Hydraulic and Hydrological Study for I-75 Reversible lanes over Noonday Creek Tributary #6

NH000-0073-03(242)
Cobb County, Georgia
PI No. 714130

November 2009

COMMUNITY COORDINATION ONLY REQUIRED
Cobb County, Community No. 130052

Prepared by JBT for
Georgia Transportation Partners
Atlanta, GA

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Section I
Hydraulic/Hydrologic Report

November 2009

NH000-0073-01(242) Cobb County
I-75 Reversible lanes over Noonday Creek Tributary #6
PI# 714130

Introduction

J.B. Trimble, Inc. (JBT) prepared this report to provide engineering calculations showing that the proposed widening (culvert extension) at the crossing of I-75 over Noonday Creek Tributary #6 in Cobb County, Georgia will meet the Georgia Department of Transportation's (GDOT) hydraulic and hydrologic requirements. Noonday Creek Tributary #6 is a FEMA studied waterway with a regulatory floodway. The proposed widening will not encroach vertically or horizontally on the current regulatory floodway elevation or width. Therefore, the proposed construction is consistent with the regulatory floodway due to bridging and excluding fill from the floodway. In accordance with section NS 23 CFR 650A of the Federal Policy Guide, coordination with FEMA is not required. Community coordination will be performed ... The design storm is the 50-year storm per the GDOT Drainage Design Manual for an Interstate. The drainage area at the proposed crossing, delineated from the United States Geological Survey (USGS) quadrangle maps for the area, is 1.0 square mile with a 50-year storm flow of 1148 cfs and a 100-year storm flow of 1317 cfs. The flows are calculated using the USGS Region 1 Urban Regression equations for Georgia and an impervious area of 25%. Noonday Creek Tributary #6 has a confluence with Noonday Creek approximately _ ft downstream from the crossing. The effects of this confluence were taken into account.

The existing culvert at this crossing is a double barrel 7' X 7' reinforced concrete box culvert (RCBC) with a length of 206.5 ft. The proposed construction will lengthen this RCBC to the west from 206.5 ft to 230 ft.

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 using version 4.0, which is the latest version.

Hydraulic Site Inspection

A hydraulic site visit was made at the existing crossing of I-75 over Noonday Creek Tributary #6 on September 14, 2009. The floodplain downstream of the NBL of I-75 consists of some trees, underbrush and a thick layer of kudzu. This crossing is located in a developed area of Cobb County and there are commercial developments located in the northeast and southeast quadrants. These developments appear to be well outside of the floodplain. The upstream floodplain between the north and south bound lanes of I-75 consists of trees and some undergrowth. The Noonday Creek Tributary #6 channel width varies from approximately 25-30 ft. The channel showed only minor signs of instability in the area of the proposed construction. The banks in this area are approximately 3-4 ft high. There is a dam located approximately 320 ft upstream from the upstream end of the southbound lanes.

Procedure

JBT personnel visited and photographed the site. A GDOT Hydraulic Engineering Field Report was completed. 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 natural, existing and proposed conditions using survey data and proposed roadway improvements.

General Modeling Considerations

The USGS urban regression equations are being used with an impervious area of 25% based on the current aerial photography. During the design of another project (NH000-0575-01(028)), the USGS was contacted along with a consultant with experience in the calculation of the FEMA flows for the Cobb County FIS in an effort to resolve the differences in the two flow sources.

This email exchange is included in the Appendix for reference. The USGS recommends the use of the current urban regression equations, although a proposal to revise these equations using a multi-state approach is being developed. This direction, along with the calculated impervious area and engineering judgment, were used to make the determination for the discharges to be used for this study. The GDOT Office of Bridge Hydraulics was also consulted and concurred with the approach used for the above reference project and the same approach is being utilized presented in this study.

As previously stated, Noonday Creek Tributary #6 is a FEMA studied floodway. The existing FEMA model was requested from the FEMA Engineering Library. However, no existing model was found. Cobb County personnel informed JBT that this area was slated to be restudied but that the work had not yet begun. In an attempt to simulate the FEMA modeling for this project, the existing and proposed HEC-RAS models were copied and modified to include the floodway widths as they were scaled off the FEMA 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 0.8:1 to 2.0:1 range for expansion and 0.8:1 to 1.4:1 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 142 ft. to 356 ft. and a contraction reach length range of 142 ft. to 249 ft. The actual exit section is located at river station -630, approximately 630 ft. downstream of the roadway, and the actual approach section is located at river station 886, approximately 235 ft. upstream of the proposed bridge. The approach section is located within the calculated range and the exit section is located further downstream, and outside of the calculated range, to take into account the downstream confluence with Noonday Creek.

Historic Drainage Patterns

The existing channel velocities at the project site for the 50-year and 100-year storm flows are 11.71 ft/s and 13.40 ft/s, respectively. The existing backwater for the 50-year and 100-year storms are 5.98 ft and 9.17 ft, respectively. There is available storage in this basin upstream of the project crossing. A more extensive modeling approach that routed the storm hydrographs through the available storage would likely show a reduction in the significant backwater values. However, due to the nature of this project, this level of detailed analysis is not required. The 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.

Proposed Drainage Patterns

The proposed culvert extension creates little to no increases in velocity and backwater. The proposed channel velocities for the 50-year and 100-year storm flows are unchanged at 11.71 ft/s and 13.40 ft/s, respectively. The proposed backwater for the 50-year and 100-year storms are 6.06 ft and 9.29 ft, respectively. Although these velocity and backwater values are considered high, no significant scour was observed at the project site. The proposed conditions show a small increase in elevation at the approach section of 0.12 ft for the 100-year storm. This is acceptable for this site since the aforementioned upstream dam will limit the increase to a confined area immediately upstream of the crossing. See the contour plot in the Appendix for reference.

Summary

The appropriate hydraulic and hydrological procedures were used in this study's development. The proposed culvert extension will not encroach vertically or horizontally on the current regulatory floodway elevation or width for Noonday Creek. Therefore, the proposed construction is consistent with the regulatory floodway and coordination with FEMA is not required. Community coordination will be performed...

The results for velocity and backwater are considered high. However, there were no significant scour problems observed during the site visit and the available storage in this basin will reduce the actual flow that occurs at this site. An extensive analysis that routes the storm hydrographs through the storage facilities would likely reduce the velocities at backwater values achieved at this site. However, due to the nature of the project, this level of detailed modeling is not required.

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 4.0, dated March 2008.

- 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.

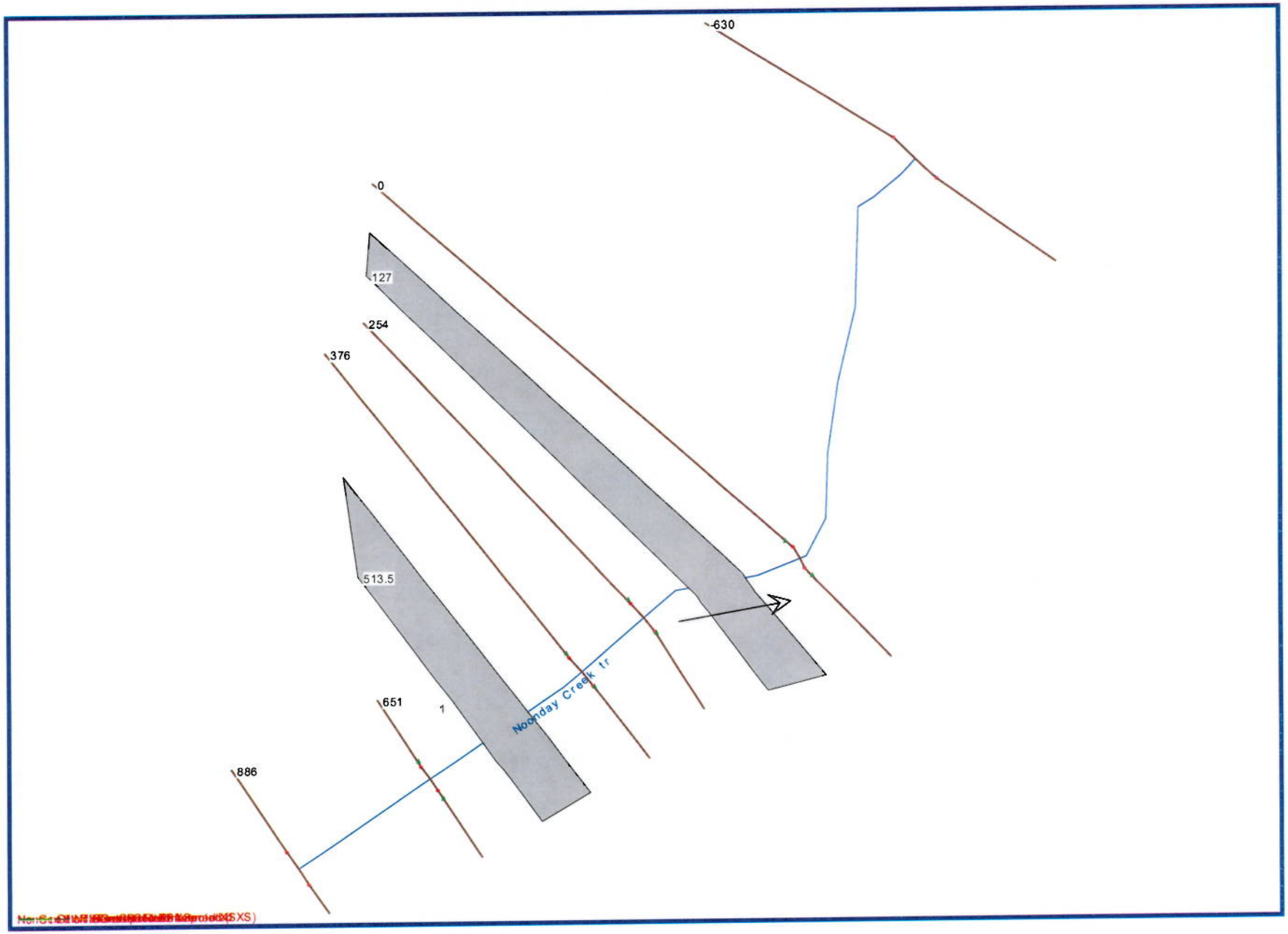
- Hydraulic Engineering Circular No. 23 (HEC-23) *Bridge Scour and Stream Instability Countermeasures* (FHWA-NHI-01-003) dated March 2001, Second Edition.

