cfs)	210991.1	Conv. (cfs)		210902.3		88.8
Length Wtd. (ft)	24	Wetted Per. (ft)		277.58		17.24
Min Ch El (ft)	109	Shear (lb/sq ft)		0.62		0.04
Alpha	1.01	Stream Power (lb/ft s)		4.72		0.03
Frctn Loss (ft)	0.05	Cum Vo	0.3	59.79		0.18
C & E Loss (ft)	0.01	Cum SA	0.6	6.87		0.32

Existing Bridge

Existing Bridge, modeled w/ TW for Ice, Section at Downstream Fascia

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR D	Profile: Q1.1		
E.G. Elev (ft)	116.94	Element	Left OB		Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.			0.025	
W.S. Elev (ft)	116.88	Reach L		265.5	265.5	265.5
Crit W.S. (ft)	111.86	Flow Area (sq ft)			711.3	
E.G. Slope (ft/ft)	0.000119	Area (sq ft)			711.3	
Q Total (cfs)	1415	Flow (cfs)			1415	
Top Width (ft)	106.87	Top Width (ft)			106.87	
Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)			1.99	
Max Chl Dpth (ft)	7.18	Hydr. Depth (ft)			6.66	
Conv. Total (cfs)	129558.4	Conv. (cfs)			129558.4	
Length Wtd. (ft)	265.5	Wetted Per. (ft)			132.59	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			0.04	
Alpha	1	Stream Power (lb/ft s)			0.08	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)			18.34	
C & E Loss (ft)	0.01	Cum SA (acres)			3.97	

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR D	Profile: Q10		
E.G. Elev (ft)	120.38	Element	Left OB		Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.			0.025	
W.S. Elev (ft)	120.07	Reach L		265.5	265.5	265.5
Crit W.S. (ft)	114.14	Flow Area (sq ft)			1052.19	
E.G. Slope (ft/ft)	0.000425	Area (sq ft)			1052.19	
Q Total (cfs)	4690	Flow (cfs)			4690	
Top Width (ft)	106.96	Top Width (ft)			106.96	
Vel Total (ft/s)	4.46	Avg. Vel. (ft/s)			4.46	
Max Chl Dpth (ft)	10.37	Hydr. Depth (ft)			9.84	
Conv. Total (cfs)	227395.1	Conv. (cfs)			227395.1	
Length Wtd. (ft)	265.5	Wetted Per. (ft)			151.76	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			0.18	
Alpha	1	Stream Power (lb/ft s)			0.82	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)			32.63	
C & E Loss (ft)	0.05	Cum SA (acres)			5.23	

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR D	Profile: Q25		
E.G. Elev (ft)	121.59	Element	Left OB		Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.			0.025	
W.S. Elev (ft)	121.21	Reach L		265.5	265.5	265.5
Crit W.S. (ft)	114.74	Flow Area (sq ft)			1174.22	
E.G. Slope (ft/ft)	0.000482	Area (sq ft)			1174.22	
Q Total (cfs)	5820	Flow (cfs)			5820	
Top Width (ft)	106.99	Top Width (ft)			106.99	
Vel Total (ft/s)	4.96	Avg. Vel. (ft/s)			4.96	
Max Chl Dpth (ft)	11.51	Hydr. Depth (ft)			10.98	
Conv. Total (cfs)	265101.4	Conv. (cfs)			265101.4	
Length Wtd. (ft)	265.5	Wetted Per. (ft)			158.61	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			0.22	
Alpha	1	Stream Power (lb/ft s)			1.1	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)			39.2	
C & E Loss (ft)	0.07	Cum SA (acres)			5.94	

Existing Bridge, modeled w/ TW for Ice, Section at Downstream Fascia

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR D	Profile: Q50		
E.G. Elev (ft)	122.44	Element Left OB		Channel	Right OB	
Vel Head (ft)	0.46	Wt. n-Val.		0.025		
W.S. Elev (ft)	121.98	Reach L	265.5	265.5	265.5	
Crit W.S. (ft)	115.18	Flow Area (sq ft)		1226.38		
E.G. Slope (ft/ft)	0.001108	Area (sq ft)		1226.38		
Q Total (cfs)	6680	Flow (cfs)		6680		
Top Width (ft)		Top Width (ft)				
Vel Total (ft/s)	5.45	Avg. Vel. (ft/s)		5.45		
Max Chl Dpth (ft)	12.28	Hydr. Depth (ft)				
Conv. Total (cfs)	200639.8	Conv. (cfs)		200639.8		
Length Wtd. (ft)	265.5	Wetted Per. (ft)		268.54		
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.32		
Alpha	1	Stream Power (lb/ft s)		1.72		
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)		43.98		
C & E Loss (ft)	0.09	Cum SA (acres)		6.15		

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR D	Profile: Q100		
E.G. Elev (ft)	123.37	Element Left OB		Channel	Right OB	
Vel Head (ft)	0.59	Wt. n-Val.		0.025		
W.S. Elev (ft)	122.78	Reach L	265.5	265.5	265.5	
Crit W.S. (ft)	115.62	Flow Area (sq ft)		1226.38		
E.G. Slope (ft/ft)	0.001431	Area (sq ft)		1226.38		
Q Total (cfs)	7590	Flow (cfs)		7590		
Top Width (ft)		Top Width (ft)				
Vel Total (ft/s)	6.19	Avg. Vel. (ft/s)		6.19		
Max Chl Dpth (ft)	13.07	Hydr. Depth (ft)				
Conv. Total (cfs)	200639.8	Conv. (cfs)		200639.8		
Length Wtd. (ft)	265.5	Wetted Per. (ft)		268.54		
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.41		
Alpha	1	Stream Power (lb/ft s)		2.53		
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)		49.76		
C & E Loss (ft)	0.13	Cum SA (acres)		6.72		

Plan: IcedBridge	Kenduskeag	Village RS: 9825	BR D	Profile: Q500		
E.G. Elev (ft)	124.87	Element Left OB		Channel	Right OB	
Vel Head (ft)	0.98	Wt. n-Val.		0.025	0.045	
W.S. Elev (ft)	123.89	Reach L	265.5	265.5	265.5	
Crit W.S. (ft)	116.61	Flow Area (sq ft)		1229.47	2.07	
E.G. Slope (ft/ft)	0.002405	Area (sq ft)		1229.47	2.07	
Q Total (cfs)	9780	Flow (cfs)		9778.07	1.93	
Top Width (ft)	7.84	Top Width (ft)		3.2	4.64	
Vel Total (ft/s)	7.94	Avg. Vel. (ft/s)		7.95	0.93	
Max Chl Dpth (ft)	14.19	Hydr. Depth (ft)		384.21	0.45	
Conv. Total (cfs)	199427.4	Conv. (cfs)		199388.1	39.3	
Length Wtd. (ft)	265.5	Wetted Per. (ft)		272.79	4.72	
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.68	0.07	
Alpha	1	Stream Power (lb/ft s)		5.38	0.06	
Frctn Loss (ft)	0.12	Cum Vo	0.3	59.1	0.18	
C & E Loss (ft)	0.24	Cum SA	0.6	6.87	0.31	

