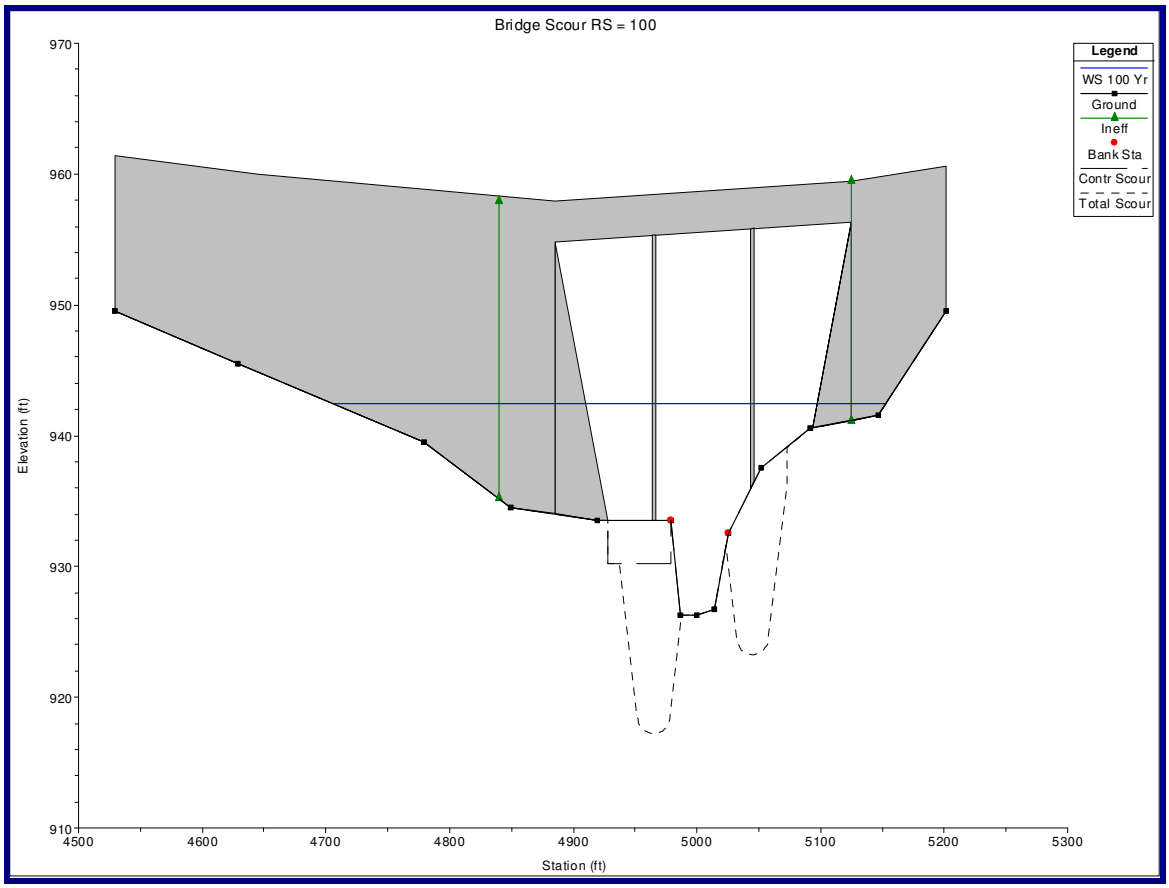
PROPOSED MODEL BRIDGE SCOUR

Proposed 100-yr



Hydraulic Design Data
Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	0.71	9.50	2.61
Approach Velocity (ft/s):	1.38	15.65	3.31
Br Average Depth (ft):	7.71	14.69	4.68
BR Opening Flow (cfs):	1069.51	5271.49	548.00
BR Top WD (ft):	66.26	46.00	69.26
Grain Size D50 (mm):	0.37	0.37	0.37
Approach Flow (cfs):	8.01	6394.71	486.28
Approach Top WD (ft):	8.13	43.00	56.17
K1 Coefficient:	0.690	0.690	0.690
Results			
Scour Depth Ys (ft):	3.36	0.00	0.00
Critical Velocity (ft/s):	1.13	1.74	1.40
Equation:	Live	Live	Live

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Square nose
Pier Width (ft):	3.00
Grain Size D50 (mm):	0.37000
Depth Upstream (ft):	14.79
Velocity Upstream (ft/s):	5.86
K1 Nose Shape:	1.00
Pier Angle:	30.00
Pier Length (ft):	12.00
K2 Angle Coef:	1.98
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.47000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