- 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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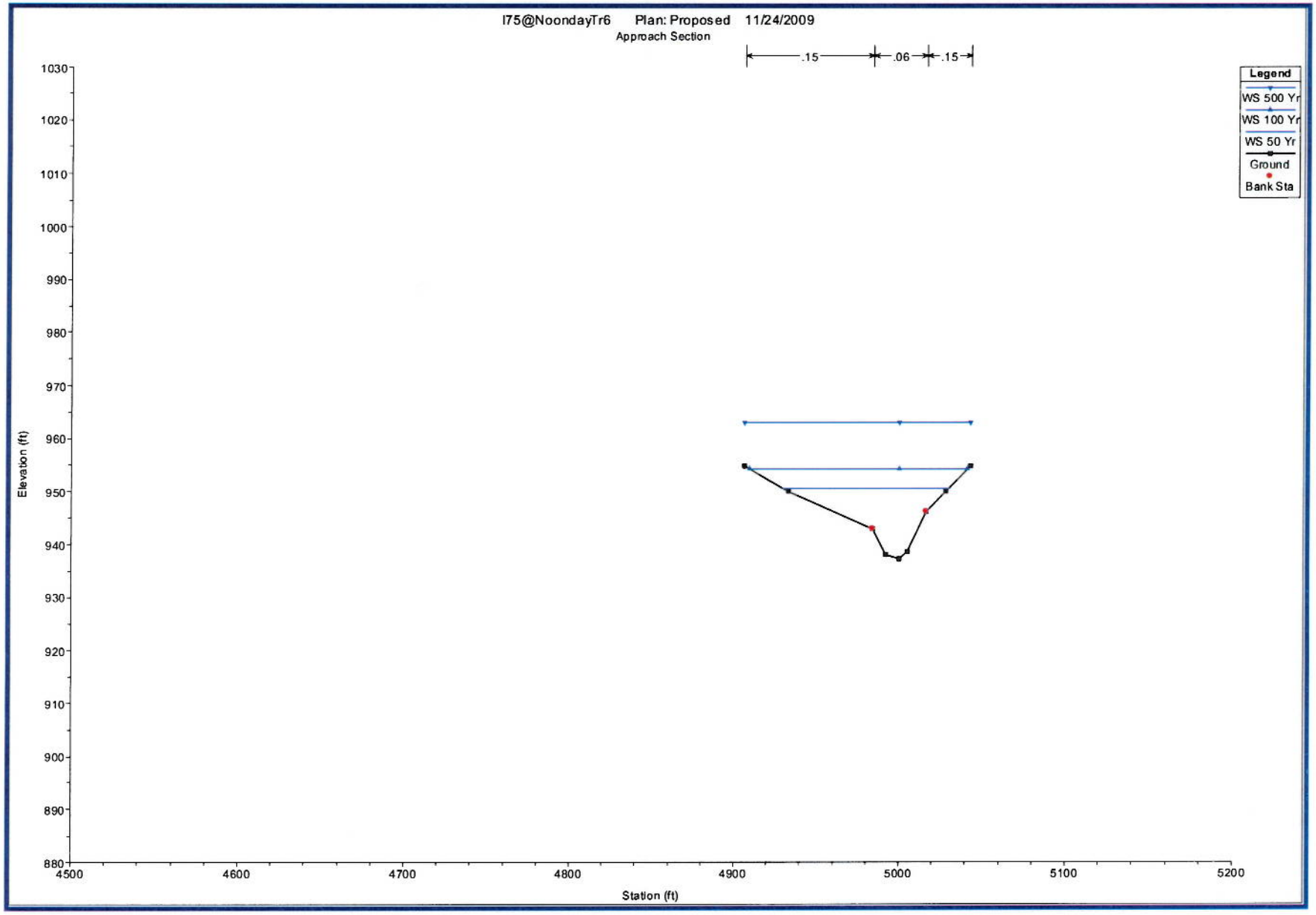
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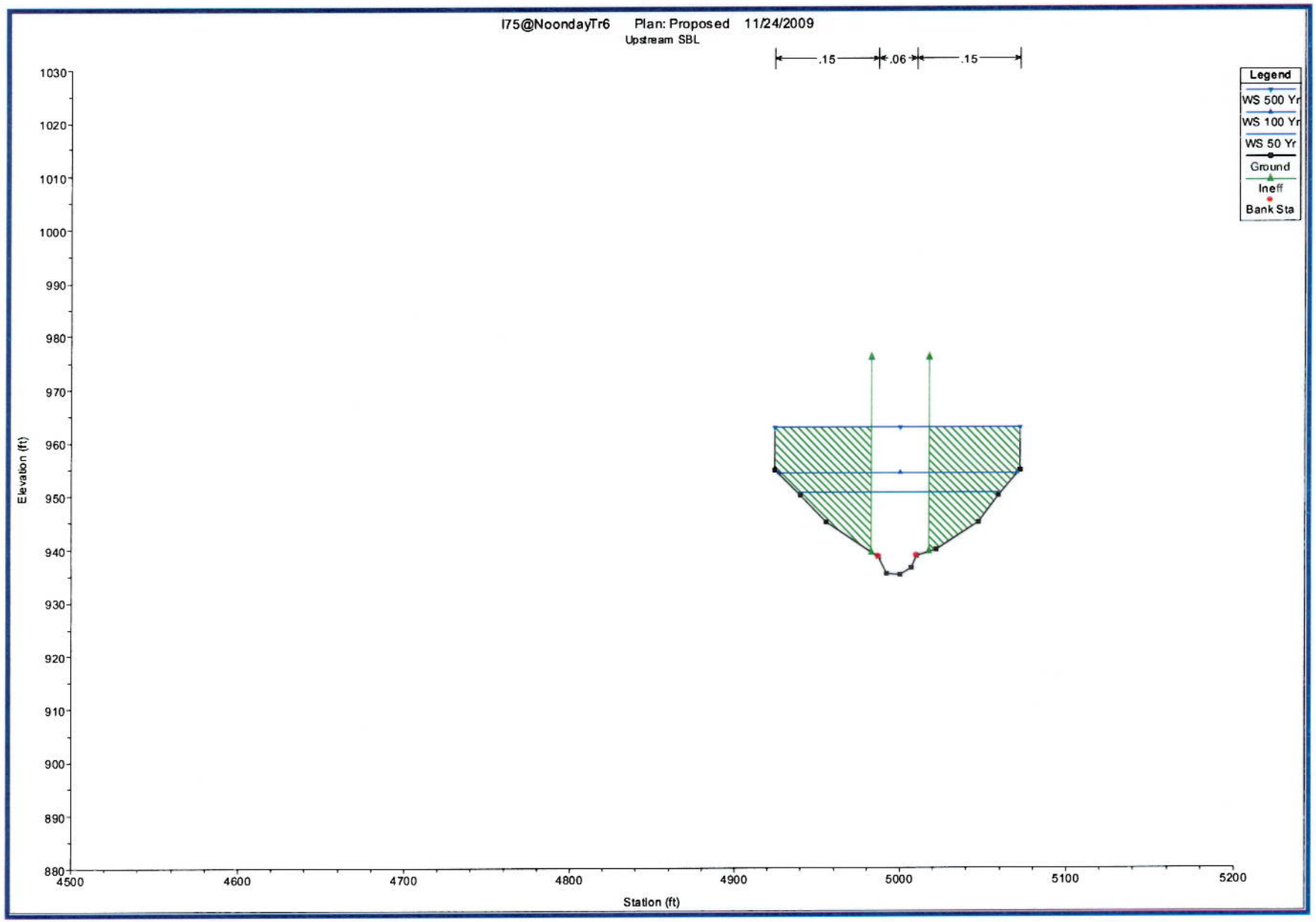
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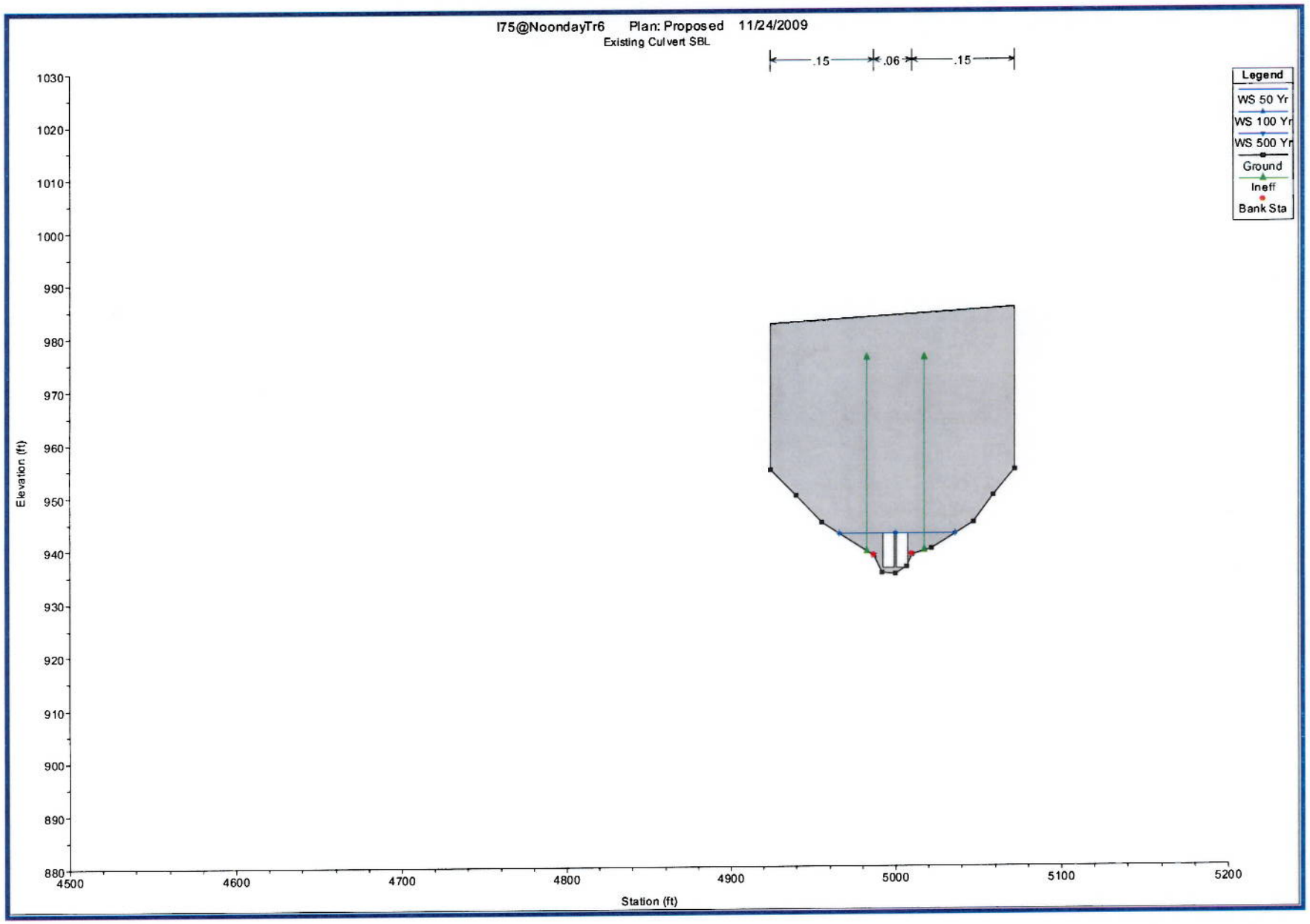
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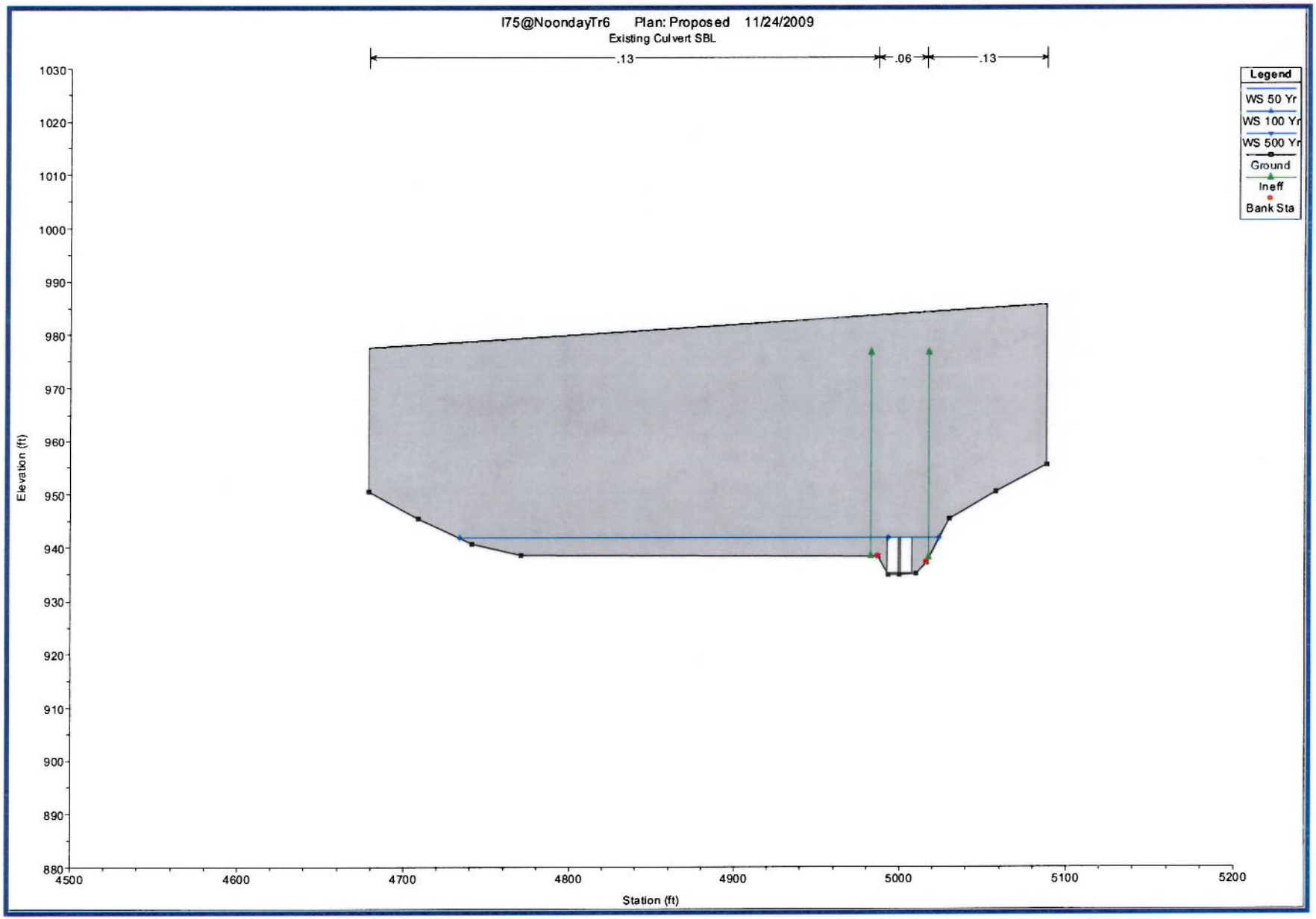
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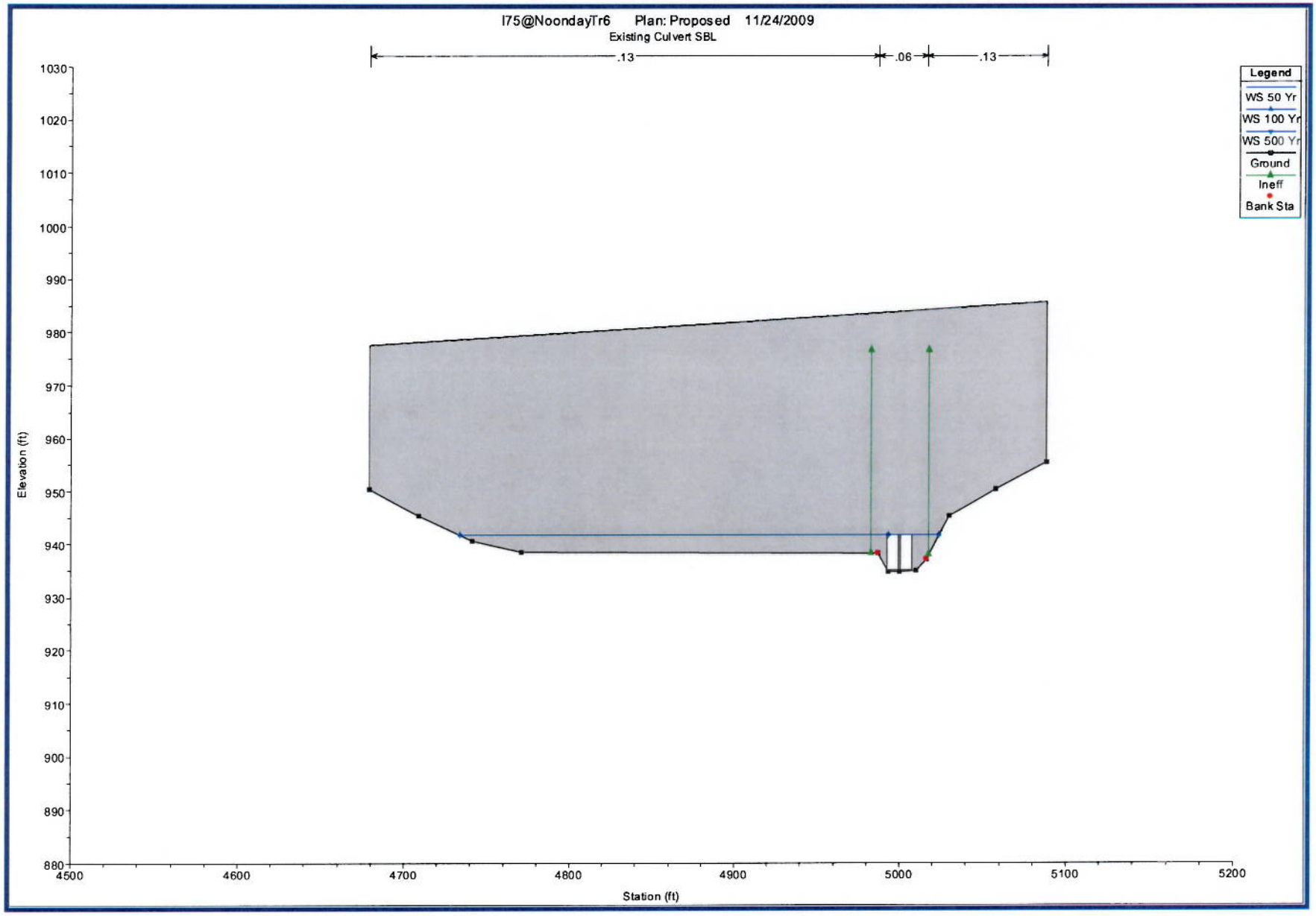
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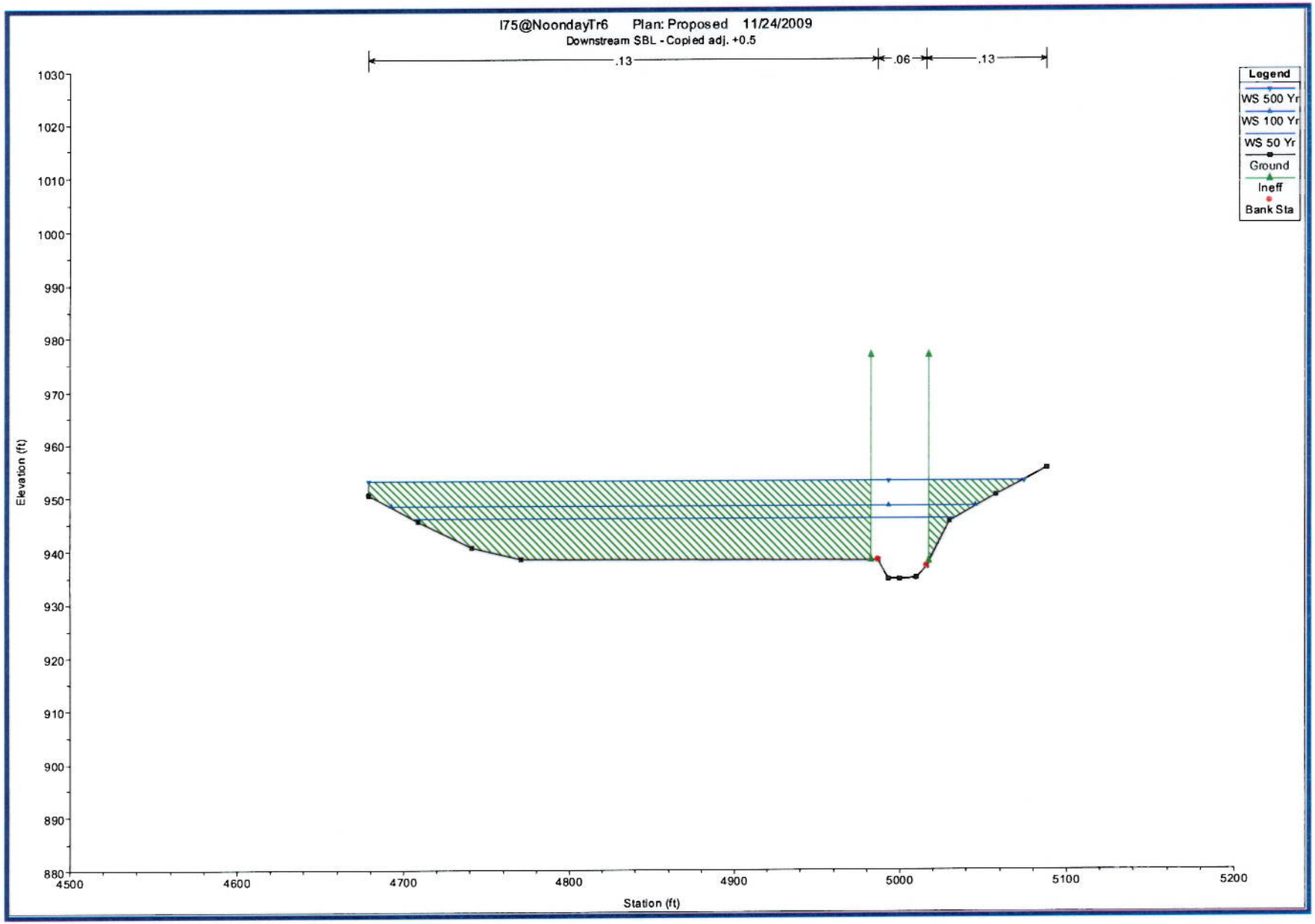