Iced Bridge Profile Output Existing Conditions

HEC-RAS Plan: IcedBridge River: Kenduskeag Reach: Village

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)
Village	10000	Q1.1	1415	108.8	116.96		117.01	0.000073	1.79
Village	10000	Q10	4690	108.8	120.33		120.58	0.000247	4.08
Village	10000	Q25	5820	108.8	121.51		121.83	0.000275	4.56
Village	10000	Q50	6680	108.8	122.34		122.71	0.000296	4.89
Village	10000	Q100	7590	108.8	123.25		123.67	0.000308	5.18
Village	10000	Q500	9780	108.8	124.71		125.27	0.000361	6.01
Village	9894	Q1.1	1415	108.4	116.96		116.98	0.000023	0.93
Village	9894	Q10	4690	108.4	120.42		120.47	0.00006	1.92
Village	9894	Q25	5820	108.4	121.63		121.7	0.000064	2.07
Village	9894	Q50	6680	108.4	122.49		122.57	0.000066	2.17
Village	9894	Q100	7590	108.4	123.44		123.51	0.000064	2.24
Village	9894	Q500	9780	108.4	124.98		125.07	0.000067	2.51
Village	9865.5	Q1.1	1415	109	116.95		116.97	0.00004	1.13
Village	9865.5	Q10	4690	109	120.37		120.45	0.000092	2.18
Village	9865.5	Q25	5820	109	121.59		121.67	0.000096	2.31
Village	9865.5	Q50	6680	109	122.45		122.54	0.000097	2.38
Village	9865.5	Q100	7590	109	123.39		123.49	0.000091	2.42
Village	9865.5	Q500	9780	109	124.94		125.05	0.000089	2.65
Village	9841.5	Q1.1	1415	109	116.93	111.5	116.95	0.00005	1.25
Village	9841.5	Q10	4690	109	120.32	113.53	120.41	0.00012	2.39
Village	9841.5	Q25	5820	109	121.54	114.05	121.63	0.000126	2.5
Village	9841.5	Q50	6680	109	122.4	114.42	122.5	0.000126	2.56
Village	9841.5	Q100	7590	109	123.35	114.78	123.45	0.000112	2.58
Village	9841.5	Q500	9780	109	124.89	115.54	125.02	0.000105	2.79
Village	9825		Bridge						
Village	9807.7	Q1.1	1415	109.7	116.87		116.91	0.000106	1.65
Village	9807.7	Q10	4690	109.7	120.11		120.25	0.000215	2.97
Village	9807.7	Q25	5820	109.7	121.29		121.44	0.000224	3.06
Village	9807.7	Q50	6680	109.7	122.08		122.23	0.000235	3.11
Village	9807.7	Q100	7590	109.7	122.97		123.12	0.000219	3.08
Village	9807.7	Q500	9780	109.7	124.34		124.5	0.000194	3.28
Village	9785.13	Q1.1	1415	110	116.84		116.88	0.00011	1.63
Village	9785.13	Q10	4690	110	120.06		120.19	0.000224	2.86
Village	9785.13	Q25	5820	110	121.25		121.38	0.000207	2.92
Village	9785.13	Q50	6680	110	122.03		122.17	0.000198	2.97
Village	9785.13	Q100	7590	110	122.92		123.06	0.000185	2.96
Village	9785.13	Q500	9780	110	124.3		124.45	0.000171	3.19
Village	9728.2	Q1.1	1415	109	116.77		116.84	0.000194	2.22
Village	9728.2	Q10	4690	109	119.85		120.1	0.000476	4.03
Village	9728.2	Q25	5820	109	121.04		121.3	0.000442	4.07
Village	9728.2	Q50	6680	109	121.83		122.09	0.000413	4.11
Village	9728.2	Q100	7590	109	122.73		122.99	0.000369	4.07
Village	9728.2	Q500	9780	109	124.09		124.38	0.00034	4.36

Flow Area (sq ft)	Top Width (ft)	Froude #
790.09	106.63	0.12
1150.04	106.96	0.22
1276.34	107.08	0.23
1365.91	108.18	0.24
1465.59	109.86	0.25
1660.59	199.28	0.27
1514.64	256.07	0.07
2448.77	287.03	0.12
2808.13	304.58	0.12
3075.82	318.17	0.12
3383.81	336.88	0.12
3935.62	386.47	0.13
1255.82	239.28	0.09
2152.87	285.52	0.14
2518.66	317.08	0.14
2801.3	339.4	0.15
3133.89	363.83	0.14
3735.95	417.77	0.15
1129.12	219.79	0.1
1962.18	277.07	0.16
2323.99	317.99	0.16
2609.61	344.61	0.16
2952.76	378.82	0.16
3583.93	437.19	0.16
858.41	193.14	0.14
1580.77	250.04	0.21
1898.93	295.2	0.21
2148.28	339.11	0.22
2466.31	375.68	0.21
3004.08	407.04	0.21
870.48	206.19	0.14
1640.32	282.89	0.21
1994.53	315.23	0.2
2249.35	334.66	0.2
2560.69	363.6	0.2
3090.83	405.9	0.19
636.86	141.44	0.18
1164.34	208.79	0.3
1431.27	239.96	0.29
1626.15	254.9	0.29
1863.6	271.86	0.27
2265.08	349.64	0.27

Village	9662	Q1.1	1415	109	116.75		116.81	0.000123	1.95
Village	9662	Q10	4690	109	119.78		120.02	0.000368	3.95
Village	9662	Q25	5820	109	120.96		121.22	0.000376	4.12
Village	9662	Q50	6680	109	121.74		122.02	0.000379	4.24
Village	9662	Q100	7590	109	122.64		122.92	0.000362	4.26
Village	9662	Q500	9780	109	123.98		124.32	0.000356	4.63
Village	9547	Q1.1	1415	109	116.5	114.44	116.75	0.007572	3.99
Village	9547	Q10	4690	109	119	117.11	119.84	0.013562	7.35
Village	9547	Q25	5820	109	120.2	117.71	121.04	0.012144	7.35
Village	9547	Q50	6680	109	121	118.16	121.83	0.012456	7.33
Village	9547	Q100	7590	109	122	118.63	122.75	0.011307	6.95
Village	9547	Q500	9780	109	123.4	119.71	124.16	0.010817	6.98

725.37	138.65	0.15
1187.88	178.96	0.27
1412.48	202.96	0.28
1576.68	218.61	0.28
1781.2	236.71	0.27
2126.75	286.23	0.28
355	108.85	0.39
637.76	120.33	0.56
791.58	137.81	0.54
911.37	163.01	0.55
1091.31	197.05	0.52
1400.17	243.72	0.51

Steel Br. U.S. Section

Steel Beam Bridge, modeled S = 9 ft/mi, Section at Upstream Fascia

Plan: SteelNoTW	Kenduskeag Village RS: 9825 BR U	Profile: Q1.1			
E.G. Elev (ft)	114.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.1	Wt. n-Val.		0.025	
W.S. Elev (ft)	114.86	Reach L	24	24	24
Crit W.S. (ft)	111.48	Flow Area (sq ft)		558.17	
E.G. Slope (ft/ft)	0.000265	Area (sq ft)		558.17	
Q Total (cfs)	1415	Flow (cfs)		1415	
Top Width (ft)	109.55	Top Width (ft)		109.55	
Vel Total (ft/s)	2.54	Avg. Vel. (ft/s)		2.54	
Max Chl Dpth (ft)	5.86	Hydr. Depth (ft)		5.1	
Conv. Total (cfs)	86887.6	Conv. (cfs)		86887.6	
Length Wtd. (ft)	24	Wetted Per. (ft)		131.69	
Min Ch El (ft)	109	Shear (lb/sq ft)		0.07	
Alpha	1	Stream Power (lb/ft s)		0.18	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		10.51	
C & E Loss (ft)	0	Cum SA (acres)		3.17	

