Hydraulic and Hydrological Study for I-575 Reversible lanes over Little River

NH000-0575-01(028)
Cherokee County, Georgia
PI No. 713640

November 2009

NO FEMA OR COMMUNITY COORDINATION REQUIRED

GEORGIA
REGISTERED
No. 27873
PROFESSIONAL
11-18-09
ENGINEER
JOHN K. McWHORTER III

Prepared by JBT for
Georgia Transportation Partners
Atlanta, Georgia

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Section I
Hydraulic/Hydrologic Report

November 2009

NH000-0575-01(028) Cherokee County
I-575 Reversible lanes over Little River (Lake Allatoona)
P.I. No. 713640

Introduction

J.B. Trimble, Inc. (JBT) prepared this report to provide engineering calculations showing that the proposed bridge widening at the crossing of I-575 over Little River in Cherokee County, Georgia will meet the Georgia Department of Transportation's (GDOT) hydraulic and hydrologic requirements. The project starts at the junction of I-75 and I-575 and continues to just north of Sixes Road. The widening at the Little River crossing consists of the northbound bridge of I-575.

Little River is a FEMA studied waterway upstream of the I-575 crossing. Since there is no established floodway at the site, no FEMA or community coordination is required. The design storm is the 50-year storm per the GDOT Drainage Design Manual for all interstate routes. The drainage area at the proposed crossing, obtained from the USGS quad maps for this area, is 142 square miles with a 50-year storm flow of 15,780 cfs and a 100-year storm flow of 18,250 cfs. The flows are calculated using the USGS Region 1 Rural Regression equations for Georgia.

HEC-2 data was obtained for Little River and a model was created and run using this data. The results from the HEC-2 models show a difference in the water surfaces between the HEC-RAS and HEC-2 models. This discrepancy is due to the difference in discharges between the models. The HEC-2 100-year discharges were 52% smaller than the discharges that were calculated using the USGS Region 1 Rural Regression equations. The HEC-2 data does show a no-rise between the existing and proposed models. Although not a project requirement, these models are included in the appendix of this report for reference.

The proposed construction at this crossing consists of widening the northbound bridge from 42'-0" to 60'- 2-1/2", gutter to gutter. Three new beams will be added to the median side of the bridge. The southbound bridge will remain untouched.

Incorporated in the hydraulic models is the latest research on expanded and contracted flow for locating exit and approach sections. These locations are based on channel slope, main channel and overbank Manning's "n" values and the ratio of the bridge opening to the floodplain width. This information is used to locate the exit and approach sections. This process is discussed in the *General Modeling Considerations* section in this report. HEC-RAS models were developed for this study. HEC-RAS version 4.0 was used for the study.

Hydraulic Site Visit

A hydraulic site visit was made at the crossing of I-575 over Little River on May 30, 2008. This crossing is within the backwaters of Lake Allatoona. The channel is approximately 115 feet wide and 13.5 feet deep at the existing bridge. The existing 445 ft long southbound bridge consists of five 89 ft long PSC beam spans. The existing 534 ft long northbound bridge consists of six 89 ft long PSC beam spans. Both bridges are slightly curved. The upstream and downstream floodplains outside of the limits of the river are wooded.

Procedure

JBT personnel visited and photographed the site. The drainage area and Manning's "n" values were determined and storm flows were calculated for this Region 1 site. HEC-RAS computer models were developed for the existing and proposed conditions using survey data and proposed roadway improvements.

General Modeling Considerations

As previously stated, this crossing is subjected to the abnormal floodstages created from Allatoona Dam. The 50-year and 100-year pool elevations of 861 feet and 862 feet, respectively,

were obtained from a previous study for GDOT project number BRSST-1375-00(006). This information was used as the basis for the "Abnormal Flood" condition. The "River Flood" condition was modeled using the slope obtained from the USGS quadrangle map.

In locating the approach and exit sections, new research detailed in the HEC-RAS Hydraulic Reference Manual, Version 3.1, dated November 2002, Appendix B is utilized. The expansion and contraction ratios used to locate the exit and approach sections are applicable to HEC-2, HEC-RAS and WSPRO models. The resulting coefficients are in the 1.2:1 to 1.6:1 range for expansion and 0.8:1 to 1.5:1 for contraction. These ranges were applied to the average floodplain constriction for both the proposed and existing conditions, yielding an expansion reach length range of 78 ft to 101 ft and a contraction reach length range of 50 ft to 94 ft. The actual approach section is located at river station 3, approximately 320 ft upstream of the roadway and the actual exit section is located at river station 0, approximately 310 ft downstream of the proposed bridge. The approach and exit sections were selected based on the geometry of the floodplain due to the low calculated expansion and contraction reach lengths.

The parallel bridges were modeled as one bridge due to the geometry of the crossing. The Little River flood stages do not reach the bridge deck or the end rolls of the bridge and thus there is little to no contraction of the flow. Since the widening of the bridge is occurring to the inside of the northbound structure, the existing and proposed models are the same.

Drainage Patterns

The velocities for the river floods were the main design criteria with regard to scour. The GDOT Bridge Hydraulics Office contacted the Atlanta Regional Office of the USGS to determine the likelihood of a 100-year flood event occurring while the lake was low (River Flood.) The response was that it was likely to occur. Correspondence on this issue is included in the Appendix.

Manning's "n" values for the project site were developed using methods described in the USGS publication, *Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Flood Plains,* by George J. Arcement, Jr. and Verne R. Schneider.

The existing and proposed channel velocities for the 50-year and 100-year river floods are 6.99 ft/s and 7.46 ft/s, respectively. The associated backwaters for the existing and proposed conditions during the 50-year and 100-year river floods are 0.16 ft. and 0.17 ft., respectively. The 100-year backwater for the abnormal flood condition is 0.08 ft, which is acceptable. The abnormal flood stage elevations are much higher and therefore are the controlling values for clearance. The maximum calculated pier plus contraction scour depth is 17.6 ft for the 100-year river flood. See the Hydraulic Tables in Section 2 of the report for additional hydraulic data pertaining to the abnormal floodstages.

Guide bank calculations were not performed due to the presence of Lake Allatoona. Riprap calculations were performed in accordance with the procedures outlined in Hydraulic Engineering Circular No. 23 *Bridge Scour and Stream Instability Countermeasures*. GDOT Type I riprap 24-inches thick is specified here.

Summary

The appropriate GDOT hydraulic and hydrological procedures were used in this study's development. The proposed bridge meets current Georgia Department of Transportation requirements. Little River is a FEMA studied waterway upstream of the crossing. Since no regulatory floodway exists at the study site, no FEMA or community coordination is required. The proposed bridge design only includes widening to the inside of the northbound bridge. Velocity values for the creek floods were found to be inside of the acceptable range.

References

JBT utilized the following for this study:

- The Current Georgia Department of Transportation Drainage Manual for Highways with Supplemental guidelines for Hydraulic and Hydrological Studies.

- The United States Geological Survey (USGS) publication, *Techniques for Estimating Magnitude and Frequency of Floods in Rural Basins of Georgia*--1993, Water Resources Investigations Report 93-4016.

- Hydrologic Engineering Center (HEC) River Analysis System (HEC-RAS), Water-Surface Computational Model Version 3.1.3, dated May 2005.

- Hydrologic Engineering Center (HEC) River Analysis System (HEC-RAS) Users Manual Version 3.1, dated November 2002.

- Hydrologic Engineering Center (HEC) River Analysis System (HEC-RAS) Hydraulic Reference Manual Version 3.1, dated November 2002.

- Hydraulic Engineering Circular No. 18 (HEC-18) *Evaluating Scour at Bridges,* (FHWA-NHI-01-001), dated May 2001, Fourth Edition.

- Hydraulic Engineering Circular No. 20 (HEC-20) *Stream Stability at Highway Structures* (FHWA-NHI-01-002) dated March 2001, Third Edition.

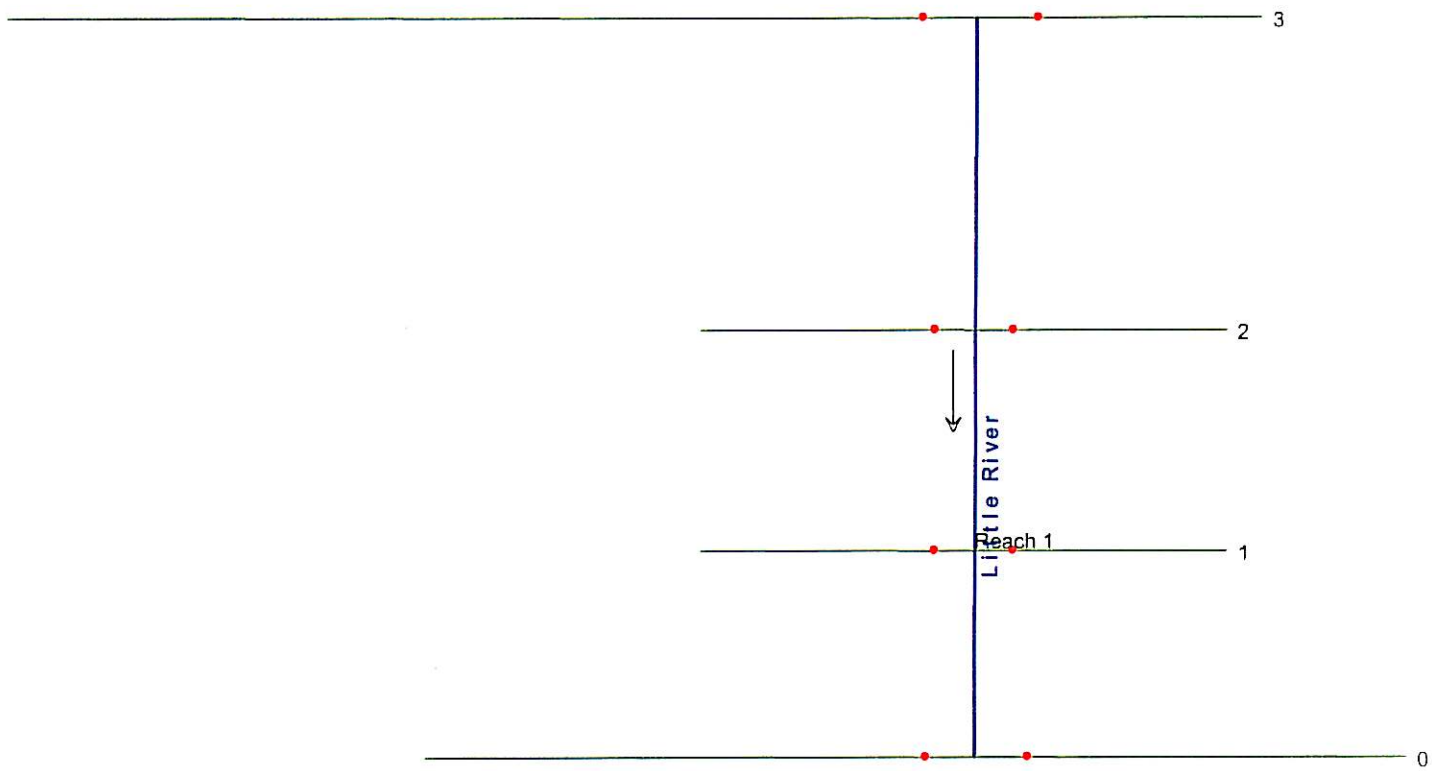
- Hydraulic Engineering Circular No. 23 (HEC-23) *Bridge Scour and Stream Instability Countermeasures* (FHWA-NHI-01-003) dated March 2001, Second Edition.

- The United States Geological Survey (USGS) publication, *Roughness Characteristics of Natural Channels,* Harry H. Barnes, Jr.—1987 (3rd Printing), Water-Supply Paper 1849.

- The United States Geological Survey (USGS) publication, *Guide for selecting Manning's Roughness Coefficients for Natural Channels and Flood Plains,* George J. Arcement, Jr., and Verne R. Schneider—1992 (2nd Printing); Water-Supply Paper 2339.

- *Computer Assisted Floodplain Hydrology & Hydraulics*, Daniel H. Hoggan, McGraw-Hill, New York, 1989.

HEC-RAS PLOTS


3
2
Little River
Reach 1
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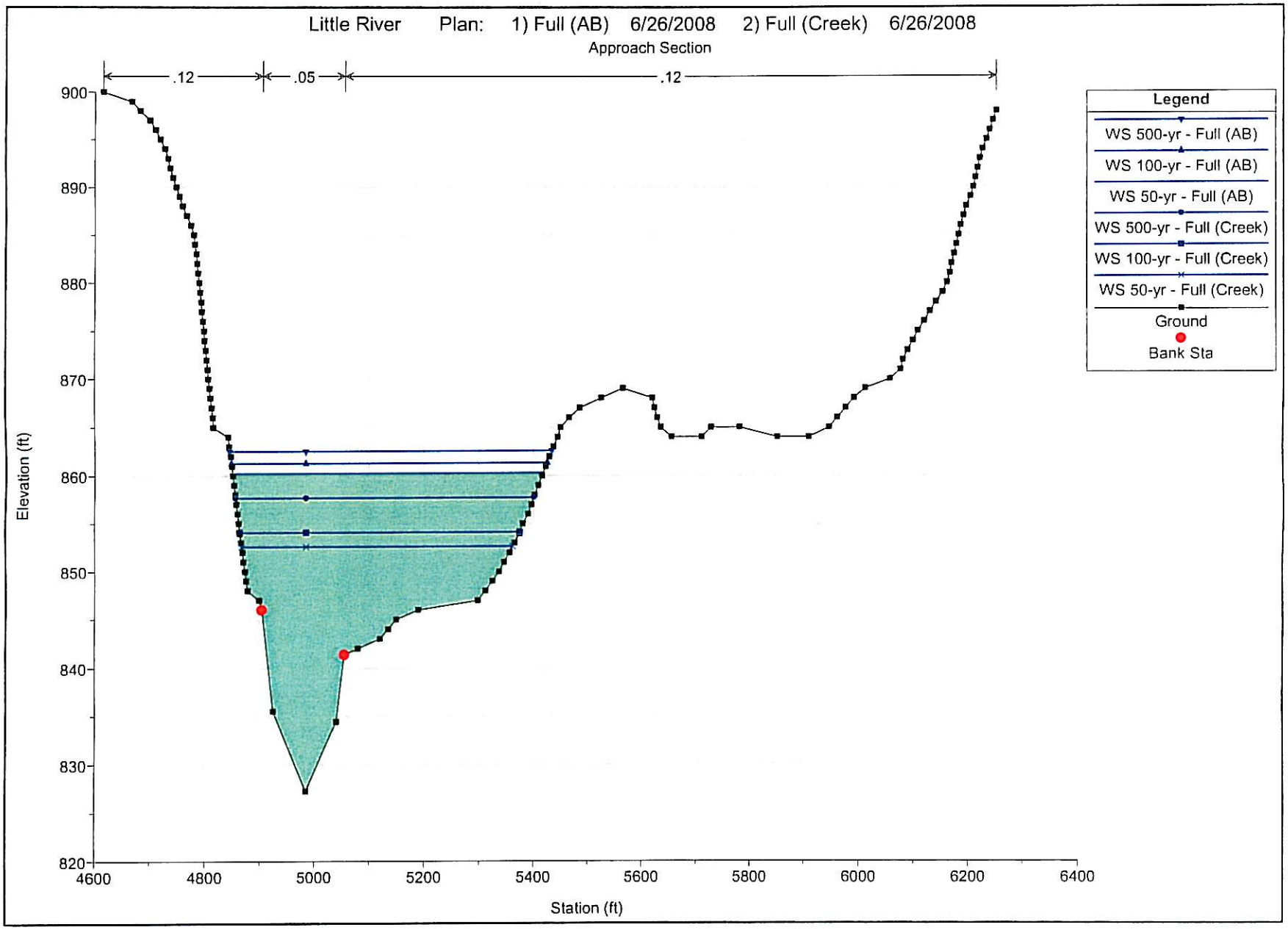
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Approach Section
.12
.05
.12
Legend
WS 500-yr - Full (AB)
WS 100-yr - Full (AB)
WS 50-yr - Full (AB)
WS 500-yr - Full (Creek)
WS 100-yr - Full (Creek)
WS 50-yr - Full (Creek)
Ground
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Elevation (ft)
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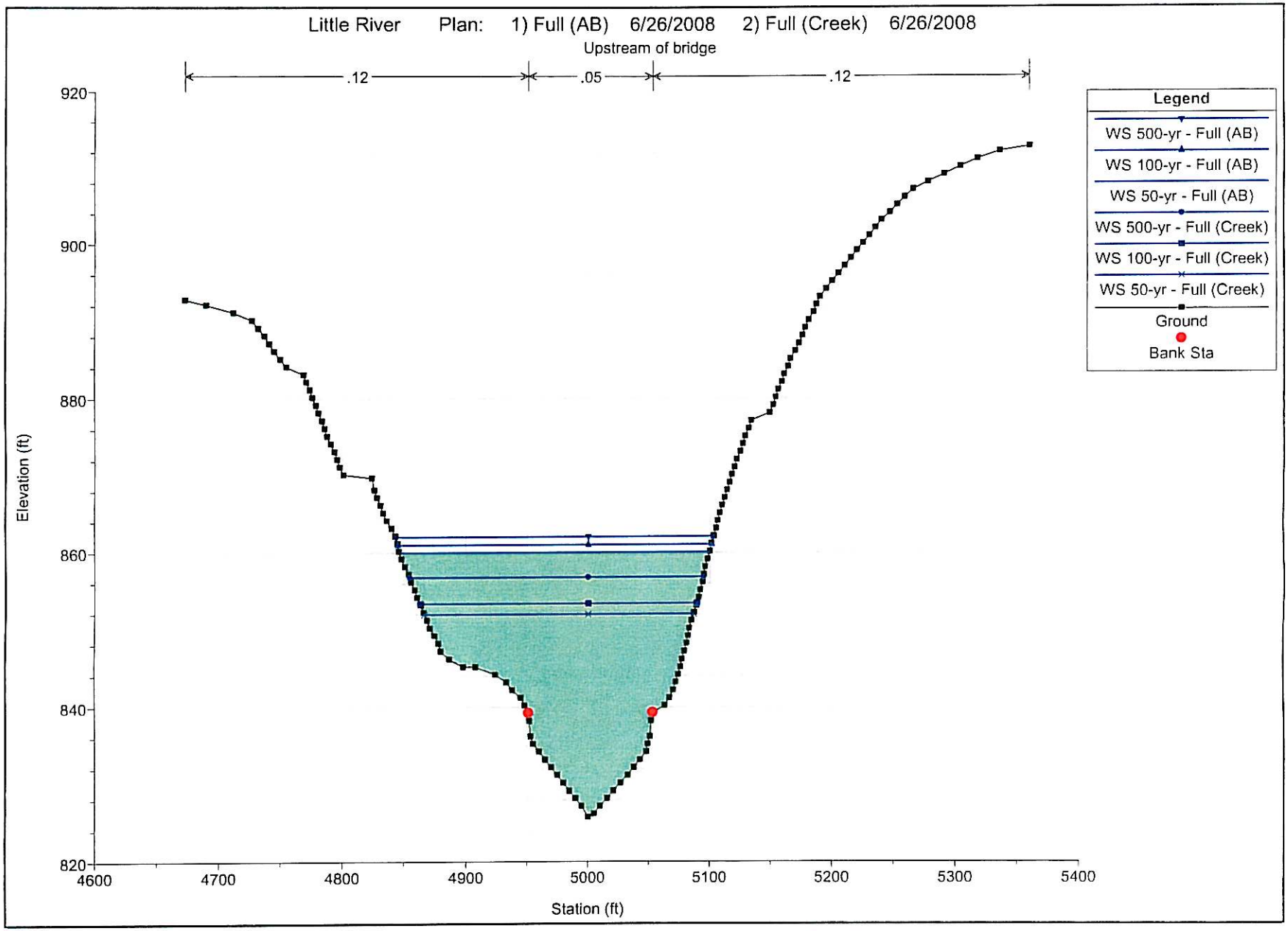
6200
6400
Station (ft)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Upstream of bridge
.12
.05
.12
Legend
WS 500-yr - Full (AB)
WS 100-yr - Full (AB)
WS 50-yr - Full (AB)
WS 500-yr - Full (Creek)
WS 100-yr - Full (Creek)
WS 50-yr - Full (Creek)
Ground
Bank Sta
Elevation (ft)
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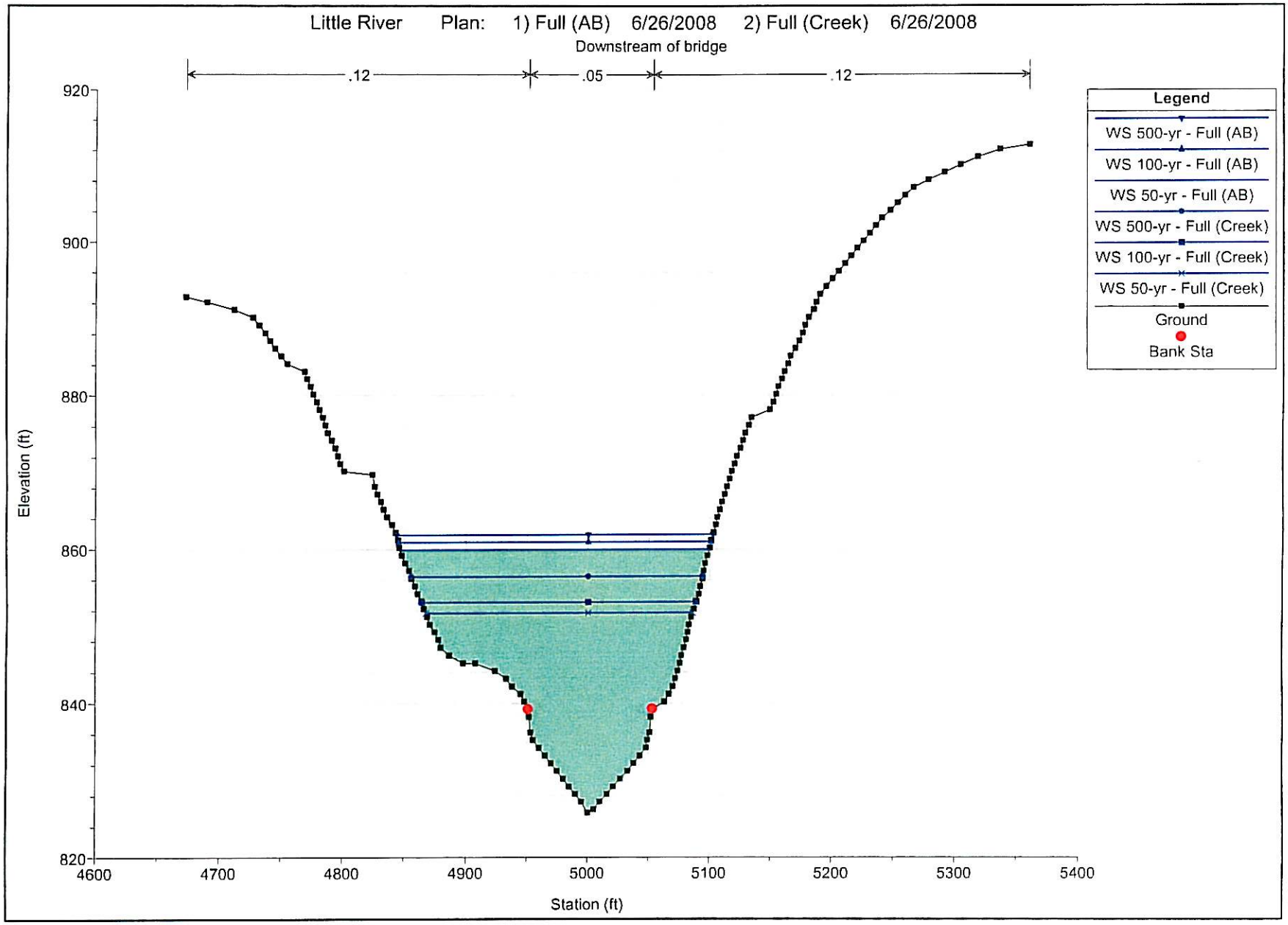
Station (ft)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Downstream of bridge
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Legend
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WS 100-yr - Full (AB)
WS 50-yr - Full (AB)
WS 500-yr - Full (Creek)
WS 100-yr - Full (Creek)
WS 50-yr - Full (Creek)
Ground
Bank Sta
Elevation (ft)
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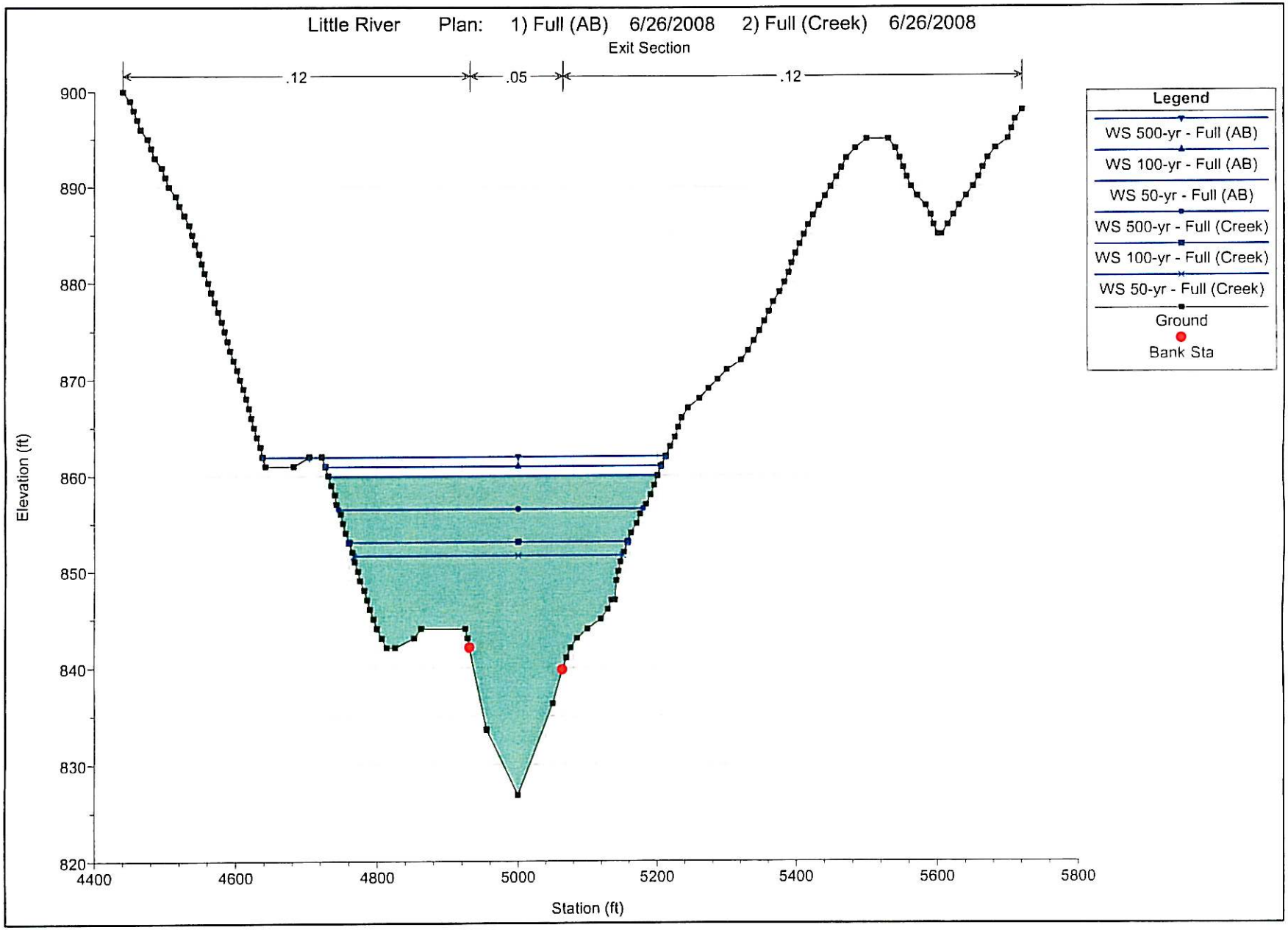
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Exit Section
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.05
.12
Legend
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WS 100-yr - Full (AB)
WS 50-yr - Full (AB)
WS 500-yr - Full (Creek)
WS 100-yr - Full (Creek)
WS 50-yr - Full (Creek)
Ground
Bank Sta
Elevation (ft)
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890
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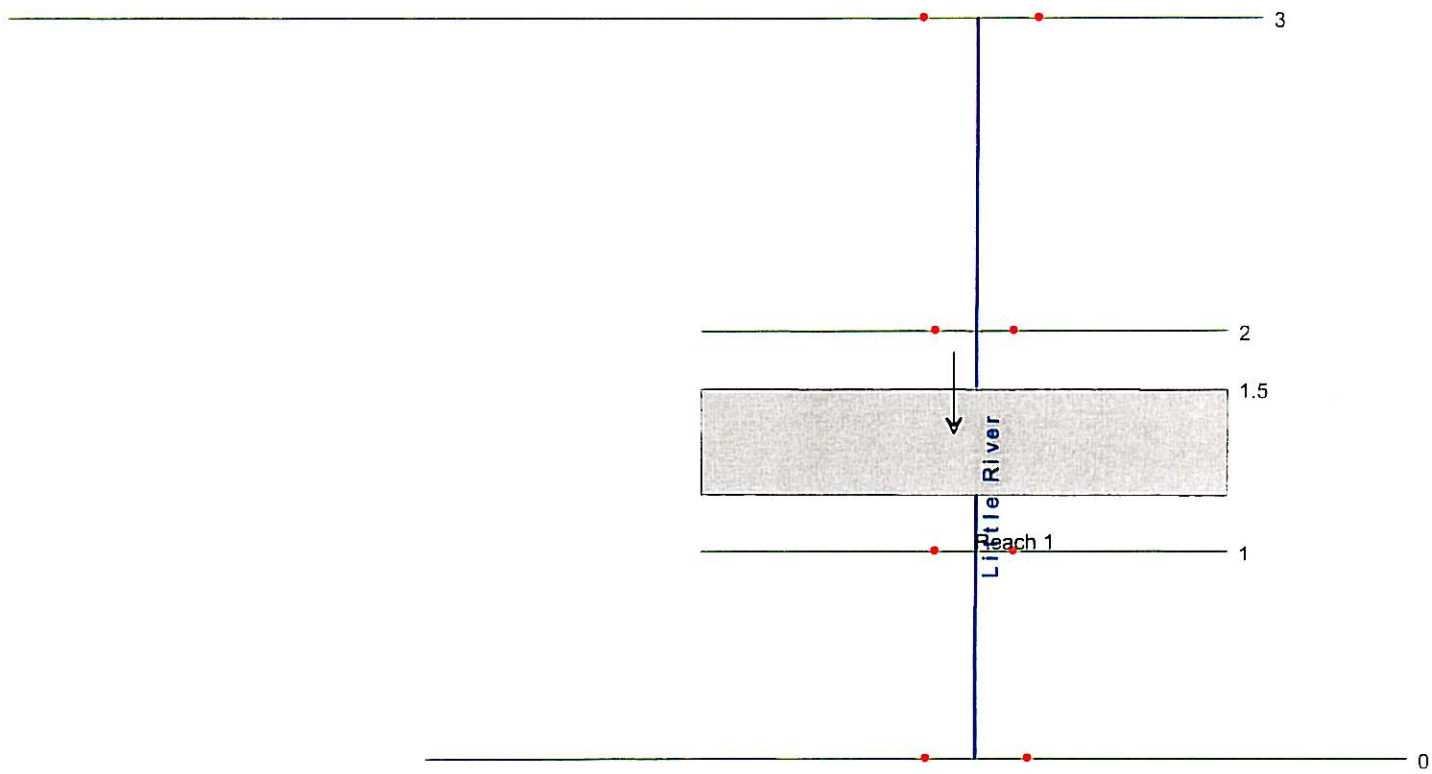
Station (ft)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Little River
Reach 1
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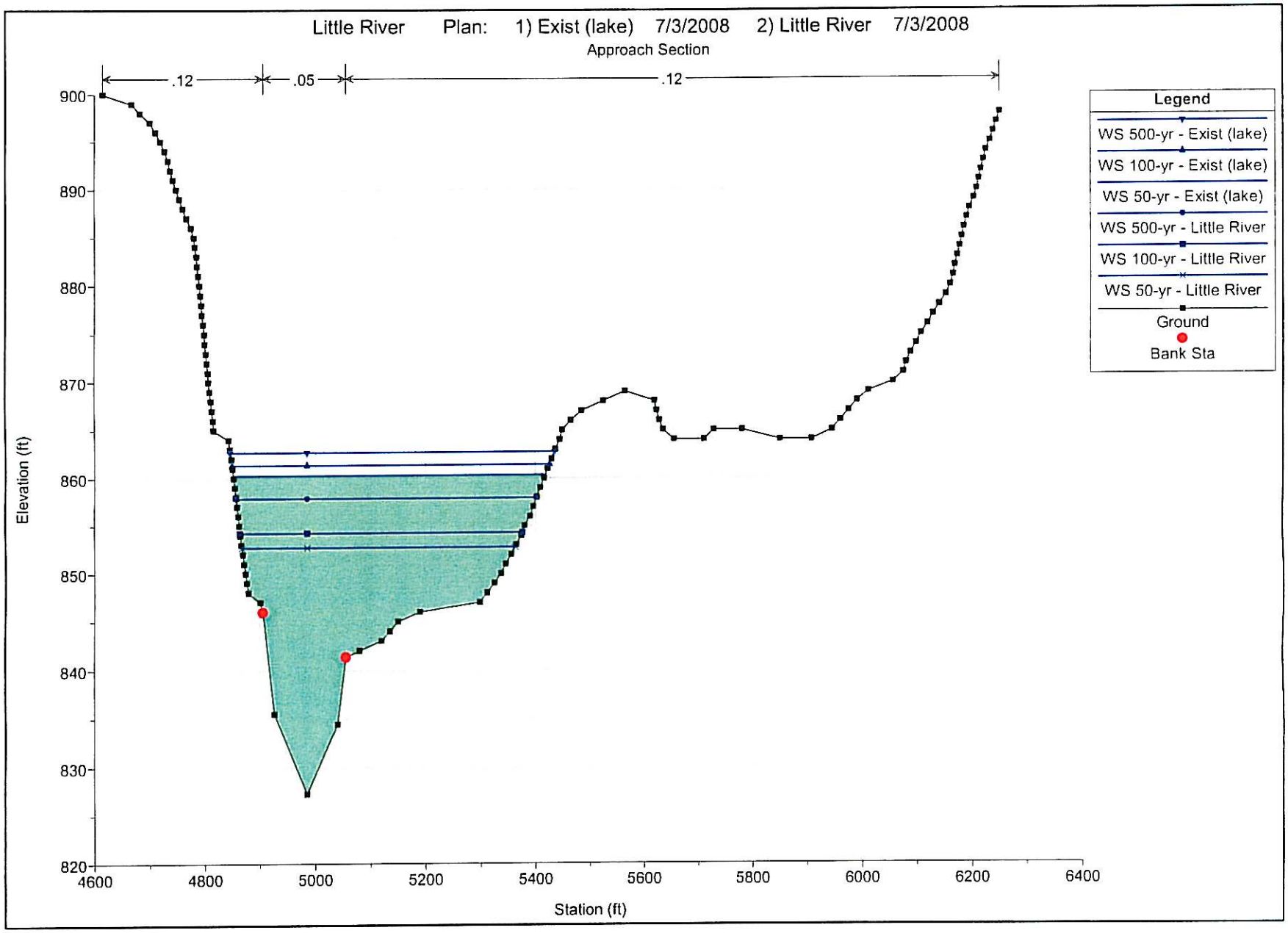
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Approach Section
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.05
.12
Legend
WS 500-yr - Exist (lake)
WS 100-yr - Exist (lake)
WS 50-yr - Exist (lake)
WS 500-yr - Little River
WS 100-yr - Little River
WS 50-yr - Little River
Ground
Bank Sta
Elevation (ft)
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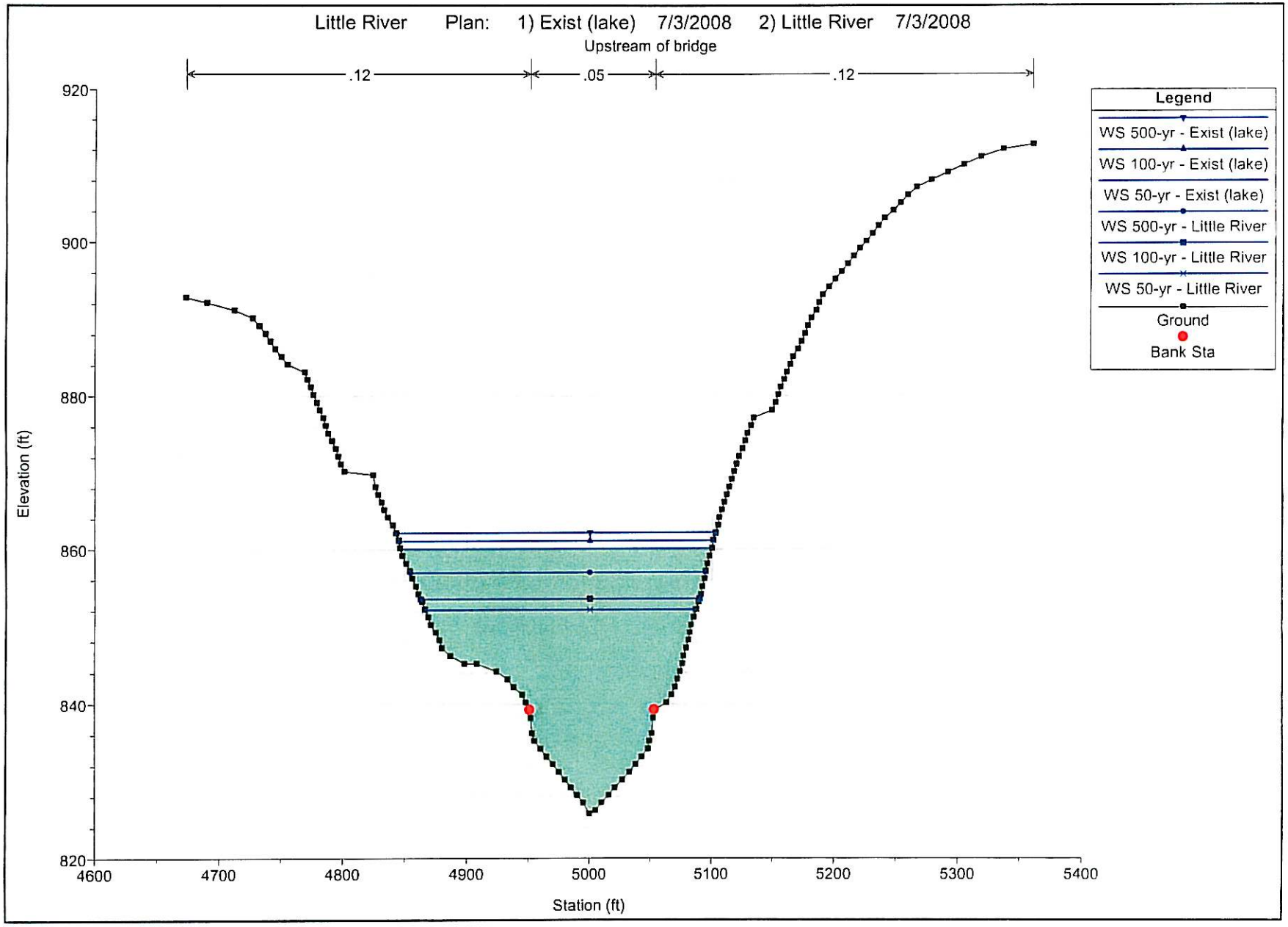
Station (ft)


Little River Plan: 1) Exist (lake) 7/3/2008 2) Little River 7/3/2008
Upstream of bridge
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Legend
WS 500-yr - Exist (lake)
WS 100-yr - Exist (lake)
WS 50-yr - Exist (lake)
WS 500-yr - Little River
WS 100-yr - Little River
WS 50-yr - Little River
Ground
Bank Sta
Elevation (ft)
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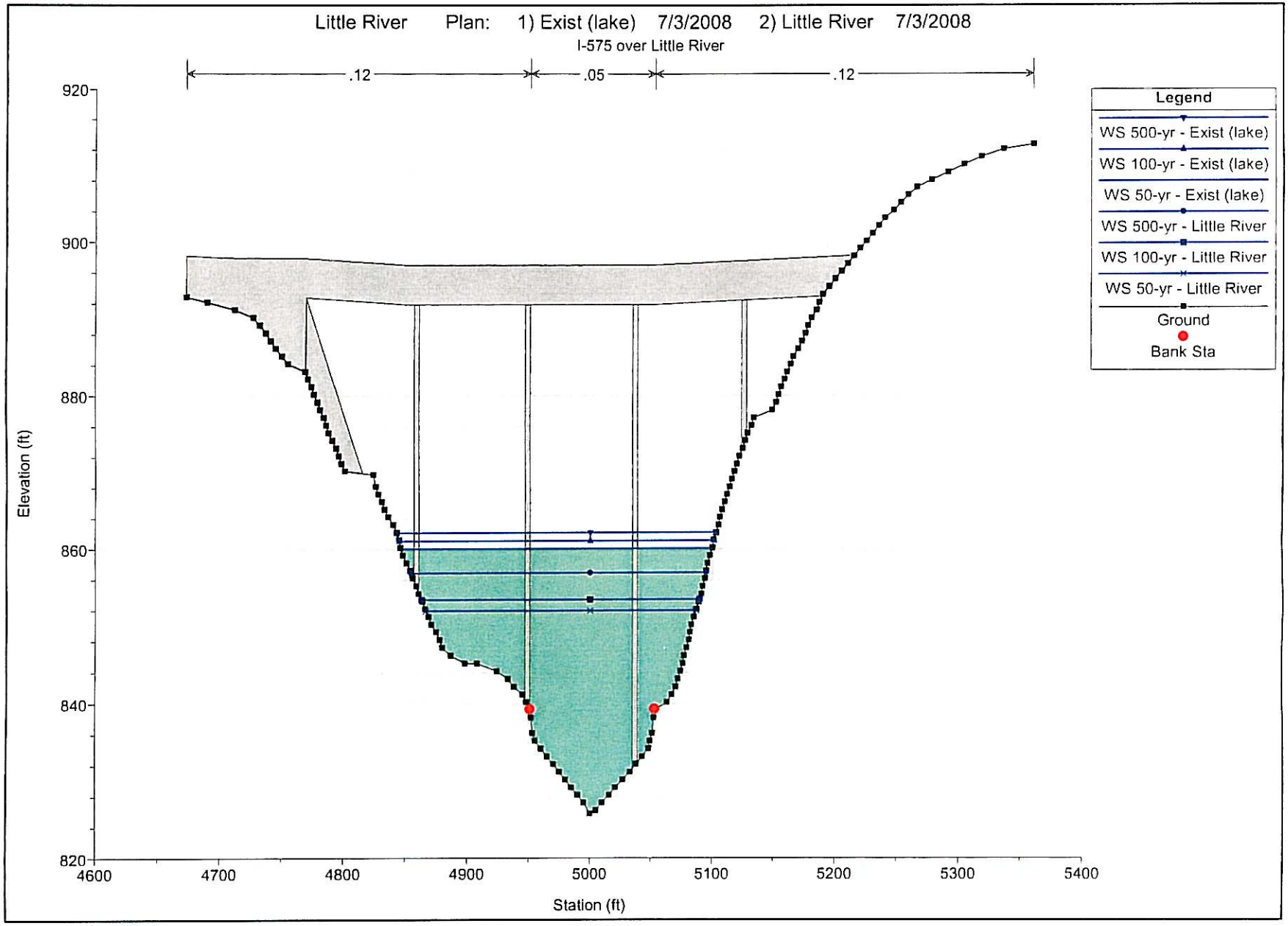
Station (ft)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I-575 over Little River
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Legend
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WS 100-yr - Exist (lake)
WS 50-yr - Exist (lake)
WS 500-yr - Little River
WS 100-yr - Little River
WS 50-yr - Little River
Ground
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Elevation (ft)
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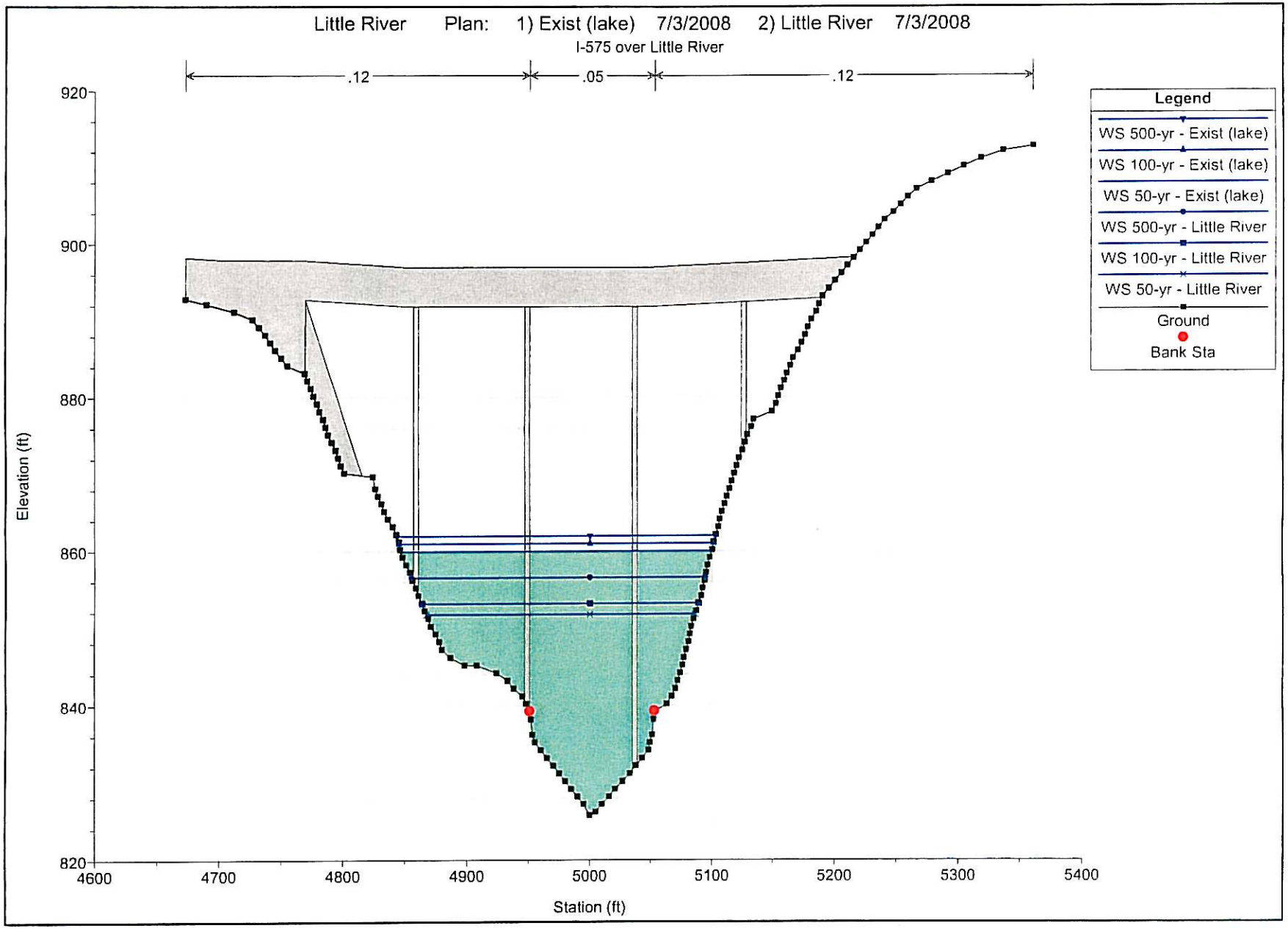
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I-575 over Little River
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Legend
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WS 100-yr - Exist (lake)
WS 50-yr - Exist (lake)
WS 500-yr - Little River
WS 100-yr - Little River
WS 50-yr - Little River
Ground
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Elevation (ft)
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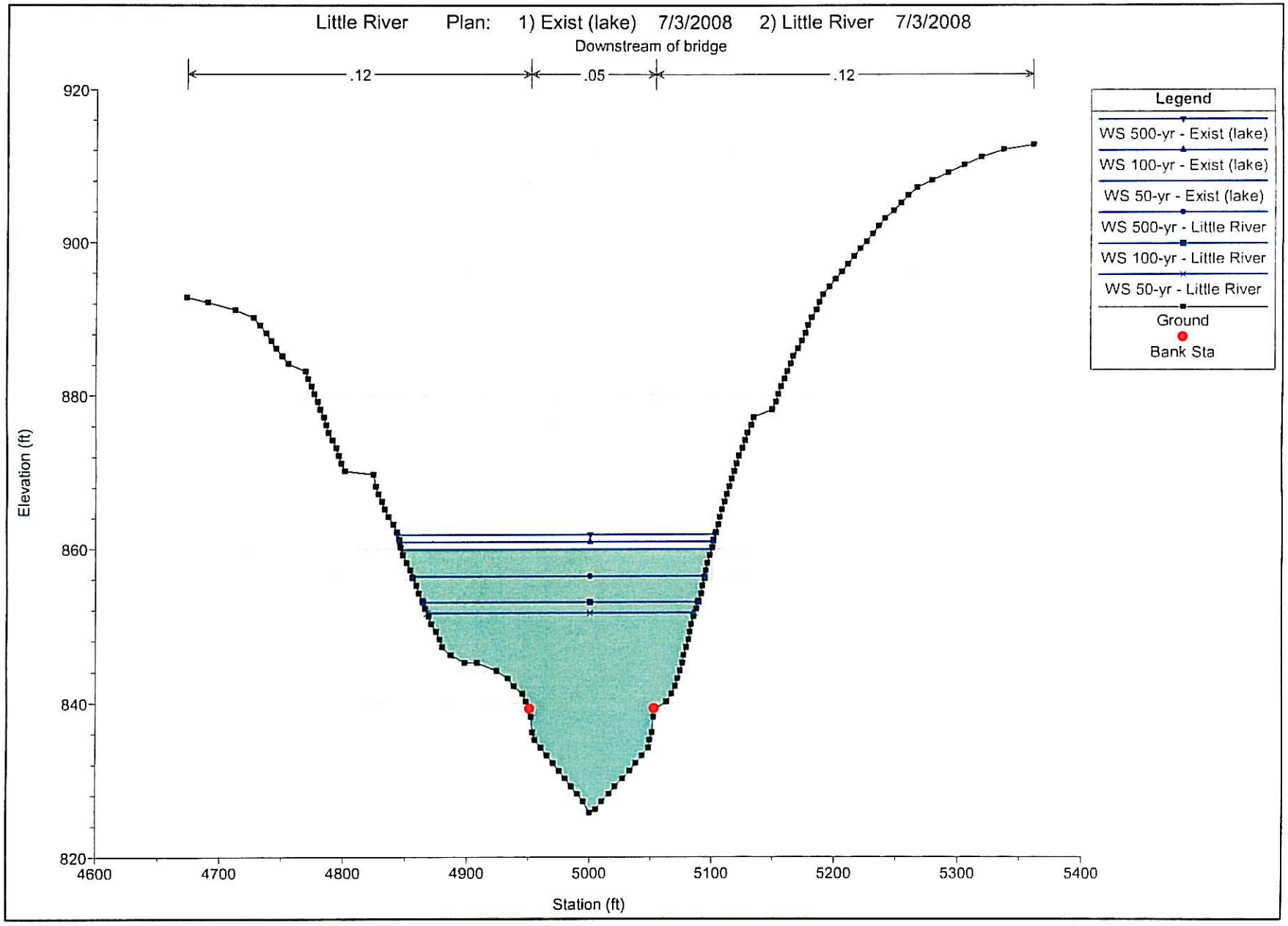
Station (ft)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Downstream of bridge
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Legend
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WS 100-yr - Exist (lake)
WS 50-yr - Exist (lake)
WS 500-yr - Little River
WS 100-yr - Little River
WS 50-yr - Little River
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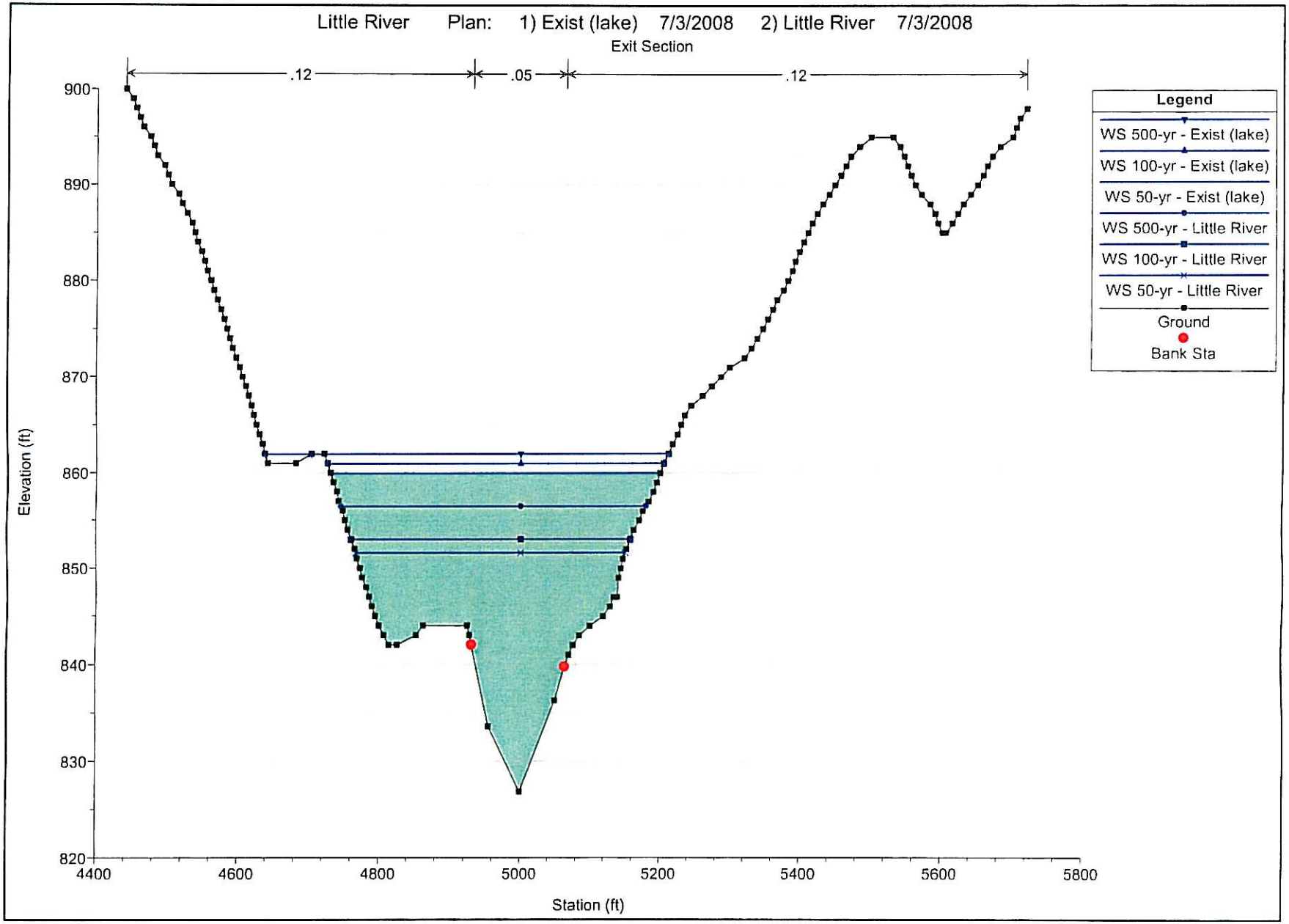
Little River Plan: 1) Exist (lake) 7/3/2008 2) Little River 7/3/2008
Exit Section
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Legend
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WS 100-yr - Exist (lake)
WS 50-yr - Exist (lake)
WS 500-yr - Little River
WS 100-yr - Little River
WS 50-yr - Little River
Ground
Bank Sta
Elevation (ft)
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Station (ft)

Section II
Hydraulic Tables

RIVER FLOODS

HYDRAULIC TABLE (50-YEAR STORM)

River Floods
NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640

	FULL VALLEY CONDITIONS	***EXISTING / PROPOSED CONDITIONS***
FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	851.65	852.13
FLOODSTAGE ELEVATION APPROACH SECTION (ft)	852.62	852.78
AREA OF OPENING UNDER FLOODSTAGE (ft^2)	-	2846
DISCHARGE THROUGH BRIDGE (cfs)	-	15780
DISCHARGE OVER ROADWAY (cfs)	-	0
CHANNEL VELOCITY (ft/s)	6.85	6.99
MEAN VELOCITY (ft/s)	5.33	5.55
2-YEAR FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	843.85	843.67
BACKWATER HEIGHT (ft)	-	0.16

HYDRAULIC TABLE (100-YEAR STORM)

River Floods
NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640

	FULL VALLEY CONDITIONS	***EXISTING / PROPOSED CONDITIONS***
FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	853.37	853.56
FLOODSTAGE ELEVATION APPROACH SECTION (ft)	854.12	854.29
AREA OF OPENING UNDER FLOODSTAGE (ft^2)	-	3145
DISCHARGE THROUGH BRIDGE (cfs)	-	18250
DISCHARGE OVER ROADWAY (cfs)	-	0
CHANNEL VELOCITY (ft/s)	7.33	7.46
MEAN VELOCITY (ft/s)	5.58	5.80
2-YEAR FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	843.85	843.67
BACKWATER HEIGHT (ft)	-	0.17

HYDRAULIC TABLE (500-YEAR STORM)

River Floods
NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640

	FULL VALLEY CONDITIONS	***EXISTING / PROPOSED CONDITIONS***
FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	856.77	857.00
FLOODSTAGE ELEVATION APPROACH SECTION (ft)	857.72	857.92
AREA OF OPENING UNDER FLOODSTAGE (ft^2)	-	3901
DISCHARGE THROUGH BRIDGE (cfs)	-	24913
DISCHARGE OVER ROADWAY (cfs)	-	0
CHANNEL VELOCITY (ft/s)	8.45	8.48
MEAN VELOCITY (ft/s)	6.15	6.39
2-YEAR FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	843.85	843.67
BACKWATER HEIGHT (ft)	-	0.20

NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640

Proposed bridge
River Floods

MIN PROFILE GRADE ELEVATION	895.77
DEPTH OF CROSS SLOPE	-0.69
DEPTH OF SLAB AND BEAM	5.51
BOTTOM OF BEAM ELEVATION	890.95
MINIMUM BOTTOM OF BEAM ELEVATION	890.95
50 YEAR FLOODSTAGE ELEVATION*	852.13
CLEARANCE	38.82
MINIMUM BOTTOM OF BEAM ELEVATION	890.95
100 YEAR FLOODSTAGE ELEVATION*	853.56
CLEARANCE	37.39

*Floodstage taken from proposed conditions model.

ABNORMAL FLOODS

HYDRAULIC TABLE (50-YEAR STORM)

Abnormal Floods
NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640

	FULL VALLEY CONDITIONS	***EXISTING / PROPOSED CONDITIONS***
FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	860.04	860.10
FLOODSTAGE ELEVATION APPROACH SECTION (ft)	860.31	860.37
AREA OF OPENING UNDER FLOODSTAGE (ft^2)	-	4705
DISCHARGE THROUGH BRIDGE (cfs)	-	15780
DISCHARGE OVER ROADWAY (cfs)	-	0
CHANNEL VELOCITY (ft/s)	4.58	4.56
MEAN VELOCITY (ft/s)	3.21	3.35
2-YEAR FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	*****	*****
BACKWATER HEIGHT (ft)	-	0.06

HYDRAULIC TABLE (100-YEAR STORM)

Abnormal Floods
NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640

	FULL VALLEY CONDITIONS	***EXISTING / PROPOSED CONDITIONS***
FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	861.04	861.12
FLOODSTAGE ELEVATION APPROACH SECTION (ft)	861.37	861.45
AREA OF OPENING UNDER FLOODSTAGE (ft^2)	-	4945
DISCHARGE THROUGH BRIDGE (cfs)	-	18250
DISCHARGE OVER ROADWAY (cfs)	-	0
CHANNEL VELOCITY (ft/s)	5.08	5.05
MEAN VELOCITY (ft/s)	3.53	3.69
2-YEAR FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	*****	*****
BACKWATER HEIGHT (ft)	-	0.08

HYDRAULIC TABLE (500-YEAR STORM)

Abnormal Floods
NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640

	FULL VALLEY CONDITIONS	***EXISTING / PROPOSED CONDITIONS***
FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	862.06	862.19
FLOODSTAGE ELEVATION APPROACH SECTION (ft)	862.62	862.75
AREA OF OPENING UNDER FLOODSTAGE (ft^2)	-	5187
DISCHARGE THROUGH BRIDGE (cfs)	-	24913
DISCHARGE OVER ROADWAY (cfs)	-	0
CHANNEL VELOCITY (ft/s)	6.68	6.61
MEAN VELOCITY (ft/s)	4.60	4.80
2-YEAR FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	*****	*****
BACKWATER HEIGHT (ft)	-	0.13

NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640

Proposed bridge
Abnormal Flood

MIN PROFILE GRADE ELEVATION	895.77
DEPTH OF CROSS SLOPE	-0.69
DEPTH OF SLAB AND BEAM	5.51
BOTTOM OF BEAM ELEVATION	890.95
MINIMUM BOTTOM OF BEAM ELEVATION	890.95
50 YEAR FLOODSTAGE ELEVATION*	860.10
CLEARANCE	30.85
MINIMUM BOTTOM OF BEAM ELEVATION	890.95
100 YEAR FLOODSTAGE ELEVATION*	861.12
CLEARANCE	29.83

*Floodstage taken from proposed conditions model.

Section III
Peak Flow Summary

NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640

Drainage Area (sq. mi.)	142.0
Region No.	1
Impervious Area (%)	0
USGS Gage No.	N/A
Drainage Area @ Gage	
Q2	
Q5	
Q10	
Q25	
Q50	
Q100	
Q500	

Discharge (cfs)

	Regional	Urbanized	Qu(w) Weighted Discharge
Q2	5291	0	0
Q5	8183	0	0
Q10	10359	0	0
Q25	13354	0	0
Q50	15780	0	0
Q100	18250	0	0
Q500	24913	0	0

<u>Hydraulic Slope Calculation</u>
Based on USGS quad

Upstream Elevation =	860
Downstream Elevation =	840
Horizontal Distance =	25510

Slope = 0.00078 ft/ft
4.14 ft/mi

/Index number applies to figures 19A & 19B/

INDEX NO.	STREAM	TRIBUTARY TO	LOCATION	DRAINAGE AREA (SQ. MI.)
106A	Little River	Etowah River	Cherokee County, lat 34°07', long 84°30', at State Highway 5, 1¾ miles north of Woodstock	137
106C	Little River	Etowah River	Cherokee County, lat 34°08', long 84°31', at junction with Allatoona Reservoir	139
106B	Noonday Creek	Little River	Cobb County, lat 34°00', long 84°36', at State Highway 3, 4 miles northwest of Marietta	4.1
107	Noonday Creek	Little River	USGS Gaging Station 1939; Noonday Creek near Woodstock, Ga. Cherokee County, lat 34°05', long 84°32', at county road, 1¼ miles southwest of Woodstock	42.8
107A	Noonday Creek	Little River	Cherokee County, lat 34°08', long 84°33', at junction with Allatoona Reservoir	50
106D	Little River	Etowah River	Cherokee County, lat 34°10', long 84°36', at confluence of Little River arm of Allatoona Reservoir with main Reservoir	210
111	Stamp Creek	Etowah River	Bartow County, lat 34°14', long 84°41', near county road, 8 miles northeast of Cartersville	16.2
111A	Proctor Creek	Etowah River	Cobb County, lat 34°02', long 84°40', at State Highway 3, 3 miles west of Kennesaw	7.9
112A	Allatoona Creek	Etowah River	Cobb County, lat 34°02', long 80°43', at junction with Allatoona Reservoir	28
113	Tanyard Creek	Allatoona Creek (Arm of Reservoir)	Cobb County, lat 34°04', long 84°41', at State Highway 92, at Acworth	2.19
114A	Etowah River	Coosa River	Bartow County, lat 34°10', long 84°44', at Allatoona Dam, 4 miles east of Cartersville	1,110

FROM THE USGS PUBLICATION - "DRAINAGE AREA DATA FOR GEORGIA STREAMS"

USGS
science for a changing world

Water Resources Data
Georgia
Water Year 1998

Water-Data Report GA-98-1

.. Department of the Interior
.S. Geological Survey

Prepared in cooperation with the
State of Georgia
and with other agencies

LAKES AND RESERVOIRS IN MOBILE RIVER BASIN--Continued

02393500 ALLATOONA RESERVOIR NEAR CARTERSVILLE, GA.

LOCATION.--Lat 34°09'46", long 84°43'40", Bartow County, Hydrologic Unit 03150104, at forebay of dam on Etowah River, 2.8 mi upstream from Nashville, Chattanooga, & St. Louis Railway bridge, 4 mi east of Cartersville, and 6 mi upstream from Pumpkinvine Creek.
DRAINAGE AREA.--1,120 mi^2.
PERIOD OF RECORD.--December 1949 to current year.
REVISED RECORDS.--WRD GA-80-1: Drainage area.
GAGE.--Water-stage recorder. Datum of gage is at sea level (levels by U.S. Army Corps of Engineers).
REMARKS.--Lake is formed by concrete gravity dam. Spillway (crest elevation, 835.0 ft) is equipped with nine tainter gates 40 ft wide by 25 ft high. There are four sluices 5.67 ft by 10 ft high and one sluice 4.0 ft in diameter. Storage began Dec. 27, 1949; water in lake first reached minimum pool elevation Feb. 5, 1950. Total capacity at elevation 860.0 ft, top of gates, is 670,000 acre-ft, of which 587,100 acre-ft is controlled storage above 800 ft, minimum pool. Lake is used for flood control and power. Records furnished by U.S. Army Corps of Engineers.
EXTREMES FOR PERIOD OF RECORD: Maximum contents, 693,800 acre-ft Apr. 10, 1964, elevation, 861.19 ft; minimum, 119,600 acre-ft Dec. 4, 1954, elevation, 809.34 ft
EXTREMES FOR CURRENT YEAR: Maximum contents, 907,800 acre-ft Oct. 28, elevation, 843.27 ft; minimum, 200,800 acre-ft Dec. 17, elevation, 822.74 ft.

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in cubic feet per second)
Sept. 30	839.56	362300	-	-
Oct. 31	841.22	382200	+19900	+324
Nov. 30	827.51	239500	-142700	-2398
Dec. 31	825.38	221600	-17900	-291
CAL YR 1997	-	-	+15200	+21
Jan. 31	827.18	236600	+15000	+244
Feb. 28	833.36	294500	+57900	+1043
Mar. 31	838.33	348100	+53600	+872
Apr. 30	841.73	388400	+40300	+677
May 31	841.84	389800	+1400	+23
June 30	840.66	375400	-14400	-242
July 31	839.03	356100	-19300	-314
Aug. 31	837.43	337900	-18200	-296
Sept. 30	832.58	286700	-51200	-860
WTR YR 1998	-	-	-75600	-104

Expansion and Contraction Reach Length Computation

NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640
River Flows

Expansion Reach Length Computation

b - bridge opening width	451.7	
B - floodplain width	539.33	
b/B	**0.84**	
(B-b)/2 avg. obs. Length	43.815	
n(ob)	0.12	
n(mc)	0.05	
n(ob)/n(mc)	**2.40**	
S (ft/ft)	0.0007	
S (ft/mile)	**3.70**	
Er-Exp. rate from chart	1.2	1.6
Exp. Reach Length	**52.578**	**70.104**

Ranges of Expansion Ratios

		n(ob)/n(mc)=1	n(ob)/n(mc)=2	n(ob)/n(mc)=4
b/B=0.10	**S=1 ft/mile**	1.4-3.6	1.3-3.0	1.2-2.1
	5 ft/mile	1.0-2.5	0.8-2.0	0.8-2.0
	10 ft/mile	1.0-2.2	0.8-2.0	0.8-2.0
b/B=0.25	**S=1 ft/mile**	1.6-3.0	1.4-2.5	1.2-2.0
	5 ft/mile	1.5-2.5	1.3-2.0	1.3-2.0
	10 ft/mile	1.5-2.0	1.3-2.0	1.3-2.0
b/B=0.50	**S=1 ft/mile**	1.4-2.6	1.3-1.9	1.2-1.4
	5 ft/mile	1.3-2.1	1.2-1.6	1.0-1.4
	10 ft/mile	1.3-2.0	1.2-1.5	1.0-1.4

Contraction Reach Length Computation

Cr-Contr. rate from chart	0.8	1.5
Contr. Reach Length	**35.052**	**65.7225**

Ranges of Contraction Ratios

	n(ob)/n(mc)=1	n(ob)/n(mc)=2	n(ob)/n(mc)=4
S=1 ft/mile	1.0-2.3	0.8-1.7	0.7-1.3
5 ft/mile	1.0-1.9	0.8-1.5	0.7-1.2
10 ft/mile	1.0-1.9	0.8-1.4	0.7-1.2

Reference : Hydrologic Engineering Center (HEC) Research Document No. 42 ***Flow Transitions in Bridge Backwater Analysis*** , John H. Hunt and Gary Brunner, dated September 1995.

Expansion and Contraction Reach Length Computation

NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640
Abnormal Flood

Expansion Reach Length Computation

b - bridge opening width	451.7	
B - floodplain width	578.82	
b/B	**0.78**	
(B-b)/2 avg. obs. Length	63.56	
n(ob)	0.12	
n(mc)	0.05	
n(ob)/n(mc)	**2.40**	
S (ft/ft)	0.0007	
S (ft/mile)	**3.70**	
Er-Exp. rate from chart	1.2	1.6
Exp. Reach Length	**76.272**	**101.696**

Ranges of Expansion Ratios

		n(ob)/n(mc)=1	n(ob)/n(mc)=2	n(ob)/n(mc)=4
b/B=0.10	**S=1 ft/mile**	1.4-3.6	1.3-3.0	1.2-2.1
	5 ft/mile	1.0-2.5	0.8-2.0	0.8-2.0
	10 ft/mile	1.0-2.2	0.8-2.0	0.8-2.0
b/B=0.25	**S=1 ft/mile**	1.6-3.0	1.4-2.5	1.2-2.0
	5 ft/mile	1.5-2.5	1.3-2.0	1.3-2.0
	10 ft/mile	1.5-2.0	1.3-2.0	1.3-2.0
b/B=0.50	**S=1 ft/mile**	1.4-2.6	1.3-1.9	1.2-1.4
	5 ft/mile	1.3-2.1	1.2-1.6	1.0-1.4
	10 ft/mile	1.3-2.0	1.2-1.5	1.0-1.4

Contraction Reach Length Computation

Cr-Contr. rate from chart	0.8	1.5
Contr. Reach Length	**50.848**	**95.34**

Ranges of Contraction Ratios

	n(ob)/n(mc)=1	n(ob)/n(mc)=2	n(ob)/n(mc)=4
S=1 ft/mile	1.0-2.3	0.8-1.7	0.7-1.3
5 ft/mile	1.0-1.9	0.8-1.5	0.7-1.2
10 ft/mile	1.0-1.9	0.8-1.4	0.7-1.2

Reference : Hydrologic Engineering Center (HEC) Research Document No. 42 ***Flow Transitions in Bridge Backwater Analysis*** , John H. Hunt and Gary Brunner, dated September 1995.

Section IV
Hydraulic Engineering Field Data

HYDRAULIC ENGINEERING FIELD REPORT

I. Hydraulic and Hydrologic Data Required for all Bridge Stream Crossing Projects. See Appendix A of the Georgia DOT Drainage Manual for required survey information.

A. Project Location

Location Description:	**I-575 over Little River/Lake Allatoona**	Date:	**5-30-08**
Reported by:	**HMM Personnel**	JBT Project #:	**31-6036**
Client:	**GDOT**	PI No.:	**713640**
County:	**Cherokee County**	GDOT District:	**6**
Stream Name:	**Little River**	Route:	**I-575**

B. Site Location

Floodplain Description:

a) flat, rolling, mountainous etc.: **Flat**

b) wooded, heavily vegetated, pasture, swampy etc.: **Vegetated near structure then wooded**

Stream Channel Description:

a) banks stable, unstable etc.: **Stable bank**

b) stream meandering, straight etc.: **Slightly meandering**

c) debris: **None**

d) Is there any fill in the upstream or downstream floodplains that will affect the natural drainage or limit floodplain width at this site? **No**

C. Required Existing Bridge Data at Project Site

Bridge ID #: **057-0044-0**

Date Built: **1982**

Skew angle of bridge or bents: **90 degrees**

Substructure Description:

a) column type (concrete, steel, pile, etc.): **Concrete**

b) size of column: **4' 3"**

c) number of columns per bent: **2**

d) height of curb, parapet or barrier: **2' 8"**

spurdike length: **N/A**

spurdike elevation:

spurdike location:

e) scour problems at intermediate bents: **None Observed**

f) scour problems at abutments: **None Observed**

D. Normal Water Surface Data

a) Water Surface elevation 500 ft upstream of the survey centerline: **N/A**
b) Water Surface elevation at the roadway centerline: **N/A**
c) Water Surface elevation 500 ft downstream of the survey centerline: **N/A**
d) Is site affected by tides: **No**
e) Normal high tide: **N/A** Normal low tide: **N/A**

E. Historical Flood Data

a) Extreme high-water elevation at Site: **862.1'** Date: **1973**
b) Highest tide elevation observed at Site: Date:
c) Location where taken (upstream, downstream, centerline):
c) Source of high-water information:
e) Are there any houses that have been flooded: **N/A**
f) House location and floor elevation:
g) Number of times house has been flooded, elevations and dates of floods:
h) Additional houses that may be flooded? (with floor elevations within 2 ft of the flood of record):

F. Miscellaneous Information

a) Are water surface elevations at the site affected by other factors such as high-water from other stream, reservoirs etc.: **Water Surface Elevations are effected by backwater from Lake Allatoona**

b) Length, width, and elevations of dam and spillway if applicable: **N/A**

Note: if the project site is affected by the above factors, additional floodplain cross sections may be required. The Engineer should be contacted during the survey phase to identify the additional cross sections required.

G. Upstream and Downstream Stream Crossings

The below information is required for all bridges or box culverts within 1 mile upstream and downstream of the project site. Additional survey information is required for all hydraulic structures within 2000 ft of the project site.

Upstream Structure

Distance and direction from proposed structure:	**N/A**
Railroad or highway structure:	**N/A**
Route # if highway bridge:	**N/A**
Length of bridge or culvert size:	

Substructure Information:

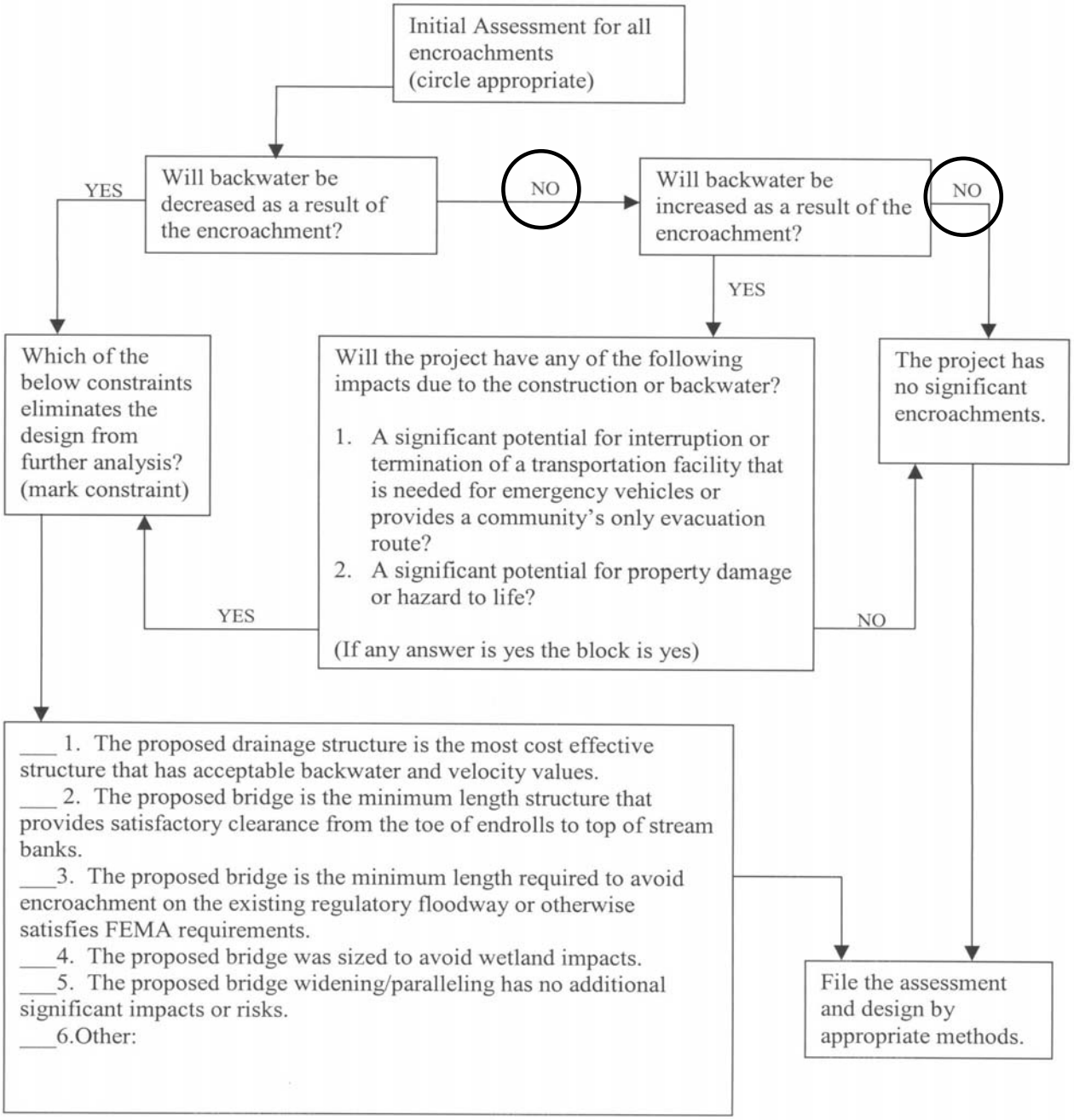
a) column type (concrete, steel, pile):	**N/A**
b) column size:	**N/A**
c) number of columns of bent:	**N/A**
d) length of over flow bridge or culvert size:	**N/A**

Downstream Structure

Distance and direction from proposed structure:	**N/A**
Railroad or highway structure:	**N/A**
Route # if highway bridge:	**N/A**
Length of bridge or culvert size:	**N/A**

Substructure Information:

e) column type (concrete, steel, pile):	**N/A**
f) column size:	**N/A**
g) number of columns of bent:	**N/A**
h) length of over flow bridge or culvert size:	**N/A**



Risk Assessment

NH000-0575-01(028) Cherokee County

I-575 over Little River

PI # 713640

Section V
HEC-RAS Computer Model Output

HEC-RAS FULL VALLEY MODEL

RIVER FLOODS

HEC-RAS Plan: Full (Creek) River: Little River Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	3	2-yr	5291.00	827.26	844.16		844.31	0.000458	3.15	1802.72	228.87	0.16
Reach 1	3	5-yr	8183.00	827.26	847.10		847.31	0.000499	3.77	2645.69	401.40	0.18
Reach 1	3	10-yr	10359.00	827.26	848.89		849.13	0.000498	4.08	3413.33	447.21	0.18
Reach 1	3	25-yr	13354.00	827.26	851.04		851.32	0.000493	4.42	4408.89	475.52	0.18
Reach 1	3	50-yr	15780.00	827.26	852.62		852.92	0.000487	4.65	5175.98	494.50	0.19
Reach 1	3	100-yr	18250.00	827.26	854.12		854.43	0.000481	4.85	5925.83	510.92	0.19
Reach 1	3	500-yr	24913.00	827.26	857.72		858.07	0.000466	5.31	7827.04	543.74	0.19
Reach 1	2	2-yr	5291.00	825.74	843.85		844.09	0.000604	3.91	1445.44	146.19	0.19
Reach 1	2	5-yr	8183.00	825.74	846.69		847.05	0.000726	4.88	1934.44	194.43	0.22
Reach 1	2	10-yr	10359.00	825.74	848.41		848.86	0.000800	5.49	2277.48	203.83	0.23
Reach 1	2	25-yr	13354.00	825.74	850.46		851.02	0.000886	6.22	2704.72	213.03	0.25
Reach 1	2	50-yr	15780.00	825.74	851.96		852.61	0.000942	6.73	3029.31	219.80	0.26
Reach 1	2	100-yr	18250.00	825.74	853.37		854.11	0.000991	7.21	3343.92	225.86	0.27
Reach 1	2	500-yr	24913.00	825.74	856.77		857.73	0.001092	8.31	4136.90	239.72	0.29
Reach 1	1	2-yr	5291.00	825.74	843.67		843.91	0.000635	3.97	1418.16	144.12	0.19
Reach 1	1	5-yr	8183.00	825.74	846.46		846.84	0.000765	4.97	1889.99	192.36	0.22
Reach 1	1	10-yr	10359.00	825.74	848.15		848.62	0.000845	5.59	2225.23	202.80	0.24
Reach 1	1	25-yr	13354.00	825.74	850.17		850.76	0.000936	6.33	2643.59	211.85	0.25
Reach 1	1	50-yr	15780.00	825.74	851.65		852.33	0.000995	6.85	2961.86	218.26	0.26
Reach 1	1	100-yr	18250.00	825.74	853.05		853.81	0.001046	7.33	3270.52	224.38	0.27
Reach 1	1	500-yr	24913.00	825.74	856.41		857.40	0.001152	8.45	4049.55	238.63	0.29
Reach 1	0	2-yr	5291.00	826.84	843.50	835.43	843.72	0.000700	3.73	1507.99	220.66	0.20
Reach 1	0	5-yr	8183.00	826.84	846.33	837.12	846.61	0.000701	4.37	2376.73	341.95	0.21
Reach 1	0	10-yr	10359.00	826.84	848.04	838.16	848.36	0.000700	4.73	2979.77	358.31	0.21
Reach 1	0	25-yr	13354.00	826.84	850.11	839.45	850.47	0.000701	5.16	3732.91	371.85	0.22
Reach 1	0	50-yr	15780.00	826.84	851.62	840.39	852.02	0.000700	5.45	4305.65	383.97	0.22
Reach 1	0	100-yr	18250.00	826.84	853.05	841.23	853.48	0.000701	5.73	4863.31	397.50	0.23
Reach 1	0	500-yr	24913.00	826.84	856.51	843.49	857.02	0.000700	6.37	6299.26	434.08	0.23

```
                        HEC-RAS Version 3.1.3 May 2005
                         U.S. Army Corp of Engineers
                        Hydrologic Engineering Center
                              609 Second Street
                              Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX



PROJECT DATA
Project Title: Little River
Project File : LittleRiver.prj
Run Date and Time: 6/26/2008 9:59:02 AM

Project in English units



PLAN DATA

Plan Title: Little River Full (Creek)
Plan File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.p02

           Geometry Title: Little River Full
           Geometry File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-
RAS\LittleRiver.g02

           Flow Title    : River Floods
           Flow File     : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-
RAS\LittleRiver.f01

Plan Summary Information:
Number of:  Cross Sections =    4    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance  =  0.01
    Critical depth calculation tolerance =  0.01
    Maximum number of iterations         =  20
    Maximum difference tolerance         =  0.3
    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: River Floods
Flow File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.f01

Flow Data (cfs)

  River           Reach           RS                    2-yr            5-yr           10-
yr           25-yr           50-yr          100-yr          500-yr
  Little River    Reach 1         3                     5291            8183
10359           13354           15780           18250           24913


Boundary Conditions
```

```
  River           Reach           Profile                       Upstream
Downstream

  Little River    Reach 1         2-yr
Normal S = 0.0007
  Little River    Reach 1         5-yr
Normal S = 0.0007
  Little River    Reach 1         10-yr
Normal S = 0.0007
  Little River    Reach 1         25-yr
Normal S = 0.0007
  Little River    Reach 1         50-yr
Normal S = 0.0007
  Little River    Reach 1         100-yr
Normal S = 0.0007
  Little River    Reach 1         500-yr
Normal S = 0.0007
```

GEOMETRY DATA

Geometry Title: Little River Full
Geometry File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.g02