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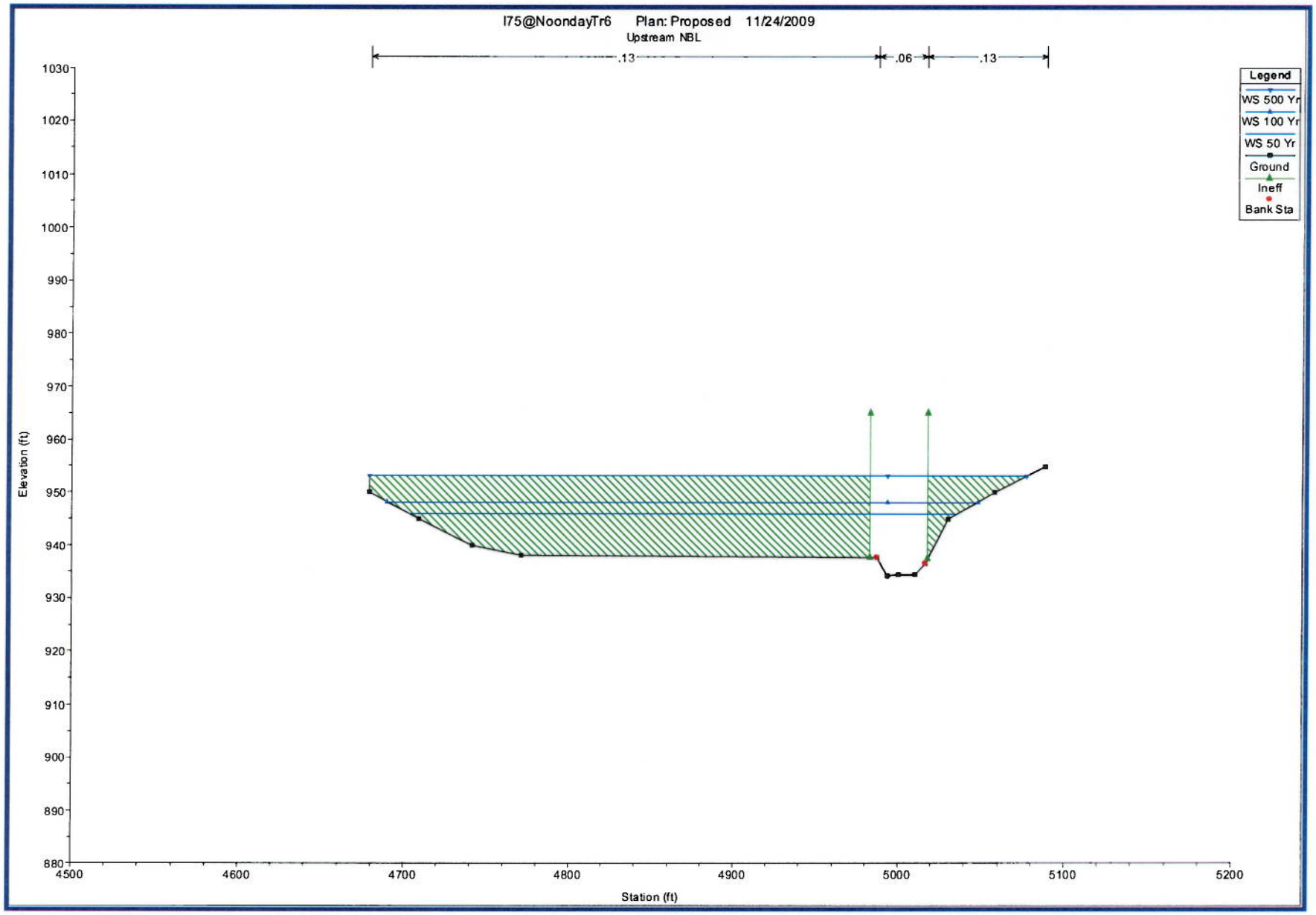
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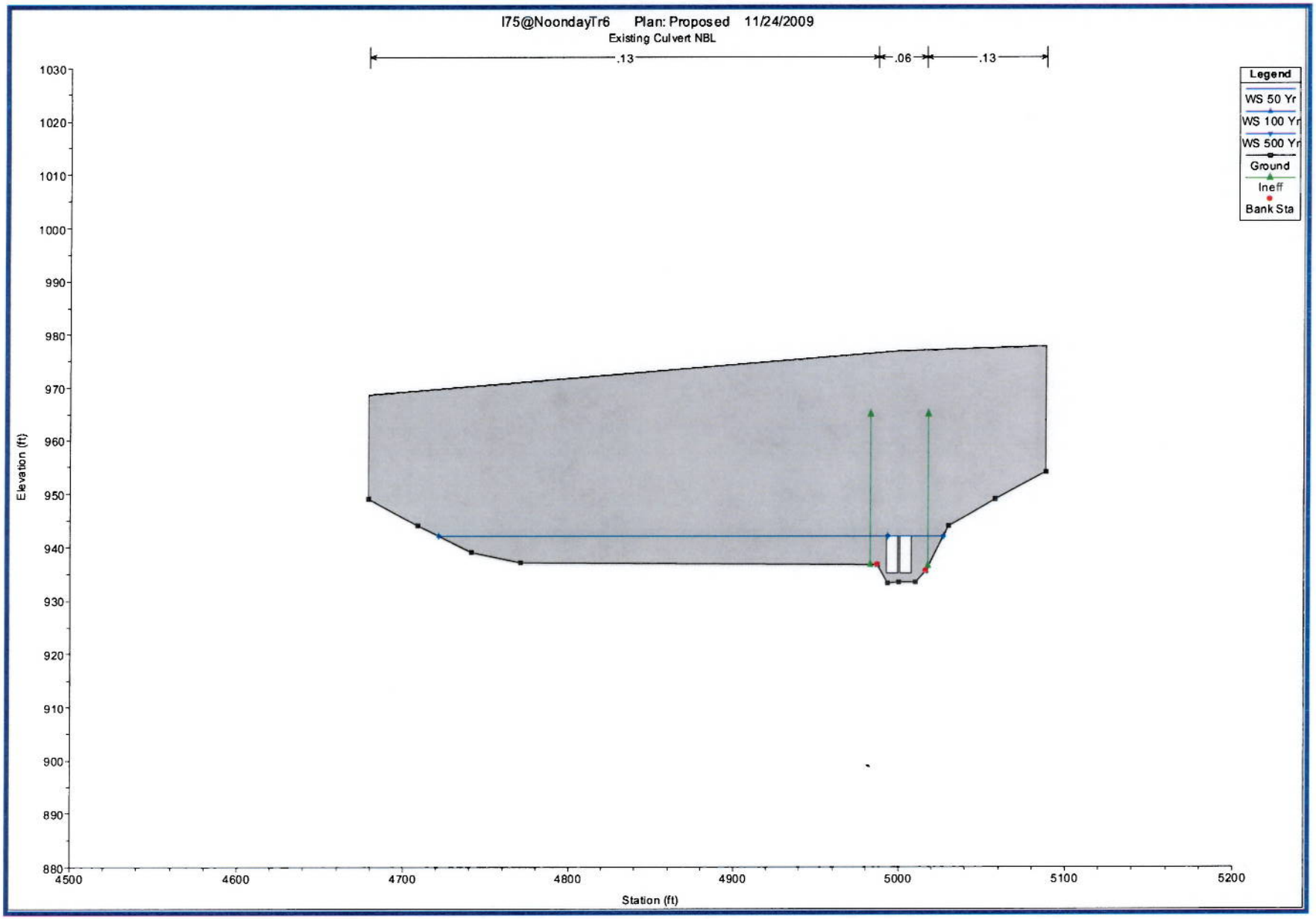
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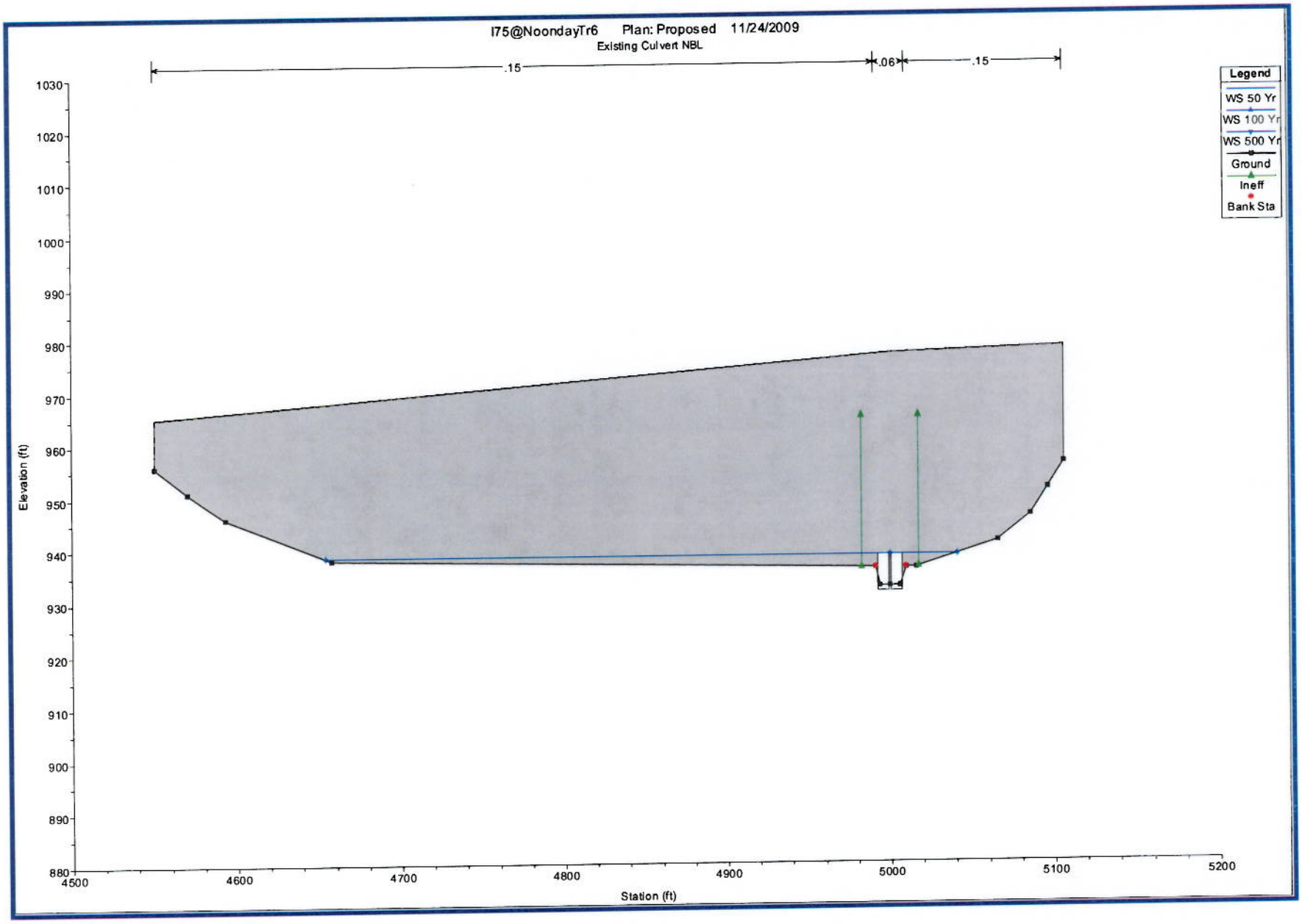
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Existing Culvert NBL
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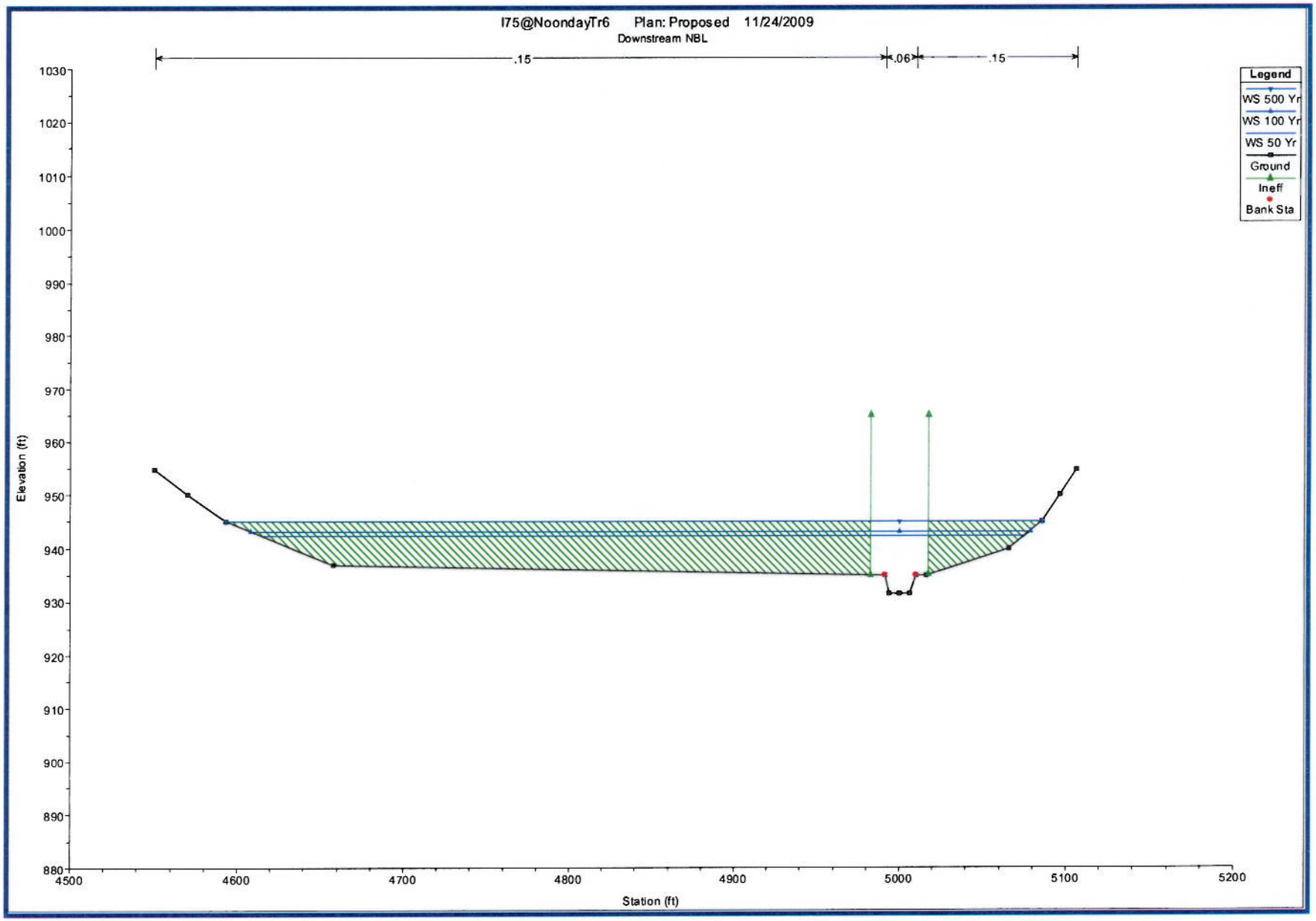
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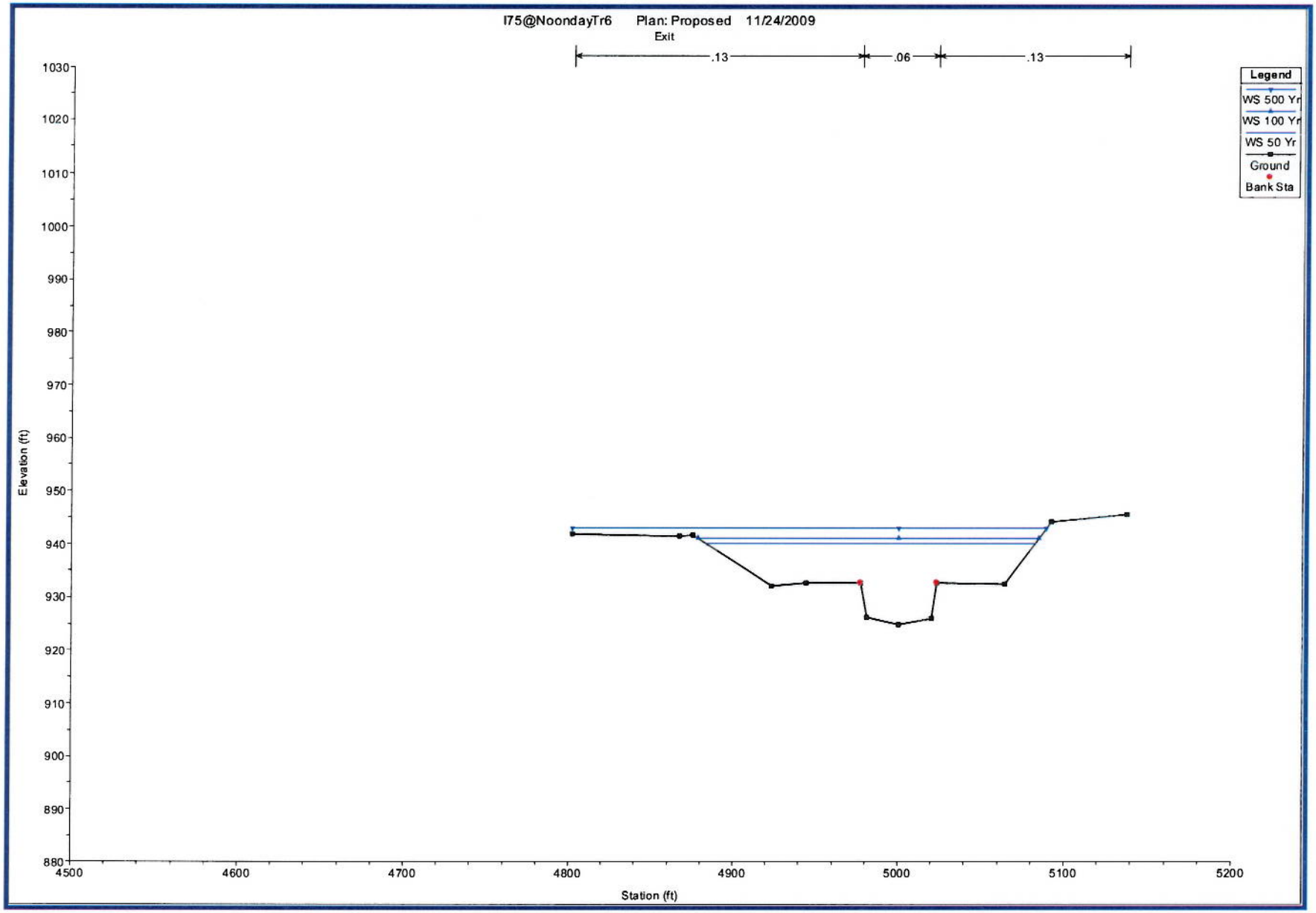
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Section II
Hydraulic Tables