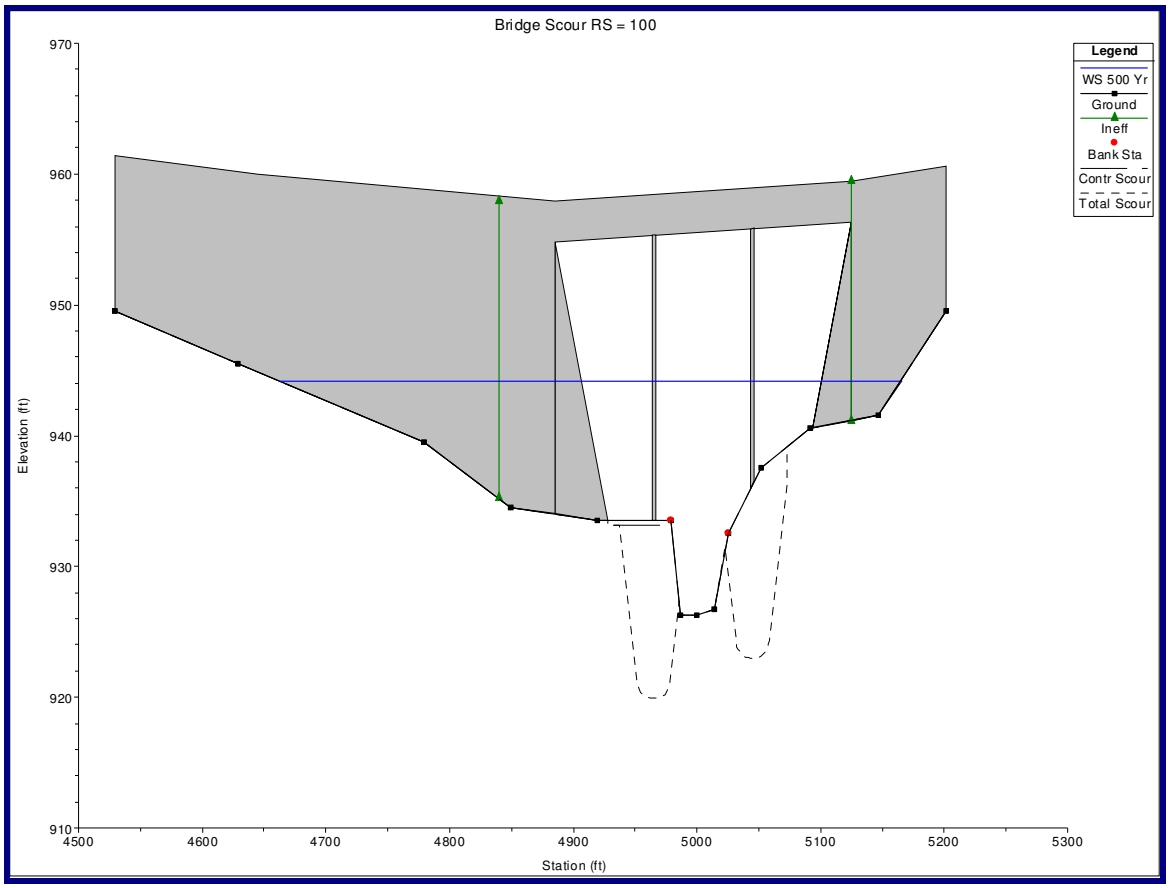
Scour Depth Ys (ft):	12.97
Froude #:	0.27
Equation:	CSU equation

Combined Scour Depths

Pier Scour + Contraction Scour (ft):

Left Bank:	16.3
Right Bank:	13.0

Proposed 500-yr



Hydraulic Design Data
Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	1.52	11.11	3.42
Approach Velocity (ft/s):	2.09	15.82	3.61
Br Average Depth (ft):	9.03	16.44	6.17
BR Opening Flow (cfs):	1414.11	6258.69	846.20
BR Top WD (ft):	69.77	46.00	72.77
Grain Size D50 (mm):	0.37	0.37	0.37
Approach Flow (cfs):	54.90	7557.44	906.66
Approach Top WD (ft):	17.34	43.00	73.50
K1 Coefficient:	0.690	0.690	0.690
Results			
Scour Depth Ys (ft):	0.38	0.00	0.00 **Use 1 ft Min.**
Critical Velocity (ft/s):	1.28	1.79	1.47
Equation:	Live	Live	Live