CROSS SECTION

RIVER: Little River
REACH: Reach 1 RS: 3

INPUT
Description: Approach Section
Station Elevation Data num= 131

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4615	900	4667	899	4682	898	4700	897	4710	896
4719	895	4727	894	4733	893	4737	892	4742	891
4748	890	4754	889	4760	888	4767	887	4775	886
4780	885	4782	884	4785	883	4786	882	4788	881
4790	880	4792	879	4794	878	4795	877	4797	876
4799	875	4800	874	4802	873	4804	872	4806	871
4807	870	4809	869	4811	868	4813	867	4815	866
4816	865	4843	864	4845	863	4848	862	4850	861
4852	860	4854	859	4856	858	4858	857	4860	856
4862	855	4864	854	4866	853	4869	852	4871	851
4874	850	4876	849	4879	848	4900	847	4905	846
4925	835.5	4985	827.26	5040	834.44	5055	841.34	5080	842
5120	843	5135	844	5150	845	5190	846	5298	847
5312	848	5325	849	5337	850	5346	851	5356	852
5365	853	5374	854	5380	855	5390	856	5396	857
5402	858	5409	859	5416	860	5423	861	5430	862
5437	863	5445	864	5450	865	5466	866	5485	867
5525	868	5565	869	5619	868	5623	867	5628	866
5635	865	5655	864	5710	864	5728	865	5780	865
5850	864	5908	864	5945	865	5960	866	5975	867
5990	868	6011	869	6056	870	6075	871	6080	872
6088	873	6098	874	6107	875	6119	876	6129	877
6140	878	6152	879	6160	880	6165	881	6168	882
6173	883	6177	884	6181	885	6185	886	6190	887
6195	888	6203	889	6208	890	6212	891	6216	892
6220	893	6225	894	6232	895	6238	896	6244	897
6250	898								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4615	.12	4905	.05	5055	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4905	5055	380	410	405	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

```
  E.G. Elev (ft)            844.31    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.15    Wt. n-Val.                             0.050
0.120
```

```
  W.S. Elev (ft)            844.16    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)                   1664.11
138.62
  E.G. Slope (ft/ft)      0.000458    Area (sq ft)                        1664.11
138.62
  Q Total (cfs)            5291.00    Flow (cfs)                          5239.04
51.96
  Top Width (ft)            228.87    Top Width (ft)                       146.49
82.38
  Vel Total (ft/s)            2.94    Avg. Vel. (ft/s)                       3.15
0.37
  Max Chl Dpth (ft)          16.90    Hydr. Depth (ft)                      11.36
1.68
  Conv. Total (cfs)       247157.2    Conv. (cfs)                        244730.0
2427.2
  Length Wtd. (ft)          409.90    Wetted Per. (ft)                     151.17
82.44
  Min Ch El (ft)            827.26    Shear (lb/sq ft)                       0.31
0.05
  Alpha                       1.14    Stream Power (lb/ft s)                 0.99
0.02
  Frctn Loss (ft)             0.21    Cum Volume (acre-ft)        0.78      31.42
1.68
  C & E Loss (ft)             0.01    Cum SA (acres)              0.50       2.58
0.77


CROSS SECTION OUTPUT  Profile #5-yr

  E.G. Elev (ft)            847.31    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.21    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            847.10    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)           3.08    2101.67
540.93
  E.G. Slope (ft/ft)      0.000499    Area (sq ft)                3.08    2101.67
540.93
  Q Total (cfs)            8183.00    Flow (cfs)                  0.49    7928.47
254.05
  Top Width (ft)            401.40    Top Width (ft)              7.04     150.00
244.36
  Vel Total (ft/s)            3.09    Avg. Vel. (ft/s)            0.16       3.77
0.47
  Max Chl Dpth (ft)          19.84    Hydr. Depth (ft)            0.44      14.01
2.21
  Conv. Total (cfs)       366348.8    Conv. (cfs)                 21.8   354953.4
11373.6
  Length Wtd. (ft)          409.68    Wetted Per. (ft)            7.14     155.13
244.47
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.01       0.42
0.07
  Alpha                       1.44    Stream Power (lb/ft s)      0.00       1.59
0.03
  Frctn Loss (ft)             0.24    Cum Volume (acre-ft)        3.68      38.80
4.95
  C & E Loss (ft)             0.01    Cum SA (acres)              1.40       2.59
1.71


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)            849.13    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.24    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            848.89    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)          42.28    2370.35
1000.69
  E.G. Slope (ft/ft)      0.000498    Area (sq ft)               42.28    2370.35
1000.69
  Q Total (cfs)           10359.00    Flow (cfs)                 15.05    9679.63
664.33
```

```
  Top Width (ft)            447.21    Top Width (ft)             28.67     150.00
268.55
  Vel Total (ft/s)            3.03    Avg. Vel. (ft/s)            0.36       4.08
0.66
  Max Chl Dpth (ft)          21.63    Hydr. Depth (ft)            1.48      15.80
3.73
  Conv. Total (cfs)       464205.6    Conv. (cfs)                674.2   433761.5
29769.8
  Length Wtd. (ft)          409.38    Wetted Per. (ft)           28.93     155.13
268.72
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.05       0.48
0.12
  Alpha                       1.69    Stream Power (lb/ft s)      0.02       1.94
0.08
  Frctn Loss (ft)             0.25    Cum Volume (acre-ft)        6.31      43.28
8.15
  C & E Loss (ft)             0.02    Cum SA (acres)              1.61       2.59
1.91


CROSS SECTION OUTPUT  Profile #25-yr

  E.G. Elev (ft)            851.32    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.27    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            851.04    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         109.47    2693.58
1605.83
  E.G. Slope (ft/ft)      0.000493    Area (sq ft)              109.47    2693.58
1605.83
  Q Total (cfs)           13354.00    Flow (cfs)                 64.62   11913.43
1375.96
  Top Width (ft)            475.52    Top Width (ft)             34.09     150.00
291.43
  Vel Total (ft/s)            3.03    Avg. Vel. (ft/s)            0.59       4.42
0.86
  Max Chl Dpth (ft)          23.78    Hydr. Depth (ft)            3.21      17.96
5.51
  Conv. Total (cfs)       601663.6    Conv. (cfs)               2911.3   536758.6
61993.6
  Length Wtd. (ft)          409.01    Wetted Per. (ft)           34.78     155.13
291.71
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.10       0.53
0.17
  Alpha                       1.91    Stream Power (lb/ft s)      0.06       2.36
0.15
  Frctn Loss (ft)             0.26    Cum Volume (acre-ft)        9.77      48.66
12.35
  C & E Loss (ft)             0.03    Cum SA (acres)              1.76       2.59
2.06


CROSS SECTION OUTPUT  Profile #50-yr

  E.G. Elev (ft)            852.92    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.29    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            852.62    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         166.08    2930.82
2079.08
  E.G. Slope (ft/ft)      0.000487    Area (sq ft)              166.08    2930.82
2079.08
  Q Total (cfs)           15780.00    Flow (cfs)                119.39   13627.92
2032.70
  Top Width (ft)            494.50    Top Width (ft)             37.87     150.00
306.62
  Vel Total (ft/s)            3.05    Avg. Vel. (ft/s)            0.72       4.65
0.98
  Max Chl Dpth (ft)          25.36    Hydr. Depth (ft)            4.38      19.54
6.78
  Conv. Total (cfs)       715410.7    Conv. (cfs)               5412.6   617842.7
92155.4
```

```
  Length Wtd. (ft)          408.74    Wetted Per. (ft)           38.90     155.13
306.98
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.13       0.57
0.21
  Alpha                       2.02    Stream Power (lb/ft s)      0.09       2.67
0.20
  Frctn Loss (ft)             0.27    Cum Volume (acre-ft)       12.48      52.60
15.64
  C & E Loss (ft)             0.04    Cum SA (acres)              1.85       2.59
2.19


CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            854.43    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.31    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            854.12    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         225.25    3154.43
2546.15
  E.G. Slope (ft/ft)      0.000481    Area (sq ft)              225.25    3154.43
2546.15
  Q Total (cfs)           18250.00    Flow (cfs)                185.65   15310.43
2753.91
  Top Width (ft)            510.92    Top Width (ft)             41.23     150.00
319.69
  Vel Total (ft/s)            3.08    Avg. Vel. (ft/s)            0.82       4.85
1.08
  Max Chl Dpth (ft)          26.86    Hydr. Depth (ft)            5.46      21.03
7.96
  Conv. Total (cfs)       832477.5    Conv. (cfs)               8468.6   698388.5
125620.4
  Length Wtd. (ft)          408.50    Wetted Per. (ft)           42.58     155.13
320.14
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.16       0.61
0.24
  Alpha                       2.10    Stream Power (lb/ft s)      0.13       2.96
0.26
  Frctn Loss (ft)             0.27    Cum Volume (acre-ft)       15.15      56.31
18.94
  C & E Loss (ft)             0.04    Cum SA (acres)              1.93       2.59
2.32


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 #500-yr

  E.G. Elev (ft)            858.07    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.35    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            857.72    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         386.75    3694.76
3745.54
  E.G. Slope (ft/ft)      0.000466    Area (sq ft)              386.75    3694.76
3745.54
  Q Total (cfs)           24913.00    Flow (cfs)                400.83   19614.62
4897.56
  Top Width (ft)            543.74    Top Width (ft)             48.44     150.00
345.31
  Vel Total (ft/s)            3.18    Avg. Vel. (ft/s)            1.04       5.31
1.31
  Max Chl Dpth (ft)          30.46    Hydr. Depth (ft)            7.98      24.63
10.85
  Conv. Total (cfs)       1154476.0    Conv. (cfs)              18574.4   908947.0
226954.2
  Length Wtd. (ft)          407.99    Wetted Per. (ft)           50.63     155.13
346.02
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.22       0.69
0.31
```

Alpha	2.23	Stream Power (lb/ft s)	0.23	3.68	0.41
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	22.10	65.28	27.60
C & E Loss (ft)	0.06	Cum SA (acres)	2.12	2.59	2.58

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

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

RIVER: Little River
REACH: Reach 1 RS: 2

INPUT
Description: Upstream of bridge
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4673	892.86	4690	892.2	4712	891.2	4727	890.2	4732	889.2
4737	888.2	4741	887.2	4745	886.2	4750	885.2	4755	884.2
4769	883.2	4771	882.2	4774	881.2	4776	880.2	4779	879.2
4781	878.2	4784	877.2	4786	876.2	4788	875.2	4791	874.2
4794	873.2	4796	872.2	4798	871.2	4801	870.2	4824	869.8
4826	868.2	4828	867.2	4831	866.2	4833	865.2	4836	864.2
4840	863.2	4843	862.2	4845	861.2	4846	860.2	4848	859.2
4851	858.2	4854	857.2	4856	856.2	4859	855.2	4861	854.2
4864	853.2	4866	852.2	4869	851.2	4871	850.2	4875	849.2
4878	848.2	4880	847.2	4887	846.2	4898	845.2	4908	845.2
4924	844.2	4933	843.2	4938	842.2	4945	841.2	4948	840.2
4951	839.2	4952	838.2	4953	836.2	4955	835.2	4960	834.2
4965	833.2	4970	832.2	4975	831.2	4980	830.2	4985	829.2
4990	828.2	4995	827.2	5000	825.74	5005	826.2	5010	827.2
5016	828.2	5021	829.2	5027	830.2	5033	831.2	5038	832.2
5043	833.2	5048	834.2	5049	835.2	5051	836.2	5052	838.2
5053	839.2	5063	840.2	5067	841.2	5070	842.2	5072	843.2
5074	844.2	5076	845.2	5077	846.2	5079	847.2	5081	848.2
5082	849.2	5083	850.2	5085	851.2	5087	852.2	5089	853.2
5091	854.2	5092	855.2	5094	856.2	5095	857.2	5096	858.2
5098	859.2	5100	860.2	5101	861.2	5103	862.2	5105	863.2
5106	864.2	5108	865.2	5110	866.2	5112	867.2	5114	868.2
5116	869.2	5118	870.2	5120	871.2	5122	872.2	5125	873.2
5127	874.2	5129	875.2	5132	876.2	5134	877.2	5149	878.2
5152	879.2	5154	880.2	5156	881.2	5159	882.2	5161	883.2
5164	884.2	5166	885.2	5170	886.2	5173	887.2	5176	888.2
5178	889.2	5181	890.2	5185	891.2	5187	892.2	5190	893.2
5195	894.2	5200	895.2	5205	896.2	5210	897.2	5215	898.2
5220	899.2	5225	900.2	5230	901.2	5235	902.2	5240	903.2
5247	904.2	5253	905.2	5259	906.2	5266	907.2	5278	908.2
5291	909.2	5304	910.2	5318	911.2	5336	912.2	5360	912.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4673	.12	4951	.05	5053	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4951	5053	290	290	290	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

E.G. Elev (ft)	844.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	843.85	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)		Flow Area (sq ft)	44.68	1337.43	63.34
E.G. Slope (ft/ft)	0.000604	Area (sq ft)	44.68	1337.43	63.34

```
  Q Total (cfs)            5291.00    Flow (cfs)                 20.35    5230.46
40.20
  Top Width (ft)            146.19    Top Width (ft)             23.88     102.00
20.31
  Vel Total (ft/s)            3.66    Avg. Vel. (ft/s)            0.46       3.91
0.63
  Max Chl Dpth (ft)          18.11    Hydr. Depth (ft)            1.87      13.11
3.12
  Conv. Total (cfs)       215270.7    Conv. (cfs)                827.8   212807.4
1635.5
  Length Wtd. (ft)          290.00    Wetted Per. (ft)           24.41     107.95
21.03
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.07       0.47
0.11
  Alpha                       1.13    Stream Power (lb/ft s)      0.03       1.83
0.07
  Frctn Loss (ft)             0.18    Cum Volume (acre-ft)        0.58      17.29
0.74
  C & E Loss (ft)             0.00    Cum SA (acres)              0.40       1.41
0.29


CROSS SECTION OUTPUT  Profile #5-yr

  E.G. Elev (ft)            847.05    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.36    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            846.69    Reach Len. (ft)           290.00     290.00
290.00
  Crit W.S. (ft)                      Flow Area (sq ft)         179.36    1627.02
128.06
  E.G. Slope (ft/ft)      0.000726    Area (sq ft)              179.36    1627.02
128.06
  Q Total (cfs)            8183.00    Flow (cfs)                114.09    7947.00
121.91
  Top Width (ft)            194.43    Top Width (ft)             67.45     102.00
24.98
  Vel Total (ft/s)            4.23    Avg. Vel. (ft/s)            0.64       4.88
0.95
  Max Chl Dpth (ft)          20.95    Hydr. Depth (ft)            2.66      15.95
5.13
  Conv. Total (cfs)       303786.6    Conv. (cfs)               4235.4   295025.4
4525.8
  Length Wtd. (ft)          290.00    Wetted Per. (ft)           68.11     107.95
26.56
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.12       0.68
0.22
  Alpha                       1.30    Stream Power (lb/ft s)      0.08       3.33
0.21
  Frctn Loss (ft)             0.22    Cum Volume (acre-ft)        2.88      21.25
1.84
  C & E Loss (ft)             0.00    Cum SA (acres)              1.08       1.41
0.46


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)            848.86    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.45    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            848.41    Reach Len. (ft)           290.00     290.00
290.00
  Crit W.S. (ft)                      Flow Area (sq ft)         301.70    1801.95
173.83
  E.G. Slope (ft/ft)      0.000800    Area (sq ft)              301.70    1801.95
173.83
  Q Total (cfs)           10359.00    Flow (cfs)                268.31    9895.21
195.48
  Top Width (ft)            203.83    Top Width (ft)             73.62     102.00
28.21
  Vel Total (ft/s)            4.55    Avg. Vel. (ft/s)            0.89       5.49
1.12
  Max Chl Dpth (ft)          22.67    Hydr. Depth (ft)            4.10      17.67
6.16
```

Conv. Total (cfs)	366156.7	Conv. (cfs)	9483.9	349763.2	6909.5
Length Wtd. (ft)	290.00	Wetted Per. (ft)	74.59	107.95	30.22
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.20	0.83	0.29
Alpha	1.39	Stream Power (lb/ft s)	0.18	4.58	0.32
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	4.81	23.65	2.69
C & E Loss (ft)	0.00	Cum SA (acres)	1.16	1.41	0.53

CROSS SECTION OUTPUT Profile #25-yr

E.G. Elev (ft)	851.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.56	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	850.46	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)		Flow Area (sq ft)	459.74	2011.16	233.82
E.G. Slope (ft/ft)	0.000886	Area (sq ft)	459.74	2011.16	233.82
Q Total (cfs)	13354.00	Flow (cfs)	535.67	12502.55	315.79
Top Width (ft)	213.03	Top Width (ft)	80.52	102.00	30.52
Vel Total (ft/s)	4.94	Avg. Vel. (ft/s)	1.17	6.22	1.35
Max Chl Dpth (ft)	24.72	Hydr. Depth (ft)	5.71	19.72	7.66
Conv. Total (cfs)	448635.8	Conv. (cfs)	17996.1	420030.7	10609.0
Length Wtd. (ft)	290.00	Wetted Per. (ft)	81.80	107.95	33.34
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.31	1.03	0.39
Alpha	1.49	Stream Power (lb/ft s)	0.36	6.41	0.52
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	7.28	26.52	3.79
C & E Loss (ft)	0.00	Cum SA (acres)	1.26	1.41	0.56

CROSS SECTION OUTPUT Profile #50-yr

E.G. Elev (ft)	852.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	851.96	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)		Flow Area (sq ft)	583.15	2164.28	281.88
E.G. Slope (ft/ft)	0.000942	Area (sq ft)	583.15	2164.28	281.88
Q Total (cfs)	15780.00	Flow (cfs)	794.83	14568.09	417.08
Top Width (ft)	219.80	Top Width (ft)	84.28	102.00	33.52
Vel Total (ft/s)	5.21	Avg. Vel. (ft/s)	1.36	6.73	1.48
Max Chl Dpth (ft)	26.22	Hydr. Depth (ft)	6.92	21.22	8.41
Conv. Total (cfs)	514157.7	Conv. (cfs)	25897.9	474670.0	13589.7
Length Wtd. (ft)	290.00	Wetted Per. (ft)	85.86	107.95	36.69
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.40	1.18	0.45
Alpha	1.55	Stream Power (lb/ft s)	0.54	7.94	0.67

```
  Frctn Loss (ft)             0.28    Cum Volume (acre-ft)        9.21      28.62
4.67
  C & E Loss (ft)             0.00    Cum SA (acres)              1.31       1.41
0.61


CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            854.11    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.74    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            853.37    Reach Len. (ft)           290.00     290.00
290.00
  Crit W.S. (ft)                      Flow Area (sq ft)         704.45    2308.28
331.20
  E.G. Slope (ft/ft)      0.000991    Area (sq ft)              704.45    2308.28
331.20
  Q Total (cfs)           18250.00    Flow (cfs)               1087.21   16633.17
529.62
  Top Width (ft)            225.86    Top Width (ft)             87.51     102.00
36.34
  Vel Total (ft/s)            5.46    Avg. Vel. (ft/s)            1.54       7.21
1.60
  Max Chl Dpth (ft)          27.63    Hydr. Depth (ft)            8.05      22.63
9.11
  Conv. Total (cfs)       579834.8    Conv. (cfs)              34542.5   528465.3
16827.1
  Length Wtd. (ft)          290.00    Wetted Per. (ft)           89.40     107.95
39.85
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.49       1.32
0.51
  Alpha                       1.60    Stream Power (lb/ft s)      0.75       9.53
0.82
  Frctn Loss (ft)             0.30    Cum Volume (acre-ft)       11.10      30.61
5.57
  C & E Loss (ft)             0.00    Cum SA (acres)              1.36       1.41
0.66


CROSS SECTION OUTPUT  Profile #500-yr

  E.G. Elev (ft)            857.73    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.96    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            856.77    Reach Len. (ft)           290.00     290.00
290.00
  Crit W.S. (ft)                      Flow Area (sq ft)        1017.36    2655.35
464.20
  E.G. Slope (ft/ft)      0.001092    Area (sq ft)             1017.36    2655.35
464.20
  Q Total (cfs)           24913.00    Flow (cfs)               1971.78   22056.30
884.92
  Top Width (ft)            239.72    Top Width (ft)             96.15     102.00
41.57
  Vel Total (ft/s)            6.02    Avg. Vel. (ft/s)            1.94       8.31
1.91
  Max Chl Dpth (ft)          31.03    Hydr. Depth (ft)           10.58      26.03
11.17
  Conv. Total (cfs)       753874.1    Conv. (cfs)              59666.7   667429.4
26778.0
  Length Wtd. (ft)          290.00    Wetted Per. (ft)           98.70     107.95
46.16
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.70       1.68
0.69
  Alpha                       1.70    Stream Power (lb/ft s)      1.36      13.93
1.31
  Frctn Loss (ft)             0.33    Cum Volume (acre-ft)       15.97      35.39
8.03
  C & E Loss (ft)             0.00    Cum SA (acres)              1.49       1.41
0.78


CROSS SECTION
```

RIVER: Little River
REACH: Reach 1 RS: 1

INPUT
Description: Downstream of bridge
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4673	892.86	4690	892.2	4712	891.2	4727	890.2	4732	889.2
4737	888.2	4741	887.2	4745	886.2	4750	885.2	4755	884.2
4769	883.2	4771	882.2	4774	881.2	4776	880.2	4779	879.2
4781	878.2	4784	877.2	4786	876.2	4788	875.2	4791	874.2
4794	873.2	4796	872.2	4798	871.2	4801	870.2	4824	869.8
4826	868.2	4828	867.2	4831	866.2	4833	865.2	4836	864.2
4840	863.2	4843	862.2	4845	861.2	4846	860.2	4848	859.2
4851	858.2	4854	857.2	4856	856.2	4859	855.2	4861	854.2
4864	853.2	4866	852.2	4869	851.2	4871	850.2	4875	849.2
4878	848.2	4880	847.2	4887	846.2	4898	845.2	4908	845.2
4924	844.2	4933	843.2	4938	842.2	4945	841.2	4948	840.2
4951	839.2	4952	838.2	4953	836.2	4955	835.2	4960	834.2
4965	833.2	4970	832.2	4975	831.2	4980	830.2	4985	829.2
4990	828.2	4995	827.2	5000	825.74	5005	826.2	5010	827.2
5016	828.2	5021	829.2	5027	830.2	5033	831.2	5038	832.2
5043	833.2	5048	834.2	5049	835.2	5051	836.2	5052	838.2
5053	839.2	5063	840.2	5067	841.2	5070	842.2	5072	843.2
5074	844.2	5076	845.2	5077	846.2	5079	847.2	5081	848.2
5082	849.2	5083	850.2	5085	851.2	5087	852.2	5089	853.2
5091	854.2	5092	855.2	5094	856.2	5095	857.2	5096	858.2
5098	859.2	5100	860.2	5101	861.2	5103	862.2	5105	863.2
5106	864.2	5108	865.2	5110	866.2	5112	867.2	5114	868.2
5116	869.2	5118	870.2	5120	871.2	5122	872.2	5125	873.2
5127	874.2	5129	875.2	5132	876.2	5134	877.2	5149	878.2
5152	879.2	5154	880.2	5156	881.2	5159	882.2	5161	883.2
5164	884.2	5166	885.2	5170	886.2	5173	887.2	5176	888.2
5178	889.2	5181	890.2	5185	891.2	5187	892.2	5190	893.2
5195	894.2	5200	895.2	5205	896.2	5210	897.2	5215	898.2
5220	899.2	5225	900.2	5230	901.2	5235	902.2	5240	903.2
5247	904.2	5253	905.2	5259	906.2	5266	907.2	5278	908.2
5291	909.2	5304	910.2	5318	911.2	5336	912.2	5360	912.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4673	.12	4951	.05	5053	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4951	5053	265	270	284	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

E.G. Elev (ft)	843.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	843.67	Reach Len. (ft)	265.00	270.00	284.00
Crit W.S. (ft)		Flow Area (sq ft)	40.35	1318.26	59.56
E.G. Slope (ft/ft)	0.000635	Area (sq ft)	40.35	1318.26	59.56
Q Total (cfs)	5291.00	Flow (cfs)	18.47	5234.83	37.70
Top Width (ft)	144.12	Top Width (ft)	22.19	102.00	19.93
Vel Total (ft/s)	3.73	Avg. Vel. (ft/s)	0.46	3.97	0.63
Max Chl Dpth (ft)	17.93	Hydr. Depth (ft)	1.82	12.92	2.99
Conv. Total (cfs)	209977.5	Conv. (cfs)	733.0	207748.4	1496.1
Length Wtd. (ft)	270.06	Wetted Per. (ft)	22.71	107.95	20.61
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.07	0.48	0.11
Alpha	1.12	Stream Power (lb/ft s)	0.03	1.92	0.07
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	0.30	8.45	0.33

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  C & E Loss (ft)             0.01    Cum SA (acres)              0.25       0.73
0.16


CROSS SECTION OUTPUT  Profile #5-yr

  E.G. Elev (ft)            846.84    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.37    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            846.46    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         164.04    1603.58
122.37
  E.G. Slope (ft/ft)      0.000765    Area (sq ft)              164.04    1603.58
122.37
  Q Total (cfs)            8183.00    Flow (cfs)                102.56    7962.90
117.54
  Top Width (ft)            192.36    Top Width (ft)             65.84     102.00
24.52
  Vel Total (ft/s)            4.33    Avg. Vel. (ft/s)            0.63       4.97
0.96
  Max Chl Dpth (ft)          20.72    Hydr. Depth (ft)            2.49      15.72
4.99
  Conv. Total (cfs)       295933.5    Conv. (cfs)               3709.1   287973.8
4250.7
  Length Wtd. (ft)          270.09    Wetted Per. (ft)           66.48     107.95
26.04
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.12       0.71
0.22
  Alpha                       1.28    Stream Power (lb/ft s)      0.07       3.52
0.22
  Frctn Loss (ft)             0.20    Cum Volume (acre-ft)        1.74      10.50
1.00
  C & E Loss (ft)             0.03    Cum SA (acres)              0.63       0.73
0.30


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)            848.62    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.46    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            848.15    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         282.88    1775.74
166.61
  E.G. Slope (ft/ft)      0.000845    Area (sq ft)              282.88    1775.74
166.61
  Q Total (cfs)           10359.00    Flow (cfs)                249.31    9920.87
188.82
  Top Width (ft)            202.80    Top Width (ft)             72.90     102.00
27.90
  Vel Total (ft/s)            4.66    Avg. Vel. (ft/s)            0.88       5.59
1.13
  Max Chl Dpth (ft)          22.41    Hydr. Depth (ft)            3.88      17.41
5.97
  Conv. Total (cfs)       356399.3    Conv. (cfs)               8577.4   341325.6
6496.3
  Length Wtd. (ft)          270.10    Wetted Per. (ft)           73.82     107.95
29.82
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.20       0.87
0.29
  Alpha                       1.38    Stream Power (lb/ft s)      0.18       4.85
0.33
  Frctn Loss (ft)             0.21    Cum Volume (acre-ft)        2.86      11.74
1.55
  C & E Loss (ft)             0.04    Cum SA (acres)              0.68       0.73
0.34


CROSS SECTION OUTPUT  Profile #25-yr

  E.G. Elev (ft)            850.76    Element                   Left OB    Channel
Right OB
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  Vel Head (ft)               0.58    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            850.17    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         436.66    1981.81
225.12
  E.G. Slope (ft/ft)      0.000936    Area (sq ft)              436.66    1981.81
225.12
  Q Total (cfs)           13354.00    Flow (cfs)                508.09   12537.43
308.48
  Top Width (ft)            211.85    Top Width (ft)             79.88     102.00
29.97
  Vel Total (ft/s)            5.05    Avg. Vel. (ft/s)            1.16       6.33
1.37
  Max Chl Dpth (ft)          24.43    Hydr. Depth (ft)            5.47      19.43
7.51
  Conv. Total (cfs)       436560.0    Conv. (cfs)              16610.2   409865.1
10084.7
  Length Wtd. (ft)          270.13    Wetted Per. (ft)           81.10     107.95
32.72
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.31       1.07
0.40
  Alpha                       1.48    Stream Power (lb/ft s)      0.37       6.78
0.55
  Frctn Loss (ft)             0.22    Cum Volume (acre-ft)        4.30      13.23
2.27
  C & E Loss (ft)             0.07    Cum SA (acres)              0.73       0.73
0.36


CROSS SECTION OUTPUT  Profile #50-yr

  E.G. Elev (ft)            852.33    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.68    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            851.65    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         557.34    2132.86
271.66
  E.G. Slope (ft/ft)      0.000995    Area (sq ft)              557.34    2132.86
271.66
  Q Total (cfs)           15780.00    Flow (cfs)                763.13   14608.79
408.08
  Top Width (ft)            218.26    Top Width (ft)             83.35     102.00
32.90
  Vel Total (ft/s)            5.33    Avg. Vel. (ft/s)            1.37       6.85
1.50
  Max Chl Dpth (ft)          25.91    Hydr. Depth (ft)            6.69      20.91
8.26
  Conv. Total (cfs)       500382.1    Conv. (cfs)              24198.9   463243.0
12940.2
  Length Wtd. (ft)          270.13    Wetted Per. (ft)           84.88     107.95
36.00
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.41       1.23
0.47
  Alpha                       1.54    Stream Power (lb/ft s)      0.56       8.40
0.70
  Frctn Loss (ft)             0.22    Cum Volume (acre-ft)        5.41      14.32
2.83
  C & E Loss (ft)             0.08    Cum SA (acres)              0.76       0.73
0.39


CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            853.81    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.77    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            853.05    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         676.06    2275.01
319.45
  E.G. Slope (ft/ft)      0.001046    Area (sq ft)              676.06    2275.01
319.45
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  Q Total (cfs)           18250.00    Flow (cfs)               1049.99   16681.28
518.73
  Top Width (ft)            224.38    Top Width (ft)             86.69     102.00
35.69
  Vel Total (ft/s)            5.58    Avg. Vel. (ft/s)            1.55       7.33
1.62
  Max Chl Dpth (ft)          27.31    Hydr. Depth (ft)            7.80      22.30
8.95
  Conv. Total (cfs)       564343.3    Conv. (cfs)              32468.9   515833.8
16040.6
  Length Wtd. (ft)          270.13    Wetted Per. (ft)           88.51     107.95
39.12
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.50       1.38
0.53
  Alpha                       1.59    Stream Power (lb/ft s)      0.77      10.09
0.87
  Frctn Loss (ft)             0.23    Cum Volume (acre-ft)        6.50      15.35
3.40
  C & E Loss (ft)             0.10    Cum SA (acres)              0.78       0.73
0.42


CROSS SECTION OUTPUT  Profile #500-yr

  E.G. Elev (ft)            857.40    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.99    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            856.41    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         982.37    2618.09
449.08
  E.G. Slope (ft/ft)      0.001152    Area (sq ft)              982.37    2618.09
449.08
  Q Total (cfs)           24913.00    Flow (cfs)               1920.99   22125.48
866.53
  Top Width (ft)            238.63    Top Width (ft)             95.42     102.00
41.21
  Vel Total (ft/s)            6.15    Avg. Vel. (ft/s)            1.96       8.45
1.93
  Max Chl Dpth (ft)          30.67    Hydr. Depth (ft)           10.30      25.67
10.90
  Conv. Total (cfs)       734026.4    Conv. (cfs)              56599.2   651896.1
25531.1
  Length Wtd. (ft)          270.15    Wetted Per. (ft)           97.88     107.95
45.65
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.72       1.74
0.71
  Alpha                       1.69    Stream Power (lb/ft s)      1.41      14.74
1.37
  Frctn Loss (ft)             0.24    Cum Volume (acre-ft)        9.31      17.84
4.99
  C & E Loss (ft)             0.14    Cum SA (acres)              0.86       0.73
0.51


CROSS SECTION


RIVER: Little River
REACH: Reach 1            RS: 0

INPUT
Description: Exit Section
Station Elevation Data    num=     153
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    4440     900    4450     899    4455     898    4460     897    4465     896
    4475     895    4480     894    4485     893    4495     892    4500     891
    4505     890    4515     889    4520     888    4527     887    4534     886
    4538     885    4542     884    4548     883    4552     882    4556     881
    4561     880    4565     879    4570     878    4575     877    4580     876
    4584     875    4588     874    4592     873    4597     872    4602     871
    4606     870    4611     869    4615     868    4619     867    4622     866
    4626     865    4630     864    4635     863    4638     862    4642     861
    4682     861    4704     862    4722     862    4727     861    4731     860
    4735     859    4740     858    4742     857    4748     856    4751     855
    4755     854    4760     853    4765     852    4768     851    4773     850
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4776	849	4782	848	4786	847	4790	846	4795	845
4800	844	4807	843	4814	842	4826	842	4853	843
4863	844	4925	844	4928	843	4931	842	4955	833.61
5000	826.84	5050	836.29	5064	839.72	5070	841	5076	842
5085	843	5100	844	5119	845	5129	846	5134	847
5139	847	5141	849	5144	850	5147	851	5152	852
5157	853	5162	854	5170	855	5175	856	5183	857
5190	858	5195	859	5200	860	5205	861	5212	862
5218	863	5225	864	5230	865	5235	866	5244	867
5260	868	5273	869	5286	870	5299	871	5320	872
5330	873	5338	874	5346	875	5353	876	5360	877
5366	878	5375	879	5382	880	5388	881	5392	882
5398	883	5404	884	5410	885	5416	886	5423	887
5431	888	5440	889	5448	890	5456	891	5463	892
5470	893	5483	894	5499	895	5530	895	5540	894
5546	893	5551	892	5556	891	5562	890	5571	889
5583	888	5590	887	5594	886	5600	885	5605	885
5614	886	5622	887	5630	888	5640	889	5650	890
5658	891	5664	892	5671	893	5682	894	5700	895
5705	896	5710	897	5720	898				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4440	.12	4931	.05	5064	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4931	5064	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

E.G. Elev (ft)	843.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	843.50	Reach Len. (ft)			
Crit W.S. (ft)	835.43	Flow Area (sq ft)	57.78	1408.36	41.85
E.G. Slope (ft/ft)	0.000700	Area (sq ft)	57.78	1408.36	41.85
Q Total (cfs)	5291.00	Flow (cfs)	18.63	5254.81	17.56
Top Width (ft)	220.66	Top Width (ft)	59.09	133.00	28.57
Vel Total (ft/s)	3.51	Avg. Vel. (ft/s)	0.32	3.73	0.42
Max Chl Dpth (ft)	16.66	Hydr. Depth (ft)	0.98	10.59	1.46
Conv. Total (cfs)	199992.6	Conv. (cfs)	704.1	198624.6	663.9
Length Wtd. (ft)		Wetted Per. (ft)	59.49	136.23	28.86
Min Ch El (ft)	826.84	Shear (lb/sq ft)	0.04	0.45	0.06
Alpha	1.12	Stream Power (lb/ft s)	0.01	1.69	0.03
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #5-yr

E.G. Elev (ft)	846.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	846.33	Reach Len. (ft)			
Crit W.S. (ft)	837.12	Flow Area (sq ft)	407.95	1783.85	184.93
E.G. Slope (ft/ft)	0.000701	Area (sq ft)	407.95	1783.85	184.93
Q Total (cfs)	8183.00	Flow (cfs)	268.83	7794.98	119.19
Top Width (ft)	341.95	Top Width (ft)	142.31	133.00	66.64

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  Vel Total (ft/s)            3.44    Avg. Vel. (ft/s)            0.66       4.37
0.64
  Max Chl Dpth (ft)          19.49    Hydr. Depth (ft)            2.87      13.41
2.78
  Conv. Total (cfs)       309175.8    Conv. (cfs)              10157.1   294515.4
4503.2
  Length Wtd. (ft)                    Wetted Per. (ft)          143.09     136.23
67.05
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.12       0.57
0.12
  Alpha                       1.54    Stream Power (lb/ft s)      0.08       2.50
0.08
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)            848.36    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.32    Wt. n-Val.                  0.120      0.050
0.120
  W.S. Elev (ft)            848.04    Reach Len. (ft)
  Crit W.S. (ft)            838.16    Flow Area (sq ft)         658.04    2012.06
309.67
  E.G. Slope (ft/ft)      0.000700    Area (sq ft)              658.04    2012.06
309.67
  Q Total (cfs)           10359.00    Flow (cfs)                577.19    9525.10
256.71
  Top Width (ft)            358.31    Top Width (ft)            149.26     133.00
76.04
  Vel Total (ft/s)            3.48    Avg. Vel. (ft/s)            0.88       4.73
0.83
  Max Chl Dpth (ft)          21.20    Hydr. Depth (ft)            4.41      15.13
4.07
  Conv. Total (cfs)       391466.5    Conv. (cfs)              21812.0   359953.6
9700.9
  Length Wtd. (ft)                    Wetted Per. (ft)          150.25     136.23
76.96
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.19       0.65
0.18
  Alpha                       1.71    Stream Power (lb/ft s)      0.17       3.06
0.15
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #25-yr

  E.G. Elev (ft)            850.47    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.37    Wt. n-Val.                  0.120      0.050
0.120
  W.S. Elev (ft)            850.11    Reach Len. (ft)
  Crit W.S. (ft)            839.45    Flow Area (sq ft)         976.76    2286.32
469.83
  E.G. Slope (ft/ft)      0.000701    Area (sq ft)              976.76    2286.32
469.83
  Q Total (cfs)           13354.00    Flow (cfs)               1070.46   11789.67
493.87
  Top Width (ft)            371.85    Top Width (ft)            158.53     133.00
80.32
  Vel Total (ft/s)            3.58    Avg. Vel. (ft/s)            1.10       5.16
1.05
  Max Chl Dpth (ft)          23.27    Hydr. Depth (ft)            6.16      17.19
5.85
  Conv. Total (cfs)       504484.8    Conv. (cfs)              40439.6   445387.8
18657.4
  Length Wtd. (ft)                    Wetted Per. (ft)          159.76     136.23
81.81
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.27       0.73
0.25
  Alpha                       1.85    Stream Power (lb/ft s)      0.29       3.79
0.26
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)
```

CROSS SECTION OUTPUT Profile #50-yr

```
  E.G. Elev (ft)           852.02    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.40    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)           851.62    Reach Len. (ft)
  Crit W.S. (ft)           840.39    Flow Area (sq ft)        1222.38    2487.89
595.39
  E.G. Slope (ft/ft)      0.000700   Area (sq ft)             1222.38    2487.89
595.39
  Q Total (cfs)           15780.00   Flow (cfs)               1514.15   13566.99
698.86
  Top Width (ft)           383.97    Top Width (ft)            164.86     133.00
86.11
  Vel Total (ft/s)           3.66    Avg. Vel. (ft/s)            1.24       5.45
1.17
  Max Chl Dpth (ft)         24.78    Hydr. Depth (ft)            7.41      18.71
6.91
  Conv. Total (cfs)       596374.4   Conv. (cfs)              57224.4   512737.8
26412.2
  Length Wtd. (ft)                   Wetted Per. (ft)          166.29     136.23
87.80
  Min Ch El (ft)           826.84    Shear (lb/sq ft)            0.32       0.80
0.30
  Alpha                      1.92    Stream Power (lb/ft s)      0.40       4.35
0.35
  Frctn Loss (ft)                    Cum Volume (acre-ft)
  C & E Loss (ft)                    Cum SA (acres)
```

CROSS SECTION OUTPUT Profile #100-yr

```
  E.G. Elev (ft)           853.48    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.43    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)           853.05    Reach Len. (ft)
  Crit W.S. (ft)           841.23    Flow Area (sq ft)        1462.00    2677.84
723.47
  E.G. Slope (ft/ft)      0.000701   Area (sq ft)             1462.00    2677.84
723.47
  Q Total (cfs)           18250.00   Flow (cfs)               1989.44   15343.22
917.34
  Top Width (ft)           397.50    Top Width (ft)            171.25     133.00
93.25
  Vel Total (ft/s)           3.75    Avg. Vel. (ft/s)            1.36       5.73
1.27
  Max Chl Dpth (ft)         26.21    Hydr. Depth (ft)            8.54      20.13
7.76
  Conv. Total (cfs)       689443.4   Conv. (cfs)              75156.7   579631.7
34655.1
  Length Wtd. (ft)                   Wetted Per. (ft)          172.84     136.23
95.09
  Min Ch El (ft)           826.84    Shear (lb/sq ft)            0.37       0.86
0.33
  Alpha                      1.98    Stream Power (lb/ft s)      0.50       4.93
0.42
  Frctn Loss (ft)                    Cum Volume (acre-ft)
  C & E Loss (ft)                    Cum SA (acres)
```

CROSS SECTION OUTPUT Profile #500-yr

```
  E.G. Elev (ft)           857.02    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.51    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)           856.51    Reach Len. (ft)
  Crit W.S. (ft)           843.49    Flow Area (sq ft)        2079.79    3137.48
1081.99
  E.G. Slope (ft/ft)      0.000700   Area (sq ft)             2079.79    3137.48
1081.99
  Q Total (cfs)           24913.00   Flow (cfs)               3382.54   19970.15
1560.31
```

Top Width (ft)	434.08	Top Width (ft)	186.03	133.00	115.04
Vel Total (ft/s)	3.95	Avg. Vel. (ft/s)	1.63	6.37	1.44
Max Chl Dpth (ft)	29.67	Hydr. Depth (ft)	11.18	23.59	9.40
Conv. Total (cfs)	941579.5	Conv. (cfs)	127842.1	754766.1	58971.3
Length Wtd. (ft)		Wetted Per. (ft)	188.04	136.23	117.17
Min Ch El (ft)	826.84	Shear (lb/sq ft)	0.48	1.01	0.40
Alpha	2.11	Stream Power (lb/ft s)	0.79	6.41	0.58
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Little River

Reach	River Sta.	n1	n2	n3
Reach 1	3	.12	.05	.12
Reach 1	2	.12	.05	.12
Reach 1	1	.12	.05	.12
Reach 1	0	.12	.05	.12

SUMMARY OF REACH LENGTHS

River: Little River

Reach	River Sta.	Left	Channel	Right
Reach 1	3	380	410	405
Reach 1	2	290	290	290
Reach 1	1	265	270	284
Reach 1	0	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Little River

Reach	River Sta.	Contr.	Expan.
Reach 1	3	.1	.3
Reach 1	2	.1	.3
Reach 1	1	.1	.3
Reach 1	0	.1	.3

ABNORMAL FLOODS

HEC-RAS Plan: Full (AB) River: Little River Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	3	2-yr	5291.00	827.26	840.72		841.03	0.001388	4.52	1171.67	138.58	0.27
Reach 1	3	5-yr	8183.00	827.26	843.15		843.60	0.001482	5.37	1580.44	211.82	0.29
Reach 1	3	10-yr	10359.00	827.26	853.34		853.46	0.000181	2.90	5534.68	502.78	0.11
Reach 1	3	25-yr	13354.00	827.26	846.55		847.18	0.001537	6.45	2437.75	346.68	0.31
Reach 1	3	50-yr	15780.00	827.26	860.31		860.41	0.000124	2.93	9265.26	566.78	0.10
Reach 1	3	100-yr	18250.00	827.26	861.37		861.49	0.000142	3.21	9870.56	576.31	0.11
Reach 1	3	500-yr	24913.00	827.26	862.62		862.82	0.000221	4.13	10598.06	588.17	0.13
Reach 1	2	2-yr	5291.00	825.74	839.81		840.32	0.002110	5.72	927.77	109.97	0.33
Reach 1	2	5-yr	8183.00	825.74	842.02		842.80	0.002419	7.08	1193.74	130.24	0.37
Reach 1	2	10-yr	10359.00	825.74	853.10		853.35	0.000334	4.15	3282.73	224.60	0.15
Reach 1	2	25-yr	13354.00	825.74	845.04		846.28	0.002851	9.00	1629.09	165.11	0.42
Reach 1	2	50-yr	15780.00	825.74	860.04		860.32	0.000281	4.56	4940.89	253.36	0.15
Reach 1	2	100-yr	18250.00	825.74	861.04		861.38	0.000331	5.06	5195.58	255.68	0.16
Reach 1	2	500-yr	24913.00	825.74	862.06		862.64	0.000545	6.64	5457.17	259.42	0.21
Reach 1	1	2-yr	5291.00	825.74	838.98		839.60	0.002882	6.29	840.84	101.57	0.39
Reach 1	1	5-yr	8183.00	825.74	841.03		841.97	0.003309	7.79	1068.88	120.79	0.43
Reach 1	1	10-yr	10359.00	825.74	853.00		853.25	0.000340	4.17	3260.15	224.20	0.16
Reach 1	1	25-yr	13354.00	825.74	843.77		845.28	0.003939	9.94	1432.61	145.22	0.49
Reach 1	1	50-yr	15780.00	825.74	859.95		860.24	0.000284	4.58	4919.57	253.02	0.15
Reach 1	1	100-yr	18250.00	825.74	860.94		861.29	0.000335	5.08	5170.07	255.48	0.16
Reach 1	1	500-yr	24913.00	825.74	861.89		862.48	0.000556	6.68	5413.41	258.75	0.21
Reach 1	0	2-yr	5291.00	826.84	835.43	835.43	837.74	0.022827	12.18	434.55	95.69	1.01
Reach 1	0	5-yr	8183.00	826.84	837.12	837.12	839.94	0.021247	13.48	606.87	108.42	1.00
Reach 1	0	10-yr	10359.00	826.84	853.00	838.16	853.14	0.000228	3.26	4843.58	397.00	0.13
Reach 1	0	25-yr	13354.00	826.84	839.45	839.45	843.04	0.019921	15.20	878.60	124.61	1.01
Reach 1	0	50-yr	15780.00	826.84	860.00	840.39	860.14	0.000163	3.36	7880.58	469.00	0.11
Reach 1	0	100-yr	18250.00	826.84	861.00	841.23	861.17	0.000188	3.71	8354.08	478.00	0.12
Reach 1	0	500-yr	24913.00	826.84	862.00	843.49	862.28	0.000306	4.83	8891.08	556.00	0.16

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp 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: Little River
Project File : LittleRiver.prj
Run Date and Time: 6/26/2008 9:59:02 AM

Project in English units

PLAN DATA

Plan Title: Little River Full (Allatoona)
Plan File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.p01

Geometry Title: Little River Full
Geometry File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.g02

Flow Title : Abnormal Floods (Lake Allatoona)
Flow File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.f02

Plan Summary Information:

Number of:	Cross Sections	= 4	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
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: Abnormal Floods (Lake Allatoona)
Flow File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.f02

Flow Data (cfs)

River	Reach	RS	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
Little River	Reach 1	3	5291	8183	10359	13354	15780	18250	24913

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Little River	Reach 1	2-yr		Known WS = 0
Little River	Reach 1	5-yr		Known WS = 0
Little River	Reach 1	10-yr		Known WS = 853
Little River	Reach 1	25-yr		Known WS = 0
Little River	Reach 1	50-yr		Known WS = 860
Little River	Reach 1	100-yr		Known WS = 861
Little River	Reach 1	500-yr		Known WS = 862

GEOMETRY DATA

Geometry Title: Little River Full
Geometry File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.g02

CROSS SECTION

RIVER: Little River
REACH: Reach 1 RS: 3

INPUT
Description: Approach Section
Station Elevation Data num= 131

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4615	900	4667	899	4682	898	4700	897	4710	896
4719	895	4727	894	4733	893	4737	892	4742	891
4748	890	4754	889	4760	888	4767	887	4775	886
4780	885	4782	884	4785	883	4786	882	4788	881
4790	880	4792	879	4794	878	4795	877	4797	876
4799	875	4800	874	4802	873	4804	872	4806	871
4807	870	4809	869	4811	868	4813	867	4815	866
4816	865	4843	864	4845	863	4848	862	4850	861
4852	860	4854	859	4856	858	4858	857	4860	856
4862	855	4864	854	4866	853	4869	852	4871	851
4874	850	4876	849	4879	848	4900	847	4905	846
4925	835.5	4985	827.26	5040	834.44	5055	841.34	5080	842
5120	843	5135	844	5150	845	5190	846	5298	847
5312	848	5325	849	5337	850	5346	851	5356	852
5365	853	5374	854	5380	855	5390	856	5396	857
5402	858	5409	859	5416	860	5423	861	5430	862
5437	863	5445	864	5450	865	5466	866	5485	867
5525	868	5565	869	5619	868	5623	867	5628	866
5635	865	5655	864	5710	864	5728	865	5780	865
5850	864	5908	864	5945	865	5960	866	5975	867
5990	868	6011	869	6056	870	6075	871	6080	872
6088	873	6098	874	6107	875	6119	876	6129	877
6140	878	6152	879	6160	880	6165	881	6168	882
6173	883	6177	884	6181	885	6185	886	6190	887
6195	888	6203	889	6208	890	6212	891	6216	892
6220	893	6225	894	6232	895	6238	896	6244	897
6250	898								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4615	.12	4905	.05	5055	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4905	5055	380	410	405	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

E.G. Elev (ft)	841.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.		0.050	

```
  W.S. Elev (ft)            840.72    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)                   1171.67
  E.G. Slope (ft/ft)      0.001388    Area (sq ft)                        1171.67
  Q Total (cfs)            5291.00    Flow (cfs)                          5291.00
  Top Width (ft)            138.58    Top Width (ft)                       138.58
  Vel Total (ft/s)            4.52    Avg. Vel. (ft/s)                       4.52
  Max Chl Dpth (ft)          13.46    Hydr. Depth (ft)                       8.45
  Conv. Total (cfs)       141997.8    Conv. (cfs)                        141997.8
  Length Wtd. (ft)          410.00    Wetted Per. (ft)                     142.27
  Min Ch El (ft)            827.26    Shear (lb/sq ft)                       0.71
  Alpha                       1.00    Stream Power (lb/ft s)                 3.22
  Frctn Loss (ft)             0.69    Cum Volume (acre-ft)        0.00      19.70
0.01
  C & E Loss (ft)             0.02    Cum SA (acres)              0.01       2.42
0.05


CROSS SECTION OUTPUT  Profile #5-yr

  E.G. Elev (ft)            843.60    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.45    Wt. n-Val.                              0.050
0.120
  W.S. Elev (ft)            843.15    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)                   1517.29
63.15
  E.G. Slope (ft/ft)      0.001482    Area (sq ft)                        1517.29
63.15
  Q Total (cfs)            8183.00    Flow (cfs)                          8154.15
28.86
  Top Width (ft)            211.82    Top Width (ft)                       144.57
67.25
  Vel Total (ft/s)            5.18    Avg. Vel. (ft/s)                       5.37
0.46
  Max Chl Dpth (ft)          15.89    Hydr. Depth (ft)                      10.50
0.94
  Conv. Total (cfs)       212596.6    Conv. (cfs)                        211847.0
749.7
  Length Wtd. (ft)          409.97    Wetted Per. (ft)                     149.00
67.27
  Min Ch El (ft)            827.26    Shear (lb/sq ft)                       0.94
0.09
  Alpha                       1.07    Stream Power (lb/ft s)                 5.06
0.04
  Frctn Loss (ft)             0.76    Cum Volume (acre-ft)        0.13      25.01
0.63
  C & E Loss (ft)             0.03    Cum SA (acres)              0.13       2.49
0.53


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)            853.46    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.11    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            853.34    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         194.04    3038.71
2301.94
  E.G. Slope (ft/ft)      0.000181    Area (sq ft)              194.04    3038.71
2301.94
  Q Total (cfs)           10359.00    Flow (cfs)                 91.26    8820.34
1447.40
  Top Width (ft)            502.78    Top Width (ft)             39.69     150.00
313.10
  Vel Total (ft/s)            1.87    Avg. Vel. (ft/s)            0.47       2.90
0.63
  Max Chl Dpth (ft)          26.08    Hydr. Depth (ft)            4.89      20.26
7.35
  Conv. Total (cfs)       770683.8    Conv. (cfs)               6789.2   656211.3
107683.2
  Length Wtd. (ft)          408.58    Wetted Per. (ft)           40.85     155.13
313.50
```

```
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.05       0.22
0.08
  Alpha                       2.06    Stream Power (lb/ft s)      0.03       0.64
0.05
  Frctn Loss (ft)             0.10    Cum Volume (acre-ft)       14.78      55.50
17.70
  C & E Loss (ft)             0.01    Cum SA (acres)              1.91       2.59
2.28


CROSS SECTION OUTPUT  Profile #25-yr

  E.G. Elev (ft)            847.18    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.63    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            846.55    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)           0.74    2018.98
418.03
  E.G. Slope (ft/ft)      0.001537    Area (sq ft)                0.74    2018.98
418.03
  Q Total (cfs)           13354.00    Flow (cfs)                  0.15   13015.36
338.49
  Top Width (ft)            346.68    Top Width (ft)              2.73     150.00
193.95
  Vel Total (ft/s)            5.48    Avg. Vel. (ft/s)            0.20       6.45
0.81
  Max Chl Dpth (ft)          19.29    Hydr. Depth (ft)            0.27      13.46
2.16
  Conv. Total (cfs)       340619.2    Conv. (cfs)                  3.8   331981.4
8633.9
  Length Wtd. (ft)          409.81    Wetted Per. (ft)            2.78     155.13
194.05
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.03       1.25
0.21
  Alpha                       1.35    Stream Power (lb/ft s)      0.01       8.05
0.17
  Frctn Loss (ft)             0.84    Cum Volume (acre-ft)        0.90      32.48
3.06
  C & E Loss (ft)             0.06    Cum SA (acres)              0.47       2.57
1.22


Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate
the need for
         additional cross sections.

CROSS SECTION OUTPUT  Profile #50-yr

  E.G. Elev (ft)            860.41    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.10    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            860.31    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         518.94    4083.37
4662.94
  E.G. Slope (ft/ft)      0.000124    Area (sq ft)              518.94    4083.37
4662.94
  Q Total (cfs)           15780.00    Flow (cfs)                313.89   11948.89
3517.23
  Top Width (ft)            566.78    Top Width (ft)             53.62     150.00
363.16
  Vel Total (ft/s)            1.70    Avg. Vel. (ft/s)            0.60       2.93
0.75
  Max Chl Dpth (ft)          33.05    Hydr. Depth (ft)            9.68      27.22
12.84
  Conv. Total (cfs)       1418099.0    Conv. (cfs)              28207.9   1073809.0
316082.2
  Length Wtd. (ft)          407.61    Wetted Per. (ft)           56.42     155.13
364.06
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.07       0.20
0.10
  Alpha                       2.28    Stream Power (lb/ft s)      0.04       0.60
0.07
```

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  Frctn Loss (ft)             0.07    Cum Volume (acre-ft)       29.50      73.55
35.46
  C & E Loss (ft)             0.02    Cum SA (acres)              2.31       2.59
2.81


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

CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            861.49    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.12    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            861.37    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         576.85    4242.23
5051.48
  E.G. Slope (ft/ft)      0.000142    Area (sq ft)              576.85    4242.23
5051.48
  Q Total (cfs)           18250.00    Flow (cfs)                389.63   13619.58
4240.79
  Top Width (ft)            576.31    Top Width (ft)             55.74     150.00
370.57
  Vel Total (ft/s)            1.85    Avg. Vel. (ft/s)            0.68       3.21
0.84
  Max Chl Dpth (ft)          34.11    Hydr. Depth (ft)           10.35      28.28
13.63
  Conv. Total (cfs)       1533388.0    Conv. (cfs)              32737.0   1144335.0
356316.7
  Length Wtd. (ft)          407.49    Wetted Per. (ft)           58.79     155.13
371.55
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.09       0.24
0.12
  Alpha                       2.30    Stream Power (lb/ft s)      0.06       0.78
0.10
  Frctn Loss (ft)             0.08    Cum Volume (acre-ft)       31.84      76.17
38.40
  C & E Loss (ft)             0.02    Cum SA (acres)              2.35       2.59
2.88


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 #500-yr

  E.G. Elev (ft)            862.82    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.20    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            862.62    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         648.26    4429.71
5520.10
  E.G. Slope (ft/ft)      0.000221    Area (sq ft)              648.26    4429.71
5520.10
  Q Total (cfs)           24913.00    Flow (cfs)                569.97   18293.87
6049.16
  Top Width (ft)            588.17    Top Width (ft)             58.85     150.00
379.32
  Vel Total (ft/s)            2.35    Avg. Vel. (ft/s)            0.88       4.13
1.10
  Max Chl Dpth (ft)          35.36    Hydr. Depth (ft)           11.02      29.53
14.55
  Conv. Total (cfs)       1674842.0    Conv. (cfs)              38317.5   1229854.0
406670.9
  Length Wtd. (ft)          407.36    Wetted Per. (ft)           62.16     155.13
380.38
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.14       0.39
0.20
```

Alpha	2.32	Stream Power (lb/ft s)	0.13	1.63	0.22
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	34.42	78.92	41.75
C & E Loss (ft)	0.04	Cum SA (acres)	2.61	2.59	2.97

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

RIVER: Little River
REACH: Reach 1 RS: 2

INPUT
Description: Upstream of bridge
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4673	892.86	4690	892.2	4712	891.2	4727	890.2	4732	889.2
4737	888.2	4741	887.2	4745	886.2	4750	885.2	4755	884.2
4769	883.2	4771	882.2	4774	881.2	4776	880.2	4779	879.2
4781	878.2	4784	877.2	4786	876.2	4788	875.2	4791	874.2
4794	873.2	4796	872.2	4798	871.2	4801	870.2	4824	869.8
4826	868.2	4828	867.2	4831	866.2	4833	865.2	4836	864.2
4840	863.2	4843	862.2	4845	861.2	4846	860.2	4848	859.2
4851	858.2	4854	857.2	4856	856.2	4859	855.2	4861	854.2
4864	853.2	4866	852.2	4869	851.2	4871	850.2	4875	849.2
4878	848.2	4880	847.2	4887	846.2	4898	845.2	4908	845.2
4924	844.2	4933	843.2	4938	842.2	4945	841.2	4948	840.2
4951	839.2	4952	838.2	4953	836.2	4955	835.2	4960	834.2
4965	833.2	4970	832.2	4975	831.2	4980	830.2	4985	829.2
4990	828.2	4995	827.2	5000	825.74	5005	826.2	5010	827.2
5016	828.2	5021	829.2	5027	830.2	5033	831.2	5038	832.2
5043	833.2	5048	834.2	5049	835.2	5051	836.2	5052	838.2
5053	839.2	5063	840.2	5067	841.2	5070	842.2	5072	843.2
5074	844.2	5076	845.2	5077	846.2	5079	847.2	5081	848.2
5082	849.2	5083	850.2	5085	851.2	5087	852.2	5089	853.2
5091	854.2	5092	855.2	5094	856.2	5095	857.2	5096	858.2
5098	859.2	5100	860.2	5101	861.2	5103	862.2	5105	863.2
5106	864.2	5108	865.2	5110	866.2	5112	867.2	5114	868.2
5116	869.2	5118	870.2	5120	871.2	5122	872.2	5125	873.2
5127	874.2	5129	875.2	5132	876.2	5134	877.2	5149	878.2
5152	879.2	5154	880.2	5156	881.2	5159	882.2	5161	883.2
5164	884.2	5166	885.2	5170	886.2	5173	887.2	5176	888.2
5178	889.2	5181	890.2	5185	891.2	5187	892.2	5190	893.2
5195	894.2	5200	895.2	5205	896.2	5210	897.2	5215	898.2
5220	899.2	5225	900.2	5230	901.2	5235	902.2	5240	903.2
5247	904.2	5253	905.2	5259	906.2	5266	907.2	5278	908.2
5291	909.2	5304	910.2	5318	911.2	5336	912.2	5360	912.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4673	.12	4951	.05	5053	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4951	5053	290	290	290	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

E.G. Elev (ft)	840.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	839.81	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)		Flow Area (sq ft)	0.56	925.33	1.88
E.G. Slope (ft/ft)	0.002110	Area (sq ft)	0.56	925.33	1.88
Q Total (cfs)	5291.00	Flow (cfs)	0.14	5290.38	0.48

Top Width (ft)	109.97	Top Width (ft)	1.84	102.00	6.13
Vel Total (ft/s)	5.70	Avg. Vel. (ft/s)	0.25	5.72	0.26
Max Chl Dpth (ft)	14.07	Hydr. Depth (ft)	0.31	9.07	0.31
Conv. Total (cfs)	115190.3	Conv. (cfs)	3.1	115176.7	10.5
Length Wtd. (ft)	290.00	Wetted Per. (ft)	1.94	107.95	6.16
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.04	1.13	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.01	6.45	0.01
Frctn Loss (ft)	0.71	Cum Volume (acre-ft)	0.00	9.83	0.01
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	1.29	0.02

CROSS SECTION OUTPUT Profile #5-yr

E.G. Elev (ft)	842.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.78	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	842.02	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)		Flow Area (sq ft)	13.32	1150.86	29.56
E.G. Slope (ft/ft)	0.002419	Area (sq ft)	13.32	1150.86	29.56
Q Total (cfs)	8183.00	Flow (cfs)	8.63	8148.12	26.25
Top Width (ft)	130.24	Top Width (ft)	11.77	102.00	16.47
Vel Total (ft/s)	6.85	Avg. Vel. (ft/s)	0.65	7.08	0.89
Max Chl Dpth (ft)	16.28	Hydr. Depth (ft)	1.13	11.28	1.79
Conv. Total (cfs)	166377.6	Conv. (cfs)	175.4	165668.5	533.8
Length Wtd. (ft)	290.00	Wetted Per. (ft)	12.15	107.95	16.78
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.17	1.61	0.27
Alpha	1.06	Stream Power (lb/ft s)	0.11	11.40	0.24
Frctn Loss (ft)	0.82	Cum Volume (acre-ft)	0.08	12.46	0.19
C & E Loss (ft)	0.02	Cum SA (acres)	0.07	1.33	0.14

CROSS SECTION OUTPUT Profile #10-yr

E.G. Elev (ft)	853.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	853.10	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)		Flow Area (sq ft)	680.78	2280.56	321.40
E.G. Slope (ft/ft)	0.000334	Area (sq ft)	680.78	2280.56	321.40
Q Total (cfs)	10359.00	Flow (cfs)	599.65	9463.88	295.47
Top Width (ft)	224.60	Top Width (ft)	86.80	102.00	35.80
Vel Total (ft/s)	3.16	Avg. Vel. (ft/s)	0.88	4.15	0.92
Max Chl Dpth (ft)	27.36	Hydr. Depth (ft)	7.84	22.36	8.98
Conv. Total (cfs)	566919.3	Conv. (cfs)	32817.3	517931.9	16170.1

Length Wtd. (ft)	290.00	Wetted Per. (ft)	88.63	107.95	39.24
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.16	0.44	0.17
Alpha	1.59	Stream Power (lb/ft s)	0.14	1.83	0.16
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	10.97	30.46	5.51
C & E Loss (ft)	0.00	Cum SA (acres)	1.36	1.41	0.66

CROSS SECTION OUTPUT Profile #25-yr

E.G. Elev (ft)	846.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.24	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	845.04	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)		Flow Area (sq ft)	81.81	1458.45	88.84
E.G. Slope (ft/ft)	0.002851	Area (sq ft)	81.81	1458.45	88.84
Q Total (cfs)	13354.00	Flow (cfs)	85.71	13126.51	141.78
Top Width (ft)	165.11	Top Width (ft)	40.43	102.00	22.68
Vel Total (ft/s)	8.20	Avg. Vel. (ft/s)	1.05	9.00	1.60
Max Chl Dpth (ft)	19.30	Hydr. Depth (ft)	2.02	14.30	3.92
Conv. Total (cfs)	250120.6	Conv. (cfs)	1605.3	245859.6	2655.6
Length Wtd. (ft)	290.00	Wetted Per. (ft)	41.01	107.95	23.68
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.36	2.40	0.67
Alpha	1.19	Stream Power (lb/ft s)	0.37	21.64	1.07
Frctn Loss (ft)	0.97	Cum Volume (acre-ft)	0.54	16.12	0.70
C & E Loss (ft)	0.03	Cum SA (acres)	0.28	1.38	0.21

CROSS SECTION OUTPUT Profile #50-yr

E.G. Elev (ft)	860.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	860.04	Reach Len. (ft)	290.00	290.00	290.00
Crit W.S. (ft)		Flow Area (sq ft)	1345.59	2988.35	606.95
E.G. Slope (ft/ft)	0.000281	Area (sq ft)	1345.59	2988.35	606.95
Q Total (cfs)	15780.00	Flow (cfs)	1503.30	13630.51	646.19
Top Width (ft)	253.36	Top Width (ft)	104.68	102.00	46.68
Vel Total (ft/s)	3.19	Avg. Vel. (ft/s)	1.12	4.56	1.06
Max Chl Dpth (ft)	34.30	Hydr. Depth (ft)	12.85	29.30	13.00
Conv. Total (cfs)	940845.0	Conv. (cfs)	89630.6	812687.1	38527.4
Length Wtd. (ft)	290.00	Wetted Per. (ft)	107.85	107.95	52.29
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.22	0.49	0.20
Alpha	1.78	Stream Power (lb/ft s)	0.24	2.22	0.22
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	21.37	40.27	10.96

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  C & E Loss (ft)             0.00    Cum SA (acres)              1.62       1.41
0.91


CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            861.38    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.34    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            861.04    Reach Len. (ft)           290.00     290.00
290.00
  Crit W.S. (ft)                      Flow Area (sq ft)        1450.93    3090.37
654.28
  E.G. Slope (ft/ft)      0.000331    Area (sq ft)             1450.93    3090.37
654.28
  Q Total (cfs)           18250.00    Flow (cfs)               1831.80   15638.96
779.24
  Top Width (ft)            255.68    Top Width (ft)            105.84     102.00
47.84
  Vel Total (ft/s)            3.51    Avg. Vel. (ft/s)            1.26       5.06
1.19
  Max Chl Dpth (ft)          35.30    Hydr. Depth (ft)           13.71      30.30
13.68
  Conv. Total (cfs)       1002939.0    Conv. (cfs)             100667.4   859448.4
42823.6
  Length Wtd. (ft)          290.00    Wetted Per. (ft)          109.40     107.95
53.84
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.27       0.59
0.25
  Alpha                       1.80    Stream Power (lb/ft s)      0.35       2.99
0.30
  Frctn Loss (ft)             0.10    Cum Volume (acre-ft)       23.00      41.66
11.88
  C & E Loss (ft)             0.00    Cum SA (acres)              1.65       1.41
0.93


CROSS SECTION OUTPUT  Profile #500-yr

  E.G. Elev (ft)            862.64    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.59    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            862.06    Reach Len. (ft)           290.00     290.00
290.00
  Crit W.S. (ft)                      Flow Area (sq ft)        1559.37    3194.02
703.78
  E.G. Slope (ft/ft)      0.000545    Area (sq ft)             1559.37    3194.02
703.78
  Q Total (cfs)           24913.00    Flow (cfs)               2615.95   21197.13
1099.93
  Top Width (ft)            259.42    Top Width (ft)            107.71     102.00
49.71
  Vel Total (ft/s)            4.57    Avg. Vel. (ft/s)            1.68       6.64
1.56
  Max Chl Dpth (ft)          36.32    Hydr. Depth (ft)           14.48      31.31
14.16
  Conv. Total (cfs)       1067207.0    Conv. (cfs)             112060.2   908028.9
47117.9
  Length Wtd. (ft)          290.00    Wetted Per. (ft)          111.54     107.95
55.98
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.48       1.01
0.43
  Alpha                       1.82    Stream Power (lb/ft s)      0.80       6.68
0.67
  Frctn Loss (ft)             0.16    Cum Volume (acre-ft)       24.79      43.04
12.82
  C & E Loss (ft)             0.00    Cum SA (acres)              1.88       1.41
0.97


CROSS SECTION


RIVER: Little River
REACH: Reach 1            RS: 1
```

INPUT
Description: Downstream of bridge
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4673	892.86	4690	892.2	4712	891.2	4727	890.2	4732	889.2
4737	888.2	4741	887.2	4745	886.2	4750	885.2	4755	884.2
4769	883.2	4771	882.2	4774	881.2	4776	880.2	4779	879.2
4781	878.2	4784	877.2	4786	876.2	4788	875.2	4791	874.2
4794	873.2	4796	872.2	4798	871.2	4801	870.2	4824	869.8
4826	868.2	4828	867.2	4831	866.2	4833	865.2	4836	864.2
4840	863.2	4843	862.2	4845	861.2	4846	860.2	4848	859.2
4851	858.2	4854	857.2	4856	856.2	4859	855.2	4861	854.2
4864	853.2	4866	852.2	4869	851.2	4871	850.2	4875	849.2
4878	848.2	4880	847.2	4887	846.2	4898	845.2	4908	845.2
4924	844.2	4933	843.2	4938	842.2	4945	841.2	4948	840.2
4951	839.2	4952	838.2	4953	836.2	4955	835.2	4960	834.2
4965	833.2	4970	832.2	4975	831.2	4980	830.2	4985	829.2
4990	828.2	4995	827.2	5000	825.74	5005	826.2	5010	827.2
5016	828.2	5021	829.2	5027	830.2	5033	831.2	5038	832.2
5043	833.2	5048	834.2	5049	835.2	5051	836.2	5052	838.2
5053	839.2	5063	840.2	5067	841.2	5070	842.2	5072	843.2
5074	844.2	5076	845.2	5077	846.2	5079	847.2	5081	848.2
5082	849.2	5083	850.2	5085	851.2	5087	852.2	5089	853.2
5091	854.2	5092	855.2	5094	856.2	5095	857.2	5096	858.2
5098	859.2	5100	860.2	5101	861.2	5103	862.2	5105	863.2
5106	864.2	5108	865.2	5110	866.2	5112	867.2	5114	868.2
5116	869.2	5118	870.2	5120	871.2	5122	872.2	5125	873.2
5127	874.2	5129	875.2	5132	876.2	5134	877.2	5149	878.2
5152	879.2	5154	880.2	5156	881.2	5159	882.2	5161	883.2
5164	884.2	5166	885.2	5170	886.2	5173	887.2	5176	888.2
5178	889.2	5181	890.2	5185	891.2	5187	892.2	5190	893.2
5195	894.2	5200	895.2	5205	896.2	5210	897.2	5215	898.2
5220	899.2	5225	900.2	5230	901.2	5235	902.2	5240	903.2
5247	904.2	5253	905.2	5259	906.2	5266	907.2	5278	908.2
5291	909.2	5304	910.2	5318	911.2	5336	912.2	5360	912.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4673	.12	4951	.05	5053	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4951	5053	265	270	284	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

E.G. Elev (ft)	839.60	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.61	Wt. n-Val.		0.050
W.S. Elev (ft)	838.98	Reach Len. (ft)	265.00	270.00
284.00				
Crit W.S. (ft)		Flow Area (sq ft)		840.84
E.G. Slope (ft/ft)	0.002882	Area (sq ft)		840.84
Q Total (cfs)	5291.00	Flow (cfs)		5291.00
Top Width (ft)	101.57	Top Width (ft)		101.57
Vel Total (ft/s)	6.29	Avg. Vel. (ft/s)		6.29
Max Chl Dpth (ft)	13.24	Hydr. Depth (ft)		8.28
Conv. Total (cfs)	98559.9	Conv. (cfs)		98559.9
Length Wtd. (ft)	270.00	Wetted Per. (ft)		107.34
Min Ch El (ft)	825.74	Shear (lb/sq ft)		1.41
Alpha	1.00	Stream Power (lb/ft s)		8.87
Frctn Loss (ft)	1.69	Cum Volume (acre-ft)		3.95
C & E Loss (ft)	0.17	Cum SA (acres)		0.61

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
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 #5-yr

```
  E.G. Elev (ft)            841.97    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.94    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            841.03    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)           5.01    1049.23
14.65
  E.G. Slope (ft/ft)      0.003309    Area (sq ft)                5.01    1049.23
14.65
  Q Total (cfs)            8183.00    Flow (cfs)                  3.25    8168.72
11.04
  Top Width (ft)            120.79    Top Width (ft)              5.48     102.00
13.31
  Vel Total (ft/s)            7.66    Avg. Vel. (ft/s)            0.65       7.79
0.75
  Max Chl Dpth (ft)          15.29    Hydr. Depth (ft)            0.91      10.29
1.10
  Conv. Total (cfs)       142258.1    Conv. (cfs)                 56.4   142009.8
191.9
  Length Wtd. (ft)          270.01    Wetted Per. (ft)            5.78     107.95
13.46
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.18       2.01
0.22
  Alpha                       1.03    Stream Power (lb/ft s)      0.12      15.63
0.17
  Frctn Loss (ft)             1.84    Cum Volume (acre-ft)        0.02       5.13
0.05
  C & E Loss (ft)             0.19    Cum SA (acres)              0.02       0.65
0.04


Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate
the need for
         additional cross sections.
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 #10-yr

  E.G. Elev (ft)            853.25    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.25    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            853.00    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         672.05    2270.29
317.80
  E.G. Slope (ft/ft)      0.000340    Area (sq ft)              672.05    2270.29
317.80
  Q Total (cfs)           10359.00    Flow (cfs)                592.87    9472.56
293.56
  Top Width (ft)            224.20    Top Width (ft)             86.60     102.00
35.60
  Vel Total (ft/s)            3.18    Avg. Vel. (ft/s)            0.88       4.17
0.92
  Max Chl Dpth (ft)          27.26    Hydr. Depth (ft)            7.76      22.26
8.93
  Conv. Total (cfs)       562156.5    Conv. (cfs)              32173.8   514051.7
15931.0
  Length Wtd. (ft)          270.13    Wetted Per. (ft)           88.40     107.95
39.02
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.16       0.45
0.17
  Alpha                       1.58    Stream Power (lb/ft s)      0.14       1.86
0.16
  Frctn Loss (ft)             0.07    Cum Volume (acre-ft)        6.47      15.31
3.38
  C & E Loss (ft)             0.03    Cum SA (acres)              0.78       0.73
0.42
```

CROSS SECTION OUTPUT Profile #25-yr

E.G. Elev (ft)	845.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.52	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	843.77	Reach Len. (ft)	265.00	270.00	284.00
Crit W.S. (ft)		Flow Area (sq ft)	42.61	1328.44	61.56
E.G. Slope (ft/ft)	0.003939	Area (sq ft)	42.61	1328.44	61.56
Q Total (cfs)	13354.00	Flow (cfs)	49.08	13206.42	98.50
Top Width (ft)	145.22	Top Width (ft)	23.09	102.00	20.13
Vel Total (ft/s)	9.32	Avg. Vel. (ft/s)	1.15	9.94	1.60
Max Chl Dpth (ft)	18.03	Hydr. Depth (ft)	1.85	13.02	3.06
Conv. Total (cfs)	212781.9	Conv. (cfs)	782.1	210430.4	1569.4
Length Wtd. (ft)	270.04	Wetted Per. (ft)	23.61	107.95	20.84
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.44	3.03	0.73
Alpha	1.13	Stream Power (lb/ft s)	0.51	30.08	1.16
Frctn Loss (ft)	2.04	Cum Volume (acre-ft)	0.13	6.84	0.20
C & E Loss (ft)	0.21	Cum SA (acres)	0.07	0.70	0.07

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
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 #50-yr

E.G. Elev (ft)	860.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	859.95	Reach Len. (ft)	265.00	270.00	284.00
Crit W.S. (ft)		Flow Area (sq ft)	1336.79	2979.76	603.02
E.G. Slope (ft/ft)	0.000284	Area (sq ft)	1336.79	2979.76	603.02
Q Total (cfs)	15780.00	Flow (cfs)	1496.76	13638.98	644.26
Top Width (ft)	253.02	Top Width (ft)	104.51	102.00	46.51
Vel Total (ft/s)	3.21	Avg. Vel. (ft/s)	1.12	4.58	1.07
Max Chl Dpth (ft)	34.21	Hydr. Depth (ft)	12.79	29.21	12.97
Conv. Total (cfs)	935759.7	Conv. (cfs)	88758.3	808796.3	38205.1
Length Wtd. (ft)	270.18	Wetted Per. (ft)	107.66	107.95	52.10
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.22	0.49	0.21
Alpha	1.78	Stream Power (lb/ft s)	0.25	2.24	0.22
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	12.44	20.40	6.93

```
  C & E Loss (ft)             0.04    Cum SA (acres)              0.93       0.73
0.59


CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            861.29    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.35    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            860.94    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)        1440.38    3080.19
649.51
  E.G. Slope (ft/ft)      0.000335    Area (sq ft)             1440.38    3080.19
649.51
  Q Total (cfs)           18250.00    Flow (cfs)               1822.62   15651.37
776.01
  Top Width (ft)            255.48    Top Width (ft)            105.74     102.00
47.74
  Vel Total (ft/s)            3.53    Avg. Vel. (ft/s)            1.27       5.08
1.19
  Max Chl Dpth (ft)          35.20    Hydr. Depth (ft)           13.62      30.20
13.61
  Conv. Total (cfs)       996649.3    Conv. (cfs)              99535.2   854735.6
42378.6
  Length Wtd. (ft)          270.20    Wetted Per. (ft)          109.26     107.95
53.70
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.28       0.60
0.25
  Alpha                       1.79    Stream Power (lb/ft s)      0.35       3.03
0.30
  Frctn Loss (ft)             0.07    Cum Volume (acre-ft)       13.37      21.12
7.54
  C & E Loss (ft)             0.05    Cum SA (acres)              0.94       0.73
0.62


CROSS SECTION OUTPUT  Profile #500-yr

  E.G. Elev (ft)            862.48    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.60    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            861.89    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)        1541.21    3176.79
695.41
  E.G. Slope (ft/ft)      0.000556    Area (sq ft)             1541.21    3176.79
695.41
  Q Total (cfs)           24913.00    Flow (cfs)               2597.42   21221.44
1094.15
  Top Width (ft)            258.75    Top Width (ft)            107.37     102.00
49.37
  Vel Total (ft/s)            4.60    Avg. Vel. (ft/s)            1.69       6.68
1.57
  Max Chl Dpth (ft)          36.15    Hydr. Depth (ft)           14.35      31.15
14.08
  Conv. Total (cfs)       1056420.0    Conv. (cfs)             110141.8   899881.9
46396.7
  Length Wtd. (ft)          270.21    Wetted Per. (ft)          111.16     107.95
55.60
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.48       1.02
0.43
  Alpha                       1.81    Stream Power (lb/ft s)      0.81       6.83
0.68
  Frctn Loss (ft)             0.11    Cum Volume (acre-ft)       14.47      21.83
8.16
  C & E Loss (ft)             0.10    Cum SA (acres)              1.16       0.73
0.64


CROSS SECTION


RIVER: Little River
REACH: Reach 1            RS: 0
```

INPUT
Description: Exit Section
Station Elevation Data num= 153

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4440	900	4450	899	4455	898	4460	897	4465	896
4475	895	4480	894	4485	893	4495	892	4500	891
4505	890	4515	889	4520	888	4527	887	4534	886
4538	885	4542	884	4548	883	4552	882	4556	881
4561	880	4565	879	4570	878	4575	877	4580	876
4584	875	4588	874	4592	873	4597	872	4602	871
4606	870	4611	869	4615	868	4619	867	4622	866
4626	865	4630	864	4635	863	4638	862	4642	861
4682	861	4704	862	4722	862	4727	861	4731	860
4735	859	4740	858	4742	857	4748	856	4751	855
4755	854	4760	853	4765	852	4768	851	4773	850
4776	849	4782	848	4786	847	4790	846	4795	845
4800	844	4807	843	4814	842	4826	842	4853	843
4863	844	4925	844	4928	843	4931	842	4955	833.61
5000	826.84	5050	836.29	5064	839.72	5070	841	5076	842
5085	843	5100	844	5119	845	5129	846	5134	847
5139	847	5141	849	5144	850	5147	851	5152	852
5157	853	5162	854	5170	855	5175	856	5183	857
5190	858	5195	859	5200	860	5205	861	5212	862
5218	863	5225	864	5230	865	5235	866	5244	867
5260	868	5273	869	5286	870	5299	871	5320	872
5330	873	5338	874	5346	875	5353	876	5360	877
5366	878	5375	879	5382	880	5388	881	5392	882
5398	883	5404	884	5410	885	5416	886	5423	887
5431	888	5440	889	5448	890	5456	891	5463	892
5470	893	5483	894	5499	895	5530	895	5540	894
5546	893	5551	892	5556	891	5562	890	5571	889
5583	888	5590	887	5594	886	5600	885	5605	885
5614	886	5622	887	5630	888	5640	889	5650	890
5658	891	5664	892	5671	893	5682	894	5700	895
5705	896	5710	897	5720	898				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4440	.12	4931	.05	5064	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4931	5064	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

E.G. Elev (ft)	837.74	Element	Left OB	Channel
Right OB				
Vel Head (ft)	2.30	Wt. n-Val.		0.050
W.S. Elev (ft)	835.43	Reach Len. (ft)		
Crit W.S. (ft)	835.43	Flow Area (sq ft)		434.55
E.G. Slope (ft/ft)	0.022827	Area (sq ft)		434.55
Q Total (cfs)	5291.00	Flow (cfs)		5291.00
Top Width (ft)	95.69	Top Width (ft)		95.69
Vel Total (ft/s)	12.18	Avg. Vel. (ft/s)		12.18
Max Chl Dpth (ft)	8.59	Hydr. Depth (ft)		4.54
Conv. Total (cfs)	35020.1	Conv. (cfs)		35020.1
Length Wtd. (ft)		Wetted Per. (ft)		97.31
Min Ch El (ft)	826.84	Shear (lb/sq ft)		6.36
Alpha	1.00	Stream Power (lb/ft s)		77.48
Frctn Loss (ft)		Cum Volume (acre-ft)		
C & E Loss (ft)		Cum SA (acres)		

CROSS SECTION OUTPUT Profile #5-yr

E.G. Elev (ft)	839.94	Element	Left OB	Channel
Right OB				
Vel Head (ft)	2.82	Wt. n-Val.		0.050
W.S. Elev (ft)	837.12	Reach Len. (ft)		
Crit W.S. (ft)	837.12	Flow Area (sq ft)		606.87
E.G. Slope (ft/ft)	0.021247	Area (sq ft)		606.87
Q Total (cfs)	8183.00	Flow (cfs)		8183.00
Top Width (ft)	108.42	Top Width (ft)		108.42
Vel Total (ft/s)	13.48	Avg. Vel. (ft/s)		13.48
Max Chl Dpth (ft)	10.28	Hydr. Depth (ft)		5.60
Conv. Total (cfs)	56139.5	Conv. (cfs)		56139.5

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  Length Wtd. (ft)                    Wetted Per. (ft)                     110.50
  Min Ch El (ft)           826.84     Shear (lb/sq ft)                       7.28
  Alpha                      1.00     Stream Power (lb/ft s)                98.22
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)           853.14     Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.14     Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)           853.00     Reach Len. (ft)
  Crit W.S. (ft)           838.16     Flow Area (sq ft)        1453.50    2671.24
718.84
  E.G. Slope (ft/ft)      0.000228    Area (sq ft)             1453.50    2671.24
718.84
  Q Total (cfs)           10359.00    Flow (cfs)               1124.87    8715.54
518.59
  Top Width (ft)           397.00     Top Width (ft)            171.00     133.00
93.00
  Vel Total (ft/s)           2.14     Avg. Vel. (ft/s)            0.77       3.26
0.72
  Max Chl Dpth (ft)         26.16     Hydr. Depth (ft)            8.50      20.08
7.73
  Conv. Total (cfs)       686099.8    Conv. (cfs)              74502.5   577249.8
34347.5
  Length Wtd. (ft)                    Wetted Per. (ft)          172.58     136.23
94.83
  Min Ch El (ft)           826.84     Shear (lb/sq ft)            0.12       0.28
0.11
  Alpha                      1.98     Stream Power (lb/ft s)      0.09       0.91
0.08
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #25-yr

  E.G. Elev (ft)           843.04     Element                   Left OB    Channel
Right OB
  Vel Head (ft)              3.59     Wt. n-Val.                            0.050
  W.S. Elev (ft)           839.45     Reach Len. (ft)
  Crit W.S. (ft)           839.45     Flow Area (sq ft)                    878.60
  E.G. Slope (ft/ft)      0.019921    Area (sq ft)                         878.60
  Q Total (cfs)           13354.00    Flow (cfs)                        13354.00
  Top Width (ft)           124.61     Top Width (ft)                       124.61
  Vel Total (ft/s)          15.20     Avg. Vel. (ft/s)                      15.20
  Max Chl Dpth (ft)         12.61     Hydr. Depth (ft)                       7.05
  Conv. Total (cfs)        94614.9    Conv. (cfs)                         94614.9
  Length Wtd. (ft)                    Wetted Per. (ft)                     127.37
  Min Ch El (ft)           826.84     Shear (lb/sq ft)                       8.58
  Alpha                      1.00     Stream Power (lb/ft s)               130.39
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #50-yr

  E.G. Elev (ft)           860.14     Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.14     Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)           860.00     Reach Len. (ft)
  Crit W.S. (ft)           840.39     Flow Area (sq ft)        2754.00    3602.24
1524.34
  E.G. Slope (ft/ft)      0.000163    Area (sq ft)             2754.00    3602.24
1524.34
  Q Total (cfs)           15780.00    Flow (cfs)               2476.76   12112.26
1190.98
  Top Width (ft)           469.00     Top Width (ft)            200.00     133.00
136.00
  Vel Total (ft/s)           2.00     Avg. Vel. (ft/s)            0.90       3.36
0.78
  Max Chl Dpth (ft)         33.16     Hydr. Depth (ft)           13.77      27.08
11.21
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  Conv. Total (cfs)       1237881.0    Conv. (cfs)             194292.5   950160.6
93427.6
  Length Wtd. (ft)                     Wetted Per. (ft)          202.51     136.23
138.42
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.14       0.27
0.11
  Alpha                       2.21    Stream Power (lb/ft s)      0.12       0.90
0.09
  Frctn Loss (ft)                      Cum Volume (acre-ft)
  C & E Loss (ft)                      Cum SA (acres)


CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            861.17    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.17    Wt. n-Val.                  0.120      0.050
0.120
  W.S. Elev (ft)            861.00    Reach Len. (ft)
  Crit W.S. (ft)            841.23    Flow Area (sq ft)        2956.00    3735.24
1662.84
  E.G. Slope (ft/ft)      0.000188    Area (sq ft)             2956.00    3735.24
1662.84
  Q Total (cfs)           18250.00    Flow (cfs)               2958.77   13845.11
1446.13
  Top Width (ft)            478.00    Top Width (ft)            204.00     133.00
141.00
  Vel Total (ft/s)            2.18    Avg. Vel. (ft/s)            1.00       3.71
0.87
  Max Chl Dpth (ft)          34.16    Hydr. Depth (ft)           14.49      28.08
11.79
  Conv. Total (cfs)       1330475.0    Conv. (cfs)             215702.2   1009346.0
105426.5
  Length Wtd. (ft)                     Wetted Per. (ft)          206.63     136.23
143.52
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.17       0.32
0.14
  Alpha                       2.23    Stream Power (lb/ft s)      0.17       1.19
0.12
  Frctn Loss (ft)                      Cum Volume (acre-ft)
  C & E Loss (ft)                      Cum SA (acres)


CROSS SECTION OUTPUT  Profile #500-yr

  E.G. Elev (ft)            862.28    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.28    Wt. n-Val.                  0.120      0.050
0.120
  W.S. Elev (ft)            862.00    Reach Len. (ft)
  Crit W.S. (ft)            843.49    Flow Area (sq ft)        3215.50    3868.24
1807.34
  E.G. Slope (ft/ft)      0.000306    Area (sq ft)             3215.50    3868.24
1807.34
  Q Total (cfs)           24913.00    Flow (cfs)               4161.18   18701.37
2050.45
  Top Width (ft)            556.00    Top Width (ft)            275.00     133.00
148.00
  Vel Total (ft/s)            2.80    Avg. Vel. (ft/s)            1.29       4.83
1.13
  Max Chl Dpth (ft)          35.16    Hydr. Depth (ft)           11.69      29.08
12.21
  Conv. Total (cfs)       1425337.0    Conv. (cfs)             238071.6   1069954.0
117311.6
  Length Wtd. (ft)                     Wetted Per. (ft)          277.88     136.23
150.59
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.22       0.54
0.23
  Alpha                       2.28    Stream Power (lb/ft s)      0.29       2.62
0.26
  Frctn Loss (ft)                      Cum Volume (acre-ft)
  C & E Loss (ft)                      Cum SA (acres)


Warning: Divided flow computed for this cross-section.
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SUMMARY OF MANNING'S N VALUES

River:Little River

Reach	River Sta.	n1	n2	n3
Reach 1	3	.12	.05	.12
Reach 1	2	.12	.05	.12
Reach 1	1	.12	.05	.12
Reach 1	0	.12	.05	.12

SUMMARY OF REACH LENGTHS

River: Little River

Reach	River Sta.	Left	Channel	Right
Reach 1	3	380	410	405
Reach 1	2	290	290	290
Reach 1	1	265	270	284
Reach 1	0	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Little River

Reach	River Sta.	Contr.	Expan.
Reach 1	3	.1	.3
Reach 1	2	.1	.3
Reach 1	1	.1	.3
Reach 1	0	.1	.3

HEC-RAS EXISTING / PROPOSED BRIDGE MODEL

RIVER FLOODS

HEC-RAS Plan: Little River River: Little River Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	3	2-yr	5291.00	827.26	844.22		844.37	0.000450	3.13	1817.50	229.96	0.16
Reach 1	3	5-yr	8183.00	827.26	847.19		847.40	0.000486	3.74	2684.76	404.79	0.18
Reach 1	3	10-yr	10359.00	827.26	849.01		849.24	0.000483	4.04	3465.87	449.08	0.18
Reach 1	3	25-yr	13354.00	827.26	851.18		851.45	0.000477	4.38	4476.22	477.21	0.18
Reach 1	3	50-yr	15780.00	827.26	852.78		853.07	0.000471	4.60	5254.48	496.40	0.18
Reach 1	3	100-yr	18250.00	827.26	854.29		854.59	0.000464	4.80	6014.70	512.31	0.18
Reach 1	3	500-yr	24913.00	827.26	857.92		858.27	0.000450	5.25	7939.62	545.40	0.19
Reach 1	2	2-yr	5291.00	825.74	843.92	834.78	844.15	0.000593	3.89	1455.57	146.94	0.19
Reach 1	2	5-yr	8183.00	825.74	846.80	836.44	847.15	0.000709	4.85	1954.87	195.37	0.21
Reach 1	2	10-yr	10359.00	825.74	848.53	837.47	848.97	0.000779	5.45	2303.48	204.34	0.23
Reach 1	2	25-yr	13354.00	825.74	850.61	838.80	851.17	0.000861	6.16	2737.66	213.65	0.24
Reach 1	2	50-yr	15780.00	825.74	852.13	839.79	852.77	0.000914	6.67	3067.57	220.67	0.25
Reach 1	2	100-yr	18250.00	825.74	853.56	840.78	854.28	0.000960	7.13	3387.17	226.81	0.26
Reach 1	2	500-yr	24913.00	825.74	857.00	843.20	857.94	0.001056	8.22	4192.16	240.41	0.28
Reach 1	1.5		Bridge									
Reach 1	1	2-yr	5291.00	825.74	843.67		843.91	0.000635	3.97	1418.16	144.12	0.19
Reach 1	1	5-yr	8183.00	825.74	846.46		846.84	0.000765	4.97	1889.99	192.36	0.22
Reach 1	1	10-yr	10359.00	825.74	848.15		848.62	0.000845	5.59	2225.23	202.80	0.24
Reach 1	1	25-yr	13354.00	825.74	850.17		850.76	0.000936	6.33	2643.59	211.85	0.25
Reach 1	1	50-yr	15780.00	825.74	851.65		852.33	0.000995	6.85	2961.86	218.26	0.26
Reach 1	1	100-yr	18250.00	825.74	853.05		853.81	0.001046	7.33	3270.52	224.38	0.27
Reach 1	1	500-yr	24913.00	825.74	856.41		857.40	0.001152	8.45	4049.55	238.63	0.29
Reach 1	0	2-yr	5291.00	826.84	843.50	835.43	843.72	0.000700	3.73	1507.99	220.66	0.20
Reach 1	0	5-yr	8183.00	826.84	846.33	837.11	846.61	0.000701	4.37	2376.73	341.95	0.21
Reach 1	0	10-yr	10359.00	826.84	848.04	838.18	848.36	0.000700	4.73	2979.77	358.31	0.21
Reach 1	0	25-yr	13354.00	826.84	850.11	839.47	850.47	0.000701	5.16	3732.91	371.85	0.22
Reach 1	0	50-yr	15780.00	826.84	851.62	840.39	852.02	0.000700	5.45	4305.65	383.97	0.22
Reach 1	0	100-yr	18250.00	826.84	853.05	841.23	853.48	0.000701	5.73	4863.31	397.50	0.23
Reach 1	0	500-yr	24913.00	826.84	856.51	843.49	857.02	0.000700	6.37	6299.26	434.08	0.23

HEC-RAS Plan: Little River River: Little River Reach: Reach 1

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl	Flow Area
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)	(sq ft)
Reach 1	3	2-yr	844.37	844.22		0.21	0.01	229.96		5236.60	54.40	3.13	1817.50
Reach 1	3	5-yr	847.40	847.19		0.24	0.01	404.79	0.59	7914.10	268.31	3.74	2684.76
Reach 1	3	10-yr	849.24	849.01		0.25	0.02	449.08	16.71	9655.53	686.75	4.04	3465.87
Reach 1	3	25-yr	851.45	851.18		0.26	0.03	477.21	67.93	11878.05	1408.02	4.38	4476.22
Reach 1	3	50-yr	853.07	852.78		0.26	0.04	496.40	123.56	13585.03	2071.41	4.60	5254.48
Reach 1	3	100-yr	854.59	854.29		0.26	0.04	512.31	191.16	15258.51	2800.33	4.80	6014.70
Reach 1	3	500-yr	858.27	857.92		0.27	0.06	545.40	408.69	19548.61	4955.70	5.25	7939.62
Reach 1	2	2-yr	844.15	843.92	834.78	0.05	0.00	146.94	21.08	5228.80	41.12	3.89	1455.57
Reach 1	2	5-yr	847.15	846.80	836.44	0.07	0.00	195.37	119.42	7939.68	123.90	4.85	1954.87
Reach 1	2	10-yr	848.97	848.53	837.47	0.08	0.00	204.34	277.68	9882.50	198.82	5.45	2303.48
Reach 1	2	25-yr	851.17	850.61	838.80	0.08	0.00	213.65	550.47	12483.92	319.61	6.16	2737.66
Reach 1	2	50-yr	852.77	852.13	839.79	0.09	0.00	220.67	812.55	14545.31	422.15	6.67	3067.57
Reach 1	2	100-yr	854.28	853.56	840.78	0.10	0.00	226.81	1108.15	16605.83	536.02	7.13	3387.17
Reach 1	2	500-yr	857.94	857.00	843.20	0.11	0.00	240.41	2003.31	22013.37	896.32	8.22	4192.16
Reach 1	1.5 BR U	2-yr	844.10	843.84	834.86	0.13	0.00	137.59	11.87	5230.26	48.87	4.07	1376.88
Reach 1	1.5 BR U	5-yr	847.08	846.70	836.58	0.17	0.00	185.96	107.35	7920.84	154.80	5.06	1843.54
Reach 1	1.5 BR U	10-yr	848.90	848.42	837.65	0.19	0.00	195.38	275.63	9829.41	253.95	5.67	2173.99
Reach 1	1.5 BR U	25-yr	851.08	850.49	839.02	0.22	0.00	204.65	579.73	12354.11	420.16	6.39	2587.31
Reach 1	1.5 BR U	50-yr	852.68	852.00	840.03	0.24	0.00	211.52	881.75	14333.96	564.29	6.88	2902.45
Reach 1	1.5 BR U	100-yr	854.18	853.43	841.05	0.26	0.00	217.66	1228.51	16294.26	727.22	7.33	3208.80
Reach 1	1.5 BR U	500-yr	857.83	856.89	843.57	0.31	0.00	227.32	2334.00	21323.93	1255.08	8.33	3979.19
Reach 1	1.5 BR D	2-yr	843.97	843.71	834.86	0.06	0.01	136.11	10.71	5233.70	46.59	4.11	1358.53
Reach 1	1.5 BR D	5-yr	846.91	846.52	836.58	0.07	0.01	184.35	97.52	7935.34	150.14	5.13	1810.50
Reach 1	1.5 BR D	10-yr	848.70	848.21	837.65	0.08	0.01	194.55	258.16	9854.66	246.18	5.76	2133.42
Reach 1	1.5 BR D	25-yr	850.85	850.24	839.02	0.09	0.01	203.68	551.86	12391.11	411.03	6.49	2537.53
Reach 1	1.5 BR D	50-yr	852.43	851.73	840.03	0.10	0.01	210.17	847.92	14379.92	552.17	6.99	2845.70
Reach 1	1.5 BR D	100-yr	853.92	853.14	841.05	0.10	0.00	216.26	1187.58	16350.60	711.82	7.46	3145.31
Reach 1	1.5 BR D	500-yr	857.52	856.55	843.57	0.12	0.00	226.29	2273.29	21412.53	1227.18	8.48	3900.88
Reach 1	1	2-yr	843.91	843.67		0.18	0.01	144.12	18.47	5234.83	37.70	3.97	1418.16
Reach 1	1	5-yr	846.84	846.46		0.20	0.03	192.36	102.56	7962.90	117.54	4.97	1889.99
Reach 1	1	10-yr	848.62	848.15		0.21	0.04	202.80	249.31	9920.87	188.82	5.59	2225.23
Reach 1	1	25-yr	850.76	850.17		0.22	0.07	211.85	508.09	12537.43	308.48	6.33	2643.59
Reach 1	1	50-yr	852.33	851.65		0.22	0.08	218.26	763.13	14608.79	408.08	6.85	2961.86
Reach 1	1	100-yr	853.81	853.05		0.23	0.10	224.38	1049.99	16681.28	518.73	7.33	3270.52
Reach 1	1	500-yr	857.40	856.41		0.24	0.14	238.63	1920.99	22125.48	866.53	8.45	4049.55
Reach 1	0	2-yr	843.72	843.50	835.43			220.66	18.63	5254.81	17.56	3.73	1507.99

HEC-RAS Plan: Little River River: Little River Reach: Reach 1 (Continued)

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl	Flow Area
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)	(sq ft)
Reach 1	0	5-yr	846.61	846.33	837.11			341.95	268.83	7794.98	119.19	4.37	2376.73
Reach 1	0	10-yr	848.36	848.04	838.18			358.31	577.19	9525.10	256.71	4.73	2979.77
Reach 1	0	25-yr	850.47	850.11	839.47			371.85	1070.46	11789.67	493.87	5.16	3732.91
Reach 1	0	50-yr	852.02	851.62	840.39			383.97	1514.15	13566.99	698.86	5.45	4305.65
Reach 1	0	100-yr	853.48	853.05	841.23			397.50	1989.44	15343.22	917.34	5.73	4863.31
Reach 1	0	500-yr	857.02	856.51	843.49			434.08	3382.54	19970.15	1560.31	6.37	6299.26