HYDRAULIC TABLE (50-YEAR STORM)

	UNCONSTRICTED SECTION	*EXISTING CONDITIONS*	*PROPOSED CONDITIONS*
FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	941.65	942.23	942.23
FLOODSTAGE ELEVATION APPROACH SECTION (ft)*	944.67	950.65	950.73
AREA OF OPENING UNDER FLOODSTAGE (ft^2)	**********	98	98
DISCHARGE THROUGH CULVERT (cfs)	**********	1148	1148
DISCHARGE OVER ROADWAY (cfs)	**********	0	0
CHANNEL VELOCITY (f/s)	1.38	11.71	11.71
MEAN VELOCITY (f/s)	**********	11.71	11.71
2-YEAR FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	937.61	937.84	937.84
BACKWATER HEIGHT (ft)	**********	5.98	6.06

* Approach Section is located upstream of the southbound culvert (Section 886).

HYDRAULIC TABLE (100-YEAR STORM)

	UNCONSTRICTED SECTION	*EXISTING CONDITIONS*	*PROPOSED CONDITIONS*
FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	942.55	943.15	943.15
FLOODSTAGE ELEVATION APPROACH SECTION (ft)*	945.07	954.24	954.36
AREA OF OPENING UNDER FLOODSTAGE (ft^2)	**********	98	98
DISCHARGE THROUGH CULVERT (cfs)	**********	1317	1317
DISCHARGE OVER ROADWAY (cfs)	**********	0	0
CHANNEL VELOCITY (f/s)	1.33	13.44	13.44
MEAN VELOCITY (f/s)	**********	13.44	13.44
2-YEAR FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	937.61	937.84	937.84
BACKWATER HEIGHT (ft)	**********	9.17	9.29

* Approach Section is located upstream of the southbound culvert (Section 886).

HYDRAULIC TABLE (500-YEAR STORM)

	UNCONSTRICTED SECTION	*EXISTING CONDITIONS*	*PROPOSED CONDITIONS*
FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	944.34	944.98	944.98
FLOODSTAGE ELEVATION APPROACH SECTION (ft)*	945.94	962.80	963.01
AREA OF OPENING UNDER FLOODSTAGE (ft^2)	**********	98	98
DISCHARGE THROUGH CULVER (cfs)	**********	1668	1668
DISCHARGE OVER ROADWAY (cfs)	**********	0	0
CHANNEL VELOCITY (f/s)	1.27	17.02	17.02
MEAN VELOCITY (f/s)	**********	17.02	17.02
2-YEAR FLOODSTAGE ELEVATION BRIDGE SECTION (ft)	937.61	937.84	937.84
BACKWATER HEIGHT (ft)	**********	16.86	17.07

* Approach Section is located upstream of the southbound culvert (Section 886).