Plan: SteelNoTW	Kenduskeag Village RS: 9825 BR U	Profile: Q10			
E.G. Elev (ft)	118.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.39	Wt. n-Val.		0.025	
W.S. Elev (ft)	118.27	Reach L	24	24	24
Crit W.S. (ft)	113.61	Flow Area (sq ft)		932.4	
E.G. Slope (ft/ft)	0.000601	Area (sq ft)		932.4	
Q Total (cfs)	4690	Flow (cfs)		4690	
Top Width (ft)	110.03	Top Width (ft)		110.03	
Vel Total (ft/s)	5.03	Avg. Vel. (ft/s)		5.03	
Max Chl Dpth (ft)	9.27	Hydr. Depth (ft)		8.47	
Conv. Total (cfs)	191278.4	Conv. (cfs)		191278.4	
Length Wtd. (ft)	24	Wetted Per. (ft)		145.41	
Min Ch El (ft)	109	Shear (lb/sq ft)		0.24	
Alpha	1	Stream Power (lb/ft s)		1.21	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		23.38	
C & E Loss (ft)	0.01	Cum SA (acres)		4.34	

Plan: SteelNoTW	Kenduskeag Village RS: 9825 BR U	Profile: Q25			
E.G. Elev (ft)	119.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.		0.025	
W.S. Elev (ft)	119.2	Reach L	24	24	24
Crit W.S. (ft)	114.21	Flow Area (sq ft)		1034.04	
E.G. Slope (ft/ft)	0.000678	Area (sq ft)		1034.04	
Q Total (cfs)	5820	Flow (cfs)		5820	
Top Width (ft)	110.08	Top Width (ft)		110.08	
Vel Total (ft/s)	5.63	Avg. Vel. (ft/s)		5.63	
Max Chl Dpth (ft)	10.2	Hydr. Depth (ft)		9.39	
Conv. Total (cfs)	223502.3	Conv. (cfs)		223502.3	
Length Wtd. (ft)	24	Wetted Per. (ft)		149.11	
Min Ch El (ft)	109	Shear (lb/sq ft)		0.29	
Alpha	1	Stream Power (lb/ft s)		1.65	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		27.76	
C & E Loss (ft)	0.01	Cum SA (acres)		4.75	

Steel Beam Bridge, modeled S = 9 ft/mi, Section at Upstream Fascia

Plan: SteelNoTW	Kenduskeag Village RS: 9825 BR U	Profile: Q50			
E.G. Elev (ft)	120.46	Element Left OB		Channel	Right OB
Vel Head (ft)	0.56	Wt. n-Val.		0.025	
W.S. Elev (ft)	119.9	Reach L	24	24	24
Crit W.S. (ft)	114.63	Flow Area (sq ft)		1111.63	
E.G. Slope (ft/ft)	0.00072	Area (sq ft)		1111.63	
Q Total (cfs)	6680	Flow (cfs)		6680	
Top Width (ft)	110.08	Top Width (ft)		110.08	
Vel Total (ft/s)	6.01	Avg. Vel. (ft/s)		6.01	
Max Chl Dpth (ft)	10.9	Hydr. Depth (ft)		10.1	
Conv. Total (cfs)	249012.4	Conv. (cfs)		249012.4	
Length Wtd. (ft)	24	Wetted Per. (ft)		151.93	
Min Ch El (ft)	109	Shear (lb/sq ft)		0.33	
Alpha	1	Stream Power (lb/ft s)		1.98	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		31.53	
C & E Loss (ft)	0.01	Cum SA (acres)		5.12	

Plan: SteelNoTW	Kenduskeag Village RS: 9825 BR U	Profile: Q100			
E.G. Elev (ft)	121.19	Element Left OB		Channel	Right OB
Vel Head (ft)	0.64	Wt. n-Val.		0.025	
W.S. Elev (ft)	120.56	Reach L	24	24	24
Crit W.S. (ft)	115.07	Flow Area (sq ft)		1183.83	
E.G. Slope (ft/ft)	0.000771	Area (sq ft)		1183.83	
Q Total (cfs)	7590	Flow (cfs)		7590	
Top Width (ft)	110.08	Top Width (ft)		110.08	
Vel Total (ft/s)	6.41	Avg. Vel. (ft/s)		6.41	
Max Chl Dpth (ft)	11.56	Hydr. Depth (ft)		10.75	
Conv. Total (cfs)	273407	Conv. (cfs)		273407	
Length Wtd. (ft)	24	Wetted Per. (ft)		154.56	
Min Ch El (ft)	109	Shear (lb/sq ft)		0.37	
Alpha	1	Stream Power (lb/ft s)		2.36	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		35.28	
C & E Loss (ft)	0.01	Cum SA (acres)		5.53	

Plan: SteelNoTW	Kenduskeag Village RS: 9825 BR U	Profile: Q500			
E.G. Elev (ft)	122.64	Element Left OB		Channel	Right OB
Vel Head (ft)	0.85	Wt. n-Val.		0.025	
W.S. Elev (ft)	121.79	Reach L	24	24	24
Crit W.S. (ft)	116.05	Flow Area (sq ft)		1319.16	
E.G. Slope (ft/ft)	0.000929	Area (sq ft)		1319.16	
Q Total (cfs)	9780	Flow (cfs)		9780	
Top Width (ft)	110.07	Top Width (ft)		110.07	
Vel Total (ft/s)	7.41	Avg. Vel. (ft/s)		7.41	
Max Chl Dpth (ft)	12.79	Hydr. Depth (ft)		11.98	
Conv. Total (cfs)	320913.3	Conv. (cfs)		320913.3	
Length Wtd. (ft)	24	Wetted Per. (ft)		159.31	
Min Ch El (ft)	109	Shear (lb/sq ft)		0.48	
Alpha	1	Stream Power (lb/ft s)		3.56	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		43.06	
C & E Loss (ft)	0.01	Cum SA (acres)		6.42	

Steel Beam Bridge, modeled S = 9 ft/mi, Section at Downstream Fascia

Plan: SteelNoTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q1.1		
E.G. Elev (ft)	114.95	Element Left OB		Channel		Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.025		
W.S. Elev (ft)	114.83	Reach L	265.5	265.5		265.5
Crit W.S. (ft)	111.86	Flow Area (sq ft)		499.85		
E.G. Slope (ft/ft)	0.000348	Area (sq ft)		499.85		
Q Total (cfs)	1415	Flow (cfs)		1415		
Top Width (ft)	109.55	Top Width (ft)		109.55		
Vel Total (ft/s)	2.83	Avg. Vel. (ft/s)		2.83		
Max Chl Dpth (ft)	5.13	Hydr. Depth (ft)		4.56		
Conv. Total (cfs)	75890.6	Conv. (cfs)		75890.6		
Length Wtd. (ft)	265.5	Wetted Per. (ft)		122.43		
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.09		
Alpha	1	Stream Power (lb/ft s)		0.25		
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)		10.22		
C & E Loss (ft)	0	Cum SA (acres)		3.11		

Plan: SteelNoTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q10		
E.G. Elev (ft)	118.64	Element Left OB		Channel		Right OB
Vel Head (ft)	0.45	Wt. n-Val.		0.025		
W.S. Elev (ft)	118.19	Reach L	265.5	265.5		265.5
Crit W.S. (ft)	114.11	Flow Area (sq ft)		868.9		
E.G. Slope (ft/ft)	0.000696	Area (sq ft)		868.9		
Q Total (cfs)	4690	Flow (cfs)		4690		
Top Width (ft)	110.02	Top Width (ft)		110.02		
Vel Total (ft/s)	5.4	Avg. Vel. (ft/s)		5.4		
Max Chl Dpth (ft)	8.49	Hydr. Depth (ft)		7.9		
Conv. Total (cfs)	177793.8	Conv. (cfs)		177793.8		
Length Wtd. (ft)	265.5	Wetted Per. (ft)		136.03		
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.28		
Alpha	1	Stream Power (lb/ft s)		1.5		
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)		22.88		
C & E Loss (ft)	0.05	Cum SA (acres)		4.28		