```
                    HEC-RAS Version 3.1.3 May 2005
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California


          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX



PROJECT DATA
Project Title: Little River
Project File : LittleRiver.prj
Run Date and Time: 7/3/2008 12:31:44 PM

Project in English units



PLAN DATA

Plan Title: Little River Existing (Creek)
Plan File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.p04

           Geometry Title: Little River Existing
           Geometry File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-
RAS\LittleRiver.g01

           Flow Title    : River Floods
           Flow File     : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-
RAS\LittleRiver.f01

Plan Summary Information:
Number of:  Cross Sections =    4    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: River Floods
Flow File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.f01

Flow Data (cfs)

  River           Reach           RS                    2-yr            5-yr           10-
yr           25-yr           50-yr          100-yr          500-yr
  Little River    Reach 1         3                     5291            8183
10359           13354           15780           18250           24913


Boundary Conditions
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  River           Reach           Profile                       Upstream
Downstream

  Little River    Reach 1         2-yr
Normal S = 0.0007
  Little River    Reach 1         5-yr
Normal S = 0.0007
  Little River    Reach 1         10-yr
Normal S = 0.0007
  Little River    Reach 1         25-yr
Normal S = 0.0007
  Little River    Reach 1         50-yr
Normal S = 0.0007
  Little River    Reach 1         100-yr
Normal S = 0.0007
  Little River    Reach 1         500-yr
Normal S = 0.0007
```

GEOMETRY DATA

Geometry Title: Little River Existing
Geometry File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.g01

CROSS SECTION

RIVER: Little River
REACH: Reach 1 RS: 3

INPUT
Description: Approach Section
Station Elevation Data num= 131

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4615	900	4667	899	4682	898	4700	897	4710	896
4719	895	4727	894	4733	893	4737	892	4742	891
4748	890	4754	889	4760	888	4767	887	4775	886
4780	885	4782	884	4785	883	4786	882	4788	881
4790	880	4792	879	4794	878	4795	877	4797	876
4799	875	4800	874	4802	873	4804	872	4806	871
4807	870	4809	869	4811	868	4813	867	4815	866
4816	865	4843	864	4845	863	4848	862	4850	861
4852	860	4854	859	4856	858	4858	857	4860	856
4862	855	4864	854	4866	853	4869	852	4871	851
4874	850	4876	849	4879	848	4900	847	4905	846
4925	835.5	4985	827.26	5040	834.44	5055	841.34	5080	842
5120	843	5135	844	5150	845	5190	846	5298	847
5312	848	5325	849	5337	850	5346	851	5356	852
5365	853	5374	854	5380	855	5390	856	5396	857
5402	858	5409	859	5416	860	5423	861	5430	862
5437	863	5445	864	5450	865	5466	866	5485	867
5525	868	5565	869	5619	868	5623	867	5628	866
5635	865	5655	864	5710	864	5728	865	5780	865
5850	864	5908	864	5945	865	5960	866	5975	867
5990	868	6011	869	6056	870	6075	871	6080	872
6088	873	6098	874	6107	875	6119	876	6129	877
6140	878	6152	879	6160	880	6165	881	6168	882
6173	883	6177	884	6181	885	6185	886	6190	887
6195	888	6203	889	6208	890	6212	891	6216	892
6220	893	6225	894	6232	895	6238	896	6244	897
6250	898								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4615	.12	4905	.05	5055	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4905	5055	380	410	405	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

```
  E.G. Elev (ft)            844.37    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.15    Wt. n-Val.                             0.050
0.120
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  W.S. Elev (ft)            844.22    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)                   1673.54
143.95
  E.G. Slope (ft/ft)      0.000450    Area (sq ft)                        1673.54
143.95
  Q Total (cfs)            5291.00    Flow (cfs)                          5236.60
54.40
  Top Width (ft)            229.96    Top Width (ft)                       146.62
83.34
  Vel Total (ft/s)            2.91    Avg. Vel. (ft/s)                       3.13
0.38
  Max Chl Dpth (ft)          16.96    Hydr. Depth (ft)                      11.41
1.73
  Conv. Total (cfs)       249461.2    Conv. (cfs)                        246896.3
2564.8
  Length Wtd. (ft)          409.90    Wetted Per. (ft)                     151.31
83.41
  Min Ch El (ft)            827.26    Shear (lb/sq ft)                       0.31
0.05
  Alpha                       1.14    Stream Power (lb/ft s)                 0.97
0.02
  Frctn Loss (ft)             0.21    Cum Volume (acre-ft)        0.71      31.26
1.71
  C & E Loss (ft)             0.01    Cum SA (acres)              0.49       2.56
0.77


CROSS SECTION OUTPUT  Profile #5-yr

  E.G. Elev (ft)            847.40    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.21    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            847.19    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)           3.87    2116.21
564.68
  E.G. Slope (ft/ft)      0.000486    Area (sq ft)                3.87    2116.21
564.68
  Q Total (cfs)            8183.00    Flow (cfs)                  0.59    7914.10
268.31
  Top Width (ft)            404.79    Top Width (ft)              9.08     150.00
245.72
  Vel Total (ft/s)            3.05    Avg. Vel. (ft/s)            0.15       3.74
0.48
  Max Chl Dpth (ft)          19.93    Hydr. Depth (ft)            0.43      14.11
2.30
  Conv. Total (cfs)       371254.9    Conv. (cfs)                 26.9   359055.2
12172.9
  Length Wtd. (ft)          409.66    Wetted Per. (ft)            9.18     155.13
245.83
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.01       0.41
0.07
  Alpha                       1.46    Stream Power (lb/ft s)      0.00       1.55
0.03
  Frctn Loss (ft)             0.24    Cum Volume (acre-ft)        3.59      38.63
5.07
  C & E Loss (ft)             0.01    Cum SA (acres)              1.40       2.57
1.72


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)            849.24    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.24    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            849.01    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)          45.66    2387.94
1032.27
  E.G. Slope (ft/ft)      0.000483    Area (sq ft)               45.66    2387.94
1032.27
  Q Total (cfs)           10359.00    Flow (cfs)                 16.71    9655.53
686.75
```

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  Top Width (ft)            449.08    Top Width (ft)             29.01     150.00
270.07
  Vel Total (ft/s)            2.99    Avg. Vel. (ft/s)            0.37       4.04
0.67
  Max Chl Dpth (ft)          21.75    Hydr. Depth (ft)            1.57      15.92
3.82
  Conv. Total (cfs)       471132.7    Conv. (cfs)                760.1   439138.7
31233.9
  Length Wtd. (ft)          409.36    Wetted Per. (ft)           29.30     155.13
270.25
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.05       0.46
0.12
  Alpha                       1.71    Stream Power (lb/ft s)      0.02       1.88
0.08
  Frctn Loss (ft)             0.25    Cum Volume (acre-ft)        6.21      43.11
8.32
  C & E Loss (ft)             0.02    Cum SA (acres)              1.59       2.57
1.91


CROSS SECTION OUTPUT  Profile #25-yr

  E.G. Elev (ft)            851.45    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.27    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            851.18    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         114.31    2714.79
1647.13
  E.G. Slope (ft/ft)      0.000477    Area (sq ft)              114.31    2714.79
1647.13
  Q Total (cfs)           13354.00    Flow (cfs)                 67.93   11878.05
1408.02
  Top Width (ft)            477.21    Top Width (ft)             34.37     150.00
292.85
  Vel Total (ft/s)            2.98    Avg. Vel. (ft/s)            0.59       4.38
0.85
  Max Chl Dpth (ft)          23.92    Hydr. Depth (ft)            3.33      18.10
5.62
  Conv. Total (cfs)       611393.7    Conv. (cfs)               3110.1   543819.3
64464.3
  Length Wtd. (ft)          408.98    Wetted Per. (ft)           35.10     155.13
293.13
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.10       0.52
0.17
  Alpha                       1.92    Stream Power (lb/ft s)      0.06       2.28
0.14
  Frctn Loss (ft)             0.26    Cum Volume (acre-ft)        9.66      48.48
12.57
  C & E Loss (ft)             0.03    Cum SA (acres)              1.74       2.57
2.07


CROSS SECTION OUTPUT  Profile #50-yr

  E.G. Elev (ft)            853.07    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.28    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            852.78    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         172.12    2954.59
2127.77
  E.G. Slope (ft/ft)      0.000471    Area (sq ft)              172.12    2954.59
2127.77
  Q Total (cfs)           15780.00    Flow (cfs)                123.56   13585.03
2071.41
  Top Width (ft)            496.40    Top Width (ft)             38.35     150.00
308.05
  Vel Total (ft/s)            3.00    Avg. Vel. (ft/s)            0.72       4.60
0.97
  Max Chl Dpth (ft)          25.52    Hydr. Depth (ft)            4.49      19.70
6.91
  Conv. Total (cfs)       727395.2    Conv. (cfs)               5695.8   626215.8
95483.7
```

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  Length Wtd. (ft)          408.72    Wetted Per. (ft)           39.40     155.13
308.42
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.13       0.56
0.20
  Alpha                       2.03    Stream Power (lb/ft s)      0.09       2.57
0.20
  Frctn Loss (ft)             0.26    Cum Volume (acre-ft)       12.36      52.42
15.91
  C & E Loss (ft)             0.04    Cum SA (acres)              1.83       2.57
2.20


CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            854.59    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.30    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            854.29    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         232.44    3180.49
2601.77
  E.G. Slope (ft/ft)      0.000464    Area (sq ft)              232.44    3180.49
2601.77
  Q Total (cfs)           18250.00    Flow (cfs)                191.16   15258.51
2800.33
  Top Width (ft)            512.31    Top Width (ft)             41.58     150.00
320.74
  Vel Total (ft/s)            3.03    Avg. Vel. (ft/s)            0.82       4.80
1.08
  Max Chl Dpth (ft)          27.03    Hydr. Depth (ft)            5.59      21.20
8.11
  Conv. Total (cfs)       846841.6    Conv. (cfs)               8870.2   708029.6
129941.8
  Length Wtd. (ft)          408.48    Wetted Per. (ft)           42.96     155.13
321.20
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.16       0.59
0.23
  Alpha                       2.11    Stream Power (lb/ft s)      0.13       2.85
0.25
  Frctn Loss (ft)             0.26    Cum Volume (acre-ft)       15.03      56.13
19.25
  C & E Loss (ft)             0.04    Cum SA (acres)              1.91       2.57
2.32


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 #500-yr

  E.G. Elev (ft)            858.27    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.34    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            857.92    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         396.80    3725.77
3817.05
  E.G. Slope (ft/ft)      0.000450    Area (sq ft)              396.80    3725.77
3817.05
  Q Total (cfs)           24913.00    Flow (cfs)                408.69   19548.61
4955.70
  Top Width (ft)            545.40    Top Width (ft)             48.85     150.00
346.55
  Vel Total (ft/s)            3.14    Avg. Vel. (ft/s)            1.03       5.25
1.30
  Max Chl Dpth (ft)          30.66    Hydr. Depth (ft)            8.12      24.84
11.01
  Conv. Total (cfs)       1174622.0    Conv. (cfs)              19269.3   921696.7
233656.1
  Length Wtd. (ft)          407.96    Wetted Per. (ft)           51.09     155.13
347.28
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.22       0.67
0.31
```

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  Alpha                        2.23    Stream Power (lb/ft s)      0.22       3.54
0.40
  Frctn Loss (ft)              0.27    Cum Volume (acre-ft)       21.94      65.09
28.01
  C & E Loss (ft)              0.06    Cum SA (acres)              2.09       2.57
2.59


Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate
the need for
         additional cross sections.
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


RIVER: Little River
REACH: Reach 1            RS: 2

INPUT
Description: Upstream of bridge
Station Elevation Data    num=     155
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    4673  892.86    4690   892.2    4712   891.2    4727   890.2    4732   889.2
    4737   888.2    4741   887.2    4745   886.2    4750   885.2    4755   884.2
    4769   883.2    4771   882.2    4774   881.2    4776   880.2    4779   879.2
    4781   878.2    4784   877.2    4786   876.2    4788   875.2    4791   874.2
    4794   873.2    4796   872.2    4798   871.2    4801   870.2    4824   869.8
    4826   868.2    4828   867.2    4831   866.2    4833   865.2    4836   864.2
    4840   863.2    4843   862.2    4845   861.2    4846   860.2    4848   859.2
    4851   858.2    4854   857.2    4856   856.2    4859   855.2    4861   854.2
    4864   853.2    4866   852.2    4869   851.2    4871   850.2    4875   849.2
    4878   848.2    4880   847.2    4887   846.2    4898   845.2    4908   845.2
    4924   844.2    4933   843.2    4938   842.2    4945   841.2    4948   840.2
    4951   839.2    4952   838.2    4953   836.2    4955   835.2    4960   834.2
    4965   833.2    4970   832.2    4975   831.2    4980   830.2    4985   829.2
    4990   828.2    4995   827.2    5000  825.74    5005   826.2    5010   827.2
    5016   828.2    5021   829.2    5027   830.2    5033   831.2    5038   832.2
    5043   833.2    5048   834.2    5049   835.2    5051   836.2    5052   838.2
    5053   839.2    5063   840.2    5067   841.2    5070   842.2    5072   843.2
    5074   844.2    5076   845.2    5077   846.2    5079   847.2    5081   848.2
    5082   849.2    5083   850.2    5085   851.2    5087   852.2    5089   853.2
    5091   854.2    5092   855.2    5094   856.2    5095   857.2    5096   858.2
    5098   859.2    5100   860.2    5101   861.2    5103   862.2    5105   863.2
    5106   864.2    5108   865.2    5110   866.2    5112   867.2    5114   868.2
    5116   869.2    5118   870.2    5120   871.2    5122   872.2    5125   873.2
    5127   874.2    5129   875.2    5132   876.2    5134   877.2    5149   878.2
    5152   879.2    5154   880.2    5156   881.2    5159   882.2    5161   883.2
    5164   884.2    5166   885.2    5170   886.2    5173   887.2    5176   888.2
    5178   889.2    5181   890.2    5185   891.2    5187   892.2    5190   893.2
    5195   894.2    5200   895.2    5205   896.2    5210   897.2    5215   898.2
    5220   899.2    5225   900.2    5230   901.2    5235   902.2    5240   903.2
    5247   904.2    5253   905.2    5259   906.2    5266   907.2    5278   908.2
    5291   909.2    5304   910.2    5318   911.2    5336   912.2    5360   912.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    4673     .12    4951     .05    5053     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          4951    5053              290     290     290             .1       .3

CROSS SECTION OUTPUT  Profile #2-yr

  E.G. Elev (ft)            844.15    Element                    Left OB    Channel
Right OB
  Vel Head (ft)               0.23    Wt. n-Val.                  0.120      0.050
0.120
  W.S. Elev (ft)            843.92    Reach Len. (ft)            75.00      75.00
75.00
  Crit W.S. (ft)            834.78    Flow Area (sq ft)          46.35    1344.47
64.75
  E.G. Slope (ft/ft)      0.000593    Area (sq ft)               46.35    1344.47
64.75
```

Q Total (cfs)	5291.00	Flow (cfs)	21.08	5228.80	41.12
Top Width (ft)	146.94	Top Width (ft)	24.50	102.00	20.44
Vel Total (ft/s)	3.64	Avg. Vel. (ft/s)	0.45	3.89	0.64
Max Chl Dpth (ft)	18.18	Hydr. Depth (ft)	1.89	13.18	3.17
Conv. Total (cfs)	217233.3	Conv. (cfs)	865.3	214679.7	1688.3
Length Wtd. (ft)	75.00	Wetted Per. (ft)	25.04	107.95	21.19
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.07	0.46	0.11
Alpha	1.13	Stream Power (lb/ft s)	0.03	1.79	0.07
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.51	17.06	0.74
C & E Loss (ft)	0.00	Cum SA (acres)	0.38	1.39	0.29

CROSS SECTION OUTPUT Profile #5-yr

E.G. Elev (ft)	847.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	846.80	Reach Len. (ft)	75.00	75.00	75.00
Crit W.S. (ft)	836.44	Flow Area (sq ft)	186.47	1637.71	130.69
E.G. Slope (ft/ft)	0.000709	Area (sq ft)	186.47	1637.71	130.69
Q Total (cfs)	8183.00	Flow (cfs)	119.42	7939.68	123.90
Top Width (ft)	195.37	Top Width (ft)	68.18	102.00	25.19
Vel Total (ft/s)	4.19	Avg. Vel. (ft/s)	0.64	4.85	0.95
Max Chl Dpth (ft)	21.06	Hydr. Depth (ft)	2.73	16.06	5.19
Conv. Total (cfs)	307403.6	Conv. (cfs)	4486.2	298262.9	4654.4
Length Wtd. (ft)	75.00	Wetted Per. (ft)	68.85	107.95	26.79
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.12	0.67	0.22
Alpha	1.30	Stream Power (lb/ft s)	0.08	3.25	0.20
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	2.76	20.96	1.84
C & E Loss (ft)	0.00	Cum SA (acres)	1.06	1.39	0.46

CROSS SECTION OUTPUT Profile #10-yr

E.G. Elev (ft)	848.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	848.53	Reach Len. (ft)	75.00	75.00	75.00
Crit W.S. (ft)	837.47	Flow Area (sq ft)	311.11	1814.95	177.43
E.G. Slope (ft/ft)	0.000779	Area (sq ft)	311.11	1814.95	177.43
Q Total (cfs)	10359.00	Flow (cfs)	277.68	9882.50	198.82
Top Width (ft)	204.34	Top Width (ft)	74.00	102.00	28.33
Vel Total (ft/s)	4.50	Avg. Vel. (ft/s)	0.89	5.45	1.12
Max Chl Dpth (ft)	22.79	Hydr. Depth (ft)	4.20	17.79	6.26

Conv. Total (cfs)	371046.4	Conv. (cfs)	9946.1	353978.8	7121.6
Length Wtd. (ft)	75.00	Wetted Per. (ft)	74.99	107.95	30.40
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.20	0.82	0.28
Alpha	1.40	Stream Power (lb/ft s)	0.18	4.45	0.32
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	4.66	23.33	2.69
C & E Loss (ft)	0.00	Cum SA (acres)	1.14	1.39	0.53

CROSS SECTION OUTPUT Profile #25-yr

E.G. Elev (ft)	851.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	850.61	Reach Len. (ft)	75.00	75.00	75.00
Crit W.S. (ft)	838.80	Flow Area (sq ft)	472.20	2026.91	238.56
E.G. Slope (ft/ft)	0.000861	Area (sq ft)	472.20	2026.91	238.56
Q Total (cfs)	13354.00	Flow (cfs)	550.47	12483.92	319.61
Top Width (ft)	213.65	Top Width (ft)	80.83	102.00	30.83
Vel Total (ft/s)	4.88	Avg. Vel. (ft/s)	1.17	6.16	1.34
Max Chl Dpth (ft)	24.87	Hydr. Depth (ft)	5.84	19.87	7.74
Conv. Total (cfs)	455185.4	Conv. (cfs)	18763.3	425527.8	10894.4
Length Wtd. (ft)	75.00	Wetted Per. (ft)	82.14	107.95	33.68
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.31	1.01	0.38
Alpha	1.49	Stream Power (lb/ft s)	0.36	6.21	0.51
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	7.10	26.17	3.80
C & E Loss (ft)	0.00	Cum SA (acres)	1.24	1.39	0.56

CROSS SECTION OUTPUT Profile #50-yr

E.G. Elev (ft)	852.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.64	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	852.13	Reach Len. (ft)	75.00	75.00	75.00
Crit W.S. (ft)	839.79	Flow Area (sq ft)	597.84	2182.00	287.74
E.G. Slope (ft/ft)	0.000914	Area (sq ft)	597.84	2182.00	287.74
Q Total (cfs)	15780.00	Flow (cfs)	812.55	14545.31	422.15
Top Width (ft)	220.67	Top Width (ft)	84.80	102.00	33.87
Vel Total (ft/s)	5.14	Avg. Vel. (ft/s)	1.36	6.67	1.47
Max Chl Dpth (ft)	26.39	Hydr. Depth (ft)	7.05	21.39	8.50
Conv. Total (cfs)	522008.6	Conv. (cfs)	26879.4	481164.4	13964.8
Length Wtd. (ft)	75.00	Wetted Per. (ft)	86.41	107.95	37.08
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.39	1.15	0.44
Alpha	1.55	Stream Power (lb/ft s)	0.54	7.69	0.65

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  Frctn Loss (ft)             0.09    Cum Volume (acre-ft)        9.00      28.25
4.68
  C & E Loss (ft)             0.00    Cum SA (acres)              1.29       1.39
0.61


CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            854.28    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.72    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            853.56    Reach Len. (ft)            75.00      75.00
75.00
  Crit W.S. (ft)            840.78    Flow Area (sq ft)         721.23    2327.77
338.18
  E.G. Slope (ft/ft)      0.000960    Area (sq ft)              721.23    2327.77
338.18
  Q Total (cfs)           18250.00    Flow (cfs)               1108.15   16605.83
536.02
  Top Width (ft)            226.81    Top Width (ft)             88.09     102.00
36.72
  Vel Total (ft/s)            5.39    Avg. Vel. (ft/s)            1.54       7.13
1.59
  Max Chl Dpth (ft)          27.82    Hydr. Depth (ft)            8.19      22.82
9.21
  Conv. Total (cfs)       588986.6    Conv. (cfs)              35763.5   535923.9
17299.1
  Length Wtd. (ft)           75.00    Wetted Per. (ft)           90.00     107.95
40.28
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.48       1.29
0.50
  Alpha                       1.60    Stream Power (lb/ft s)      0.74       9.22
0.80
  Frctn Loss (ft)             0.10    Cum Volume (acre-ft)       10.87      30.21
5.59
  C & E Loss (ft)             0.00    Cum SA (acres)              1.35       1.39
0.66


CROSS SECTION OUTPUT  Profile #500-yr

  E.G. Elev (ft)            857.94    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.93    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            857.00    Reach Len. (ft)            75.00      75.00
75.00
  Crit W.S. (ft)            843.20    Flow Area (sq ft)        1039.54    2678.82
473.79
  E.G. Slope (ft/ft)      0.001056    Area (sq ft)             1039.54    2678.82
473.79
  Q Total (cfs)           24913.00    Flow (cfs)               2003.31   22013.37
896.32
  Top Width (ft)            240.41    Top Width (ft)             96.61     102.00
41.80
  Vel Total (ft/s)            5.94    Avg. Vel. (ft/s)            1.93       8.22
1.89
  Max Chl Dpth (ft)          31.26    Hydr. Depth (ft)           10.76      26.26
11.33
  Conv. Total (cfs)       766507.7    Conv. (cfs)              61636.6   677293.7
27577.5
  Length Wtd. (ft)           75.00    Wetted Per. (ft)           99.21     107.95
46.49
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.69       1.64
0.67
  Alpha                       1.70    Stream Power (lb/ft s)      1.33      13.45
1.27
  Frctn Loss (ft)             0.11    Cum Volume (acre-ft)       15.67      34.95
8.07
  C & E Loss (ft)             0.00    Cum SA (acres)              1.45       1.39
0.79


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

BRIDGE

RIVER: Little River
REACH: Reach 1 RS: 1.5

INPUT
Description: I-575 over Little River
Distance from Upstream XS = 75
Deck/Roadway Width = 140
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 22

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
4420	903	0	4456	902	0	4498	901	0
4540	900	0	4600	899	0	4700	898	0
4770	897.89	892.765	4850	897	891.875	5000	897	891.875
5050	897	891.875	5175	898	892.875	5215	898.3	893.175
5220	899	0	5233	899	0	5318	900	0
5385	901	0	5435	902	0	5480	903	0
5520	904	0	5560	905	0	5596	906	0
5635	907	0						

Upstream Bridge Cross Section Data
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4673	892.86	4690	892.2	4712	891.2	4727	890.2	4732	889.2
4737	888.2	4741	887.2	4745	886.2	4750	885.2	4755	884.2
4769	883.2	4771	882.2	4774	881.2	4776	880.2	4779	879.2
4781	878.2	4784	877.2	4786	876.2	4788	875.2	4791	874.2
4794	873.2	4796	872.2	4798	871.2	4801	870.2	4824	869.8
4826	868.2	4828	867.2	4831	866.2	4833	865.2	4836	864.2
4840	863.2	4843	862.2	4845	861.2	4846	860.2	4848	859.2
4851	858.2	4854	857.2	4856	856.2	4859	855.2	4861	854.2
4864	853.2	4866	852.2	4869	851.2	4871	850.2	4875	849.2
4878	848.2	4880	847.2	4887	846.2	4898	845.2	4908	845.2
4924	844.2	4933	843.2	4938	842.2	4945	841.2	4948	840.2
4951	839.2	4952	838.2	4953	836.2	4955	835.2	4960	834.2
4965	833.2	4970	832.2	4975	831.2	4980	830.2	4985	829.2
4990	828.2	4995	827.2	5000	825.74	5005	826.2	5010	827.2
5016	828.2	5021	829.2	5027	830.2	5033	831.2	5038	832.2
5043	833.2	5048	834.2	5049	835.2	5051	836.2	5052	838.2
5053	839.2	5063	840.2	5067	841.2	5070	842.2	5072	843.2
5074	844.2	5076	845.2	5077	846.2	5079	847.2	5081	848.2
5082	849.2	5083	850.2	5085	851.2	5087	852.2	5089	853.2
5091	854.2	5092	855.2	5094	856.2	5095	857.2	5096	858.2
5098	859.2	5100	860.2	5101	861.2	5103	862.2	5105	863.2
5106	864.2	5108	865.2	5110	866.2	5112	867.2	5114	868.2
5116	869.2	5118	870.2	5120	871.2	5122	872.2	5125	873.2
5127	874.2	5129	875.2	5132	876.2	5134	877.2	5149	878.2
5152	879.2	5154	880.2	5156	881.2	5159	882.2	5161	883.2
5164	884.2	5166	885.2	5170	886.2	5173	887.2	5176	888.2
5178	889.2	5181	890.2	5185	891.2	5187	892.2	5190	893.2
5195	894.2	5200	895.2	5205	896.2	5210	897.2	5215	898.2
5220	899.2	5225	900.2	5230	901.2	5235	902.2	5240	903.2
5247	904.2	5253	905.2	5259	906.2	5266	907.2	5278	908.2
5291	909.2	5304	910.2	5318	911.2	5336	912.2	5360	912.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4673	.12	4951	.05	5053	.12

Bank Sta: Left	Right	Coeff Contr.	Expan.
4951	5053	.1	.3

Downstream Deck/Roadway Coordinates
num= 22

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
4420	903	0	4456	902	0	4498	901	0
4540	900	0	4600	899	0	4700	898	0
4770	897.89	892.765	4850	897	891.875	5000	897	891.875
5050	897	891.875	5175	898	892.875	5215	898.3	893.175
5220	899	0	5233	899	0	5318	900	0
5385	901	0	5435	902	0	5480	903	0

5520	904	0	5560	905	0	5596	906	0	
5635	907	0							

Downstream Bridge Cross Section Data
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4673	892.86	4690	892.2	4712	891.2	4727	890.2	4732	889.2
4737	888.2	4741	887.2	4745	886.2	4750	885.2	4755	884.2
4769	883.2	4771	882.2	4774	881.2	4776	880.2	4779	879.2
4781	878.2	4784	877.2	4786	876.2	4788	875.2	4791	874.2
4794	873.2	4796	872.2	4798	871.2	4801	870.2	4824	869.8
4826	868.2	4828	867.2	4831	866.2	4833	865.2	4836	864.2
4840	863.2	4843	862.2	4845	861.2	4846	860.2	4848	859.2
4851	858.2	4854	857.2	4856	856.2	4859	855.2	4861	854.2
4864	853.2	4866	852.2	4869	851.2	4871	850.2	4875	849.2
4878	848.2	4880	847.2	4887	846.2	4898	845.2	4908	845.2
4924	844.2	4933	843.2	4938	842.2	4945	841.2	4948	840.2
4951	839.2	4952	838.2	4953	836.2	4955	835.2	4960	834.2
4965	833.2	4970	832.2	4975	831.2	4980	830.2	4985	829.2
4990	828.2	4995	827.2	5000	825.74	5005	826.2	5010	827.2
5016	828.2	5021	829.2	5027	830.2	5033	831.2	5038	832.2
5043	833.2	5048	834.2	5049	835.2	5051	836.2	5052	838.2
5053	839.2	5063	840.2	5067	841.2	5070	842.2	5072	843.2
5074	844.2	5076	845.2	5077	846.2	5079	847.2	5081	848.2
5082	849.2	5083	850.2	5085	851.2	5087	852.2	5089	853.2
5091	854.2	5092	855.2	5094	856.2	5095	857.2	5096	858.2
5098	859.2	5100	860.2	5101	861.2	5103	862.2	5105	863.2
5106	864.2	5108	865.2	5110	866.2	5112	867.2	5114	868.2
5116	869.2	5118	870.2	5120	871.2	5122	872.2	5125	873.2
5127	874.2	5129	875.2	5132	876.2	5134	877.2	5149	878.2
5152	879.2	5154	880.2	5156	881.2	5159	882.2	5161	883.2
5164	884.2	5166	885.2	5170	886.2	5173	887.2	5176	888.2
5178	889.2	5181	890.2	5185	891.2	5187	892.2	5190	893.2
5195	894.2	5200	895.2	5205	896.2	5210	897.2	5215	898.2
5220	899.2	5225	900.2	5230	901.2	5235	902.2	5240	903.2
5247	904.2	5253	905.2	5259	906.2	5266	907.2	5278	908.2
5291	909.2	5304	910.2	5318	911.2	5336	912.2	5360	912.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4673	.12	4951	.05	5053	.12

Bank Sta: Left	Right	Coeff Contr.	Expan.
4951	5053	.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 = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data
Upstream num= 2

Sta	Elev	Sta	Elev
4770	892.77	4816	869.77

Downstream num= 2

Sta	Elev	Sta	Elev
4770	892.77	4816	869.77

Abutment Data
Upstream num= 2

Sta	Elev	Sta	Elev
5175	873.17	5215	893.17

Downstream num= 2

Sta	Elev	Sta	Elev
5175	873.17	5215	893.17

Number of Piers = 4

Pier Data
Pier Station Upstream= 4859 Downstream= 4859
Upstream num= 2

Width	Elev	Width	Elev

```
    4.25       0    4.25     895
Downstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895

Pier Data
Pier Station     Upstream=    4949    Downstream=    4949
Upstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895
Downstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895

Pier Data
Pier Station     Upstream=    5037    Downstream=    5037
Upstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895
Downstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895

Pier Data
Pier Station     Upstream=    5126    Downstream=    5126
Upstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895
Downstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895

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 #2-yr

  E.G. US. (ft)                844.15    Element                 Inside BR US  Inside BR
DS
  W.S. US. (ft)                843.92    E.G. Elev (ft)               844.10
843.97
  Q Total (cfs)               5291.00    W.S. Elev (ft)               843.84
843.71
  Q Bridge (cfs)              5291.00    Crit W.S. (ft)               834.86
834.86
  Q Weir (cfs)                           Max Chl Dpth (ft)             18.10
17.97
  Weir Sta Lft (ft)                      Vel Total (ft/s)               3.84
3.89
  Weir Sta Rgt (ft)                      Flow Area (sq ft)           1376.88
1358.53
  Weir Submerg                           Froude # Chl                  0.20
0.20
  Weir Max Depth (ft)                    Specif Force (cu ft)        9756.35
9580.55
  Min El Weir Flow (ft)        897.01    Hydr Depth (ft)               10.01
9.98
  Min El Prs (ft)              892.98    W.P. Total (ft)              176.16
174.11
  Delta EG (ft)                  0.25    Conv. Total (cfs)          176351.7
173608.2
  Delta WS (ft)                  0.26    Top Width (ft)               137.59
136.11
```

```
  BR Open Area (sq ft)       14911.46    Frctn Loss (ft)                0.13
0.06
  BR Open Vel (ft/s)             3.89    C & E Loss (ft)                0.00
0.01
  Coef of Q                              Shear Total (lb/sq ft)         0.44
0.45
  Br Sel Method           Energy only    Power Total (lb/ft s)          1.69
1.76


BRIDGE OUTPUT  Profile #5-yr

  E.G. US. (ft)                847.15    Element                 Inside BR US  Inside BR
DS
  W.S. US. (ft)                846.80    E.G. Elev (ft)               847.08
846.91
  Q Total (cfs)               8183.00    W.S. Elev (ft)               846.70
846.52
  Q Bridge (cfs)              8183.00    Crit W.S. (ft)               836.58
836.58
  Q Weir (cfs)                           Max Chl Dpth (ft)             20.96
20.78
  Weir Sta Lft (ft)                      Vel Total (ft/s)               4.44
4.52
  Weir Sta Rgt (ft)                      Flow Area (sq ft)           1843.54
1810.50
  Weir Submerg                           Froude # Chl                   0.22
0.23
  Weir Max Depth (ft)                    Specif Force (cu ft)       14901.52
14593.71
  Min El Weir Flow (ft)        897.01    Hydr Depth (ft)                9.91
9.82
  Min El Prs (ft)              892.98    W.P. Total (ft)              236.92
234.54
  Delta EG (ft)                  0.32    Conv. Total (cfs)          239427.5
235167.2
  Delta WS (ft)                  0.33    Top Width (ft)               185.96
184.35
  BR Open Area (sq ft)       14911.46    Frctn Loss (ft)                0.17
0.07
  BR Open Vel (ft/s)             4.52    C & E Loss (ft)                0.00
0.01
  Coef of Q                              Shear Total (lb/sq ft)         0.57
0.58
  Br Sel Method           Energy only    Power Total (lb/ft s)          2.52
2.64


BRIDGE OUTPUT  Profile #10-yr

  E.G. US. (ft)                848.97    Element                 Inside BR US  Inside BR
DS
  W.S. US. (ft)                848.53    E.G. Elev (ft)               848.90
848.70
  Q Total (cfs)              10359.00    W.S. Elev (ft)               848.42
848.21
  Q Bridge (cfs)             10359.00    Crit W.S. (ft)               837.65
837.65
  Q Weir (cfs)                           Max Chl Dpth (ft)             22.68
22.47
  Weir Sta Lft (ft)                      Vel Total (ft/s)               4.76
4.86
  Weir Sta Rgt (ft)                      Flow Area (sq ft)           2173.99
2133.42
  Weir Submerg                           Froude # Chl                   0.24
0.24
  Weir Max Depth (ft)                    Specif Force (cu ft)       18862.92
18443.29
  Min El Weir Flow (ft)        897.01    Hydr Depth (ft)               11.13
10.97
  Min El Prs (ft)              892.98    W.P. Total (ft)              254.00
252.21
  Delta EG (ft)                  0.36    Conv. Total (cfs)          282730.1
277308.0
  Delta WS (ft)                  0.38    Top Width (ft)               195.38
194.55
```

BR Open Area (sq ft)	14911.46	Frctn Loss (ft)	0.19	0.08
BR Open Vel (ft/s)	4.86	C & E Loss (ft)	0.00	0.01
Coef of Q		Shear Total (lb/sq ft)	0.72	0.74
Br Sel Method	Energy only	Power Total (lb/ft s)	3.42	3.58

BRIDGE OUTPUT Profile #25-yr

E.G. US. (ft)	851.17	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	850.61	E.G. Elev (ft)	851.08	850.85
Q Total (cfs)	13354.00	W.S. Elev (ft)	850.49	850.24
Q Bridge (cfs)	13354.00	Crit W.S. (ft)	839.02	839.02
Q Weir (cfs)		Max Chl Dpth (ft)	24.75	24.50
Weir Sta Lft (ft)		Vel Total (ft/s)	5.16	5.26
Weir Sta Rgt (ft)		Flow Area (sq ft)	2587.31	2537.53
Weir Submerg		Froude # Chl	0.25	0.26
Weir Max Depth (ft)		Specif Force (cu ft)	24528.29	23947.34
Min El Weir Flow (ft)	897.01	Hydr Depth (ft)	12.64	12.46
Min El Prs (ft)	892.98	W.P. Total (ft)	272.66	270.60
Delta EG (ft)	0.41	Conv. Total (cfs)	338908.6	332061.7
Delta WS (ft)	0.44	Top Width (ft)	204.65	203.68
BR Open Area (sq ft)	14911.46	Frctn Loss (ft)	0.22	0.09
BR Open Vel (ft/s)	5.26	C & E Loss (ft)	0.00	0.01
Coef of Q		Shear Total (lb/sq ft)	0.92	0.95
Br Sel Method	Energy only	Power Total (lb/ft s)	4.75	4.98

BRIDGE OUTPUT Profile #50-yr

E.G. US. (ft)	852.77	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	852.13	E.G. Elev (ft)	852.68	852.43
Q Total (cfs)	15780.00	W.S. Elev (ft)	852.00	851.73
Q Bridge (cfs)	15780.00	Crit W.S. (ft)	840.03	840.03
Q Weir (cfs)		Max Chl Dpth (ft)	26.26	25.99
Weir Sta Lft (ft)		Vel Total (ft/s)	5.44	5.55
Weir Sta Rgt (ft)		Flow Area (sq ft)	2902.45	2845.70
Weir Submerg		Froude # Chl	0.26	0.27
Weir Max Depth (ft)		Specif Force (cu ft)	29333.34	28616.81
Min El Weir Flow (ft)	897.01	Hydr Depth (ft)	13.72	13.54
Min El Prs (ft)	892.98	W.P. Total (ft)	286.25	283.72
Delta EG (ft)	0.44	Conv. Total (cfs)	382686.4	374765.0
Delta WS (ft)	0.48	Top Width (ft)	211.52	210.17

```
  BR Open Area (sq ft)       14911.46    Frctn Loss (ft)                0.24
0.10
  BR Open Vel (ft/s)             5.55    C & E Loss (ft)                0.00
0.01
  Coef of Q                              Shear Total (lb/sq ft)         1.08
1.11
  Br Sel Method           Energy only    Power Total (lb/ft s)          5.85
6.16


BRIDGE OUTPUT  Profile #100-yr

  E.G. US. (ft)                854.28    Element                 Inside BR US  Inside BR
DS
  W.S. US. (ft)                853.56    E.G. Elev (ft)               854.18
853.92
  Q Total (cfs)              18250.00    W.S. Elev (ft)               853.43
853.14
  Q Bridge (cfs)             18250.00    Crit W.S. (ft)               841.05
841.05
  Q Weir (cfs)                           Max Chl Dpth (ft)             27.69
27.40
  Weir Sta Lft (ft)                      Vel Total (ft/s)               5.69
5.80
  Weir Sta Rgt (ft)                      Flow Area (sq ft)           3208.80
3145.31
  Weir Submerg                           Froude # Chl                   0.27
0.28
  Weir Max Depth (ft)                    Specif Force (cu ft)       34382.92
33524.90
  Min El Weir Flow (ft)        897.01    Hydr Depth (ft)               14.74
14.54
  Min El Prs (ft)              892.98    W.P. Total (ft)              298.74
296.05
  Delta EG (ft)                  0.47    Conv. Total (cfs)          425996.3
416988.3
  Delta WS (ft)                  0.52    Top Width (ft)               217.66
216.26
  BR Open Area (sq ft)       14911.46    Frctn Loss (ft)                0.26
0.10
  BR Open Vel (ft/s)             5.80    C & E Loss (ft)                0.00
0.00
  Coef of Q                              Shear Total (lb/sq ft)         1.23
1.27
  Br Sel Method           Energy only    Power Total (lb/ft s)          7.00
7.37


BRIDGE OUTPUT  Profile #500-yr

  E.G. US. (ft)                857.94    Element                 Inside BR US  Inside BR
DS
  W.S. US. (ft)                857.00    E.G. Elev (ft)               857.83
857.52
  Q Total (cfs)              24913.00    W.S. Elev (ft)               856.89
856.55
  Q Bridge (cfs)             24913.00    Crit W.S. (ft)               843.57
843.57
  Q Weir (cfs)                           Max Chl Dpth (ft)             31.15
30.81
  Weir Sta Lft (ft)                      Vel Total (ft/s)               6.26
6.39
  Weir Sta Rgt (ft)                      Flow Area (sq ft)           3979.19
3900.88
  Weir Submerg                           Froude # Chl                   0.29
0.29
  Weir Max Depth (ft)                    Specif Force (cu ft)       48774.39
47529.18
  Min El Weir Flow (ft)        897.01    Hydr Depth (ft)               17.50
17.24
  Min El Prs (ft)              892.98    W.P. Total (ft)              327.40
324.07
  Delta EG (ft)                  0.54    Conv. Total (cfs)          539561.6
527718.5
  Delta WS (ft)                  0.60    Top Width (ft)               227.32
226.29
```

BR Open Area (sq ft)	14911.46	Frctn Loss (ft)	0.31
0.12			
BR Open Vel (ft/s)	6.39	C & E Loss (ft)	0.00
0.00			
Coef of Q		Shear Total (lb/sq ft)	1.62
1.67			
Br Sel Method	Energy only	Power Total (lb/ft s)	10.13
10.70			

CROSS SECTION

RIVER: Little River
REACH: Reach 1 RS: 1

INPUT
Description: Downstream of bridge
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4673	892.86	4690	892.2	4712	891.2	4727	890.2	4732	889.2
4737	888.2	4741	887.2	4745	886.2	4750	885.2	4755	884.2
4769	883.2	4771	882.2	4774	881.2	4776	880.2	4779	879.2
4781	878.2	4784	877.2	4786	876.2	4788	875.2	4791	874.2
4794	873.2	4796	872.2	4798	871.2	4801	870.2	4824	869.8
4826	868.2	4828	867.2	4831	866.2	4833	865.2	4836	864.2
4840	863.2	4843	862.2	4845	861.2	4846	860.2	4848	859.2
4851	858.2	4854	857.2	4856	856.2	4859	855.2	4861	854.2
4864	853.2	4866	852.2	4869	851.2	4871	850.2	4875	849.2
4878	848.2	4880	847.2	4887	846.2	4898	845.2	4908	845.2
4924	844.2	4933	843.2	4938	842.2	4945	841.2	4948	840.2
4951	839.2	4952	838.2	4953	836.2	4955	835.2	4960	834.2
4965	833.2	4970	832.2	4975	831.2	4980	830.2	4985	829.2
4990	828.2	4995	827.2	5000	825.74	5005	826.2	5010	827.2
5016	828.2	5021	829.2	5027	830.2	5033	831.2	5038	832.2
5043	833.2	5048	834.2	5049	835.2	5051	836.2	5052	838.2
5053	839.2	5063	840.2	5067	841.2	5070	842.2	5072	843.2
5074	844.2	5076	845.2	5077	846.2	5079	847.2	5081	848.2
5082	849.2	5083	850.2	5085	851.2	5087	852.2	5089	853.2
5091	854.2	5092	855.2	5094	856.2	5095	857.2	5096	858.2
5098	859.2	5100	860.2	5101	861.2	5103	862.2	5105	863.2
5106	864.2	5108	865.2	5110	866.2	5112	867.2	5114	868.2
5116	869.2	5118	870.2	5120	871.2	5122	872.2	5125	873.2
5127	874.2	5129	875.2	5132	876.2	5134	877.2	5149	878.2
5152	879.2	5154	880.2	5156	881.2	5159	882.2	5161	883.2
5164	884.2	5166	885.2	5170	886.2	5173	887.2	5176	888.2
5178	889.2	5181	890.2	5185	891.2	5187	892.2	5190	893.2
5195	894.2	5200	895.2	5205	896.2	5210	897.2	5215	898.2
5220	899.2	5225	900.2	5230	901.2	5235	902.2	5240	903.2
5247	904.2	5253	905.2	5259	906.2	5266	907.2	5278	908.2
5291	909.2	5304	910.2	5318	911.2	5336	912.2	5360	912.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4673	.12	4951	.05	5053	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4951	5053	265	270	284	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

E.G. Elev (ft)	843.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	843.67	Reach Len. (ft)	265.00	270.00	284.00
Crit W.S. (ft)		Flow Area (sq ft)	40.35	1318.26	59.56
E.G. Slope (ft/ft)	0.000635	Area (sq ft)	40.35	1318.26	59.56
Q Total (cfs)	5291.00	Flow (cfs)	18.47	5234.83	37.70
Top Width (ft)	144.12	Top Width (ft)	22.19	102.00	19.93
Vel Total (ft/s)	3.73	Avg. Vel. (ft/s)	0.46	3.97	0.63

```
  Max Chl Dpth (ft)          17.93    Hydr. Depth (ft)            1.82      12.92
2.99
  Conv. Total (cfs)       209977.5    Conv. (cfs)                733.0   207748.4
1496.1
  Length Wtd. (ft)          270.06    Wetted Per. (ft)           22.71     107.95
20.61
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.07       0.48
0.11
  Alpha                       1.12    Stream Power (lb/ft s)      0.03       1.92
0.07
  Frctn Loss (ft)             0.18    Cum Volume (acre-ft)        0.30       8.45
0.33
  C & E Loss (ft)             0.01    Cum SA (acres)              0.25       0.73
0.16


CROSS SECTION OUTPUT  Profile #5-yr

  E.G. Elev (ft)            846.84    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.37    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            846.46    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         164.04    1603.58
122.37
  E.G. Slope (ft/ft)      0.000765    Area (sq ft)              164.04    1603.58
122.37
  Q Total (cfs)            8183.00    Flow (cfs)                102.56    7962.90
117.54
  Top Width (ft)            192.36    Top Width (ft)             65.84     102.00
24.52
  Vel Total (ft/s)            4.33    Avg. Vel. (ft/s)            0.63       4.97
0.96
  Max Chl Dpth (ft)          20.72    Hydr. Depth (ft)            2.49      15.72
4.99
  Conv. Total (cfs)       295933.5    Conv. (cfs)               3709.1   287973.8
4250.7
  Length Wtd. (ft)          270.09    Wetted Per. (ft)           66.48     107.95
26.04
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.12       0.71
0.22
  Alpha                       1.28    Stream Power (lb/ft s)      0.07       3.52
0.22
  Frctn Loss (ft)             0.20    Cum Volume (acre-ft)        1.74      10.50
1.00
  C & E Loss (ft)             0.03    Cum SA (acres)              0.63       0.73
0.30


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)            848.62    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.46    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            848.15    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         282.88    1775.74
166.61
  E.G. Slope (ft/ft)      0.000845    Area (sq ft)              282.88    1775.74
166.61
  Q Total (cfs)           10359.00    Flow (cfs)                249.31    9920.87
188.82
  Top Width (ft)            202.80    Top Width (ft)             72.90     102.00
27.90
  Vel Total (ft/s)            4.66    Avg. Vel. (ft/s)            0.88       5.59
1.13
  Max Chl Dpth (ft)          22.41    Hydr. Depth (ft)            3.88      17.41
5.97
  Conv. Total (cfs)       356399.3    Conv. (cfs)               8577.4   341325.6
6496.3
  Length Wtd. (ft)          270.10    Wetted Per. (ft)           73.82     107.95
29.82
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.20       0.87
0.29
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  Alpha                        1.38    Stream Power (lb/ft s)      0.18       4.85
0.33
  Frctn Loss (ft)              0.21    Cum Volume (acre-ft)        2.86      11.74
1.55
  C & E Loss (ft)              0.04    Cum SA (acres)              0.68       0.73
0.34


CROSS SECTION OUTPUT  Profile #25-yr

  E.G. Elev (ft)             850.76    Element                   Left OB    Channel
Right OB
  Vel Head (ft)                0.58    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)             850.17    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                       Flow Area (sq ft)         436.66    1981.81
225.12
  E.G. Slope (ft/ft)       0.000936    Area (sq ft)              436.66    1981.81
225.12
  Q Total (cfs)            13354.00    Flow (cfs)                508.09   12537.43
308.48
  Top Width (ft)             211.85    Top Width (ft)             79.88     102.00
29.97
  Vel Total (ft/s)             5.05    Avg. Vel. (ft/s)            1.16       6.33
1.37
  Max Chl Dpth (ft)           24.43    Hydr. Depth (ft)            5.47      19.43
7.51
  Conv. Total (cfs)        436560.0    Conv. (cfs)               16610.2   409865.1
10084.7
  Length Wtd. (ft)           270.13    Wetted Per. (ft)           81.10     107.95
32.72
  Min Ch El (ft)             825.74    Shear (lb/sq ft)            0.31       1.07
0.40
  Alpha                        1.48    Stream Power (lb/ft s)      0.37       6.78
0.55
  Frctn Loss (ft)              0.22    Cum Volume (acre-ft)        4.30      13.23
2.27
  C & E Loss (ft)              0.07    Cum SA (acres)              0.73       0.73
0.36


CROSS SECTION OUTPUT  Profile #50-yr

  E.G. Elev (ft)             852.33    Element                   Left OB    Channel
Right OB
  Vel Head (ft)                0.68    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)             851.65    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                       Flow Area (sq ft)         557.34    2132.86
271.66
  E.G. Slope (ft/ft)       0.000995    Area (sq ft)              557.34    2132.86
271.66
  Q Total (cfs)            15780.00    Flow (cfs)                763.13   14608.79
408.08
  Top Width (ft)             218.26    Top Width (ft)             83.35     102.00
32.90
  Vel Total (ft/s)             5.33    Avg. Vel. (ft/s)            1.37       6.85
1.50
  Max Chl Dpth (ft)           25.91    Hydr. Depth (ft)            6.69      20.91
8.26
  Conv. Total (cfs)        500382.1    Conv. (cfs)               24198.9   463243.0
12940.2
  Length Wtd. (ft)           270.13    Wetted Per. (ft)           84.88     107.95
36.00
  Min Ch El (ft)             825.74    Shear (lb/sq ft)            0.41       1.23
0.47
  Alpha                        1.54    Stream Power (lb/ft s)      0.56       8.40
0.70
  Frctn Loss (ft)              0.22    Cum Volume (acre-ft)        5.41      14.32
2.83
  C & E Loss (ft)              0.08    Cum SA (acres)              0.76       0.73
0.39


CROSS SECTION OUTPUT  Profile #100-yr
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  E.G. Elev (ft)            853.81    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.77    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            853.05    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         676.06    2275.01
319.45
  E.G. Slope (ft/ft)      0.001046    Area (sq ft)              676.06    2275.01
319.45
  Q Total (cfs)           18250.00    Flow (cfs)               1049.99   16681.28
518.73
  Top Width (ft)            224.38    Top Width (ft)             86.69     102.00
35.69
  Vel Total (ft/s)            5.58    Avg. Vel. (ft/s)            1.55       7.33
1.62
  Max Chl Dpth (ft)          27.31    Hydr. Depth (ft)            7.80      22.30
8.95
  Conv. Total (cfs)       564343.3    Conv. (cfs)              32468.9   515833.8
16040.6
  Length Wtd. (ft)          270.13    Wetted Per. (ft)           88.51     107.95
39.12
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.50       1.38
0.53
  Alpha                       1.59    Stream Power (lb/ft s)      0.77      10.09
0.87
  Frctn Loss (ft)             0.23    Cum Volume (acre-ft)        6.50      15.35
3.40
  C & E Loss (ft)             0.10    Cum SA (acres)              0.78       0.73
0.42


CROSS SECTION OUTPUT  Profile #500-yr

  E.G. Elev (ft)            857.40    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.99    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            856.41    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                      Flow Area (sq ft)         982.37    2618.09
449.08
  E.G. Slope (ft/ft)      0.001152    Area (sq ft)              982.37    2618.09
449.08
  Q Total (cfs)           24913.00    Flow (cfs)               1920.99   22125.48
866.53
  Top Width (ft)            238.63    Top Width (ft)             95.42     102.00
41.21
  Vel Total (ft/s)            6.15    Avg. Vel. (ft/s)            1.96       8.45
1.93
  Max Chl Dpth (ft)          30.67    Hydr. Depth (ft)           10.30      25.67
10.90
  Conv. Total (cfs)       734026.4    Conv. (cfs)              56599.2   651896.1
25531.1
  Length Wtd. (ft)          270.15    Wetted Per. (ft)           97.88     107.95
45.65
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.72       1.74
0.71
  Alpha                       1.69    Stream Power (lb/ft s)      1.41      14.74
1.37
  Frctn Loss (ft)             0.24    Cum Volume (acre-ft)        9.31      17.84
4.99
  C & E Loss (ft)             0.14    Cum SA (acres)              0.86       0.73
0.51


CROSS SECTION


RIVER: Little River
REACH: Reach 1            RS: 0

INPUT
Description: Exit Section
Station Elevation Data    num=     153
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

4440	900	4450	899	4455	898	4460	897	4465	896
4475	895	4480	894	4485	893	4495	892	4500	891
4505	890	4515	889	4520	888	4527	887	4534	886
4538	885	4542	884	4548	883	4552	882	4556	881
4561	880	4565	879	4570	878	4575	877	4580	876
4584	875	4588	874	4592	873	4597	872	4602	871
4606	870	4611	869	4615	868	4619	867	4622	866
4626	865	4630	864	4635	863	4638	862	4642	861
4682	861	4704	862	4722	862	4727	861	4731	860
4735	859	4740	858	4742	857	4748	856	4751	855
4755	854	4760	853	4765	852	4768	851	4773	850
4776	849	4782	848	4786	847	4790	846	4795	845
4800	844	4807	843	4814	842	4826	842	4853	843
4863	844	4925	844	4928	843	4931	842	4955	833.61
5000	826.84	5050	836.29	5064	839.72	5070	841	5076	842
5085	843	5100	844	5119	845	5129	846	5134	847
5139	847	5141	849	5144	850	5147	851	5152	852
5157	853	5162	854	5170	855	5175	856	5183	857
5190	858	5195	859	5200	860	5205	861	5212	862
5218	863	5225	864	5230	865	5235	866	5244	867
5260	868	5273	869	5286	870	5299	871	5320	872
5330	873	5338	874	5346	875	5353	876	5360	877
5366	878	5375	879	5382	880	5388	881	5392	882
5398	883	5404	884	5410	885	5416	886	5423	887
5431	888	5440	889	5448	890	5456	891	5463	892
5470	893	5483	894	5499	895	5530	895	5540	894
5546	893	5551	892	5556	891	5562	890	5571	889
5583	888	5590	887	5594	886	5600	885	5605	885
5614	886	5622	887	5630	888	5640	889	5650	890
5658	891	5664	892	5671	893	5682	894	5700	895
5705	896	5710	897	5720	898				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4440	.12	4931	.05	5064	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4931	5064	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

E.G. Elev (ft)	843.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	843.50	Reach Len. (ft)			
Crit W.S. (ft)	835.43	Flow Area (sq ft)	57.78	1408.36	41.85
E.G. Slope (ft/ft)	0.000700	Area (sq ft)	57.78	1408.36	41.85
Q Total (cfs)	5291.00	Flow (cfs)	18.63	5254.81	17.56
Top Width (ft)	220.66	Top Width (ft)	59.09	133.00	28.57
Vel Total (ft/s)	3.51	Avg. Vel. (ft/s)	0.32	3.73	0.42
Max Chl Dpth (ft)	16.66	Hydr. Depth (ft)	0.98	10.59	1.46
Conv. Total (cfs)	199992.6	Conv. (cfs)	704.1	198624.6	663.9
Length Wtd. (ft)		Wetted Per. (ft)	59.49	136.23	28.86
Min Ch El (ft)	826.84	Shear (lb/sq ft)	0.04	0.45	0.06
Alpha	1.12	Stream Power (lb/ft s)	0.01	1.69	0.03
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #5-yr

E.G. Elev (ft)	846.61	Element	Left OB	Channel	Right OB

```
  Vel Head (ft)               0.28    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            846.33    Reach Len. (ft)
  Crit W.S. (ft)            837.11    Flow Area (sq ft)         407.95    1783.85
184.93
  E.G. Slope (ft/ft)      0.000701    Area (sq ft)              407.95    1783.85
184.93
  Q Total (cfs)            8183.00    Flow (cfs)                268.83    7794.98
119.19
  Top Width (ft)            341.95    Top Width (ft)            142.31     133.00
66.64
  Vel Total (ft/s)            3.44    Avg. Vel. (ft/s)            0.66       4.37
0.64
  Max Chl Dpth (ft)          19.49    Hydr. Depth (ft)            2.87      13.41
2.78
  Conv. Total (cfs)       309175.8    Conv. (cfs)              10157.1   294515.4
4503.2
  Length Wtd. (ft)                    Wetted Per. (ft)          143.09     136.23
67.05
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.12       0.57
0.12
  Alpha                       1.54    Stream Power (lb/ft s)      0.08       2.50
0.08
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)            848.36    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.32    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            848.04    Reach Len. (ft)
  Crit W.S. (ft)            838.18    Flow Area (sq ft)         658.04    2012.06
309.67
  E.G. Slope (ft/ft)      0.000700    Area (sq ft)              658.04    2012.06
309.67
  Q Total (cfs)           10359.00    Flow (cfs)                577.19    9525.10
256.71
  Top Width (ft)            358.31    Top Width (ft)            149.26     133.00
76.04
  Vel Total (ft/s)            3.48    Avg. Vel. (ft/s)            0.88       4.73
0.83
  Max Chl Dpth (ft)          21.20    Hydr. Depth (ft)            4.41      15.13
4.07
  Conv. Total (cfs)       391466.5    Conv. (cfs)              21812.0   359953.6
9700.9
  Length Wtd. (ft)                    Wetted Per. (ft)          150.25     136.23
76.96
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.19       0.65
0.18
  Alpha                       1.71    Stream Power (lb/ft s)      0.17       3.06
0.15
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #25-yr

  E.G. Elev (ft)            850.47    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.37    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            850.11    Reach Len. (ft)
  Crit W.S. (ft)            839.47    Flow Area (sq ft)         976.76    2286.32
469.83
  E.G. Slope (ft/ft)      0.000701    Area (sq ft)              976.76    2286.32
469.83
  Q Total (cfs)           13354.00    Flow (cfs)               1070.46   11789.67
493.87
  Top Width (ft)            371.85    Top Width (ft)            158.53     133.00
80.32
  Vel Total (ft/s)            3.58    Avg. Vel. (ft/s)            1.10       5.16
1.05
  Max Chl Dpth (ft)          23.27    Hydr. Depth (ft)            6.16      17.19
5.85
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  Conv. Total (cfs)       504484.8    Conv. (cfs)              40439.6   445387.8
18657.4
  Length Wtd. (ft)                    Wetted Per. (ft)          159.76     136.23
81.81
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.27       0.73
0.25
  Alpha                       1.85    Stream Power (lb/ft s)      0.29       3.79
0.26
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #50-yr

  E.G. Elev (ft)            852.02    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.40    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            851.62    Reach Len. (ft)
  Crit W.S. (ft)            840.39    Flow Area (sq ft)        1222.38    2487.89
595.39
  E.G. Slope (ft/ft)      0.000700    Area (sq ft)             1222.38    2487.89
595.39
  Q Total (cfs)           15780.00    Flow (cfs)               1514.15   13566.99
698.86
  Top Width (ft)            383.97    Top Width (ft)            164.86     133.00
86.11
  Vel Total (ft/s)            3.66    Avg. Vel. (ft/s)            1.24       5.45
1.17
  Max Chl Dpth (ft)          24.78    Hydr. Depth (ft)            7.41      18.71
6.91
  Conv. Total (cfs)       596374.4    Conv. (cfs)              57224.4   512737.8
26412.2
  Length Wtd. (ft)                    Wetted Per. (ft)          166.29     136.23
87.80
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.32       0.80
0.30
  Alpha                       1.92    Stream Power (lb/ft s)      0.40       4.35
0.35
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            853.48    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.43    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            853.05    Reach Len. (ft)
  Crit W.S. (ft)            841.23    Flow Area (sq ft)        1462.00    2677.84
723.47
  E.G. Slope (ft/ft)      0.000701    Area (sq ft)             1462.00    2677.84
723.47
  Q Total (cfs)           18250.00    Flow (cfs)               1989.44   15343.22
917.34
  Top Width (ft)            397.50    Top Width (ft)            171.25     133.00
93.25
  Vel Total (ft/s)            3.75    Avg. Vel. (ft/s)            1.36       5.73
1.27
  Max Chl Dpth (ft)          26.21    Hydr. Depth (ft)            8.54      20.13
7.76
  Conv. Total (cfs)       689443.4    Conv. (cfs)              75156.7   579631.7
34655.1
  Length Wtd. (ft)                    Wetted Per. (ft)          172.84     136.23
95.09
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.37       0.86
0.33
  Alpha                       1.98    Stream Power (lb/ft s)      0.50       4.93
0.42
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #500-yr
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E.G. Elev (ft)	857.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	856.51	Reach Len. (ft)			
Crit W.S. (ft)	843.49	Flow Area (sq ft)	2079.79	3137.48	1081.99
E.G. Slope (ft/ft)	0.000700	Area (sq ft)	2079.79	3137.48	1081.99
Q Total (cfs)	24913.00	Flow (cfs)	3382.54	19970.15	1560.31
Top Width (ft)	434.08	Top Width (ft)	186.03	133.00	115.04
Vel Total (ft/s)	3.95	Avg. Vel. (ft/s)	1.63	6.37	1.44
Max Chl Dpth (ft)	29.67	Hydr. Depth (ft)	11.18	23.59	9.40
Conv. Total (cfs)	941579.5	Conv. (cfs)	127842.1	754766.1	58971.3
Length Wtd. (ft)		Wetted Per. (ft)	188.04	136.23	117.17
Min Ch El (ft)	826.84	Shear (lb/sq ft)	0.48	1.01	0.40
Alpha	2.11	Stream Power (lb/ft s)	0.79	6.41	0.58
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Little River

Reach	River Sta.	n1	n2	n3
Reach 1	3	.12	.05	.12
Reach 1	2	.12	.05	.12
Reach 1	1.5	Bridge		
Reach 1	1	.12	.05	.12
Reach 1	0	.12	.05	.12

SUMMARY OF REACH LENGTHS

River: Little River

Reach	River Sta.	Left	Channel	Right
Reach 1	3	380	410	405
Reach 1	2	290	290	290
Reach 1	1.5	Bridge		
Reach 1	1	265	270	284
Reach 1	0	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Little River

Reach	River Sta.	Contr.	Expan.
Reach 1	3	.1	.3
Reach 1	2	.1	.3
Reach 1	1.5	Bridge	
Reach 1	1	.1	.3
Reach 1	0	.1	.3

ABNORMAL FLOODS

HEC-RAS Plan: Exist (lake) River: Little River Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	3	2-yr	5291.00	827.26	840.83		841.14	0.001335	4.46	1187.24	139.04	0.27
Reach 1	3	5-yr	8183.00	827.26	843.33		843.76	0.001402	5.28	1618.75	214.85	0.29
Reach 1	3	10-yr	10359.00	827.26	853.40		853.51	0.000179	2.89	5564.41	503.43	0.11
Reach 1	3	25-yr	13354.00	827.26	846.84		847.43	0.001424	6.29	2543.21	379.50	0.30
Reach 1	3	50-yr	15780.00	827.26	860.37		860.47	0.000123	2.92	9300.90	567.34	0.10
Reach 1	3	100-yr	18250.00	827.26	861.45		861.57	0.000140	3.20	9915.34	577.01	0.11
Reach 1	3	500-yr	24913.00	827.26	862.75		862.95	0.000217	4.10	10675.73	589.49	0.13
Reach 1	2	2-yr	5291.00	825.74	839.97	834.78	840.46	0.001995	5.62	944.80	111.96	0.33
Reach 1	2	5-yr	8183.00	825.74	842.27	836.44	843.01	0.002247	6.92	1226.17	132.50	0.36
Reach 1	2	10-yr	10359.00	825.74	853.16	837.47	853.40	0.000330	4.14	3296.43	224.84	0.15
Reach 1	2	25-yr	13354.00	825.74	845.45	838.80	846.61	0.002587	8.74	1699.91	180.95	0.40
Reach 1	2	50-yr	15780.00	825.74	860.10	839.79	860.38	0.000279	4.55	4957.25	253.61	0.15
Reach 1	2	100-yr	18250.00	825.74	861.12	840.78	861.46	0.000328	5.04	5216.07	255.84	0.16
Reach 1	2	500-yr	24913.00	825.74	862.19	843.20	862.78	0.000536	6.60	5493.18	259.97	0.21
Reach 1	1.5		Bridge									
Reach 1	1	2-yr	5291.00	825.74	838.98		839.60	0.002882	6.29	840.84	101.57	0.39
Reach 1	1	5-yr	8183.00	825.74	841.03		841.97	0.003307	7.78	1069.05	120.80	0.43
Reach 1	1	10-yr	10359.00	825.74	853.00		853.25	0.000340	4.17	3260.15	224.20	0.16
Reach 1	1	25-yr	13354.00	825.74	843.76		845.28	0.003944	9.95	1431.91	145.16	0.49
Reach 1	1	50-yr	15780.00	825.74	859.95		860.24	0.000284	4.58	4919.57	253.02	0.15
Reach 1	1	100-yr	18250.00	825.74	860.94		861.29	0.000335	5.08	5170.07	255.48	0.16
Reach 1	1	500-yr	24913.00	825.74	861.89		862.48	0.000556	6.68	5413.41	258.75	0.21
Reach 1	0	2-yr	5291.00	826.84	835.43	835.43	837.74	0.022827	12.18	434.55	95.69	1.01
Reach 1	0	5-yr	8183.00	826.84	837.11	837.11	839.94	0.021295	13.49	606.38	108.39	1.01
Reach 1	0	10-yr	10359.00	826.84	853.00	838.18	853.14	0.000228	3.26	4843.58	397.00	0.13
Reach 1	0	25-yr	13354.00	826.84	839.47	839.47	843.04	0.019807	15.17	880.40	124.71	1.01
Reach 1	0	50-yr	15780.00	826.84	860.00	840.39	860.14	0.000163	3.36	7880.58	469.00	0.11
Reach 1	0	100-yr	18250.00	826.84	861.00	841.23	861.17	0.000188	3.71	8354.08	478.00	0.12
Reach 1	0	500-yr	24913.00	826.84	862.00	843.49	862.28	0.000306	4.83	8891.08	556.00	0.16

HEC-RAS Plan: Exist (lake) River: Little River Reach: Reach 1

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl	Flow Area
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)	(sq ft)
Reach 1	3	2-yr	841.14	840.83		0.66	0.02	139.04		5291.00		4.46	1187.24
Reach 1	3	5-yr	843.76	843.33		0.72	0.03	214.85		8146.20	36.80	5.28	1618.75
Reach 1	3	10-yr	853.51	853.40		0.10	0.01	503.43	92.35	8810.23	1456.43	2.89	5564.41
Reach 1	3	25-yr	847.43	846.84		0.77	0.06	379.50	0.45	12983.65	369.89	6.29	2543.21
Reach 1	3	50-yr	860.47	860.37		0.07	0.02	567.34	315.28	11938.33	3526.40	2.92	9300.90
Reach 1	3	100-yr	861.57	861.45		0.08	0.02	577.01	391.54	13605.44	4253.02	3.20	9915.34
Reach 1	3	500-yr	862.95	862.75		0.13	0.04	589.49	573.61	18263.84	6075.55	4.10	10675.73
Reach 1	2	2-yr	840.46	839.97	834.78	0.18	0.01	111.96	0.25	5289.90	0.85	5.62	944.80
Reach 1	2	5-yr	843.01	842.27	836.44	0.21	0.01	132.50	10.86	8141.50	30.64	6.92	1226.17
Reach 1	2	10-yr	853.40	853.16	837.47	0.03	0.00	224.84	603.74	9458.64	296.62	4.14	3296.43
Reach 1	2	25-yr	846.61	845.45	838.80	0.25	0.02	180.95	95.25	13102.27	156.48	8.74	1699.91
Reach 1	2	50-yr	860.38	860.10	839.79	0.03	0.00	253.61	1508.29	13624.04	647.66	4.55	4957.25
Reach 1	2	100-yr	861.46	861.12	840.78	0.03	0.00	255.84	1839.12	15629.06	781.82	5.04	5216.07
Reach 1	2	500-yr	862.78	862.19	843.20	0.06	0.01	259.97	2631.05	21177.28	1104.67	6.60	5493.18
Reach 1	1.5 BR U	2-yr	840.27	839.72	834.86	0.43	0.01	102.79		5290.65	0.35	5.99	883.92
Reach 1	1.5 BR U	5-yr	842.79	841.94	836.58	0.53	0.01	120.94	1.69	8151.87	29.44	7.41	1132.25
Reach 1	1.5 BR U	10-yr	853.37	853.12	837.65	0.09	0.00	216.17	672.37	9283.20	403.43	4.24	3140.84
Reach 1	1.5 BR U	25-yr	846.34	845.00	839.02	0.69	0.02	155.87	62.69	13117.20	174.11	9.38	1545.25
Reach 1	1.5 BR U	50-yr	860.35	860.08	840.03	0.08	0.00	240.77	1801.41	13042.94	935.65	4.54	4725.06
Reach 1	1.5 BR U	100-yr	861.42	861.09	841.05	0.10	0.00	243.04	2188.68	14922.45	1138.87	5.03	4970.26
Reach 1	1.5 BR U	500-yr	862.71	862.16	843.57	0.16	0.00	247.07	3130.93	20159.36	1622.70	6.56	5230.30
Reach 1	1.5 BR D	2-yr	839.84	839.21	834.86	0.23	0.00	97.72		5291.00	0.00	6.35	833.11
Reach 1	1.5 BR D	5-yr	842.25	841.29	836.58	0.28	0.01	114.40	0.24	8165.72	17.05	7.88	1055.25
Reach 1	1.5 BR D	10-yr	853.28	853.03	837.65	0.03	0.00	215.81	664.88	9293.37	400.75	4.26	3121.36
Reach 1	1.5 BR D	25-yr	845.64	844.08	839.02	0.34	0.01	140.15	35.63	13184.96	133.40	10.08	1409.26
Reach 1	1.5 BR D	50-yr	860.27	860.00	840.03	0.03	0.00	240.43	1793.51	13054.29	932.20	4.56	4704.72
Reach 1	1.5 BR D	100-yr	861.32	860.99	841.05	0.04	0.00	242.83	2178.36	14938.53	1133.11	5.05	4945.48
Reach 1	1.5 BR D	500-yr	862.54	861.98	843.57	0.06	0.00	246.37	3107.96	20193.33	1611.71	6.61	5187.31
Reach 1	1	2-yr	839.60	838.98		1.69	0.17	101.57		5291.00		6.29	840.84
Reach 1	1	5-yr	841.97	841.03		1.84	0.19	120.80	3.25	8168.70	11.05	7.78	1069.05
Reach 1	1	10-yr	853.25	853.00		0.07	0.03	224.20	592.87	9472.56	293.56	4.17	3260.15
Reach 1	1	25-yr	845.28	843.76		2.04	0.21	145.16	48.96	13206.71	98.33	9.95	1431.91
Reach 1	1	50-yr	860.24	859.95		0.06	0.04	253.02	1496.76	13638.98	644.26	4.58	4919.57
Reach 1	1	100-yr	861.29	860.94		0.07	0.05	255.48	1822.62	15651.37	776.01	5.08	5170.07
Reach 1	1	500-yr	862.48	861.89		0.11	0.10	258.75	2597.42	21221.44	1094.15	6.68	5413.41
Reach 1	0	2-yr	837.74	835.43	835.43			95.69		5291.00		12.18	434.55

HEC-RAS Plan: Exist (lake) River: Little River Reach: Reach 1 (Continued)

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl	Flow Area
			(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft/s)	(sq ft)
Reach 1	0	5-yr	839.94	837.11	837.11			108.39		8183.00		13.49	606.38
Reach 1	0	10-yr	853.14	853.00	838.18			397.00	1124.87	8715.54	518.59	3.26	4843.58
Reach 1	0	25-yr	843.04	839.47	839.47			124.71		13354.00		15.17	880.40
Reach 1	0	50-yr	860.14	860.00	840.39			469.00	2476.76	12112.26	1190.98	3.36	7880.58
Reach 1	0	100-yr	861.17	861.00	841.23			478.00	2958.77	13845.11	1446.13	3.71	8354.08
Reach 1	0	500-yr	862.28	862.00	843.49			556.00	4161.18	18701.37	2050.45	4.83	8891.08

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                        HEC-RAS Version 3.1.3 May 2005
                         U.S. Army Corp of Engineers
                        Hydrologic Engineering Center
                              609 Second Street
                              Davis, California


            X     X  XXXXXX    XXXX        XXXX       XX      XXXX
            X     X  X        X    X       X   X     X  X    X
            X     X  X        X            X   X    X    X   X
            XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
            X     X  X        X            X  X     X    X        X
            X     X  X        X    X       X   X    X    X        X
            X     X  XXXXXX    XXXX        X    X   X    X   XXXXX



PROJECT DATA
Project Title: Little River
Project File : LittleRiver.prj
Run Date and Time: 7/3/2008 1:55:58 PM

Project in English units



PLAN DATA

Plan Title: Little River Existing (Allatoona)
Plan File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.p03

           Geometry Title: Little River Existing
           Geometry File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-
RAS\LittleRiver.g01

           Flow Title    : Abnormal  Floods (Lake Allatoona)
           Flow File     : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-
RAS\LittleRiver.f02

Plan Summary Information:
Number of:  Cross Sections =    4    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: Abnormal  Floods (Lake Allatoona)
Flow File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.f02

Flow Data (cfs)

  River           Reach           RS                    2-yr            5-yr           10-
yr           25-yr           50-yr          100-yr          500-yr
  Little River    Reach 1         3                     5291            8183
10359           13354           15780           18250           24913


Boundary Conditions
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River	Reach	Profile	Upstream	Downstream
Little River	Reach 1	2-yr		Known WS = 0
Little River	Reach 1	5-yr		Known WS = 0
Little River	Reach 1	10-yr		Known WS = 853
Little River	Reach 1	25-yr		Known WS = 0
Little River	Reach 1	50-yr		Known WS = 860
Little River	Reach 1	100-yr		Known WS = 861
Little River	Reach 1	500-yr		Known WS = 862

GEOMETRY DATA

Geometry Title: Little River Existing
Geometry File : m:\TRA\31-6036 02 I-575\Hydraulics\Little River\HEC-RAS\LittleRiver.g01

CROSS SECTION

RIVER: Little River
REACH: Reach 1 RS: 3

INPUT
Description: Approach Section
Station Elevation Data num= 131

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4615	900	4667	899	4682	898	4700	897	4710	896
4719	895	4727	894	4733	893	4737	892	4742	891
4748	890	4754	889	4760	888	4767	887	4775	886
4780	885	4782	884	4785	883	4786	882	4788	881
4790	880	4792	879	4794	878	4795	877	4797	876
4799	875	4800	874	4802	873	4804	872	4806	871
4807	870	4809	869	4811	868	4813	867	4815	866
4816	865	4843	864	4845	863	4848	862	4850	861
4852	860	4854	859	4856	858	4858	857	4860	856
4862	855	4864	854	4866	853	4869	852	4871	851
4874	850	4876	849	4879	848	4900	847	4905	846
4925	835.5	4985	827.26	5040	834.44	5055	841.34	5080	842
5120	843	5135	844	5150	845	5190	846	5298	847
5312	848	5325	849	5337	850	5346	851	5356	852
5365	853	5374	854	5380	855	5390	856	5396	857
5402	858	5409	859	5416	860	5423	861	5430	862
5437	863	5445	864	5450	865	5466	866	5485	867
5525	868	5565	869	5619	868	5623	867	5628	866
5635	865	5655	864	5710	864	5728	865	5780	865
5850	864	5908	864	5945	865	5960	866	5975	867
5990	868	6011	869	6056	870	6075	871	6080	872
6088	873	6098	874	6107	875	6119	876	6129	877
6140	878	6152	879	6160	880	6165	881	6168	882
6173	883	6177	884	6181	885	6185	886	6190	887
6195	888	6203	889	6208	890	6212	891	6216	892
6220	893	6225	894	6232	895	6238	896	6244	897
6250	898								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4615	.12	4905	.05	5055	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
4905	5055	380	410	405	.1	.3

CROSS SECTION OUTPUT Profile #2-yr

E.G. Elev (ft)	841.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.		0.050	

```
  W.S. Elev (ft)            840.83    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)                   1187.24
  E.G. Slope (ft/ft)      0.001335    Area (sq ft)                        1187.24
  Q Total (cfs)            5291.00    Flow (cfs)                          5291.00
  Top Width (ft)            139.04    Top Width (ft)                       139.04
  Vel Total (ft/s)            4.46    Avg. Vel. (ft/s)                       4.46
  Max Chl Dpth (ft)          13.57    Hydr. Depth (ft)                       8.54
  Conv. Total (cfs)       144811.6    Conv. (cfs)                        144811.6
  Length Wtd. (ft)          410.00    Wetted Per. (ft)                     142.78
  Min Ch El (ft)            827.26    Shear (lb/sq ft)                       0.69
  Alpha                       1.00    Stream Power (lb/ft s)                 3.09
  Frctn Loss (ft)             0.66    Cum Volume (acre-ft)        0.00      19.74
0.02
  C & E Loss (ft)             0.02    Cum SA (acres)              0.01       2.40
0.06


CROSS SECTION OUTPUT  Profile #5-yr

  E.G. Elev (ft)            843.76    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.43    Wt. n-Val.                              0.050
0.120
  W.S. Elev (ft)            843.33    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)                   1543.29
75.47
  E.G. Slope (ft/ft)      0.001402    Area (sq ft)                        1543.29
75.47
  Q Total (cfs)            8183.00    Flow (cfs)                          8146.20
36.80
  Top Width (ft)            214.85    Top Width (ft)                       144.91
69.94
  Vel Total (ft/s)            5.06    Avg. Vel. (ft/s)                       5.28
0.49
  Max Chl Dpth (ft)          16.07    Hydr. Depth (ft)                      10.65
1.08
  Conv. Total (cfs)       218536.3    Conv. (cfs)                        217553.5
982.8
  Length Wtd. (ft)          409.96    Wetted Per. (ft)                     149.38
69.97
  Min Ch El (ft)            827.26    Shear (lb/sq ft)                       0.90
0.09
  Alpha                       1.09    Stream Power (lb/ft s)                 4.77
0.05
  Frctn Loss (ft)             0.72    Cum Volume (acre-ft)        0.12      25.12
0.71
  C & E Loss (ft)             0.03    Cum SA (acres)              0.11       2.47
0.55


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)            853.51    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.11    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            853.40    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         196.38    3047.57
2320.45
  E.G. Slope (ft/ft)      0.000179    Area (sq ft)              196.38    3047.57
2320.45
  Q Total (cfs)           10359.00    Flow (cfs)                 92.35    8810.23
1456.43
  Top Width (ft)            503.43    Top Width (ft)             39.81     150.00
313.63
  Vel Total (ft/s)            1.86    Avg. Vel. (ft/s)            0.47       2.89
0.63
  Max Chl Dpth (ft)          26.14    Hydr. Depth (ft)            4.93      20.32
7.40
  Conv. Total (cfs)       775322.5    Conv. (cfs)               6911.8   659404.1
109006.6
  Length Wtd. (ft)          408.57    Wetted Per. (ft)           40.98     155.13
314.03
```

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  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.05       0.22
0.08
  Alpha                       2.07    Stream Power (lb/ft s)      0.03       0.63
0.05
  Frctn Loss (ft)             0.10    Cum Volume (acre-ft)       14.56      55.13
17.80
  C & E Loss (ft)             0.01    Cum SA (acres)              1.89       2.57
2.28


CROSS SECTION OUTPUT  Profile #25-yr

  E.G. Elev (ft)            847.43    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.60    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            846.84    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)           1.75    2062.55
478.92
  E.G. Slope (ft/ft)      0.001424    Area (sq ft)                1.75    2062.55
478.92
  Q Total (cfs)           13354.00    Flow (cfs)                  0.45   12983.65
369.89
  Top Width (ft)            379.50    Top Width (ft)              4.18     150.00
225.32
  Vel Total (ft/s)            5.25    Avg. Vel. (ft/s)            0.26       6.29
0.77
  Max Chl Dpth (ft)          19.58    Hydr. Depth (ft)            0.42      13.75
2.13
  Conv. Total (cfs)       353819.9    Conv. (cfs)                12.0   344007.5
9800.5
  Length Wtd. (ft)          409.79    Wetted Per. (ft)            4.26     155.13
225.43
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.04       1.18
0.19
  Alpha                       1.40    Stream Power (lb/ft s)      0.01       7.44
0.15
  Frctn Loss (ft)             0.77    Cum Volume (acre-ft)        0.93      32.72
3.41
  C & E Loss (ft)             0.06    Cum SA (acres)              0.54       2.55
1.37


Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate
the need for
         additional cross sections.