Section III
Peak Flow Summary

NH000-0073-03(242) Cobb County
I-75 over Noonday Creek Tributary #6
PI # 714130

Drainage Area (sq. mi.)	1.0
Region No.	1
Impervious Area (%)	25
USGS Gage No.	N/A
Drainage Area @ Gage	

	FEMA Discharges
Q2	-
Q5	-
Q10	339
Q25	-
Q50	550
Q100	601
Q500	680

Discharge (cfs)

	Regional	Urbanized	Qu(w) Weighted Discharge
Q2	207	453	0
Q5	357	695	0
Q10	482	796	0
Q25	666	1003	0
Q50	827	1148	0
Q100	1010	1317	0
Q500	1530	1668	0

Hydraulic Slope Calculation
Based on USGS quad

Upstream Elevation =	960
Downstream Elevation =	940
Horizontal Distance =	4000

Slope = 0.00500 ft/ft
26.40 ft/mi

NH000-0073-03(242) Cobb County
I-75 over Noonday Creek Tributary #6
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Drainage Area (sq. mi.)	12.4	@ Confluence
Region No.	1	
Impervious Area (%)	25	
USGS Gage No.	N/A	
Drainage Area @ Gage		
Q2		
Q5		
Q10		
Q25		
Q50		
Q100		
Q500		

Discharge (cfs)

	Regional	Urbanized	Qu(w) Weighted Discharge
Q2	1074	2846	0
Q5	1753	4153	0
Q10	2290	4639	0
Q25	3055	5845	0
Q50	3699	6521	0
Q100	4394	7483	0
Q500	6314	9242	0

Hydraulic Slope Calculation

Based on USGS quad

Upstream Elevation =	960
Downstream Elevation =	940
Horizontal Distance =	4000

Slope = 0.00500 ft/ft
26.40 ft/mi

Expansion and Contraction Reach Length Computation

I-75 over Noonday Creek Tributary #6

Expansion Reach Length Computation

b - bridge opening width	14				
B - floodplain width	370				
b/B	**0.04**				
(B-b)/2 avg. obs. Length	178				
n(ob)	0.15				
n(mc)	0.06				
n(ob)/n(mc)	**2.73**				
S (ft/ft)	0.0050				
S (ft/mile)	**26.40**				
Er-Exp. rate from chart	0.8	2.0			
Exp. Reach Length	**142.4**	**356**			

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	1.4	
Contr. Reach Length	**142.4**	**249.2**	

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-75 over Noonday Creek Trib #6**	Date:	**08-27-2009**
Reported by:	**JBT Personnel**	HMMoject No.:	**255717**
Client:	**PBS&J**	Project No.:	**NH000-0073-03(242)**
County:	**Cobb**	GDOT District:	**7**
Stream Name:	**Noonday Creek Trib #6**	Route:	**I-75 NBL**

B. Site Location

Floodplain Description:

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

b) Wooded, heavily vegetated, pasture, swampy etc.: **Vegetated**

Stream Channel Description:

a) Banks stable, unstable etc.: **Well-defined; some instability at banks upstream and downstream**

b) Stream meandering, straight etc.: **Meandering, particularly downstream .**

c) Debris: **No debris witnessed**

d) Is there any fill in the upstream or downstream floodplains that will affect the natural drainage or limit floodplain width at this site? **Yes. Development exists upstream and downstream.**

C. Required Existing Bridge Data at Project Site

Bridge ID #:	**N/A**
Date Built:	**N/A**
Skew angle of bridge or bents :	**90°**

Substructure Description:

a)	column type (concrete, steel, pile, etc.):	**n/a – double 7' x 7'**
b)	size of column:	**n/a**
c)	number of columns per bent:	**n/a**
d)	height of curb, parapet or barrier:	**n/a**
	spurdike length:	**n/a**
	spurdike elevation:	**n/a**
	spurdike location:	**n/a**
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: **Not Obtained**
b) Water Surface elevation at the roadway centerline: **Not Obtained**
c) Water Surface elevation 500 ft downstream of the survey centerline: **Not Obtained**
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: **938.8** Date: **N/A**
b) Highest tide elevation observed at Site: **N/A** Date: **N/A**
c) Location where taken (upstream, downstream, centerline): **N/A**
c) Source of high-water information: **Existing bridge plans (Noonday)**
e) Are there any houses that have been flooded: **No**
f) House location and floor elevation: **No**
g) Number of times house has been flooded, elevations and dates of floods: **No**
h) Additional houses that may be flooded? (with floor elevations within 2 ft of the flood of record): **No**

F. Miscellaneous Information

a) Are water surface elevations at the site affected by other factors such as high-water from other stream, reservoirs etc.: **No**

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

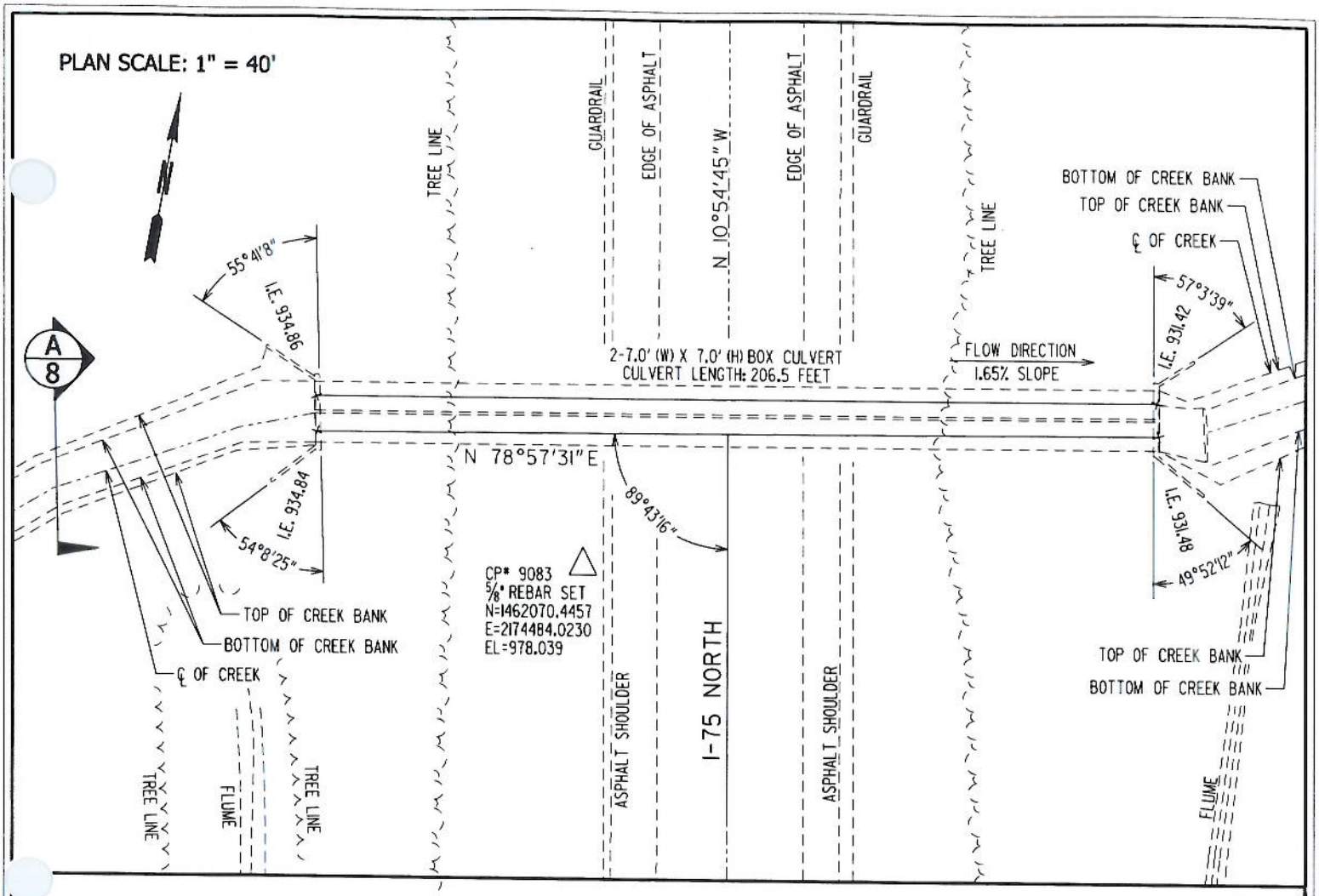
The below information is required for all bridges or box culverts within 1 mile upstream and downstream of the project site. Additional survey information is required for all hydraulic structures within 2000 ft of the project site.

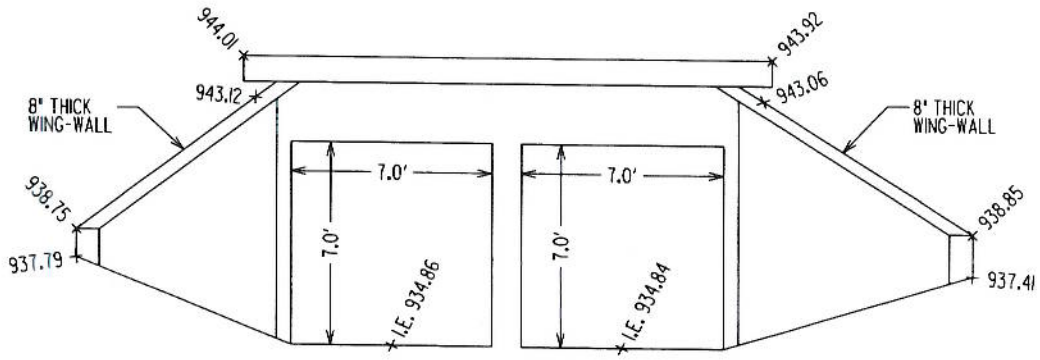
Upstream Structure

Distance and direction from proposed structure:	**170 ft**
Railroad or highway structure:	**Highway**
Route # if highway bridge:	**I-75 Southbound**
Length of bridge or culvert size	**Double 6.5' x 7'**
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:	**1000 ft**
Railroad or highway structure:	**Highway**
Route # if highway bridge:	**George Busbee Parkway**
Length of bridge or culvert size	**220' long**
Substructure Information:	
a) column type (concrete, steel, pile):	**Piles**
b) column size:	
c) number of columns of bent:	
d) length of over flow bridge or culvert size:	**N/A**





FLOW

HEADWALL ELEVATION VIEW
UPSTREAM END LOOKING NORTHEAST (A/8)

NO SCALE

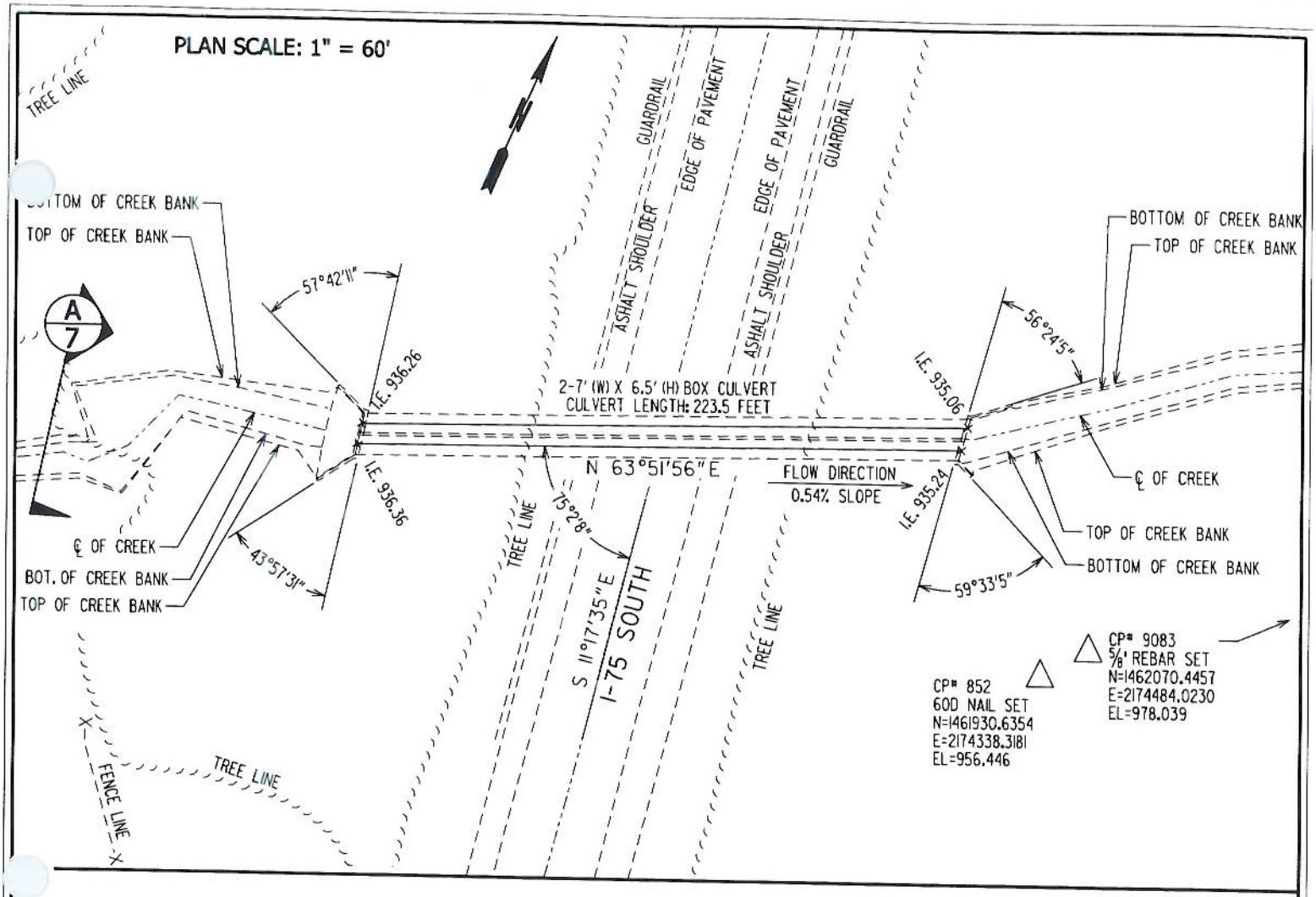
CULVERT SKETCH

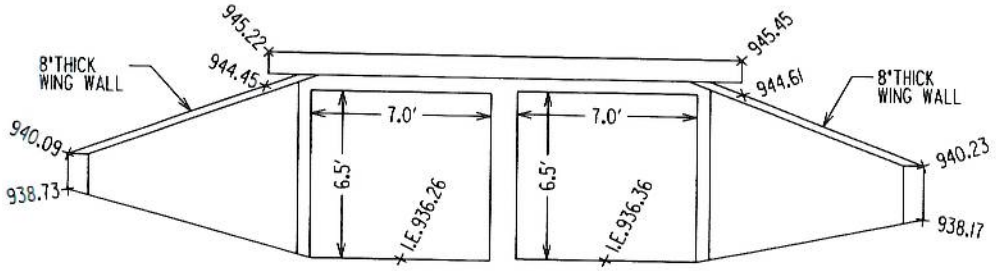
P. I. NO. 0008256	LONG JOB NO. 0165-0020	REVISION DATES
DRAWN BY SMS	DATE SEP 12 2008	
CHECKED BY JGL	SCALE AS NOTED	