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Square nose
Pier Width (ft):	3.00
Grain Size D50 (mm):	0.37000
Depth Upstream (ft):	16.61
Velocity Upstream (ft/s):	5.95
K1 Nose Shape:	1.00
Pier Angle:	30.00
Pier Length (ft):	12.00
K2 Angle Coef:	1.98
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.47000
K4 Armouring Coef:	1.00

Set K1 value to 1.0 because angle > 5 degrees

Results

Scour Depth Ys (ft):	13.27
Froude #:	0.26
Equation:	CSU equation

Combined Scour Depths

Pier Scour + Contraction Scour (ft): 14.3

RIPRAP CALCULATIONS

NH000-0073-03(242) Cobb County
I-75 over Noonday Creek
PI # 714130

ENDROLL RIPRAP CALCULATIONS (100 YEAR STORM)
METHOD IN HEC-18,"EVALUATING SCOUR AT BRIDGES"

BRIDGE ABUTMENT LOCATION	839+37	841+79.25
SET BACK LENGTH =	66	52
MAIN CHANNEL AREA @ BRIDGE =	664	664
TOP WIDTH OF MAIN CHANNEL @ BRIDGE =	46	46
AVERAGE DEPTH OF MAIN CHANNEL @ BR =	14.4	14.4
SET BACK RATIO =	4.583	3.611
CHARACTERISTIC AVG VELOCITY CALCULATIONS (SEE PAGES 120,121)		
DISCHARGE @ ABUTMENT =	454	1286
AREA @ ABUTMENT =	289	590
AVERAGE VELOCITY, V =	1.57	2.18
AREA OF OVERBANK FLOW @ BRIDGE =	289	590
LENGTH OF OVERBANK FLOW @ BRIDGE =	66	52
AVERAGE DEPTH OF OVERBANK FLOW =	4.38	11.35
FROUDE NUMBER =	0.132	0.114
IF FROUDE NUMBER <= 0.80, THEN D50 =	0.041	0.080
IF FROUDE NUMBER > 0.80, THEN D50 =	0.919	2.284
MEDIAN STONE DIAMETER REQUIRED, D50 =	0.041	0.080
TYPE OF RIPRAP REQUIRED =	TYPE 3	TYPE 3

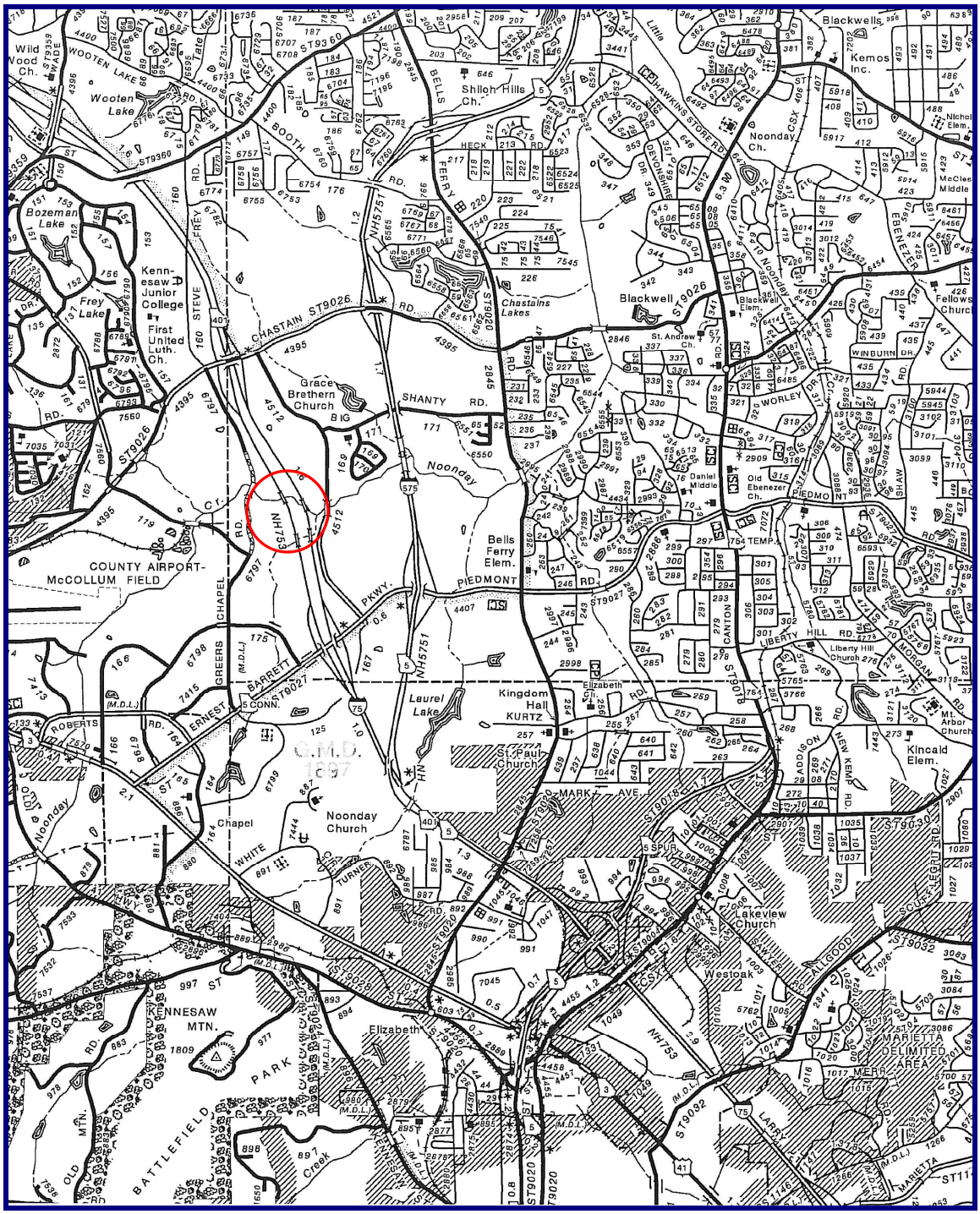
Note : Type I Riprap will be used at this site.