CROSS SECTION OUTPUT  Profile #50-yr

  E.G. Elev (ft)            860.47    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.10    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            860.37    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         522.32    4092.80
4685.79
  E.G. Slope (ft/ft)      0.000123    Area (sq ft)              522.32    4092.80
4685.79
  Q Total (cfs)           15780.00    Flow (cfs)                315.28   11938.33
3526.40
  Top Width (ft)            567.34    Top Width (ft)             53.74     150.00
363.60
  Vel Total (ft/s)            1.70    Avg. Vel. (ft/s)            0.60       2.92
0.75
  Max Chl Dpth (ft)          33.11    Hydr. Depth (ft)            9.72      27.29
12.89
  Conv. Total (cfs)       1424820.0    Conv. (cfs)              28467.1   1077945.0
318407.9
  Length Wtd. (ft)          407.61    Wetted Per. (ft)           56.56     155.13
364.50
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.07       0.20
0.10
  Alpha                       2.28    Stream Power (lb/ft s)      0.04       0.59
0.07
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```
  Frctn Loss (ft)             0.07    Cum Volume (acre-ft)       29.06      73.05
35.59
  C & E Loss (ft)             0.02    Cum SA (acres)              2.27       2.57
2.81


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

CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            861.57    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.12    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            861.45    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         581.18    4253.88
5080.27
  E.G. Slope (ft/ft)      0.000140    Area (sq ft)              581.18    4253.88
5080.27
  Q Total (cfs)           18250.00    Flow (cfs)                391.54   13605.44
4253.02
  Top Width (ft)            577.01    Top Width (ft)             55.89     150.00
371.12
  Vel Total (ft/s)            1.84    Avg. Vel. (ft/s)            0.67       3.20
0.84
  Max Chl Dpth (ft)          34.19    Hydr. Depth (ft)           10.40      28.36
13.69
  Conv. Total (cfs)       1542012.0    Conv. (cfs)              33082.8   1149575.0
359354.0
  Length Wtd. (ft)          407.48    Wetted Per. (ft)           58.97     155.13
372.10
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.09       0.24
0.12
  Alpha                       2.30    Stream Power (lb/ft s)      0.06       0.77
0.10
  Frctn Loss (ft)             0.08    Cum Volume (acre-ft)       31.38      75.68
38.57
  C & E Loss (ft)             0.02    Cum SA (acres)              2.31       2.57
2.88


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 #500-yr

  E.G. Elev (ft)            862.95    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.20    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            862.75    Reach Len. (ft)           380.00     410.00
405.00
  Crit W.S. (ft)                      Flow Area (sq ft)         656.05    4449.49
5570.19
  E.G. Slope (ft/ft)      0.000217    Area (sq ft)              656.05    4449.49
5570.19
  Q Total (cfs)           24913.00    Flow (cfs)                573.61   18263.84
6075.55
  Top Width (ft)            589.49    Top Width (ft)             59.25     150.00
380.25
  Vel Total (ft/s)            2.33    Avg. Vel. (ft/s)            0.87       4.10
1.09
  Max Chl Dpth (ft)          35.49    Hydr. Depth (ft)           11.07      29.66
14.65
  Conv. Total (cfs)       1690103.0    Conv. (cfs)              38913.8   1239023.0
412166.7
  Length Wtd. (ft)          407.35    Wetted Per. (ft)           62.58     155.13
381.32
  Min Ch El (ft)            827.26    Shear (lb/sq ft)            0.14       0.39
0.20
```

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  Alpha                        2.32    Stream Power (lb/ft s)      0.12       1.60
0.22
  Frctn Loss (ft)              0.13    Cum Volume (acre-ft)       33.99      78.49
42.04
  C & E Loss (ft)              0.04    Cum SA (acres)              2.57       2.57
2.97


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


RIVER: Little River
REACH: Reach 1            RS: 2

INPUT
Description: Upstream of bridge
Station Elevation Data    num=     155
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    4673  892.86    4690   892.2    4712   891.2    4727   890.2    4732   889.2
    4737   888.2    4741   887.2    4745   886.2    4750   885.2    4755   884.2
    4769   883.2    4771   882.2    4774   881.2    4776   880.2    4779   879.2
    4781   878.2    4784   877.2    4786   876.2    4788   875.2    4791   874.2
    4794   873.2    4796   872.2    4798   871.2    4801   870.2    4824   869.8
    4826   868.2    4828   867.2    4831   866.2    4833   865.2    4836   864.2
    4840   863.2    4843   862.2    4845   861.2    4846   860.2    4848   859.2
    4851   858.2    4854   857.2    4856   856.2    4859   855.2    4861   854.2
    4864   853.2    4866   852.2    4869   851.2    4871   850.2    4875   849.2
    4878   848.2    4880   847.2    4887   846.2    4898   845.2    4908   845.2
    4924   844.2    4933   843.2    4938   842.2    4945   841.2    4948   840.2
    4951   839.2    4952   838.2    4953   836.2    4955   835.2    4960   834.2
    4965   833.2    4970   832.2    4975   831.2    4980   830.2    4985   829.2
    4990   828.2    4995   827.2    5000  825.74    5005   826.2    5010   827.2
    5016   828.2    5021   829.2    5027   830.2    5033   831.2    5038   832.2
    5043   833.2    5048   834.2    5049   835.2    5051   836.2    5052   838.2
    5053   839.2    5063   840.2    5067   841.2    5070   842.2    5072   843.2
    5074   844.2    5076   845.2    5077   846.2    5079   847.2    5081   848.2
    5082   849.2    5083   850.2    5085   851.2    5087   852.2    5089   853.2
    5091   854.2    5092   855.2    5094   856.2    5095   857.2    5096   858.2
    5098   859.2    5100   860.2    5101   861.2    5103   862.2    5105   863.2
    5106   864.2    5108   865.2    5110   866.2    5112   867.2    5114   868.2
    5116   869.2    5118   870.2    5120   871.2    5122   872.2    5125   873.2
    5127   874.2    5129   875.2    5132   876.2    5134   877.2    5149   878.2
    5152   879.2    5154   880.2    5156   881.2    5159   882.2    5161   883.2
    5164   884.2    5166   885.2    5170   886.2    5173   887.2    5176   888.2
    5178   889.2    5181   890.2    5185   891.2    5187   892.2    5190   893.2
    5195   894.2    5200   895.2    5205   896.2    5210   897.2    5215   898.2
    5220   899.2    5225   900.2    5230   901.2    5235   902.2    5240   903.2
    5247   904.2    5253   905.2    5259   906.2    5266   907.2    5278   908.2
    5291   909.2    5304   910.2    5318   911.2    5336   912.2    5360   912.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    4673     .12    4951     .05    5053     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          4951    5053              290     290     290             .1       .3

CROSS SECTION OUTPUT  Profile #2-yr

  E.G. Elev (ft)            840.46    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.49    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            839.97    Reach Len. (ft)            75.00      75.00
75.00
  Crit W.S. (ft)            834.78    Flow Area (sq ft)           0.88     940.98
2.94
  E.G. Slope (ft/ft)      0.001995    Area (sq ft)                0.88     940.98
2.94
  Q Total (cfs)            5291.00    Flow (cfs)                  0.25    5289.90
0.85
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  Top Width (ft)            111.96    Top Width (ft)              2.30     102.00
7.67
  Vel Total (ft/s)            5.60    Avg. Vel. (ft/s)            0.28       5.62
0.29
  Max Chl Dpth (ft)          14.23    Hydr. Depth (ft)            0.38       9.23
0.38
  Conv. Total (cfs)       118466.6    Conv. (cfs)                  5.6   118441.9
19.1
  Length Wtd. (ft)           75.00    Wetted Per. (ft)            2.42     107.95
7.70
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.05       1.09
0.05
  Alpha                       1.01    Stream Power (lb/ft s)      0.01       6.10
0.01
  Frctn Loss (ft)             0.18    Cum Volume (acre-ft)        0.00       9.72
0.01
  C & E Loss (ft)             0.01    Cum SA (acres)              0.00       1.27
0.02


CROSS SECTION OUTPUT  Profile #5-yr

  E.G. Elev (ft)            843.01    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.74    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            842.27    Reach Len. (ft)            75.00      75.00
75.00
  Crit W.S. (ft)            836.44    Flow Area (sq ft)          16.43    1176.03
33.71
  E.G. Slope (ft/ft)      0.002247    Area (sq ft)               16.43    1176.03
33.71
  Q Total (cfs)            8183.00    Flow (cfs)                 10.86    8141.50
30.64
  Top Width (ft)            132.50    Top Width (ft)             13.35     102.00
17.14
  Vel Total (ft/s)            6.67    Avg. Vel. (ft/s)            0.66       6.92
0.91
  Max Chl Dpth (ft)          16.53    Hydr. Depth (ft)            1.23      11.53
1.97
  Conv. Total (cfs)       172626.8    Conv. (cfs)                229.1   171751.3
646.4
  Length Wtd. (ft)           75.00    Wetted Per. (ft)           13.76     107.95
17.49
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.17       1.53
0.27
  Alpha                       1.07    Stream Power (lb/ft s)      0.11      10.58
0.25
  Frctn Loss (ft)             0.21    Cum Volume (acre-ft)        0.05      12.32
0.20
  C & E Loss (ft)             0.01    Cum SA (acres)              0.06       1.31
0.14


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)            853.40    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.24    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            853.16    Reach Len. (ft)            75.00      75.00
75.00
  Crit W.S. (ft)            837.47    Flow Area (sq ft)         686.07    2286.78
323.58
  E.G. Slope (ft/ft)      0.000330    Area (sq ft)              686.07    2286.78
323.58
  Q Total (cfs)           10359.00    Flow (cfs)                603.74    9458.64
296.62
  Top Width (ft)            224.84    Top Width (ft)             86.92     102.00
35.92
  Vel Total (ft/s)            3.14    Avg. Vel. (ft/s)            0.88       4.14
0.92
  Max Chl Dpth (ft)          27.42    Hydr. Depth (ft)            7.89      22.42
9.01
  Conv. Total (cfs)       569814.3    Conv. (cfs)              33209.9   520288.2
16316.2
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  Length Wtd. (ft)           75.00    Wetted Per. (ft)           88.77     107.95
39.38
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.16       0.44
0.17
  Alpha                       1.59    Stream Power (lb/ft s)      0.14       1.81
0.16
  Frctn Loss (ft)             0.03    Cum Volume (acre-ft)       10.71      30.03
5.51
  C & E Loss (ft)             0.00    Cum SA (acres)              1.34       1.39
0.66


CROSS SECTION OUTPUT  Profile #25-yr

  E.G. Elev (ft)            846.61    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               1.16    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            845.45    Reach Len. (ft)            75.00      75.00
75.00
  Crit W.S. (ft)            838.80    Flow Area (sq ft)         101.86    1499.87
98.18
  E.G. Slope (ft/ft)      0.002587    Area (sq ft)              101.86    1499.87
98.18
  Q Total (cfs)           13354.00    Flow (cfs)                 95.25   13102.27
156.48
  Top Width (ft)            180.95    Top Width (ft)             55.70     102.00
23.25
  Vel Total (ft/s)            7.86    Avg. Vel. (ft/s)            0.94       8.74
1.59
  Max Chl Dpth (ft)          19.71    Hydr. Depth (ft)            1.83      14.70
4.22
  Conv. Total (cfs)       262557.8    Conv. (cfs)               1872.8   257608.4
3076.5
  Length Wtd. (ft)           75.00    Wetted Per. (ft)           56.30     107.95
24.39
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.29       2.24
0.65
  Alpha                       1.21    Stream Power (lb/ft s)      0.27      19.60
1.04
  Frctn Loss (ft)             0.25    Cum Volume (acre-ft)        0.48      15.96
0.72
  C & E Loss (ft)             0.02    Cum SA (acres)              0.28       1.36
0.21


CROSS SECTION OUTPUT  Profile #50-yr

  E.G. Elev (ft)            860.38    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.28    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            860.10    Reach Len. (ft)            75.00      75.00
75.00
  Crit W.S. (ft)            839.79    Flow Area (sq ft)        1352.35    2994.93
609.96
  E.G. Slope (ft/ft)      0.000279    Area (sq ft)             1352.35    2994.93
609.96
  Q Total (cfs)           15780.00    Flow (cfs)               1508.29   13624.04
647.66
  Top Width (ft)            253.61    Top Width (ft)            104.81     102.00
46.81
  Vel Total (ft/s)            3.18    Avg. Vel. (ft/s)            1.12       4.55
1.06
  Max Chl Dpth (ft)          34.36    Hydr. Depth (ft)           12.90      29.36
13.03
  Conv. Total (cfs)       944749.1    Conv. (cfs)              90301.5   815671.9
38775.7
  Length Wtd. (ft)           75.00    Wetted Per. (ft)          107.99     107.95
52.44
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.22       0.48
0.20
  Alpha                       1.78    Stream Power (lb/ft s)      0.24       2.20
0.22
  Frctn Loss (ft)             0.03    Cum Volume (acre-ft)       20.89      39.69
10.97
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  C & E Loss (ft)             0.00    Cum SA (acres)              1.58       1.39
0.91


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

CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)            861.46    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.34    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            861.12    Reach Len. (ft)            75.00      75.00
75.00
  Crit W.S. (ft)            840.78    Flow Area (sq ft)        1459.42    3098.54
658.12
  E.G. Slope (ft/ft)      0.000328    Area (sq ft)             1459.42    3098.54
658.12
  Q Total (cfs)           18250.00    Flow (cfs)               1839.12   15629.06
781.82
  Top Width (ft)            255.84    Top Width (ft)            105.92     102.00
47.92
  Vel Total (ft/s)            3.50    Avg. Vel. (ft/s)            1.26       5.04
1.19
  Max Chl Dpth (ft)          35.38    Hydr. Depth (ft)           13.78      30.38
13.73
  Conv. Total (cfs)       1008004.0    Conv. (cfs)             101580.3   863240.9
43182.5
  Length Wtd. (ft)           75.00    Wetted Per. (ft)          109.51     107.95
53.95
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.27       0.59
0.25
  Alpha                       1.80    Stream Power (lb/ft s)      0.34       2.96
0.30
  Frctn Loss (ft)             0.03    Cum Volume (acre-ft)       22.48      41.07
11.89
  C & E Loss (ft)             0.00    Cum SA (acres)              1.61       1.39
0.93


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 #500-yr

  E.G. Elev (ft)            862.78    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.58    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            862.19    Reach Len. (ft)            75.00      75.00
75.00
  Crit W.S. (ft)            843.20    Flow Area (sq ft)        1574.33    3208.17
710.69
  E.G. Slope (ft/ft)      0.000536    Area (sq ft)             1574.33    3208.17
710.69
  Q Total (cfs)           24913.00    Flow (cfs)               2631.05   21177.28
1104.67
  Top Width (ft)            259.97    Top Width (ft)            107.99     102.00
49.99
  Vel Total (ft/s)            4.54    Avg. Vel. (ft/s)            1.67       6.60
1.55
  Max Chl Dpth (ft)          36.45    Hydr. Depth (ft)           14.58      31.45
14.22
  Conv. Total (cfs)       1076104.0    Conv. (cfs)             113646.5   914741.2
47715.7
  Length Wtd. (ft)           75.00    Wetted Per. (ft)          111.85     107.95
56.29
  Min Ch El (ft)            825.74    Shear (lb/sq ft)            0.47       0.99
0.42
  Alpha                       1.82    Stream Power (lb/ft s)      0.79       6.56
0.66
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  Frctn Loss (ft)             0.06    Cum Volume (acre-ft)       24.26      42.46
12.85
  C & E Loss (ft)             0.01    Cum SA (acres)              1.84       1.39
0.97


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: Little River
REACH: Reach 1            RS: 1.5

INPUT
Description: I-575 over Little River
Distance from Upstream XS =      75
Deck/Roadway Width        =     140
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=      22
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    4420     903       0    4456     902       0    4498     901       0
    4540     900       0    4600     899       0    4700     898       0
    4770  897.89 892.765    4850     897 891.875    5000     897 891.875
    5050     897 891.875    5175     898 892.875    5215   898.3 893.175
    5220     899       0    5233     899       0    5318     900       0
    5385     901       0    5435     902       0    5480     903       0
    5520     904       0    5560     905       0    5596     906       0
    5635     907       0

Upstream Bridge Cross Section Data
Station Elevation Data    num=     155
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    4673  892.86    4690   892.2    4712   891.2    4727   890.2    4732   889.2
    4737   888.2    4741   887.2    4745   886.2    4750   885.2    4755   884.2
    4769   883.2    4771   882.2    4774   881.2    4776   880.2    4779   879.2
    4781   878.2    4784   877.2    4786   876.2    4788   875.2    4791   874.2
    4794   873.2    4796   872.2    4798   871.2    4801   870.2    4824   869.8
    4826   868.2    4828   867.2    4831   866.2    4833   865.2    4836   864.2
    4840   863.2    4843   862.2    4845   861.2    4846   860.2    4848   859.2
    4851   858.2    4854   857.2    4856   856.2    4859   855.2    4861   854.2
    4864   853.2    4866   852.2    4869   851.2    4871   850.2    4875   849.2
    4878   848.2    4880   847.2    4887   846.2    4898   845.2    4908   845.2
    4924   844.2    4933   843.2    4938   842.2    4945   841.2    4948   840.2
    4951   839.2    4952   838.2    4953   836.2    4955   835.2    4960   834.2
    4965   833.2    4970   832.2    4975   831.2    4980   830.2    4985   829.2
    4990   828.2    4995   827.2    5000  825.74    5005   826.2    5010   827.2
    5016   828.2    5021   829.2    5027   830.2    5033   831.2    5038   832.2
    5043   833.2    5048   834.2    5049   835.2    5051   836.2    5052   838.2
    5053   839.2    5063   840.2    5067   841.2    5070   842.2    5072   843.2
    5074   844.2    5076   845.2    5077   846.2    5079   847.2    5081   848.2
    5082   849.2    5083   850.2    5085   851.2    5087   852.2    5089   853.2
    5091   854.2    5092   855.2    5094   856.2    5095   857.2    5096   858.2
    5098   859.2    5100   860.2    5101   861.2    5103   862.2    5105   863.2
    5106   864.2    5108   865.2    5110   866.2    5112   867.2    5114   868.2
    5116   869.2    5118   870.2    5120   871.2    5122   872.2    5125   873.2
    5127   874.2    5129   875.2    5132   876.2    5134   877.2    5149   878.2
    5152   879.2    5154   880.2    5156   881.2    5159   882.2    5161   883.2
    5164   884.2    5166   885.2    5170   886.2    5173   887.2    5176   888.2
    5178   889.2    5181   890.2    5185   891.2    5187   892.2    5190   893.2
    5195   894.2    5200   895.2    5205   896.2    5210   897.2    5215   898.2
    5220   899.2    5225   900.2    5230   901.2    5235   902.2    5240   903.2
    5247   904.2    5253   905.2    5259   906.2    5266   907.2    5278   908.2
    5291   909.2    5304   910.2    5318   911.2    5336   912.2    5360   912.8

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    4673     .12    4951     .05    5053     .12

Bank Sta: Left   Right    Coeff Contr.   Expan.
          4951    5053             .1       .3

Downstream  Deck/Roadway Coordinates
```

num= 22

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
4420	903	0	4456	902	0	4498	901	0
4540	900	0	4600	899	0	4700	898	0
4770	897.89	892.765	4850	897	891.875	5000	897	891.875
5050	897	891.875	5175	898	892.875	5215	898.3	893.175
5220	899	0	5233	899	0	5318	900	0
5385	901	0	5435	902	0	5480	903	0
5520	904	0	5560	905	0	5596	906	0
5635	907	0						

Downstream Bridge Cross Section Data
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4673	892.86	4690	892.2	4712	891.2	4727	890.2	4732	889.2
4737	888.2	4741	887.2	4745	886.2	4750	885.2	4755	884.2
4769	883.2	4771	882.2	4774	881.2	4776	880.2	4779	879.2
4781	878.2	4784	877.2	4786	876.2	4788	875.2	4791	874.2
4794	873.2	4796	872.2	4798	871.2	4801	870.2	4824	869.8
4826	868.2	4828	867.2	4831	866.2	4833	865.2	4836	864.2
4840	863.2	4843	862.2	4845	861.2	4846	860.2	4848	859.2
4851	858.2	4854	857.2	4856	856.2	4859	855.2	4861	854.2
4864	853.2	4866	852.2	4869	851.2	4871	850.2	4875	849.2
4878	848.2	4880	847.2	4887	846.2	4898	845.2	4908	845.2
4924	844.2	4933	843.2	4938	842.2	4945	841.2	4948	840.2
4951	839.2	4952	838.2	4953	836.2	4955	835.2	4960	834.2
4965	833.2	4970	832.2	4975	831.2	4980	830.2	4985	829.2
4990	828.2	4995	827.2	5000	825.74	5005	826.2	5010	827.2
5016	828.2	5021	829.2	5027	830.2	5033	831.2	5038	832.2
5043	833.2	5048	834.2	5049	835.2	5051	836.2	5052	838.2
5053	839.2	5063	840.2	5067	841.2	5070	842.2	5072	843.2
5074	844.2	5076	845.2	5077	846.2	5079	847.2	5081	848.2
5082	849.2	5083	850.2	5085	851.2	5087	852.2	5089	853.2
5091	854.2	5092	855.2	5094	856.2	5095	857.2	5096	858.2
5098	859.2	5100	860.2	5101	861.2	5103	862.2	5105	863.2
5106	864.2	5108	865.2	5110	866.2	5112	867.2	5114	868.2
5116	869.2	5118	870.2	5120	871.2	5122	872.2	5125	873.2
5127	874.2	5129	875.2	5132	876.2	5134	877.2	5149	878.2
5152	879.2	5154	880.2	5156	881.2	5159	882.2	5161	883.2
5164	884.2	5166	885.2	5170	886.2	5173	887.2	5176	888.2
5178	889.2	5181	890.2	5185	891.2	5187	892.2	5190	893.2
5195	894.2	5200	895.2	5205	896.2	5210	897.2	5215	898.2
5220	899.2	5225	900.2	5230	901.2	5235	902.2	5240	903.2
5247	904.2	5253	905.2	5259	906.2	5266	907.2	5278	908.2
5291	909.2	5304	910.2	5318	911.2	5336	912.2	5360	912.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4673	.12	4951	.05	5053	.12

Bank Sta: Left	Right	Coeff Contr.	Expan.
4951	5053	.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 = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data
Upstream num= 2

Sta	Elev	Sta	Elev
4770	892.77	4816	869.77

Downstream num= 2

Sta	Elev	Sta	Elev
4770	892.77	4816	869.77

Abutment Data
Upstream num= 2

Sta	Elev	Sta	Elev
5175	873.17	5215	893.17

Downstream num= 2

Sta	Elev	Sta	Elev

```
    5175  873.17    5215  893.17

Number of Piers =  4

Pier Data
Pier Station     Upstream=    4859    Downstream=    4859
Upstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895
Downstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895

Pier Data
Pier Station     Upstream=    4949    Downstream=    4949
Upstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895
Downstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895

Pier Data
Pier Station     Upstream=    5037    Downstream=    5037
Upstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895
Downstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895

Pier Data
Pier Station     Upstream=    5126    Downstream=    5126
Upstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895
Downstream     num=       2
    Width   Elev    Width   Elev
    4.25       0    4.25     895

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 #2-yr

  E.G. US. (ft)                840.46    Element                  Inside BR US  Inside BR
DS
  W.S. US. (ft)                839.97    E.G. Elev (ft)               840.27
839.84
  Q Total (cfs)               5291.00    W.S. Elev (ft)               839.72
839.21
  Q Bridge (cfs)              5291.00    Crit W.S. (ft)               834.86
834.86
  Q Weir (cfs)                           Max Chl Dpth (ft)             13.98
13.47
  Weir Sta Lft (ft)                      Vel Total (ft/s)               5.99
6.35
  Weir Sta Rgt (ft)                      Flow Area (sq ft)            883.92
833.11
  Weir Submerg                           Froude # Chl                   0.35
0.38
  Weir Max Depth (ft)                    Specif Force (cu ft)        5460.97
5084.64
```

Min El Weir Flow (ft)	897.01	Hydr Depth (ft)	8.60 8.53
Min El Prs (ft)	892.98	W.P. Total (ft)	124.70 118.09
Delta EG (ft)	0.86	Conv. Total (cfs)	99471.7 91121.5
Delta WS (ft)	0.98	Top Width (ft)	102.79 97.72
BR Open Area (sq ft)	14911.46	Frctn Loss (ft)	0.43 0.23
BR Open Vel (ft/s)	6.35	C & E Loss (ft)	0.01 0.00
Coef of Q		Shear Total (lb/sq ft)	1.25 1.48
Br Sel Method	Energy only	Power Total (lb/ft s)	7.49 9.43

BRIDGE OUTPUT Profile #5-yr

E.G. US. (ft)	843.01	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	842.27	E.G. Elev (ft)	842.79	842.25
Q Total (cfs)	8183.00	W.S. Elev (ft)	841.94	841.29
Q Bridge (cfs)	8183.00	Crit W.S. (ft)	836.58	836.58
Q Weir (cfs)		Max Chl Dpth (ft)	16.20	15.55
Weir Sta Lft (ft)		Vel Total (ft/s)	7.23	7.75
Weir Sta Rgt (ft)		Flow Area (sq ft)	1132.25	1055.25
Weir Submerg		Froude # Chl	0.39	0.43
Weir Max Depth (ft)		Specif Force (cu ft)	8592.01	7998.43
Min El Weir Flow (ft)	897.01	Hydr Depth (ft)	9.36	9.22
Min El Prs (ft)	892.98	W.P. Total (ft)	151.33	142.02
Delta EG (ft)	1.04	Conv. Total (cfs)	139001.5	126915.9
Delta WS (ft)	1.24	Top Width (ft)	120.94	114.40
BR Open Area (sq ft)	14911.46	Frctn Loss (ft)	0.53	0.28
BR Open Vel (ft/s)	7.75	C & E Loss (ft)	0.01	0.01
Coef of Q		Shear Total (lb/sq ft)	1.62	1.93
Br Sel Method	Energy only	Power Total (lb/ft s)	11.70	14.95

BRIDGE OUTPUT Profile #10-yr

E.G. US. (ft)	853.40	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	853.16	E.G. Elev (ft)	853.37	853.28
Q Total (cfs)	10359.00	W.S. Elev (ft)	853.12	853.03
Q Bridge (cfs)	10359.00	Crit W.S. (ft)	837.65	837.65
Q Weir (cfs)		Max Chl Dpth (ft)	27.38	27.29
Weir Sta Lft (ft)		Vel Total (ft/s)	3.30	3.32
Weir Sta Rgt (ft)		Flow Area (sq ft)	3140.84	3121.36
Weir Submerg		Froude # Chl	0.16	0.16
Weir Max Depth (ft)		Specif Force (cu ft)	30815.17	30540.23

Min El Weir Flow (ft)	897.01	Hydr Depth (ft)	14.53	14.46
Min El Prs (ft)	892.98	W.P. Total (ft)	295.87	295.11
Delta EG (ft)	0.16	Conv. Total (cfs)	416351.8	413582.5
Delta WS (ft)	0.16	Top Width (ft)	216.17	215.81
BR Open Area (sq ft)	14911.46	Frctn Loss (ft)	0.09	0.03
BR Open Vel (ft/s)	3.32	C & E Loss (ft)	0.00	0.00
Coef of Q		Shear Total (lb/sq ft)	0.41	0.41
Br Sel Method	Energy only	Power Total (lb/ft s)	1.35	1.37

BRIDGE OUTPUT Profile #25-yr

E.G. US. (ft)	846.61	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	845.45	E.G. Elev (ft)	846.34	845.64
Q Total (cfs)	13354.00	W.S. Elev (ft)	845.00	844.08
Q Bridge (cfs)	13354.00	Crit W.S. (ft)	839.02	839.02
Q Weir (cfs)		Max Chl Dpth (ft)	19.26	18.34
Weir Sta Lft (ft)		Vel Total (ft/s)	8.64	9.48
Weir Sta Rgt (ft)		Flow Area (sq ft)	1545.25	1409.26
Weir Submerg		Froude # Chl	0.44	0.49
Weir Max Depth (ft)		Specif Force (cu ft)	14612.80	13554.79
Min El Weir Flow (ft)	897.01	Hydr Depth (ft)	9.91	10.06
Min El Prs (ft)	892.98	W.P. Total (ft)	199.38	179.73
Delta EG (ft)	1.33	Conv. Total (cfs)	200654.1	181163.1
Delta WS (ft)	1.69	Top Width (ft)	155.87	140.15
BR Open Area (sq ft)	14911.46	Frctn Loss (ft)	0.69	0.34
BR Open Vel (ft/s)	9.48	C & E Loss (ft)	0.02	0.01
Coef of Q		Shear Total (lb/sq ft)	2.14	2.66
Br Sel Method	Energy only	Power Total (lb/ft s)	18.52	25.20

BRIDGE OUTPUT Profile #50-yr

E.G. US. (ft)	860.38	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	860.10	E.G. Elev (ft)	860.35	860.27
Q Total (cfs)	15780.00	W.S. Elev (ft)	860.08	860.00
Q Bridge (cfs)	15780.00	Crit W.S. (ft)	840.03	840.03
Q Weir (cfs)		Max Chl Dpth (ft)	34.34	34.26
Weir Sta Lft (ft)		Vel Total (ft/s)	3.34	3.35
Weir Sta Rgt (ft)		Flow Area (sq ft)	4725.06	4704.72
Weir Submerg		Froude # Chl	0.15	0.15
Weir Max Depth (ft)		Specif Force (cu ft)	58810.10	58419.83

```
  Min El Weir Flow (ft)        897.01    Hydr Depth (ft)               19.62
19.57
  Min El Prs (ft)              892.98    W.P. Total (ft)              361.58
360.70
  Delta EG (ft)                  0.14    Conv. Total (cfs)          652472.4
649392.7
  Delta WS (ft)                  0.15    Top Width (ft)               240.77
240.43
  BR Open Area (sq ft)       14911.46    Frctn Loss (ft)                0.08
0.03
  BR Open Vel (ft/s)             3.35    C & E Loss (ft)                0.00
0.00
  Coef of Q                              Shear Total (lb/sq ft)         0.48
0.48
  Br Sel Method           Energy only    Power Total (lb/ft s)          1.59
1.61


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 #100-yr

  E.G. US. (ft)                861.46    Element                 Inside BR US  Inside BR
DS
  W.S. US. (ft)                861.12    E.G. Elev (ft)               861.42
861.32
  Q Total (cfs)              18250.00    W.S. Elev (ft)               861.09
860.99
  Q Bridge (cfs)             18250.00    Crit W.S. (ft)               841.05
841.05
  Q Weir (cfs)                           Max Chl Dpth (ft)             35.35
35.25
  Weir Sta Lft (ft)                      Vel Total (ft/s)               3.67
3.69
  Weir Sta Rgt (ft)                      Flow Area (sq ft)           4970.26
4945.48
  Weir Submerg                           Froude # Chl                   0.16
0.16
  Weir Max Depth (ft)                    Specif Force (cu ft)       64256.34
63763.17
  Min El Weir Flow (ft)        897.01    Hydr Depth (ft)               20.45
20.37
  Min El Prs (ft)              892.98    W.P. Total (ft)              370.72
369.82
  Delta EG (ft)                  0.17    Conv. Total (cfs)          690147.5
686318.8
  Delta WS (ft)                  0.18    Top Width (ft)               243.04
242.83
  BR Open Area (sq ft)       14911.46    Frctn Loss (ft)                0.10
0.04
  BR Open Vel (ft/s)             3.69    C & E Loss (ft)                0.00
0.00
  Coef of Q                              Shear Total (lb/sq ft)         0.59
0.59
  Br Sel Method           Energy only    Power Total (lb/ft s)          2.15
2.18


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 #500-yr

  E.G. US. (ft)                862.78    Element                 Inside BR US  Inside BR
DS
  W.S. US. (ft)                862.19    E.G. Elev (ft)               862.71
862.54
  Q Total (cfs)              24913.00    W.S. Elev (ft)               862.16
861.98
  Q Bridge (cfs)             24913.00    Crit W.S. (ft)               843.57
843.57
```

Q Weir (cfs)		Max Chl Dpth (ft)	36.42
36.24			
Weir Sta Lft (ft)		Vel Total (ft/s)	4.76
4.80			
Weir Sta Rgt (ft)		Flow Area (sq ft)	5230.30
5187.31			
Weir Submerg		Froude # Chl	0.21
0.21			
Weir Max Depth (ft)		Specif Force (cu ft)	71601.91
70730.33			
Min El Weir Flow (ft)	897.01	Hydr Depth (ft)	21.17
21.05			
Min El Prs (ft)	892.98	W.P. Total (ft)	381.66
379.84			
Delta EG (ft)	0.29	Conv. Total (cfs)	729997.0
723407.9			
Delta WS (ft)	0.31	Top Width (ft)	247.07
246.37			
BR Open Area (sq ft)	14911.46	Frctn Loss (ft)	0.16
0.06			
BR Open Vel (ft/s)	4.80	C & E Loss (ft)	0.00
0.00			
Coef of Q		Shear Total (lb/sq ft)	1.00
1.01			
Br Sel Method	Energy only	Power Total (lb/ft s)	4.75
4.86			

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

RIVER: Little River
REACH: Reach 1 RS: 1

INPUT
Description: Downstream of bridge
Station Elevation Data num= 155

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4673	892.86	4690	892.2	4712	891.2	4727	890.2	4732	889.2
4737	888.2	4741	887.2	4745	886.2	4750	885.2	4755	884.2
4769	883.2	4771	882.2	4774	881.2	4776	880.2	4779	879.2
4781	878.2	4784	877.2	4786	876.2	4788	875.2	4791	874.2
4794	873.2	4796	872.2	4798	871.2	4801	870.2	4824	869.8
4826	868.2	4828	867.2	4831	866.2	4833	865.2	4836	864.2
4840	863.2	4843	862.2	4845	861.2	4846	860.2	4848	859.2
4851	858.2	4854	857.2	4856	856.2	4859	855.2	4861	854.2
4864	853.2	4866	852.2	4869	851.2	4871	850.2	4875	849.2
4878	848.2	4880	847.2	4887	846.2	4898	845.2	4908	845.2
4924	844.2	4933	843.2	4938	842.2	4945	841.2	4948	840.2
4951	839.2	4952	838.2	4953	836.2	4955	835.2	4960	834.2
4965	833.2	4970	832.2	4975	831.2	4980	830.2	4985	829.2
4990	828.2	4995	827.2	5000	825.74	5005	826.2	5010	827.2
5016	828.2	5021	829.2	5027	830.2	5033	831.2	5038	832.2
5043	833.2	5048	834.2	5049	835.2	5051	836.2	5052	838.2
5053	839.2	5063	840.2	5067	841.2	5070	842.2	5072	843.2
5074	844.2	5076	845.2	5077	846.2	5079	847.2	5081	848.2
5082	849.2	5083	850.2	5085	851.2	5087	852.2	5089	853.2
5091	854.2	5092	855.2	5094	856.2	5095	857.2	5096	858.2
5098	859.2	5100	860.2	5101	861.2	5103	862.2	5105	863.2
5106	864.2	5108	865.2	5110	866.2	5112	867.2	5114	868.2
5116	869.2	5118	870.2	5120	871.2	5122	872.2	5125	873.2
5127	874.2	5129	875.2	5132	876.2	5134	877.2	5149	878.2
5152	879.2	5154	880.2	5156	881.2	5159	882.2	5161	883.2
5164	884.2	5166	885.2	5170	886.2	5173	887.2	5176	888.2
5178	889.2	5181	890.2	5185	891.2	5187	892.2	5190	893.2
5195	894.2	5200	895.2	5205	896.2	5210	897.2	5215	898.2
5220	899.2	5225	900.2	5230	901.2	5235	902.2	5240	903.2
5247	904.2	5253	905.2	5259	906.2	5266	907.2	5278	908.2
5291	909.2	5304	910.2	5318	911.2	5336	912.2	5360	912.8

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
    4673     .12    4951     .05    5053     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          4951    5053              265     270     284             .1       .3

CROSS SECTION OUTPUT  Profile #2-yr

  E.G. Elev (ft)           839.60    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.61    Wt. n-Val.                            0.050
  W.S. Elev (ft)           838.98    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                     Flow Area (sq ft)                    840.84
  E.G. Slope (ft/ft)      0.002882   Area (sq ft)                         840.84
  Q Total (cfs)           5291.00    Flow (cfs)                          5291.00
  Top Width (ft)           101.57    Top Width (ft)                       101.57
  Vel Total (ft/s)           6.29    Avg. Vel. (ft/s)                       6.29
  Max Chl Dpth (ft)         13.24    Hydr. Depth (ft)                       8.28
  Conv. Total (cfs)        98559.9   Conv. (cfs)                         98559.9
  Length Wtd. (ft)         270.00    Wetted Per. (ft)                     107.34
  Min Ch El (ft)           825.74    Shear (lb/sq ft)                       1.41
  Alpha                      1.00    Stream Power (lb/ft s)                 8.87
  Frctn Loss (ft)            1.69    Cum Volume (acre-ft)                   3.95
  C & E Loss (ft)            0.17    Cum SA (acres)                         0.61


Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate
the need for
         additional cross sections.
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 #5-yr

  E.G. Elev (ft)           841.97    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.94    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)           841.03    Reach Len. (ft)           265.00     270.00
284.00
  Crit W.S. (ft)                     Flow Area (sq ft)           5.02    1049.37
14.67
  E.G. Slope (ft/ft)      0.003307   Area (sq ft)                5.02    1049.37
14.67
  Q Total (cfs)           8183.00    Flow (cfs)                  3.25    8168.70
11.05
  Top Width (ft)           120.80    Top Width (ft)              5.49     102.00
13.32
  Vel Total (ft/s)           7.65    Avg. Vel. (ft/s)            0.65       7.78
0.75
  Max Chl Dpth (ft)         15.29    Hydr. Depth (ft)            0.91      10.29
1.10
  Conv. Total (cfs)       142290.8   Conv. (cfs)                 56.5   142042.0
192.2
  Length Wtd. (ft)         270.01    Wetted Per. (ft)            5.78     107.95
13.47
  Min Ch El (ft)           825.74    Shear (lb/sq ft)            0.18       2.01
0.22
  Alpha                      1.03    Stream Power (lb/ft s)      0.12      15.62
0.17
  Frctn Loss (ft)            1.84    Cum Volume (acre-ft)        0.02       5.13
0.05
  C & E Loss (ft)            0.19    Cum SA (acres)              0.02       0.65
0.04


Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate
the need for
         additional cross sections.
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 #10-yr

E.G. Elev (ft)	853.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	853.00	Reach Len. (ft)	265.00	270.00	284.00
Crit W.S. (ft)		Flow Area (sq ft)	672.05	2270.29	317.80
E.G. Slope (ft/ft)	0.000340	Area (sq ft)	672.05	2270.29	317.80
Q Total (cfs)	10359.00	Flow (cfs)	592.87	9472.56	293.56
Top Width (ft)	224.20	Top Width (ft)	86.60	102.00	35.60
Vel Total (ft/s)	3.18	Avg. Vel. (ft/s)	0.88	4.17	0.92
Max Chl Dpth (ft)	27.26	Hydr. Depth (ft)	7.76	22.26	8.93
Conv. Total (cfs)	562156.5	Conv. (cfs)	32173.8	514051.7	15931.0
Length Wtd. (ft)	270.13	Wetted Per. (ft)	88.40	107.95	39.02
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.16	0.45	0.17
Alpha	1.58	Stream Power (lb/ft s)	0.14	1.86	0.16
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	6.47	15.31	3.38
C & E Loss (ft)	0.03	Cum SA (acres)	0.78	0.73	0.42

CROSS SECTION OUTPUT Profile #25-yr

E.G. Elev (ft)	845.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.52	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	843.76	Reach Len. (ft)	265.00	270.00	284.00
Crit W.S. (ft)		Flow Area (sq ft)	42.50	1327.95	61.46
E.G. Slope (ft/ft)	0.003944	Area (sq ft)	42.50	1327.95	61.46
Q Total (cfs)	13354.00	Flow (cfs)	48.96	13206.71	98.33
Top Width (ft)	145.16	Top Width (ft)	23.04	102.00	20.12
Vel Total (ft/s)	9.33	Avg. Vel. (ft/s)	1.15	9.95	1.60
Max Chl Dpth (ft)	18.02	Hydr. Depth (ft)	1.84	13.02	3.05
Conv. Total (cfs)	212646.0	Conv. (cfs)	779.6	210300.5	1565.9
Length Wtd. (ft)	270.04	Wetted Per. (ft)	23.57	107.95	20.82
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.44	3.03	0.73
Alpha	1.12	Stream Power (lb/ft s)	0.51	30.12	1.16
Frctn Loss (ft)	2.04	Cum Volume (acre-ft)	0.13	6.84	0.20
C & E Loss (ft)	0.21	Cum SA (acres)	0.07	0.70	0.07

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.

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 #50-yr

E.G. Elev (ft)	860.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	859.95	Reach Len. (ft)	265.00	270.00	284.00
Crit W.S. (ft)		Flow Area (sq ft)	1336.79	2979.76	603.02
E.G. Slope (ft/ft)	0.000284	Area (sq ft)	1336.79	2979.76	603.02
Q Total (cfs)	15780.00	Flow (cfs)	1496.76	13638.98	644.26
Top Width (ft)	253.02	Top Width (ft)	104.51	102.00	46.51
Vel Total (ft/s)	3.21	Avg. Vel. (ft/s)	1.12	4.58	1.07
Max Chl Dpth (ft)	34.21	Hydr. Depth (ft)	12.79	29.21	12.97
Conv. Total (cfs)	935759.7	Conv. (cfs)	88758.3	808796.3	38205.1
Length Wtd. (ft)	270.18	Wetted Per. (ft)	107.66	107.95	52.10
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.22	0.49	0.21
Alpha	1.78	Stream Power (lb/ft s)	0.25	2.24	0.22
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	12.44	20.40	6.93
C & E Loss (ft)	0.04	Cum SA (acres)	0.93	0.73	0.59

CROSS SECTION OUTPUT Profile #100-yr

E.G. Elev (ft)	861.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	860.94	Reach Len. (ft)	265.00	270.00	284.00
Crit W.S. (ft)		Flow Area (sq ft)	1440.38	3080.19	649.51
E.G. Slope (ft/ft)	0.000335	Area (sq ft)	1440.38	3080.19	649.51
Q Total (cfs)	18250.00	Flow (cfs)	1822.62	15651.37	776.01
Top Width (ft)	255.48	Top Width (ft)	105.74	102.00	47.74
Vel Total (ft/s)	3.53	Avg. Vel. (ft/s)	1.27	5.08	1.19
Max Chl Dpth (ft)	35.20	Hydr. Depth (ft)	13.62	30.20	13.61
Conv. Total (cfs)	996649.3	Conv. (cfs)	99535.2	854735.6	42378.6
Length Wtd. (ft)	270.20	Wetted Per. (ft)	109.26	107.95	53.70
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.28	0.60	0.25
Alpha	1.79	Stream Power (lb/ft s)	0.35	3.03	0.30
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	13.37	21.12	7.54
C & E Loss (ft)	0.05	Cum SA (acres)	0.94	0.73	0.62

CROSS SECTION OUTPUT Profile #500-yr

E.G. Elev (ft)	862.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	861.89	Reach Len. (ft)	265.00	270.00	284.00
Crit W.S. (ft)		Flow Area (sq ft)	1541.21	3176.79	695.41
E.G. Slope (ft/ft)	0.000556	Area (sq ft)	1541.21	3176.79	695.41
Q Total (cfs)	24913.00	Flow (cfs)	2597.42	21221.44	1094.15
Top Width (ft)	258.75	Top Width (ft)	107.37	102.00	49.37
Vel Total (ft/s)	4.60	Avg. Vel. (ft/s)	1.69	6.68	1.57
Max Chl Dpth (ft)	36.15	Hydr. Depth (ft)	14.35	31.15	14.08
Conv. Total (cfs)	1056420.0	Conv. (cfs)	110141.8	899881.9	46396.7
Length Wtd. (ft)	270.21	Wetted Per. (ft)	111.16	107.95	55.60
Min Ch El (ft)	825.74	Shear (lb/sq ft)	0.48	1.02	0.43
Alpha	1.81	Stream Power (lb/ft s)	0.81	6.83	0.68
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	14.47	21.83	8.16
C & E Loss (ft)	0.10	Cum SA (acres)	1.16	0.73	0.64

CROSS SECTION

RIVER: Little River
REACH: Reach 1 RS: 0

INPUT
Description: Exit Section
Station Elevation Data num= 153

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4440	900	4450	899	4455	898	4460	897	4465	896
4475	895	4480	894	4485	893	4495	892	4500	891
4505	890	4515	889	4520	888	4527	887	4534	886
4538	885	4542	884	4548	883	4552	882	4556	881
4561	880	4565	879	4570	878	4575	877	4580	876
4584	875	4588	874	4592	873	4597	872	4602	871
4606	870	4611	869	4615	868	4619	867	4622	866
4626	865	4630	864	4635	863	4638	862	4642	861
4682	861	4704	862	4722	862	4727	861	4731	860
4735	859	4740	858	4742	857	4748	856	4751	855
4755	854	4760	853	4765	852	4768	851	4773	850
4776	849	4782	848	4786	847	4790	846	4795	845
4800	844	4807	843	4814	842	4826	842	4853	843
4863	844	4925	844	4928	843	4931	842	4955	833.61
5000	826.84	5050	836.29	5064	839.72	5070	841	5076	842
5085	843	5100	844	5119	845	5129	846	5134	847
5139	847	5141	849	5144	850	5147	851	5152	852
5157	853	5162	854	5170	855	5175	856	5183	857
5190	858	5195	859	5200	860	5205	861	5212	862
5218	863	5225	864	5230	865	5235	866	5244	867
5260	868	5273	869	5286	870	5299	871	5320	872
5330	873	5338	874	5346	875	5353	876	5360	877
5366	878	5375	879	5382	880	5388	881	5392	882
5398	883	5404	884	5410	885	5416	886	5423	887
5431	888	5440	889	5448	890	5456	891	5463	892
5470	893	5483	894	5499	895	5530	895	5540	894
5546	893	5551	892	5556	891	5562	890	5571	889
5583	888	5590	887	5594	886	5600	885	5605	885
5614	886	5622	887	5630	888	5640	889	5650	890
5658	891	5664	892	5671	893	5682	894	5700	895
5705	896	5710	897	5720	898				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

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    4440     .12    4931     .05    5064     .12

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          4931    5064                0       0       0             .1       .3

CROSS SECTION OUTPUT  Profile #2-yr

  E.G. Elev (ft)           837.74    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              2.30    Wt. n-Val.                            0.050
  W.S. Elev (ft)           835.43    Reach Len. (ft)
  Crit W.S. (ft)           835.43    Flow Area (sq ft)                    434.55
  E.G. Slope (ft/ft)      0.022827    Area (sq ft)                         434.55
  Q Total (cfs)           5291.00    Flow (cfs)                          5291.00
  Top Width (ft)            95.69    Top Width (ft)                        95.69
  Vel Total (ft/s)          12.18    Avg. Vel. (ft/s)                      12.18
  Max Chl Dpth (ft)          8.59    Hydr. Depth (ft)                       4.54
  Conv. Total (cfs)        35020.1    Conv. (cfs)                        35020.1
  Length Wtd. (ft)                    Wetted Per. (ft)                      97.31
  Min Ch El (ft)           826.84    Shear (lb/sq ft)                       6.36
  Alpha                      1.00    Stream Power (lb/ft s)                77.48
  Frctn Loss (ft)                    Cum Volume (acre-ft)
  C & E Loss (ft)                    Cum SA (acres)


CROSS SECTION OUTPUT  Profile #5-yr

  E.G. Elev (ft)           839.94    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              2.83    Wt. n-Val.                            0.050
  W.S. Elev (ft)           837.11    Reach Len. (ft)
  Crit W.S. (ft)           837.11    Flow Area (sq ft)                    606.38
  E.G. Slope (ft/ft)      0.021295    Area (sq ft)                         606.38
  Q Total (cfs)           8183.00    Flow (cfs)                          8183.00
  Top Width (ft)           108.39    Top Width (ft)                       108.39
  Vel Total (ft/s)          13.49    Avg. Vel. (ft/s)                      13.49
  Max Chl Dpth (ft)         10.27    Hydr. Depth (ft)                       5.59
  Conv. Total (cfs)        56075.1    Conv. (cfs)                        56075.1
  Length Wtd. (ft)                    Wetted Per. (ft)                     110.47
  Min Ch El (ft)           826.84    Shear (lb/sq ft)                       7.30
  Alpha                      1.00    Stream Power (lb/ft s)                98.48
  Frctn Loss (ft)                    Cum Volume (acre-ft)
  C & E Loss (ft)                    Cum SA (acres)


CROSS SECTION OUTPUT  Profile #10-yr

  E.G. Elev (ft)           853.14    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.14    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)           853.00    Reach Len. (ft)
  Crit W.S. (ft)           838.18    Flow Area (sq ft)        1453.50    2671.24
718.84
  E.G. Slope (ft/ft)      0.000228    Area (sq ft)            1453.50    2671.24
718.84
  Q Total (cfs)          10359.00    Flow (cfs)               1124.87    8715.54
518.59
  Top Width (ft)           397.00    Top Width (ft)            171.00     133.00
93.00
  Vel Total (ft/s)           2.14    Avg. Vel. (ft/s)            0.77       3.26
0.72
  Max Chl Dpth (ft)         26.16    Hydr. Depth (ft)            8.50      20.08
7.73
  Conv. Total (cfs)      686099.8    Conv. (cfs)              74502.5   577249.8
34347.5
  Length Wtd. (ft)                   Wetted Per. (ft)          172.58     136.23
94.83
  Min Ch El (ft)           826.84    Shear (lb/sq ft)            0.12       0.28
0.11
  Alpha                      1.98    Stream Power (lb/ft s)      0.09       0.91
0.08
  Frctn Loss (ft)                    Cum Volume (acre-ft)
  C & E Loss (ft)                    Cum SA (acres)


CROSS SECTION OUTPUT  Profile #25-yr
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  E.G. Elev (ft)           843.04    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              3.57    Wt. n-Val.                            0.050
  W.S. Elev (ft)           839.47    Reach Len. (ft)
  Crit W.S. (ft)           839.47    Flow Area (sq ft)                    880.40
  E.G. Slope (ft/ft)      0.019807    Area (sq ft)                         880.40
  Q Total (cfs)          13354.00    Flow (cfs)                         13354.00
  Top Width (ft)           124.71    Top Width (ft)                       124.71
  Vel Total (ft/s)          15.17    Avg. Vel. (ft/s)                      15.17
  Max Chl Dpth (ft)         12.62    Hydr. Depth (ft)                       7.06
  Conv. Total (cfs)        94886.8    Conv. (cfs)                        94886.8
  Length Wtd. (ft)                    Wetted Per. (ft)                     127.48
  Min Ch El (ft)           826.84    Shear (lb/sq ft)                       8.54
  Alpha                      1.00    Stream Power (lb/ft s)               129.53
  Frctn Loss (ft)                    Cum Volume (acre-ft)
  C & E Loss (ft)                    Cum SA (acres)


CROSS SECTION OUTPUT  Profile #50-yr

  E.G. Elev (ft)           860.14    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.14    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)           860.00    Reach Len. (ft)
  Crit W.S. (ft)           840.39    Flow Area (sq ft)        2754.00    3602.24
1524.34
  E.G. Slope (ft/ft)      0.000163    Area (sq ft)             2754.00    3602.24
1524.34
  Q Total (cfs)          15780.00    Flow (cfs)               2476.76   12112.26
1190.98
  Top Width (ft)           469.00    Top Width (ft)            200.00     133.00
136.00
  Vel Total (ft/s)           2.00    Avg. Vel. (ft/s)            0.90       3.36
0.78
  Max Chl Dpth (ft)         33.16    Hydr. Depth (ft)           13.77      27.08
11.21
  Conv. Total (cfs)      1237881.0    Conv. (cfs)             194292.5   950160.6
93427.6
  Length Wtd. (ft)                    Wetted Per. (ft)          202.51     136.23
138.42
  Min Ch El (ft)           826.84    Shear (lb/sq ft)            0.14       0.27
0.11
  Alpha                      2.21    Stream Power (lb/ft s)      0.12       0.90
0.09
  Frctn Loss (ft)                    Cum Volume (acre-ft)
  C & E Loss (ft)                    Cum SA (acres)


CROSS SECTION OUTPUT  Profile #100-yr

  E.G. Elev (ft)           861.17    Element                   Left OB    Channel
Right OB
  Vel Head (ft)              0.17    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)           861.00    Reach Len. (ft)
  Crit W.S. (ft)           841.23    Flow Area (sq ft)        2956.00    3735.24
1662.84
  E.G. Slope (ft/ft)      0.000188    Area (sq ft)             2956.00    3735.24
1662.84
  Q Total (cfs)          18250.00    Flow (cfs)               2958.77   13845.11
1446.13
  Top Width (ft)           478.00    Top Width (ft)            204.00     133.00
141.00
  Vel Total (ft/s)           2.18    Avg. Vel. (ft/s)            1.00       3.71
0.87
  Max Chl Dpth (ft)         34.16    Hydr. Depth (ft)           14.49      28.08
11.79
  Conv. Total (cfs)      1330475.0    Conv. (cfs)             215702.2  1009346.0
105426.5
  Length Wtd. (ft)                    Wetted Per. (ft)          206.63     136.23
143.52
  Min Ch El (ft)           826.84    Shear (lb/sq ft)            0.17       0.32
0.14
  Alpha                      2.23    Stream Power (lb/ft s)      0.17       1.19
0.12
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  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


CROSS SECTION OUTPUT  Profile #500-yr

  E.G. Elev (ft)            862.28    Element                   Left OB    Channel
Right OB
  Vel Head (ft)               0.28    Wt. n-Val.                 0.120      0.050
0.120
  W.S. Elev (ft)            862.00    Reach Len. (ft)
  Crit W.S. (ft)            843.49    Flow Area (sq ft)        3215.50    3868.24
1807.34
  E.G. Slope (ft/ft)      0.000306    Area (sq ft)             3215.50    3868.24
1807.34
  Q Total (cfs)           24913.00    Flow (cfs)               4161.18   18701.37
2050.45
  Top Width (ft)            556.00    Top Width (ft)            275.00     133.00
148.00
  Vel Total (ft/s)            2.80    Avg. Vel. (ft/s)            1.29       4.83
1.13
  Max Chl Dpth (ft)          35.16    Hydr. Depth (ft)           11.69      29.08
12.21
  Conv. Total (cfs)       1425337.0    Conv. (cfs)             238071.6   1069954.0
117311.6
  Length Wtd. (ft)                    Wetted Per. (ft)          277.88     136.23
150.59
  Min Ch El (ft)            826.84    Shear (lb/sq ft)            0.22       0.54
0.23
  Alpha                       2.28    Stream Power (lb/ft s)      0.29       2.62
0.26
  Frctn Loss (ft)                     Cum Volume (acre-ft)
  C & E Loss (ft)                     Cum SA (acres)


Warning: Divided flow computed for this cross-section.



SUMMARY OF MANNING'S N VALUES

River:Little River

      Reach          River Sta.       n1        n2        n3

 Reach 1              3                  .12       .05       .12
 Reach 1              2                  .12       .05       .12
 Reach 1              1.5          Bridge
 Reach 1              1                  .12       .05       .12
 Reach 1              0                  .12       .05       .12



SUMMARY OF REACH LENGTHS

River: Little River

      Reach          River Sta.      Left     Channel    Right

 Reach 1              3                  380       410       405
 Reach 1              2                  290       290       290
 Reach 1              1.5          Bridge
 Reach 1              1                  265       270       284
 Reach 1              0                    0         0         0



SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Little River


      Reach          River Sta.     Contr.    Expan.

 Reach 1              3               .1        .3
 Reach 1              2               .1        .3
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Reach 1              1.5      Bridge
Reach 1              1               .1        .3
Reach 1              0               .1        .3
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Section VI
Scour Summary and Riprap Calculations

PROPOSED MODEL BRIDGE SCOUR

100 Year Scour

Scour Calculations – 100 year Storm

Hydraulic Design Data
Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	5.59	21.20	8.11
Approach Velocity (ft/s):	0.82	4.80	1.08
Br Average Depth (ft):	7.82	22.76	9.14
BR Opening Flow (cfs):	1228.51	16294.26	727.22
BR Top WD (ft):	83.57	97.63	36.46
Grain Size D50 (mm):	0.08	0.08	0.08
Approach Flow (cfs):	191.16	15258.51	2800.33
Approach Top WD (ft):	41.58	150.00	320.74
K1 Coefficient:	0.690	0.690	0.690
Results			
Scour Depth Ys (ft):	4.53	7.40	2.31
Critical Velocity (ft/s):	0.96	1.19	1.02
Equation:	Clear	Live	Live

Pier Scour
Pier: #1 (CL = 4859)
Input Data

Pier Shape:	Square nose
Pier Width (ft):	4.25
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	-1.64
Velocity Upstream (ft/s):	0.66
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	140.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm) :	0.38000
K4 Armouring Coef:	1.00

Results

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

Pier: #2 (CL = 4949)
Input Data

Pier Shape:	Square nose
Pier Width (ft):	4.25
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	13.70
Velocity Upstream (ft/s):	1.84

K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	140.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.38000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	5.43
Froude #:	0.09
Equation:	CSU equation

Pier: #3 (CL = 5037)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	4.25
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	21.56
Velocity Upstream (ft/s):	6.93
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	140.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.38000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	10.23
Froude #:	0.26
Equation:	CSU equation

Pier: #4 (CL = 5126)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	4.25
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	-20.14
Velocity Upstream (ft/s):	
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	140.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.38000
K4 Armouring Coef:	1.00

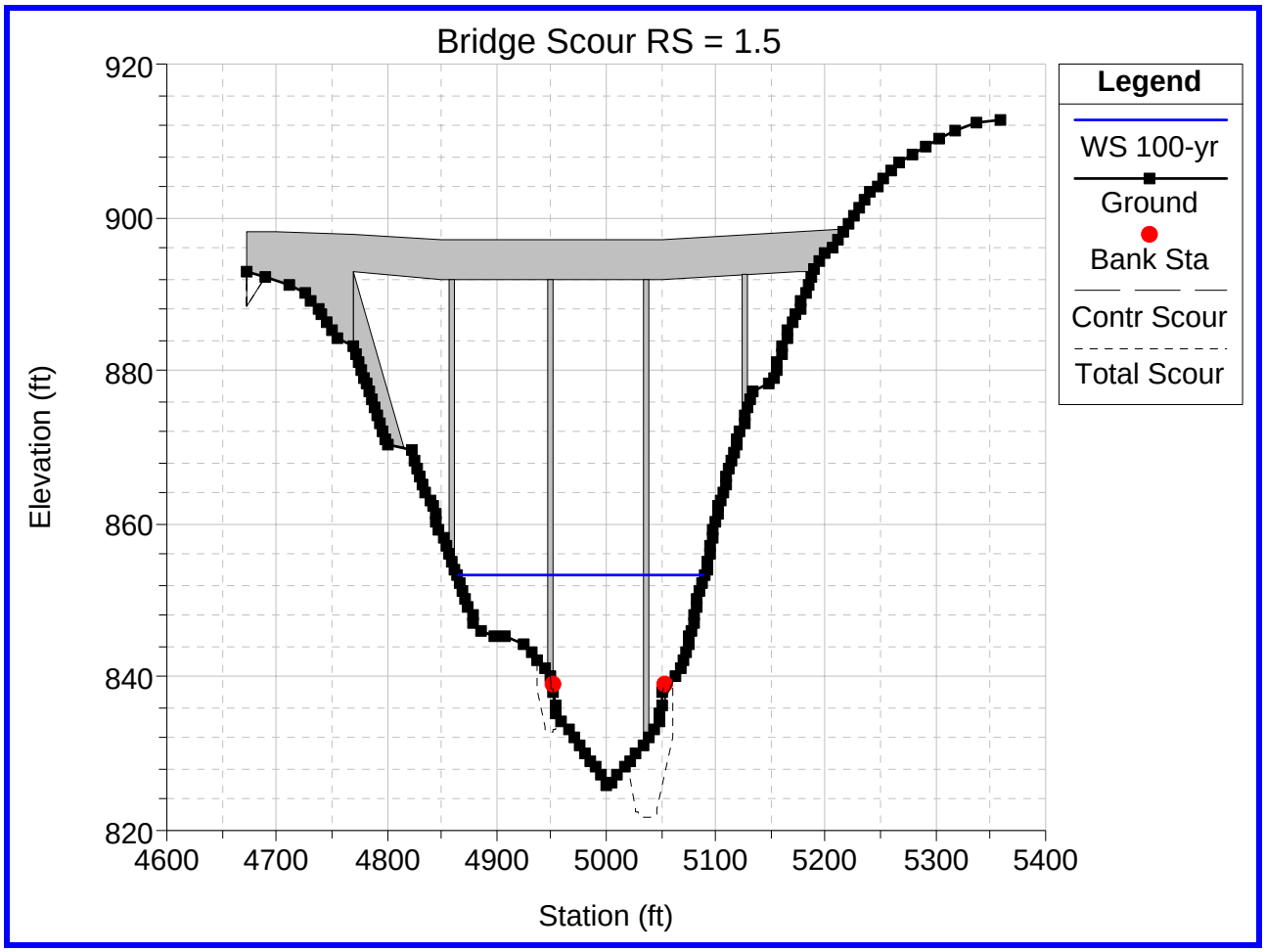
Results

Scour Depth Ys (ft):	
Froude #:	

Equation: CSU equation

Combined Scour Depths

Pier : #1 (CL = 4859) (Contr + Pier) (ft):	
Pier : #2 (CL = 4949) (Contr + Pier) (ft):	9.96
Pier : #3 (CL = 5037) (Contr + Pier) (ft):	17.63
Pier : #4 (CL = 5126) (Contr + Pier) (ft):	



100-Year Scour

500 Year Scour

Scour Calculations – 500 year Storm

Hydraulic Design Data
Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	8.12	24.84	11.01
Approach Velocity (ft/s):	1.03	5.25	1.30
Br Average Depth (ft):	10.80	26.22	11.25
BR Opening Flow (cfs):	2334.00	21323.93	1255.08
BR Top WD (ft):	88.01	97.63	41.69
Grain Size D50 (mm):	0.08	0.08	0.08
Approach Flow (cfs):	408.69	19548.61	4955.70
Approach Top WD (ft):	48.85	150.00	346.55
K1 Coefficient:	0.690	0.690	0.690
Results			
Scour Depth Ys (ft):	13.28	9.77	3.38
Critical Velocity (ft/s):	1.02	1.23	1.07
Equation:	Live	Live	Live

Pier Scour
Pier: #1 (CL = 4859)

Input Data	
Pier Shape:	Square nose
Pier Width (ft):	4.25
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	1.80
Velocity Upstream (ft/s):	1.07
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	140.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.38000
K4 Armouring Coef:	1.00
Results	
Scour Depth Ys (ft):	3.28
Froude #:	0.14
Equation:	CSU equation

Pier: #2 (CL = 4949)

Input Data	
Pier Shape:	Square nose
Pier Width (ft):	4.25
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	17.14
Velocity Upstream (ft/s):	2.27

K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	140.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.38000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	6.13
Froude #:	0.10
Equation:	CSU equation

Pier: #3 (CL = 5037)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	4.25
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	25.00
Velocity Upstream (ft/s):	8.05
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	140.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.38000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	11.12
Froude #:	0.28
Equation:	CSU equation

Pier: #4 (CL = 5126)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	4.25
Grain Size D50 (mm):	0.08000
Depth Upstream (ft):	-16.70
Velocity Upstream (ft/s):	
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	140.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.38000
K4 Armouring Coef:	1.00

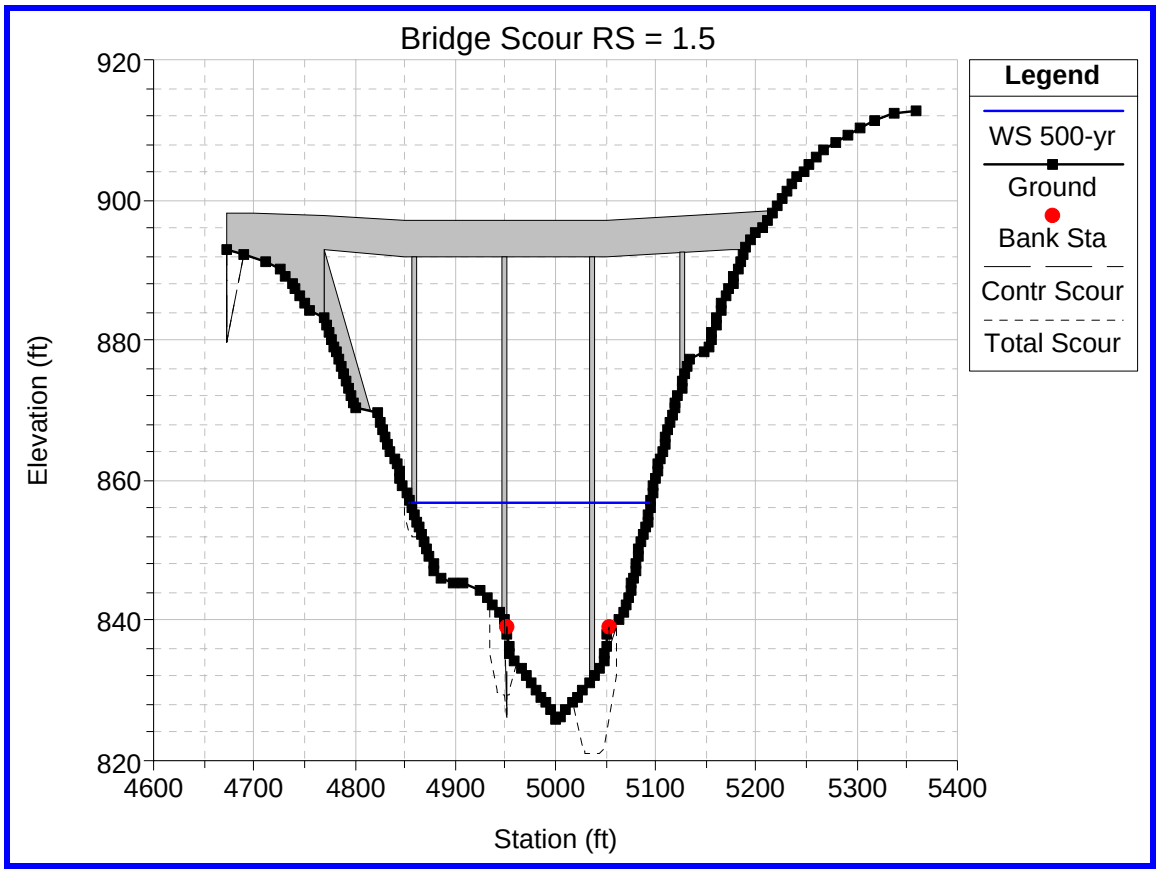
Results

Scour Depth Ys (ft):	
Froude #:	

Equation: CSU equation

Combined Scour Depths

Pier : #1 (CL = 4859) (Contr + Pier) (ft):	3.28
Pier : #2 (CL = 4949) (Contr + Pier) (ft):	19.41
Pier : #3 (CL = 5037) (Contr + Pier) (ft):	20.90
Pier : #4 (CL = 5126) (Contr + Pier) (ft):	



500-Year Scour

RIPRAP CALCULATIONS

NH000-0575-01(028) Cherokee County
I-575 over Little River
PI # 713640

Proposed bridge

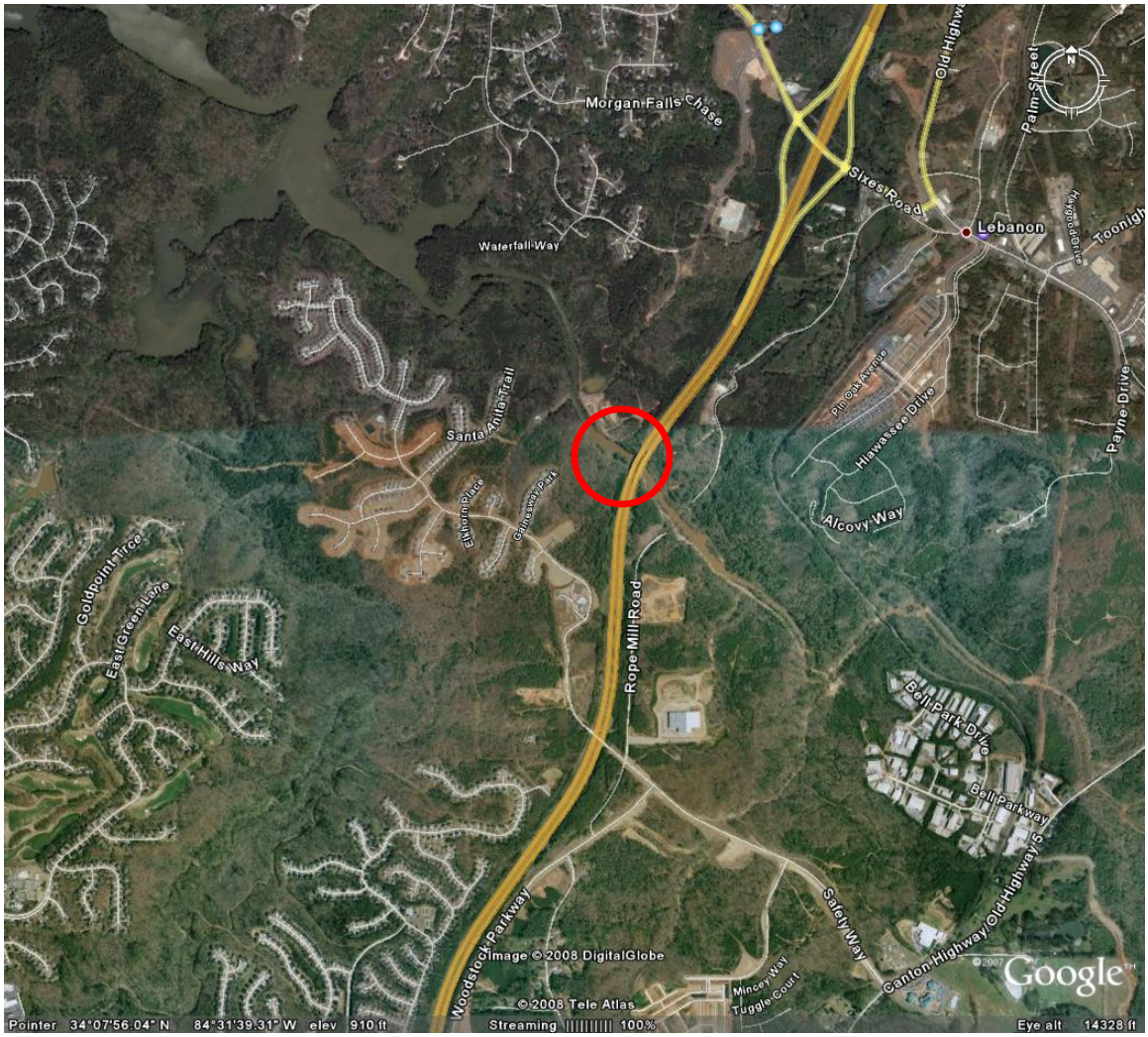
ENDROLL RIPRAP CALCULATIONS (100 YEAR STORM)
METHOD IN HEC-18,"EVALUATING SCOUR AT BRIDGES"

BRIDGE ABUTMENT LOCATION	704+55	709+89
SET BACK LENGTH =	136	122
MAIN CHANNEL AREA @ BRIDGE =	2516.46	2516.46
TOP WIDTH OF MAIN CHANNEL @ BRIDGE =	97.63	97.63
AVERAGE DEPTH OF MAIN CHANNEL @ BR =	17.2	17.2
SET BACK RATIO =	7.921	7.105
CHARACTERISTIC AVG VELOCITY CALCULATIONS		
(SEE PAGES 120,121)		
DISCHARGE @ ABUTMENT =	2192.07	1184.68
AREA @ ABUTMENT =	912.52	450.88
AVERAGE VELOCITY, V =	2.40	2.63
AREA OF OVERBANK FLOW @ BRIDGE =	912.52	450.88
LENGTH OF OVERBANK FLOW @ BRIDGE =	87.13	41.25
AVERAGE DEPTH OF OVERBANK FLOW =	10.47	10.93
FROUDE NUMBER =	0.131	0.140
IF FROUDE NUMBER <= 0.80, THEN D50 =	0.097	0.116
IF FROUDE NUMBER > 0.80, THEN D50 =	2.191	2.330
MEDIAN STONE DIAMETER REQUIRED, D50 =	0.097	0.116
TYPE OF RIPRAP REQUIRED =	TYPE 3	TYPE 3

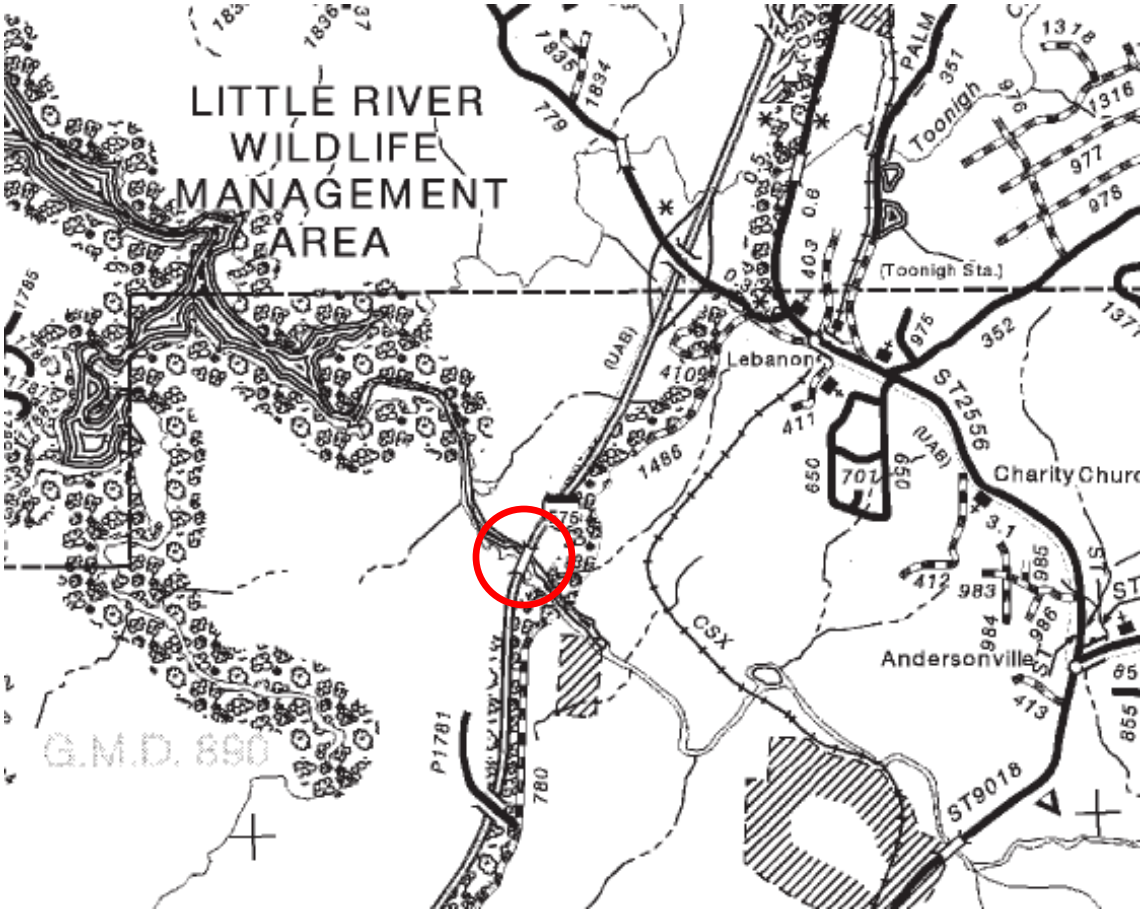
Note : Type I Riprap will be used at this site.

Section VII
Appendix

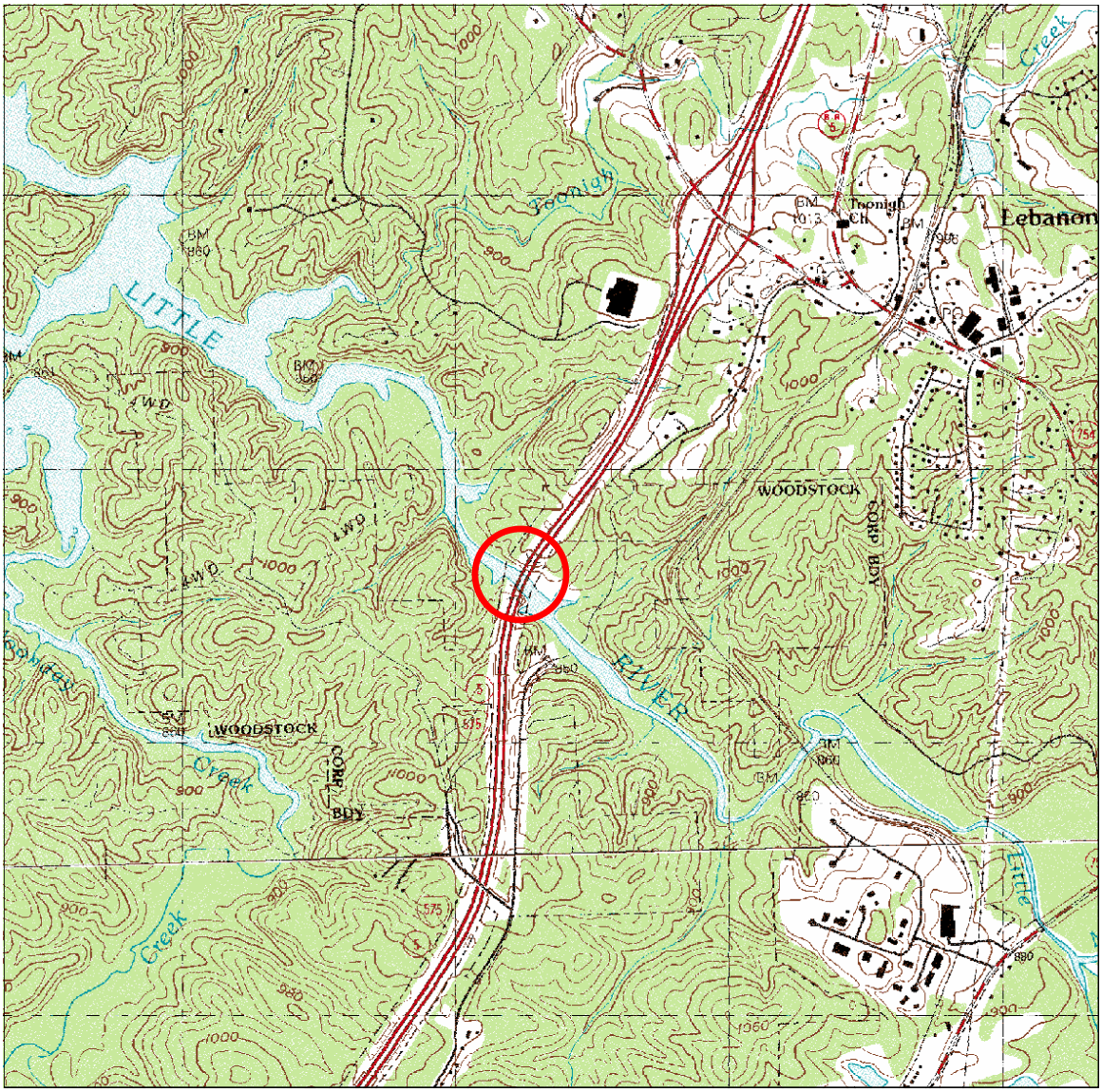
LOCATION MAPS



Cherokee County
Northwest Corridor PPI – I-575 over Little River
Project Name: NH000-0575-01 (028)



Cherokee County
Northwest Corridor PPI – I-575 over Little River
Project Name: NH000-0575-01 (028)



Cherokee County
Northwest Corridor PPI – I-575 over Little River
Project Name: NH000-0575-01 (028)

PROJECT PHOTOGRAPHS

Looking South on I-575 on the Northbound Bridge

Looking North on I-575 on the Northbound Bridge

Looking upstream from the Northbound bridge

Looking downstream (towards Southbound bridge) from the Northbound bridge

Looking downstream from the Southbound bridge

Looking North on I-575 on the Southbound Bridge

Looking South on I-575 on the Southbound Bridge

Looking South under the Southbound bridge

Looking upstream towards the Southbound bridge

FEMA DATA

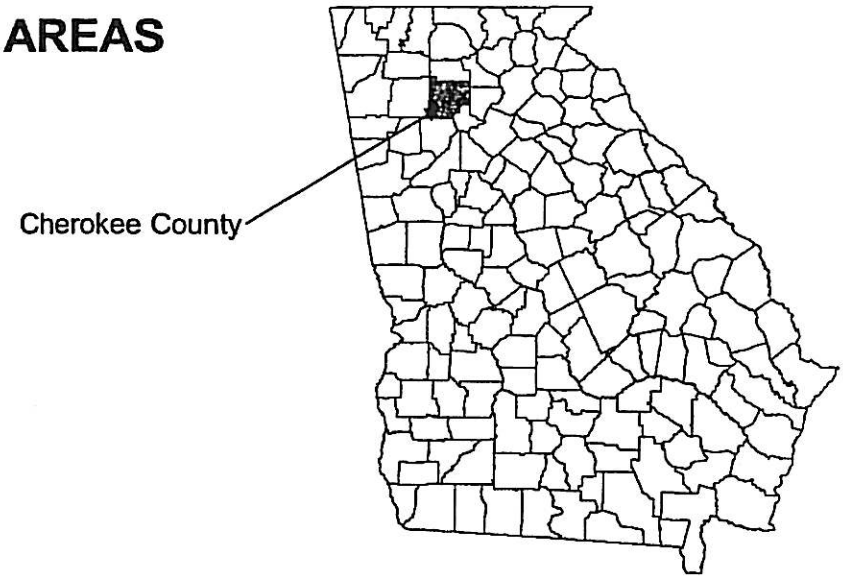
FLOOD INSURANCE STUDY

CHEROKEE COUNTY, GEORGIA

AND INCORPORATED AREAS

Community Name	*Community Number*
*BALL GROUND, CITY OF	130423
CANTON, CITY OF	130039
CHEROKEE COUNTY (UNINCORPORATED AREAS)	130424
HOLLY SPRINGS, CITY OF	130425
WALESKA, CITY OF	130031
WOODSTOCK, CITY OF	130264

*No Flood Hazard Areas Identified



Revised: September 29, 2006

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
13057CV000A

Table 4 - Summary of Discharges

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
AVERY CREEK					
At the confluence with Mill Creek	9.0	1,120	2,140	2,720	5,250
CANTON CREEK					
Approximately 1,300 feet upstream of Marietta Road/State Highway 20	*	2,550	4,100	4,800	6,250
CLARK CREEK					
At the confluence with Allatoona Lake	7.6	1,425	2,250	2,600	3,600
ETOWAH RIVER					
Just downstream of State Highway 20/Knox Bridge Highway	723.7	25,320	39,115	45,960	63,890
Just downstream of Marietta Highway/State Highway 140	613.0	23,300	36,000	42,300	58,800
KELLOGG CREEK					
At the confluence with Allatoona Lake	2.1	630	1,000	1,175	1,610
LITTLE RIVER					
Just downstream of Rope Mill Road	139.9	5,310	8,200	9,570	13,070
Approximately 16,465 feet upstream of the confluence of Rocky Creek	60.0	3,480	5,370	6,270	8,560
MILL CREEK					
At the confluence with Little River	37.0	3,900	6,050	7,000	9,700
NOONDAY CREEK					
At the confluence with Little River	49.3	5,454	8,588	9,372	10,575
OWL CREEK					
At the confluence with Allatoona Lake	2.3	660	1,050	1,225	1,700
ROCKY CREEK					
At the confluence with Little River	7.9	440	850	1,280	2,410
RUBES CREEK					
At the confluence with Little River	14.7	2,190	3,400	3,900	5,400

* Data not available

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
LITTLE RIVER								
A	130	183	2,720	3.5	861.1	849.3[2]	850.3	1.0
B	550	390	6,021	1.6	861.1	849.7[2]	850.7	1.0
C	1,040	319	4,412	2.2	861.1	849.8[2]	850.8	1.0
D	1,120	323	4,700	2.0	861.1	850.0[2]	851.0	1.0
E	1,900	224	2,955	3.2	861.1	850.3[2]	851.3	1.0
F	2,780	267	1,915	5.0	861.1	850.8[2]	851.8	1.0
G	3,700	150	2,056	4.7	861.1	853.7[2]	854.7	1.0
H	4,900	129	1,883	5.1	861.1	856.0[2]	856.9	0.9
I	5,370	127	1,673	5.7	861.1	857.0[2]	857.9	0.9
J	5,450	126	1,706	5.6	861.1	857.4[2]	858.2	0.8
K	6,100	478	5,008	1.9	861.1	858.5[2]	859.4	0.9
L	7,580	149	2,057	4.7	861.1	859.6[2]	860.5	0.9
M	8,400	251	3,337	2.9	861.1	860.7[2]	861.7	1.0
N	8,900	1075	12,230	0.8	861.1	861.0[2]	862.0	1.0
O	9,760	278	3,260	2.9	861.1	861.1	862.1	1.0
P	10,000	495	7,552	1.3	861.5	861.5	862.4	0.9
Q	13,500	661	4,876	1.5	861.6	861.6	862.5	0.9
R	16,050	640	2,707	2.8	863.3	863.3	864.3	1.0
S	17,360	287	1,994	3.8	865.8	865.8	866.8	1.0
T	17,460	463	3,067	2.5	866.6	866.6	867.6	1.0
U	18,710	465	4,656	1.6	867.6	867.6	868.6	1.0

[1] Feet above Interstate Highway 575
[2] Elevation computed without consideration of backwater effects from Allatoona Lake

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHEROKEE COUNTY, GA
AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
LITTLE RIVER (CONT'D)								
V	19,650	386	3,838	2.0	868.1	868.1	869.1	1.0
W	21,400	922	9,541	0.8	868.7	868.7	869.7	1.0
X	23,620	1,537	8,265	0.9	869.2	869.2	870.2	1.0
Y	25,400	306	2,438	3.1	870.5	870.5	871.4	0.9
Z	26,190	145	1,802	3.8	871.5	871.5	872.4	0.9
AA	26,330	120	1,272	5.4	872.9	872.9	873.9	1.0
AB	26,650	93	1,118	6.2	874.1	874.1	874.9	0.8
AC	27,500	332	3,267	2.1	875.8	875.8	876.8	1.0
AD	29,050	277	2,711	2.5	877.2	877.2	878.1	0.9
AE	30,000	408	4,333	1.6	878.0	878.0	879.0	1.0
AF	32,300	351	3,862	1.8	879.1	879.1	880.1	1.0
AG	33,900	307	2,761	2.5	879.9	879.9	880.9	1.0
AH	35,900	558	5,145	1.3	881.2	881.2	882.2	1.0
AI	36,650	325	2,289	3.0	881.7	881.7	882.7	1.0
AJ	38,000	1,212	8,502	0.8	882.8	882.8	883.8	1.0
AK	39,530	633	3,553	1.9	883.6	883.6	884.5	0.9
AL	40,350	492	2,937	2.2	885.0	885.0	885.9	0.9
AM	40,900	1,135	4,911	1.3	885.6	885.6	886.5	0.9
AN	43,080	974	3,342	2.0	888.0	888.0	888.9	0.9
AO	44,300	1,606/790[2]	2,811	0.8	890.1	890.1	891.0	0.9
AP	45,700	557/450[2]	1,985	3.3	891.1	891.1	892.0	0.9

[1] Feet above Interstate Highway 575
[2] Total width/ width within county

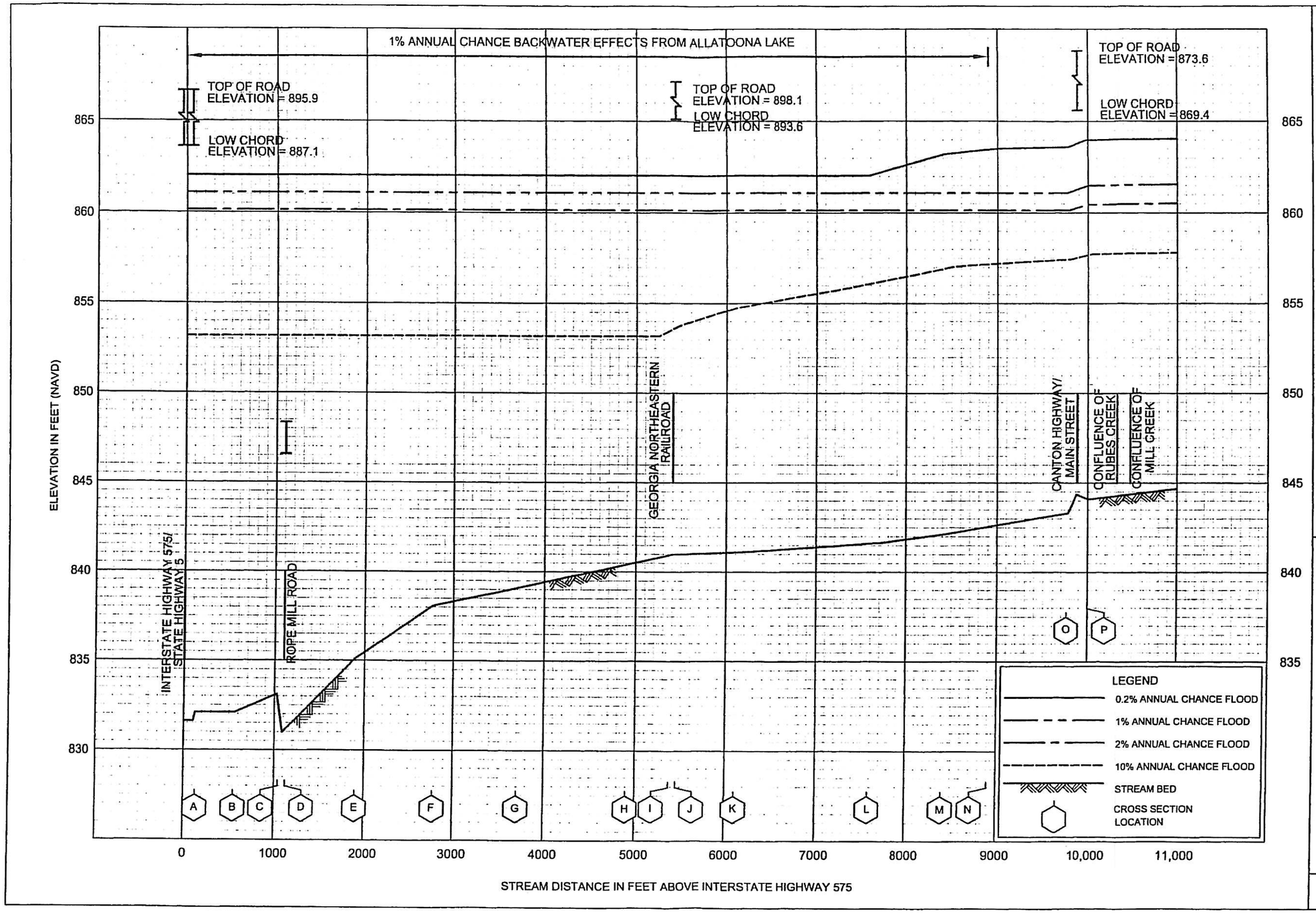
TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHEROKEE COUNTY, GA
AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE RIVER



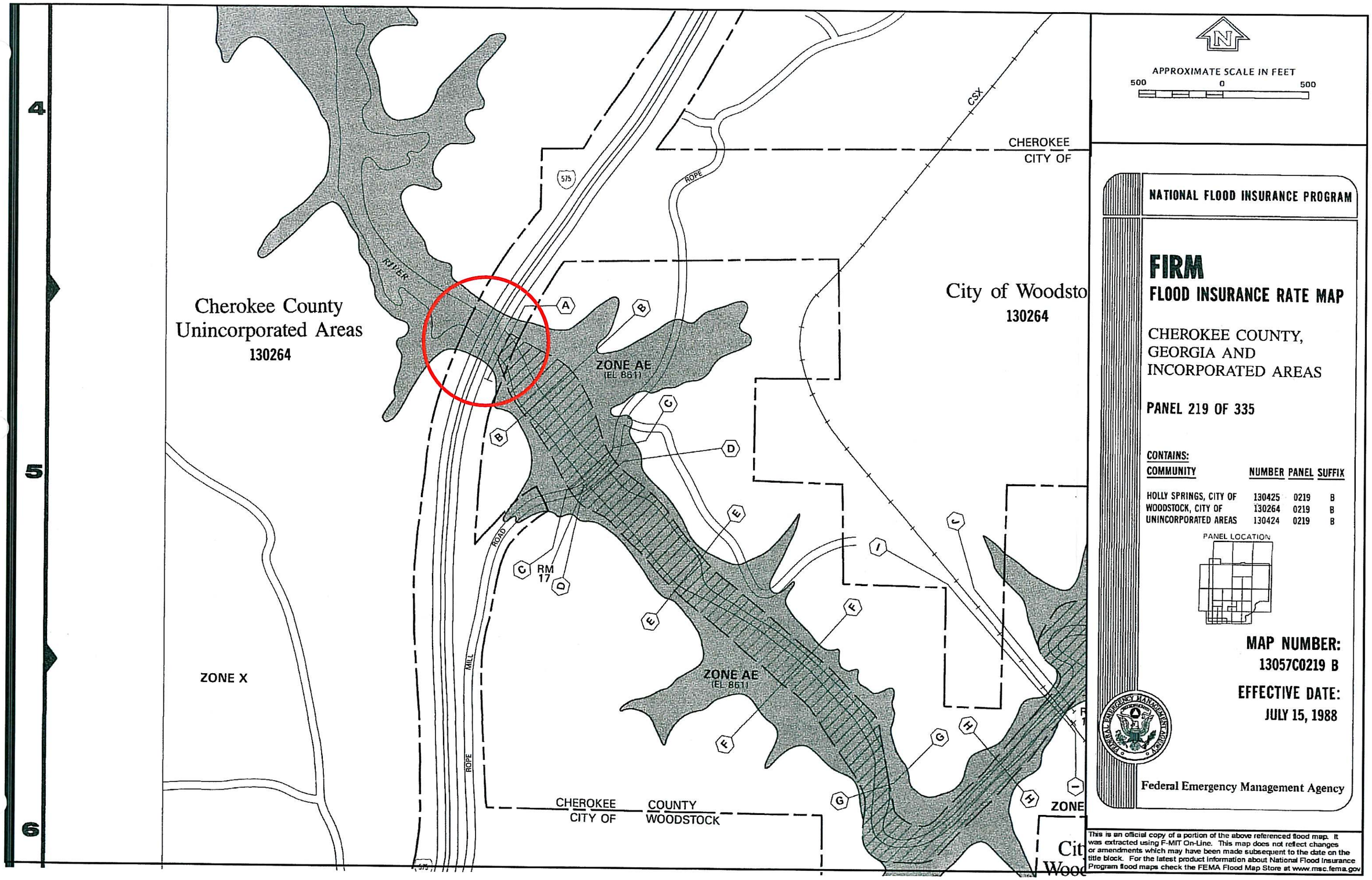
FLOOD PROFILES

LITTLE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHEROKEE COUNTY, GA

AND INCORPORATED AREAS


4
5
6
Cherokee County
Unincorporated Areas
130264
City of Woodsto
130264
CHEROKEE
CITY OF
CSX
575
ROPE
RIVER
ZONE AE
(EL 861)
A
B
C
D
E
F
G
H
I
J
RM
17
ROAD
MILL
ROPE
ZONE X
CHEROKEE
CITY OF
COUNTY
WOODSTOCK
ZONE
Cit
Wood
N
APPROXIMATE SCALE IN FEET
500
0
500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
CHEROKEE COUNTY,
GEORGIA AND
INCORPORATED AREAS
PANEL 219 OF 335
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
HOLLY SPRINGS, CITY OF 130425 0219 B
WOODSTOCK, CITY OF 130264 0219 B
UNINCORPORATED AREAS 130424 0219 B
PANEL LOCATION
MAP NUMBER:
13057C0219 B
EFFECTIVE DATE:
JULY 15, 1988
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

The projection used in the preparation of this map was Georgia State Plane West Zone (FIPS zone 1002). The horizontal datum was NAD 83, GRS 80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information about the bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from Digital Orthophotos produced by the Georgia Institute of Technology Center for GIS at a scale of 1:12,000 Images were produced from National Aerial Photography Program (NAPP) Color Infra-red photography dated 1999. Additional orthophotography was provided by Stewart Geo Technologies in 2004 at a scale of 1:1600 at a minimum, for the City of Canton and its vicinity.