STATE OF GEORGIA
DEPARTMENT OF TRANSPORTATION
I-75 NORTHBOUND 3200' NORTH OF
BARRETT PARKWAY

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

DRAWING No. 08





FLOW

HEADWALL ELEVATION VIEW
UPSTREAM END LOOKING NORTHEAST (A/7)

NO SCALE

CULVERT SKETCH

P. I. NO. 0008256	LONG JOB NO. 0165-0020	REVISION DATES	STATE OF GEORGIA DEPARTMENT OF TRANSPORTATION I-75 SOUTHBOUND 3200' NORTH OF BARRETT PKWY
DRAWN BY SMS	DATE SEP 12 2008		
CHECKED BY JGL	SCALE AS NOTED		

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

DRAWING No. 07

Section V
HEC-RAS Computer Model Output

HEC-RAS FULL VALLEY MODEL

HEC-RAS Plan: FullV River: Noonday Creek tr 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)	
1	-630	2 Yr	2846.00	925.00	935.81	930.96	936.19	0.002854	5.40	803.74	167.66	0.31
1	-630	50 Yr	6521.00	925.00	940.26	935.17	940.80	0.002850	6.95	1623.04	199.98	0.33
1	-630	100 Yr	7483.00	925.00	941.19	935.74	941.76	0.002855	7.25	1811.07	206.69	0.33
1	-630	500 Yr	9242.00	925.00	943.00	936.65	943.65	0.002847	7.82	2290.07	286.95	0.34
1	0	2 Yr	453.00	931.40	937.61		937.65	0.000872	2.07	693.58	389.09	0.16
1	0	50 Yr	1148.00	931.40	941.65		941.66	0.000186	1.38	2406.15	452.43	0.08
1	0	100 Yr	1317.00	931.40	942.55		942.56	0.000154	1.33	2817.10	463.31	0.07
1	0	500 Yr	1668.00	931.40	944.34		944.35	0.000113	1.27	3665.28	485.00	0.06
1	254	2 Yr	453.00	934.20	937.87	936.79	938.29	0.010976	5.21	98.11	153.91	0.53
1	254	50 Yr	1148.00	934.20	941.71		941.75	0.000736	2.34	1144.18	294.47	0.16
1	254	100 Yr	1317.00	934.20	942.60		942.63	0.000534	2.17	1408.14	301.61	0.14
1	254	500 Yr	1668.00	934.20	944.37		944.39	0.000329	1.95	1955.97	315.93	0.11
1	376	2 Yr	453.00	934.70	938.93	937.29	939.12	0.004495	3.74	232.77	254.55	0.35
1	376	50 Yr	1148.00	934.70	941.80		941.85	0.001009	2.63	1023.41	291.14	0.18
1	376	100 Yr	1317.00	934.70	942.66		942.70	0.000708	2.40	1276.93	298.09	0.16
1	376	500 Yr	1668.00	934.70	944.41		944.44	0.000412	2.11	1810.67	312.19	0.12
1	651	2 Yr	453.00	935.10	940.24		940.57	0.005986	4.67	111.57	44.43	0.41
1	651	50 Yr	1148.00	935.10	941.85		942.76	0.011289	8.00	195.88	60.50	0.59
1	651	100 Yr	1317.00	935.10	942.56		943.43	0.009493	7.93	241.07	67.56	0.55
1	651	500 Yr	1668.00	935.10	944.21		944.93	0.006155	7.43	366.55	84.11	0.46
1	886	2 Yr	453.00	937.20	942.10	940.84	942.61	0.012700	5.71	79.36	24.63	0.56
1	886	50 Yr	1148.00	937.20	944.67	943.02	945.55	0.012548	7.57	160.43	41.92	0.59
1	886	100 Yr	1317.00	937.20	945.07	943.45	946.05	0.013003	8.00	177.92	45.42	0.61
1	886	500 Yr	1668.00	937.20	945.94	944.23	947.05	0.012835	8.56	221.17	53.08	0.62

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX XXXX     XXXXXX    XXXX
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PROJECT DATA
Project Title: I75@NoondayTr6
Project File : I75@Noonday.prj
Run Date and Time: 11/24/2009 7:24:13 AM

Project in English units

PLAN DATA

Plan Title: Full Valley
Plan File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.p03

Geometry Title: Full Valley
Geometry File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.g03

Flow Title : Urban 25%
Flow File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.f01

Plan Summary Information:

Number of: Cross Sections	= 6	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: Mixed Flow

FLOW DATA

Flow Title: Urban 25%
Flow File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.f01

Flow Data (cfs)

River	Reach	RS	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	500 Yr
Noonday Creek	tr1	886	453	695	796	1003	1148	1317	1668
Noonday Creek	tr1	-630	2846	4153	4639	5845	6521	7483	9242

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Noonday Creek tr1		2 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		5 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		10 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		25 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		50 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		100 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		500 Yr	Normal S = 0.00285	Normal S = 0.00285

GEOMETRY DATA

Geometry Title: Full Valley
Geometry File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.g03

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: 886

INPUT
Description: Approach Section
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4906	955	4933	950	4984	943	4992	938	5000	937.2
5005	938.6	5016	946.2	5028	950	5043	955		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4906	.15	4984	.06	5016	.15

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4984	5016	220	235	220	.1 .3

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: 651

INPUT
Description: Upstream SBL
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4924	955	4940	950	4955	945	4987	938.6	4992	935.4
5000	935.1	5007	936.6	5010	938.8	5022	940	5047	945
5059	950	5072	955						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4924	.15	4987	.06	5010	.15

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4987	5010	270	275	270	.1 .3

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: 376

INPUT
Description: Downstream SBL - Copied adj. +0.5
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4679	950.5	4709	945.5	4741	940.5	4771	938.5	4987	938.2
4993	934.7	5000	934.8	5010	934.9	5016	937.1	5030	945.5
5058	950.5	5088	955.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4679	.13	4987	.06	5016	.13

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4987	5016	105	122	105	.1	.3

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: 254

INPUT
Description: Upstream NBL
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4679	950	4709	945	4741	940	4771	938	4987	937.7
4993	934.2	5000	934.3	5010	934.4	5016	936.6	5030	945
5058	950	5088	955						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4679	.13	4987	.06	5016	.13

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4987	5016	230	254	265	.1	.3

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: 0

INPUT
Description: Downstream NBL
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4550	955	4570	950	4593	945	4658	937	4991	935
4994	931.4	5000	931.4	5006	931.4	5010	935	5016	935
5066	940	5086	945	5096	950	5106	955		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4550	.15	4991	.06	5010	.15

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4991	5010	420	650	600	.1	.3

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: -630

INPUT
Description: Exit
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4802	941.9	4867	941.5	4875	941.8	4923	932	4944	932.7
4977	932.7	4981	926.3	5000	925	5020	926	5023	932.6
5064	932.4	5092	944.3	5137	945.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4802	.13	4977	.06	5023	.13

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

	4977	5023		0	0	0		.1	.3

SUMMARY OF MANNING'S N VALUES

River:Noonday Creek tr

Reach	River Sta.	n1	n2	n3
1	886	.15	.06	.15
1	651	.15	.06	.15
1	376	.13	.06	.13
1	254	.13	.06	.13
1	0	.15	.06	.15
1	-630	.13	.06	.13

SUMMARY OF REACH LENGTHS

River: Noonday Creek tr

Reach	River Sta.	Left	Channel	Right
1	886	220	235	220
1	651	270	275	270
1	376	105	122	105
1	254	230	254	265
1	0	420	650	600
1	-630	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Noonday Creek tr

Reach	River Sta.	Contr.	Expan.
1	886	.1	.3
1	651	.1	.3
1	376	.1	.3
1	254	.1	.3
1	0	.1	.3
1	-630	.1	.3

HEC-RAS EXISTING CULVERT MODEL

HEC-RAS Plan: Existing River: Noonday Creek tr 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)	
1	-630	2 Yr	2846.00	925.00	935.81	930.96	936.19	0.002854	5.40	803.74	167.66	0.31
1	-630	50 Yr	6521.00	925.00	940.26	935.17	940.80	0.002850	6.95	1623.04	199.98	0.33
1	-630	100 Yr	7483.00	925.00	941.19	935.74	941.76	0.002855	7.25	1811.07	206.69	0.33
1	-630	500 Yr	9242.00	925.00	943.00	936.65	943.65	0.002847	7.82	2290.07	286.95	0.34
1	0	2 Yr	453.00	931.40	937.84		938.04	0.002636	3.71	155.02	393.30	0.27
1	0	50 Yr	1148.00	931.40	942.23		942.54	0.002184	4.91	308.40	459.37	0.27
1	0	100 Yr	1317.00	931.40	943.15		943.49	0.002109	5.12	340.68	470.55	0.27
1	0	500 Yr	1668.00	931.40	944.98		945.37	0.001971	5.48	404.69	492.73	0.27
1	127		Culvert									
1	254	2 Yr	453.00	934.20	940.15	936.79	940.27	0.001581	2.89	168.00	281.86	0.22
1	254	50 Yr	1148.00	934.20	945.91	938.57	946.08	0.000810	3.39	369.77	331.59	0.18
1	254	100 Yr	1317.00	934.20	948.07	938.93	948.22	0.000582	3.23	445.29	356.62	0.16
1	254	500 Yr	1668.00	934.20	952.99	939.56	953.12	0.000319	2.96	617.55	396.95	0.12
1	376	2 Yr	453.00	934.70	940.35		940.50	0.001928	3.07	157.67	278.22	0.24
1	376	50 Yr	1148.00	934.70	946.01		946.20	0.000919	3.52	355.73	326.94	0.19
1	376	100 Yr	1317.00	934.70	948.14		948.31	0.000651	3.35	430.24	351.63	0.17
1	376	500 Yr	1668.00	934.70	953.03		953.17	0.000348	3.04	601.36	394.18	0.13
1	513.5		Culvert									
1	651	2 Yr	453.00	935.10	941.52	938.37	941.69	0.002295	3.46	152.47	57.16	0.26
1	651	50 Yr	1148.00	935.10	950.50	940.47	950.63	0.000473	3.03	467.07	121.93	0.14
1	651	100 Yr	1317.00	935.10	954.12	940.84	954.22	0.000288	2.74	593.51	142.88	0.11
1	651	500 Yr	1668.00	935.10	962.71	941.57	962.78	0.000122	2.32	894.22	148.00	0.08
1	886	2 Yr	453.00	937.20	942.40	940.84	942.82	0.009922	5.22	86.81	25.54	0.50
1	886	50 Yr	1148.00	937.20	950.65	943.02	950.77	0.000702	2.93	584.23	100.47	0.16
1	886	100 Yr	1317.00	937.20	954.24	943.45	954.30	0.000286	2.27	998.72	130.60	0.11
1	886	500 Yr	1668.00	937.20	962.80	944.23	962.82	0.000064	1.47	2169.00	137.00	0.05

Plan: Existing Noonday Creek tr 1 RS: 127 Culv Group: Culvert #1 Profile: 50 Yr

Q Culv Group (cfs)	1148.00	Culv Full Len (ft)	206.00
# Barrels	2	Culv Vel US (ft/s)	11.71
Q Barrel (cfs)	574.00	Culv Vel DS (ft/s)	11.71
E.G. US. (ft)	946.08	Culv Inv El Up (ft)	934.85
W.S. US. (ft)	945.91	Culv Inv El Dn (ft)	931.45
E.G. DS (ft)	942.54	Culv Frctn Ls (ft)	0.87
W.S. DS (ft)	942.23	Culv Exit Loss (ft)	1.81
Delta EG (ft)	3.54	Culv Entr Loss (ft)	0.85
Delta WS (ft)	3.69	Q Weir (cfs)	
E.G. IC (ft)	945.57	Weir Sta Lft (ft)	
E.G. OC (ft)	946.08	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	941.85	Weir Max Depth (ft)	
Culv WS Outlet (ft)	938.45	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	5.93	Min El Weir Flow (ft)	968.66

Plan: Existing Noonday Creek tr 1 RS: 127 Culv Group: Culvert #1 Profile: 100 Yr

Q Culv Group (cfs)	1317.00	Culv Full Len (ft)	206.00
# Barrels	2	Culv Vel US (ft/s)	13.44
Q Barrel (cfs)	658.50	Culv Vel DS (ft/s)	13.44
E.G. US. (ft)	948.23	Culv Inv El Up (ft)	934.85
W.S. US. (ft)	948.07	Culv Inv El Dn (ft)	931.45
E.G. DS (ft)	943.49	Culv Frctn Ls (ft)	1.15
W.S. DS (ft)	943.15	Culv Exit Loss (ft)	2.46
Delta EG (ft)	4.73	Culv Entr Loss (ft)	1.12
Delta WS (ft)	4.92	Q Weir (cfs)	
E.G. IC (ft)	947.08	Weir Sta Lft (ft)	
E.G. OC (ft)	948.23	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	941.85	Weir Max Depth (ft)	
Culv WS Outlet (ft)	938.45	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	6.50	Min El Weir Flow (ft)	968.66