HEC-RAS Plan: Proposed River: Noonday Creek Reach: 1 Profile: 100 Yr

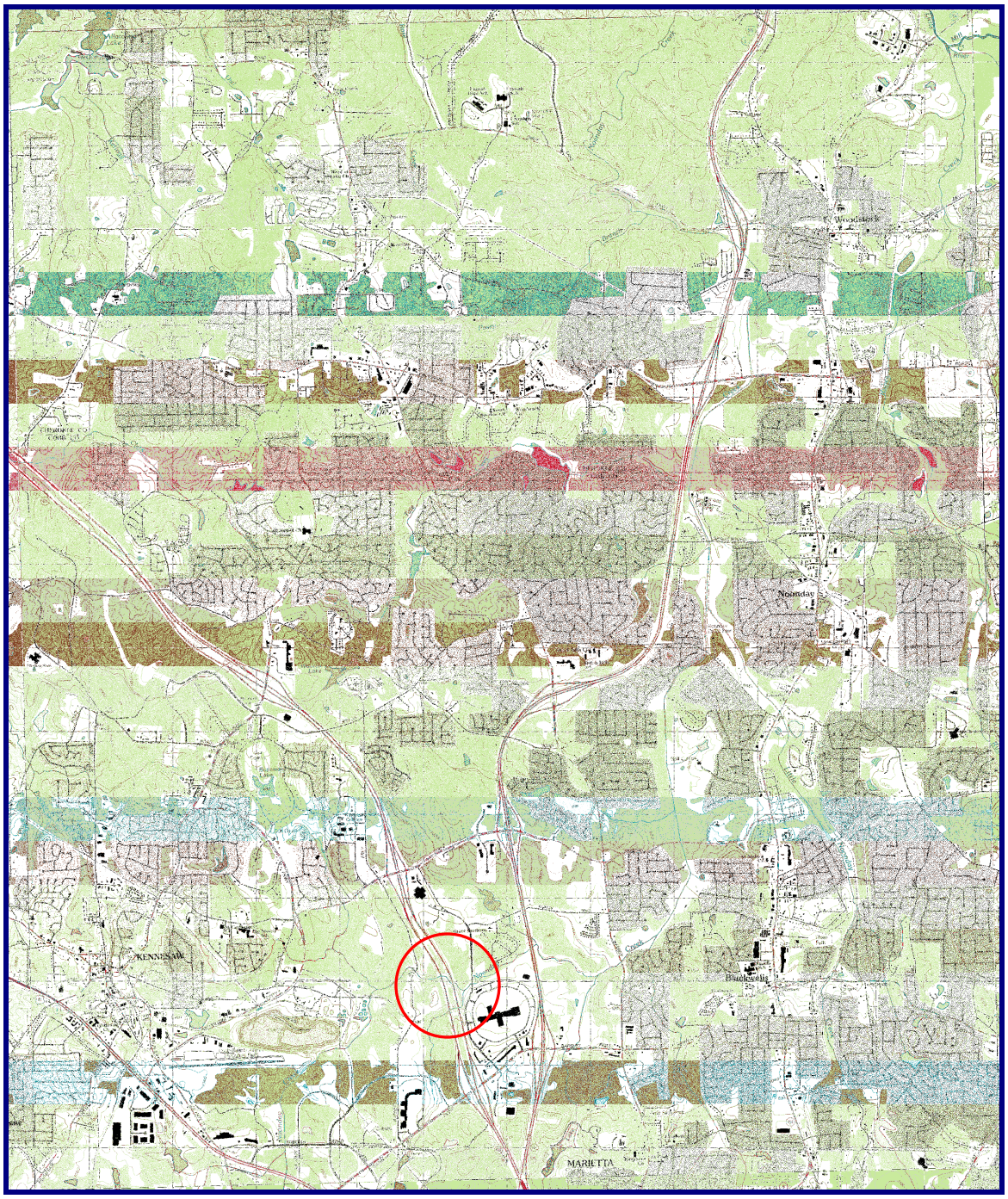
Reach	River Sta	Profile	W.S. Elev	Hydr Depth L	Hydr Depth C	Hydr Depth R	Top W Left	Top W Chnl	Top W Right	Q Left	Q Channel	Q Right	Flow Area L	Flow Area Ch	Flow Area R
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(sq ft)	(sq ft)	(sq ft)
1	-630	100 Yr	940.63	6.42	14.47	6.84	96.25	46.00	60.35	1293.66	4704.04	891.30	617.55	665.53	412.75
1	0	100 Yr	942.49	9.02	14.83	4.21	269.98	46.00	147.28	2032.78	4332.60	523.62	910.98	682.38	391.19
1	100 BR D	100 Yr	942.55	8.04	14.43	4.63	73.46	46.00	62.46	1286.15	5149.08	453.78	590.48	663.74	289.40
1	100 BR U	100 Yr	942.45	7.71	14.69	4.68	66.26	46.00	69.26	1069.51	5271.49	548.00	510.93	675.52	324.16
1	245	100 Yr	943.02	8.68	14.79	4.00	275.44	46.00	129.00	2424.93	3985.51	478.56	1206.53	680.50	400.35
1	395	100 Yr	941.02	0.71	9.50	2.61	8.13	43.00	56.17	8.01	6394.71	486.28	5.79	408.56	146.70
1	590	100 Yr	946.59	6.80	14.86	6.93	98.10	43.00	70.12	1258.41	4586.75	1043.84	591.33	639.12	486.26
1	690 BR D	100 Yr	946.74	6.83	14.69	6.75	67.28	43.00	66.43	967.42	4967.95	953.63	459.65	631.80	448.27
1	690 BR U	100 Yr	946.60	8.37	16.40	7.29	72.04	38.00	68.51	1214.24	4687.48	987.28	603.34	623.37	499.70