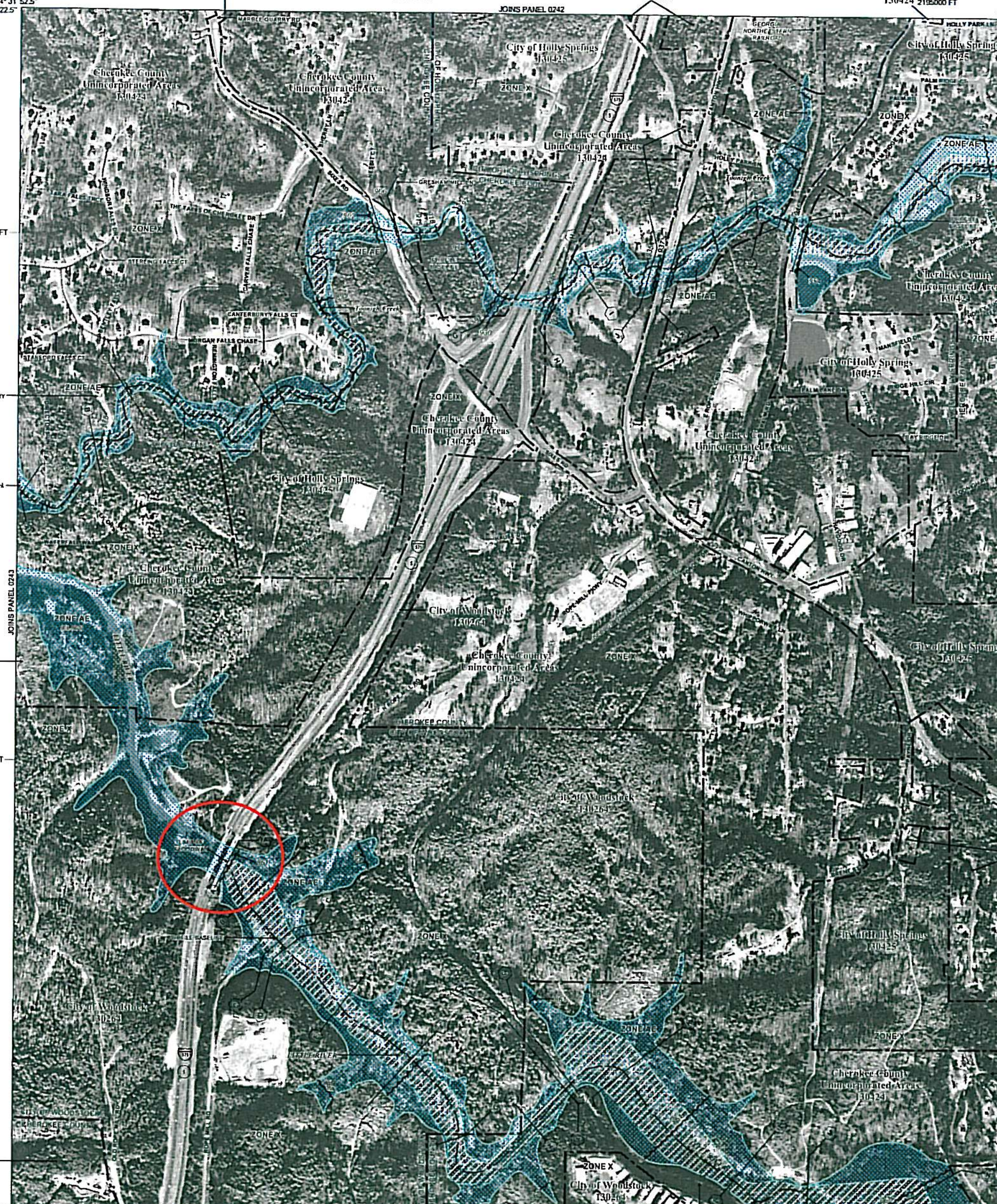
The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the Flood Insurance Study report. As a result of improved topographic data, the profile baseline, in some cases, may deviate significantly from the channel centerline or appear outside the Special Flood Hazard Area.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the FEMA Map Service Center at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and their website at www.fema.gov/msc.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~513~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

(A)——(A)	Cross section line
(23)- - - -(23)	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4989000 FT	5000-foot grid ticks: Georgia State Plane coordinate system, West zone (FIPS Zone 1002), Transverse Mercator
4989000m N	1000-meter Universal Transverse Mercator grid values, zone 16
DX5510 x	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
JULY 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

SEPTEMBER 29, 2006 - to add Special Flood Hazard Areas, roads and road names; to increase Base Flood Elevations; to change Special Flood Hazard Areas; to update corporate limits and map format; to incorporate previously issued Letters of Map Revision; and to reflect updated topographic information.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0244D

FIRM
FLOOD INSURANCE RATE MAP

CHEROKEE COUNTY, GEORGIA
AND INCORPORATED AREAS

PANEL 244 OF 380

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHEROKEE COUNTY	130424	0244	D
HOLLY SPRINGS, CITY OF	130425	0244	D
WOODSTOCK, CITY OF	130264	0244	D

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

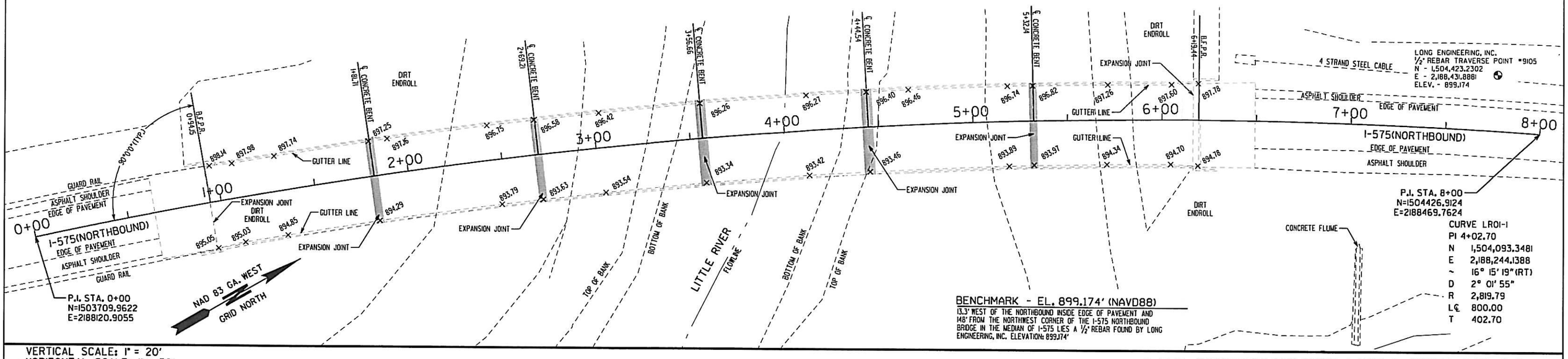
MAP NUMBER
13057C0244D

MAP REVISED
SEPTEMBER 29, 2006

Federal Emergency Management Agency

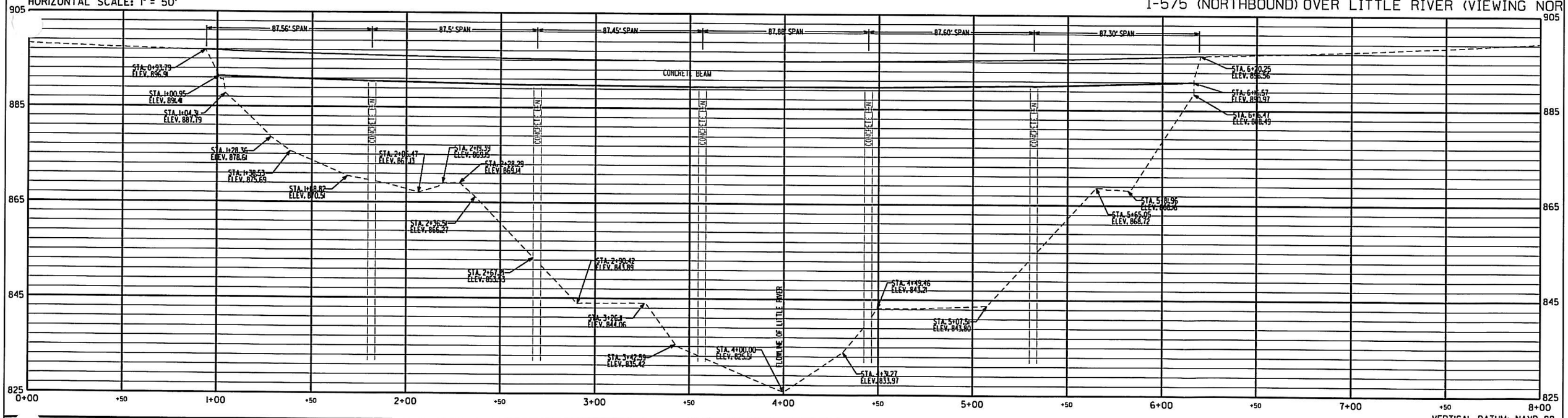
MISCELLANEOUS PROJECT DATA

DATE$$$	TIME$$$	PRF	DGN	COUNTY	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$USER$		$$PENTABLE$$		$COUNTY2$	$PROJECT$	$BR18$	SH



VERTICAL SCALE: 1" = 20'
HORIZONTAL SCALE: 1" = 50'

I-575 (NORTHBOUND) OVER LITTLE RIVER (VIEWING NOR



NOTE: THIS PROFILE INDICATES ELEVATIONS ALONG THE CENTERLINE OF I-575 (NORTHBOUND).

P. I. NO.	LONG JOB NO.
$PROJECT$	$LEI JOB$
DRAWN BY $DRAWN$	DATE DATE$$$
CHECKED BY $CHECKED$	SCALE 1" = 50'

LONG ENGINEERING, INC.

1780 Corporate Drive
Suite 400
Norcross, Georgia 30093
Tel 770.931.8005
Fax 770.931.8555
www.longeng.com

SCALE IN FEET
0 25 50 100

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION

BRIDGE DETAIL

I-575 FROM BARRETT PARKWAY TO SIXES ROAD

I-575 (NORTHBOUND) OVER LITTLE RIVER

DRAWING No. $BR18$

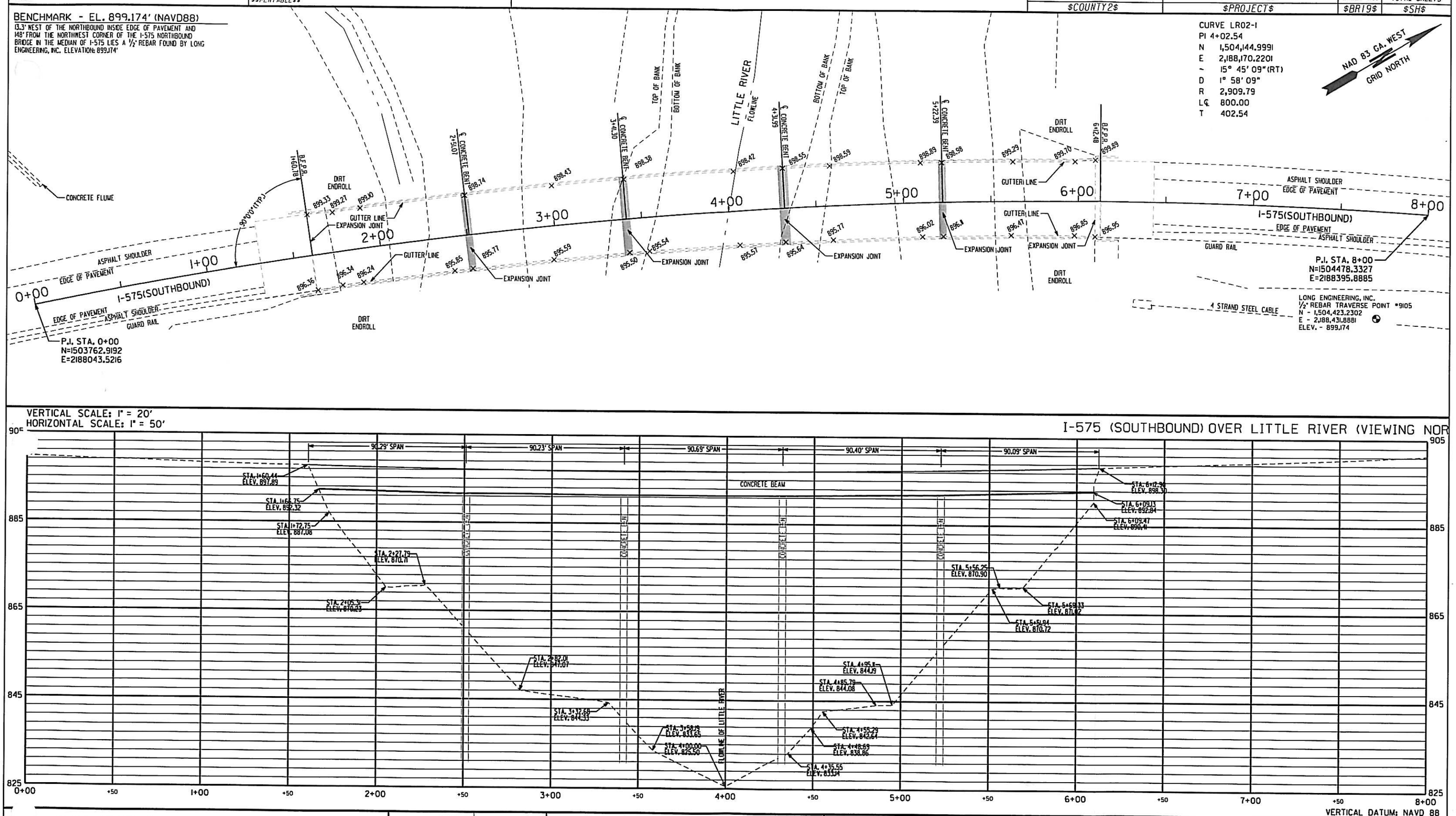
DATE$$$ | TIME$$$ | PRF | DGN
$USER$ | $$PENTABLE$$

COUNTY	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
$COUNTY2$	$PROJECT$	$BR19$	SH

BENCHMARK - EL. 899.174' (NAVD88)
13.3' WEST OF THE NORTHBOUND INSIDE EDGE OF PAVEMENT AND 148' FROM THE NORTHWEST CORNER OF THE I-575 NORTHBOUND BRIDGE IN THE MEDIAN OF I-575 LIES A 1/2" REBAR FOUND BY LONG ENGINEERING, INC. ELEVATION: 899.174'

CURVE LR02-1
PI 4+02.54
N 1,504,144.9991
E 2,188,170.2201
~ 15° 45' 09"(RT)
D 1° 58' 09"
R 2,909.79
LC 800.00
T 402.54

NAD 83 GA. WEST
GRID NORTH



VERTICAL SCALE: 1" = 20'
HORIZONTAL SCALE: 1" = 50'

I-575 (SOUTHBOUND) OVER LITTLE RIVER (VIEWING NOR

VERTICAL DATUM: NAVD 88

NOTE: THIS PROFILE INDICATES ELEVATIONS ALONG THE CENTERLINE OF I-575 (SOUTHBOUND).

P. I. NO.	LONG JOB NO.
$PROJECT$	$LEI JOB$
DRAWN BY $DRAWN$	DATE DATE$$$
CHECKED BY $CHECKED$	SCALE 1" = 50'

LONG ENGINEERING, INC.
1780 Corporate Drive
Suite 400
Norcross, Georgia 30093
Tel 770.931.8005
Fax 770.931.8555
www.longeng.com

SCALE IN FEET
0 25 50 100

REVISION DATES

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION

BRIDGE DETAIL
I-575 FROM BARRETT PARKWAY
TO SIXES ROAD
I-575 (SOUTHBOUND)
OVER LITTLE RIVER

DRAWING No. $BR19$

I-575-1 (6) 07 CHEROKEE COUNTY

LITTLE RIVER

HYDRAULIC AND HYDROLOGICAL STUDY

EXAMINED AND APPROVED:

9-7-78
(Date)

J. T. Kratzer, P. E.
State Bridge Engineer

SAG/kj

9-6-78

I-575-1 (6) 07 CHEROKEE COUNTY

HYDRAULIC AND HYDROLOGICAL STUDY

The I-575 crossing over the Little River on the above project number is to consist of dual bridges 380 feet in length and skewed 70° left. The hydraulic study on this site was performed by the U. S. Geological Survey. The 380 foot bridge length is the shortest bridge length that can be used at this site and maintain bank stability.

The profile grade for the bridge site was set because of roadway conditions and not hydraulic conditions. The bridge provides for approximately 27 feet of clearance above the 50 year floodstage.

Attached is the preliminary layout and USGS Hydraulic Study for the site.

Prepared By: Allen Groover

SAG/kg

9-6-78

Form 9-014

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
RESTON, VA. 22092

MEMORANDUM REPORT

Flood-Flow Characteristics

Little River at Interstate Highway 575

Project I-575 - Cherokee County

Georgia District
Water Resources Division
U.S. Geological Survey
Doraville, Georgia

July 1978

FOR ADMINISTRATIVE USE ONLY

MEMORANDUM REPORT

Flood-Flow Characteristics

Little River near Woodstock, Georgia

Project I-575 - Cherokee County

INTRODUCTION

This report has been prepared as part of a program of water-resources investigations under the provisions of a cooperative agreement between the Highway Division, Department of Transportation, State of Georgia, and the U.S. Geological Survey. The Highway Division plans construction of a bridge crossing Little River on Interstate 575, about 3 miles northwest of Woodstock, Georgia.

The purpose of this study was to determine the flood-flow characteristics for Little River at the proposed bridge crossing for floods having a recurrence of 50 and 100 years. In addition, the study included computations of flood elevation, area of opening under highwater, average velocity, and backwater for 2 alternate bridge openings. Alternate No. 1 is dual bridges 450 feet in length (Station 705+25 to Station 709+75) at a 90 percent skew from highway centerline. Alternate No. 2 is dual bridges ~~390~~ 380 feet in length (Station 705+50 to 709+40) at a 70 percent skew from the highway centerline. The backwater effects of these Interstate bridges on the bridge at Rope Hill Road, 1,000 feet upstream from the proposed bridges, was comput

The highway Division provided a transverse profile of the channel and floodway, proposed location of the roadway and drainage structure, and a 2 foot contour map of the flood plain from 1,000 feet below the proposed bridge to Rope Hill Road. All elevations used in this report are to highway datum, which is National Geodetic Vertical Datum.

Topographic features and the location of the crossing site are shown in figure 1. Little River drains an area of 139 square miles at the proposed crossing site.

FLOOD FREQUENCY

The discharges for the 50- and 100-year floods have been estimated to be 12,700 and 14,300 ft^3/s (cubic feet per second), respectively, based on regional relationships, $Q = 727\ A^{0.58}$ and $Q = 862\ A^{0.57}$ from the report, "Magnitude and Frequency of Floods in Georgia" (in review).

ELEVATION-DISCHARGE RELATION

During part of the year, the elevation-discharge relation at this site is controlled by backwater from Allatoona Reservoir located downstream on the Etowah River. From oral communication with the U.S. Army Corps of Engineers (June 21, 1978), the elevations of the 50- and 100-year floods for Allatoona Reservoir were estimated to be 861 and 862 feet (NGVD), respectively.

Slope-conveyance studies were used to compute the stage-discharge relation for the 50- and 100-year floods for low pool elevations in Allatoona Reservoir. The slope of Little River at the proposed bridge site was estimated from contour maps to be about 6 feet per mile. The conveyance at the proposed bridge was computed using roughness values selected during a field reconnaissance of the site on July 24, 1978. The elevations of the 50- and 100-year floods were computed to be 847.5 and 848.5 feet, respectively.

The elevation-discharge relation for the 50- and 100-year floods have been obtained from flood routing studies using the U.S. Geological Survey Step-Backwater Program (E-431) for the reach from the proposed bridge site to Rope Mill Road for (1) 50- and 100-year flood pool elevations and (2) low pool elevations in Allatoona Dam. The locations of the cross sections used are shown in figure 1.

BACKWATER EFFECTS

The computed flood elevations, area of opening under highwater conditions, average velocity, and backwater for the 50- and 100-year floods on Little River for the two alternate bridge lengths for Interstate Highway 575 are listed in table 1 for (1) 50- and 100-year flood pool elevations and (2) low pool elevations in Allatoona Reservoir.

The maximum velocity and maximum backwater caused by the proposed bridge will be produced by a flood on Little River coincident with a low pool elevation (condition 2) in Allatoona Reservoir.

As indicated in table 1, neither of the alternate bridge openings will produce appreciable backwater for either high or low pool elevations in Allatoona Reservoir.

Mr Glone Price
7/27/78

Table 1.—Little River at Interstate 575, near Woodstock, Georgia.

Condition	Discharge (ft^3/s)	Elevation ft (NGVD)	Area (ft^2)	Average velocity (ft/sec)	Little River backwater (ft)	Elevation Rope Mill Road ft (NVGD)	Backwater Rope Mill Road (ft)
Proposed Bridge (Sta. 705+25 to 709+75							
With Allatoona Reservoir at 50- and 100-year pool elevations, respectively							
50-year flood	12,700	861.0	5,500	2.3	< 0.1	861.2	< 0.1
100-year flood	14,300	862.0	5,850	2.5	< 0.1	862.2	< 0.1
With Allatoona Reservoir at low pool elevation, no backwater at bridge							
50-year flood	12,700	847.5	2,380	5.4	0.1	849.7	0.1
100-year flood	14,300	848.5	2,590	5.5	0.1	850.7	0.1
Proposed Bridge (Sta. ~~705+50~~ 705+60 to 709+40							
With Allatoona Reservoir at 50- and 100-year flood elevations, respectively							
50-year flood	12,700	861.0	5,010	2.5	< 0.1	861.2	< 0.1
100-year flood	14,300	862.0	5,260	2.7	< 0.1	862.2	< 0.1
With Allatoona Reservoir at low pool elevation, no backwater at bridge							
50-year flood	12,700	847.5	2,280	5.6	0.1	849.7	0.1
100-year flood	14,300	848.5	2,470	5.8	0.1	850.7	0.1

Teal, Sam

From: Timothy C Stamey [tcstamey@usgs.gov]
Sent: Tuesday, January 20, 2004 12:08 PM
To: Teal, Sam
Cc: Timothy C Stamey
Subject: Re: Probability of major floods occurring during winter months at Lak e Allatoona

Historically, most of the peak flows occur during the winter months and in early March and April. Although there are major flood events that have occurred in all months of the year , it is more routine for the flood events in North Georgia to occur during the winter and spring time periods.

Tim Stamey...

|---------+---------->
| "Teal, Sam" <Sammy.Teal@dot.state.ga.us> 01/20/2004 11:18 AM |
|---------+---------->

>----------
----------|
|
| To: tcstamey@usgs.gov
|
| cc:
|
| Subject: Probability of major floods occurring during winter months at Lak e Allatoona |

>----------
----------|

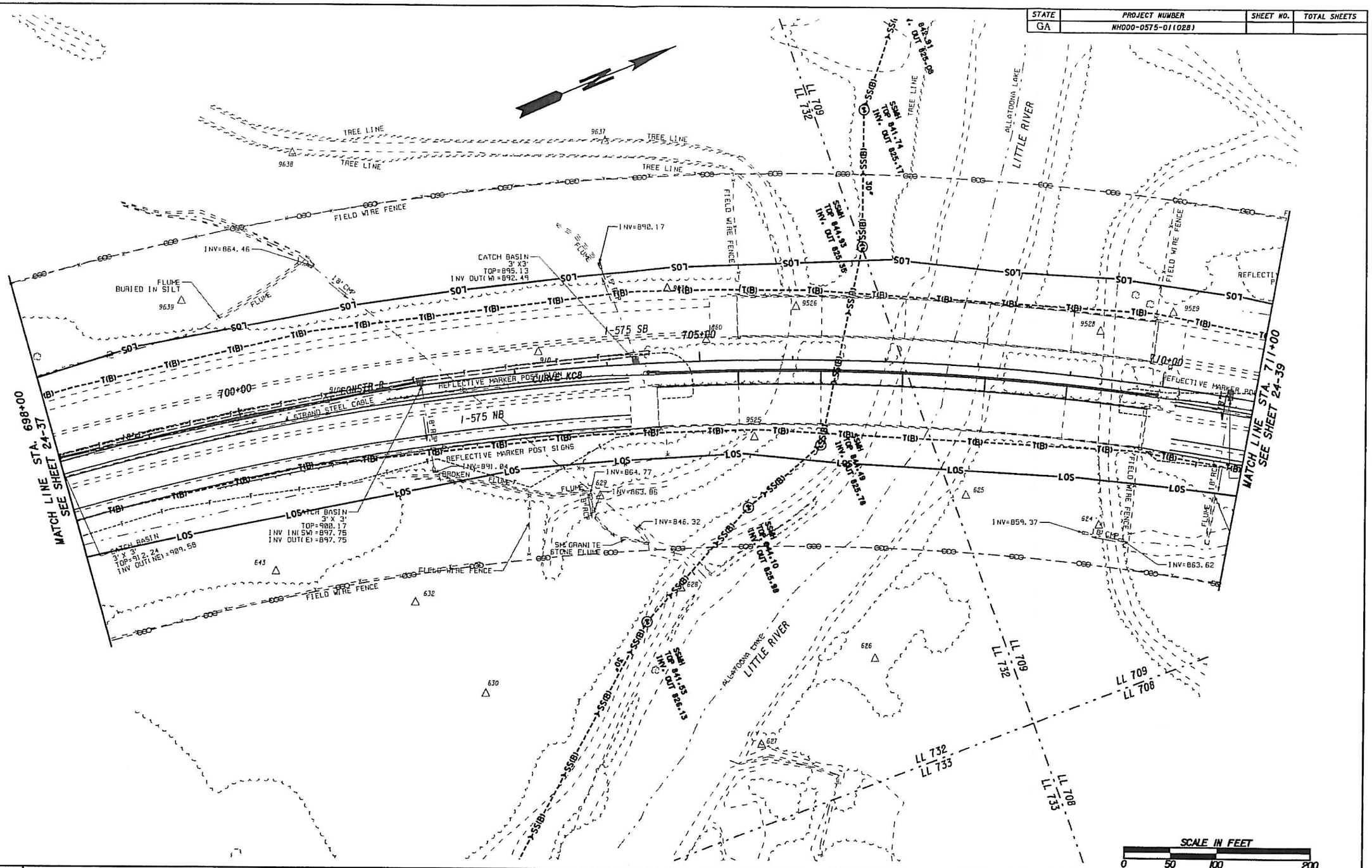
Hi Tim,

I am sizing a bridge over Lake Allatoona (Little River), and of course, the highest flow velocities are when Lake Allatoona is at low pool elevation during the winter months of November through February, mid-March.

Is there a low probability of major storms occurring during this time period? Is so, I could justify going with higher flow velocities for the 50 and 100 year storms than I normally would for this low water condition, since the lake would normally return to the pool elevation and lower velocities the rest of the year.

Thanks,
Sam

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0575-01(028)		



CLARA CASH	DRAWN BY	2/01/08 DATE
PATRICK TSE	CHECKED BY	2/05/08 DATE
MIKE MOSELEY	SUPERVISOR	2/05/08 DATE
RON MORRIS	APPROVED	2/05/08 DATE

TRACKING

NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
A	5/12/08	INTERDISCIPLINARY/CONSTRUCTABILITY REVIEW	CEC	PCT	MRM	RHM

GTP GEORGIA TRANSPORTATION PARTNERS

NORTHWEST I-75/I-575 CORRIDOR

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

PBSJ

I-75 / I-575 NORTHWEST CORRIDOR

UTILITY PLANS

I-575 HOV LANES
STA. 698+00 TO STA. 711+00

DRAWING No. 24-38

D:\000825\DGN\DGN 713648 Plans\713648UT38.dgn 6/2/2008 11:48:26 AM

BRIDGE INVENTORY DATA LISTING GEOI ı DEPARTMENT OF TRANSPORTATION

Structure ID: 057-0044-0 **Cherokee** SUFF. RATING 92.64

Location & Geography

*	Structure I.D.No:	057-0044-0	
	200 Bridge Information	01	
*	6A Feature Int:	LITTLE RIVER	
*	6B Critical Bridge:	0	
*	7A Route Number Carried:	SR00417	
*	7B Facility Carried:	I-575 (NBL)	
*	9 Location:	2.2 MI N OF WOODSTOCK	
	2 DOT District:	6	
	207 Year Photo:	2006	
*	91 Inspection Frequency:	24	Date: 03/29/2006
	92A Fract Crit Insp Freq:	00	Date: 02/01/1901
	92B Underwater Insp Freq:	60	Date: 12/02/2002
	92C Other Spc. Insp Freq:	00	Date: 02/01/1901
*	4 Place Code:	00000	
*	5 Inventory Route (O/U):	1	
	Type:	1	
	Designation:	1	
	Number:	00575	
	Direction:	0	
*	16 Latitude: 34-08.0	MMS Prefix: SR	
*	17 Longitude: 84-31.5	MMS Suffix: 00	MP: 27.30
	98 Border Bridge: 000	%Shared: 00	
	99 ID Number:	000000000000000	
*	100 STRAHNET:	1	
	12 Base Highway Network:	1	
	13A LRS Inventory Route:	571041700	
	13B Sub Inventory Route:	0	
*	101 Parallel Structure:	R	
*	102 Direction of Traffic:	1	
*	264 Road Inventory Mile Post:	004.22	
*	208 Inspection Area:	09	Initials: JMC
	Engineer's Initial:	sgm	

* Location I.D. No.: 057-00417D-010.44N

*	104 Highway System:	1	
*	26 Functional Classification:	11	
*	204 Federal Route Type:	I	No.: 05751
	105 Federal Lands Highway:	0	
*	110 Truck Route:	1	
	206 School Bus Route:	1	
	217 Benchmark Elevation:	0000.00	
	218 Datum:	0	
*	19 Bypass Length:	01	
*	20 Toll:	3	
*	21 Maintenance:	01	
*	22 Owner:	01	
*	31 Design Load:	6	
	37 Historical Significance:	5	
	205 Congressional District:	06	
	27 Year Constructed:	1982	
	106 Year Reconstructed:	0000	
	33 Bridge Median:	1	
	34 Skew:	00	
	35 Structure Flared:	0	
	38 Navigation Control:	0	
	213 Special Steel Design:	0	
	267 Type of Paint:	0	
*	42 Type of Service on:	1	
		5	
	214 Movable Bridge:	0	
	203 Type Bridge:	A-O-O-O	
	259 Pile Encasement:	3	
*	43 Structure Type Main:	5	02
	45 No. Spans Main:	006	
	44 Structure Type Appr:	0	00
	46 No. Spans Appr:	0000	
	226 Bridge Curve Horz:	1	Vert: 1
	111 Pier Protection:	0	
	107 Deck Structure Type:	1	
	108 Wearing Surface Type:	1	
	Mı	0	
	F	1	

Signs & Attachments

	225 Expansion Joint Type:	15	
	242 Deck Drains:	1	
	243 Parapet Location:	0	
	Height:	0.00	
	Width:	0.00	
	238 Curb:	0.00	0
	239 Handrail:	9	9
*	240 Median Barrier Rail:	0	
	241 Bridge Median Height:	0.00	
	Width:	0.00	
*	230 Guardrail Loc Dir Rear:	6	
	Fwrd:	0	
	Oppo Dir Rear:	0	
	Fwrd:	0	
	244 Approach Slab:	3	
	224 Retaining Wall:	0	
	233 Posted Speed Limit:	65	
	236 Warning Sign:	0	
	234 Delineator:	1	
	235 Hazard Boards:	0	
	237 Utilities Gas:	00	
	W	00	
	Ele	00	
	Telephone:	00	
	Se	00	
	247 Lighting Street:	0	
	Naviagtion:	0	
	Aerial:	0	
*	248 County Continuity No.:	02	

BRIDGE INVENTORY DATA LISTING GEO DEPARTMENT OF TRANSPORTATION

Structure ID: 057-0044-0 **Cherokee** SUFF. RATING 92.64

Programming Data

201 Project No.: I-575-1 (6) 07 CT.1
202 Plans Available: 1
249 Prop. Proj. No. 0000000000000000
250 Approval Status: 0000
251 P.I. No.: 0000000
252 Contract Date: 02/01/1901
260 Seismic No.: 00012
75 Type Work: 00 0
94 Bridge Imp. Cost: $ 0
95 Roadway Imp. Cost: $ 0
96 Total Imp Cost: $ 0
76 Imp. Length: 000000
97 Imp. Year: 0000
114 Future ADT: 107130 Year: 2025

Hydraulic Data

215 Waterway Data
Highwater Elev.: 0862.1 Year: 1973
Avg. Streambed Elev.: 0861.1 Freq.: 050
Drainage Area: 00139
Area Of Opening: 005500
113 Scour Critical: 5
216 Water Depth: 4 Br. Height: 57.8
222 Slope Protection: 1
221 Spur Dikes Rear: 0 Fwrd: 0
219 Fender System: 0
220 Dolphin: 0
223 Culvert Cover: 000
Type: 0
No. Barrels: 0
Width: 0.00 Height: 0.00
Length: 0 Apron: 0
* 265 U/W Insp. Area: 1 Diver: RM

* Location I.D. No.: 057-00417D-010.44N

Measurements

* 29 ADT: 071420 Year: 2005
109 % Trucks: 0
* 28 Lanes On: 02 Under: 00
210 No. Tracks On: 00 Under: 00
* 48 Max. Span Length: 0089
* 49 Structure Length: 534
51 Br. Rwdy. Width: 42.00
52 Deck Width: 45.20
* 47 Tot. Horz. Cl: 42.00
50 Curb/Sdewlk Width: 0.00/0.00
32 Approach Rdwy Width: 038
* 229 Shoulder Width:
Rear Lt: 4.00 Type: 2 Rt: 10.00
Fwrd Lt: 4.00 Type: 2 Rt: 10.00
Pavement Width:
Rear: 24.00 Type: 2
Fwrd: 24.00 Type: 2
Intersection Rear: 0 Fwrd: 0
36 Safety Features Br. Rail: 1
Transition: 1
App. G. Rail: 1
App. Rail End: 1
53 Minimum Cl.Over: 99 ' 99 "
Under: N 00 ' 00 "
* 228 Min. Vertical Cl
Act. Odm Dir: 99 ' 99 "
Oppo. Dir: 99 ' 99 "
Posted Odm. Dir: 00 ' 00 "
Oppo. Dir: 00 ' 00 "
55 Lateral Undercl. Rt: N 99.90
56 Lateral Undercl. Lt: 0.00
* 10 Max Min Vert Cl: 99 ' 99 " Dir: 0
39 Nav Vert Cl: 000 Horz: 0000
116 Nav Vert Cl Closed: 000
245 Deck Thickness Main: 7.50
Deck Thick Approach: 0.00
246 Overlay Thickness: 0.00
212 Year Last Painted: Sup: 0000 Sub: 0000

Ratings

65 Inventory Rating Method: 2
63 Inventory Rating Method: 2
66 Inventory Type: 2 Rating: 36
64 Operating Type: 2 Rating: 51
231 Calculated Loads
H-Modified: 20 0
HS-Modified: 25 0
Type 3: 28 0
Type 3s2: 40 0
Timber: 36 0
Piggyback: 40 0
261 H Inventory Rating: 20
262 H Operating Rating: 28
67 Structural Evaluation: 7
58 Deck Condition: 7
59 Superstructure Condition: 8
* 227 Collision Damage: 0
60A Substructure Condition: 7
60B Scour Condition: 7
60C Underwater Condition: 7
71 Waterway Adequacy: 8
61 Channel Protection Cond: 8
68 Deck Geometry: 8
69 UnderClr. Horz/Vert: N
72 Appr. Alignment: 8
62 Culvert: N

Posting Data

70 Bridge Posting Required: 5
41 Struct Open, Posted, Cl: A
* 103 Temporary Structure: 0
232 Posted Loads H-Modified: 00
HS-Modified: 00
Type 3: 00
Type3s2: 00
Timber: 00
Piggyback: 00
253 Notification Date 02/01/1901
253 Fed Notify Date: 02/01/1901 0

GEORGIA DEPARTMENT OF TRANSPORTATION

UnderWater Report

District: 6
Bridge Inspector: Bob O'Daniels
Location ID: 057-00417D-010.44N
Structure ID: 057-0044-0

Inspection Date: 3/29/2006
Over: LITTLE RIVER
County: Cherokee

Inspection Area: 09

Skew: 00

Bents Inspected: Bent 4
Bent Construction: Concrete columns on ftgs

*** Boat Used:** No
*** Surface Air:** No

Bridge Height: 57.8 **Location of Bridge Height** -5' Bent 5 downstr
Water Depth: 4

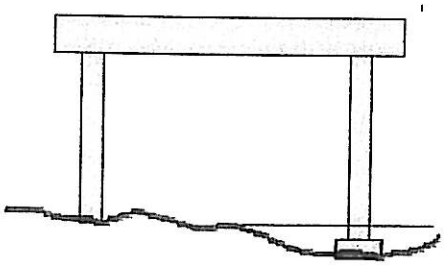
Condition Rating:

SubStructure: 7
Scour: 7
Waterway Adeq: 8
Channel Protection: 8
Underwater: 7

Detail Inspection:

12/02/02 RMO Light scale/abrasion from 9' above the waterline down.

Bent #: 4
Bent Type:
Pi c Type: 2 Column Footing



Col.	RTG	WD	FTG	FSX
1	7	dry	na	0
2	7	4	7	2

GEORGIA DEPARTMENT OF TRANSPORTATION

Bridge Inspection Report

District: 6
Bridge Inspector: Jerry Cooper
Location ID: 057-00417D-010.44N
Structure ID: 057-0044-0

Inspection Date: 3/29/2006
Over: LITTLE RIVER
County: Cherokee
Road Name: I-575 (NBL)

Inspection Area: 09
Bridge Status: 01

EVALUATION & DEFICIENCIES

SubStructure:

Year Painted: 0000

Concrete caps at both abutments.
Bents 2, 3, 4, 5, and 6 have a concrete cap and 2 concrete columns.
Minor settlement at abutment 7.
Minor cracks in both abutment caps.
Very minor cracks in caps at bent 2 ,3, & 4.

SuperStructure:

Year Painted: 0000

6 span p.s.c. "I" beam - 7 beams per span.
Neoprene bearings.
All beams are in good condition.
HS-20 Design

Deck:

7.5" concrete slab.
Concrete s.i.p. deck forms.
Minor longitudinal cracking appears to be over the beams on top.
HS-20 Design

General:

Built in 1982 - Project # I-575-1 (6) 7 CT.1 .
Special note : This bridge is scheduled for an underwater inspection.

12/02/02 RMO Light scale/abrasion from 9' above the waterline down.

Condition Rating

Component	Material	Rating
Substructure	Concrete	7
Superstructure	Concrete	8
Deck	Concrete	7

Temp Shored: **No**

Truck Type	Gross/H-Mod	HSMod	Tand	3-S-2	Log	Piggy
Calculated Posting	20	25	28	40	36	40
Posting Required	No	No	No	No	No	No
Existing Posting	00	00	00	00	00	00

*****School Bus Route.******

Structure Does Not Require Posting

GEORGIA DEPARTMENT OF TRANSPORTATION

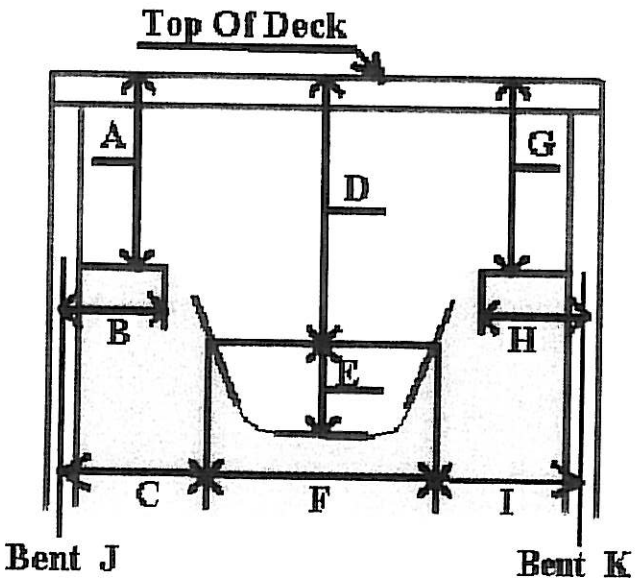
Waterway Report

District: 6
Bridge Inspector: Jerry Cooper
Location ID: 057-00417D-010.44N
Structure ID: 057-0044-0

Inspection Date: 3/29/2006
Over: LITTLE RIVER
County: Cherokee
Road Name: I-575 (NBL)

Inspection Area: 09

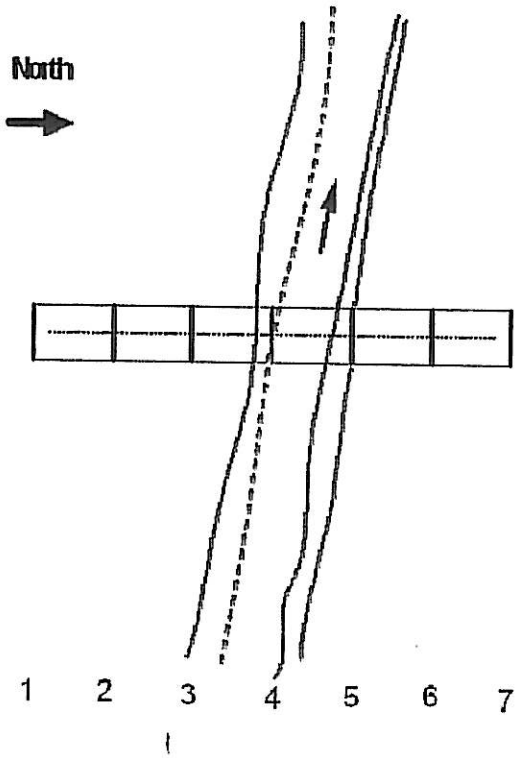
Skew: 00



Side view at the Channel.

B, C, H, & I are measured to center of bent or B.F.P.R.

A:	49
B:	62
C:	88
D:	57.8
E:	4
F:	75
G:	53
H:	0
I:	15
J:	3
K:	5



Location of Bridge Height At bent 4

Scour Condition: 7 **Waterway Adequacy:** 8 **Channel Protection:** 8

0 = **SubStructure**
15 = **Channel Skew**

15 = **Stream Angle**

Comments:

12/02/02 Bridge curves to the right and is super elevated on left, runs up hill.

Report Date: 7/11/2006

GEORGIA DEPARTMENT OF TRANSPORTATION

Waterway Report

District: 6
Bridge Inspector: Jerry Cooper
Location ID: 057-00417D-010.44N
Structure ID: 057-0044-0

Inspection Date: 3/29/2006
Over: LITTLE RIVER
County: Cherokee
Road Name: I-575 (NBL)

Inspection Area: 09

Skew: 00

Span #:	1	2	3	4	5	6
Length:	**89.0**	**89.0**	**89.0**	**89.0**	**89.0**	**89.0**

Upstream -
Upstream +

		1	2	3	4	5	6	7
05/26/1999	RMO/WSR		26.00	42.00	57.00	52.00	44.00	10.00
12/02/2002	RMO TSP		25.80	41.90	56.00	50.10	42.30	11.00
03/29/2006	JMC-WBR		26.20	42.20	60.10	50.70	43.80	10.20

Downstream -
Downstream +

		1	2	3	4	5	6	7
05/26/1999	RMO/WSR		25.00	38.00	59.00	61.00	44.00	7.00
12/02/2002	RMO TSP		24.90	39.90	59.40	61.00	44.10	9.30
03/29/2006	JMC-WBR		24.80	37.00	60.20	59.50	43.30	8.20

GEORGIA DEPARTMENT OF TRANSPORTATION

Bridge Component Report

District: 6
Bridge Inspector: Jerry Cooper
Location ID: 057-00417D-010.44N
Structure ID: 057-0044-0

Inspection Date: 3/29/2006
Over: LITTLE RIVER
County: Cherokee
Road Name: I-575 (NBL)

Inspection Area: 09

SubStructure Data

Bent#	Type	Foundation	Col	#Cols	Piling	#Piles	Sway	CAP	Remarks
1	A	ZZ		0		0		C	
2	B	SF	C	2		0		C	
3	B	SF	C	2		0		C	
4	B	SF	C	2		2		C	
5	B	SF	C	2		0		C	
6	B	SF	C	2		0		C	
7	A	ZZ		0		0		C	

SuperStructure Data

Span#	Beam Type	Spacing	Length	#Beams	Remarks
1	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV
2	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV
3	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV
4	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV
5	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV
6	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV

Bearing Data

Span#	Rear Type Bearing	FWD Type Bearing	Remarks
1	03 - Elastomeric	03 - Elastomeric	
2	03 - Elastomeric	03 - Elastomeric	
3	03 - Elastomeric	03 - Elastomeric	
4	03 - Elastomeric	03 - Elastomeric	
5	03 - Elastomeric	03 - Elastomeric	
6	03 - Elastomeric	03 - Elastomeric	

BRIDGE INVENTORY DATA LISTING GEO. A DEPARTMENT OF TRANSPORTATION

Structure ID: 057-0045-0 **Cherokee** SUFF. RATING 92.64

Location & Geography

*	Structure I.D.No:	057-0045-0	
	200 Bridge Information	01	
*	6A Feature Int:	LITTLE RIVER	
*	6B Critical Bridge:	0	
*	7A Route Number Carried:	SR00417	
*	7B Facility Carried:	I-575 (SBL)	
*	9 Location:	2.2 MI N OF WOODSTOCK	
	2 DOT District:	6	
	207 Year Photo:	2006	
*	91 Inspection Frequency:	24	Date: 03/29/2006
	92A Fract Crit Insp Freq:	00	Date: 02/01/1901
	92B Underwater Insp Freq:	60	Date: 12/02/2002
	92C Other Spc. Insp Freq:	00	Date: 02/01/1901
*	4 Place Code:	00000	
*	5 Inventory Route (O/U):	1	
	Type:	1	
	Designation:	1	
	Number:	00575	
	Direction:	0	
*	16 Latitude: 34-08.0	MMS Prefix: SR	
*	17 Longitude: 84-31.5	MMS Suffix: 00	MP: 27.31
	98 Border Bridge:	000	%Shared: 00
	99 ID Number:	000000000000000	
*	100 STRAHNET:	1	
	12 Base Highway Network:	1	
	13A LRS Inventory Route:	571041700	
	13B Sub Inventory Route:	0	
*	101 Parallel Structure:	L	
*	102 Direction of Traffic:	1	
*	264 Road Inventory Mile Post:	004.23	
*	208 Inspection Area:	09	Initials: JMC
	Engineer's Initial:	sgm	

* Location I.D. No.: 057-00417D-010.45N

*	104 Highway System:	1	
*	26 Functional Classification:	11	
*	204 Federal Route Type:	I	No.: 05751
	105 Federal Lands Highway:	0	
*	110 Truck Route:	1	
	206 School Bus Route:	1	
	217 Benchmark Elevation:	0000.00	
	218 Datum:	0	
*	19 Bypass Length:	01	
*	20 Toll:	3	
*	21 Maintenance:	01	
*	22 Owner:	01	
*	31 Design Load:	6	
	37 Historical Significance:	5	
	205 Congressional District:	06	
	27 Year Constructed:	1982	
	106 Year Reconstructed:	0000	
	33 Bridge Median:	1	
	34 Skew:	00	
	35 Structure Flared:	0	
	38 Navigation Control:	0	
	213 Special Steel Design:	0	
	267 Type of Paint:	0	
*	42 Type of Service on:	1	
		5	
	214 Movable Bridge:	0	
	203 Type Bridge:	A-O-O-O	
	259 Pile Encasement:	3	
*	43 Structure Type Main:	5	02
	45 No. Spans Main:	005	
	44 Structure Type Appr:	0	00
	46 No. Spans Appr:	0000	
	226 Bridge Curve Horz:	1	Vert: 1
	111 Pier Protection:	0	
	107 Deck Structure Type:	1	
	108 Wearing Surface Type:	1	
	M(	0	
	F	1	

Signs & Attachments

	225 Expansion Joint Type:	15	
	242 Deck Drains:	1	
	243 Parapet Location:	0	
	Height:		0.00
	Width:		0.00
	238 Curb:		0.00 0
	239 Handrail:	9	9
*	240 Median Barrier Rail:	0	
	241 Bridge Median Height:		0.00
	Width:		0.00
*	230 Guardrail Loc Dir Rear:	6	
	Fwrd:	6	
	Oppo Dir Rear:	0	
	Fwrd:	0	
	244 Approach Slab:	3	
	224 Retaining Wall:	0	
	233 Posted Speed Limit:	65	
	236 Warning Sign:	0	
	234 Delineator:	1	
	235 Hazard Boards:	0	
	237 Utilities Gas:	00	
	W	00	
	Ele	00	
	Telephone:	00	
	Se	00	
	247 Lighting Street:	0	
	Naviagtion:	0	
	Aerial:	0	
*	248 County Continuity No.:	02	

BRIDGE INVENTORY DATA LISTING GEOI ı DEPARTMENT OF TRANSPORTATION

Structure ID: 057-0045-0 **Cherokee** SUFF. RATING 92.64

Programming Data

201 Project No.: I-575-1 (6) 07 CT.1
202 Plans Available: 1
249 Prop. Proj. No. 0000000000000000
250 Approval Status: 0000
251 P.I. No.: 0000000
252 Contract Date: 02/01/1901
260 Seismic No.: 00012
75 Type Work: 00 0
94 Bridge Imp. Cost: $ 0
95 Roadway Imp. Cost: $ 0
96 Total Imp Cost: $ 0
76 Imp. Length: 000000
97 Imp. Year: 0000
114 Future ADT: 107130 Year: 2025

Hydraulic Data

215 Waterway Data
Highwater Elev.: 0862.1 Year: 1973
Avg. Streambed Elev.: 0861.1 Freq.: 050
Drainage Area: 00139
Area Of Opening: 005500
113 Scour Critical: 5
216 Water Depth: 05.0 Br. Height: 62.9
222 Slope Protection: 1
221 Spur Dikes Rear: 0 Fwrd: 0
219 Fender System: 0
220 Dolphin: 0
223 Culvert Cover: 000
Type: 0
No. Barrels: 0
Width: 0.00 Height: 0.00
Length: 0 Apron: 0
* 265 U/W Insp. Area: 1 Diver: RM

* Location I.D. No.: 057-00417D-010.45N

Measurements

* 29 ADT: 071420 Year: 2005
109 % Trucks: 0
* 28 Lanes On: 02 Under: 00
210 No. Tracks On: 00 Under: 00
* 48 Max. Span Length: 0089
* 49 Structure Length: 445
51 Br. Rwdy. Width: 42.00
52 Deck Width: 45.20
* 47 Tot. Horz. Cl: 42.00
50 Curb/Sdewlk Width: 0.00/0.00
32 Approach Rdwy Width: 038
* 229 Shoulder Width:
Rear Lt: 4.00 Type: 2 Rt: 10.00
Fwrd Lt: 4.00 Type: 2 Rt: 10.00
Pavement Width:
Rear: 24.00 Type: 2
Fwrd: 24.00 Type: 2
Intersection Rear: 0 Fwrd: 0
36 Safety Features Br. Rail: 1
Transition: 1
App. G. Rail: 1
App. Rail End: 1
53 Minimum Cl.Over: 99 ' 99 "
Under: N 00 ' 00 "
* 228 Min. Vertical Cl
Act. Odm Dir: 99 ' 99 "
Oppo. Dir: 99 ' 99 "
Posted Odm. Dir: 00 ' 00 "
Oppo. Dir: 00 ' 00 "
55 Lateral Undercl. Rt: N 99.90
56 Lateral Undercl. Lt: 0.00
* 10 Max Min Vert Cl: 99 ' 99 " Dir: 0
39 Nav Vert Cl: 000 Horz: 0000
116 Nav Vert Cl Closed: 000
245 Deck Thickness Main: 7.50
Deck Thick Approach: 0.00
246 Overlay Thickness: 0.00
212 Year Last Painted: Sup: 0000 Sub: 0000

Ratings

65 Inventory Rating Method: 2
63 Inventory Rating Method: 2
66 Inventory Type: 2 Rating: 36
64 Operating Type: 2 Rating: 51
231 Calculated Loads
H-Modified: 20 0
HS-Modified: 25 0
Type 3: 28 0
Type 3s2: 40 0
Timber: 36 0
Piggyback: 40 0
261 H Inventory Rating: 20
262 H Operating Rating: 28
67 Structural Evaluation: 7
58 Deck Condition: 7
59 Superstructure Condition: 8
* 227 Collision Damage: 0
60A Substructure Condition: 7
60B Scour Condition: 7
60C Underwater Condition: 7
71 Waterway Adequacy: 8
61 Channel Protection Cond: 8
68 Deck Geometry: 8
69 UnderClr. Horz/Vert: N
72 Appr. Alignment: 8
62 Culvert: N

Posting Data

70 Bridge Posting Required: 5
41 Struct Open, Posted, Cl: A
* 103 Temporary Structure: 0
232 Posted Loads H-Modified: 00
HS-Modified: 00
Type 3: 00
Type3s2: 00
Timber: 00
Piggyback: 00
253 Notification Date 02/01/1901
253 Fed Notify Date: 02/01/1901 0

GEORGIA DEPARTMENT OF TRANSPORTATION

Bridge Inspection Report

District: 6
Bridge Inspector: Jerry Cooper
Location ID: 057-00417D-010.45N
Structure ID: 057-0045-0

Inspection Date: 3/29/2006
Over: LITTLE RIVER
County: Cherokee
Road Name: I-575 (SBL)

Inspection Area: 09
Bridge Status: 01

EVALUATION & DEFICIENCIES

SubStructure:

Year Painted: 0000

Concrete caps at both abutments.
Bents 2, 3, 4, and 5 Have a concrete cap and 2 concrete columns.
Minor cracks in both abutment caps .
Very minor cracks in caps at the step downs.

SuperStructure:

Year Painted: 0000

5 span p.s.c. "I" beam - 7 beams per span.
Neoprene bearings.
All beams with are in good condition.

Deck:

7.5" concrete slab.
Concrete s.i.p. deck forms.
Minor longitudinal cracking which appears to be along edge of beams.

General:

Built in 1982 - Project # I-575-1 (6) 7 CT.1.
Special note : This bridge is scheduled for an underwater inspection.

12/02/02 RMO Light scale/abrasion from 9' above the waterline down.

Condition Rating

Component	Material	Rating
Substructure	Concrete	7
Superstructure	Concrete	8
Deck	Concrete	7

Temp Shored: **No**

Truck Type	Gross/H-Mod	HSMod	Tand	3-S-2	Log	Piggy
Calculated Posting	20	25	28	40	36	40
Posting Required	No	No	No	No	No	No
Existing Posting	00	00	00	00	00	00

*****School Bus Route.******

Structure Does Not Require Posting

GEORGIA DEPARTMEN . JF TRANSPORTATION

Bridge Component Report

District: 6
Bridge Inspector: Jerry Cooper
Location ID: 057-00417D-010.45N
Structure ID: 057-0045-0

Inspection Date: 3/29/2006
Over: LITTLE RIVER
County: Cherokee
Road Name: I-575 (SBL)

Inspection Area: 09

SubStructure Data

Bent#	Type	Foundation	Col	#Cols	Piling	#Piles	Sway	CAP	Remarks
1	A	ZZ		0		0		C	
2	B	SF	C	2		0		C	
3	B	SF	C	2		0		C	
4	B	SF	C	2		2		C	
5	B	SF	C	2		0		C	
6	A	ZZ		0		0		C	

SuperStructure Data

Span#	Beam Type	Spacing	Length	#Beams	Remarks
1	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV
2	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV
3	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV
4	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV
5	Concrete "I" Beam	6.80	89.00	7	P. S. C. Type IV

Bearing Data

Span#	Rear Type Bearing	FWD Type Bearing	Remarks
1	03 - Elastomeric	03 - Elastomeric	
2	03 - Elastomeric	03 - Elastomeric	
3	03 - Elastomeric	03 - Elastomeric	
4	03 - Elastomeric	03 - Elastomeric	
5	03 - Elastomeric	03 - Elastomeric	

GEORGIA DEPARTMENT OF TRANSPORTATION

UnderWater Report

District: 6
Bridge Inspector: Bob O'Daniels
Location ID: 057-00417D-010.45N
Structure ID: 057-0045-0

Inspection Date: 3/29/2006
Over: LITTLE RIVER
County: Cherokee

Inspection Area: 09
Skew: 00

Bents Inspected: Bent 4
Bent Construction: Concrete columns on ftgs

*** Boat Used:** No
*** Surface Air:** No

Bridge Height: 62.9 **Location of Bridge Height** -5' Bent 4 downstr
Water Depth: 05.0

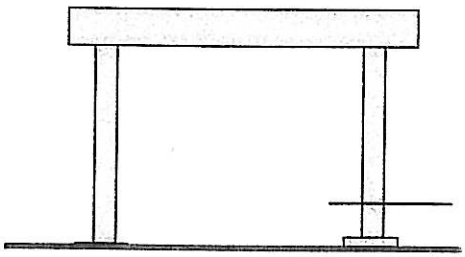
Condition Rating:

SubStructure: 7
Scour: 7
Waterway Adeq: 8
Channel Protection: 8
Underwater: 7

Detail Inspection:

12/02/02 RMO Light scale/abrasion from 9' above the waterline down.

Bent #: 4
Bent Type:
Pi c Type: 2 Column Footing



Col.	RTG	WD	FTG	FSX
1	7	1	7	1
2	7	2	7	1

GEORGIA DEPARTMENT OF TRANSPORTATION

Waterway Report

District: 6
Bridge Inspector: Jerry Cooper
Location ID: 057-00417D-010.45N
Structure ID: 057-0045-0

Inspection Date: 3/29/2006
Over: LITTLE RIVER
County: Cherokee
Road Name: I-575 (SBL)

Inspection Area: 09

Skew: 00

Span #:	1	2	3	4	5
Length:	**89.0**	**89.0**	**89.0**	**89.0**	**89.0**

Upstream -

Upstream +		1	2	3	4	5	6
05/26/1999	RMO/WSR		33.00	55.00	61.00	43.00	8.00
12/02/2002	RMO TSP		33.50	53.70	59.80	42.20	7.00
03/29/2006	JMC-WBR		34.00	55.30	64.80	43.50	7.90

Downstream -

Downstream +		1	2	3	4	5	6
05/26/1999	RMO/WSR		33.00	52.00	63.00	42.00	9.00
12/02/2002	RMO TSP		33.30	52.00	62.60	41.80	9.00
03/29/2006	JMC-WBR		34.80	52.50	66.50	42.00	8.30

GEORGIA DEPARTMENT OF TRANSPORTATION

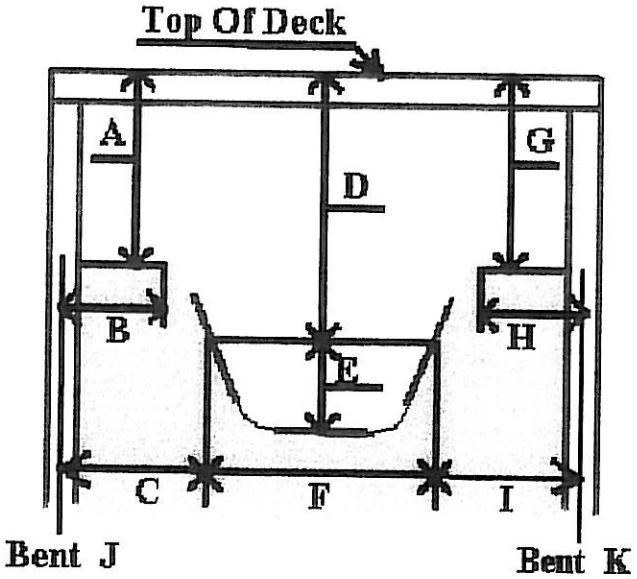
Waterway Report

District: 6
Bridge Inspector: Jerry Cooper
Location ID: 057-00417D-010.45N
Structure ID: 057-0045-0

Inspection Date: 3/29/2006
Over: LITTLE RIVER
County: Cherokee
Road Name: I-575 (SBL)

Inspection Area: 09

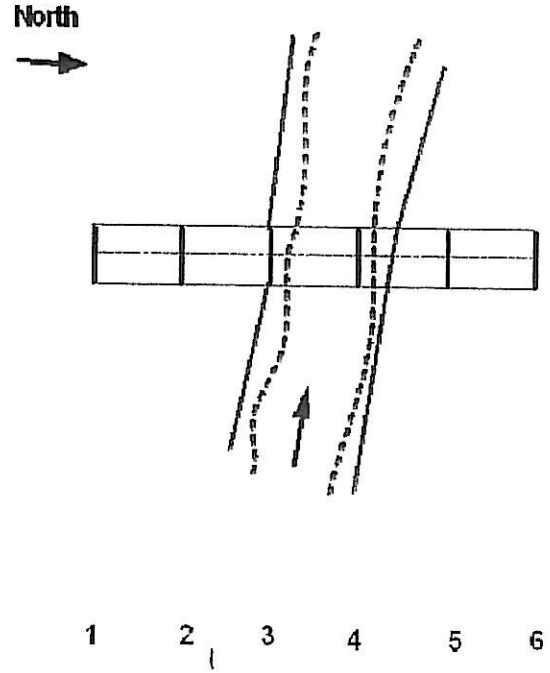
Skew: 00



Side view at the Channel.

B, C, H, & I are measured to center of bent or B.F.P.R.

A:	58
B:	0
C:	11
D:	62.9
E:	05.0
F:	92
G:	55
H:	59
I:	75
J:	3
K:	5



Location of Bridge Height -18' from bt. 4

Scour Condition: 7 **Waterway Adequacy:** 8 **Channel Protection:** 8

0 = SubStructure
10 = Channel Skew

10 = Stream Angle

Comments:

12/02/02 Bridge curves to the right and is super elevated on the left, runs up hill.

R-5

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	I-575-1(6)07	69-A	173

Contract 1 Added 10-17-79

P.I. STA. 705+34.14
Δ = 35° 05' 10" RT.
D = 2° 00'
T = 304.71
L = 1758.64
SE = .07/FT.
R = 210 FT.

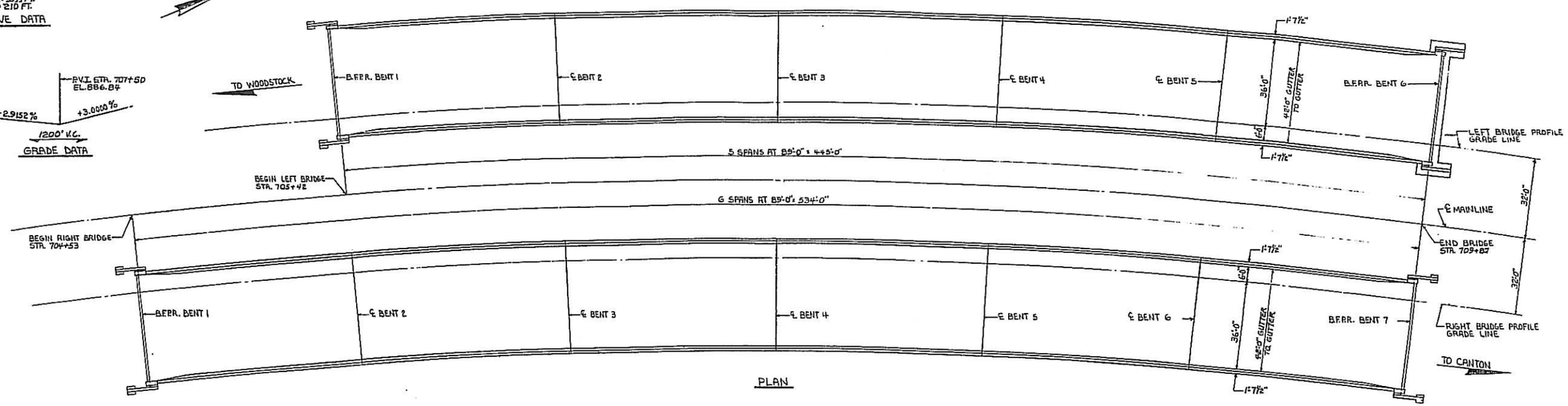
CURVE DATA

P.V.I. STA. 707+50
EL. 886.84

-2.9152% +3.0000%

1200' V.C.

GRADE DATA

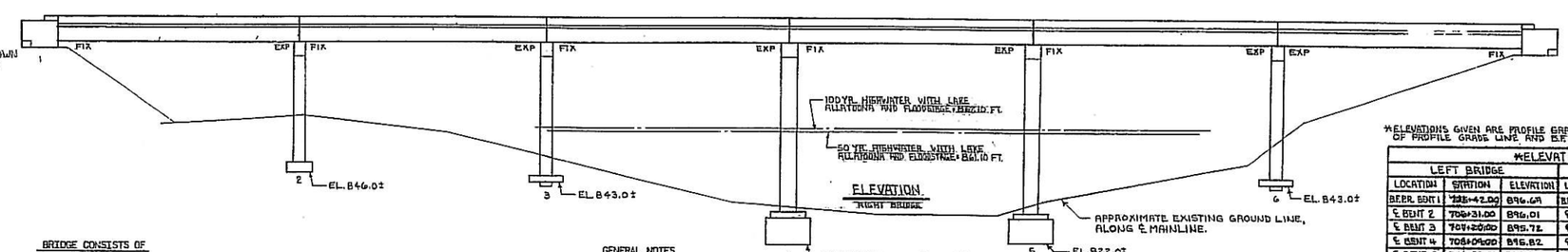


PLAN

NOTE: ALL BENTS ARE RADIAL

NOTE: PILES NOT SHOWN

NOTE: RIP RAP DETAILS NOT SHOWN FOR DETAILS SEE BRIDGE SHEET 18 OF 22.



ELEVATION
RIGHT BRIDGE

*ELEVATIONS GIVEN ARE PROFILE GRADE ELEVATIONS AT INTERSECTION OF PROFILE GRADE LINE AND B.E.P.R. OR ℄ BENT.

*ELEVATIONS

LEFT BRIDGE			RIGHT BRIDGE		
LOCATION	STATION	ELEVATION	LOCATION	STATION	ELEVATION
B.E.P.R. BENT 1	705+42.00	896.69	B.E.P.R. BENT 1	704+53.00	897.76
℄ BENT 2	706+31.00	896.01	℄ BENT 2	705+42.00	896.69
℄ BENT 3	707+20.00	895.72	℄ BENT 3	706+31.00	896.01
℄ BENT 4	708+09.00	895.82	℄ BENT 4	707+20.00	895.72
℄ BENT 5	708+98.00	896.32	℄ BENT 5	708+09.00	895.82
B.E.P.R. BENT 6	709+87.00	897.20	℄ BENT 6	708+98.00	896.32
			B.E.P.R. BENT 7	709+87.00	897.20

BRIDGE CONSISTS OF

LT.	RT.	
5	6	89'-0" PSC GIRDER SIMPLE SPANS ---------- SPECIAL DESIGN
1	2	STEEL H-PILE END BENTS ---------- SPECIAL DESIGN
4	5	CONCRETE INTERMEDIATE BENTS ---------- SPECIAL DESIGN
1	-	SPREAD FOOTING END BENTS ---------- SPECIAL DESIGN
✓	✓	BAR BENDING DETAILS ---------- GA. STD. NO. 3901
✓	✓	TYPICAL FILL DETAIL AT END OF BRIDGE -------- GA. STD. NO. 9037 (9-1-70)
✓	✓	END POST AND END POST GUARDRAIL ATTACHMENTS — GA. STD. NO. 3053 (2-1-75) W = 1'-1"; H = 2'-8"; L = 4'-0"

UTILITIES

NONE

DRAINAGE DATA

DRAINAGE AREA = 139 SQ MI

FLOOD FREQUENCY	DISCHARGE	VELOCITY	AREA OF OPENING UNDER HIGHWATER
Q_{50}	12,700 CFS	2.30 FT/SEC	5500 SQ FT
Q_{100}	14,300 CFS	2.50 FT/SEC	5850 SQ FT

GENERAL NOTES

SPECIFICATIONS - GEORGIA STANDARD DATED 1977

WAITING PERIOD - NO WORK SHALL BE STARTED AT BENT 1 LEFT BRIDGE OR BENTS 1 AND 2 RIGHT BRIDGE UNTIL THE COMPLETED END FILLS HAVE BEEN IN PLACE FOR AN ESTIMATED PERIOD OF 60 DAYS.

END BENT EXCAVATION - EXCAVATION FOR END BENT NO. 6 LT. SHALL BE PAID FOR AS CU YD BR EXCAV, STREAM CROSS.

PROTECTIVE SURFACE TREATMENT - PER SECTION 500.13C WILL BE REQUIRED AT THIS SITE.

REINFORCEMENT - ALL REINFORCEMENT SHALL BE PLACED AND TIED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS.

COFFERDAMS - COFFERDAMS PROVIDED FOR IN THE SUMMARY OF QUANTITIES ARE LOCATED AT BENTS 3 AND 4 LEFT BRIDGE AND BENTS 4 AND 5 RIGHT BRIDGE.

DRIVING DATA PILES - ONE REQUIRED AT EACH OF BENTS 1 LT. & RT., BT 3 RT, BT 7 RT.

GROOVED SURFACE FINISH OF CONCRETE DECK SHALL BE REQUIRED AT THIS SITE. SEE SPECIAL PROVISIONS.

PLAN DRIVING OBJECTIVE - SEE SUBSTRUCTURE DETAILS.

PILE TIP REINFORCEMENT - PROTECTIVE PREFABRICATED POINTS AS MANUFACTURED BY PRUYN'S P 25160 OR MACELROY TYPE 4 POINTS AND/OR EQUAL SHALL BE FURNISHED FOR ALL PILES AT BENT 7 RIGHT BRIDGE. PAYMENT WILL BE INCLUDED WITH PAYMENT FOR LIN FT PILING IN PLACE. THIS TIP REINFORCEMENT SHALL SUPERSEDE THE REQUIREMENT OF SECTION 520.05A AND 520.06E OF THE STANDARD SPECIFICATIONS.

SUMMARY OF QUANTITIES

LT.	RT.	
1720	-	CU YD BR EXCAV, STREAM CROSS - BR NO. 1 LT.
-	1560	CU YD BR EXCAV, STREAM CROSS - BR NO. 1 RT
LUMP	-	SUPERSTR CONC (CL AA) - BR NO. 1 LT (684)
-	LUMP	SUPERSTR CONC (CL AA) - BR NO. 1 RT (797)
1	-	EACH BRIDGE DECK JOINT SEAL, BT. NO. 5
-	1	EACH BRIDGE DECK JOINT SEAL, BT. NO. 6
LUMP	-	PSC BEAMS, AASHO TYPE 4-40 BR NO. 1 LT
LUMP	-	PSC BEAMS, AASHO TYPE 4-42 BR NO. 1 LT
-	LUMP	PSC BEAMS, AASHO TYPE 4-40 BR NO. 1 RT
-	LUMP	PSC BEAMS, AASHO TYPE 4-42 BR NO. 1 RT
140,965	153,395	LB BAR REINF STEEL
LUMP	-	SUPERSTR REINF STEEL - BR NO. 1 LT (84,434)
-	LUMP	SUPERSTR REINF STEEL - BR NO. 1 RT (100,044)
830	2630	LIN FT PILING IN PLACE, STEEL H, 12BP53
1	1	EACH LOAD TEST, STEEL H, 12BP53 (IF REQD)
4	4	EACH COFFERDAM
1490	3040	SQ YD STH DUMPED RIP RAP, 24 IN, TYPE II.
LUMP	-	EPOXY COATED SUPERSTR. REINF. STEEL BR. NO. 1 LT. (44,332)
-	LUMP	EPOXY COATED SUPERSTR. REINF. STEEL BR. NO. 1 RT. (75,400)
813	816	CU YD CL A CONC
350	362	CU YD SEAL CONC
2010	2335	SQ YD GROOVING CONC

DESIGN DATA

SPECIFICATIONS - AASHTO 1977

TYPICAL HS20-44 AND/OR MILITARY LOADING - IMPACT ALLOWED

FUTURE PAVING ALLOWANCE = 30 LBS PER SQ FT

CONCRETE: SUPERSTRUCTURE f'c = 3500 psi
SUBSTRUCTURE f'c = 3000 psi

REINFORCEMENT: GRADE 40, fy = 40 psi

BRIDGE NO. 1 LT & RT.

BRIDGE SHEET 1 OF 22

BY	REVISIONS	DATE

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION-BRIDGE DESIGN

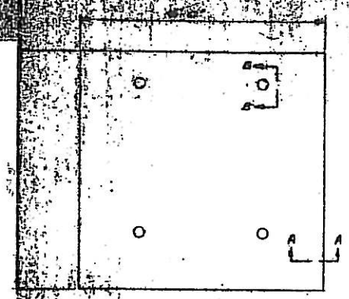
PLAN AND ELEVATION

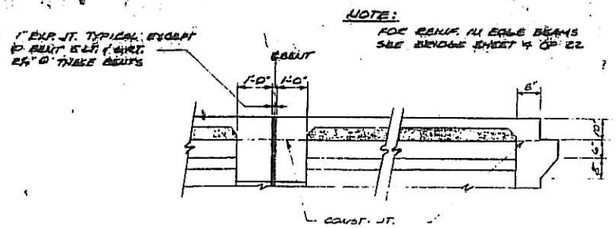
I-575 OVER LITTLE RIVER

CHEROKEE COUNTY I-575-1(6)07

SCALE: 1"=20'-0" JULY 1979

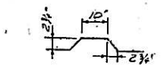
DESIGNED J.E.A.M. - P.V.L. TRACED
DRAWN M.B.M. CHECKED H.W.C. REVIEWED L.R.G.
APPROVED



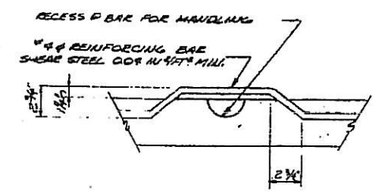


NOTE: FOR REINF. IN EDGE BEAMS SEE BRIDGE SHEET 4 OF 22

SECT. @ INTERMEDIATE BENT SECT @ END BENT

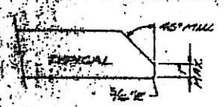


SHEAR BAR

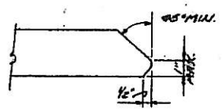


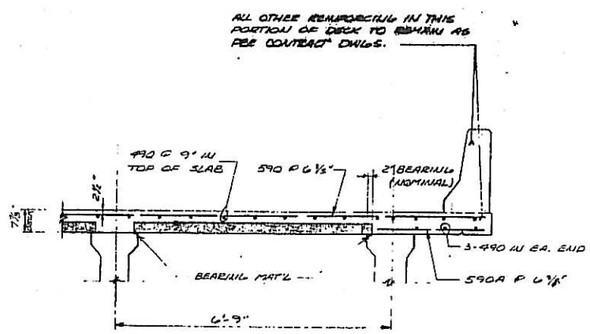
SECTION B-B
SHEAR BAR

1" EXP. PRECAST UNIT



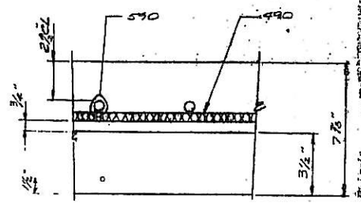
SECTION A-A



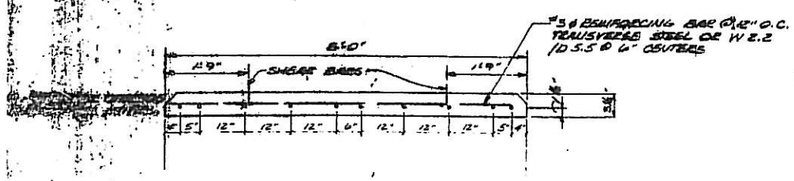


SEE BRIDGE SHEET 4 OF 22 FOR REINF. NOT SHOWN

SECTION MID SPAN (PARTIAL)



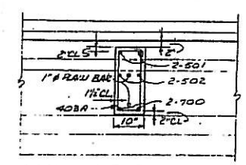
SECTION THRU SLAB.



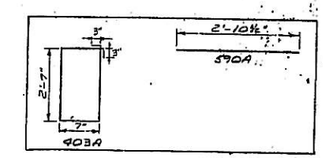
NOTE: THESE STRAND PATTERNS ARE FOR HS-20-44 LOADING AS PER CONTRACT DRAWING

DEFLECTION TABLE

	DIA. SLAB	PIR SLAB	TOTAL
N.T.	3/16"	9/16"	7/8"
EXT.	3/16	9/16	3/4



SECTION @ DIAPHRAGM



BRIDGE NO. 1 LT. ABUT.

PRODUCER: GREY CONCRETE

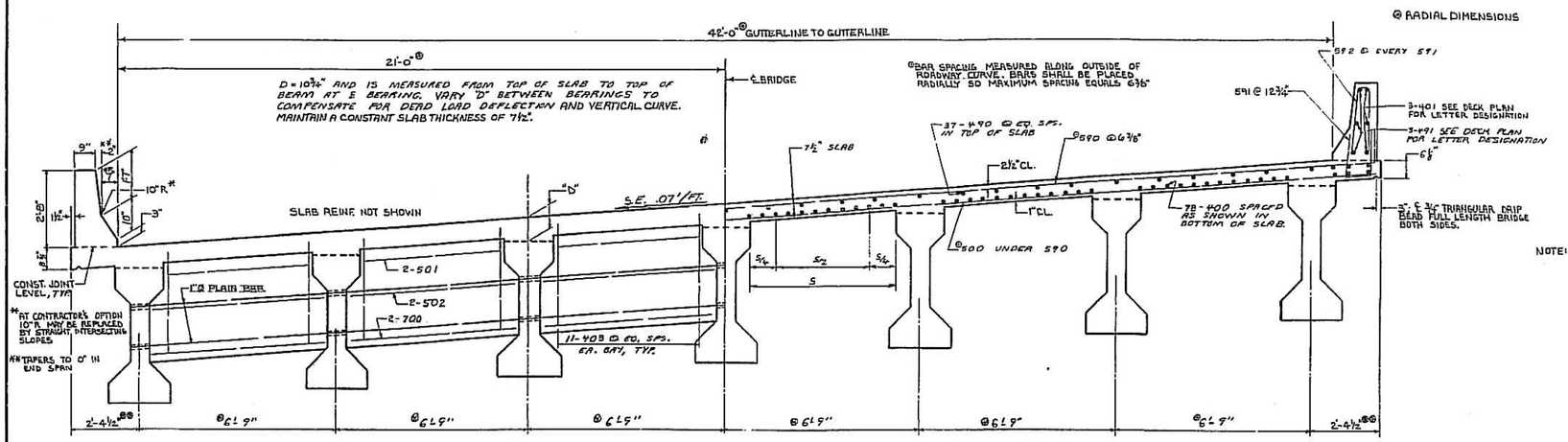
CONTRACTOR: TIDWELL

I-575 [illegible]

CHECKED:

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	I-575-1(6)07	89-D	173

Ct. 1 Added 10-11-79

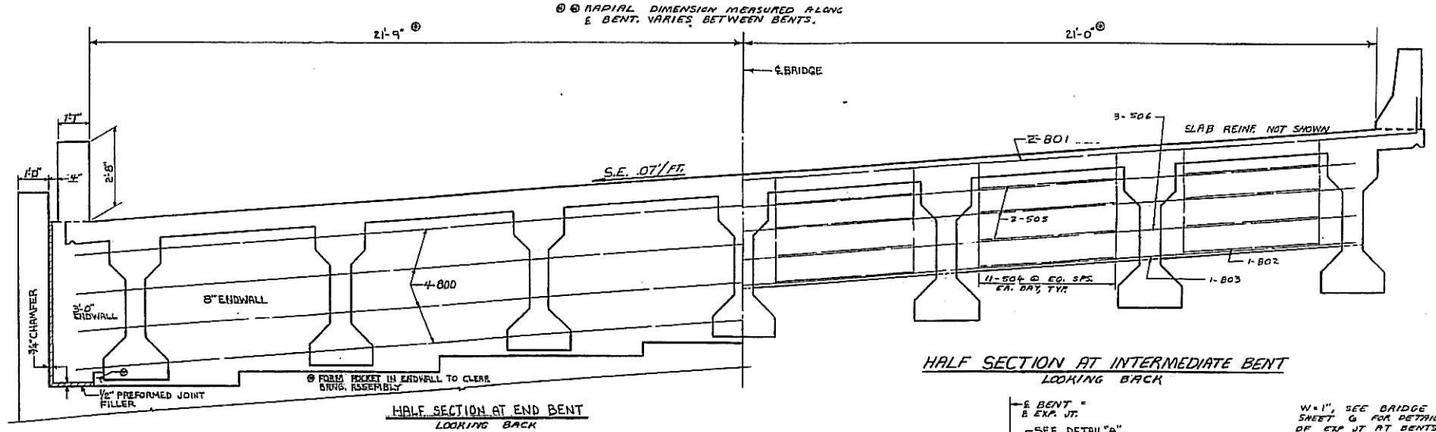


HALF SECTION AT DIAPHRAGMS
LOOKING BACK

HALF SECTION THRU SLAB
LOOKING BACK

NOTE: AT CONTRACTOR'S OPTION; 400, 401, 440, 491 BARS MAY BE SPLICED. BARS SHALL HAVE A MINIMUM LAP OF 2'-0". SPLICES SHALL BE ALTERNATED. ADDITIONAL LENGTH HAS BEEN ADDED TO LENGTH OF BARS.