Plan: Existing Noonday Creek tr 1 RS: 127 Culv Group: Culvert #1 Profile: 500 Yr

Q Culv Group (cfs)	1668.00	Culv Full Len (ft)	206.00
# Barrels	2	Culv Vel US (ft/s)	17.02
Q Barrel (cfs)	834.00	Culv Vel DS (ft/s)	17.02
E.G. US. (ft)	953.12	Culv Inv El Up (ft)	934.85
W.S. US. (ft)	952.99	Culv Inv El Dn (ft)	931.45
E.G. DS (ft)	945.37	Culv Frctn Ls (ft)	1.85
W.S. DS (ft)	944.98	Culv Exit Loss (ft)	4.11
Delta EG (ft)	7.76	Culv Entr Loss (ft)	1.80
Delta WS (ft)	8.01	Q Weir (cfs)	
E.G. IC (ft)	950.86	Weir Sta Lft (ft)	
E.G. OC (ft)	953.12	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	941.85	Weir Max Depth (ft)	
Culv WS Outlet (ft)	938.45	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	4.71	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	7.00	Min El Weir Flow (ft)	968.66

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: I75@NoondayTr6
Project File : I75@Noonday.prj
Run Date and Time: 11/24/2009 7:22:26 AM

Project in English units

PLAN DATA

Plan Title: Existing
Plan File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.p01

Geometry Title: Existing
Geometry File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.g01

Flow Title : Urban 25%
Flow File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.f01

Plan Summary Information:

Number of:	Cross Sections	= 6	Multiple Openings	=	0
	Culverts	= 2	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: Mixed Flow

FLOW DATA

Flow Title: Urban 25%
Flow File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.f01

Flow Data (cfs)

River	Reach	RS	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	500 Yr
Noonday Creek	tr1	886	453	695	796	1003	1148	1317	1668
Noonday Creek	tr1	-630	2846	4153	4639	5845	6521	7483	9242

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Noonday Creek tr1		2 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		5 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		10 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		25 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		50 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		100 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		500 Yr	Normal S = 0.00285	Normal S = 0.00285

GEOMETRY DATA

Geometry Title: Existing
Geometry File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.g01

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: 886

INPUT
Description: Approach Section
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4906	955	4933	950	4984	943	4992	938	5000	937.2
5005	938.6	5016	946.2	5028	950	5043	955		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4906	.15	4984	.06	5016	.15

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4984	5016	220	235	220	.4 .6

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: 651

INPUT
Description: Upstream SBL
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4924	955	4940	950	4955	945	4987	938.6	4992	935.4
5000	935.1	5007	936.6	5010	938.8	5022	940	5047	945
5059	950	5072	955						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4924	.15	4987	.06	5010	.15

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4987	5010	270	275	270	.4 .6

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
4924	4982.5	976	T
5017.5	5072	976	T

CULVERT

```
RIVER: Noonday Creek tr
REACH: 1                    RS: 513.5

INPUT
Description: Existing Culvert SBL
Distance from Upstream XS =       98
Deck/Roadway Width        =       80
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
    4600      976        0    5100      986        0

Upstream Bridge Cross Section Data
Station Elevation Data     num=       12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    4924      955     4940      950     4955      945     4987    938.6     4992    935.4
    5000    935.1     5007    936.6     5010    938.8     5022      940     5047      945
    5059      950     5072      955

Manning's n Values         num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
    4924      .15     4987      .06     5010      .15

Bank Sta: Left    Right     Coeff Contr.    Expan.
          4987     5010              .4        .6
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
    4924   4982.5      976          T
  5017.5     5072      976          T

Downstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
    4600      976        0    5100      986        0

Downstream Bridge Cross Section Data
Station Elevation Data     num=       12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    4679    950.5     4709    945.5     4741    940.5     4771    938.5     4987    938.2
    4993    934.7     5000    934.8     5010    934.9     5016    937.1     5030    945.5
    5058    950.5     5088    955.5

Manning's n Values         num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
    4679      .13     4987      .06     5016      .13

Bank Sta: Left    Right     Coeff Contr.    Expan.
          4987     5016              .4        .6
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
    4679   4982.5    976.5          T
  5017.5     5088    976.5          T

Upstream Embankment side slope              =     1.5 horiz. to 1.0 vertical
Downstream Embankment side slope            =     1.5 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name      Shape       Rise     Span
Culvert #1            Box      6.5        7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length     Top n  Bottom n  Depth Blocked  Entrance Loss Coef    Exit
Loss Coef
                 26      224      .012      .012         0                    .4
1
Number of Barrels =  2
Upstream   Elevation =  936.31
```

```
Centerline Stations
    Sta.    Sta.
    4996    5004
Downstream Elevation =  935.15
Centerline Stations
    Sta.    Sta.
    4996    5004

CROSS SECTION


RIVER: Noonday Creek tr
REACH: 1                    RS: 376

INPUT
Description: Downstream SBL - Copied adj. +0.5
Station Elevation Data     num=       12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    4679    950.5     4709    945.5     4741    940.5     4771    938.5     4987    938.2
    4993    934.7     5000    934.8     5010    934.9     5016    937.1     5030    945.5
    5058    950.5     5088    955.5

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
    4679      .13     4987      .06     5016      .13

Bank Sta: Left    Right     Lengths: Left Channel    Right      Coeff Contr.    Expan.
          4987     5016                  105      122      105               .4       .6
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
    4679   4982.5    976.5         T
  5017.5     5088    976.5         T

CROSS SECTION


RIVER: Noonday Creek tr
REACH: 1                    RS: 254

INPUT
Description: Upstream NBL
Station Elevation Data     num=       12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    4679      950     4709      945     4741      940     4771      938     4987    937.7
    4993    934.2     5000    934.3     5010    934.4     5016    936.6     5030      945
    5058      950     5088      955

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
    4679      .13     4987      .06     5016      .13

Bank Sta: Left    Right     Lengths: Left Channel    Right      Coeff Contr.    Expan.
          4987     5016                  230      254      265               .4       .6
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
    4679   4982.5      965         T
  5017.5     5088      965         T

CULVERT


RIVER: Noonday Creek tr
REACH: 1                    RS: 127

INPUT
Description: Existing Culvert NBL
Distance from Upstream XS =       87
Deck/Roadway Width        =       80
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=        3
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
    4500      964        0     5000      977        0     5300      980        0

Upstream Bridge Cross Section Data
Station Elevation Data     num=       12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
```

```
    4679  949.04    4709  944.04    4741  939.04    4771  937.04    4987  936.74
    4993  933.24    5000  933.34    5010  933.44    5016  935.64    5030  944.04
    5058  949.04    5088  954.04

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
    4679     .13    4987     .06    5016     .13

Bank Sta: Left   Right    Coeff Contr.    Expan.
          4987    5016             .4        .6
Ineffective Flow      num=        2
   Sta L   Sta R    Elev  Permanent
    4679  4982.5     965        T
  5017.5    5088     965        T

Downstream  Deck/Roadway Coordinates
    num=        3
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    4500      964        0    5000      977        0    5300      980        0

Downstream Bridge Cross Section Data
Station Elevation Data     num=       14
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    4550   955.96    4570   950.96    4593   945.96    4658   937.96    4991   935.96
    4994   932.36    5000   932.36    5006   932.36    5010   935.96    5016   935.96
    5066   940.96    5086   945.96    5096   950.96    5106   955.96

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
    4550     .15    4991     .06    5010     .15

Bank Sta: Left   Right    Coeff Contr.    Expan.
          4991    5010             .4        .6
Ineffective Flow      num=        2
   Sta L   Sta R    Elev  Permanent
    4550  4982.5     965        T
  5017.5    5106     965        T

Upstream Embankment side slope                =     1.5 horiz. to 1.0 vertical
Downstream Embankment side slope              =     1.5 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins           =
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise     Span
Culvert #1            Box       7        7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length     Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit
Loss Coef
                 24     206      .012      .012         0                    .4
1
Number of Barrels =  2
Upstream   Elevation =  934.85
Centerline Stations
    Sta.     Sta.
    4996     5004
Downstream Elevation =  931.45
Centerline Stations
    Sta.     Sta.
    4996     5004

CROSS SECTION


RIVER: Noonday Creek tr
REACH: 1                  RS: 0

INPUT
Description: Downstream NBL
Station Elevation Data     num=       14
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
```

4550	955	4570	950	4593	945	4658	937	4991	935
4994	931.4	5000	931.4	5006	931.4	5010	935	5016	935
5066	940	5086	945	5096	950	5106	955		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4550	.15	4991	.06	5010	.15

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4991	5010	420	650	600	.4 .6

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
4550	4982.5	965	T
5017.5	5106	965	T

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: -630

INPUT
Description: Exit
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4802	941.9	4867	941.5	4875	941.8	4923	932	4944	932.7
4977	932.7	4981	926.3	5000	925	5020	926	5023	932.6
5064	932.4	5092	944.3	5137	945.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4802	.13	4977	.06	5023	.13

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4977	5023	0	0	0	.1 .3

SUMMARY OF MANNING'S N VALUES

River:Noonday Creek tr

Reach	River Sta.	n1	n2	n3
1	886	.15	.06	.15
1	651	.15	.06	.15
1	513.5	Culvert		
1	376	.13	.06	.13
1	254	.13	.06	.13
1	127	Culvert		
1	0	.15	.06	.15
1	-630	.13	.06	.13

SUMMARY OF REACH LENGTHS

River: Noonday Creek tr

Reach	River Sta.	Left	Channel	Right
1	886	220	235	220
1	651	270	275	270
1	513.5	Culvert		
1	376	105	122	105
1	254	230	254	265
1	127	Culvert		
1	0	420	650	600
1	-630	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Noonday Creek tr

Reach	River Sta.	Contr.	Expan.
1	886	.4	.6
1	651	.4	.6
1	513.5	Culvert	
1	376	.4	.6
1	254	.4	.6
1	127	Culvert	
1	0	.4	.6
1	-630	.1	.3

HEC-RAS PROPOSED CULVERT MODEL

HEC-RAS Plan: Proposed River: Noonday Creek tr 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)	
1	-630	2 Yr	2846.00	925.00	935.81	930.96	936.19	0.002854	5.40	803.74	167.66	0.31
1	-630	50 Yr	6521.00	925.00	940.26	935.17	940.80	0.002850	6.95	1623.04	199.98	0.33
1	-630	100 Yr	7483.00	925.00	941.19	935.74	941.76	0.002855	7.25	1811.07	206.69	0.33
1	-630	500 Yr	9242.00	925.00	943.00	936.65	943.65	0.002847	7.82	2290.07	286.95	0.34
1	0	2 Yr	453.00	931.40	937.84		938.04	0.002636	3.71	155.02	393.30	0.27
1	0	50 Yr	1148.00	931.40	942.23		942.54	0.002184	4.91	308.40	459.37	0.27
1	0	100 Yr	1317.00	931.40	943.15		943.49	0.002109	5.12	340.68	470.55	0.27
1	0	500 Yr	1668.00	931.40	944.98		945.37	0.001971	5.48	404.69	492.73	0.27
1	127		Culvert									
1	254	2 Yr	453.00	934.20	940.46	936.79	940.57	0.001294	2.72	179.03	284.41	0.20
1	254	50 Yr	1148.00	934.20	946.02	938.57	946.18	0.000785	3.35	373.46	332.82	0.18
1	254	100 Yr	1317.00	934.20	948.21	938.93	948.36	0.000562	3.20	450.10	358.21	0.15
1	254	500 Yr	1668.00	934.20	953.21	939.56	953.34	0.000307	2.92	625.18	398.26	0.12
1	376	2 Yr	453.00	934.70	940.60		940.73	0.001634	2.92	166.24	281.46	0.23
1	376	50 Yr	1148.00	934.70	946.09		946.27	0.000895	3.49	358.61	327.89	0.19
1	376	100 Yr	1317.00	934.70	948.26		948.42	0.000630	3.31	434.46	353.03	0.16
1	376	500 Yr	1668.00	934.70	953.24		953.37	0.000335	3.00	608.67	395.43	0.13
1	513.5		Culvert									
1	651	2 Yr	453.00	935.10	941.61	938.37	941.78	0.002156	3.40	155.82	58.12	0.26
1	651	50 Yr	1148.00	935.10	950.59	940.47	950.71	0.000464	3.01	470.00	122.41	0.14
1	651	100 Yr	1317.00	935.10	954.24	940.84	954.34	0.000281	2.72	597.78	143.59	0.11
1	651	500 Yr	1668.00	935.10	962.92	941.57	962.99	0.000119	2.30	901.57	148.00	0.08
1	886	2 Yr	453.00	937.20	942.44	940.84	942.86	0.009567	5.15	87.97	25.67	0.49
1	886	50 Yr	1148.00	937.20	950.73	943.02	950.85	0.000681	2.90	592.48	101.16	0.16
1	886	100 Yr	1317.00	937.20	954.36	943.45	954.42	0.000276	2.24	1014.51	131.62	0.10
1	886	500 Yr	1668.00	937.20	963.01	944.23	963.03	0.000062	1.45	2197.58	137.00	0.05