Plan: SteelNoTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q25		
E.G. Elev (ft)	119.66	Element Left OB		Channel		Right OB
Vel Head (ft)	0.56	Wt. n-Val.		0.025		
W.S. Elev (ft)	119.1	Reach L	265.5	265.5		265.5
Crit W.S. (ft)	114.71	Flow Area (sq ft)		969.31		
E.G. Slope (ft/ft)	0.000771	Area (sq ft)		969.31		
Q Total (cfs)	5820	Flow (cfs)		5820		
Top Width (ft)	110.08	Top Width (ft)		110.08		
Vel Total (ft/s)	6	Avg. Vel. (ft/s)		6		
Max Chl Dpth (ft)	9.4	Hydr. Depth (ft)		8.81		
Conv. Total (cfs)	209604.1	Conv. (cfs)		209604.1		
Length Wtd. (ft)	265.5	Wetted Per. (ft)		139.68		
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.33		
Alpha	1	Stream Power (lb/ft s)		2.01		
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)		27.21		
C & E Loss (ft)	0.08	Cum SA (acres)		4.69		

Steel Beam Bridge, modeled S = 9 ft/mi, Section at Downstream Fascia

Plan: SteelNoTW	Kenduskeag Village RS: 9825 BR D		Profile: Q50		
				Channel	Right OB
E.G. Elev (ft)	120.44	Element Left OB			
Vel Head (ft)	0.63	Wt. n-Val.		0.025	
W.S. Elev (ft)	119.8	Reach L	265.5	265.5	265.5
Crit W.S. (ft)	115.14	Flow Area (sq ft)		1046.27	
E.G. Slope (ft/ft)	0.000808	Area (sq ft)		1046.27	
Q Total (cfs)	6680	Flow (cfs)		6680	
Top Width (ft)	110.08	Top Width (ft)		110.08	
Vel Total (ft/s)	6.38	Avg. Vel. (ft/s)		6.38	
Max Chl Dpth (ft)	10.1	Hydr. Depth (ft)		9.5	
Conv. Total (cfs)	234937.1	Conv. (cfs)		234937.1	
Length Wtd. (ft)	265.5	Wetted Per. (ft)		142.48	
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.37	
Alpha	1	Stream Power (lb/ft s)		2.37	
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)		30.94	
C & E Loss (ft)	0.1	Cum SA (acres)		5.06	

Plan: SteelNoTW	Kenduskeag Village RS: 9825 BR D		Profile: Q100		
				Channel	Right OB
E.G. Elev (ft)	121.17	Element Left OB			
Vel Head (ft)	0.72	Wt. n-Val.		0.025	
W.S. Elev (ft)	120.45	Reach L	265.5	265.5	265.5
Crit W.S. (ft)	115.57	Flow Area (sq ft)		1117.67	
E.G. Slope (ft/ft)	0.000858	Area (sq ft)		1117.67	
Q Total (cfs)	7590	Flow (cfs)		7590	
Top Width (ft)	110.08	Top Width (ft)		110.08	
Vel Total (ft/s)	6.79	Avg. Vel. (ft/s)		6.79	
Max Chl Dpth (ft)	10.75	Hydr. Depth (ft)		10.15	
Conv. Total (cfs)	259121.2	Conv. (cfs)		259121.2	
Length Wtd. (ft)	265.5	Wetted Per. (ft)		145.08	
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.41	
Alpha	1	Stream Power (lb/ft s)		2.8	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)		34.64	
C & E Loss (ft)	0.12	Cum SA (acres)		5.47	

Plan: SteelNoTW	Kenduskeag Village RS: 9825 BR D		Profile: Q500		
				Channel	Right OB
E.G. Elev (ft)	122.61	Element Left OB			
Vel Head (ft)	0.95	Wt. n-Val.		0.025	
W.S. Elev (ft)	121.66	Reach L	265.5	265.5	265.5
Crit W.S. (ft)	116.56	Flow Area (sq ft)		1250.29	
E.G. Slope (ft/ft)	0.001024	Area (sq ft)		1250.29	
Q Total (cfs)	9780	Flow (cfs)		9780	
Top Width (ft)	110.08	Top Width (ft)		110.08	
Vel Total (ft/s)	7.82	Avg. Vel. (ft/s)		7.82	
Max Chl Dpth (ft)	11.96	Hydr. Depth (ft)		11.36	
Conv. Total (cfs)	305629.2	Conv. (cfs)		305629.2	
Length Wtd. (ft)	265.5	Wetted Per. (ft)		149.91	
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.53	
Alpha	1	Stream Power (lb/ft s)		4.17	
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)		42.35	
C & E Loss (ft)	0.18	Cum SA (acres)		6.36	

HEC-RAS Plan: SteelNoTW River: Kenduskeag Reach: Village

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)
Village	10000	Q1.1	1415	108.8	115.03		115.12	0.00019	2.42
Village	10000	Q10	4690	108.8	118.62		118.99	0.000423	4.85
Village	10000	Q25	5820	108.8	119.59		120.05	0.000474	5.43
Village	10000	Q50	6680	108.8	120.32		120.85	0.000501	5.81
Village	10000	Q100	7590	108.8	121.01		121.61	0.000533	6.2
Village	10000	Q500	9780	108.8	122.35		123.15	0.000632	7.15
Village	9894	Q1.1	1415	108.4	115.03		115.06	0.000068	1.35
Village	9894	Q10	4690	108.4	118.73		118.81	0.000113	2.37
Village	9894	Q25	5820	108.4	119.74		119.84	0.000117	2.58
Village	9894	Q50	6680	108.4	120.51		120.62	0.000119	2.7
Village	9894	Q100	7590	108.4	121.24		121.37	0.000122	2.82
Village	9894	Q500	9780	108.4	122.69		122.84	0.000133	3.12
Village	9865.5	Q1.1	1415	109	114.97		115.02	0.000142	1.74
Village	9865.5	Q10	4690	109	118.64		118.76	0.000186	2.79
Village	9865.5	Q25	5820	109	119.65		119.79	0.000183	2.98
Village	9865.5	Q50	6680	109	120.42		120.57	0.000183	3.08
Village	9865.5	Q100	7590	109	121.16		121.31	0.000187	3.18
Village	9865.5	Q500	9780	109	122.6		122.78	0.000199	3.43
Village	9841.5	Q1.1	1415	109	114.91	111.5	114.97	0.000187	1.97
Village	9841.5	Q10	4690	109	118.54	113.54	118.69	0.000245	3.12
Village	9841.5	Q25	5820	109	119.55	114.06	119.72	0.000243	3.31
Village	9841.5	Q50	6680	109	120.32	114.42	120.5	0.000243	3.41
Village	9841.5	Q100	7590	109	121.05	114.78	121.24	0.000251	3.49
Village	9841.5	Q500	9780	109	122.49	115.53	122.71	0.000261	3.7
Village	9825		Bridge						
Village	9807.7	Q1.1	1415	109.7	114.74		114.86	0.000352	2.77
Village	9807.7	Q10	4690	109.7	118.15		118.42	0.000558	4.18
Village	9807.7	Q25	5820	109.7	119.12		119.42	0.000524	4.34
Village	9807.7	Q50	6680	109.7	119.87		120.17	0.000481	4.39
Village	9807.7	Q100	7590	109.7	120.57		120.88	0.000478	4.47
Village	9807.7	Q500	9780	109.7	121.89		122.23	0.000536	4.69
Village	9785.13	Q1.1	1415	110	114.56		114.72	0.000786	3.24
Village	9785.13	Q10	4690	110	118		118.28	0.000576	4.19
Village	9785.13	Q25	5820	110	118.98		119.27	0.000565	4.31
Village	9785.13	Q50	6680	110	119.75		120.04	0.000522	4.3
Village	9785.13	Q100	7590	110	120.46		120.75	0.000494	4.33
Village	9785.13	Q500	9780	110	121.78		122.09	0.00047	4.52
Village	9728.2	Q1.1	1415	109	114.14		114.46	0.001395	4.53
Village	9728.2	Q10	4690	109	117.38		118.03	0.00149	6.45
Village	9728.2	Q25	5820	109	118.35		119.03	0.00141	6.6
Village	9728.2	Q50	6680	109	119.16		119.81	0.001305	6.51
Village	9728.2	Q100	7590	109	119.88		120.53	0.00123	6.48
Village	9728.2	Q500	9780	109	121.2		121.89	0.00116	6.65