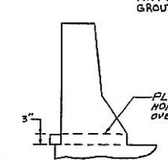
⊗ ⊗ RADIAL DIMENSION MEASURED ALONG ℄ BENT. VARIES BETWEEN BENTS.



HALF SECTION AT END BENT
LOOKING BACK

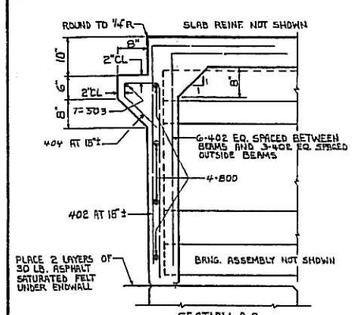
HALF SECTION AT INTERMEDIATE BENT
LOOKING BACK

NOTE: AT CONTRACTOR'S OPTION, HOLE FOR DECK DRAIN MAY BE FORMED, AND RECTANGULAR PLASTIC DRAIN GROUTED INTO PLACE AFTER BARRIER IS CONSTRUCTED.

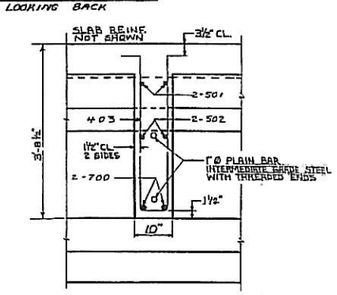


DECK DRAIN DETAIL

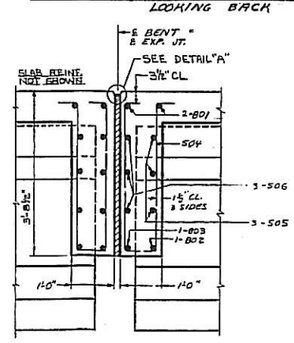
PLACE DECK DRAINS ON LOW SIDE OF BRIDGE. OMIT OVER END FILLS. SPACE AT 10'-0" ± BEGINNING 5'-0" FROM ℄ INTERMEDIATE BENTS. AT STA. 707+61.40 LOW POINT IN VERT. CURVE PLACE 5 ADDITIONAL DECK DRAINS AT 2'-6" ON BOTH SIDES OF LOW POINT.



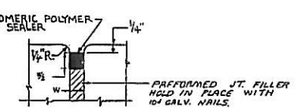
SECTION A-A



SECTION B-B

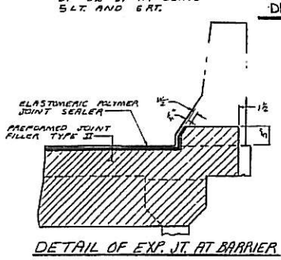


SECTION C-C



DETAIL "A"

W = 1", SEE BRIDGE SHEET 6 FOR DETAILS OF EXP JT AT BENTS 5 LT. AND 6 RT.



DETAIL OF EXP. JT. AT BARRIER

BRIDGE NO. 1

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION-BRIDGE DESIGN

SUPERSTRUCTURE DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE COUNTY I-575-1(6)07

NO SCALE AUGUST 1979

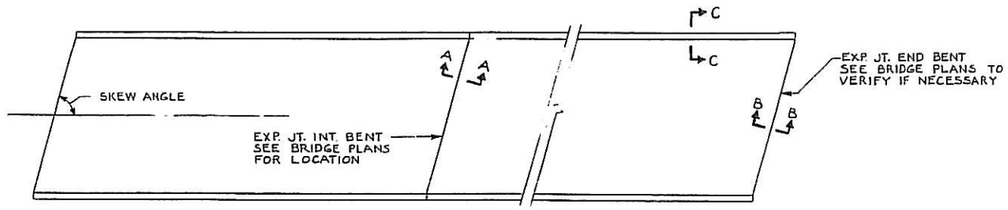
DESIGNED J.A.M.-R.W.L. TRACED DRAWN R.C.B.-K.H.M. CHECKED H.W.C. REVIEWED L.R.P. APPROVED

DATE | REVISIONS | BY

BRIDGE SHEET 4 OF 22

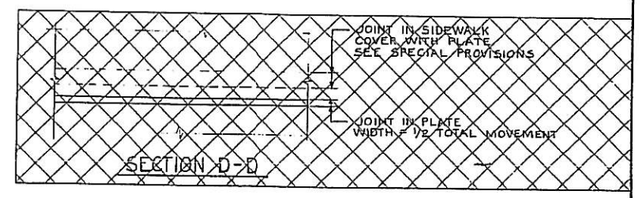
FED. ROAD ADM. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
3	GA.	I-575-1 (6) 07		89-F	173

Ct. 1 Added 10-17-79



NOTE: SEE BRIDGE PLANS FOR PROPER SKEW ANGLE AND LOCATION OF EXPANSION JOINTS.

GENERAL DECK PLAN

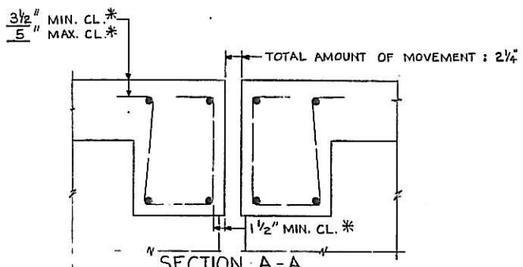


SECTION D-D

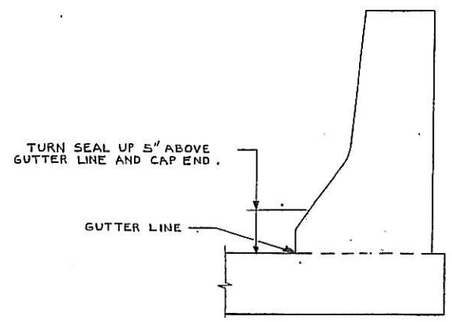
GENERAL NOTES:

1. EXPANSION JOINT SELECTED WILL BE AS PER SPECIAL PROVISION.
2. ALL EXPANSION JOINTS ARE TO TURN RADIALLY AT GUTTER LINE, UNLESS OTHERWISE NOTED.
3. THE FOLLOWING TYPES OF SEALS ARE TO BE UTILIZED IN THE CONTRACTOR'S SELECTION OF EXPANSION JOINT: BT. 5, LT. BR., TYPE I. BT. 6, RT. BR., TYPE I.

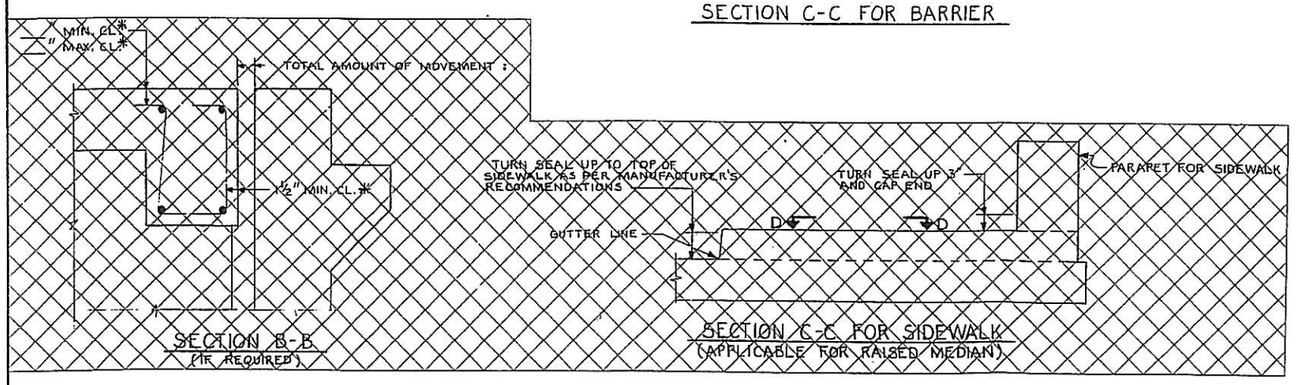
* IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CO-ORDINATE THESE DIMENSIONS WITH THE MANUFACTURER OF THE SELECTED EXPANSION JOINT, STRUCTURAL STEEL FABRICATOR AND REINFORCING STEEL FABRICATOR.



SECTION A-A
(IF REQUIRED)



SECTION C-C FOR BARRIER



SECTION B-B
(IF REQUIRED)

SECTION C-C FOR SIDEWALK
(APPLICABLE FOR RAISED MEDIAN)

BRIDGE NO. 1 LT. & RT.

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION - BRIDGE DESIGN

GENERAL DETAILS SHEET
EXPANSION JOINTS
I-575 OVER LITTLE RIVER
CHEROKEE CO.
NO SCALE
I-575-1(6)-07
SEPTEMBER, 1976

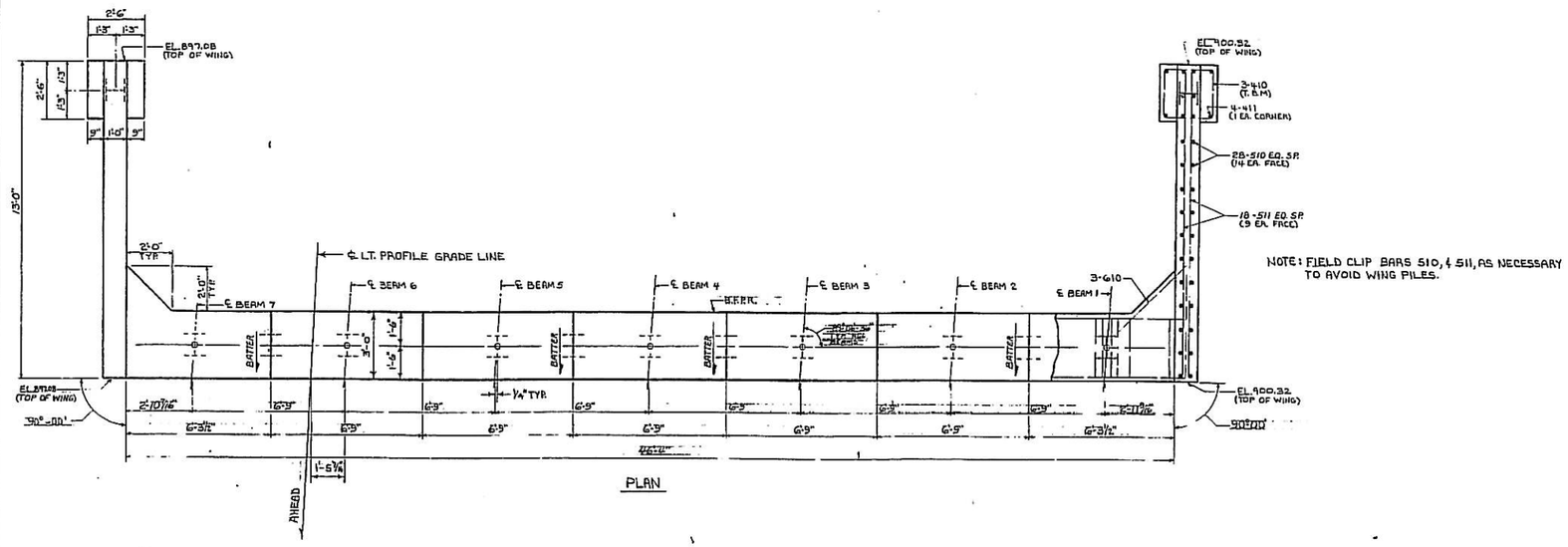
DATE | REVISIONS | BY

BRIDGE SHEET 6 OF 22

DESIGNED J.A.M.-P.V.I. | TRACED | REVIEWED L.B.P.
DRAWN B.L.Q. | CHECKED H.W.C. | APPROVED

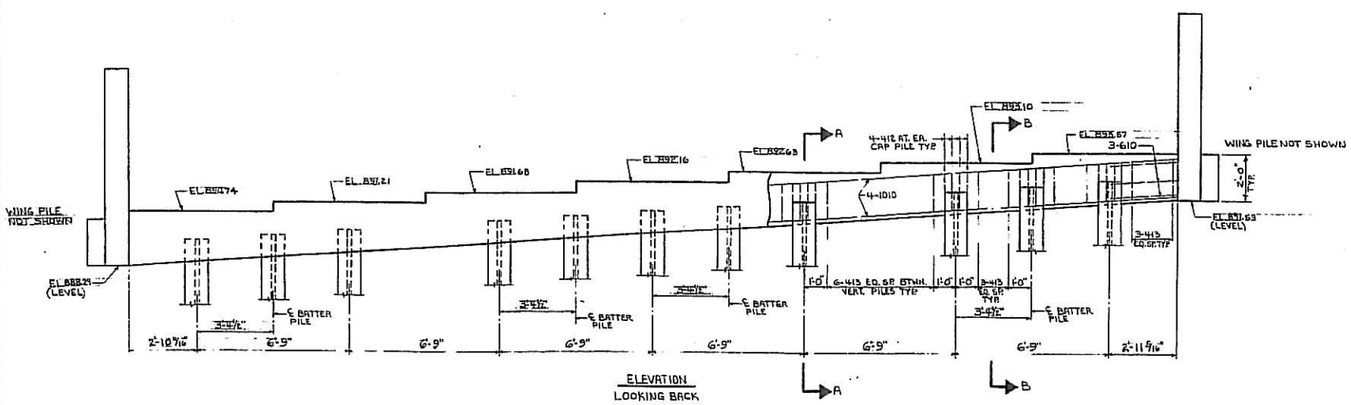
FED. ROAD STY. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
3	GA.	I-575-1 (6) 07		89-6	173

Ct. 1 Added 10-17-79

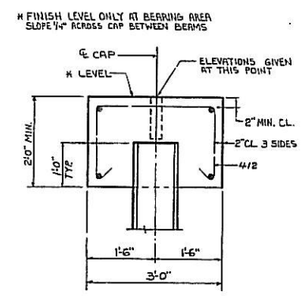


NOTE: FIELD CLIP BARS 510, & 511, AS NECESSARY TO AVOID WING PILES.

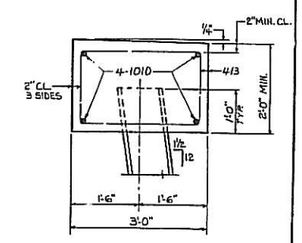
PLAN



ELEVATION
LOOKING BACK



SECTION A-A



SECTION B-B

MAINTAIN 2" CLEARANCE ON ALL REINFORCEMENT UNLESS OTHERWISE NOTED.

ALL PILES SHALL BE STEEL H12 BP 53

QUANTITIES	
CU. YDS. CLASS A CONC.	20.87
LBS. BAR REINF. STEEL	2,455

PLAN DRIVING OBJECTIVE

DRIVE ALL PILES TO A DRIVING RESISTANCE OF 70 TONS AFTER A MINIMUM TIP ELEVATION OF 850 IS ACHIEVED.

BRIDGE NO. 1 LEFT

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION - BRIDGE DESIGN

END BENT 1 DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE COUNTY — I-575-1(6)07

NO SCALE — SEPTEMBER 1979

BRIDGE SHEET 7 OF 22

DATE | REVISIONS | BY

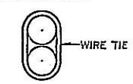
DESIGNED J.R.M. - H.W.C. | TRACED | REVIEWED L.A.R.
DRAWN M.E.M. | CHECKED P.V.L. | APPROVED

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	I-575-1(6)07	89-H	173

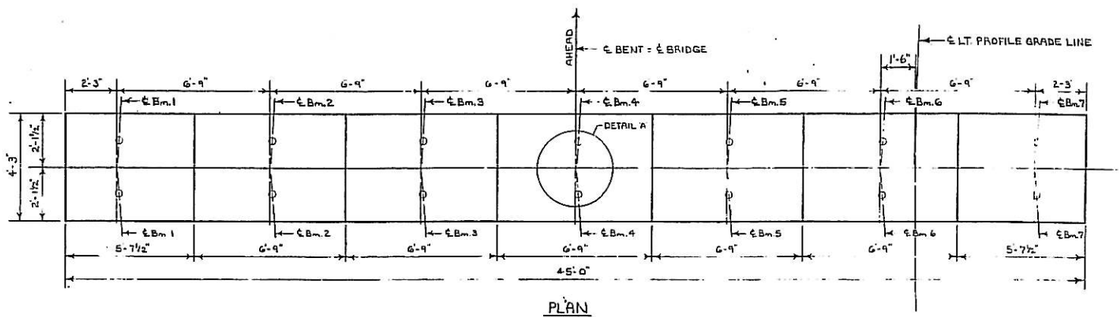
CT-1

Added 10-17-79
Rev. 9-26-80

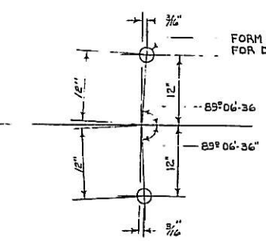
BARS TO BE BUNDLED SHALL BE BUNDLED VERTICALLY



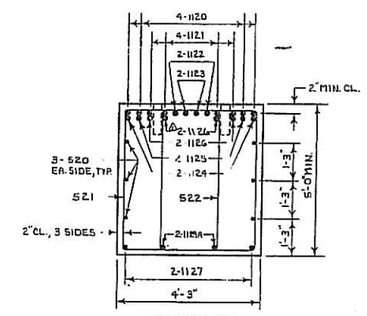
BUNDLING DETAILS



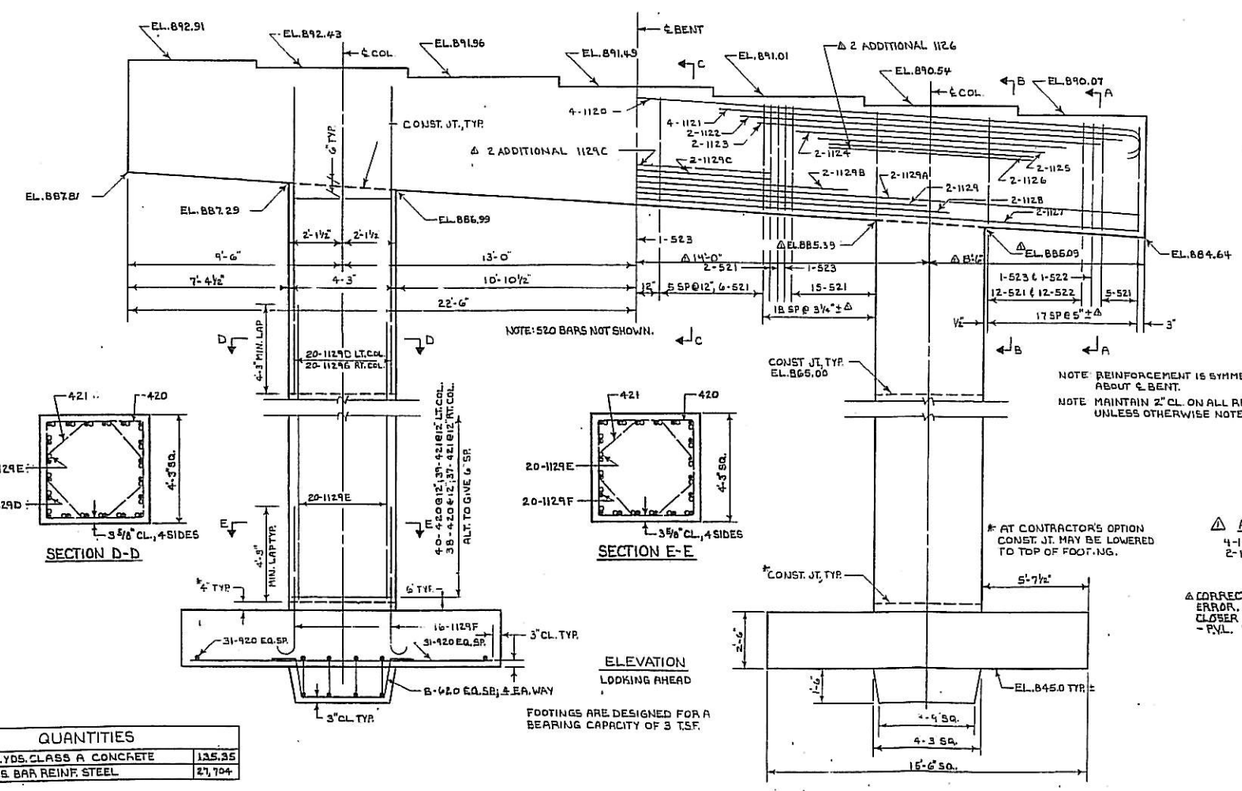
PLAN



DETAIL 'A'

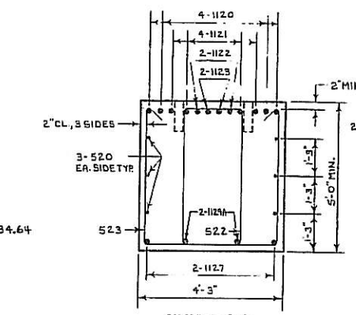


SECTION B-B

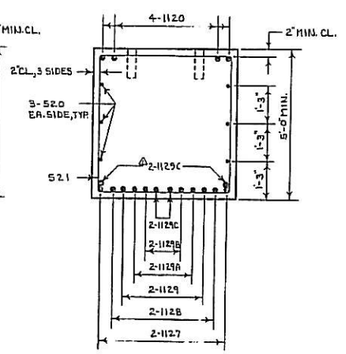


ELEVATION
LOOKING AHEAD

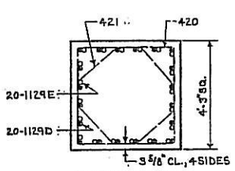
FOOTINGS ARE DESIGNED FOR A BEARING CAPACITY OF 3 T.S.F.



SECTION A-A



SECTION C-C



SECTION D-D

SECTION E-E

QUANTITIES	
CU. YDS. CLASS A CONCRETE	135.35
LBS. BAR REINF. STEEL	27,704

△ ADDITIONAL STEEL
4-1126 (2 BARS OVER 2-1129C)

△ CORRECTIONS TO ACCOMODATE LAYOUT ERROR. RIGHT FOOTING PLACED 1'-0" CLOSER TO SURVEY ℄.
- P.V.L. 9/11/80

BRIDGE NO. 1 LEFT

REVISIONS	BY	DATE
GENERAL REVISIONS	P.V.L.	9-11-80

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION-BRIDGE DESIGN

INTERMEDIATE BENT 2 DETAILS
I-575 OVER LITTLE RIVER
CHEROKEE CO. I-575-1(6)-07

NO SCALE AUGUST 1979

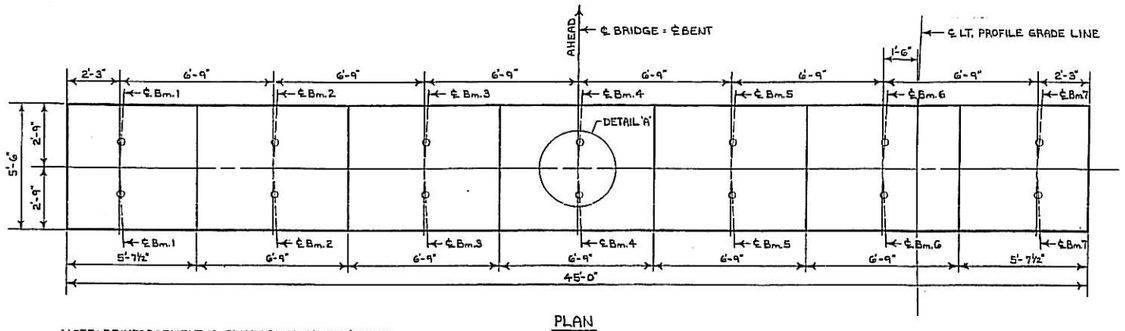
BRIDGE SHEET 8 OF 22

DESIGNED J.A.M.-H.W.C. TRACED
DRAWN B.L.O. CHECKED P.V.L.
REVIEWED L.R.P.
APPROVED

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	I-575-1(6)07	89-1	173

Ct. 1 Added 10-17-79

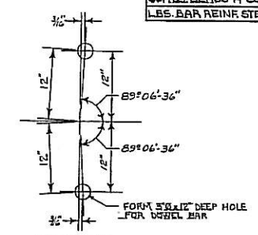
QUANTITIES		
ITEM	BT. 3	BT. 4
CU. YDS. CLASS A CONCRETE	212.89	213.11
LBS. BAR REINF. STEEL	36,801	36,925



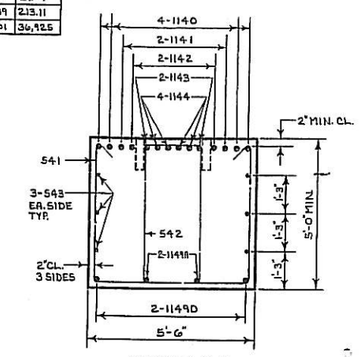
PLAN

NOTE: REINFORCEMENT IS SYMMETRICAL ABOUT ℄ BENT.

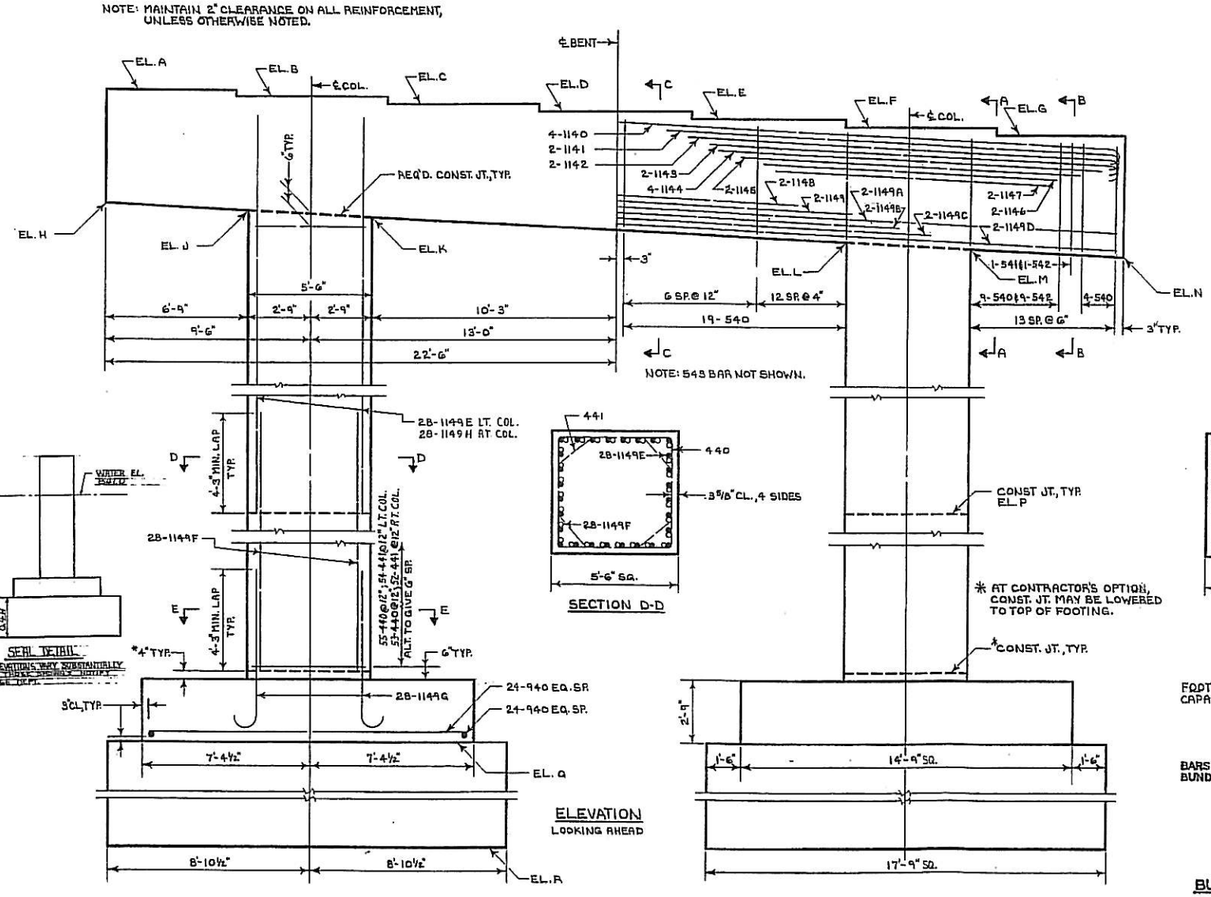
NOTE: MAINTAIN 2" CLEARANCE ON ALL REINFORCEMENT, UNLESS OTHERWISE NOTED.



DETAIL 'A'



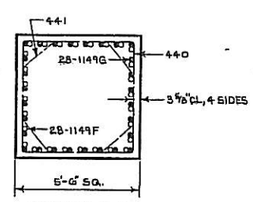
SECTION B-B



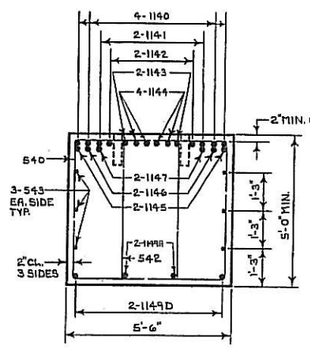
ELEVATION
LOOKING AHEAD

SEAL DETAIL
IF ELEVATION IS VERY SUBSTANTIALLY BELOW THESE ELEVATIONS NOTIFY BRIDGE DESIGN

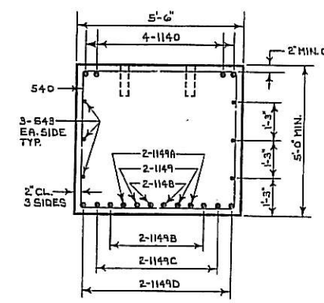
SECTION D-D



SECTION E-E



SECTION A-A



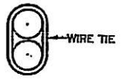
SECTION C-C

ELEVATIONS									
	A	B	C	D	E	F	G	H	J
BT. 3	892.62	892.15	891.67	891.20	890.73	890.26	889.78	887.52	887.04
BT. 4	892.72	892.25	891.77	891.30	890.83	890.36	889.88	887.62	887.14

	K	L	M	N	P	Q	R
BT. 3	886.66	885.21	884.83	884.35	859.00	829.50	822.02
BT. 4	886.76	885.31	884.93	884.45	859.00	829.50	822.02

FOOTINGS ARE DESIGNED FOR A BEARING CAPACITY OF 5 T.S.F.

BARS TO BE BUNDLED SHALL BE BUNDLED VERTICALLY



BUNDLING DETAILS

BRIDGE SHEET 9 OF 22

BRIDGE NO. 1 LEFT

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION-BRIDGE DESIGN

INTERMEDIATE BENTS 3 & 4 DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE CO. I-575-1(6)-07

NO SCALE SEPT. 1979

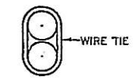
DATE | REVISIONS | BY

DESIGNED J.A.M. TRACED
DRAWN B.L.O. CHECKED P.V.L.
REVIEWED L.A.R.
APPROVED

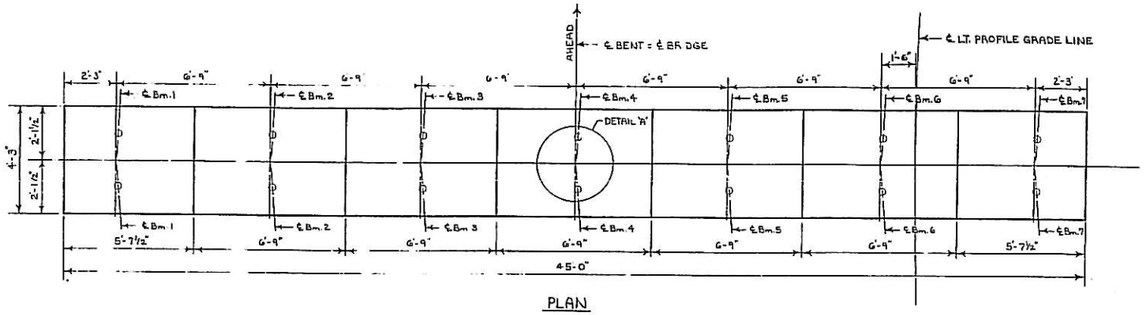
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	I-575-1(6)07	89-J	173

C.I. 1 Added 10-11-79

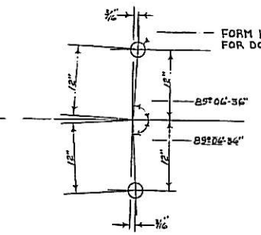
BARS TO BE BUNDLED SHALL BE BUNDLED VERTICALLY.



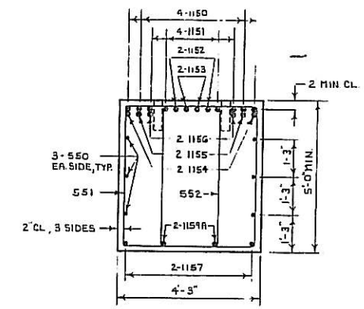
BUNDLING DETAIL S



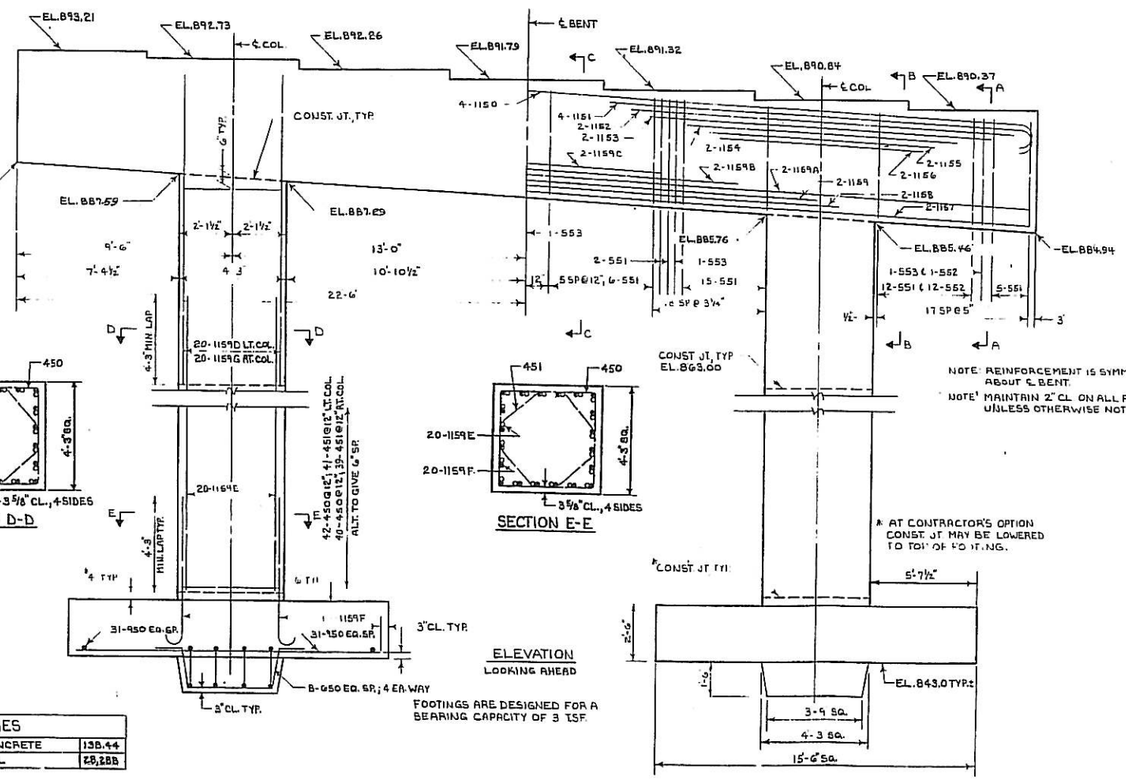
PLAN



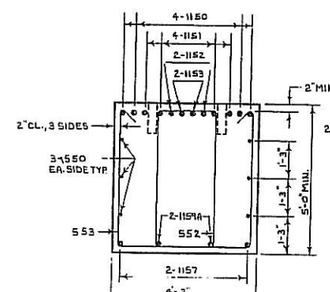
DETAIL A



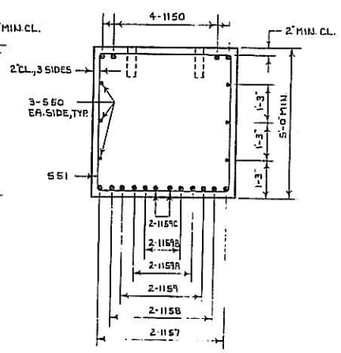
SECTION B-B



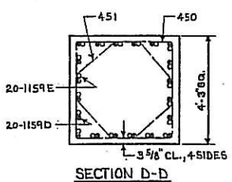
ELEVATION
LOOKING AHEAD



SECTION A-A



SECTION C-C



SECTION D-D

SECTION E-E

QUANTITIES	
CU. YDS. CLASS A CONCRETE	138.44
LBS. BAR REINF. STEEL	28,288

BRIDGE NO. 1 LEFT

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION-BRIDGE DESIGN

INTERMEDIATE BENT 5 DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE CO. I-575-1(6)-07

NO SCALE AUGUST 1979

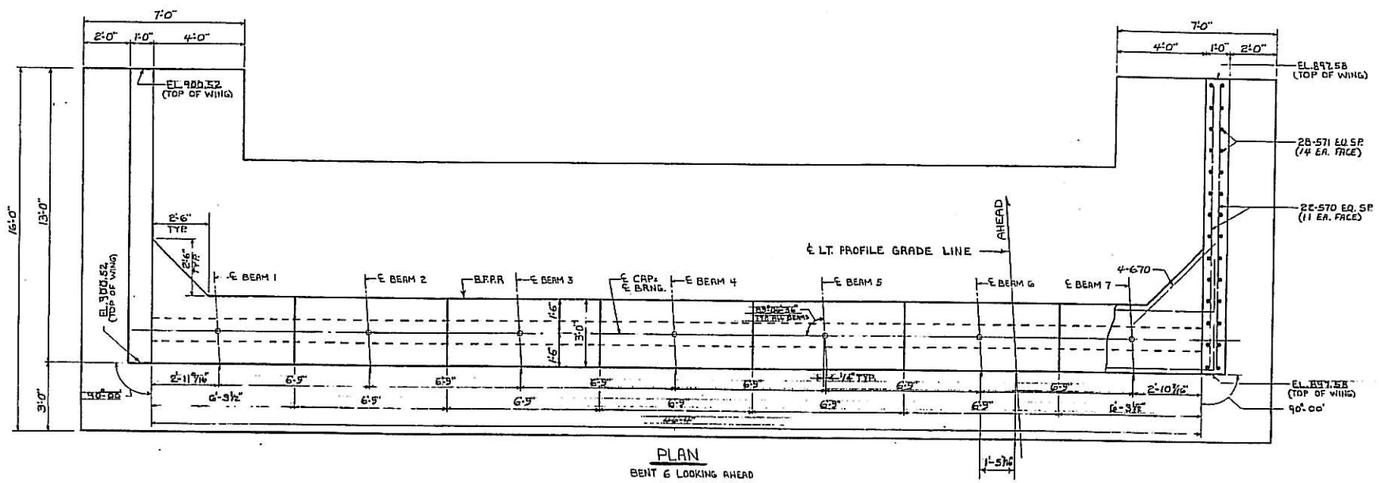
DATE | REVISIONS | BY

DESIGNED J.A.M.-H.W.C. TRACED
DRAWN B.L.O. CHECKED P.V.L. REVIEWED L.R.P
APPROVED

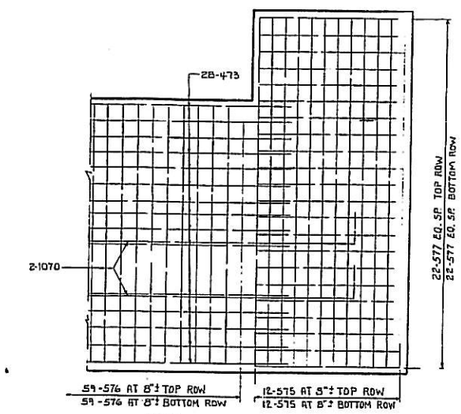
BRIDGE SHEET 10 OF 22

PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA. I-575-1(6)07	89-K	173

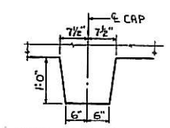
C.T.I Added 10-17-79



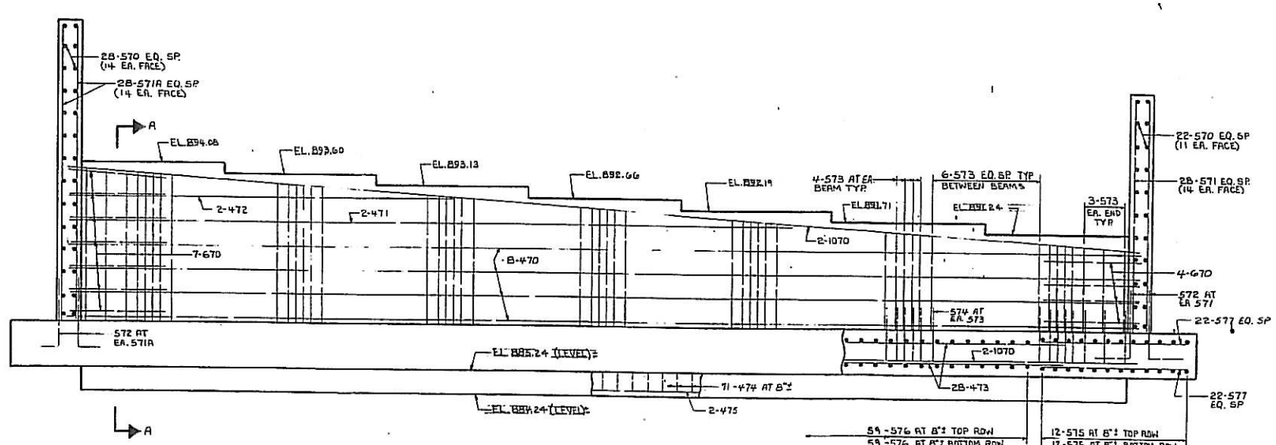
PLAN
BENT 6 LOOKING AHEAD



FOOTING REINFORCEMENT DETAIL

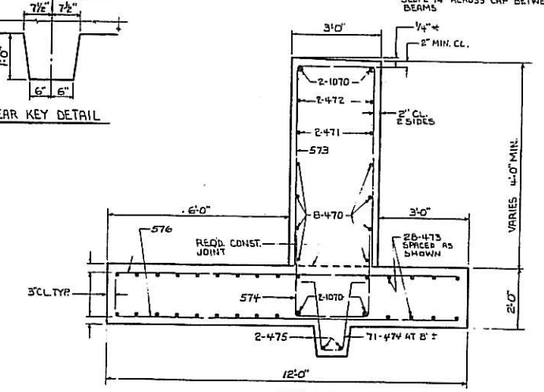


SHEAR KEY DETAIL

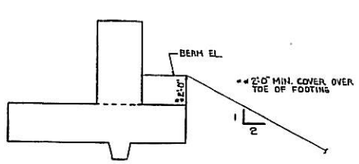


ELEVATION
BENT 6 LOOKING AHEAD

* FINISH LEVEL AT BEARING AREAS. SLOPE 1/4" ACROSS CAP BETWEEN BEAMS



SECTION A-A



BERM DETAIL

FOOTING DESIGNED FOR A BEARING CAPACITY OF 5 TONS PER SQ. FT.

QUANTITIES	
CU. YDS. CLASS A CONC.	91.87
LBS. BAR REINF. STEEL	8855

BRIDGE NO. 1 LEFT

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION-BRIDGE DESIGN

END BENT 6 DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE COUNTY I-575-1(6)07

NO SCALE SEPTEMBER 1979

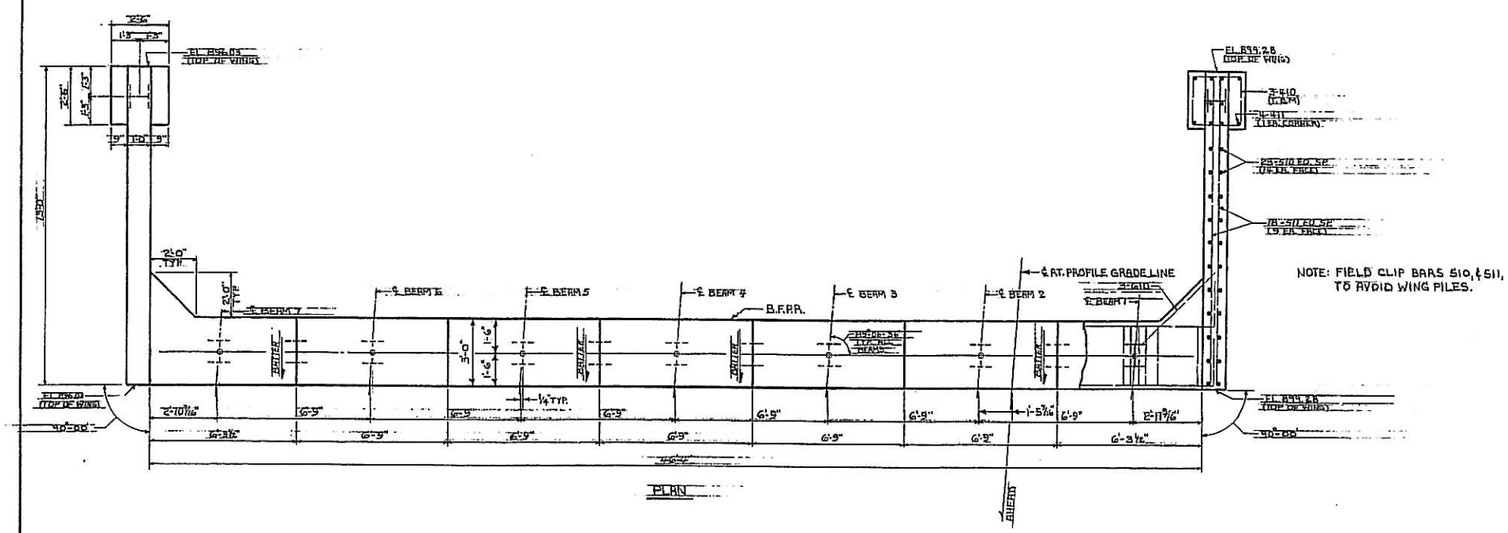
DESIGNED J.A.M.-P.W.L. CHECKED H.W.C. DETAILED L.R.R. DRAWN M.B.M. APPROVED

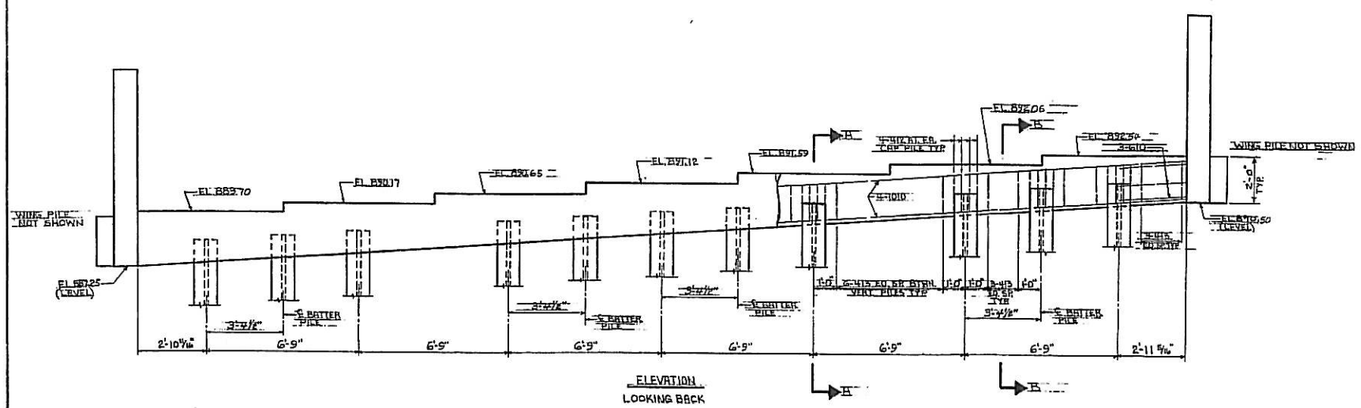
BRIDGE SHEET 11 OF 22

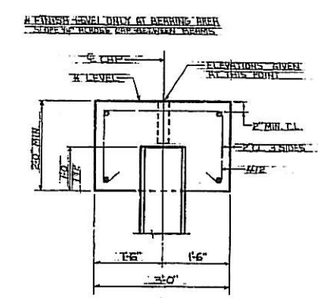
REVISIONS DATE BY

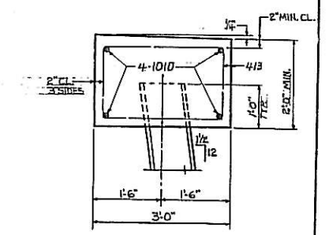
FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
3	GA.	I-575-1(6)07		89-L	173

Ct. 1 Added 10-17-79









MAINTAIN 3" CLEARANCE ON ALL REINFORCEMENT UNLESS OTHERWISE NOTED.

ALL PILES SHALL BE STEEL H12 BP 53

PLAN DRIVING OBJECTIVE

DRIVE ALL PILES TO A DRIVING RESISTANCE OF 70 TONS. RETAIN A MINIMUM TIP ELEVATION OF 821 IF ACHIEVED.

QUANTITIES	
CU. YDS. CLASS A CONC.	26.84
LBS. HIGH TENSILE STEEL	2332

BRIDGE NO. 1 RIGHT

GEORGIA

DEPARTMENT OF TRANSPORTATION

HIGHWAY DIVISION - BRIDGE DESIGN

END BENT 1 DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE COUNTY I-575-1(6)07

NO SCALE SEPTEMBER 1979

DATE | REVISIONS | BY

BRIDGE SHEET 16 OF 22

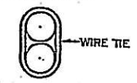
DESIGNED W.H.C. | TRACED | REVIEWED CRH

DRAWN | CHECKED P.V.L. | APPROVED

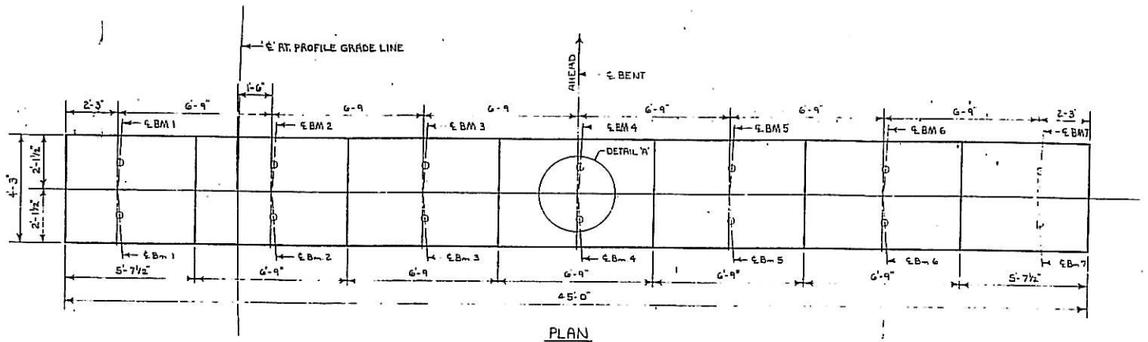
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	I-575-1(6)07	89-M	173

C-1 Added 10-17-79

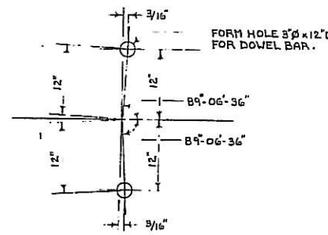
BARS TO BE BUNDLED SHALL BE: BUNDLED VERTICALLY



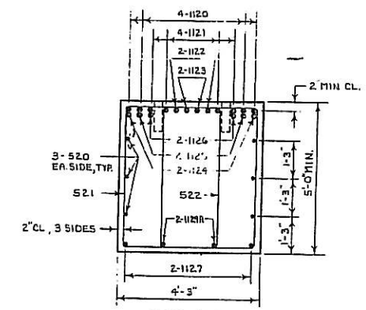
BUNDLING DETAILS



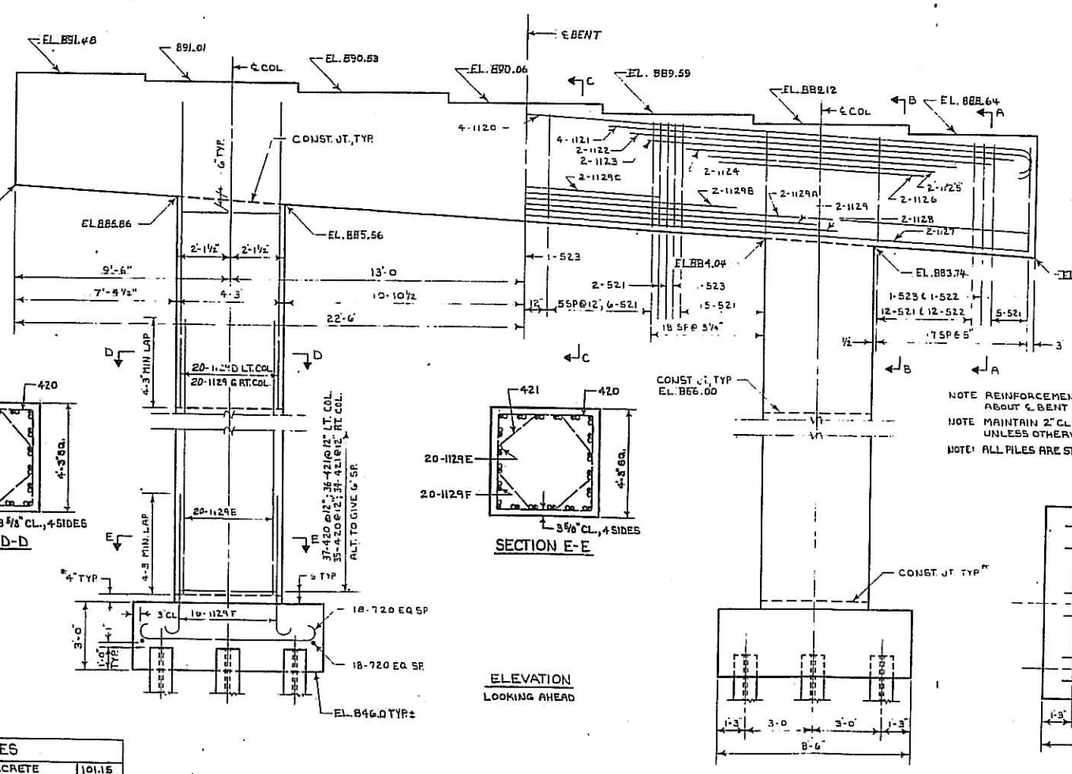
PLAN



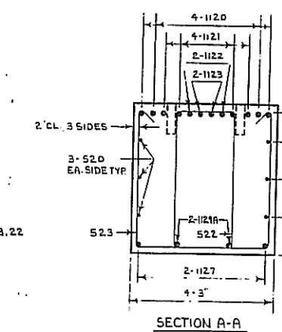
DETAIL 'A'



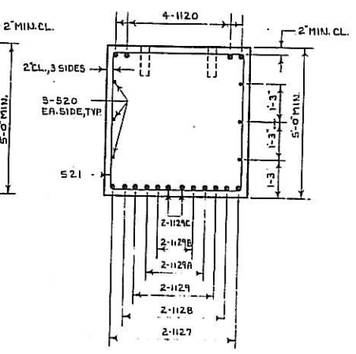
SECTION B-B



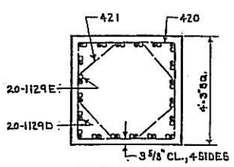
ELEVATION
LOOKING AHEAD



SECTION A-A

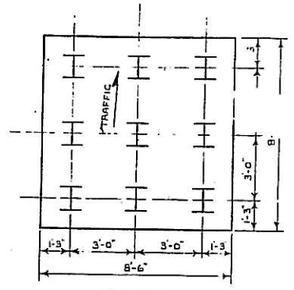


SECTION C-C



SECTION D-D

SECTION E-E



SECTION E-E

NOTE REINFORCEMENT IS SYMMETRICAL ABOUT ℄ BENT

NOTE MAINTAIN 2" CL. ON ALL REINFORCEMENT UNLESS OTHERWISE NOTED

NOTE: ALL PILES ARE STEEL H, 12 BP 53.

* AT CONTRACTOR'S OPTION, CONST. JT. MAY BE LOWERED TO TOP OF FOOTING.

PLAN DRIVING OBJECTIVE

DRIVE ALL PILES TO A DRIVING RESISTANCE OF 70 TONS AFTER A MINIMUM TIP EL OF 819 IS ACHIEVED.

QUANTITIES	
CU. YDS. CLASS A CONCRETE	101.15
LBS. BAR REINF. STEEL	21,953

BRIDGE NO. 1 RIGHT

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION-BRIDGE DESIGN

INTERMEDIATE BENT 2 DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE CO. I-575-1(6)-07

NO SCALE AUGUST 1979

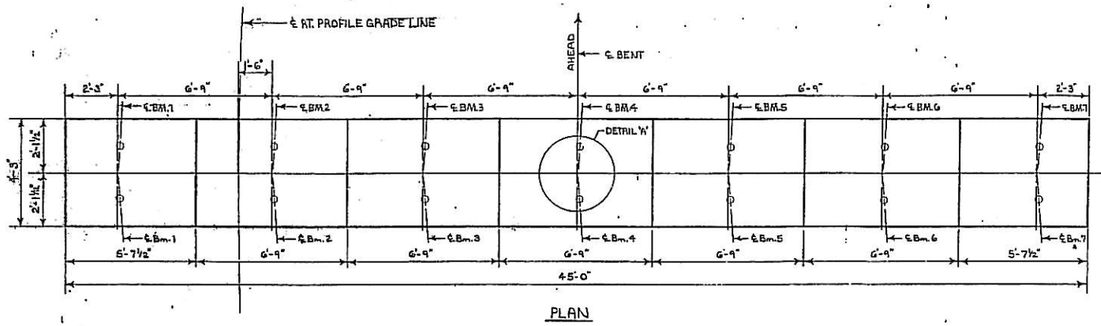
DESIGNED J.A.M.-H.W.C. TRACED
DRAWN B.L.O. CHECKED P.V.L.
REVIEWED L.R.P.
APPROVED

DATE | REVISIONS | BY

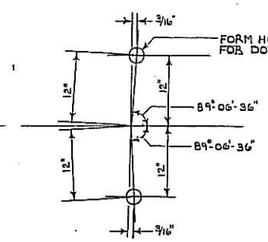
BRIDGE SHEET 13 OF 22

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	I-575-1(6)07	89-N	173

Ct. 1 Added 10-17-79

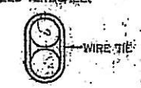


PLAN

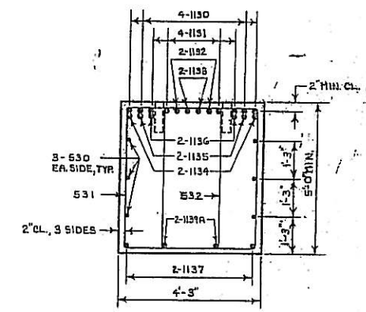


DETAIL 'A'

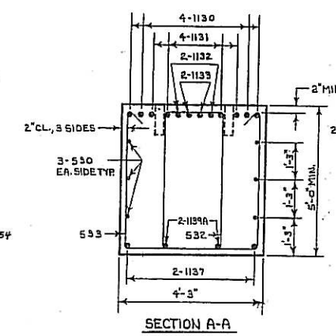
BARS TO BE BUNDLED SHALL BE BUNDLED VERTICALLY



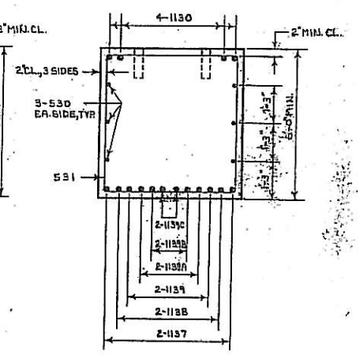
BUNDLING DETAILS



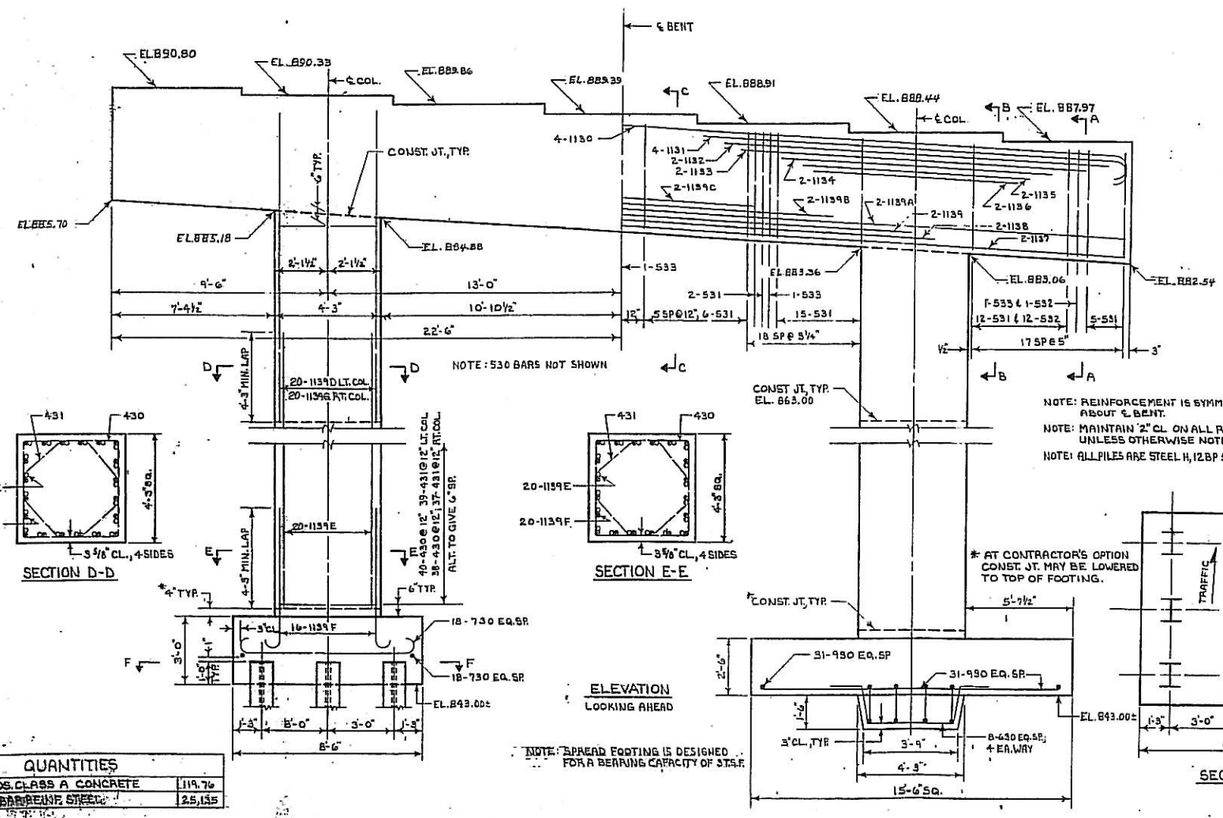
SECTION B-B



SECTION A-A



SECTION C-C



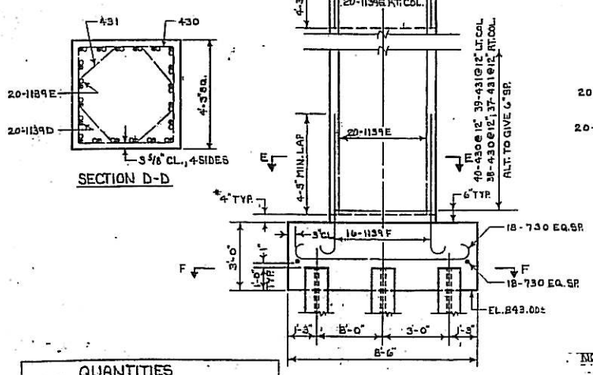
ELEVATION
LOOKING AHEAD

NOTE: SPREAD FOOTING IS DESIGNED FOR A BEARING CAPACITY OF 3 T.S.F.

NOTE: REINFORCEMENT IS SYMMETRICAL ABOUT ℄ BENT.

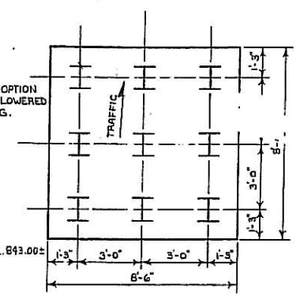
NOTE: MAINTAIN 2" CL. ON ALL REINFORCEMENT UNLESS OTHERWISE NOTED.

NOTE: ALL PILES ARE STEEL H, 12 BP 53.



SECTION D-D

SECTION E-E



SECTION F-F

* AT CONTRACTOR'S OPTION CONST. JT. MAY BE LOWERED TO TOP OF FOOTING.

PLAN DRIVING OBJECTIVE

DRIVE ALL PILES TO A DRIVING RESISTANCE OF 70 TONS AFTER A MINIMUM TIP EL. OF 828 IS ACHIEVED.

QUANTITIES	
CU.YDS. CLASS A CONCRETE	119.76
LINE BAR REINF. STEEL	25,155

BRIDGE NO. 1 RIGHT

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION-BRIDGE DESIGN

INTERMEDIATE BENT 3 DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE CO. I-575-1(6)07

NO SCALE AUGUST 1979

DESIGNED J.B.M. TRACED
DRAWN B.L.D. CHECKED B.V.L. REVIEWED
APPROVED

DATE | REVISIONS | BY

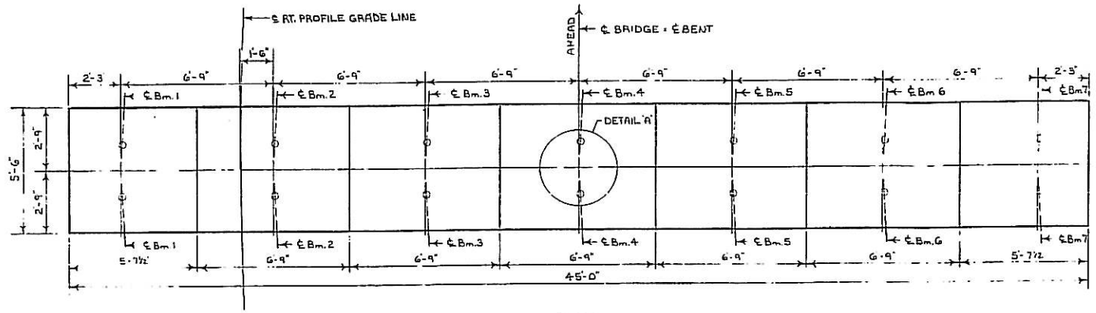
BRIDGE SHEET 14 OF 22

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	I-575-1(6)07	89-0	173

CT. 1 Added 10-17-79

QUANTITIES

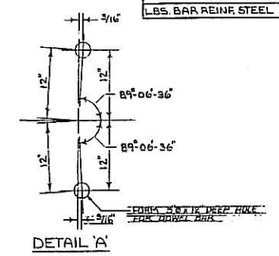
ITEM	BT. 4	BT. 5
CU. YDS. CLASS A CONCRETE	209.30	208.41
LBS. BAR REINF. STEEL	36,968	36,968



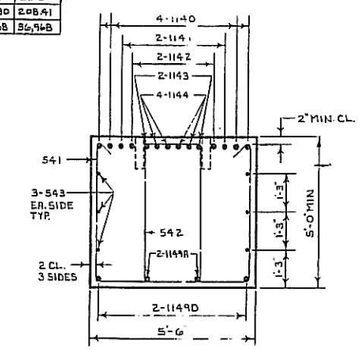
PLAN

NOTE: REINFORCEMENT IS SYMMETRICAL ABOUT ℄ BENT.

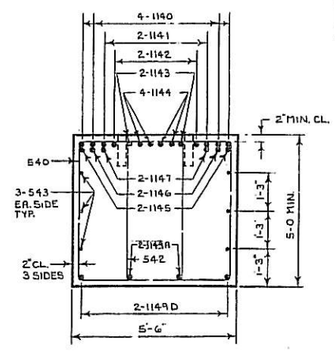
NOTE MAINTAIN 2" CLEARANCE ON ALL REINFORCEMENT, UNLESS OTHERWISE NOTED.



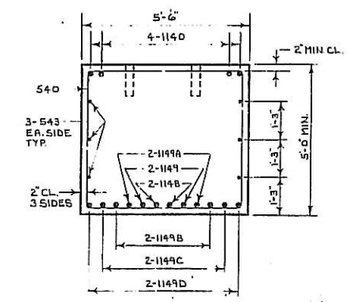
DETAIL 'A'



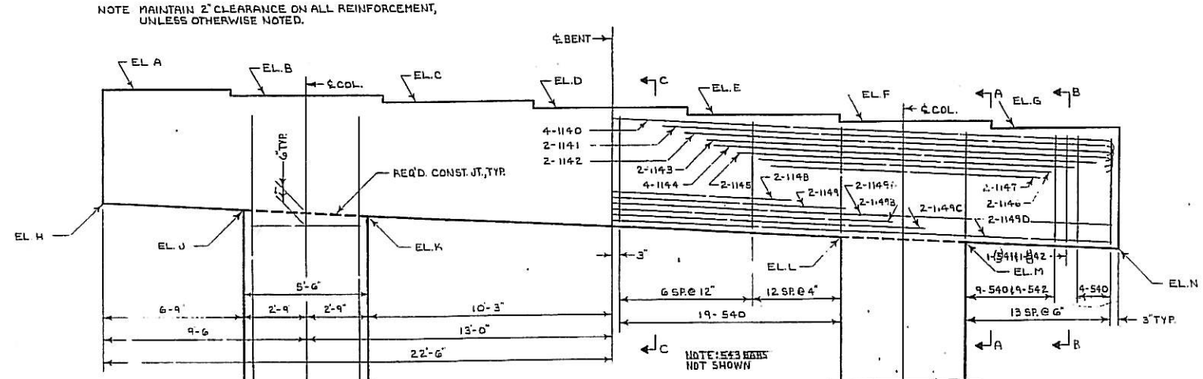
SECTION B-B



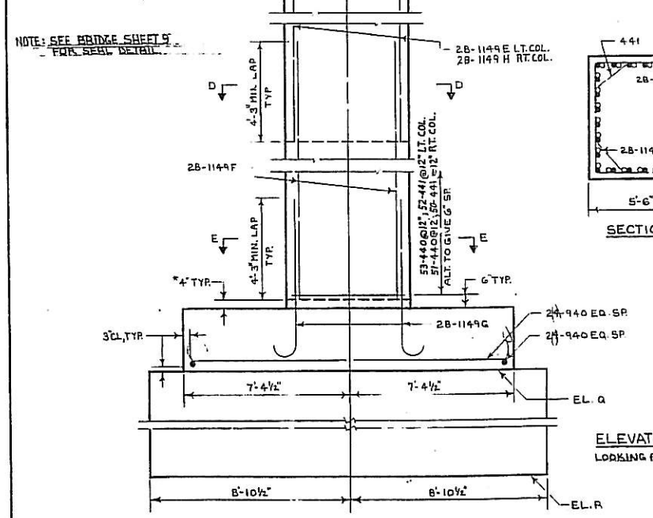
SECTION A-A



SECTION C-C

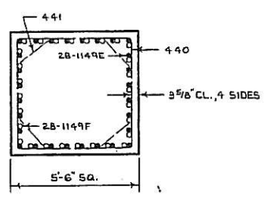


NOTE: SEE BRIDGE SHEET 5 FOR SEIS. DETAIL.

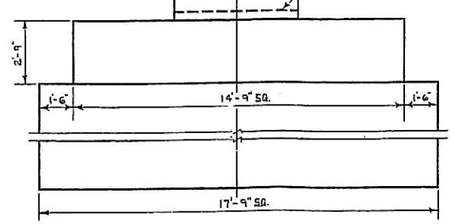


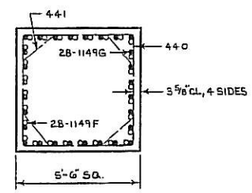
ELEVATION

LOOKING AHEAD



SECTION D-D





SECTION E-E

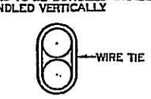
ELEVATIONS

	A	B	C	D	E	F	G	H	J
BT. 4	890.52	890.05	889.57	889.10	888.63	888.16	887.68	885.42	884.94
BT. 5	890.62	890.15	889.67	889.20	888.73	888.26	887.78	885.52	885.04

	K	L	M	N	P	Q	R		
BT. 4	884.56	883.11	882.73	882.25	856.00	829.00	841.00±		
BT. 5	884.66	883.21	882.83	882.35	857.00	829.50	842.00±		

FOOTINGS ARE DESIGNED FOR A BEARING CAPACITY OF 5 T.S.F.

BARS TO BE BUNDLED SHALL BE BUNDLED VERTICALLY



BUNDLING DETAILS

BRIDGE NO. 1 RIGHT

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION–BRIDGE DESIGN

INTERMEDIATE BENTS 4 & 5 DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE CO. I-575-1(6)-07

NO SCALE SEPT. 1979

DATE | REVISIONS | BY

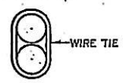
DESIGNED J.A.M. TRACED
DRAWN B.L.O. CHECKED P.V.L.-H.W.C. REVIEWED L.R.P.
APPROVED

BRIDGE SHEET 15 OF 22

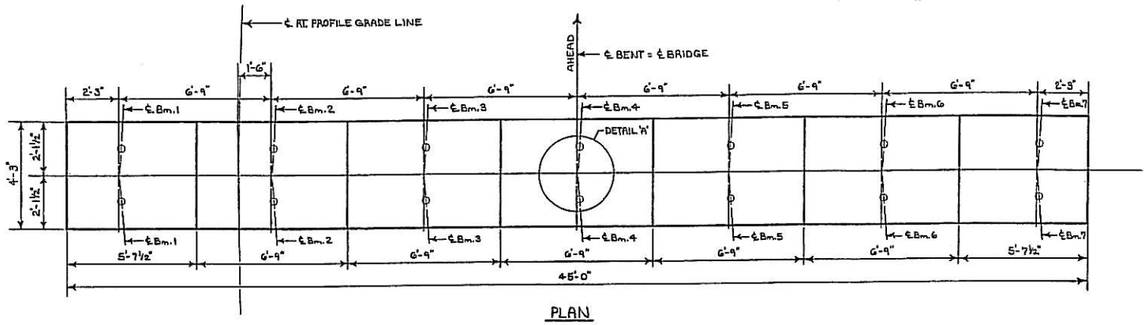
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	I-575-1(6)07	89-P	173

Ct. 1 Added 10-17-79

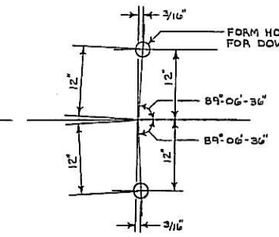
BARS TO BE BUNDLED SHALL BE BUNDLED VERTICALLY



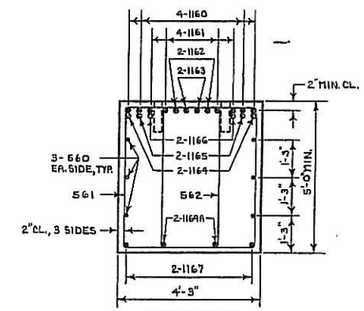
BUNDLING DETAILS



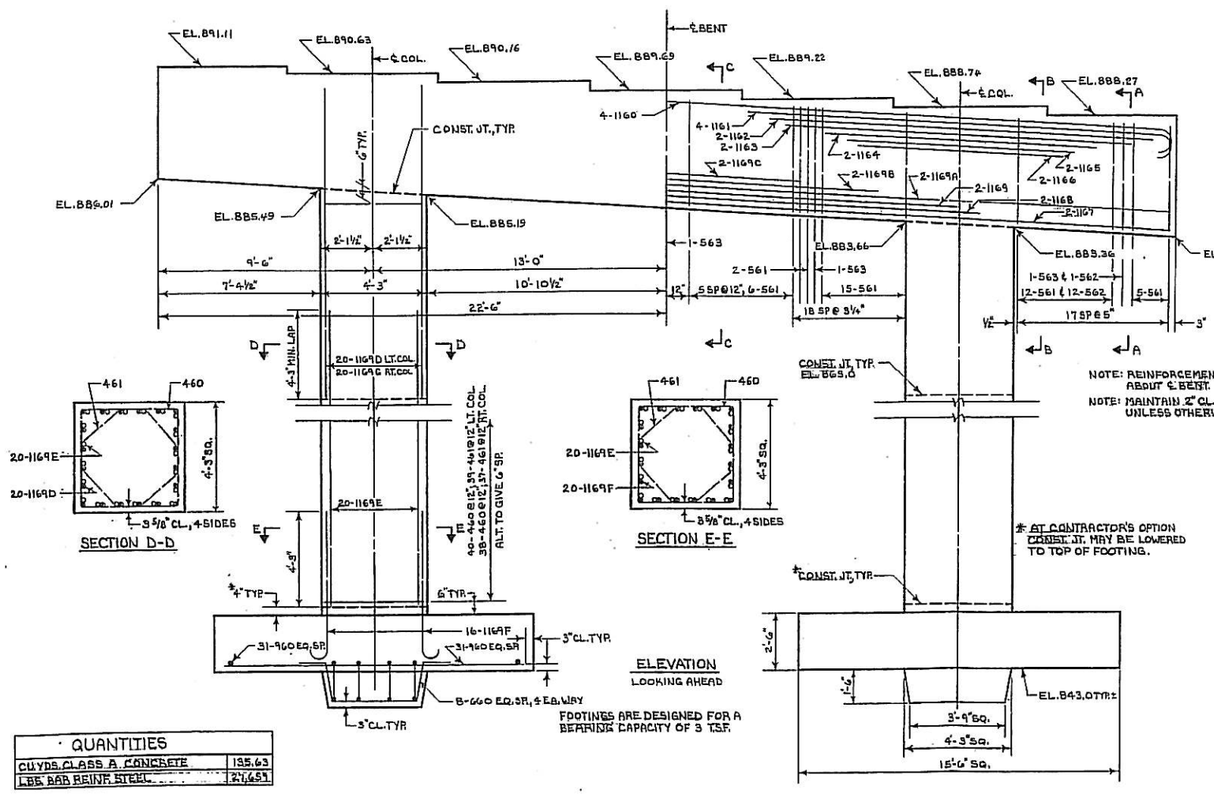
PLAN



DETAIL 'A'



SECTION B-B



ELEVATION

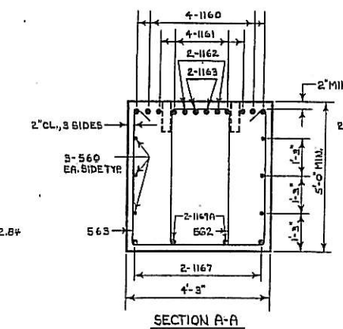
LOOKING AHEAD

FOOTINGS ARE DESIGNED FOR A BEARING CAPACITY OF 3 T.S.F.

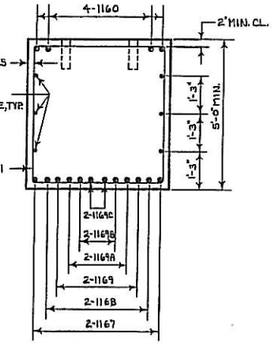
NOTE: REINFORCEMENT IS SYMMETRICAL ABOUT ℄ BENT.

NOTE: MAINTAIN 2" CL. ON ALL REINFORCEMENT UNLESS OTHERWISE NOTED.

* AT CONTRACTOR'S OPTION CONST. JT. MAY BE LOWERED TO TOP OF FOOTING.



SECTION A-A



SECTION C-C

SECTION D-D

SECTION E-E

QUANTITIES	
CU.YDS. CLASS A CONCRETE	195.63
LBS. BAR REINF. STEEL	27,659

BRIDGE NO. 1 RIGHT

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION-BRIDGE DESIGN

INTERMEDIATE BENT 6 DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE CO. I-575-1(6)-07

NO SCALE AUGUST 1979

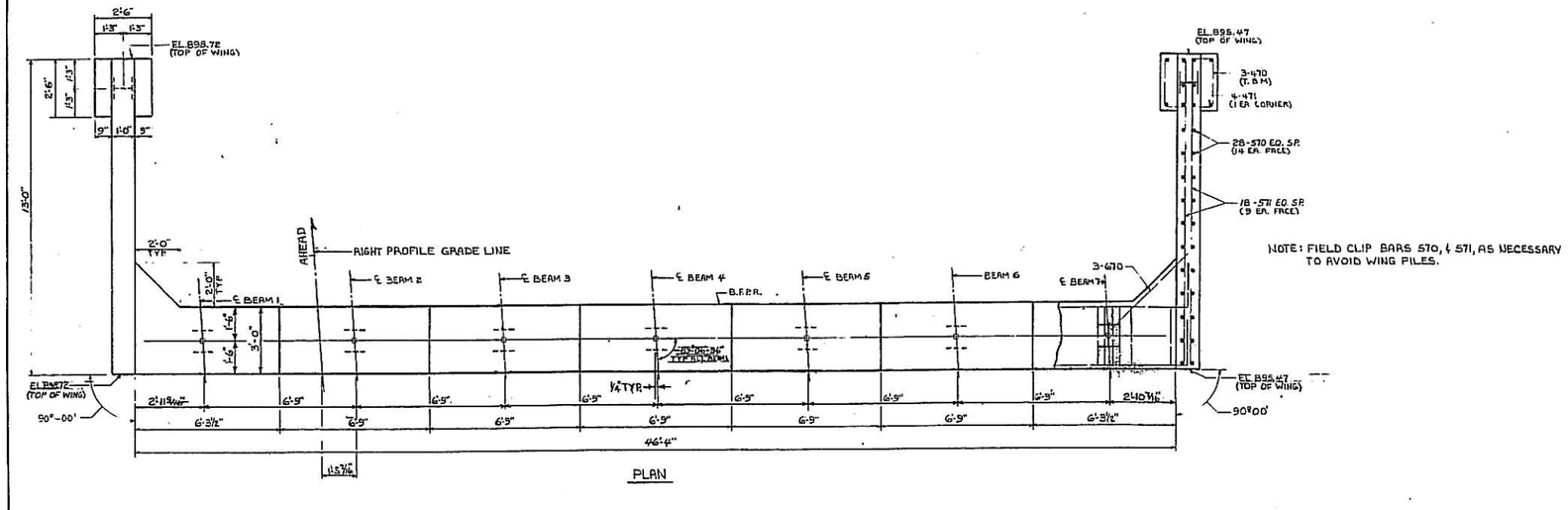
DESIGNED J.A.M. - P.K.G. TRACED
DRAWN B.L.O. CHECKED H.W.C.
REVIEWED L.A.P.
APPROVED

BRIDGE SHEET 16 OF 22

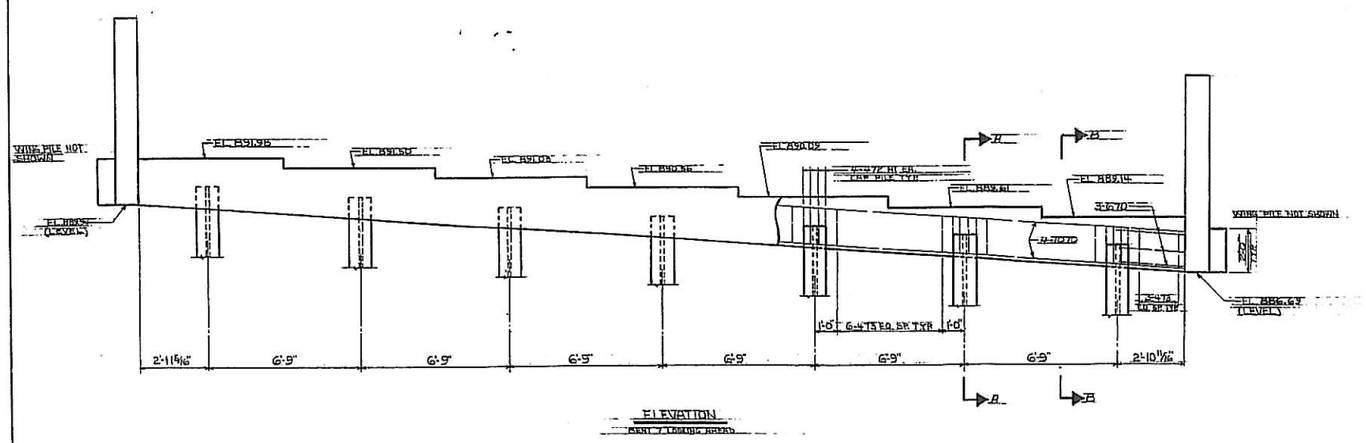
DATE BY REVISIONS

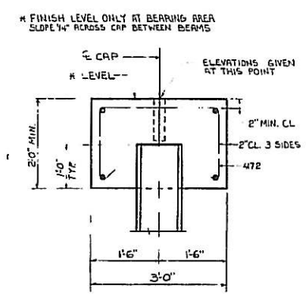
FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
3	GA.	I-575-1 (6) 07		89-Q	173

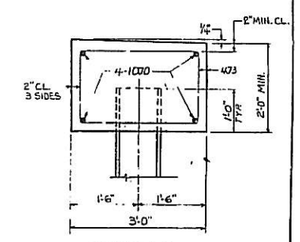
CT.1 Added 10-17-79



NOTE: FIELD CLIP BARS 570, & 571, AS NECESSARY TO AVOID WING PILES.







PLAN DRIVING OBJECTIVE

DRIVE ALL PILES TO A DRIVING RESISTANCE OF 70 TONS AFTER A MINIMUM TIP ELEVATION OF 865 IS ACHIEVED.