1	790	100 Yr	946.91	8.11	16.39	7.37	105.38	38.00	71.45	1583.59	4262.31	1043.11	746.12	622.87	526.81
1	1250	100 Yr	947.86	6.82	16.75	7.48	127.34	43.00	60.79	1642.56	4394.69	851.76	868.75	720.36	454.80

Section VIII
Appendix

LOCATION MAPS



NH000-0073-03(242) Cobb County
I-75 over Noonday Creek
PI# 714130



NH000-0073-03(242) Cobb County
I-75 over Noonday Creek
PI# 714130

NH000-0073-03(242) Cobb County
I-75 over Noonday Creek
PI# 714130

PROJECT PHOTOGRAPHS

Looking south along the upstream side of the northbound bridge.

Looking south along the upstream side of the northbound bridge.

Looking north along the upstream side of the northbound bridge.

Looking north along the upstream side of the northbound bridge. (flooding Sept. ’09)

Looking north along the upstream side of the northbound bridge.

Looking east at the northern end of the northbound bridge. Note Manholes.

Looking at the northwest corner of the northbound bridge (upstream).

Looking at the southwest corner of the northbound bridge (upstream).

Looking upstream from the northbound bridge.

Looking downstream from the northbound bridge.

Looking downstream from the northbound bridge.

Looking upstream from the downstream structure on George Busbee Parkway.