Village	9662	Q1.1	1415	109	113.97		114.21	0.00115	3.97
Village	9662	Q10	4690	109	117.23		117.78	0.001023	5.92
Village	9662	Q25	5820	109	118.19		118.8	0.000989	6.27
Village	9662	Q50	6680	109	118.97		119.6	0.000993	6.37
Village	9662	Q100	7590	109	119.68		120.33	0.001	6.49
Village	9662	Q500	9780	109	120.93		121.68	0.001073	6.95
Village	9547	Q1.1	1415	109	113.69	112.15	114.04	0.001706	4.73
Village	9547	Q10	4690	109	116.78	114.82	117.6	0.001704	7.25
Village	9547	Q25	5820	109	117.73	115.41	118.62	0.001708	7.59
Village	9547	Q50	6680	109	118.54	115.86	119.43	0.001708	7.55
Village	9547	Q100	7590	109	119.29	116.34	120.16	0.001706	7.51
Village	9547	Q500	9780	109	120.61	117.4	121.51	0.001706	7.63

Flow Area (sq ft)	Top Width (ft)	Froude # C
585.14	106.45	0.18
967.91	106.8	0.28
1071.1	106.89	0.3
1149.53	106.96	0.31
1223.67	107.03	0.32
1367.23	108.21	0.35
1045.49	227.19	0.11
1978.98	270.58	0.15
2257.76	278.88	0.16
2475.76	288.39	0.16
2691.02	298.98	0.17
3138.37	321.46	0.18
813.03	209.9	0.16
1682.3	262.07	0.19
1952.88	272.3	0.2
2166.96	286.8	0.2
2384	305.84	0.2
2852.04	343.24	0.21
716.46	188.19	0.18
1503.02	243.49	0.22
1756.53	258.39	0.22
1961.13	276.93	0.23
2173.23	302.99	0.23
2641.79	347.48	0.24
511.33	129.84	0.25
1122.55	217.24	0.32
1341.81	234.17	0.32
1521.23	244.63	0.31
1697.62	264.53	0.31
2085.29	329.56	0.33
436.62	160.15	0.35
1119.12	221	0.33
1351.45	252.5	0.33
1553.2	274.1	0.32
1753.25	293.89	0.31
2165.04	328.19	0.31
312.23	105.1	0.46
726.92	150.7	0.52
881.41	169.64	0.51
1025.47	190.38	0.49
1170.58	209.58	0.48
1470.49	243.04	0.48

356.21	126.22	0.42
792.79	140.4	0.44
928.64	146.55	0.44
1049.32	162.4	0.44
1169.5	176.85	0.44
1406.72	202.38	0.46
299.22	107.63	0.5
646.5	120.94	0.55
767.05	134.84	0.56
884.19	157.35	0.56
1011.27	182.59	0.56
1281.82	227.23	0.57

Steel Beam Bridge, modeled w/ TW for Ice, Section at Downstream Fascia

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q1.1		
E.G. Elev (ft)	116.94	Element Left OB		Channel		Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.025		
W.S. Elev (ft)	116.88	Reach L	249.5	249.5		249.5
Crit W.S. (ft)	111.86	Flow Area (sq ft)		729.49		
E.G. Slope (ft/ft)	0.000095	Area (sq ft)		729.49		
Q Total (cfs)	1415	Flow (cfs)		1415		
Top Width (ft)	110.46	Top Width (ft)		110.46		
Vel Total (ft/s)	1.94	Avg. Vel. (ft/s)		1.94		
Max Chl Dpth (ft)	7.18	Hydr. Depth (ft)		6.6		
Conv. Total (cfs)	145130.5	Conv. (cfs)		145130.5		
Length Wtd. (ft)	249.5	Wetted Per. (ft)		119.12		
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.04		
Alpha	1	Stream Power (lb/ft s)		0.07		
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		18.1		
C & E Loss (ft)	0	Cum SA (acres)		3.92		

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q10		
E.G. Elev (ft)	120.36	Element Left OB		Channel		Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.025		
W.S. Elev (ft)	120.07	Reach L	249.5	249.5		249.5
Crit W.S. (ft)	114.11	Flow Area (sq ft)		1081.2		
E.G. Slope (ft/ft)	0.000302	Area (sq ft)		1081.2		
Q Total (cfs)	4690	Flow (cfs)		4690		
Top Width (ft)	110.21	Top Width (ft)		110.21		
Vel Total (ft/s)	4.34	Avg. Vel. (ft/s)		4.34		
Max Chl Dpth (ft)	10.37	Hydr. Depth (ft)		9.81		
Conv. Total (cfs)	270060.4	Conv. (cfs)		270060.4		
Length Wtd. (ft)	249.5	Wetted Per. (ft)		125.5		
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.16		
Alpha	1	Stream Power (lb/ft s)		0.7		
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)		32.23		
C & E Loss (ft)	0.05	Cum SA (acres)		5.17		

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q25		
E.G. Elev (ft)	121.57	Element Left OB		Channel		Right OB
Vel Head (ft)	0.36	Wt. n-Val.		0.025		
W.S. Elev (ft)	121.21	Reach L	249.5	249.5		249.5
Crit W.S. (ft)	114.7	Flow Area (sq ft)		1206.97		
E.G. Slope (ft/ft)	0.00033	Area (sq ft)		1206.97		
Q Total (cfs)	5820	Flow (cfs)		5820		
Top Width (ft)	110.12	Top Width (ft)		110.12		
Vel Total (ft/s)	4.82	Avg. Vel. (ft/s)		4.82		
Max Chl Dpth (ft)	11.51	Hydr. Depth (ft)		10.96		
Conv. Total (cfs)	320540.1	Conv. (cfs)		320540.1		
Length Wtd. (ft)	249.5	Wetted Per. (ft)		127.79		
Min Ch El (ft)	109.7	Shear (lb/sq ft)		0.19		
Alpha	1	Stream Power (lb/ft s)		0.94		
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)		38.73		
C & E Loss (ft)	0.06	Cum SA (acres)		5.88		

Steel Beam Bridge, modeled w/ TW for Ice, Section at Downstream Fascia

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q50		
					Channel	Right OB
E.G. Elev (ft)	122.38	Element Left OB			0.025	
Vel Head (ft)	0.42	Wt. n-Val.		249.5	249.5	249.5
W.S. Elev (ft)	121.96	Reach L			1289.86	
Crit W.S. (ft)	115.12	Flow Area (sq ft)			1289.86	
E.G. Slope (ft/ft)	0.000354	Area (sq ft)			6680	
Q Total (cfs)	6680	Flow (cfs)			110.06	
Top Width (ft)	110.06	Top Width (ft)			5.18	
Vel Total (ft/s)	5.18	Avg. Vel. (ft/s)			11.72	
Max Chl Dpth (ft)	12.26	Hydr. Depth (ft)			355276	
Conv. Total (cfs)	355276	Conv. (cfs)			129.3	
Length Wtd. (ft)	249.5	Wetted Per. (ft)			0.22	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			1.14	
Alpha	1	Stream Power (lb/ft s)			43.54	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)			6.4	
C & E Loss (ft)	0.08	Cum SA (acres)				