QUANTITIES	
CU. YDS. CLASS A. CONC.	20.0 MG
LBS. BAR REINF. STEEL	4,140 KG

BRIDGE NO. 1 RIGHT

GEORGIA

DEPARTMENT OF TRANSPORTATION

HIGHWAY DIVISION - BRIDGE DESIGN

END BENT 7 DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE COUNTY

I-575-1(6)07

NO SCALE

SEPTEMBER 1979

BRIDGE SHEET 17 OF 22

DATE | REVISIONS | BY

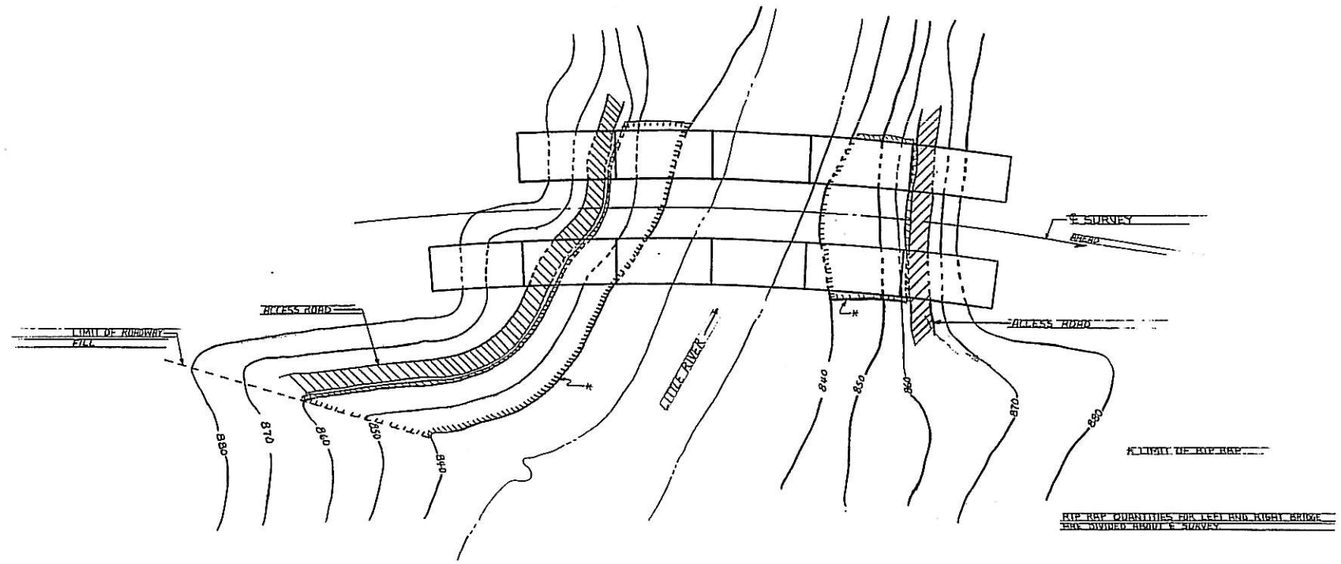
DESIGNED J.A.M. | TRACED | REVIEWED L.R.R.

DRAWN M.B.M. | CHECKED P.V.L. | APPROVED

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA.	I-575-1(6)07	B9-R	173

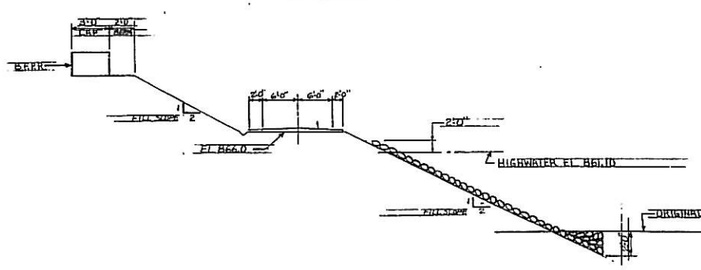
Ct 1

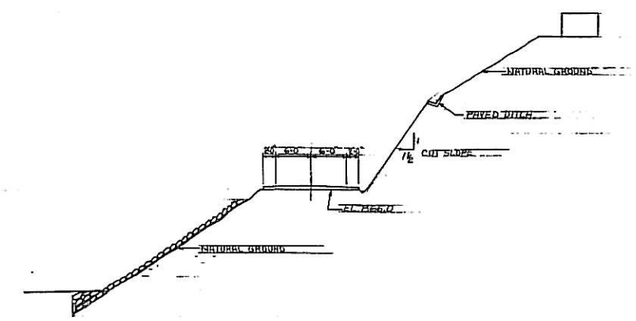
Added 10-17-79
Rev. 11-7-79



RIP RAP QUANTITIES FOR LEFT AND RIGHT BRIDGE AND DIVIDED ABOVE ℄ SURVEY

*RIP RAP IN AREAS SHOWN ON SPECIAL PLAN FROM EL 840 TO EL 863.10





FOR ACCESS ROAD DETAILS, PAVED DITCH DETAILS, ETC. SEE ROADWAY PLANS.

BRIDGE NO.1 LT. & RT.

GEORGIA
DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION-BRIDGE DESIGN

RIP RAP DETAILS

I-575 OVER LITTLE RIVER

CHEROKEE COUNTY — I-575-1(6)07

NO SCALE — NOVEMBER 1979

REVISIONS	BY	DATE
REVISED RIP RAP DETAIL & ADDED ACCESS ROAD	RTC	11-7-79

BRIDGE SHEET 18 OF 22

DESIGNED H.V.L. DRAWN J.D.R.D. TRACED CHECKED H.V.L. REVIEWED L.A.R.R. APPROVED

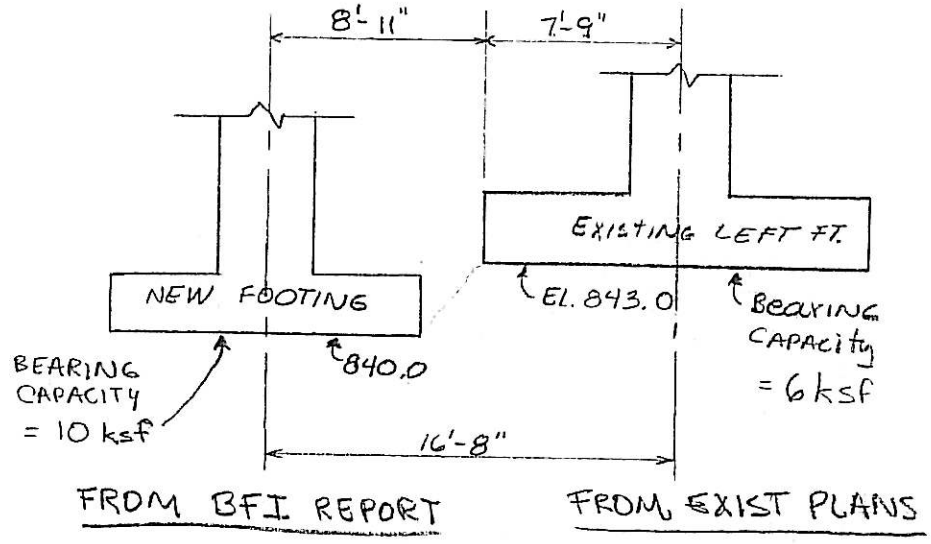
J.B. TRIMBLE, INC. Civil and Structural Engineers 2550 HERITAGE COURT, SE, SUITE 250 ATLANTA, GEORGIA 30339-3062 (770) 952-1022	PROJECT I-575 over Little River	CALC			PROJ	
	Footing Elev. & Bearing	CHK			COMP	
	SUBJECT Capacity from Exist. & BFI	APP	BY	DATE		PAGE

Notes:

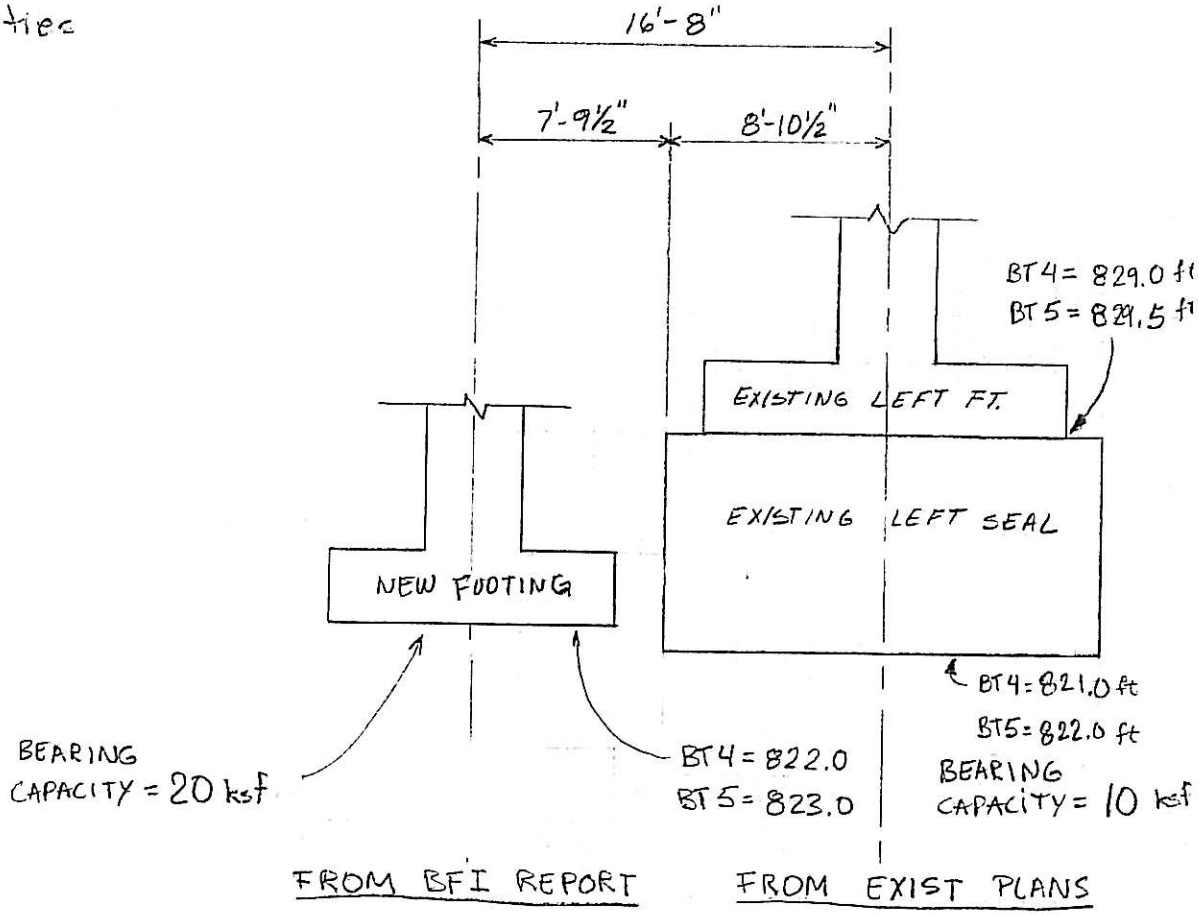
1. New footing elev is below EXISTING footing
2. New bearing capacity is higher than EXISTING footing bearing capacities.

We need:

- to MATCH new footing elev. to existing footing elev
- adjust bearing capacities to the adjusted new footing elev. capacities



BENT 6 CENTER RT Bridge



BENT 4 & 5 CENTER RT Bridge

(A)

Bridge Foundation Investigation

Project Number: CSNHS-0008-00(256)
P.I. Number: 0008256
I-575 Bridge over Little River
Cherokee County, Georgia

Prepared for:
Georgia Transportation Partners
Atlanta, Georgia

Subconsultant to:
Willmer Engineering, Inc.
3772 Pleasantdale Road, Suite 165
Atlanta, Georgia 30340

Prepared by:
Professional Service Industries, Inc.
95 Chastain Road, Suite 301
Kennesaw, Georgia 30144
770-424-6200

December 10, 2007

psi Information To Build On
Engineering • Consulting • Testing

BRIDGE FOUNDATION INVESTIGATION	
PSI Project Number	476-65003
GDOT Project Number	CSNHS-0008-00(256)
Project P.I. Number	0008256
Location	I-575 Bridge over Little River, Cherokee County, Georgia (see Figure 1)
GENERAL INFORMATION	
Project Description	Current bridge foundation investigation was performed for the proposed widening of I-575 Bridge Over Little River. The widening involves adding three new parallel bridges, one in the center median and one each on the left and right sides of the existing bridges. The bridges will be reinforced concrete structures with six spans for the right bridge and five spans for the left bridge. The existing bridges are supported on H-pile and spread footings. End bents on the south side of the bridges are supported with spread footings. The existing BFI report and pile driving data dated October 11, 1979 was provided by GDOT. Twenty three old and five new borings were performed in the existing and current BFI studies, respectively. The subsurface information from the existing borings was incorporated in the current BFI report and recommendations.
Geologic Information	The project alignment is geologically sited within the Piedmont Physiographic Province of Georgia, and is underlain by Biotite Gneiss, Mica Schist, and Amphibolite Formation.
Subsurface Features	Subsurface information for this bridge was obtained from 5 borings (BD-5 through BD-9) as part of the present study and 23 borings (B-1 through B-11 and B-14 through B-25) performed by GDOT in year 1979 for the existing bridges. The subsurface condition of the present study is generally comprised of silty sand fill underlain by residuum and alluvium consisting of silty sand, clayey sand and sandy silt. The alluvium and residuum are underlain by hard and partially weathered rock. Groundwater was encountered from EL. 820 to EL. 835 in the current borings BD-5 through BD-9 performed in October, 2007. Groundwater was encountered from EL. 840 to EL. 852 in the existing borings B-1 through B-11 and B-14 through B-25 performed in August, 1979.

PWR AND AUGER REFUSAL ELEVATIONS (feet)				
Bridge	**Bent No.**	**Reference Boring No.**	**Top of PWR**	**Auger Refusal**
Left	1	B-1	818	816
	2	B-3	858	844
	3	B-5	---	824
	4	B-8	---	824
	5	B-9	843	839
	6	B-11	888	860
Center	1 RT.	BD-5	823	805
	1 LT.	B-2	832	824
	2 RT.	B-15	858	802
	2 LT.	B-4	846	839
	3 RT.	B-17	826	811
	3 LT.	B-6	---	826
	4 RT.	B-19	---	823
	4 LT.	B-7	---	825
	5 RT.	B-21	---	824
	5 LT.	B-10	842	839
	6 RT.	B-23	843	841
	6 LT.	BD-9	892	855
	7 RT.	BD-9	892	855
Right	1	B-14	801	798
	2	B-16	791	782
	3	B-18	840	837
	4	B-20	---	824
	5	B-22	---	824
	6	B-24	838	---
	7	B-25	860	---

MAXIMUM PILE DESIGN LOADS			
Pile Type	**Load Transfer (%)**		**Design Load**
	Friction	**End Bearing**	
H-Piles	20	80	10 BP 42 = 55 Tons
			12 BP 53 = 70 Tons
			14 BP 73 = 96 Tons
			14 BP 89 = 117 Tons

FOUNDATION RECOMMENDATIONS				
Bridge	**Bent No.**	**Spread Footing (Bearing)**	**Pile FTG (Type)**	**Pile Bent (Type)**
Left	1	---	---	Steel H
	2	10 ksf on PWR	---	---
	3	20 ksf on Rock	---	---
	4	20 ksf on Rock	---	---
	5	10 ksf on PWR	---	---
	6	10 ksf on PWR	---	---
Center	1 RT.	---	---	Steel H
	1 LT.	---	---	Steel H
	2 RT.	---	Steel H	---
	2 LT.	10 ksf on PWR	---	---
	3 RT.	---	Steel H	---
	3 LT. & 4 RT.	20 ksf on Rock	---	---
	4 LT. & 5 RT.	20 ksf on Rock	---	---
	5 LT. & 6 RT.	10 ksf on PWR	---	---
	6 LT.	10 ksf on PWR	---	---
	7 RT.	---	---	Steel H
Right	1	---		Steel H
	2	---	Steel H	---
	3	10 ksf on PWR	---	---
	4	20 ksf on Rock	---	---
	5	20 ksf on Rock	---	---
	6	10 ksf on PWR	---	---
	7	---	---	Steel H

ELEVATIONS (feet)					
Bridge	Bent No.	Reference Boring No.	Bottom of Spread Footing	H-Pile Tip Elevations	
				Minimum Tip	Estimated Tip
Left	1	B-1	---	849±	847±
	2	B-3	855 or below	---	---
	3	B-5	823 or below	---	---
	4	B-8	823 or below	---	---
	5	B-9	840 or below	---	---
	6	B-11	885 or below	---	---
Center	1 RT.	BD-5	---	824±	822±
	1 LT.	B-2	---	848±	846±
	2 RT.	B-15	---	831±	805±
	2 LT.	B-4	843 or below		
	3 RT.	B-17	---	825±	823±
	3 LT.	B-6	825 or below	---	---
	4 RT.	B-19	822 or below	---	---
	4 LT.	B-7	824 or below	---	---
	5 RT.	B-21	823 or below	---	---
	5 LT.	B-10	839 or below	---	---
	6 RT.	B-23	840 or below	---	---
	6 LT.	BD-9	889 or below	---	---
	7 RT	BD-9	---	890±	888±
Right	1	B-14	---	804±	802±
	2	B-16	---	790±	788±
	3	B-18	837 or below	---	---
	4	B-20	823 or below	---	---
	5	B-22	823 or below	---	---
	6	B-24	835 or below	---	---
	7	B-25	---	859±	857±

ALTERNATE FOUNDATION RECOMMENDATIONS			
Bridge	Bent No.	Drilled Shaft (Bearing)	Pile Bent (Type)
Left	2,3,4	100 ksf on rock	---
	6	---	Steel H
Center	2 LT, 3 LT, 4 LT	100 ksf on rock	---
	4 RT, 5 RT	100 ksf on rock	---
	6	---	Steel H
Right	3,4,5	100 ksf on rock	---

ALTERNATE ELEVATIONS (feet)					
Bridge	Bent No.	Reference Boring No.	Bottom of Drilled Shaft	H-Pile Tip Elevations	
				Minimum Tip	Estimated Tip
Left	2	B-3	839 or below	---	---
	3	B-5	819 or below	---	---
	4	B-8	819 or below	---	---
	6	B-11	855 or below	877±	875±
Center	2 LT	B-4	834 or below	---	---
	3 LT	B-6	821 or below	---	---
	4 LT	B-7	820 or below	---	---
	4 RT	B-19	818 or below	---	---
	5 RT	B-21	819 or below	---	---
	6 LT	BD-9	---	890±	888±
Right	3	B-18	832 or below	---	---
	4	B-20	819 or below	---	---
	5	B-22	819 or below	---	---

NOTES: GENERAL	
Theoretical Scour	Appears feasible for the material encountered.
Erosion	We recommend the use of 24 inches of Type I riprap and filter fabric.
As-built Information	As-built information should be forwarded to the Geotechnical Engineering Bureau upon completion of the foundation system.
NOTES: SPREAD FOOTINGS	
Embedment	Spread footings (if used) should be embedded three feet into partially weathered rock or a minimum of one foot into hard rock to protect the footing from scour. The footing elevations reflect this embedment.
Excavation	Spread footings (if used) should be protected from standing water and surface runoff. Footings should be poured as soon as practical after excavation.
Temporary Shoring	Temporary shoring may be required to construct spread footings (if used) at Bents 3 and 4 of the left bridges and Bents 4 and 5 of the right bridges. Care should be exercised not to undermine the spread footings for the existing bridges. Because groundwater was encountered above the possible footing bottom elevations (i.e., above rock), dewatering of the excavations will also be required.

Groundwater	Due to the high groundwater elevations near the footing elevations, we recommend that 12 inches of Type II Foundation Backfill Material be set up for use in the footing area. The use of this material should be at the direction of the Engineer and may be eliminated on construction if the footing area is dry.
Cofferdams	Cofferdams will be needed to construct the spread footings (if used) at Bents 3 and 4 of the left bridges and Bents 4 and 5 of the right bridges. Seal concrete and dewatering of the excavations will also be required.
NOTES: PILE BENTS/FOOTING	
PDO	Driving resistance after Minimum Tip Elevations are achieved.
Waiting Period	None required.
Groundwater	Due to the high groundwater elevations near the footing elevations, we recommend that 12 inches of Type II Foundation Backfill Material be set up for use in the footing area. The use of this material should be at the direction of the Engineer and may be eliminated on construction if the footing area is dry.
Pilot Holes	Pilot Holes should be set up for H-piles due to the potential for hard driving at Bents 6 and 7 of the bridges. This work should be done at the direction of the Engineer if the Minimum Tip Elevations cannot be achieved. The diameter of the holes should be determined from the table given below. The holes should be filled with concrete to the top of the rock after the piles are driven.

Pile Size	Maximum Pilot Hole Size
10 "	24 "
12 "	24 "
14 "	24 "

NOTES: ALTERNATE FOUNDATION – DRILLED SHAFTS	
Drilled Shaft Special Provision	Drilled shafts are recommended as an alternate foundation type at this site at Bents 3 and 4 of the left bridges and Bents 4 and 5 of the right bridges because they will eliminate the need for cofferdams. Drilled shafts can be used as an alternate foundation type for spread footing at Bent 2 of the left bridges and Bent 3 of the right, Right bridge. The drilled shafts should be constructed as per Special Provision Section 524: Drilled Caisson Foundations.
Rock Socket	A minimum 5-foot socket into sound rock will be required for all drilled shafts at this site.

Downhole Inspection	The drilled shaft excavations must be inspected by a geotechnical engineer to ensure that the bearing materials will provide suitable vertical and lateral foundation support, and to verify that all unsuitable materials are removed. A minimum shaft diameter of 48 inches shall be used, and the shaft excavations shall be dewatered to allow for the inspection. A minimum test hole depth of 6 feet will be required to insure that there are no weak seams under the shaft. It is critical that the drilled shafts be embedded below any weak layers.
Temporary Casing	Temporary steel casing will be required at all drilled shaft locations to provide for inspection of the rock bearing surface and test hole. The casing should be extended below the top of the bedrock surface if the bedrock is fractured and/or broken. The casing should be of sufficient strength to withstand handling stresses, concrete pressure, and surrounding earth and/or fluid pressures.
Permanent Casing	We do not anticipate needing permanent casing to install drilled shafts at this site.
Ground Water	At locations adjacent to the creek, groundwater should be expected at or slightly above the creek water level. Thus, seepage into the shaft excavations should be expected. It is anticipated that this seepage can be handled by pumping from the shaft excavations. Also, if the soil-bedrock interface becomes a conduit for groundwater infiltration or if fractures and/or voids in the rock produce groundwater seepage into the drilled shaft excavation, the temporary steel casing should be extended into the rock to seal off the groundwater flow.
Special Problems	Erratic pile lengths can be expected.

Prepared By	Willie Liew, P.E.
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FIGURES

Site Location Plan

Boring Location Plan

Generalized Subsurface Profile A-A'

Generalized Subsurface Profile B-B'

Generalized Subsurface Profile C-C'

Generalized Subsurface Profile D-D'

Generalized Subsurface Profile E-E'

Generalized Subsurface Profile F-F'

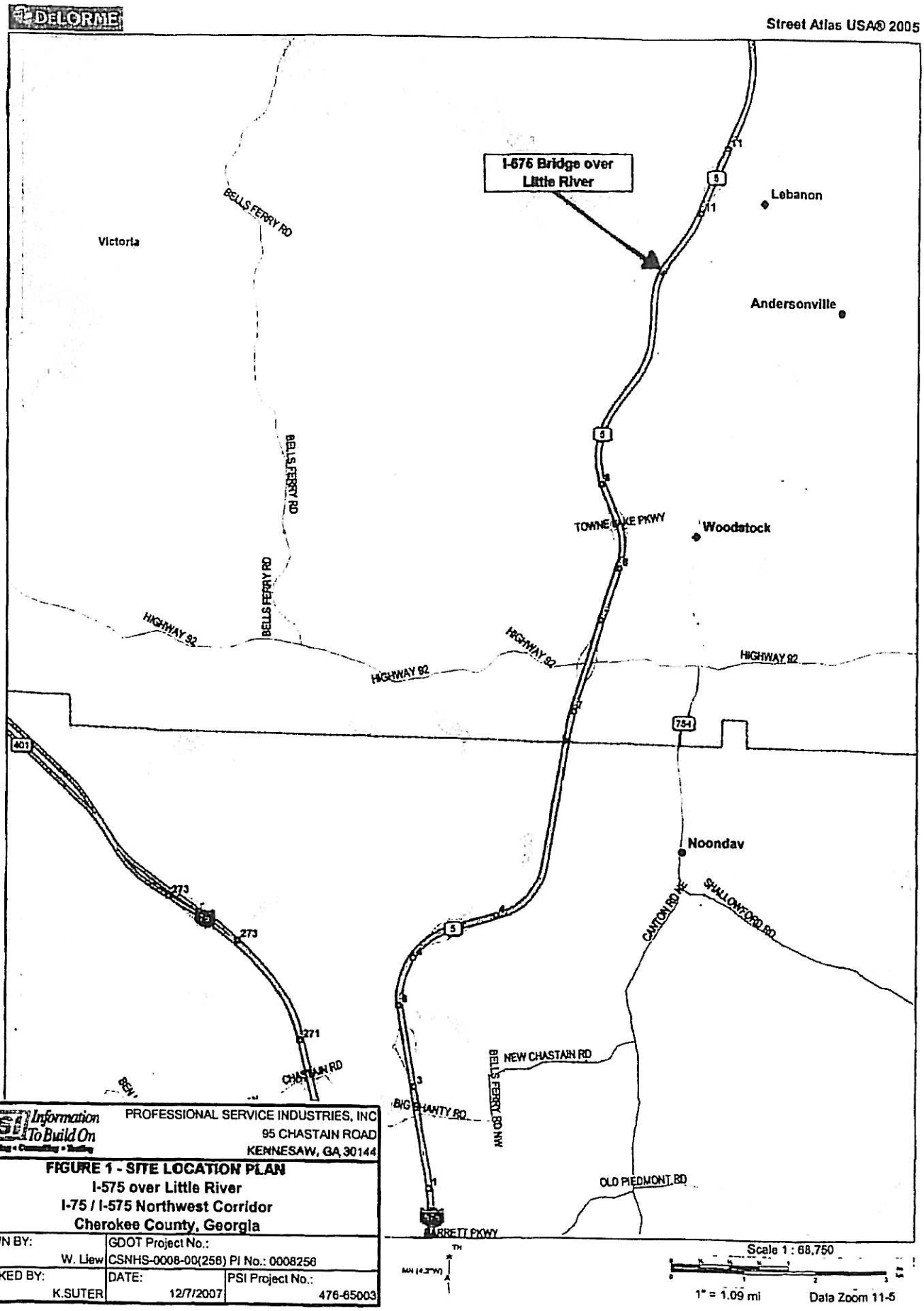

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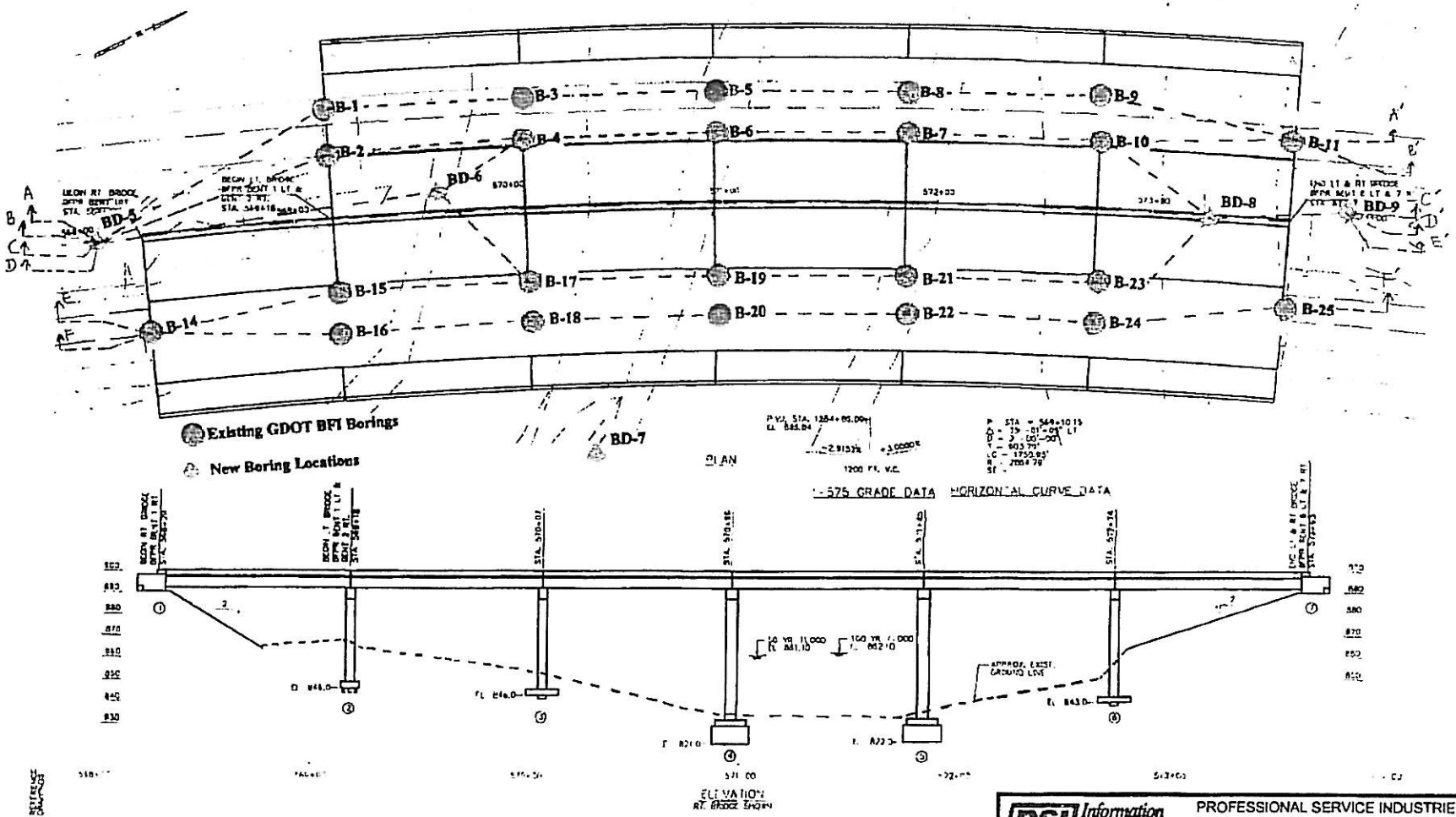
FIGURE 1 - SITE LOCATION PLAN
I-575 over Little River
I-75 / I-575 Northwest Corridor
Cherokee County, Georgia

DRAWN BY:	GDOT Project No.:	
W. Liew	CSNHS-0008-00(256) PI No.: 0008256	
CHECKED BY:	DATE:	PSI Project No.:
K.SUTER	12/7/2007	476-65003



GTP Georgia Transportation Partners

JBT J.B. TRIMBLE, INC.

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

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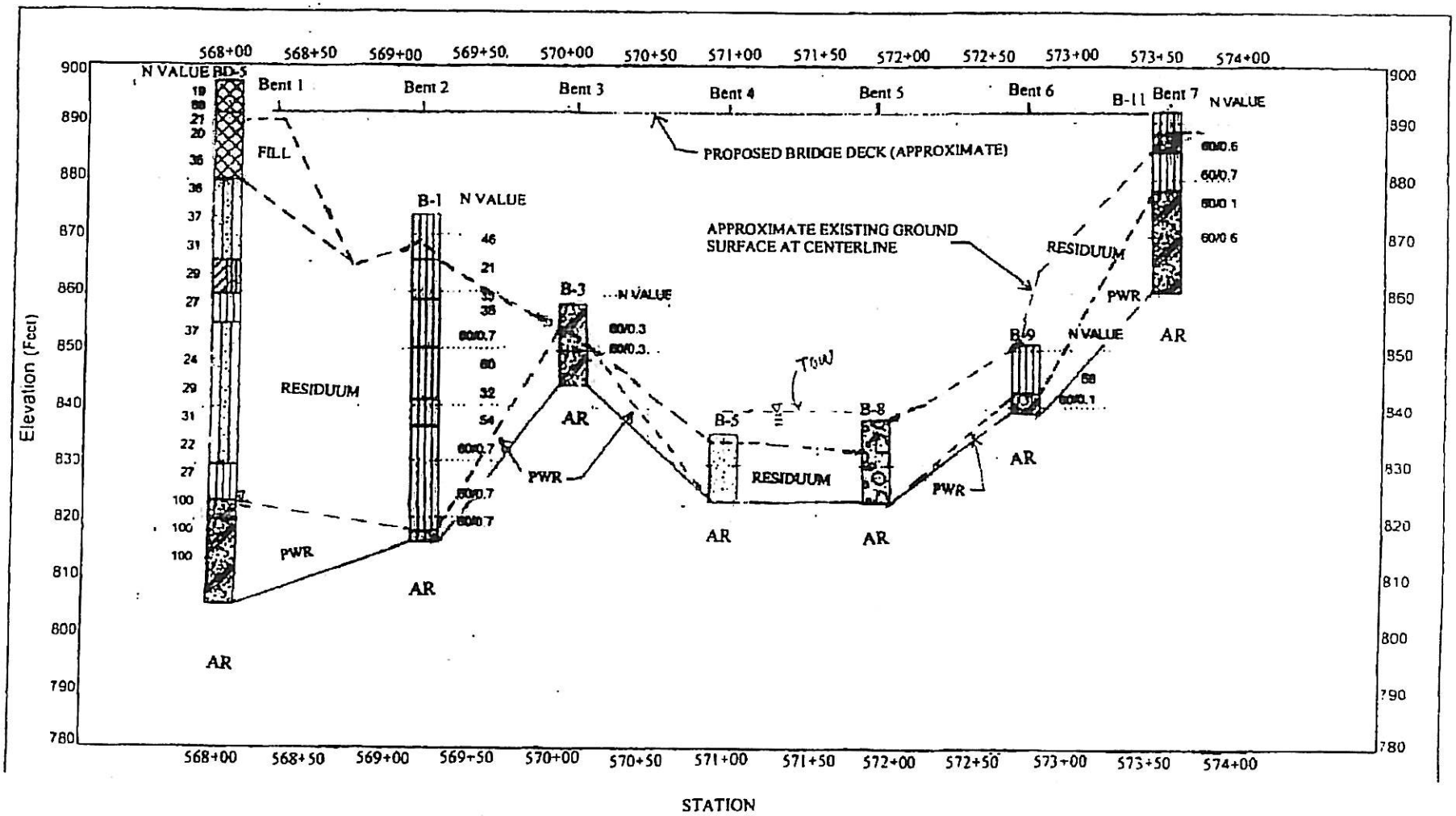
KENNESAW, GA 30144

FIGURE 2 - BORING LOCATION PLAN
I-575 over Little River
I-75 / I-575 Northwest Corridor
Cherokee County, Georgia

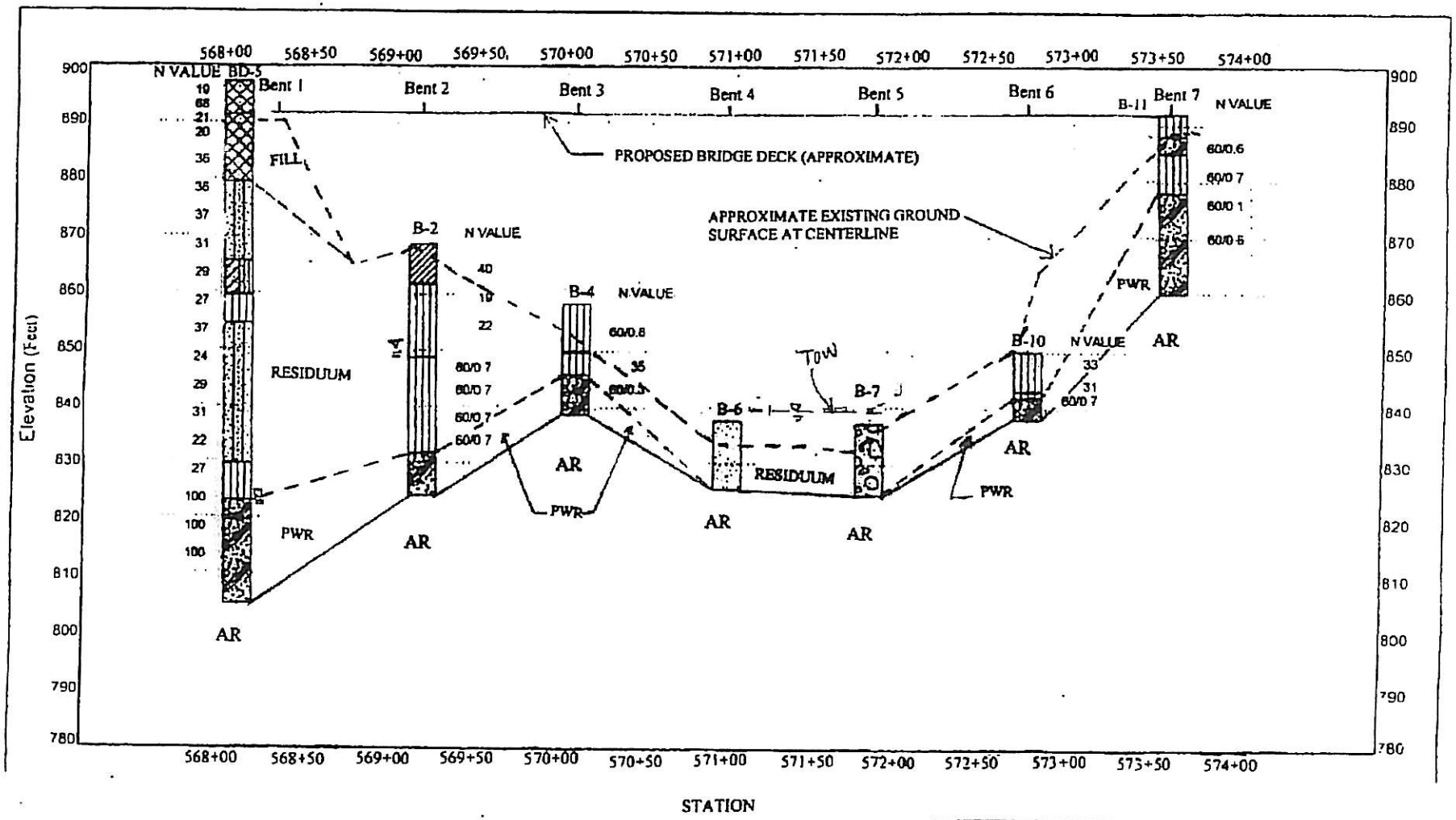
DRAWN BY: W. Liew	GDOT Project No CSNHS-0008-00(256) PI No.: 0008256	
CHECKED BY: K.SUTER	DATE: 12/7/2007	PSI Project No.: 476-65003



LEGEND:
- Groundwater Table at Time of Boring
AR – Auger Refusal
BT – Boring Terminated
PWR – Partially Weathered Rock
TOW – Top of Water

Note: Boring B-1, B-3, B-5, B-8, B-9, and B-11 were performed by GDOT in 1979

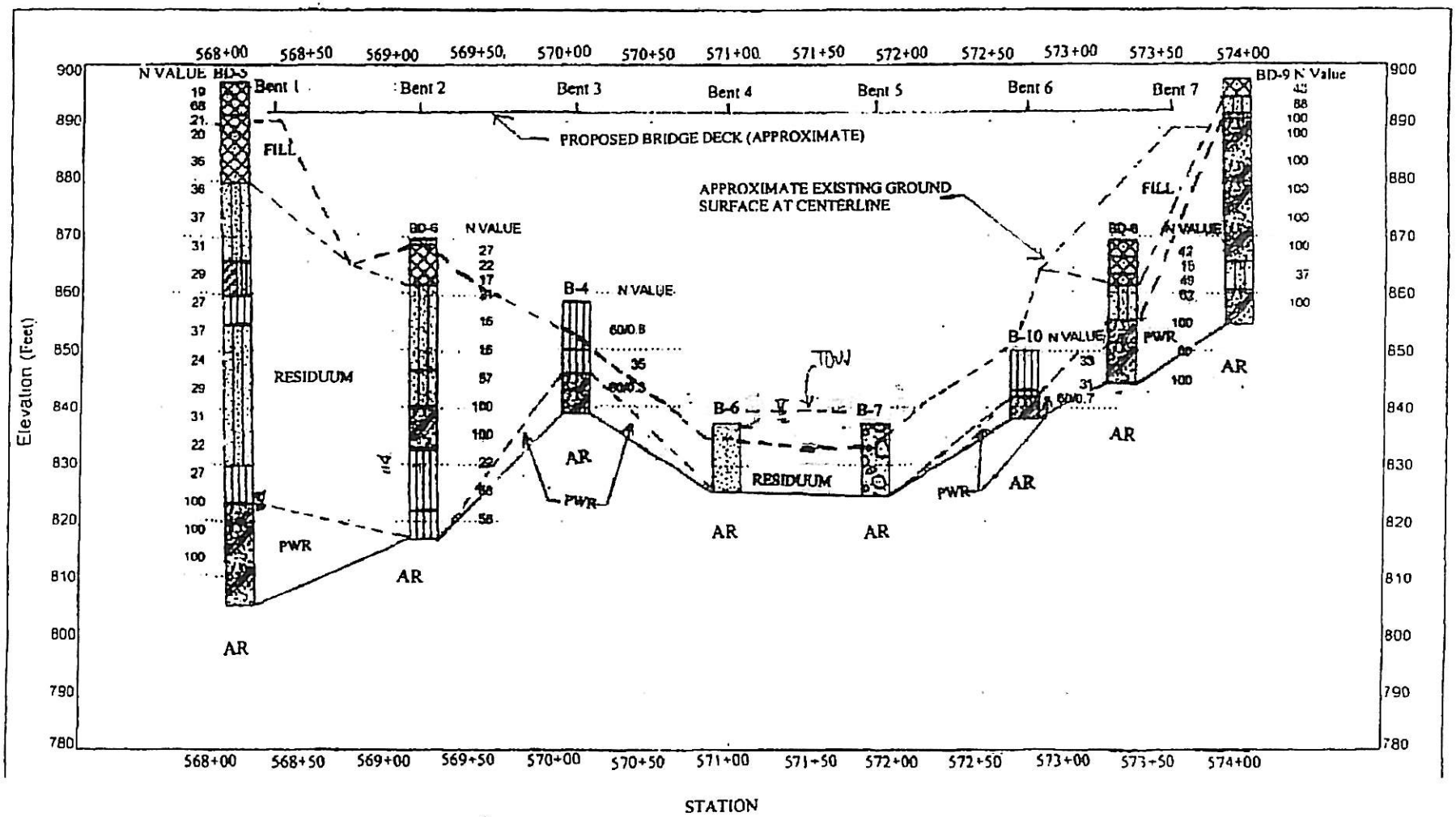
Information To Build On	PROFESSIONAL SERVICE INDUSTRIES, INC. 95 CHASTAIN ROAD KENNESAW, GA 30144	
FIGURE 3 - Generalized Subsurface Profile A-A' I-575 over Little River I-75 / I-575 Northwest Corridor Cherokee County, Georgia		
DRAWN BY: W. Liew	GDOT Project No.: CSNHS-0008-00(256) PI No.: 0008256	
CHECKED BY: K SUTER	DATE: 12/7/2007	PSI Project No.: 476-65003



LEGEND:
- ▽ - Groundwater Table at Time of Boring
- AR – Auger Refusal
- BT – Boring Terminated
- PWR – Partially Weathered Rock
- TOW – Top of Water

Note: Boring B-2, B-4, B-6, B-7, B-10, and B-11 were performed by GDOT in 1979

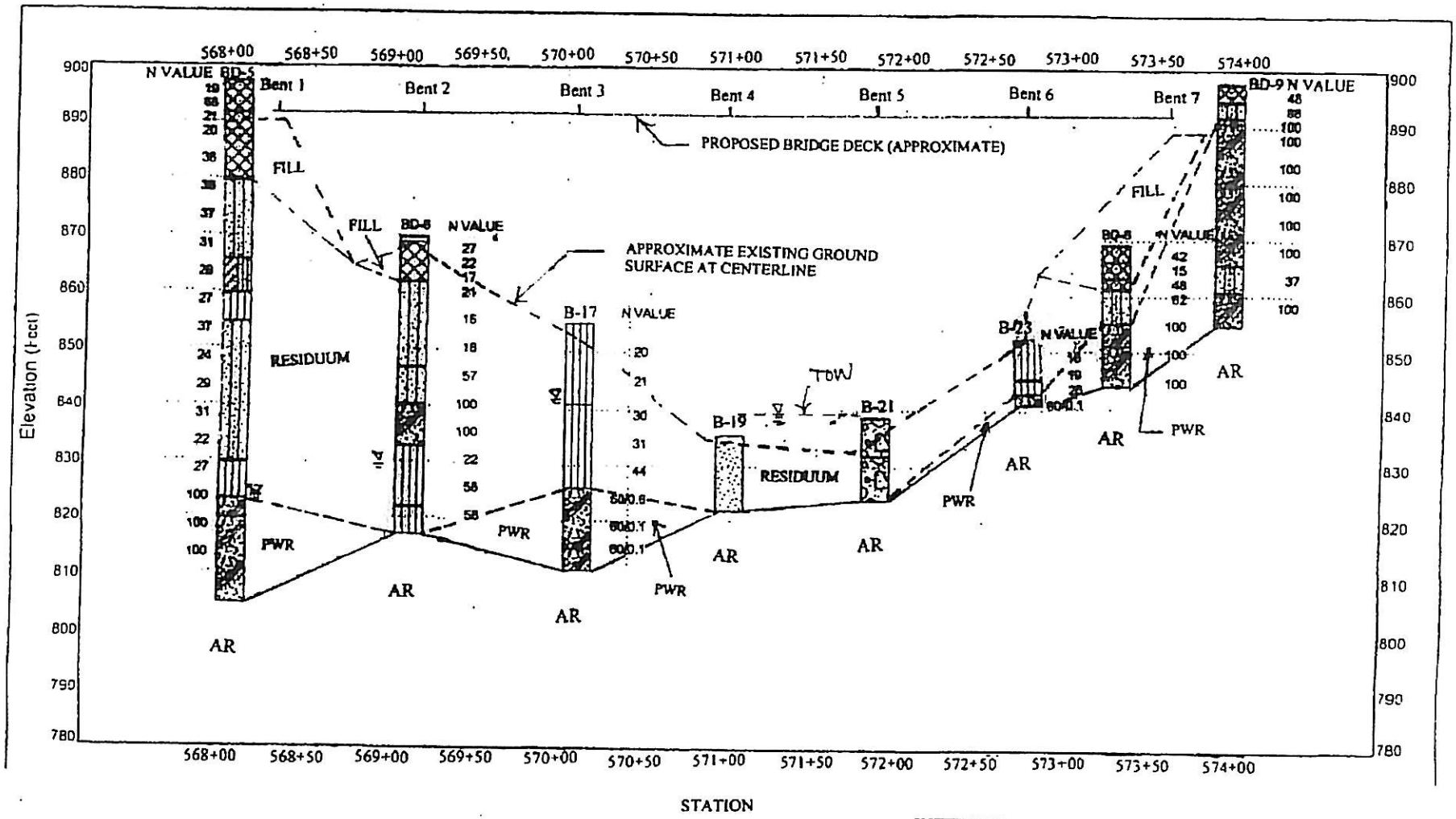
Information To Build On	PROFESSIONAL SERVICE INDUSTRIES, INC 95 CHASTAIN ROAD KENNESAW, GA 30144	
FIGURE 4 - Generalized Subsurface Profile B-B' **I-575 over Little River** **I-75 / I-575 Northwest Corridor** **Cherokee County, Georgia**		
DRAWN BY: W. Lane	GDOT Project No.: CSNHS-0008-00(256) PI No.: 0008256	
CHECKED BY: K SUTER	DATE: 12/7/2007	PSI Project No.: 476-65003



LEGEND:
- ▽ - Groundwater Table at Time of Boring
- AR – Auger Refusal
- BT – Boring Terminated
- PWR – Partially Weathered Rock
- TOW – Top of Water

Note: Boring B-4, B-6, B-7 and B-10 were performed by GDOT in 1979

PSI Information To Build On	PROFESSIONAL SERVICE INDUSTRIES, INC 95 CHASTAIN ROAD KENNESAW, GA 30144	
FIGURE 5 - Generalized Subsurface Profile C-C' **I-575 over Little River** **I-75 / I-575 Northwest Corridor** **Cherokee County, Georgia**		
DRAWN BY: W. Liew	GDOT Project No.: CSNHS-0008-00(256) PI No.. 0008256	
CHECKED BY: K.SUTER	DATE. 12/7/2007	PSI Project No.: 476-65003



LEGEND:
▽ - Groundwater Table at Time of Boring
AR – Auger Refusal
BT Boring Terminated
PWR – Partially Weathered Rock
TOW Top of Water

Note: Boring B-17, B-19, B-21, and B-23 were performed by GDOT in 1979

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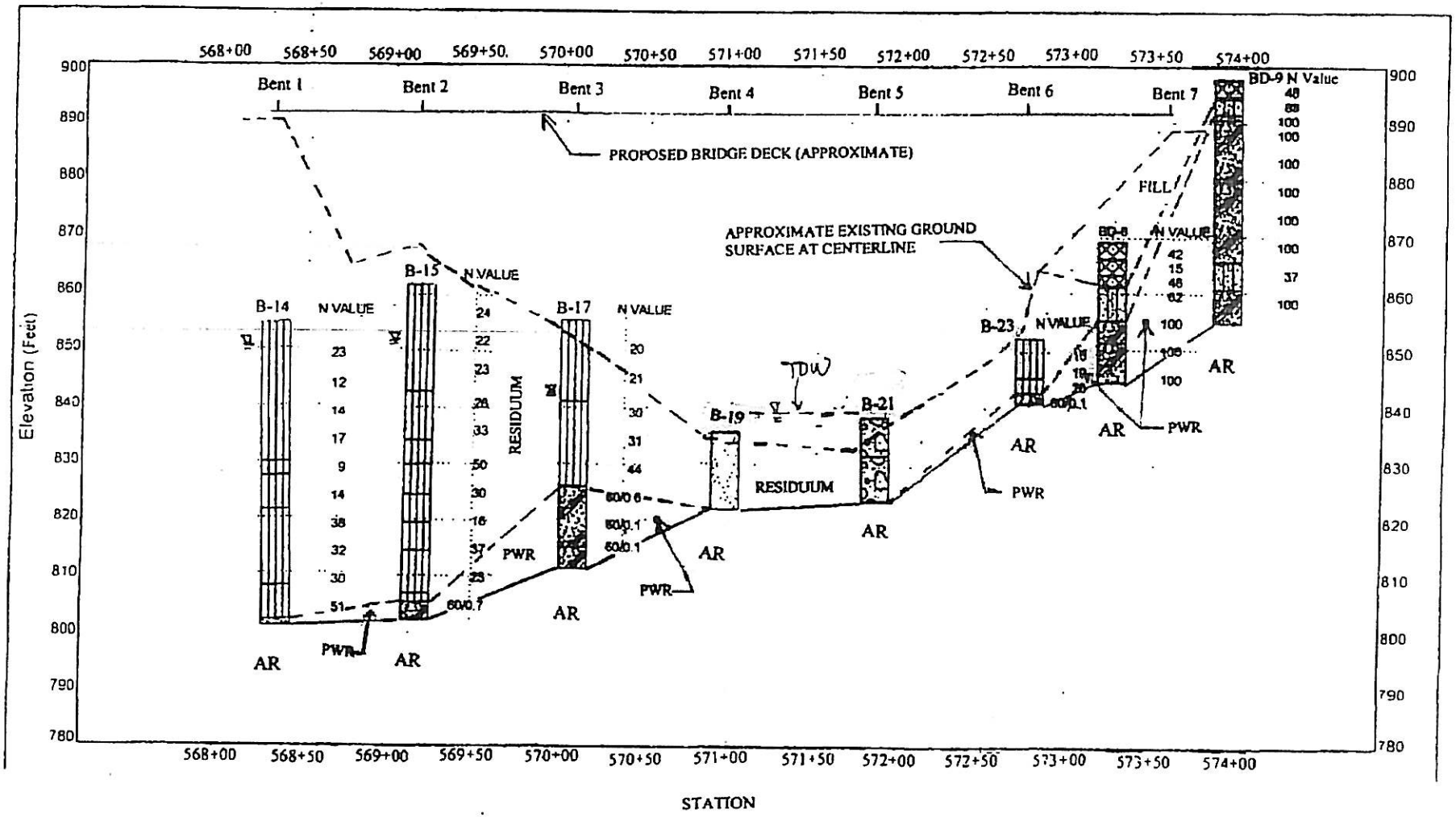
FIGURE 6 - Generalized Subsurface Profile D-D'
I-575 over Little River
I-75 / I-575 Northwest Corridor
Cherokee County, Georgia

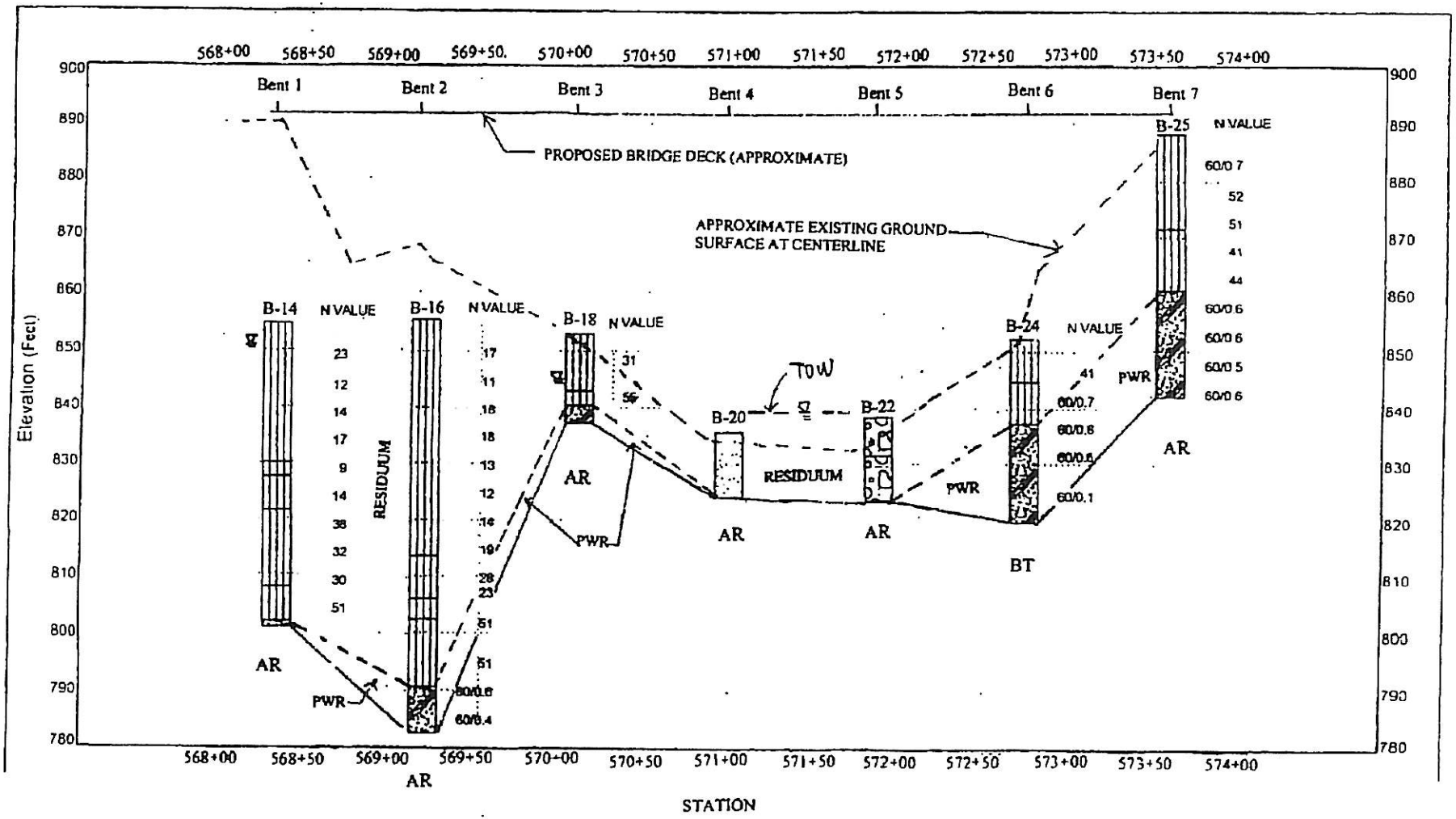
DRAWN BY: W. Liew	GDOT Project No: CSNHS-0008-00(256) PI No.: 0008256	
CHECKED BY: K SUTER	DATE: 12/7/2007	PSI Project No: 476-65003



LEGEND:
- ▽ - Groundwater Table at Time of Boring
- AR – Auger Refusal
- BT – Boring Terminated
- PWR – Partially Weathered Rock
- TOW – Top of Water

Note: Boring B-14, B-15, B-17, B-19, B-21and B-23 were performed by GDOT in 1979

Information To Build On	PROFESSIONAL SERVICE INDUSTRIES, INC 95 CHASTAIN ROAD KENNESAW, GA 30144	
FIGURE 7 - Generalized Subsurface Profile E-E' I-575 over Little River I-75 / I-575 Northwest Corridor Cherokee County, Georgia		
DRAWN BY: W. Liew	GDOT Project No.: CSNHS-0008-00(256) PI No.: 0008256	
CHECKED BY: K.SUTER	DATE: 12/7/2007	PSI Project No.: 476-65003



LEGEND:
- ▽ - Groundwater Table at Time of Boring
- AR – Auger Refusal
- BT – Boring Terminated
- PWR – Partially Weathered Rock
- TOW – Top of Water

Note: Boring B-14, B-16, B-18, B-20, B-22, B-24and B-25 were performed by GDOT in 1979

PSI Information To Build On	PROFESSIONAL SERVICE INDUSTRIES, INC 95 CHASTAIN ROAD KENNESAW, GA 30144	
FIGURE 8 - Generalized Subsurface Profile F-F' **I-575 over Little River** **I-75 / I-575 Northwest Corridor** **Cherokee County, Georgia**		
DRAWN BY: W. Liew	GDOT Project No CSNHS-0008-00(256) PI No.: 0008256	
CHECKED BY K SUTER	DATE 12/7/2007	PSI Project No : 476-85003

SPECIAL PROVISION

Section 520 – Piling

Section 524 – Drilled Caisson Foundations

Revised: May 8, 2006

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

SPECIAL PROVISION

PROJECT NO. CSNHS-0008-00(256)
P.I. NO. 0008256

SECTION 520—PILING

Delete Sub-Section 520.3.05.B and substitute the following:

520.3.05.B. Drill Pilot Holes
When pilot holes are required, drill them to the diameter and approximate depth specified on the Plans.

Backfill voids and holes with Class A or better concrete. Furnishing and placing backfill concrete is an incidental part of the work.

The following are not considered pilot holes:

- Holes created by spudding (punching)
- Holes dug to drive piling that is too long to fit leads
- Holes dug to replace a template (if permitted)

Where pilot holes are required in granular material and the material cannot be sealed off using "mudding" drilling methods, drill the pilot hole as follows:

1. Place a casing pipe with a large enough diameter around the boring device.
2. Hold the casing in position until the pilot hole is completed and the pile driving progresses deep enough into the hard material to keep loose material out of the pilot hole.

Drilling pilot holes using casing is incidental to the work.

Revised: November 9, 2006

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

SPECIAL PROVISION

PROJECT NO. CSNHS-0008-00(256)
P.I. NO. 0008256

SECTION 524 – DRILLED CAISSON FOUNDATIONS

524.1 General Description

This Work consists of furnishing all labor, materials, equipment, tools and services necessary for construction of drilled caisson foundations and includes all incidentals and additional work in conjunction therewith. Adhere to the Department's Plans, Special Provisions and Standard and Supplemental Specifications for all Work.

524.2 Materials

Use materials that meet the requirements of the Standard Specifications with the following exceptions:

- Use non-air-entrained Class AA concrete with a coarse aggregate size of No. 67 stone and a slump at time of placement of between 7 and 9 inches (178 mm and 229 mm). Use 10 percent additional cement and a retarder or water reducing agent in all concrete.
- Use Grade 60 (Grade 420) reinforcing bars that conform to ASTM 615 (ASTM A 615M). If wire spirals are used, use spirals that conform to ASTM A 82.
- Use Grade 2 steel casing that conforms to ASTM A 252.

524.3 Construction Requirements

524.3.01 Personnel

Construct drilled caissons and supervise the work with personnel who are experienced in this type work. Visit and examine the work site and all conditions, and take into consideration all such

conditions that may affect the work. At least 30 days prior to beginning drilled caisson work, submit to the Engineer for review and approval the following proof of the ability of the personnel to construct drilled caisson foundations:

1. Evidence of the successful completion of at least five projects similar in concept and scope to the proposed foundation. Include names, addresses and telephone numbers of the owners' representatives for verification.

2. Résumés of foreman and drilling operators to be employed on this project. Provide evidence showing that the drill operator has experience and knowledge of the drill rig to be used on the project. The Department will be sole judge of the qualifications of the foreman and drill rig operator.

3. A detailed sequence of construction for drilled caisson work that describes all materials, methods and equipment to be used, including, but not limited to the following:

   - casing sizes with proposed top and tip elevations
   - drilling equipment including the manufacturer's specifications on the drill rig
   - methods and equipment for stabilizing and cleaning shaft excavations
   - methods of materials handling and disposal
   - methods and equipment for placing concrete
   - details of tremie and sealing methods, if required
   - details of reinforcement placement, including support and centralization methods

Do not begin drilled caisson construction until the qualifications, construction plan and methods have been approved in writing by the Engineer.

524.3.02 Equipment

Use excavation and drilling equipment with a rated capacity (including power, torque and downward thrust) to excavate a caisson of the maximum specified diameter to a depth of 30 feet (9.1 meters) or 20 percent deeper than the deepest caisson indicated on the Plans, as measured from the ground or water surface elevation, whichever is higher.

524.3.03 Casing

Use casing that is a metal shell of a thickness to withstand handling, internal and external pressures, and that is watertight, smooth and clean. If the elevation of the top of the caisson is below ground level or water level at the time of concrete placement, use an oversize casing from ground elevation to a point below the top of the caisson to prevent caving into the fresh concrete. Do not allow the top of the permanent casing, if required, to extend above the top of the drilled caisson. Use casing in all

materials that do not have sufficient strength to safely remain open and stable during and after excavation.

When casing is used, do not use casing with an outside diameter less than the specified diameter of the caisson. That portion of the caisson below the casing may be slightly smaller than the normal outside diameter of the caisson. However, use drilling tools to excavate the caisson below the casing that are no smaller than the outside diameter of the casing minus 2 inches (51 mm). Do not leave casing in place unless permitted by the Engineer, and cut off any permanent casing as shown on the Plans.

Provide adequate equipment during concrete placement to prevent pulling up the reinforcing cage during casing extraction. The casing may be pulled in partial stages. Maintain a sufficient head of concrete above the bottom of the casing to overcome hydrostatic pressure. Extract the casing at a slow uniform rate with pull in line with the center of the caisson.

524.3.04 Protection of Existing Structures

Monitor structures for settlement that are within a distance of ten shaft diameters or the estimated shaft depth, whichever is greater, in a manner approved by the Engineer. Record elevations to an accuracy of 0.01 foot (3 mm). Record elevations before construction begins, during the driving of any required casings, during excavation or blasting, or as directed by the Engineer.

Document thoroughly the condition of the structures with descriptions and photographs made both before and after drilled caissons are constructed. Document all existing cracks, and provide copies of all documentation to the Engineer.

At any time settlement of 0.05 foot (15 mm) or damage to the structure is detected, immediately stop the source of vibrations, backfill any open drilled shaft excavations and contact the Engineer for instructions.

524.3.05 Excavation

Drill and excavate all caissons through whatever substances and to the elevations required. Excavate near the tip elevation in the presence of the Engineer. The Engineer may adjust the tip elevations depending on the quality of the bearing material found. Embed the caisson tips 5 feet (1.5 meters) into and on top of sound rock in accordance with Plan requirements and as determined by the Engineer. Sound rock is indicated by material that cannot be drilled with a conventional earth auger, and requires the use of special rock augers, core barrels, air tools, blasting and/or other methods of hand excavation. Sound rock is defined as material on which the rock auger penetration is equal to or less than 2 inches (51 mm) per five minutes of drilling with the auger subjected to a torque of 600,000 inch-pounds (67,791 kN-m) with a down thrust of 37,000 pounds (165 kN). There will be no additional compensation for removal of rock.

The Engineer will inspect the bottom of each caisson prior to setting the reinforcing cage and placing concrete. Obtain the Engineer's approval prior to placing the reinforcing cage. Remove water, sediment and debris from the bottom of the caissons to allow for a down-hole inspection. Bore the bottom of the caisson excavation a minimum of 6 feet (1.8 meters) into rock as outlined in

Specification 211.3.05.C, "Boring of Foundations and Seals". The Engineer will make a determination of the soundness and consistency of the rock and may adjust the tips of the caissons based on this information.

Where drilled caissons are located in other than open water areas, use casings or other methods approved by the Engineer to stabilize the excavation and control the hole size. When casing is not specifically required on the plans, fill in any over-excavations with Class AA concrete at no additional cost to the Department. Dispose of excess concrete, grout, displaced water and materials removed from the caisson excavation in areas approved by the Engineer, and in accordance with any Federal, State, or local code or ordinance. Verify the accuracy and existence of all applicable codes, ordinances or other regulations prior to disposing materials.

524.3.06 Reinforcing Steel

Assemble a cage of reinforcing steel and place it as a unit immediately prior to concrete placement. Assemble the cage so that the clearance between the cage and side of the caisson will be at least 5 inches (127 mm), and the clearance between the cage and bottom of the caisson will be 3 inches (76 mm).

If the caisson is lengthened, extend all reinforcement to within 3 inches (76 mm) of the bottom. If a splice is required, place it in the lower one-third of the caisson, or as shown on the Plans. Tie hoops or spirals to the caisson and column steel (vertical bars) at 100% of the junctions with double wire figure-eight ties. Do not weld the reinforcing steel. Support the cage from the top in a concentric manner to minimize its slumping downward during concrete placement and/or extracting the casing.

Check the elevation of the top of the steel cage before and after casing extraction. Any upward movement of the steel not exceeding 2 inches (51 mm) or any downward movement thereof not exceeding 6 inches (152 mm) will be acceptable. Any upward movement of the concrete or displacement of the steel beyond the above limits will be cause for rejection. Tie and support the reinforcing steel in the caisson so that the reinforcing steel will remain within allowable tolerances. In uncased caissons, use only heavy-duty plastic rollers (wheels). In cased caissons, use heavy-duty non-corrosive plastic rollers (wheels) or steel chairs. Place rollers at maximum intervals of 8 feet (2.4 meters) along the cage to ensure concentric spacing for the entire cage length. Use one roller for each one foot (305 mm) of diameter of the cage, with a minimum of four rollers at each interval. Do not use concrete spacer blocks. Use rollers that are constructed of a material approved by the Engineer and that have sufficient bearing surface to provide lateral support to the reinforcing cage.

Use rollers of adequate dimension to provide the annular spacing between the outside of the reinforcing cage and the side of the excavated hole or casing as shown on the Plans. If an oversize casing is used, use rollers that will provide concentric spacing. Use pre-cast concrete or heavy-duty plastic bottom supports (feet/boots) to provide a spacing of 3 inches (76 mm) between the cage and caisson bottom.

524.3.07 Concrete

Mix and place all concrete in accordance with Section 500 of the Specifications where applicable and the requirements herein stated.

Place concrete as soon as possible after all excavation is completed and reinforcing placed and supported. Place concrete continuously in the caisson to the top elevation of the caisson. The Engineer may allow free falling of concrete to a maximum of 60 feet (18.3 meters), if satisfactory methods are demonstrated.

If ground water is encountered and the hole can not be pumped dry, or if the Engineer does not approve free fall of concrete, place concrete using a gravity feed watertight tremie. Use a tremie pipe of at least 8 inches (203 mm) in diameter with a concrete hopper at the top. The Engineer may allow concrete to be placed by pumping through a supply line if satisfactory methods are demonstrated. If this method is allowed, use pump supply lines with watertight couplings. Seal the end of the pump line with a foam plug or other device approved by the Engineer to prevent concrete within the tremie or pump supply line from mixing with fluid in the excavation.

If a tremie is used, place it on the bottom of the excavation at the beginning of concrete placement, and keep it there until the tremie pipe and hopper are filled with concrete. Then raise the tremie only enough to induce concrete flow and do not lift the tremie further until the discharge end is immersed at least 10 feet (3.1 meters) into the deposited concrete. If concrete placement by pumping is used, secure the supply line in place so that the discharge end will not lift off the bottom of the excavation more than 6 inches (152 mm) until at least 10 feet (3.1 meters) of concrete has been placed. Embed the discharge end of the tremie or pump supply line a minimum of 10 feet (3.1 meters) in the concrete throughout the remainder of the concrete pour.

Complete the placement of all concrete in the caisson in two hours. Adjusted the retarder or water reducing agent as approved by the Engineer for the conditions encountered on the job so the concrete remains in a workable plastic state throughout the pour.

Prepare and cure the top surface of the construction joint in accordance with the requirements of Section 500. Locate construction joints as indicated on the Plans.

Do not place concrete under water in the caisson excavation without the permission of the Engineer. When permission is granted, place the concrete in accordance with the requirements of Section 500. Provide a sump to channel displaced water away from the caisson. Contain all displaced water to prevent water from entering into any body of water.

During the twenty-four hour period immediately following the completion of the placement of concrete in the caisson, do not install or extract casing within 50 feet (15.2 meters) of the completed caisson, and do not excavate any caissons within 15 feet (4.6 meters) of the completed caisson. If the Engineer determines that any construction adversely affects the recently constructed caisson, cease such activities immediately.

Protect any portion of drilled caissons exposed to a body of water from the action of water by leaving the forms in place for a minimum of seven days after pouring the concrete. Remove the forms prior to 7 days only if the concrete strength has reached 3000 psi (20.7 Mpa) or greater as tested by cylinder breaks.

524.3.08 Inspection and Safety

1. Check the dimensions and alignment of the caisson excavation under the observation of the Engineer.

2. Provide, use and maintain in good working order the following safety devices for the purpose of entering the caisson excavation for cleaning or inspection work:

   a. A safety harness attached to a separate safety line.

   b. OSHA-approved personnel lifting devices. Do not suspend any crane weights, blocks or other heavy weights above the head of any person entering the caisson excavation.

   c. Approved gas-testing equipment that tests for both oxygen level and percent explosion level. Provide and use an approved blower for fresh air if the testing equipment indicates the need.

   d. Casing of adequate thickness, size and depth to safely support the excavation.

   e. Non-electric pump(s) to adequately remove water from the excavation.

In addition, prior to entering the excavation, remove all loose and unnecessary objects from around the top of the caisson. Secure any caissons that will not be immediately poured after inspection and approval to prevent persons or objects from falling into the excavation.

524.3.08 Tolerances

Adhere to the following construction tolerances for drilled caissons:

1. Construct the drilled caisson to within 3 inches (76 mm) of the plan position plane, at the top-of-caisson elevation. Adhere to a vertical alignment tolerance of ¼-inch per 12 inches (6 mm per 305 mm) of depth.

2. Place reinforcement in accordance with the requirements of Section 511 of the Standard Specifications and Sub-section 524.3.06. Tie column steel (vertical bars) to hoops and spirals at 100% of the junctions with double wire figure-eight ties.

3. Placed vertical caisson reinforcing bars, including bars extending into columns or footings to within ½-inch (13 mm) of plan location. Place hoops or spirals to within 1 inch (25 mm) of their specified location. Adhere to a side form clearance of within ¼-inch (6 mm) of plan requirements.

4. Place the construction joint of the top of caissons used as caisson/column intermediate bents to within a tolerance of plus or minus 3 inches (76 mm) of the plan elevation.

524.4 Acceptability

In the event that significant voids are suspected in the concrete that were created during placement, verify the integrity of the caisson using a method that has been approved by the Engineer. If the caisson in question is found to be structurally deficient or out of tolerance in any way, the caisson will not be accepted unless corrective measures as approved by the Engineer are accomplished. Furnish additional materials and work necessary to effect corrections at no cost to the Department and with no increase in contract time.

524.5 Measurement

The length of accepted caisson foundation is measured in linear feet (meters) of caisson in place in the completed work. The length is measured from the final approved bottom elevation to 1 foot (305 mm) above the bottom of the footing cap where caissons are used in a footing or to the top of the caisson elevation detailed in the plans.

524.6 Payment

Drilled in place caisson foundations is paid for at the unit price bid per linear feet (meters) complete and in place as specified. The payment is full compensation for all excavation, furnishing and placement of reinforcing steel and concrete in the caisson, all temporary and permanent casing, disposal of excavated materials, and the cost of furnishing all tools, safety devices, labor, equipment and all other necessary items to complete the work.

Payment will be made under:

Item No. 524 DRILLED CAISSON_____INCHES (mm) DIA.....PER LINEAR FOOT (METER)

APPENDIX I

New Boring Logs – BD-5 through BD-9

Laboratory Test Results

Test Procedures

BORING LOG

PSI No.: 476-65003

Client: Willmer Engineering/Georgia Transportation Partners

Project: I-575 over Little River Cherokee County, Georgia

Boring No.: BD-5 (1 of 2) | Total Depth 93.0' | Elev: 898 ± | Location: Sta. 568+10 at CL

Type of Boring: Hollow Stem Auger | Started: 10/4/07 | Completed: 10/4/07 | Driller: Gable Drilling

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	N VALUE (bpf) PL %MC LL (10 20 30 40 50 60 70 80 90)	N
897.6	0.1	Topsoil Thickness = 1 inch				
		FILL: Medium Dense to Very Dense Tan Moist Silty SAND (SM), with rock fragments	9-10-9	1.0, 2.5		19
			22-26-42	3.5, 5.0		68
891.7	6.0	FILL: Medium Dense to Dense Tan Moist Silty SAND (SM), with rock fragments (Non-Plastic)	9-9-12	6.0, 7.5		21
			8-10-10	8.5, 10.0		20
			7-14-22	13.5, 15.0		36
879.7	18.0	RESIDUUM: Dense Brown to Black/Tan Moist Silty SAND (SM), with rock fragments	12-14-22	18.5, 20.0		36
			14-16-21	23.5, 25.0		37
			13-14-17	28.5, 30.0		31
865.7	32.0	Medium Dense Reddish Brown Moist Silty Clayey SAND (SC-SM), with rock fragments	9-11-18	33.5, 35.0		29
859.7	38.0	Very Stiff Red Moist Clayey Sandy SILT (ML)	10-11-16	38.5, 40.0		27
854.7	43.0	Dense to Medium Dense Red/Tan Moist Silty SAND (SM)	15-17-20	43.5, 45.0		37
			11-11-13	48.5, 50.0		24
			11-11-18	53.5, 55.0		29
			9-13-18	58.5, 60.0		31
			6-10-12	63.5, 65.0		22

* Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

J PSI_CORP.GDT 12/7/07
PL_STD 476

BORING LOG

PSI No.: 476-65003

Client: Willmer Engineering/Georgia Transportation Partners

Project: I-575 over Little River Cherokee County, Georgia

Boring No.: BD-5 (2 of 2) | Total Depth 93.0' | Elev: 898 ± | Location: Sta. 568+10 at CL

Type of Boring: Hollow Stem Auger | Started: 10/4/07 | Completed: 10/4/07 | Driller: Gable Drilling

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	N VALUE (bpf) PL %MC LL (10 20 30 40 50 60 70 80 90)	N
829.7	68.0					
		Hard to Very Stiff Brown/Tan Moist Sandy SILT (ML)	5-11-16	68.5 70.0		27
823.2	74.5		22-30-50/2	73.5 75.0		100
819.7	78.0	PARTIALLY WEATHERED ROCK: Sampled as Hard to Very Stiff Brown/Tan Wet Sandy SILT (ML)				
		PARTIALLY WEATHERED ROCK: Sampled as Very Dense Brown/Orange Silty SAND (SM)	50/4	78.5 80.0		100
			50/4	83.5 85.0		100
804.7	93.0					

Auger Refusal at 93 feet

Groundwater at Time of Drilling = 73 feet

Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

PSI_LOGRP.GDT 12/1/07

BORING LOG

PSI No.: 476-65003

Client: Willmer Engineering/Georgia Transportation Partners

Project: I-575 over Little River Cherokee County, Georgia

Boring No.: BD-6 (1 of 1) | Total Depth 53.0' | Elev: 870 ± | Location: Sta. 569+65, 10' LT CL

Type of Boring: Hollow Stem Auger | Started: 10/5/07 | Completed: 10/5/07 | Driller: Gable Drilling

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	N VALUE (bpf) ● PL %MC ▲ LL (10 20 30 40 50 60 70 80 90)	N
869.7	0.2	Asphalt Thickness = 2 inches				
868.9	1.0	Auger Refusal at 1 foot Offset Boring 10 feet West	9-15-12	1.0 2.5 3.5		27
		FILL: Medium Dense Brown/Red Moist Silty SAND (SM), with rock fragments	6-10-12	5.0 6.0		22
861.9	8.0		7-8-9	7.5 8.5		17
		RESIDUUM: Medium Dense Red/Orange/Green Moist Micaceous Silty SAND (SM) (Non-Plastic)	6-9-12	10.0		21
			5-7-9	13.5 15.0		16
			5-7-9	18.5 20.0		16
846.9	23.0					
		Very Dense Gray/Orange/Tan Moist Micaceous Silty SAND (SM)	15-22-35	23.5 25.0		57
840.4	29.5			28.5		
		PARTIALLY WEATHERED ROCK: Sampled as Very Dense Gray/Orange/Tan Moist Micaceous Silty SAND (SM)	28-32-50/5	30.0		100
			50/4	33.5 35.0		100
832.9	37.0					
		Very Stiff Brown/Orange Wet Micaceous Sandy SILT (ML)	6-9-13	38.5 40.0		22
			17-24-34	43.5 45.0		58
821.9	48.0					
		Very Stiff Brown/Orange Wet Micaceous Sandy SILT (ML), with quartz fragments	7-27-31	48.5 50.0		58
816.9	53.0					
		Auger Refusal at 53 feet Groundwater at Time of Drilling = 40 feet				

Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

PSI_CORP GDT 12/7/07
PL_STD 4/06

BORING LOG

PSI No.: 476-65003

Client: Willmer Engineering/Georgia Transportation Partners

Project: I-575 over Little River Cherokee County, Georgia

Boring No.: BD-7 (1 of 1) | Total Depth 25.0' | Elev: 843 ± | Location: Sta. 570+25, 120' RT CL

Type of Boring: Hollow Stem Auger | Started: 10/8/07 | Completed: 10/8/07 | Driller: Gable Drilling

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	N VALUE (bpf) PL %MC LL (10 20 30 40 50 60 70 80 90)	N
842.8	0.2	Topsoil Thickness = 2 inches		1.0		
840.0	3.0	FILL: Medium Dense Brown Moist Silty SAND (SM), with rock fragments	7-9-21	2.5		30
837.5	5.5	ALLUVIUM: Medium Dense Gray Moist Silty SAND (SM)	21-16-13	3.5 / 5.0		29
835.0 ▽	8.0	ALLUVIUM: Loose Gray Wet Silty SAND (SM)	3-2-4	6.0 / 7.5		6
830.0	13.0	ALLUVIUM: Very Loose Gray/Brown Wet Silty Clayey SAND (SC-SM)	1-woh-1	8.5 / 10.0		1
826.0	17.0	ALLUVIUM: Very Loose Gray Wet Silty SAND (SM)	1-1-1	13.5 / 15.0		2
819.0	24.0	RESIDUUM: Medium Dense Brown Wet Silty SAND (SM), with rock fragments	6-8-9	18.5 / 20.0		17
818.0	25.0	PARTIALLY WEATHERED ROCK: Sampled as Very Dense Orange/Brown Wet Silty SAND (SM), with rock fragments	38-50/4	23.5 / 25.0		100

Auger Refusal at 25 feet

Groundwater at Time of Drilling = 8 feet

Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N

PSI_CORP.GDT 12/7/07
PSL_STD 476b.GPJ

BORING LOG

PSI No.: 476-65003

Client: Willmer Engineering/Georgia Transportation Partners

Project: I-575 over Little River Cherokee County, Georgia

Boring No.: BD-8 (1 of 1) | Total Depth 25.0' | Elev: 869 ± | Location: Sta. 573+25 at CL

Type of Boring: Hollow Stem Auger | Started: 10/3/07 | Completed: 10/3/07 | Driller: Gable Drilling

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	N VALUE (bpf) ● PL %MC ▲ LL (10 20 30 40 50 60 70 80 90)	N
		FILL: Dense Reddish Brown Moist Silty SAND (SM)		1.0		
866.3	3.0		16-18-24	2.5		42
		FILL: Medium Dense Reddish Brown Moist Silty SAND (SM), with rock fragments		3.5		
863.3	6.0		9-8-7	5.0		15
		FILL: Dense Tan Moist Silty SAND (SM), with rock fragments		6.0		
861.3	8.0		13-23-25	7.5		48
		RESIDUUM: Very Dense Tan Moist Silty SAND (SM)		8.5		
			25-28-34	10.0		62
855.3	14.0			13.5		
		PARTIALLY WEATHERED ROCK: Sampled as Very Dense Brown Moist Silty SAND (SM)	14-50/5	15.0		100
851.3	18.0					
		PARTIALLY WEATHERED ROCK: Sampled as Very Dense Gray Silty GRAVEL (GP)		18.5		
			50/5	20.0		100
				23.5		
844.3	25.0		50/1	25.0		100
		Auger Refusal at 25 feet				
		Groundwater at Time of Drilling = Not Encountered				

Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

PSI_CORP.GDT 12/7/07
PL_STD 476b...

BORING LOG

PSI No.: 476-65003

Client: Willmer Engineering/Georgia Transportation Partners

Project: I-575 over Little River Cherokee County, Georgia

Boring No.: BD-9 (1 of 1) | Total Depth 43.0' | Elev: 898± | Location: Sta. 573+90, 10' LT CL

Type of Boring: Hollow Stem Auger | Started: 10/3/07 | Completed: 10/3/07 | Driller: Gable Drilling

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	N VALUE (bpf) ● PL ▲ %MC LL (10 20 30 40 50 60 70 80 90)	N
897.5	0.1	Topsoil Thickness = 1 inch		1.0		
894.6	3.0	FILL: Dense Red/Tan Moist Silty SAND (SM), with rock fragments	17-20-28	2.5		48
891.6	6.0	RESIDUUM: Very Dense Brown/Orange/White Moist Silty SAND (SM), with rock fragments	38-47-41	3.5 5.0		88
890.6	7.0	PARTIALLY WEATHERED ROCK: Sampled as Very Dense Red Moist Silty SAND (SM), with rock fragments	50/5	6.0 7.5		100
		Auger Refusal at 7 feet Offset 10 feet North Auger Refusal at 2 feet Offset 15 feet Southwest to 710+10 10 feet Left	21-28-50/1	8.5 10.0	▲	100
		PARTIALLY WEATHERED ROCK: Sampled as Very Dense Orange/Gray/Brown Moist Silty SAND (SM), with rock fragments	50/5	13.5 15.0		100
879.6	18.0	PARTIALLY WEATHERED ROCK: Sampled as Very Dense Orange/Tan/Black Moist Silty SAND (SM), with rock fragments	2-30-50/3	18.5 20.0		100
			49-50/5	23.5 25.0		100
			50/5	28.5 30.0		100
865.6	32.0	Dense Brown/Black/Tan Moist Silty SAND (SM), with rock fragments	8-16-21	33.5 35.0	●	37
860.6	37.0	PARTIALLY WEATHERED ROCK: Sampled as Very Dense Orange/Brown/White Moist Silty SAND (SM), with quartz fragments	13-23-50/4	38.5 40.0		100
854.6	43.0	Auger Refusal at 43 feet Groundwater at Time of Drilling = Not Encountered				

Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

PSI_CORP GDT 12/7/07
PSI_STD 476BOL

LIQUID AND PLASTIC LIMIT TEST DATA

Client:
roject: Northwest Corridor Metro Atlanta
roject Number: 476-65003

Sample Data

Source:
Sample No.: B-1/S-5
Elev. or Depth: 13.5-15.0'
Sample Length(in./cm.):
Location: I-575 Over Little River
Description: Brown micaceous Silty SAND
Water Content: 14.5 %
USCS: SM
AASHTO:
Testing Remarks: % Passing Sieve #200 = 20.7

Liquid Limit= _____
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMIT TEST DATA

Client:
'roject: Northwest Corridor Metro Atlanta
roject Number: 476-65003

Sample Data

Source:
Sample No.: B-2/S-4
Elev. or Depth: 8.5-10.0'
Location: I-575 Over Little River
Description: Red Silty SAND
Water Content: 38.6 %
USCS: SM
Testing Remarks: % Passing Sieve #200 = 42.6

Sample Length(in./cm.):

AASHTO:

Liquid Limit= ____
Plastic Limit= NP
Plasticity Index= NP

TEST PROCEDURES

The general field procedures employed by Professional Service Industries, Inc. (PSI) are summarized in the American Society for Testing and Materials (ASTM) Standard D420 which is entitled "Investigating and Sampling Soil and Rock". This recommended practice lists recognized methods for determining soil and rock distribution and groundwater conditions. These methods include geophysical and in-situ methods as well as borings.

Standard Drilling Techniques

To obtain subsurface samples, borings are drilled using one of several alternate techniques depending upon the subsurface conditions. Some of these techniques are:

In Soils:

a) Continuous hollow stem augers.
b) Rotary borings using roller cone bits or drag bits, and water or drilling mud to flush the hole.
c) "Hand" augers.

In Rock:

a) Core drilling with diamond-faced, double or triple tube core barrels.
b) Core boring with roller cone bits.

The drilling method used during this exploration is presented in the following paragraph.

Hollow Stem Augering: A hollow stem augers consists of a hollow steel tube with a continuous exterior spiral flange termed a flight. The auger is turned into the ground, returning the cuttings along the flights. The hollow center permits a variety of sampling and testing tools to be used without removing the auger.

Sampling and Testing in Boreholes

Several techniques are used to obtain samples and data in soils in the field; however the most common methods in this area are:

a) Standard Penetrating Testing
b) Undisturbed Sampling
c) Dynamic Cone Penetrometer Testing
d) Water Level Readings

The procedures utilized for this project are presented below.

Standard Penetration Testing: At regular intervals, the drilling tools are removed and soil samples obtained with a standard 2 inch diameter split tube sampler connected to an A or N-size rod. The sampler is first seated 6 inches to penetrate any loose cuttings, and then driven an additional 12 inches with blows of a 140 pound safety hammer falling 30 inches. Generally, the number of hammer blows required to drive the sampler the final 12 inches is designated the "penetration resistance" or "N" value, in blows per foot (bpf).

The split barrel sampler is designed to retain the soil penetrated, so that it may be returned to the surface for observation. Representative portions of the soil samples obtained from each split barrel sample are placed in jars, sealed and transported to our laboratory.

The standard penetration test, when properly evaluated, provides an indication of the soil strength and compressibility. The tests are conducted according to ASTM Standard D1586. The depths and N-values of standard penetration tests are shown on the Boring Logs. Split barrel samples are suitable for visual observation and classification tests but are not sufficiently intact for quantitative laboratory testing.

Water Level Readings: Water table readings are normally taken in the borings and are recorded on the Boring Logs. In sandy soils, these readings indicate the approximate location of the hydrostatic water table at the time of our field exploration. In clayey soils, the rate of water seepage into the borings is low and it is generally not possible to establish the location of the hydrostatic water table through short term water level readings. Also, fluctuation in the water table should be expected with variations in precipitation, surface run-off, evaporation, and other factors. For long-term monitoring of water levels, it is necessary to install piezometers.

The water levels reported on the Boring Logs are determined by field crews immediately after the drilling tools are removed, and several hours after the borings are completed, if possible. The time lag is intended to permit stabilization of the groundwater table which may have been disrupted by the drilling operation.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the cave-in zone. The cave-in depth is measured and recorded on the Boring Logs.

BORING LOGS

The subsurface conditions encountered during drilling are reported on a field boring log prepared by the Driller. The log contains information concerning the boring method, samples attempted and recovered, indications of the presence of coarse gravel, cobbles, etc., and observations of groundwater. It also contains the driller's interpretation of the soil conditions between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are kept on file in our office.