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q100		
					Channel	Right OB
E.G. Elev (ft)	123.29	Element Left OB			0.025	
Vel Head (ft)	0.47	Wt. n-Val.		249.5	249.5	249.5
W.S. Elev (ft)	122.82	Reach L			1382	
Crit W.S. (ft)	115.55	Flow Area (sq ft)			1382	
E.G. Slope (ft/ft)	0.000446	Area (sq ft)			7590	
Q Total (cfs)	7590	Flow (cfs)			89.53	
Top Width (ft)	89.53	Top Width (ft)			5.49	
Vel Total (ft/s)	5.49	Avg. Vel. (ft/s)			15.44	
Max Chl Dpth (ft)	13.12	Hydr. Depth (ft)			359224.8	
Conv. Total (cfs)	359224.8	Conv. (cfs)			151.11	
Length Wtd. (ft)	249.5	Wetted Per. (ft)			0.25	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			1.4	
Alpha	1	Stream Power (lb/ft s)			49.53	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)			6.91	
C & E Loss (ft)	0.1	Cum SA (acres)				

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR D	Profile: Q500		
					Channel	Right OB
E.G. Elev (ft)	124.78	Element Left OB			0.025	
Vel Head (ft)	0.75	Wt. n-Val.		249.5	249.5	249.5
W.S. Elev (ft)	124.03	Reach L			1409.75	
Crit W.S. (ft)	116.52	Flow Area (sq ft)			1409.75	
E.G. Slope (ft/ft)	0.00129	Area (sq ft)			9780	
Q Total (cfs)	9780	Flow (cfs)				
Top Width (ft)		Top Width (ft)			6.94	
Vel Total (ft/s)	6.94	Avg. Vel. (ft/s)				
Max Chl Dpth (ft)	14.33	Hydr. Depth (ft)			272289.1	
Conv. Total (cfs)	272289.1	Conv. (cfs)			240.65	
Length Wtd. (ft)	249.5	Wetted Per. (ft)			0.47	
Min Ch El (ft)	109.7	Shear (lb/sq ft)			3.27	
Alpha	1	Stream Power (lb/ft s)			58.84	
Frctn Loss (ft)	0.1	Cum Vo		0.3	6.79	0.17
C & E Loss (ft)	0.17	Cum SA		0.6		0.3

Steel Beam Bridge, modeled w/ TW for Ice, Section at Upstream Fascia

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q1.1		
E.G. Elev (ft)	116.94	Element Left OB		Channel		Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.025		
W.S. Elev (ft)	116.89	Reach L	40	40		40
Crit W.S. (ft)	111.49	Flow Area (sq ft)		787.8		
E.G. Slope (ft/ft)	0.000076	Area (sq ft)		787.8		
Q Total (cfs)	1415	Flow (cfs)		1415		
Top Width (ft)	110.46	Top Width (ft)		110.46		
Vel Total (ft/s)	1.8	Avg. Vel. (ft/s)		1.8		
Max Chl Dpth (ft)	7.89	Hydr. Depth (ft)		7.13		
Conv. Total (cfs)	162151.9	Conv. (cfs)		162151.9		
Length Wtd. (ft)	40	Wetted Per. (ft)		122.25		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.03		
Alpha	1	Stream Power (lb/ft s)		0.06		
Frctn Loss (ft)	0	Cum Volume (acre-ft)		18.8		
C & E Loss (ft)	0	Cum SA (acres)		4.03		

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q10		
E.G. Elev (ft)	120.37	Element Left OB		Channel		Right OB
Vel Head (ft)	0.26	Wt. n-Val.		0.025		
W.S. Elev (ft)	120.11	Reach L	40	40		40
Crit W.S. (ft)	113.59	Flow Area (sq ft)		1143.1		
E.G. Slope (ft/ft)	0.000259	Area (sq ft)		1143.1		
Q Total (cfs)	4690	Flow (cfs)		4690		
Top Width (ft)	110.2	Top Width (ft)		110.2		
Vel Total (ft/s)	4.1	Avg. Vel. (ft/s)		4.1		
Max Chl Dpth (ft)	11.11	Hydr. Depth (ft)		10.37		
Conv. Total (cfs)	291395.7	Conv. (cfs)		291395.7		
Length Wtd. (ft)	40	Wetted Per. (ft)		128.7		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.14		
Alpha	1	Stream Power (lb/ft s)		0.59		
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		33.25		
C & E Loss (ft)	0	Cum SA (acres)		5.27		

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q25		
E.G. Elev (ft)	121.59	Element Left OB		Channel		Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.025		
W.S. Elev (ft)	121.26	Reach L	40	40		40
Crit W.S. (ft)	114.18	Flow Area (sq ft)		1269.45		
E.G. Slope (ft/ft)	0.000288	Area (sq ft)		1269.45		
Q Total (cfs)	5820	Flow (cfs)		5820		
Top Width (ft)	110.11	Top Width (ft)		110.11		
Vel Total (ft/s)	4.58	Avg. Vel. (ft/s)		4.58		
Max Chl Dpth (ft)	12.26	Hydr. Depth (ft)		11.53		
Conv. Total (cfs)	342965.9	Conv. (cfs)		342965.9		
Length Wtd. (ft)	40	Wetted Per. (ft)		130.99		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.17		
Alpha	1	Stream Power (lb/ft s)		0.8		
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		39.87		
C & E Loss (ft)	0	Cum SA (acres)		5.98		

Steel Beam Bridge, modeled w/ TW for Ice, Section at Upstream Fascia

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q50		
E.G. Elev (ft)	122.4	Element Left OB		Channel		Right OB
Vel Head (ft)	0.38	Wt. n-Val.		0.025		
W.S. Elev (ft)	122.02	Reach L	40	40		40
Crit W.S. (ft)	114.61	Flow Area (sq ft)		1352.84		
E.G. Slope (ft/ft)	0.000312	Area (sq ft)		1352.84		
Q Total (cfs)	6680	Flow (cfs)		6680		
Top Width (ft)	110.05	Top Width (ft)		110.05		
Vel Total (ft/s)	4.94	Avg. Vel. (ft/s)		4.94		
Max Chl Dpth (ft)	13.02	Hydr. Depth (ft)		12.29		
Conv. Total (cfs)	378413.7	Conv. (cfs)		378413.7		
Length Wtd. (ft)	40	Wetted Per. (ft)		132.51		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.2		
Alpha	1	Stream Power (lb/ft s)		0.98		
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		44.76		
C & E Loss (ft)	0	Cum SA (acres)		6.5		

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q100		
E.G. Elev (ft)	123.31	Element Left OB		Channel		Right OB
Vel Head (ft)	0.43	Wt. n-Val.		0.025		
W.S. Elev (ft)	122.88	Reach L	40	40		40
Crit W.S. (ft)	115.04	Flow Area (sq ft)		1444.16		
E.G. Slope (ft/ft)	0.00042	Area (sq ft)		1444.16		
Q Total (cfs)	7590	Flow (cfs)		7590		
Top Width (ft)	82.7	Top Width (ft)		82.7		
Vel Total (ft/s)	5.26	Avg. Vel. (ft/s)		5.26		
Max Chl Dpth (ft)	13.88	Hydr. Depth (ft)		17.46		
Conv. Total (cfs)	370487.1	Conv. (cfs)		370487.1		
Length Wtd. (ft)	40	Wetted Per. (ft)		161.05		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.23		
Alpha	1	Stream Power (lb/ft s)		1.23		
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		50.83		
C & E Loss (ft)	0	Cum SA (acres)		6.99		

Plan: Steel_IceTW	Kenduskeag	Village RS: 9825	BR U	Profile: Q500		
E.G. Elev (ft)	124.83	Element Left OB		Channel		Right OB
Vel Head (ft)	0.69	Wt. n-Val.		0.025		
W.S. Elev (ft)	124.14	Reach L	40	40		40
Crit W.S. (ft)	116.01	Flow Area (sq ft)		1466.68		
E.G. Slope (ft/ft)	0.00115	Area (sq ft)		1466.68		
Q Total (cfs)	9780	Flow (cfs)		9780		
Top Width (ft)		Top Width (ft)				
Vel Total (ft/s)	6.67	Avg. Vel. (ft/s)		6.67		
Max Chl Dpth (ft)	15.14	Hydr. Depth (ft)				
Conv. Total (cfs)	288388.9	Conv. (cfs)		288388.9		
Length Wtd. (ft)	40	Wetted Per. (ft)		243.76		
Min Ch El (ft)	109	Shear (lb/sq ft)		0.43		
Alpha	1	Stream Power (lb/ft s)		2.88		
Frctn Loss (ft)	0.05	Cum Vo	0.3	60.16		0.17
C & E Loss (ft)	0.01	Cum SA	0.6	6.79		0.3

Detailed profile Steel w Ice

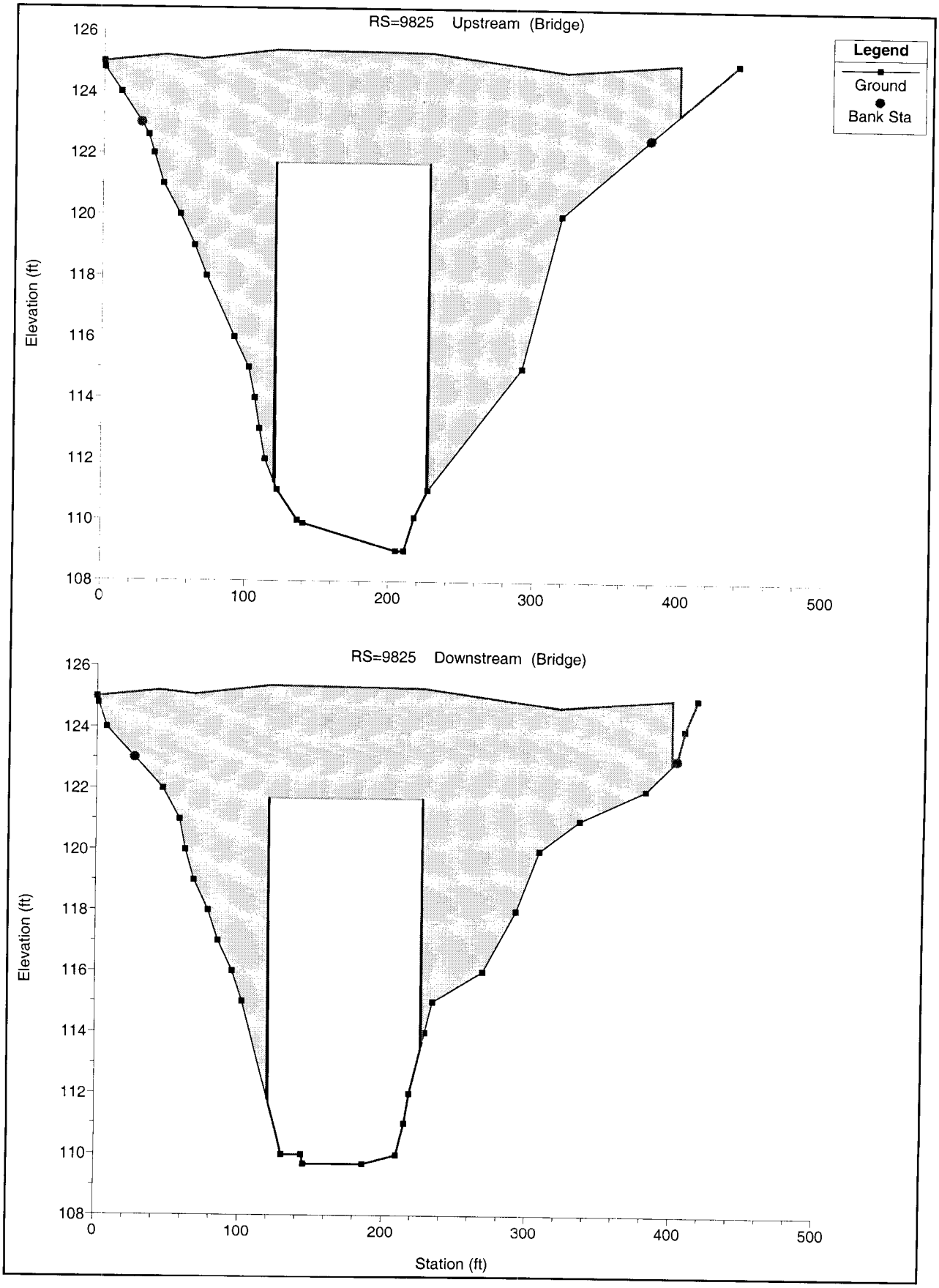
HEC-RAS Plan: Steel_IceTW River: Kenduskeag Reach: Village

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)
Village	10000	Q1.1	1415	108.8	116.95		117	0.000073	1.79
Village	10000	Q10	4690	108.8	120.31		120.56	0.000248	4.09
Village	10000	Q25	5820	108.8	121.48		121.81	0.000277	4.57
Village	10000	Q50	6680	108.8	122.26		122.64	0.000301	4.92
Village	10000	Q100	7590	108.8	123.14		123.56	0.000316	5.22
Village	10000	Q500	9780	108.8	124.58		125.16	0.000372	6.06
Village	9894	Q1.1	1415	108.4	116.96		116.97	0.000023	0.94
Village	9894	Q10	4690	108.4	120.4		120.45	0.000061	1.92
Village	9894	Q25	5820	108.4	121.61		121.68	0.000064	2.08
Village	9894	Q50	6680	108.4	122.42		122.49	0.000067	2.19
Village	9894	Q100	7590	108.4	123.33		123.41	0.000066	2.27
Village	9894	Q500	9780	108.4	124.85		124.95	0.000069	2.54
Village	9865.5	Q1.1	1415	109	116.94		116.96	0.00004	1.13
Village	9865.5	Q10	4690	109	120.35		120.43	0.000092	2.18
Village	9865.5	Q25	5820	109	121.56		121.65	0.000097	2.32
Village	9865.5	Q50	6680	109	122.37		122.46	0.000099	2.41
Village	9865.5	Q100	7590	109	123.28		123.38	0.000095	2.45
Village	9865.5	Q500	9780	109	124.81		124.92	0.000092	2.69
Village	9841.5	Q1.1	1415	109	116.92	111.5	116.95	0.000051	1.25
Village	9841.5	Q10	4690	109	120.3	113.53	120.39	0.00012	2.4
Village	9841.5	Q25	5820	109	121.51	114.05	121.61	0.000127	2.51
Village	9841.5	Q50	6680	109	122.32	114.42	122.42	0.000129	2.59
Village	9841.5	Q100	7590	109	123.24	114.78	123.34	0.000118	2.61
Village	9841.5	Q500	9780	109	124.77	115.54	124.89	0.00011	2.83
Village	9825		Bridge						
Village	9807.7	Q1.1	1415	109.7	116.87		116.91	0.000106	1.65
Village	9807.7	Q10	4690	109.7	120.11		120.25	0.000215	2.97
Village	9807.7	Q25	5820	109.7	121.29		121.44	0.000224	3.06
Village	9807.7	Q50	6680	109.7	122.08		122.23	0.000235	3.11
Village	9807.7	Q100	7590	109.7	122.97		123.12	0.000219	3.08
Village	9807.7	Q500	9780	109.7	124.34		124.5	0.000194	3.28
Village	9785.13	Q1.1	1415	110	116.84		116.88	0.00011	1.63
Village	9785.13	Q10	4690	110	120.06		120.19	0.000224	2.86
Village	9785.13	Q25	5820	110	121.25		121.38	0.000207	2.92
Village	9785.13	Q50	6680	110	122.03		122.17	0.000198	2.97
Village	9785.13	Q100	7590	110	122.92		123.06	0.000185	2.96
Village	9785.13	Q500	9780	110	124.3		124.45	0.000171	3.19
Village	9728.2	Q1.1	1415	109	116.77		116.84	0.000194	2.22
Village	9728.2	Q10	4690	109	119.85		120.1	0.000476	4.03
Village	9728.2	Q25	5820	109	121.04		121.3	0.000442	4.07
Village	9728.2	Q50	6680	109	121.83		122.09	0.000413	4.11
Village	9728.2	Q100	7590	109	122.73		122.99	0.000369	4.07
Village	9728.2	Q500	9780	109	124.09		124.38	0.00034	4.36