After the drilling is completed, a geotechnical professional classifies the soil samples and prepares the final Boring Logs which are the basis for our evaluations and recommendations.

SOIL CLASSIFICATION

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our Boring Logs.

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary; grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D-2487). Each of these

classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties are presented in this report.

The table below presents criteria that are typically utilized in the classification and description of soil and rock samples for preparation of the Boring Logs.

Relative Density of Cohesionless Soils From Standard Penetration Test		**Consistency of Cohesive Soils**	
Very Loose	≤ 4 bpf	Very Soft	≤ 2 bpf
Loose	5 - 10 bpf	Soft	3 - 4 bpf
Medium Dense	11 - 30 bpf	Medium Stiff	5 - 8 bpf
Dense	31 - 50 bpf	Stiff	9 - 15 bpf
Very Dense	> 50 bpf	Very Stiff	16 - 30 bpf
		Hard	31 – 50 bpf
(bpf = blows per foot, ASTM D 1586)		Very Hard	> 50 bpf
Relative Hardness of Rock		**Particle Size Identification**	
Very Soft	Hard Rock disintegrates or easily compresses to touch; can be hard to very hard soil.	Boulders	Larger than 12"
Soft	May be broken with fingers.	Cobbles	3" - 12"
Moderately Soft	May be scratched with a nail, Corners and edges may be broken with fingers.	Gravel	
		Coarse	3/4" - 3"
		Fine	4.76mm - 3/4"
Moderately Hard	Light blow of hammer required to break samples.	Sand	
		Coarse	2.0 - 4.76 mm
		Medium	0.42 - 2.00 mm
		Fine	0.42 - 0.074 mm
Hard	Hard blow of hammer required to break sample.	Fines (Silt or Clay)	Smaller than 0.074 mm
Rock Continuity		**Relative Quality of Rocks**	
RECOVERY = Total Length of Core / Length of Core Run x 100 %		**RQD** = Total core, counting only pieces > 4" long / Length of Core Run x 100%	
Description	Core Recovery %	Description	RQD %
Incompetent	Less than 40	Very Poor	0 - 25 %
Competent	40 - 70	Poor	26 - 50 %
Fairly Continuous	71 - 90	Fair	51 - 75 %
Continuous	91 -100	Good	76 - 90 %
		Excellent	91 - 100 %

APPENDIX II

Existing BFI Report Boring logs – B-1 through B-11 and B-14 through B-25

Existing Pile Driving Data

LOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 5/2/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 1

BENT NO. 1 FOOTING 52' LT. ℄ LT. BR. GROUND ELEV. 873.58

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

EL	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø
	GR. EL.												
860	Dense Mltc Micas Sandy Silt	1s	46										
	Med. Dense Same W/ Weath. Rock	2s	21										
		3s	39										
	Dense Same	4s	36										
850		5s	60=.7'										
	V. Dense Same	6s	60										
840	Dense Same	7s	32										
		8s	54										
830	V. Dense Same	9s	60=.7'										
		10s	60=.7'										
820		11s	60=.7'										
	V. Hard Rock												
	Refusal												
810													

TEST PILE #

MIN. TIP- 850

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contractor relies on this information in his bidding or in his construction operations and finds that it is inaccurate.

This foundation investigation report is not considered as a part of the Plans and Specifications.

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 5/2/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 2

BENT NO. 1 FOOTING 30' LT. ℄ LT. BR GROUND ELEV. 868.83

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

EL	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
	GR. EL.													
	Hard Red Micas Sandy Silty Clay	1s	40											
860														
	Med. Dense Mltc Micas Sandy Silt	2s	19											
		3s	22											
		4s	60=.7'											
	V. Dense Same	5s	60=.7'											
840														
		6s	60=.7'											
		7s	60=.7'											
830	V. Hard Rock													
	Refusal													
820														
810														
800														

The Department of Transportation is making this foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contract [illegible] in the bidding or [illegible] that [illegible]

GDT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/14/79

LOCATION Nb BR. O/ LITTLE RIVER. BORING NO. 3

BENT NO. 2 FOOTING 52' LT. ℄ LT. BR GROUND ELEV. 858.22

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

ELEV.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
	GR. EL.													
	V. Dense Mltc Micas Sandy Silt W/Weath. Rock	1s	60=.3'											
840		2s	60=.3'											
	V. Hard Rock													
	Refusal													
830														
820														

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/14/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 4

BENT NO. 2 FOOTING 32' LT ℄ LT. BR. GROUND ELEV. 858.41

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

V.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
	GR.EL.													
	V.Dense Mltc Micas Sandy Silt W/ Weath. Rock	1s	60=.8'											
840	Dense Same	2s	35											
	V. Dense Same	3s	60=.3'											
	V. Dense Rock													
	Refusal													
830														
820														

The Department of Transportation in making the foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contractor relies on this information in his bidding or in his construction operations and finds that it is inaccurate.

This foundation investigation report is not considered as a part of the Plans and Specifications or Contract on the job

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/16/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 5

BENT NO. 3 FOOTING 52' LT. ℄ LT. BR. GROUND ELEV. 835.64

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

WASHBORING

ELEV.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
830	Top Water													
	GR. EL.													
	Loose to Med. Dense Sand													
820	Washboring Refusal on Rock													
810														

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contractor relies on this information in his bidding, or in his construction operations and finds that it is inaccurate.

This [illegible] report is not [illegible] and Specifications [illegible]

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/16/79

LOCATION NB BR. O/ LITTLE RIVER. BORING NO. 6

BENT NO. 3 FOOTING 32' LT ℄ LT. BR GROUND ELEV. 837.64

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

WASHBORING

EL.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
830	Top Water													
	GR. EL.													
	Loose to Med. Dense Sand													
	Washboring Refusal on Rock													
820														
810														

The Department of Transportation in making this information available to contractors assumes no responsibility for its accuracy.

[illegible] shall be limited to the contractor [illegible] in his bidding or [illegible] operations and finds that [illegible].

This foundation investigation report is not [illegible] as a part of the Plans and Specifications to Contract on the job.

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/15/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 7

BENT NO. 4 FOOTING 32' LT. ℄ LT. BR GROUND ELEV. 837.14

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

WASHBORING

ELEV.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
10	Top Water													
	GR. EL.													
	Loose to Med. Dense Sand & Gravel													
0														
	Washboring Refusal on Rock													
820														
810														

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contractor or relies on this information in his bidding or in his construction operations and it is inaccurate

This foundation investigation report is not considered as a part of the Plans and Specifications or Contract on the job

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/15/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 8

BENT NO. 4 FOOTING 52' LT. ℄ LT. BR. GROUND ELEV. 838.14

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

WASHBORING

EL.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	Ø	
0	Top Water ?													
	GR. EL. ?													
	Loose to Med. Dense Sand & Gravel													
820	Washboring Refusal on Rock													
810														

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contractor relies on this information in his bidding or in his construction operations and finds that it is inaccurate.

[illegible] foundation report is not [illegible] and Specifications [illegible]

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT 1-575-1(6)07 COUNTY CHEROKEE DATE 8/15/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 9

BENT NO. 5 FOOTING 52' LT. ℄ LT. BR GROUND ELEV. 850.99

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

EL.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
850	GR.EL.													
	V. Dense Mltc Micas Sandy Silt W/ Weath. Rock	1s	56											
		2s	60=.1'											
	V. Hard Rock													
	Refusal													
830														
820														

The Department [illegible] in making [illegible] contractors [illegible] accuracy, [illegible] the contract [illegible] in his bidding or [illegible] and finds that [illegible] report is not [illegible] and Speci-

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/15/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 10

BENT NO. 5 FOOTING 32' LT. ℄ LT. BR. GROUND ELEV. 850.19

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

V.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
0	GR. EL.													
	Dense Mltc Micas Sandy Silt W/ Weath. Rock	1s	33											
		2s	31											
	V. Dense Same	3s	60=.7'											
	V. Hard Rock			12										
	Refusal													
830														
820														

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/15/79

LOCATION NB BR. O/ LITTLE RIVER. BORING NO. 11

BENT NO. 6 FOOTING 38' LT ℄ LT. BR. GROUND ELEV. 892.07

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

ELEV.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
	GR. EL.													
890	Loose Mtc Micas Sandy Silt													
		1s	60=.6'											
	V. Dense Same W/ Weath. Rock	2s	60=.7'											
880		3s	60=.1'											
		4s	60=.6'											
	Dense Same													
860	Refusal on Rock													

DOT 450

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 5/1/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 14

BENT NO. 1 FOOTING 42'RT. ℄ RT. BR. GROUND ELEV. 854.68

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

ELEV.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	Ø	
	GR.EL.													
830		1s	23											
	Med. Mltc Micas Sandy Silt	2s	12											
0		3s	14											
		4s	17											
3.0	Loose Same	5s	9											
	Med. Dense Same	6s	14											
820	Dense Same W/ Weath. Rock	7s	38											
		8s	32											
810		9s	30											
	V. Dense Same	10s	51											
10	V. Hard Rock													
	Refusal													

The Department of Transportation in making this foundation [illegible] to contractors assumes no [illegible]

No claim [illegible] for relief [illegible] in his co[illegible] It is in[illegible]

This [illegible] consid[illegible] local [illegible]

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 5/2/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 15

BENT NO. 2 FOOTING 32' RT ℄ RT. BR GROUND ELEV. 861.76

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

EV	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	Ø
	GR.EL.												
860													
	Med. Dense Mltc Micas Sandy Silt	1s	24										
VT		2s	22										
0		3s	23										
10		4s	28										
	Dense Same W/ Weath. Rock	5s	33										
830	V. Dense Same	6s	50										
	Dense Same	7s	30										
820	Med. Dense Mltc Micas Sandy Silt	8s	16										
	Dense Same	9s	37										
8	Med. Dense Same	10s	23										
	V.Dense Same W/Weo.Rock	11s	60=.7'										
	V. Hard Rock												
8	Refusal												

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contractor relies on this information in any phase of his construction operations and finds that it is inaccurate.

This foundation investigation report is not considered as a part of the Plans and Specifications or Contract on the job.

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT 1-575-1(6)07 COUNTY CHEROKEE DATE 5/1/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 16

BENT NO. 2 FOOTING 52' RT. ℄ RT. BR. GROUND ELEV. 855.58

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

V.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
	GR. EL.													
		1s	17											
		2s	11											
	Med. Dense Mltc Micas Sandy Silt	3s	18											
		4s	18											
		5s	13											
		6s	12											
820		7s	14											
	W/ Weath. Rock	8s	19											
810	Dense Mltc Micas Sandy Silt W/ Weath. Rock	9s	28											
		10s	23											
	M. Dense Same	11s	51											
	V. Dense Same	12s	51											
		13s	60=.6'											
	CONTINUED													

The Department of Transportation in making this foundation report available to [illegible] assumes no responsibility for its [illegible]. No claim will be considered [illegible] or relies on this information [illegible]

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT _____ COUNTY _____ DATE _____

LOCATION _____ BORING NO. 16 CONT

BENT NO. _____ FOOTING _____ GROUND ELEV. _____

PROPOSED FOOTING ELEV. _____ PARTY CHIEF _____

EL V.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
	V. Dense Mltc Micas Sandy Silt W/ Weath. Rock	14s	60=.4'											
	V. Hard Rock													
30	Refusal													

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/13/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 17

BENT NO. 3 FOOTING 32' RT. ℄ RT. BR. GROUND ELEV. 855.02

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

V.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
	GR. EL.													
0	Med. Dense Mltc Micas Sandy Silt W/ Weath. Rock	1s	20											
WT		2s	21											
		3s	30											
	Dense Same	4s	31											
830		5s	44											
		6s	60=.6'											
820	V. Dense Same	7s	60=.1'											
		8s	60=.1'											
	V. Hard Rock													
810	Refusal													
10														

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contractor relies on this information in his bidding or in his construction operations and finds that it is inaccurate.

This foundation investigation report is not considered as a part of the Plans and Specifications as Contract on the job.

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/13/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 18

BENT NO. 3 FOOTING 54' RT ℄ RT. BR. GROUND ELEV. 852.94

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

EL.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
	GR. EL.													
830	Dense Red Micas Sandy Silt	1s	31											
825	V. Dense Mltc Micas Sandy Silt W/ Weath. Rock	2s	56											
	V. Hard Rock													
	Refusal													
810														
820														

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contractor relies on this information in his bidding or in his construction operations and finds that it is inaccurate.

This foundation [illegible] report is not considered as [illegible] Specifications [illegible]

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/16/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 19

BENT NO. _____ FOOTING 32' RT. ℄ RT. BR. GROUND ELEV. 836.64

PROPOSED FOOTING ELEV. _____ PARTY CHIEF HOLLIS

WASHBORING

L	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
830	Top Water													
	GR. EL.													
	Loose to Med. Dense Sand													
820	Washboring Refusal on Rock													
810														

The Department of Transportation in making this formal or informal available to contractors assumes no responsibility for the accuracy of the data shown thereon.

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/16/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 20

BENT NO. 4 FOOTING 52' RT. ℄ RT. BR. GROUND ELEV. 835.64

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

WASHBORING

BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
Top Water													
GR.EL.													
Loose to Med. Dense Sand													
Washboring Refusal on Rock													

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy or rules on this [illegible] in his construction [illegible] it is inaccurate.

This foundation investigation report [illegible] considered as a part of the [illegible] fications or Contract on this [illegible]

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/15/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 21

BENT NO. 5 FOOTING 32' RT. ℄ RT. BR. GROUND ELEV. 838.64

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

WASH BORING

L	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
830	Top Water ? GR. EL. ?													
	Loose Same													
	Med. Dense Sand & Gravel													
320	Washboring Refusal on Rock													
310														

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/15/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. '22

BENT NO. 5 FOOTING 52' RT. ℄ RT. BR. GROUND ELEV. 838.64

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

WASHBORING

EL.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
830	Top Water GR. EL.													
	Loose to Med. Dense Gravel													
	Med. Dense Sand & Gravel													
820	Washboring Refusal on Rock													
810														

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contractor relies on this information in his bidding or in his construction operations and finds that it is inaccurate.

This foundation investigation report is not considered as a part of the [illegible] is not Spe[illegible]

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/15/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 23

BENT NO. 6 FOOTING 34' RT. ℄ RT. BR. GROUND ELEV. 852.49

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

EL.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
	GR. EL.													
830	Med. Dense Mltc Micas Sandy Silt W/ Weath. Rock	1s	16											
		2s	19											
	Dense Same	3s	26											
	V. Hard Rock	4s	60=.1'											
	Refusal													
820														

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy. [illegible] the contractor [illegible] the boring or [illegible] and lines that [illegible]

The foundation investigation report is not considered as a part of the Plans and Specifications or Contract on the job.

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/15/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 24

BENT NO. 6 FOOTING 52' RT. ℄ RT. BR. GROUND ELEV. 852.29

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

V.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
	GR. EL.													
60	Dense Mltc Micas Sandy Silt	1s	4 1											
		2s	60=.7'											
	V. Dense Same W/ Weath. Rock	3s	60=.6'											
830		4s	60=.6'											
	V. Dense Weath. Rock	5s	60=.1'											
820	End Drilling in Wea. Rock													

The Department of Transportation in making this foundation report available to contractors assumes no responsibility for its accuracy.

No claim will be considered if the contractor relies on this information in his bidding or in his construction operations and finds that it is inaccurate.

This foundation investigation report is not considered as a part of the Plans and Specifications [illegible] job.

DOT 490

DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS AND RESEARCH, FOREST PARK, GEORGIA
GEOTECHNICAL ENGINEERING

BRIDGE SUBSURFACE INVESTIGATION

PROJECT I-575-1(6)07 COUNTY CHEROKEE DATE 8/16/79

LOCATION NL BR. O/ LITTLE RIVER. BORING NO. 25

BENT NO. 7 FOOTING 38' RT. ℄ RT. BR. GROUND ELEV. 888.47

PROPOSED FOOTING ELEV. PARTY CHIEF HOLLIS

E.	V.	BORING LOG		BLOW	UNIFIED	γ	W	Gs	% 200	% CLAY	LL	PI	C	ø	
		GR.EL.7													
			1s	60=.7'											
	10	V. Dense Mitc Micas Sandy Silt ,W/ Weath. Rock.	2s	52											
			3s	51											
		Dens e Same	4s	41											
			5s	44											
	860		6s	60=.6'											
		V. Dense Same	7s	60=.6'											
	850		8s	60=.5'											
			9s	60=.6'											
	840	End Drilling													
	830														

[illegible] Transportation in making [illegible] contractors [illegible] accuracy.

[illegible] If the contractor [illegible] ling or [illegible] finds that

[illegible] report is not [illegible] Plans and Specifi- [illegible] job.

OR

DRIVING DATA PILE ☐

12-15-80

PROJECT NO. I-575-1(6) 07 CT # 1 COUNTY Cherokee

BRIDGE CARRYING I-575 OVER Little River

PILING	LOCATION			SUMMARY	
UT ..... x '	DATA OR TEST PILE NO.	BRIDGE NO.	BENT NO. 1	ELEVATIONS, IN WHOLE NO.'S ONLY	PILE LENGTH ESTIMATED IN BFI REPORT, THIS BENT 62 FT.
TT ..... x '	1	1LT	PILE NO. 12	(1) CUT-OFF 892.32	REMARKS:
H. 12 BP 53 x '				GROUND 891.32	
MS ____ IN. O.D. x '				(2) FINAL TIP 843.32	
PSC ____ IN. ____ x '				(3) ACCEPT. TIP 843.32	
OTHER	HAMMER			(1) – (2) = 49.0	
PLAN DRIVING OBJECTIVE (PDO)	GRAVITY ____ LB.			(1) – (3) = 49.0	
☐ PRACTICAL REFUSAL	MKT DE –			NAME:	
☐ DRIVE. RESIST. 70 TONS	DELMAG D – 22				
☐ MIN. TIP ELEV. 850.0	VULCAN NO.				
	LINK-BELT MODEL				
	OTHER:				

DATA BEGAN WITH A PENT. OF 11.0 FEET BELOW CUT-OFF AND A TIP ELEVATION OF 890.0 (WHOLE NO.'S ONLY)

*HAMMER FALL (FEET)	NO. OF BLOWS	TOTAL PENT. (INCHES)	AVER. PENT. PER BLOW (INCHES)	ELEVATION OF TIP WHOLE FEET	DRIV. RESIST. IN WHOLE TONS	OCCASIONAL CORRECTED TIP ELEVATION, FINAL TIP ELEVATION, ORDER LENGTH, ETC.
3	10	17 1/2	1 7/8	881.69	—	
3		16 1/2	1 3/4	880.23	—	
3		14 1/2	1 1/2	878.85	—	
3		12 1/2	1 1/4	877.64	—	
3 1/2		12 1/2	1 1/4	876.60	—	
3 1/2		12 1/2	1 1/4	875.56	—	
3 1/2		8 1/2	7/8	874.52	—	
4		7 1/2	5/8	873.81	—	
4		7 1/2	5/8	873.18	—	
4 1/2		6 1/2	5/8	872.55	—	
5		6	5/8	872.01	30	
5		6	5/8	871.51	30	
5 1/2		5 1/2	1/2	871.01	32	
5 1/2		5	1/2	870.55	38	
5 1/2		5	1/2	870.13	38	
5 1/2		4 1/2	3/8	869.71	41	
5 1/2		4 1/2	3/8	869.33	41	
5 1/2		4 1/2	3/8	869.95	41	
5 1/2		4 1/2	3/8	868.57	41	
6		4 1/2	3/8	868.19	45	
6		4 1/2	3/8	867.81	45	
6		3 1/2	3/8	867.43	53	
6		3 1/2	3/8	867.14	53	
6		4 1/2	3/8	866.85	45	
6		4 1/2	3/8	866.47	45	
6		3 1/2	3/8	866.09	53	
6		3 1/2	3/8	865.80	53	
6		~~5 1/2~~ 4	3/8	865.51	49	
6		4	3/8	865.18	49	

*FOR GRAVITY AND POWER HAMMERS

FOR DIFFERENTIAL OR DOUBLE ACTING STEAM OR AIR HAMMERS, USE MANUFACTURERS ENERGY RATING.

FOR ENCLOSED — RAM DIESEL HAMMERS, CONVERT BOUNCE CHAMBER PRESSURE READING TO "E" VALUE BY MEANS OF CHART; USE IN APPROPRIATE FORMULA.

110 66.

TEST PILE DRIVING DATA

TEST PILE NO. 12 CONTINUED. PAGE NO. 2 OF 3

PROJECT NO. T-575-1(6)07CT#1 COUNTY Cherokee

HAMMER FALL (FEET)	NO. OF BLOWS	TOTAL PENT. (INCHES)	AVER. PENT. PER BLOW (INCHES)	ELEVATION OF TIP, WHOLE FEET	BEARING IN WHOLE TONS	OCCASIONAL CORRECTED TIP ELEVATION, FINAL TIP ELEVATION, ORDER LENGTHS, ETC.
6	10	4 1/2	3/8	864.85	45	
6		4 1/2	3/8	864.47	45	
6		4 1/2	3/8	864.09	45	
6		4 1/2	3/8	863.71	45	
6		4 1/2	3/8	863.33	45	
6		4 1/2	3/8	862.95	45	
6		4 1/2	3/8	862.57	45	
6		4	3/8	862.19	49	
6		4	3/8	861.86	49	
6		4	3/8	861.53	49	
6		4	3/8	861.20	49	
6		4	3/8	860.87	49	
6		4	3/8	860.54	49	
6		4	3/8	860.21	49	
6		4 1/2	3/8	859.88	45	
6		4 1/2	3/8	859.50	45	
6		4 1/2	3/8	859.12	45	
6		3 1/2	3/8	858.74	53	
6		3 1/2	3/8	858.45	53	
6		4 1/2	3/8	858.16	45	
6		4 1/2	3/8	857.78	45	
6		5	1/2	857.40	42	
6		4 1/2	3/8	856.98	45	
6		5	1/2	856.60	42	
6		4 1/2	3/8	856.18	45	
6		4 1/2	3/8	855.80	45	
6		4 1/2	3/8	855.42	45	
6		4	3/8	855.04	49	
6		4 1/2	3/8	854.71	45	
6		4 1/2	3/8	854.33	45	
6		4	3/8	853.95	49	
6		4	3/8	853.62	49	
6		4	3/8	853.29	49	
5 1/2		3 1/2	3/8	852.96	49	
5 1/2		3 1/2	3/8	852.67	49	
5 1/2		3 1/2	3/8	852.38	49	
5 1/2		3 1/2	3/8	852.09	49	
5 1/2		3 1/2	3/8	851.80	49	
5		3 1/2	3/8	851.51	44	
5		3 1/2	3/8	851.22	44	
5		3 1/2	3/8	850.93	44	
5		3 1/2	3/8	850.64	44	
5		3 1/2	3/8	850.35	44	
5		4	3/8	850.06	41	
5		4	3/8	849.73	41	
5		4	3/8	849.40	41	
5		4	3/8	849.07	41	
5		4	3/8	848.74	41	
5		3 1/2	3/8	848.41	44	
5		3 1/2	3/8	848.12	44	
5		3	5/16	847.83	49	

(10-66)

TEST PILE DRIVING DATA

TEST PILE NO. 12 CONTINUED. PAGE NO. 3 OF 3

PROJECT NO. I-575-1(6)07 CT. #1 COUNTY Cherokee

HAMMER FALL (FEET)	NO. OF BLOWS	TOTAL PENT. (INCHES)	AVER. PENT. PER BLOW (INCHES)	ELEVATION OF TIP. WHOLE FEET	BEARING IN WHOLE TONS	OCCASIONAL CORRECTED TIP ELEVATION. FINAL TIP ELEVATION. ORDER LENGTHS. ETC.
5	10	3	5/16	847.58	49	
5		3	5/16	847.33	49	
5		3	5/16	847.08	49	
5 1/2		2 1/2	1/4	846.83	60	
5 1/2		2 1/2	1/4	846.62	60	
5 1/2		2 1/2	1/4	846.41	60	
5 1/2		2 1/2	1/4	846.20	60	
5 1/2		2 1/2	1/4	845.99	60	
5 1/2		2	3/16	845.78	67	
5 1/2		2	3/16	845.61	67	
5 1/2		2	3/16	845.44	67	
5 1/2		2	3/16	845.27	67	
5 1/2		1 1/2	1/8	845.10	77	
5 1/2		1 1/2	1/8	844.97	77	
5 1/2		1 1/2	1/8	844.84	77	
5 1/2		1 1/2	1/8	844.71	77	
5 1/2		1 1/2	1/8	844.58	77	
5 1/2		1 1/2	1/8	844.45	77	
5 1/2		1 1/2	1/8	844.32	77	
5 1/2		1 1/2	1/8	844.19	77	
5 1/2		1 1/2	1/8	844.06	77	
5 1/2		1 1/2	1/8	843.93	77	
5 1/2		1	1/8	843.80	89	
5 1/2		1	1/8	843.72	89	
5 1/2		1	1/8	843.64	89	
5 1/2		1	1/8	843.56	89	
5 1/2		1	1/8	843.48	89	
5 1/2		1	1/8	843.40	89	
				843.32		FINAL TIP

D. C. T 500-A
(4-72)

TEST PILE ☐
OR
DRIVING DATA PILE ☑

DATE 10-30-8(

PROJECT NO. I-575-1 (6) 07 CT#1 COUNTY Cherokee

BRIDGE CARRYING I-575 OVER Little River

PILING	LOCATION	SUMMARY
UT . . . . . x '	DATA ~~OR TEST PILE NO.~~ 2	ELEVATIONS. IN WHOLE NO.'S ONLY
TT . . . . . x '	BRIDGE NO. 1RT.	(1) CUT-OFF 844.00
H. 12 BP 53 x '	BENT NO. 3	GROUND 843.00
MS ____ IN. O.D. x '	PILE NO. 6	(2) FINAL TIP 834.20
PSC ____ IN. ____ x '	HAMMER	(3) ACCEPT. TIP 834.20
OTHER	GRAVITY. ____ LB.	(1) – (2) = 9.8
PLAN DRIVING OBJECTIVE (PDO)	MKT DE –	(1) – (3) = 9.8
☐ PRACTICAL REFUSAL	DELMAG D – 22	NAME:
☐ DRIVE. RESIST. 70 TONS	VULCAN NO.	PILE LENGTH ESTIMATED IN BFI REPORT. THIS BENT 20 FT.
☐ MIN. TIP ELEV. 834.20	LINK-BELT MODEL	REMARKS:
	OTHER:	

DATA BEGAN WITH A PENT. OF 6.79 FEET BELOW CUT-OFF AND A TIP ELEVATION OF 837.21 | WHOLE NO.'S ONLY

*HAMMER FALL (FEET)	NO. OF BLOWS	TOTAL PENT. (INCHES)	AVER. PENT. PER BLOW (INCHES)	ELEVATION OF TIP WHOLE FEET	DRIV. RESIST. IN WHOLE TONS	OCCASIONAL CORRECTED TIP ELEVATION. FINAL TIP ELEVATION. ORDER LENGTH. ETC.
5	10	8		836.54		
5 1/2	10	6		836.04		
5 1/2	10	6		835.54		
6	10	4 1/2		835.16		
6	10	4		834.83		
7	10	2 1/2		834.62		
7 1/2	10	3		834.37		
7 1/2	10	2		834.20		

*FOR GRAVITY AND POWER HAMMERS.
FOR DIFFERENTIAL OR DOUBLE ACTING STEAM OR AIR HAMMERS. USE MANUFACTURERS ENERGY RATING.
FOR ENCLOSED – RAM DIESEL HAMMERS. CONVERT BOUNCE CHAMBER PRESSURE READING TO "E" VALUE BY MEANS OF CHART: USE IN APPROPRIATE FORMULA.

ROADWAY PLAN AND PROFILE

McWhorter III, John K

From: Moseley, Michael R [mrmoseley@pbsj.com]
nt: Friday, February 06, 2009 11:00 AM
To: McWhorter III, John K
Cc: Curtis, Steven
Subject: RE: I-575 Hydro reports
Attachments: DOC.PDF

John,

Use these traffic numbers for the preliminary layouts. Let me know if you need anything else.

Thanks,
Mike

Michael R. Moseley Jr., PE
Sr. Engineer II | PBS&J
770 933-0280

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From: McWhorter III, John K [mailto:John.McWhorter@hatchmott.com]
S : Friday, February 06, 2009 9:36 AM
To: Navarro, Hernan R
Cc: Moseley, Michael R; Curtis, Steven; Frizzell, Robbie L
Subject: RE: I-575 Hydro reports

Ricardo,

Would you please do me a quick favor and email Mike Moseley at PBS&J pdf's of the latest bridge layouts for the Noonday South, Noonday North and Little River bridges on I-575?

Thanks!

John

-----Original Message-----
From: Moseley, Michael R [mailto:mrmoseley@pbsj.com]
Sent: Fri 2/6/2009 9:02 AM
To: McWhorter III, John K
Cc: Curtis, Steven
Subject: I-575 Hydro reports

John,

C l you send me the preliminary layouts that you need traffic information on? Pdfs would be great.

Thanks,
Mike

Michael R. Moseley Jr., PE

PBS&J

1600 RiverEdge Pkwy NW, Suite 600

Atlanta, GA 30328

770 933-0280

mrmoseley@pbsj.com

www.pbsj.com

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NOONDAY SOUTH

TRAFFIC - - - - ADT = 72,700 (2005)
ADT = 108,032 (2025)

DESIGN SPEED - - - 65 MPH

TRUCKS - - - - 3%

24 HR TRUCKS - - 10%

DIRECTIONAL - - - 58%

NOONDAY NORTH

TRAFFIC - - - ADT = 85,100 (2005)
ADT = 126,459 (2025)

DESIGN SPEED - - - 65 MPH

TRUCKS - - - - 3%

24 HR TRUCKS - - - 10%

DIRECTIONAL - - - 58%

LITTLE RIVER

TRAFFIC - - - ADT = 93,740 (2005)
ADT = 139,298 (2025)

DESIGN SPEED - 65 MPH

TRUCKS - - - 3%

24 HR TRUCKS - - - 10%

DIRECTIONAL - - - 58%

McWhorter III, John K

From: Curtis, Steven [sacurtis@bechtel.com]
Sent: Friday, February 13, 2009 7:53 AM
To: McWhorter III, John K
Cc: Powell-Kent, Maxine
Subject: RE: I-575 Hydro reports

John

Monday is OK for submittal.

I don't think Mike showed any traffic data on the plans. We are just doing Costing Plans (which aren't really identified in the GDOT PPG.

In terms of title block, You can say the title block is consistent with the Costing Plans set title block prepared by GTP as part of the PPI (Public Private Initiative).

Steve

From: McWhorter III, John K [mailto:John.McWhorter@hatchmott.com]
Sent: Friday, February 13, 2009 7:46 AM
To: Moseley, Michael R; Curtis, Steven
Cc: Frizzell, Robbie L; Powell-Kent, Maxine
Subject: RE: I-575 Hydro reports
Importance: Low

Mike,

Thanks for the traffic info. Have you added this info to your cover sheet? The Bridge Office typically compares the traffic data on the bridge layout with that shown on the roadway cover sheet. I can include the data you provided with the plans, but I can't guarantee that it would eliminate the comment.

Steve,

One comment was to use the GDOT title block, which we are not doing. How would you like me to respond to this? Also, I know I mentioned Friday (today) and Monday at the latest for the schedule to resubmit these studies. Would it be OK if it ends up being on Monday?

Thanks,

John

From: Moseley, Michael R [mailto:mrmoseley@pbsj.com]
Sent: Friday, February 06, 2009 11:00 AM
To: McWhorter III, John K
Cc: Curtis, Steven
Subject: RE: I-575 Hydro reports

Use these traffic numbers for the preliminary layouts. Let me know if you need anything else.

Thanks,

Mike

Michael R. Moseley Jr., PE
Sr Engineer II | PBS&J
7)33-0280

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Sent: Friday, February 06, 2009 9:36 AM
To: Navarro, Hernan R
Cc: Moseley, Michael R; Curtis, Steven; Frizzell, Robbie L
Subject: RE: I-575 Hydro reports

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Thanks!

John

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Thanks,
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/ ta, GA 30328

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mrmoseley@pbsj.com

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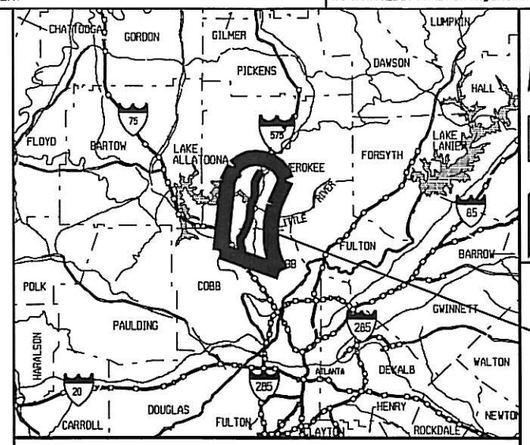
DATE*** $USER$	PRF N:\TRA\255717\Drawings\Civil\Rdy\175.pen	DGN GRWCOV	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
			GA	NH000-0575-01(028)		

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

PLAN AND PROFILE OF PROPOSED

I-575 REVERSIBLE LANES
NH000-0575-01(028)



LOCATION SKETCH

I-575 PROJECT NH000-0575-01(028),PI 713640
COBB/CHEROKEE COUNTIES

NOTE :
ALL REFERENCES IN THIS DOCUMENT,WHICH INCLUDES ALL PAPERS,WRITINGS, DOCUMENTS,DRAWINGS,OR PHOTOGRAPHS USED,OR TO BE USED IN CONNECTION WITH THIS DOCUMENT,TO "STATE HIGHWAY DEPARTMENT OF GEORGIA","STATE HIGHWAY DEPARTMENT","GEORGIA STATE HIGHWAY DEPARTMENT","HIGHWAY DEPARTMENT",OR "DEPARTMENT" WHEN THE CONTEXT THEREOF MEANS THE STATE HIGHWAY DEPARTMENT OF GEORGIA,AND SHALL BE DEEMED TO MEAN THE DEPARTMENT OF TRANSPORTATION.

COBB/CHEROKEE COUNTIES
FEDERAL AID PROJECT

FEDERAL ROUTE * I-575
STATE ROUTE * 5
P.I.NO. 713640

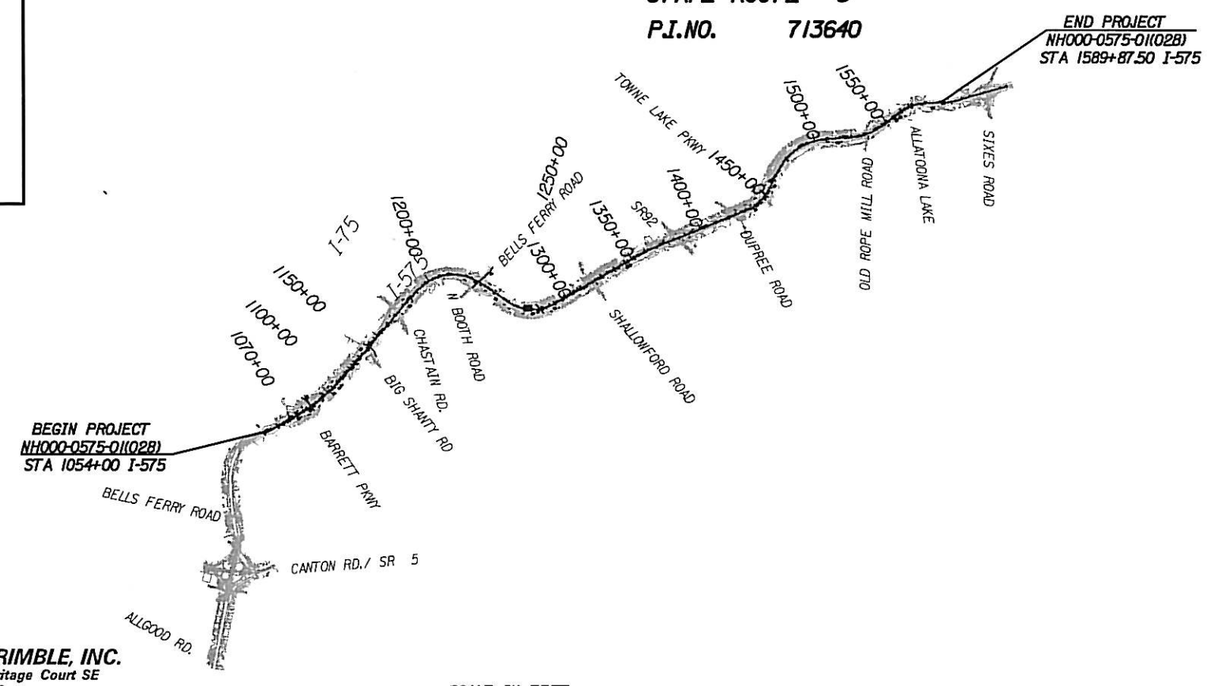
DESIGN DATA:
TRAFFIC A.D.T.:
TRAFFIC A.D.T.:
TRAFFIC D.H.V.:
DIRECTIONAL DIST:
% TRUCKS:
24 HR.TRUCKS %:
SPEED DESIGN: 70 MPH

LOCATION & DESIGN
APPROVAL DATE:

FUNCTIONAL CLASS:
INTERSTATE PRINCIPAL ARTERIAL

THIS PROJECT IS 55% IN COBB COUNTY AND 45% IN CHEROKEE COUNTY AND IS
55 % IN CONG.DIST.NO. 11 ,
45 % IN CONG.DIST.NO.6

PROJECT DESIGNATION: EXEMPT
DESIGNED IN ENGLISH UNITS.



SCALE IN FEET
0 5000 10000 20000

PREPARED BY: _____
DESIGN

RECOMMENDED FOR SUBMISSION BY: _____
DESIGN

SUBMITTED BY: _____
STATE DESIGN ENGINEER

DATE CHIEF ENGINEER

PLANS COMPLETED –

REVISIONS	FIRST UTILITY SUBMISSION

J.B. TRIMBLE, INC.
2550 Heritage Court SE
Suite 250
Atlanta, Georgia 30339

GTP Georgia Transportation Partners

NORTHWEST I-75/I-575 CORRIDOR

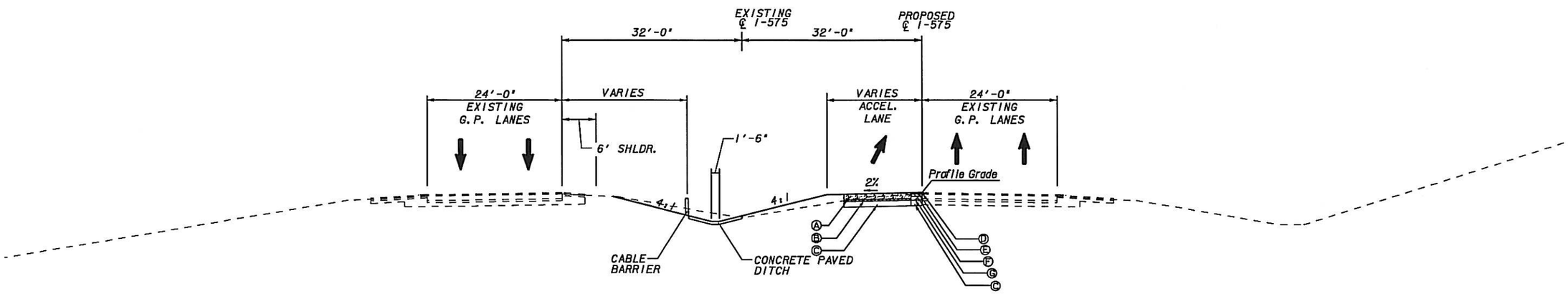
THIS PROJECT HAS BEEN PREPARED USING THE HORIZONTAL GEORGIA COORDINATE SYSTEM OF 1984 (NAD 1983)/94 WEST ZONE,AND THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988.

THE DATA,TOGETHER WITH ALL OTHER INFORMATION SHOWN ON THESE PLANS OR IN ANYWAY INDICATED THEREBY,WHETHER BY DRAWINGS OR NOTES,OR IN ANY OTHER MANNER,ARE BASED UPON FIELD INVESTIGATIONS AND ARE BELIEVED TO BE INDICATIVE OF ACTUAL CONDITIONS. HOWEVER, THE SAME ARE SHOWN AS INFORMATION ONLY,ARE NOT GUARANTEED,AND DO NOT BIND THE DEPARTMENT OF TRANSPORTATION IN ANY WAY.THE ATTENTION OF BIDDER IS SPECIFICALLY DIRECTED TO SUBSECTIONS 102.04,102.05,AND 104.03 OF THE SPECIFICATIONS.

LENGTH OF PROJECT	COBB COUNTY COUNTY NO. 067	CHEROKEE COUNTY COUNTY NO. 067	TOTAL
	MILES	MILES	MILES
NET LENGTH OF ROADWAY	5.384	4.402	9.786
NET LENGTH OF BRIDGES	0.189	0.174	0.363
NET LENGTH OF PROJECT	5.573	4.576	10.149
NET LENGTH OF EXCEPTIONS	0.000	0.000	0.000
GROSS LENGTH OF PROJECT	5.573	4.576	10.149

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH-000-0073-03(242)		

PAVEMENT MATERIAL SCHEDULE
(A) PLAIN PORTLAND CEMENT CONTRETE WITH DOWELS, 12 INCH
(B) 19 MM SUPERPAVE, MIX DESIGN LEVEL A, 330 LBS./SY
(C) GRADED AGGREGATE BASE, 12 INCH
(D) RECYCLED ASPH. CONC. 12.5 mm PEM, 135 LBS./SY
(E) RECYCLED ASPH. CONC. 12.5 mm SMA, 165 LBS./SY
(F) RECYCLED ASPH. CONC. 19 mm SUPERPAVE, 660 LBS./SY
(G) RECYCLED ASPH. CONC. 25 mm SUPERPAVE, 880 LBS./SY



TS-23- I-575 TANGENT SECTION
ONE-LANE REVERSIBLE
APPLIES TO: STA. 1570+63 TO STA. 1589+87

N:\TRA\255717\Drawings\Civil\Rdy\714130TYP.dgn 30-SEP-2009 01:44

REF FILES:

		TRACKING						
MINDY SANDERS	9/23/09	NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
DRAWN BY	DATE							
STEVE LINLEY	9/23/09	A	6/30/09	PROGRESS DRAWINGS (ROLL PLOTS)	CEC	PCT	WRW	RHM
CHECKED BY	DATE	B	9/25/09	50% SUBMITTAL	WHS	SJL	SJL	LFC
STEVE LINLEY	9/23/09							
SUPERVISOR	DATE							
LARRY COOK	9/23/09							
APPROVED	DATE							

GTP Georgia Transportation Partners

SCALE IN FEET
0 10 20 40

NORTHWEST I-75/I-575 CORRIDOR

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

JBT J.B. TRIMBLE, INC.
2550 Heritage Court SE
Suite 250
Atlanta, Georgia 30339

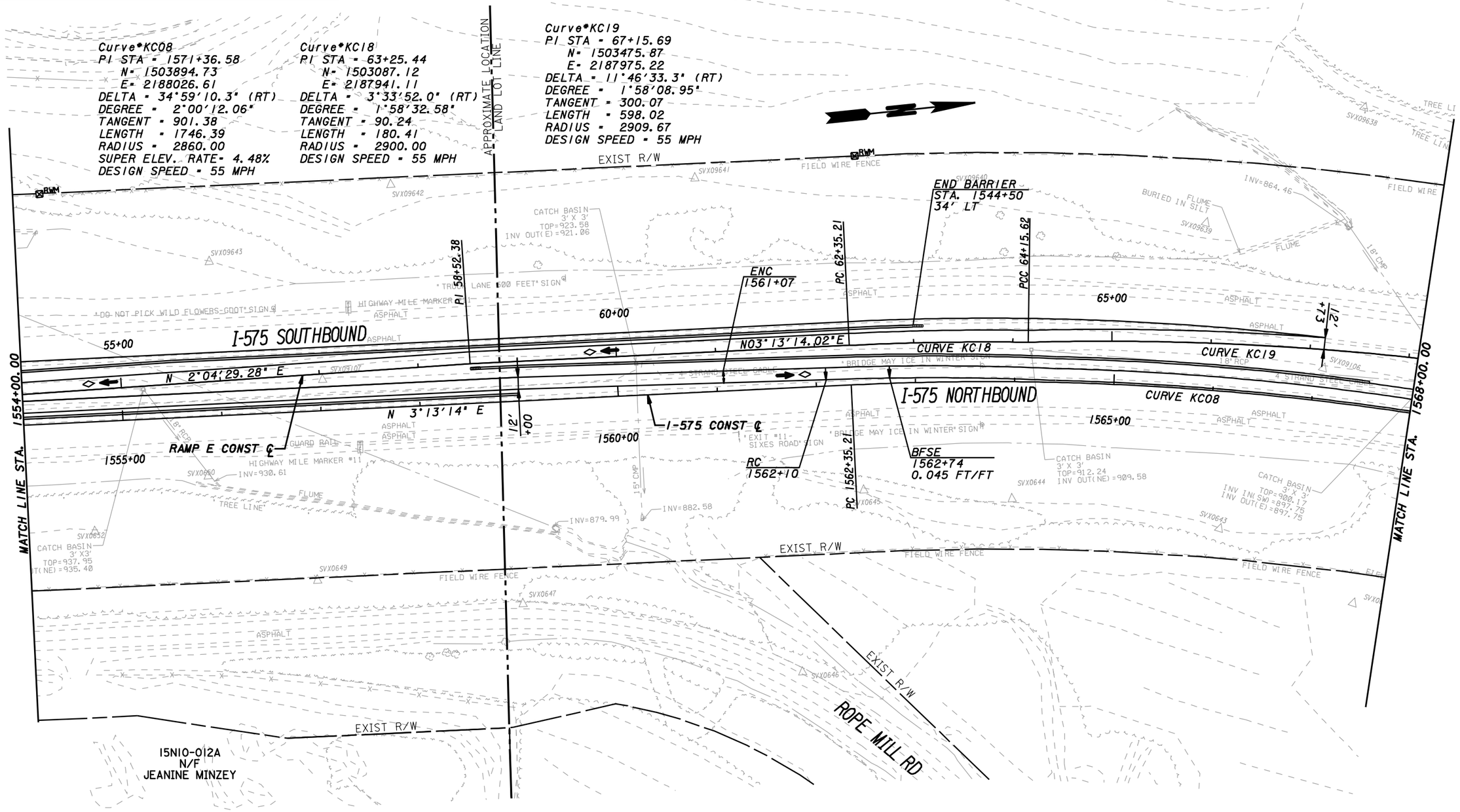
I-75 / I-575 NORTHWEST CORRIDOR

TYPICAL SECTIONS
I-575 REVERSIBLE MANAGED LANES

DRAWING No. 05-12

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0575-01(028)		

Note 1: IMPORTANT NOTICE:
This drawing is an incomplete work-in-progress and its use is subject to Note 1 on Drawing No. 1-01.



N:\TRA\255717\Drawings\Civil\Rdy\I-575 Plotfiles\713640CP37.dgn 20-NOV-2009 13:36

REF FILES:

MINDY SANDERS	11/12/09
DRAWN BY	DATE
CHECKED BY	DATE
SUPERVISOR	DATE
APPROVED	DATE

REVISIONS

NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
A	6/30/09	PROGRESS DRAWINGS (ROLL PLOTS)	MHS	SJL	SJL	LFC
B	9/25/09	50% SUBMITTAL	MHS	SJL	SJL	LFC
C	11/30/09	PLOTTED PER GDOT'S TERMINATION FOR CONVENIENCE DIRECTION	MHS			

GTP Georgia Transportation Partners

SCALE IN FEET
0 50 100 200

NORTHWEST I-75/I-575 CORRIDOR

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

JBT J.B. TRIMBLE, INC.
2550 Heritage Court SE
Suite 250
Atlanta, Georgia 30339

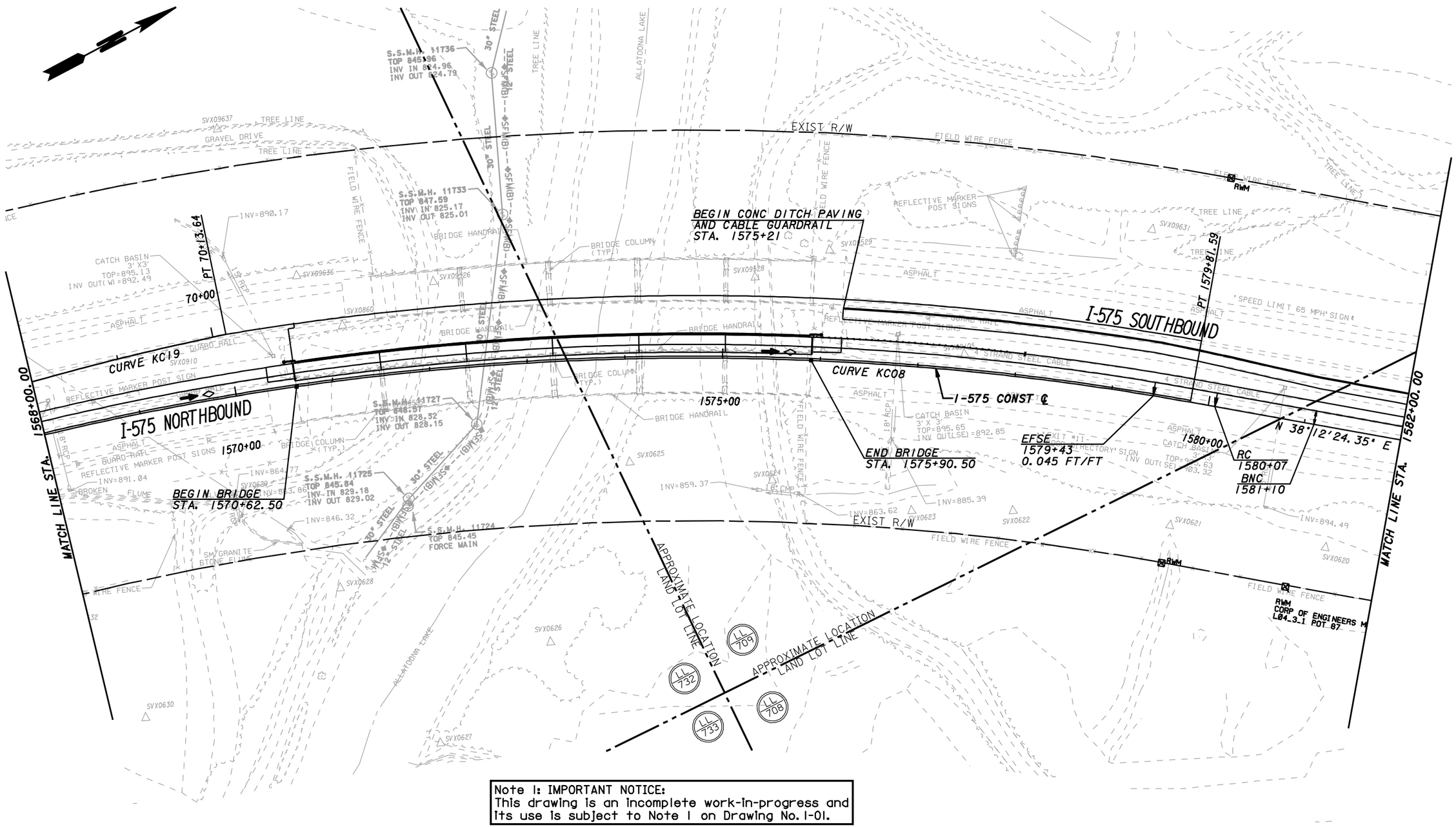
I-75 / I-575 NORTHWEST CORRIDOR

CONSTRUCTION PLAN

I-575 REVERSIBLE MANAGED LANES

DRAWING No. 13-37

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0575-01(028)		



Note 1: IMPORTANT NOTICE:
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N:\TRA\255717\Drawings\Civil\Rdgl\I-575 Plotfiles\713640CP38.dgn 20-NOV-2009 13:36

REF FILES:

MINDY SANDERS	11/12/09	
DRAWN BY	DATE	
CHECKED BY	DATE	
SUPERVISOR	DATE	
APPROVED	DATE	

REVISIONS

NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
A	6/30/09	PROGRESS DRAWINGS (ROLL PLOTS)	MHS	SJL	SJL	LFC
B	9/25/09	50% SUBMITTAL	MHS	SJL	SJL	LFC
C	11/30/09	PLOTTED PER GDOT'S TERMINATION FOR CONVENIENCE DIRECTION	MHS			

GTP Georgia Transportation Partners

SCALE IN FEET
0 50 100 200

NORTHWEST I-75/I-575 CORRIDOR

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

JBT J.B. TRIMBLE, INC.
2550 Heritage Court SE
Suite 250
Atlanta, Georgia 30339

I-75 / I-575 NORTHWEST CORRIDOR

CONSTRUCTION PLAN

I-575 REVERSIBLE MANAGED LANES

DRAWING No. 13-38

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0575-01(028)		

Note 1: IMPORTANT NOTICE:
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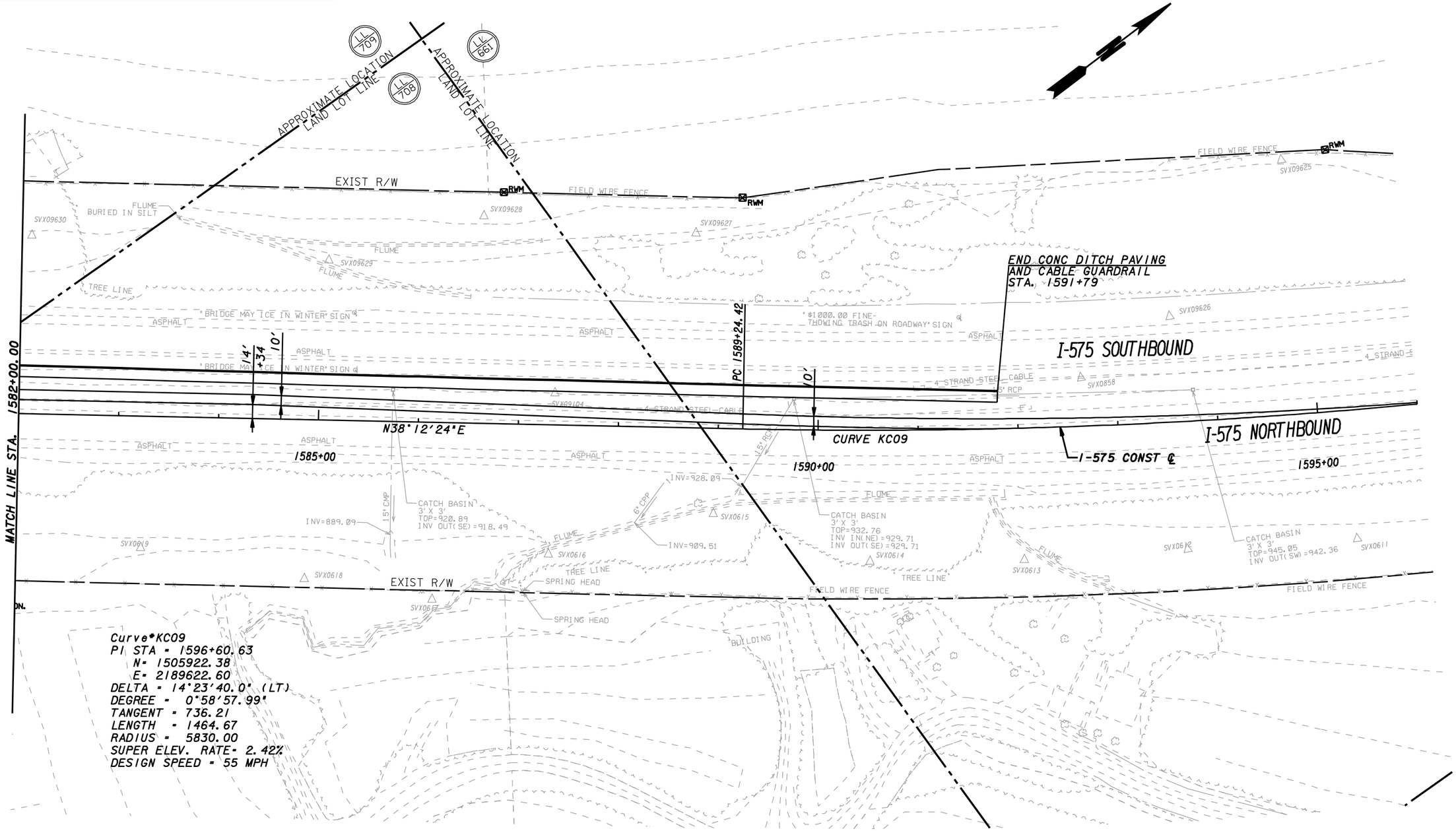


Curve*KC09
PI STA = 1596+60.63
N= 1505922.38
E= 2189622.60
DELTA = 14°23'40.0" (LT)
DEGREE = 0°58'57.99"
TANGENT = 736.21
LENGTH = 1464.67
RADIUS = 5830.00
SUPER ELEV. RATE= 2.42%
DESIGN SPEED = 55 MPH

N:\TRA\255717\Drawings\Civil\Rdgl\I-575 Plotfiles\713640CP39.dgn 20-NOV-2009 13:36

REF FILES: 1415GL387.dgn; 1415GL500.dgn; half1\tra\255717\ROD-rw\hgeat2\rw\RdSyd\1415GP60R0.dgn; half1\tra\255717\ROD-rw\hgeat2\rw\RdSyd\1415GI11L0.dgn; half1\tra\255717\ROD-rw\hgeat2\rw\RdSyd\1415GT0R0.dgn; half1\tra\255717\ROD-rw\hgeat2\rw\RdSyd\1415GS0R0.dgn; half1\tra\255717\ROD-rw\hgeat2\rw\RdSyd\1415GS0R0_PLN_I-575.dgn

MINDY SANDERS	11/12/09	
DRAWN BY	DATE	
CHECKED BY	DATE	
SUPERVISOR	DATE	
APPROVED	DATE	

REVISIONS

NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
A	6/30/09	PROGRESS DRAWINGS (ROLL PLOTS)	MHS	SJL	SJL	LFC
B	9/25/09	50% SUBMITTAL	MHS	SJL	SJL	LFC
C	11/30/09	PLOTTED PER GDOT'S TERMINATION FOR CONVENIENCE DIRECTION	MHS			

GTP Georgia Transportation Partners

SCALE IN FEET
0 50 100 200

NORTHWEST I-75/I-575 CORRIDOR

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

JBT J.B. TRIMBLE, INC.
2550 Heritage Court SE
Suite 250
Atlanta, Georgia 30339

I-75 / I-575 NORTHWEST CORRIDOR

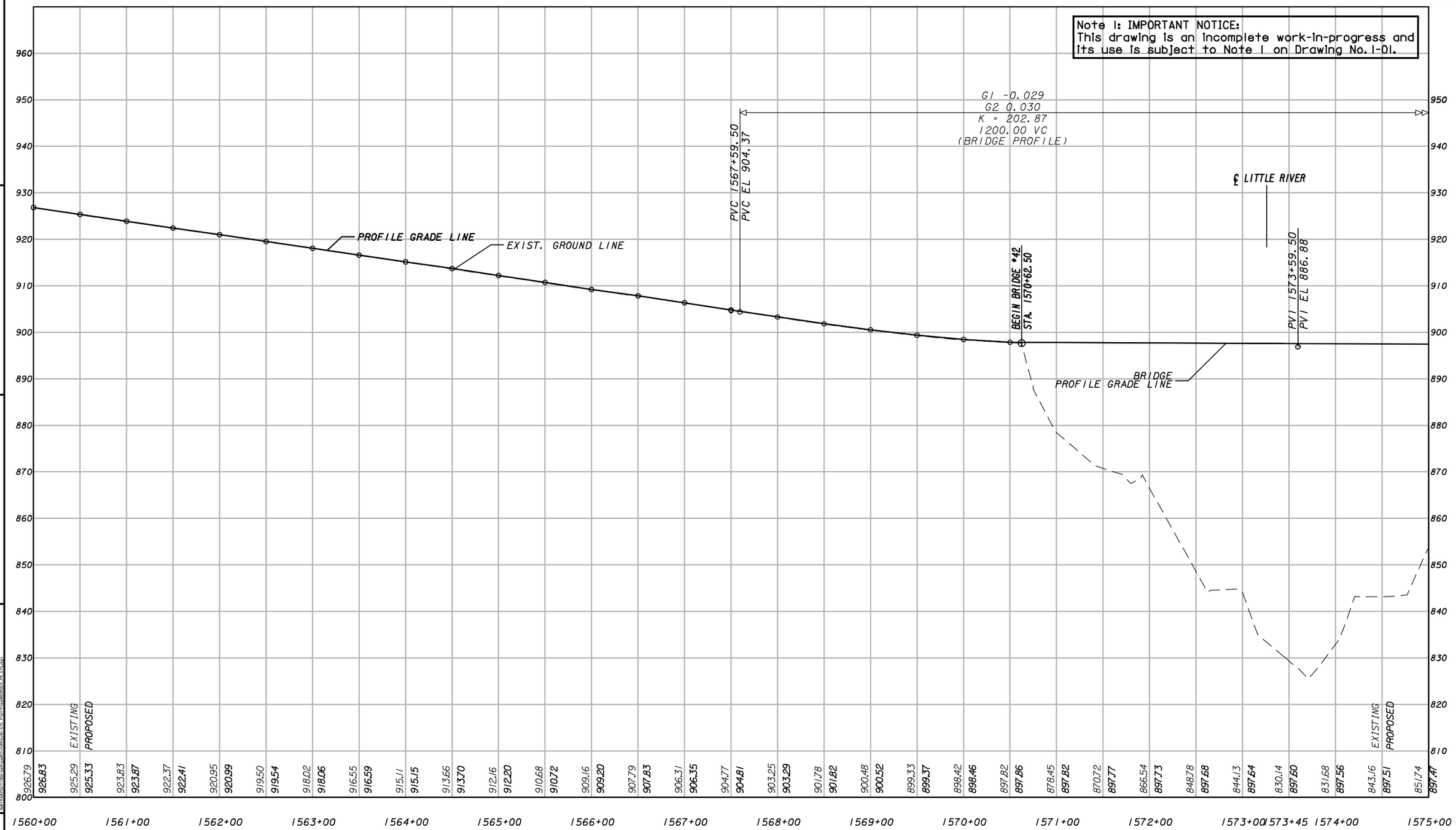
CONSTRUCTION PLAN

I-575 REVERSIBLE MANAGED LANES

DRAWING No. 13-39

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0575-01(028)		

Note 1: IMPORTANT NOTICE:
This drawing is an incomplete work-in-progress and its use is subject to Note 1 on Drawing No. 1-01.



REF FILES:

DRAWN BY	DATE
CHECKED BY	DATE
SUPERVISOR	DATE
APPROVED	DATE

REVISIONS

NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR

GTP Georgia Transportation Partners

SCALE: 1" = 50' HORIZ.
1" = 10' VERT.

NORTHWEST I-75/I-575 CORRIDOR

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

JBT J.B. TRIMBLE, INC.
2550 Heritage Court SE
Suite 250
Atlanta, Georgia 30339

I-75 / I-575 NORTHWEST CORRIDOR

MAINLINE PROFILE

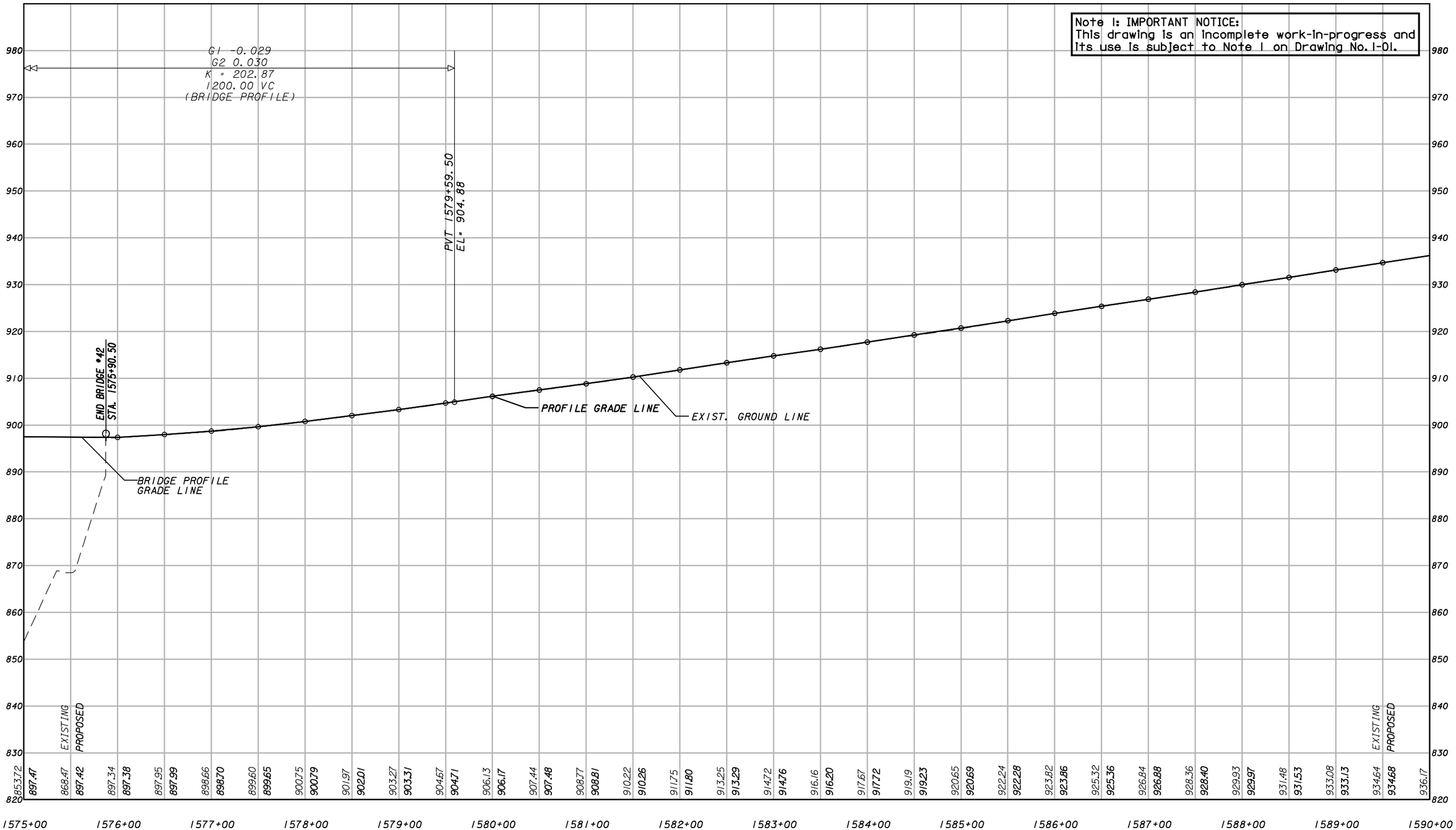
I-575 REVERSIBLE MANAGED LANES

DRAWING No. 15-35

10:05 23-NOV-2009 713640PR_I575.dgn

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0575-01(028)		

Note 1: IMPORTANT NOTICE:
This drawing is an incomplete work-in-progress and its use is subject to Note 1 on Drawing No. I-01.



REF FILES:

REVISIONS						
NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR

DRAWN BY — DATE
CHECKED BY — DATE
SUPERVISOR — DATE
APPROVED — DATE

GTP Georgia Transportation Partners

SCALE: 1" = 50' HORIZ. 1" = 10' VERT.

NORTHWEST I-75/I-575 CORRIDOR

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

JBT J.B. TRIMBLE, INC.
2550 Heritage Court SE
Suite 250
Atlanta, Georgia 30339

I-75 / I-575 NORTHWEST CORRIDOR

MAINLINE PROFILE

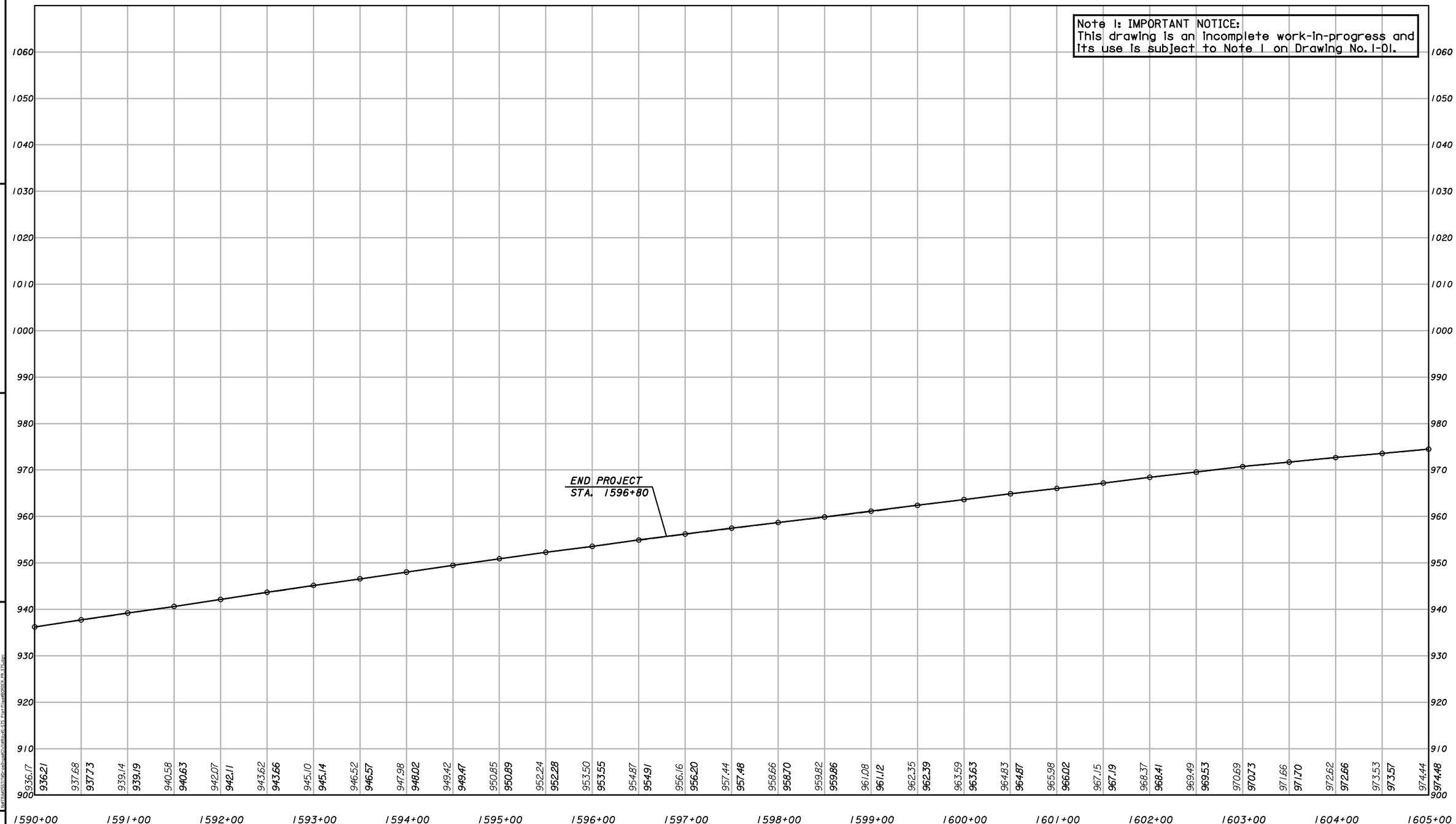
I-575 REVERSIBLE MANAGED LANES

DRAWING No. 15-36

713640PR_1575.dgn 23-NOV-2009 10:05

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0575-01(028)		

Note 1: IMPORTANT NOTICE:
This drawing is an incomplete work-in-progress and its use is subject to Note 1 on Drawing No. 1-01.



REF FILES:

REVISIONS						
NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR

DRAWN BY DATE
CHECKED BY DATE
SUPERVISOR DATE
APPROVED DATE

GTP Georgia Transportation Partners

SCALE: 1" = 50' HORIZ.
1" = 10' VERT.

NORTHWEST I-75/I-575 CORRIDOR

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

JBT J.B. TRIMBLE, INC.
2550 Heritage Court SE
Suite 250
Atlanta, Georgia 30339

I-75 / I-575 NORTHWEST CORRIDOR

MAINLINE PROFILE

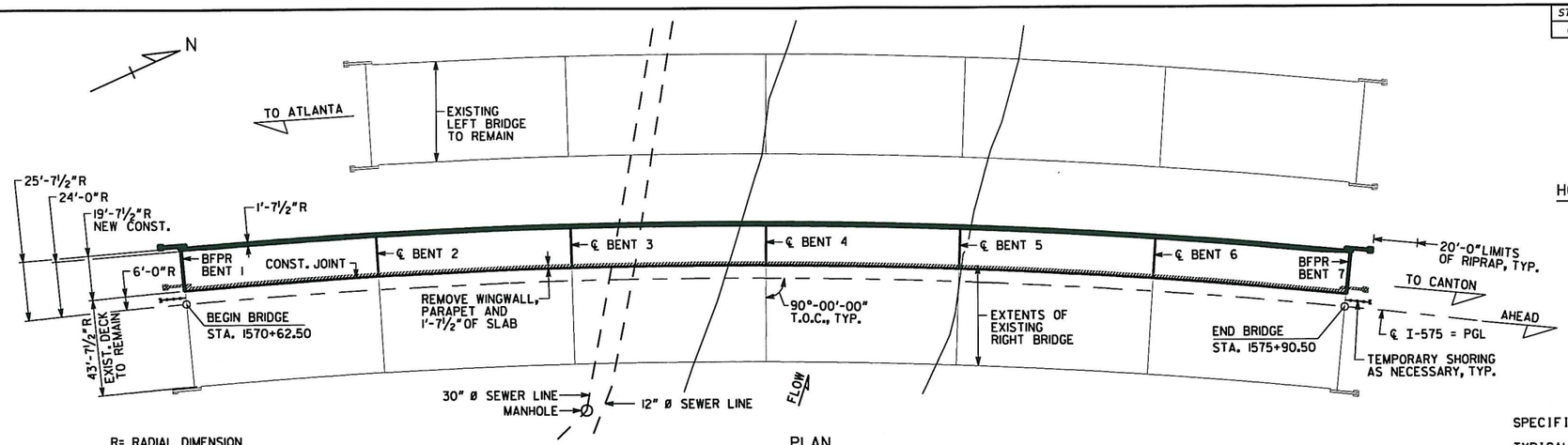
I-575 REVERSIBLE MANAGED LANES

DRAWING No. 15-37

713640PR_I575.dgn 23-NOV-2009 10:05

PRELIMINARY BRIDGE PLAN AND ELEVATION SECTION

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0575-01(028)		

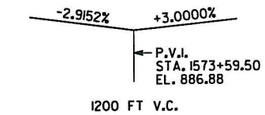


R= RADIAL DIMENSION

PLAN
SCALE: 1" = 30'-0"

P.I. STA. = 1571+36.58
Δ = 34°-59'-10"
D = 2°-00'-12"
T = 901.38 FT
L = 1746.39 FT
R = 2860.00 FT

℄ I-575
HORIZONTAL CURVE DATA



I-575
GRADE DATA

BERM ELEVATIONS ⊛		
BENT	LEFT	RIGHT
1	891.46	890.55
7	890.83	889.92

⊛ NOTE: FOR BRIDGE ENDROLL STAKING PURPOSES ONLY.

DESIGN DATA

SPECIFICATIONS ---------- AASHTO 17TH EDITION, 2002
(DESIGNED FOR SEISMIC PERFORMANCE CATEGORY B)
TYPICAL HS20-44 AND/OR MILITARY LOADING --- IMPACT ALLOWED
FUTURE PAVING ALLOWANCE ---------- 30 LBS PER SQ FT

WIDENED BRIDGE CONSISTS OF

6 - 88'-0" BULB TEE, 54 IN, PSC BEAM SPANS -------- SPECIAL DESIGN
2 - PILE END BENTS ---------- SPECIAL DESIGN
5 - CONCRETE INTERMEDIATE BENTS ---------- SPECIAL DESIGN

24" TYPE I RIP RAP

EXISTING UTILITIES UNDER BRIDGE

30" STEEL SANITARY SEWER LINE
12" STEEL SANITARY SEWER LINE

DRAINAGE DATA

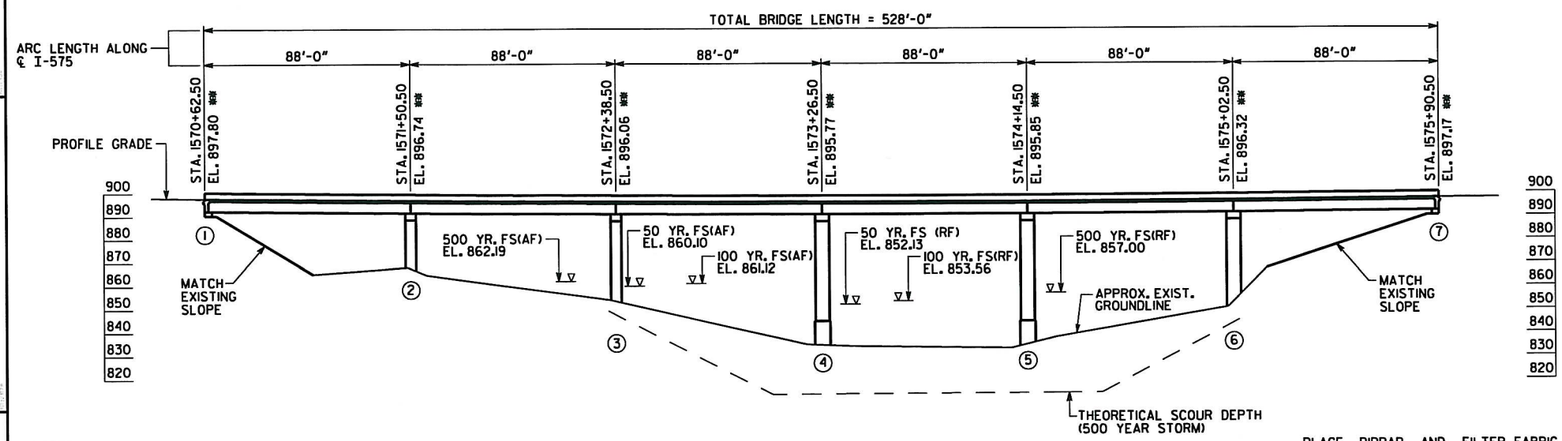
DRAINAGE AREA ---------- 142.0 SQ MI

RIVER FLOODS

FLOOD FREQUENCY	DISCHARGE THRU BRIDGE	MEAN VELOCITY	AREA OF OPENING UNDER FLOODSTAGE	BACKWATER
50 YEAR	15,780 CFS	5.55 FPS	2,846 SQ FT	0.16 FT
100 YEAR	18,250 CFS	5.80 FPS	3,145 SQ FT	0.17 FT
500 YEAR	24,913 CFS	6.39 FPS	3,901 SQ FT	0.20 FT

ABNORMAL FLOODS

FLOOD FREQUENCY	DISCHARGE THRU BRIDGE	MEAN VELOCITY	AREA OF OPENING UNDER FLOODSTAGE	BACKWATER
50 YEAR	15,780 CFS	3.35 FPS	4,705 SQ FT	0.06 FT
100 YEAR	18,250 CFS	3.69 FPS	4,945 SQ FT	0.08 FT
500 YEAR	24,913 CFS	4.80 FPS	5,187 SQ FT	0.13 FT

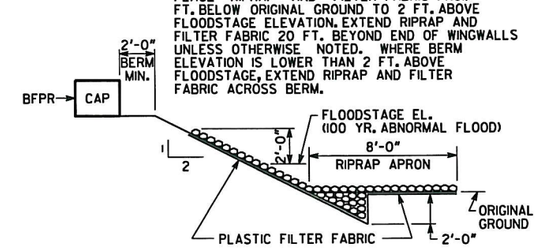


ELEVATION
SCALE: 1" = 30'-0"

NOTES:

1. *** STATIONS ARE ALONG ℄ I-575 AT THE INTERSECTION OF ℄ I-575 AND BFPR OR ℄ BENT. ELEVATIONS ARE ALONG PGL.
2. END BENT PILES NOT SHOWN.
3. THE PROPOSED BRIDGE DECK IS TO BE BUILT ON A CONSTANT CROSS SLOPE OF 7%, SLOPING DOWN TO THE RIGHT.
4. REPAIR AND REPLACE EXISTING RIPRAP AS NEEDED. EXTEND APRON ACROSS TOE OF EXISTING SLOPES.
5. THE MINIMUM BOTTOM OF BEAM ELEVATION FOR THE PROPOSED BRIDGE SHALL BE NO LOWER THAN ELEVATION 863.10
6. THE PROPOSED BRIDGE BOTTOM OF BEAM ELEVATION IS 890.95
7. ALL BENTS ARE RADIAL.

PLACE RIPRAP AND FILTER FABRIC FROM FT. BELOW ORIGINAL GROUND TO 2 FT. ABOVE FLOODSTAGE ELEVATION. EXTEND RIPRAP AND FILTER FABRIC 20 FT. BEYOND END OF WINGWALLS UNLESS OTHERWISE NOTED. WHERE BERM ELEVATION IS LOWER THAN 2 FT. ABOVE FLOODSTAGE, EXTEND RIPRAP AND FILTER FABRIC ACROSS BERM.



RIPRAP DETAIL
NO SCALE

THEORETICAL SCOUR DEPTHS (FT)						
	100 YEAR STORM			500 YEAR STORM		
BENT LOCATION	GENERAL	LOCAL	TOTAL	GENERAL	LOCAL	TOTAL
BENT 2	0.0	0.0	0.0	0.0	0.0	0.0
BENT 3	0.0	0.0	0.0	0.0	3.3	3.3
BENT 4	4.5	5.4	9.9	13.3	6.1	19.4
BENT 5	7.4	10.2	17.6	9.8	11.1	20.9
BENT 6	0.0	0.0	0.0	0.0	3.3	3.3

EXISTING RIGHT BRIDGE SERIAL NO. 057-0044-0
EXISTING RIGHT BRIDGE I.D. NO. 057-0041D-010.44N
PROJECT P.I. NO. 713640

BRIDGE NO. 42

ABBAS ESHAGJEH-MEYBODI	11/20/09	DRAWN BY DATE
		CHECKED BY DATE
		SUPERVISOR DATE
		APPROVED DATE

REVISIONS

NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
A	6/30/09	Progress Drawings (SO II Revision 2)	AEM	JCR	GLE	SJL
B	9/25/09	50% SUBMISSION	AEM	JCR	GLE	SJL
C	11/20/09	HYDRAULIC STUDY SUBMISSION	AEM	JCR	GLE	SJL

GTP Georgia Transportation Partners

NORTHWEST I-75/I-575 CORRIDOR

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

JBT J.B. Trimble, Inc.
2550 Heritage Ct. SE Suite 250
Atlanta GA 30339-3062
(770) 952-1022

GEORGIA REGISTERED PROFESSIONAL ENGINEER No. 27873 JOHN A. McWHORTER 11-25-09

BRIDGE SHEET
1 OF 2

I-75 / I-575 NORTHWEST CORRIDOR

I-575 REVERSIBLE OVER LITTLE RIVER
PLAN AND ELEVATION

CHEROKEE COUNTY NH000-0575-01(028)

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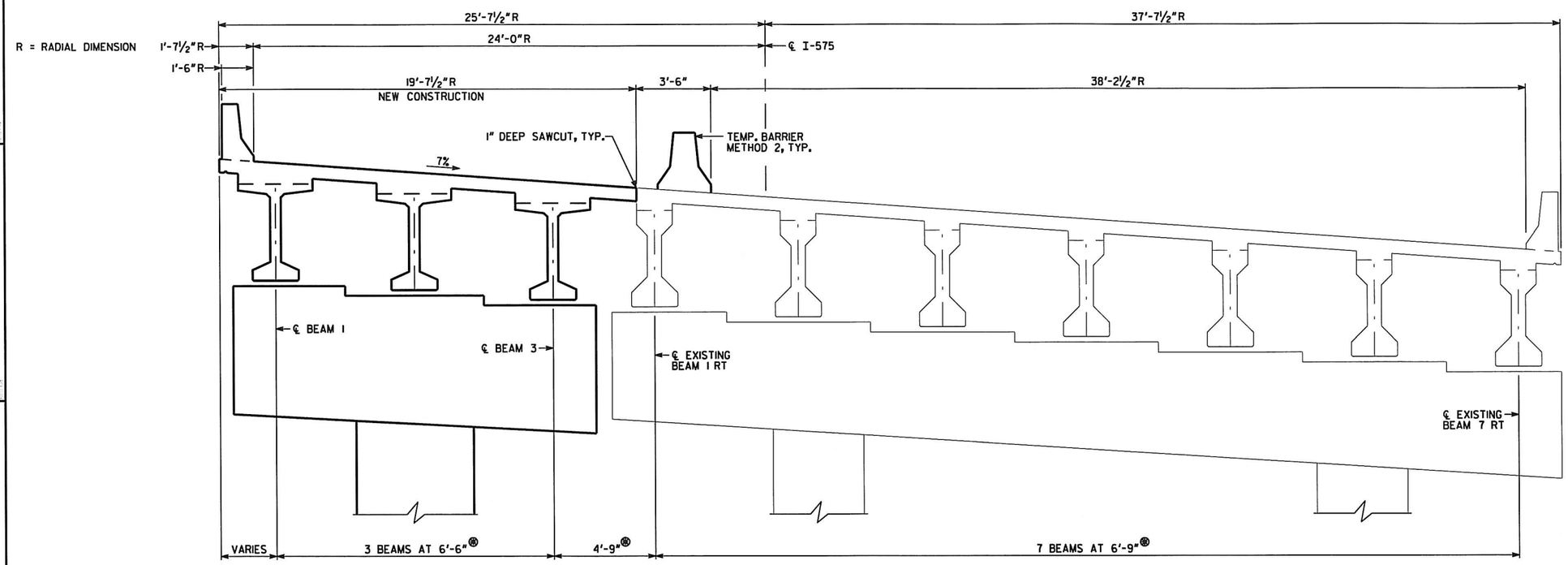
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0575-01(028)		



⊛ ALL BEAMS ARE CHORDS OF CONCENTRIC CIRCLES MEASURED BETWEEN ℄ BENTS OR BACK FACE PAVING REST.

TYPICAL SECTION
(LOOKING AHEAD, RIGHT BRIDGE)

CONSTRUCTION SEQUENCE

1. PLACE TEMPORARY BARRIER. MAINTAIN TWO 12'-0" LANES OF TRAFFIC ON EXISTING NORTHBOUND BRIDGE.
2. REMOVE PORTIONS OF EXISTING NORTHBOUND BRIDGE AS NECESSARY FOR NEW CONSTRUCTION.
3. CONSTRUCT NEW SUBSTRUCTURE.
4. CONSTRUCT NEW SUPERSTRUCTURE.

BRIDGE NO. 42

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ABBAS ESHAGIEH-MEYBODI	11/20/09
DRAWN BY	DATE
CHECKED BY	DATE
SUPERVISOR	DATE
APPROVED	DATE

REVISIONS

NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
A	6/30/09	Progress Drawings (50 11 Revision 2)	AEM	JCR	GLE	SJL
B	9/25/09	50% SUBMISSION	AEM	JCR	GLE	SJL
C	11/20/09	HYDRAULIC STUDY SUBMISSION	AEM	JCR	GLE	SJL

GTP Georgia Transportation Partners

NORTHWEST I-75/I-575 CORRIDOR

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

JBT J.B. Trimble, Inc.
2550 Heritage Ct. SE Suite 250
Atlanta GA 30339-3062
(770) 952-1022

BRIDGE SHEET
2 OF 2

I-75 / I-575 NORTHWEST CORRIDOR

I-575 REVERSIBLE OVER LITTLE RIVER
CONSTRUCTION SEQUENCE

CHEROKEE COUNTY NH000-0575-01(028)