Village	9662	Q1.1	1415	109	116.75		116.81	0.000123	1.95
Village	9662	Q10	4690	109	119.78		120.02	0.000368	3.95
Village	9662	Q25	5820	109	120.96		121.22	0.000376	4.12
Village	9662	Q50	6680	109	121.74		122.02	0.000379	4.24
Village	9662	Q100	7590	109	122.64		122.92	0.000362	4.26
Village	9662	Q500	9780	109	123.98		124.32	0.000356	4.63
Village	9547	Q1.1	1415	109	116.5	114.44	116.75	0.007572	3.99
Village	9547	Q10	4690	109	119	117.11	119.84	0.013562	7.35
Village	9547	Q25	5820	109	120.2	117.71	121.04	0.012144	7.35
Village	9547	Q50	6680	109	121	118.16	121.83	0.012456	7.33
Village	9547	Q100	7590	109	122	118.63	122.75	0.011307	6.95
Village	9547	Q500	9780	109	123.4	119.71	124.16	0.010817	6.98

Flow Area (sq ft)	Top Width (ft)	Froude # C
789.53	106.63	0.12
1147.88	106.96	0.22
1273.75	107.08	0.23
1357.6	108.04	0.24
1453.28	109.66	0.25
1636.22	181.23	0.28
1513.3	256.02	0.07
2443.03	286.75	0.12
2800.86	304.24	0.12
3051.81	316.9	0.12
3346.82	334.3	0.13
3887.94	380.96	0.13
1254.55	239.2	0.09
2147.07	284.99	0.14
2510.98	316.45	0.15
2775.33	337.41	0.15
3093.33	360.94	0.15
3683.6	413.26	0.15
1127.95	219.71	0.1
1956.46	276.32	0.16
2316.14	317.23	0.16
2582.72	342.2	0.17
2909.8	374.44	0.16
3528.21	433.38	0.16
858.41	193.14	0.14
1580.77	250.04	0.21
1898.93	295.2	0.21
2148.28	339.11	0.22
2466.31	375.68	0.21
3004.08	407.04	0.21
870.48	206.19	0.14
1640.32	282.89	0.21
1994.53	315.23	0.2
2249.35	334.66	0.2
2560.69	363.6	0.2
3090.83	405.9	0.19
636.86	141.44	0.18
1164.34	208.79	0.3
1431.27	239.96	0.29
1626.15	254.9	0.29
1863.6	271.86	0.27
2265.08	349.64	0.27

725.37	138.65	0.15
1187.88	178.96	0.27
1412.48	202.96	0.28
1576.68	218.61	0.28
1781.2	236.71	0.27
2126.75	286.23	0.28
355	108.85	0.39
637.76	120.33	0.56
791.58	137.81	0.54
911.37	163.01	0.55
1091.31	197.05	0.52
1400.17	243.72	0.51


RS=9825 Upstream (Bridge)
Legend
Ground
Bank Sta
Elevation (ft)
126
124
122
120
118
116
114
112
110
108
0
100
200
300
400
500
RS=9825 Downstream (Bridge)
Elevation (ft)
126
124
122
120
118
116
114
112
110
108
0
100
200
300
400
500
Station (ft)

Miscellaneous Data

1104/1.00 Kenduskeag Village Bridge

Questions concerning the VERTCON process may be mailed to NGS

Latitude: 44 55 10.00

Longitude: 68 55 54.00

NGVD 29 height:

Datum shift (NAVD 88 minus NGVD 29): -0.194 meter

In other words, NGVD29 datum elevations, such as all the Natural Resource Conservation Service information in the "Kenduskeag Floodplain Management Study" (including stream cross sections) is 0.194m ≃ 7.64 inches higher than the NAVD88 elevations for the project topography files.

The Status.rpt file for 1104/1.00 was created 7/23/2003 and states that the vertical datum is NAVD88

Subtract 7.64" or 0.636' from NRCS data to compare it with the current NAVD88 survey

PRELIMINARY COST ESTIMATE

PROJECT: Town, Kenduskeag Bridge # 2975 Bridge Replacement Project description - 114-ft. steel I-girder simple span, cast-in-place abutments, 5-ft.sidewalk, bitumen. W.S. Traffic maintained by detour on local roads Deck Area: 40.33' x 114' = 4600 SF	PIN: 17576.00 ESTIMATED BY: R.S. Bulger

SUPERSTRUCTURE:	4600 SF x $150	=	$690,000
ABUTMENTS:	4600 SF x $134	=	$620,000
PIERS:N/A	0 SF x $50	=	$0
COFFERDAMS:	2 EA x $50,000	=	$100,000
STRUCTURAL AND ROCK EXCAVATION:	2400 CY x $43	=	$104,000
COMMON AND GRANULAR BORROW:	1100 CY x $31	=	$35,000
RIPRAP:Plain	50 CY x $60	=	$3,000
EXISTING BRIDGE REMOVAL:	3420 SF x $35	=	$120,000
DETOUR: N/A	0 SF x $0	=	$0
REHABILITATION CONTINGENCIES:N/A	0%	=	$0
MISCELLANEOUS (TCP'S, FIELD OFFICE, ETC.):	8%	=	$134,000
MOBILIZATION:	8%	=	$134,000
STRUCTURE SUBTOTAL		=	**$1,940,000**
APPROACHES:	236 ft x $395	=	$94,000
MISCELLANEOUS:	8%	=	$8,000
MOBILIZATION:	8%	=	$8,000
APPROACHES SUBTOTAL		=	**$110,000**
TOTAL CONSTRUCTION COST		=	**$2,050,000**
PRELIMINARY ENGINEERING:	13%	=	$270,000
RIGHT OF WAY:		=	$10,000
CONSTRUCTION ENGINEERING:	13%	=	$270,000
OTHER:		=	$0
TOTAL PROJECT COST		=	**$2,600,000**