Plan: Proposed Noonday Creek tr 1 RS: 127 Culv Group: Culvert #1 Profile: 50 Yr

Q Culv Group (cfs)	1148.00	Culv Full Len (ft)	230.00
# Barrels	2	Culv Vel US (ft/s)	11.71
Q Barrel (cfs)	574.00	Culv Vel DS (ft/s)	11.71
E.G. US. (ft)	946.19	Culv Inv El Up (ft)	935.15
W.S. US. (ft)	946.02	Culv Inv El Dn (ft)	931.45
E.G. DS (ft)	942.54	Culv Frctn Ls (ft)	0.98
W.S. DS (ft)	942.23	Culv Exit Loss (ft)	1.81
Delta EG (ft)	3.64	Culv Entr Loss (ft)	0.85
Delta WS (ft)	3.79	Q Weir (cfs)	
E.G. IC (ft)	945.88	Weir Sta Lft (ft)	
E.G. OC (ft)	946.19	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	942.15	Weir Max Depth (ft)	
Culv WS Outlet (ft)	938.45	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	5.93	Min El Weir Flow (ft)	968.66

Plan: Proposed Noonday Creek tr 1 RS: 127 Culv Group: Culvert #1 Profile: 100 Yr

Q Culv Group (cfs)	1317.00	Culv Full Len (ft)	230.00
# Barrels	2	Culv Vel US (ft/s)	13.44
Q Barrel (cfs)	658.50	Culv Vel DS (ft/s)	13.44
E.G. US. (ft)	948.36	Culv Inv El Up (ft)	935.15
W.S. US. (ft)	948.21	Culv Inv El Dn (ft)	931.45
E.G. DS (ft)	943.49	Culv Frctn Ls (ft)	1.28
W.S. DS (ft)	943.15	Culv Exit Loss (ft)	2.46
Delta EG (ft)	4.87	Culv Entr Loss (ft)	1.12
Delta WS (ft)	5.06	Q Weir (cfs)	
E.G. IC (ft)	947.38	Weir Sta Lft (ft)	
E.G. OC (ft)	948.36	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	942.15	Weir Max Depth (ft)	
Culv WS Outlet (ft)	938.45	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	6.50	Min El Weir Flow (ft)	968.66

Plan: Proposed Noonday Creek tr 1 RS: 127 Culv Group: Culvert #1 Profile: 500 Yr

Q Culv Group (cfs)	1668.00	Culv Full Len (ft)	230.00
# Barrels	2	Culv Vel US (ft/s)	17.02
Q Barrel (cfs)	834.00	Culv Vel DS (ft/s)	17.02
E.G. US. (ft)	953.34	Culv Inv El Up (ft)	935.15
W.S. US. (ft)	953.21	Culv Inv El Dn (ft)	931.45
E.G. DS (ft)	945.37	Culv Frctn Ls (ft)	2.06
W.S. DS (ft)	944.98	Culv Exit Loss (ft)	4.11
Delta EG (ft)	7.97	Culv Entr Loss (ft)	1.80
Delta WS (ft)	8.23	Q Weir (cfs)	
E.G. IC (ft)	951.17	Weir Sta Lft (ft)	
E.G. OC (ft)	953.34	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	942.15	Weir Max Depth (ft)	
Culv WS Outlet (ft)	938.45	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	4.75	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	7.00	Min El Weir Flow (ft)	968.66

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

PROJECT DATA
Project Title: I75@NoondayTr6
Project File : I75@Noonday.prj
Run Date and Time: 11/24/2009 7:22:23 AM

Project in English units

PLAN DATA

Plan Title: Proposed
Plan File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.p02

Geometry Title: Proposed
Geometry File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.g02

Flow Title : Urban 25%
Flow File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.f01

Plan Summary Information:

Number of:	Cross Sections	= 6	Multiple Openings	=	0
	Culverts	= 2	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: Mixed Flow

FLOW DATA

Flow Title: Urban 25%
Flow File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.f01

Flow Data (cfs)

River	Reach	RS	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	500 Yr
Noonday Creek	tr1	886	453	695	796	1003	1148	1317	1668
Noonday Creek	tr1	-630	2846	4153	4639	5845	6521	7483	9242

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Noonday Creek tr1		2 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		5 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		10 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		25 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		50 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		100 Yr	Normal S = 0.00285	Normal S = 0.00285
Noonday Creek tr1		500 Yr	Normal S = 0.00285	Normal S = 0.00285

GEOMETRY DATA

Geometry Title: Proposed
Geometry File : n:\TRA\255717\Hydraulics\I75@NoondayTrib6\HECRAS\Preliminary 4\I75@Noonday.g02

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: 886

INPUT
Description: Approach Section
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4906	955	4933	950	4984	943	4992	938	5000	937.2
5005	938.6	5016	946.2	5028	950	5043	955		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4906	.15	4984	.06	5016	.15

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4984	5016	220	235	220	.4 .6

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: 651

INPUT
Description: Upstream SBL
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4924	955	4940	950	4955	945	4987	938.6	4992	935.4
5000	935.1	5007	936.6	5010	938.8	5022	940	5047	945
5059	950	5072	955						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4924	.15	4987	.06	5010	.15

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4987	5010	270	275	270 .4	.6

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
4924	4982.5	976	T
5017.5	5072	976	T

CULVERT

```
RIVER: Noonday Creek tr
REACH: 1                    RS: 513.5

INPUT
Description: Existing Culvert SBL
Distance from Upstream XS =       98
Deck/Roadway Width        =       80
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    4600      976        0    5100      986        0

Upstream Bridge Cross Section Data
Station Elevation Data     num=       12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    4924      955     4940      950     4955      945     4987     938.6     4992     935.4
    5000    935.1     5007    936.6     5010    938.8     5022      940     5047      945
    5059      950     5072      955

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
    4924      .15     4987      .06     5010      .15

Bank Sta: Left    Right     Coeff Contr.    Expan.
          4987     5010              .4        .6
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
    4924   4982.5      976        T
  5017.5     5072      976        T

Downstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    4600      976        0    5100      986        0

Downstream Bridge Cross Section Data
Station Elevation Data     num=       12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    4679    950.5     4709    945.5     4741    940.5     4771    938.5     4987    938.2
    4993    934.7     5000    934.8     5010    934.9     5016    937.1     5030    945.5
    5058    950.5     5088    955.5

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
    4679      .13     4987      .06     5016      .13

Bank Sta: Left    Right     Coeff Contr.    Expan.
          4987     5016              .4        .6
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
    4679   4982.5    976.5        T
  5017.5     5088    976.5        T

Upstream Embankment side slope              =     1.5 horiz. to 1.0 vertical
Downstream Embankment side slope            =     1.5 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise     Span
Culvert #1            Box      6.5        7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length     Top n  Bottom n  Depth Blocked  Entrance Loss Coef    Exit
Loss Coef
                 26      224      .012      .012         0                    .4
1
Number of Barrels =  2
Upstream   Elevation =  936.31
```

```
Centerline Stations
    Sta.     Sta.
    4996     5004
Downstream Elevation =  935.15
Centerline Stations
    Sta.     Sta.
    4996     5004

CROSS SECTION


RIVER: Noonday Creek tr
REACH: 1                    RS: 376

INPUT
Description: Downstream SBL - Copied adj. +0.5
Station Elevation Data     num=       12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    4679    950.5     4709    945.5     4741    940.5     4771    938.5     4987    938.2
    4993    934.7     5000    934.8     5010    934.9     5016    937.1     5030    945.5
    5058    950.5     5088    955.5

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
    4679      .13     4987      .06     5016      .13

Bank Sta: Left    Right     Lengths: Left Channel    Right      Coeff Contr.    Expan.
          4987     5016                 81       98       81              .4       .6
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
    4679   4982.5    976.5         T
  5017.5     5088    976.5         T

CROSS SECTION


RIVER: Noonday Creek tr
REACH: 1                    RS: 254

INPUT
Description: Upstream NBL
Station Elevation Data     num=       12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    4679      950     4709      945     4741      940     4771      938     4987    937.7
    4993    934.2     5000    934.3     5010    934.4     5016    936.6     5030      945
    5058      950     5088      955

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
    4679      .13     4987      .06     5016      .13

Bank Sta: Left    Right     Lengths: Left Channel    Right      Coeff Contr.    Expan.
          4987     5016                254      278      289              .4       .6
Ineffective Flow      num=        2
   Sta L    Sta R     Elev  Permanent
    4679   4982.5      965         T
  5017.5     5088      965         T

CULVERT


RIVER: Noonday Creek tr
REACH: 1                    RS: 127

INPUT
Description: Existing Culvert NBL
Distance from Upstream XS =       87
Deck/Roadway Width        =       80
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=        3
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
    4500      964         0     5000      977         0     5300      980         0

Upstream Bridge Cross Section Data
Station Elevation Data     num=       12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
```

```
    4679  949.04    4709  944.04    4741  939.04    4771  937.04    4987  936.74
    4993  933.24    5000  933.34    5010  933.44    5016  935.64    5030  944.04
    5058  949.04    5088  954.04

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    4679     .13    4987     .06    5016     .13

Bank Sta: Left   Right    Coeff Contr.   Expan.
          4987    5016            .4        .6
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    4679  4982.5     965       T
  5017.5    5088     965       T

Downstream  Deck/Roadway Coordinates
    num=       3
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    4500      964        0    5000      977        0    5300      980        0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    4550  955.96    4570  950.96    4593  945.96    4658  937.96    4991  935.96
    4994  932.36    5000  932.36    5006  932.36    5010  935.96    5016  935.96
    5066  940.96    5086  945.96    5096  950.96    5106  955.96

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    4550     .15    4991     .06    5010     .15

Bank Sta: Left   Right    Coeff Contr.   Expan.
          4991    5010            .4        .6
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    4550  4982.5     965       T
  5017.5    5106     965       T

Upstream Embankment side slope              =     1.5 horiz. to 1.0 vertical
Downstream Embankment side slope            =     1.5 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise    Span
Culvert #1            Box       7       7
FHWA Chart # 8 - flared wingwalls
FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef    Exit
Loss Coef
                24     230      .012      .012        0                    .4
1
Number of Barrels =  2
Upstream   Elevation =  935.15
Centerline Stations
    Sta.    Sta.
    4996    5004
Downstream Elevation =  931.45
Centerline Stations
    Sta.    Sta.
    4996    5004

CROSS SECTION


RIVER: Noonday Creek tr
REACH: 1                  RS: 0

INPUT
Description: Downstream NBL
Station Elevation Data    num=      14
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

4550	955	4570	950	4593	945	4658	937	4991	935
4994	931.4	5000	931.4	5006	931.4	5010	935	5016	935
5066	940	5086	945	5096	950	5106	955		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4550	.15	4991	.06	5010	.15

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4991	5010	420	650	600	.4 .6

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
4550	4982.5	965	T
5017.5	5106	965	T

CROSS SECTION

RIVER: Noonday Creek tr
REACH: 1 RS: -630

INPUT
Description: Exit
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4802	941.9	4867	941.5	4875	941.8	4923	932	4944	932.7
4977	932.7	4981	926.3	5000	925	5020	926	5023	932.6
5064	932.4	5092	944.3	5137	945.6				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4802	.13	4977	.06	5023	.13

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
4977	5023	0	0	0	.1 .3

SUMMARY OF MANNING'S N VALUES

River:Noonday Creek tr

Reach	River Sta.	n1	n2	n3
1	886	.15	.06	.15
1	651	.15	.06	.15
1	513.5	Culvert		
1	376	.13	.06	.13
1	254	.13	.06	.13
1	127	Culvert		
1	0	.15	.06	.15
1	-630	.13	.06	.13

SUMMARY OF REACH LENGTHS

River: Noonday Creek tr

Reach	River Sta.	Left	Channel	Right
1	886	220	235	220
1	651	270	275	270
1	513.5	Culvert		
1	376	81	98	81
1	254	254	278	289
1	127	Culvert		
1	0	420	650	600
1	-630	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Noonday Creek tr

Reach	River Sta.	Contr.	Expan.
1	886	.4	.6
1	651	.4	.6
1	513.5	Culvert	
1	376	.4	.6
1	254	.4	.6
1	127	Culvert	
1	0	.4	.6
1	-630	.1	.3

Section VI
FEMA Computer Model Output

DUPLICATE EFFECTIVE (DE) MODEL-
CORRECTED EFFECTIVE (CE) –
EXISTING CONDITIONS MODEL
FLOODWAY

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

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	-630	100 Yr	Existing	7483.00	925.00	941.19	935.74	941.76	0.002855	7.25	1811.07	206.69	0.33
1	-630	100 Yr	Existing FW	7483.00	925.00	943.09	935.77	943.89	0.002855	7.85	1343.92	100.00	0.34
1	0	100 Yr	Existing	1317.00	931.40	943.15		943.49	0.002109	5.12	340.68	470.55	0.27
1	0	100 Yr	Existing FW	1317.00	931.40	945.36		945.59	0.001108	4.19	418.15	36.00	0.20
1	127			Culvert									
1	254	100 Yr	Existing	1317.00	934.20	948.07	938.93	948.22	0.000582	3.23	445.29	356.62	0.16
1	254	100 Yr	Existing FW	1317.00	934.20	950.33	938.93	950.44	0.000341	2.75	524.27	36.00	0.12
1	376	100 Yr	Existing	1317.00	934.70	948.14		948.31	0.000651	3.35	430.24	351.63	0.17
1	376	100 Yr	Existing FW	1317.00	934.70	950.37		950.49	0.000377	2.84	508.19	36.00	0.13
1	513.5			Culvert									
1	651	100 Yr	Existing	1317.00	935.10	954.12	940.84	954.22	0.000288	2.74	593.51	142.88	0.11
1	651	100 Yr	Existing FW	1317.00	935.10	956.37	940.86	956.45	0.000192	2.43	672.26	36.00	0.10
1	886	100 Yr	Existing	1317.00	937.20	954.24	943.45	954.30	0.000286	2.27	998.72	130.60	0.11
1	886	100 Yr	Existing FW	1317.00	937.20	956.42	943.45	956.52	0.000389	2.47	577.46	36.00	0.11

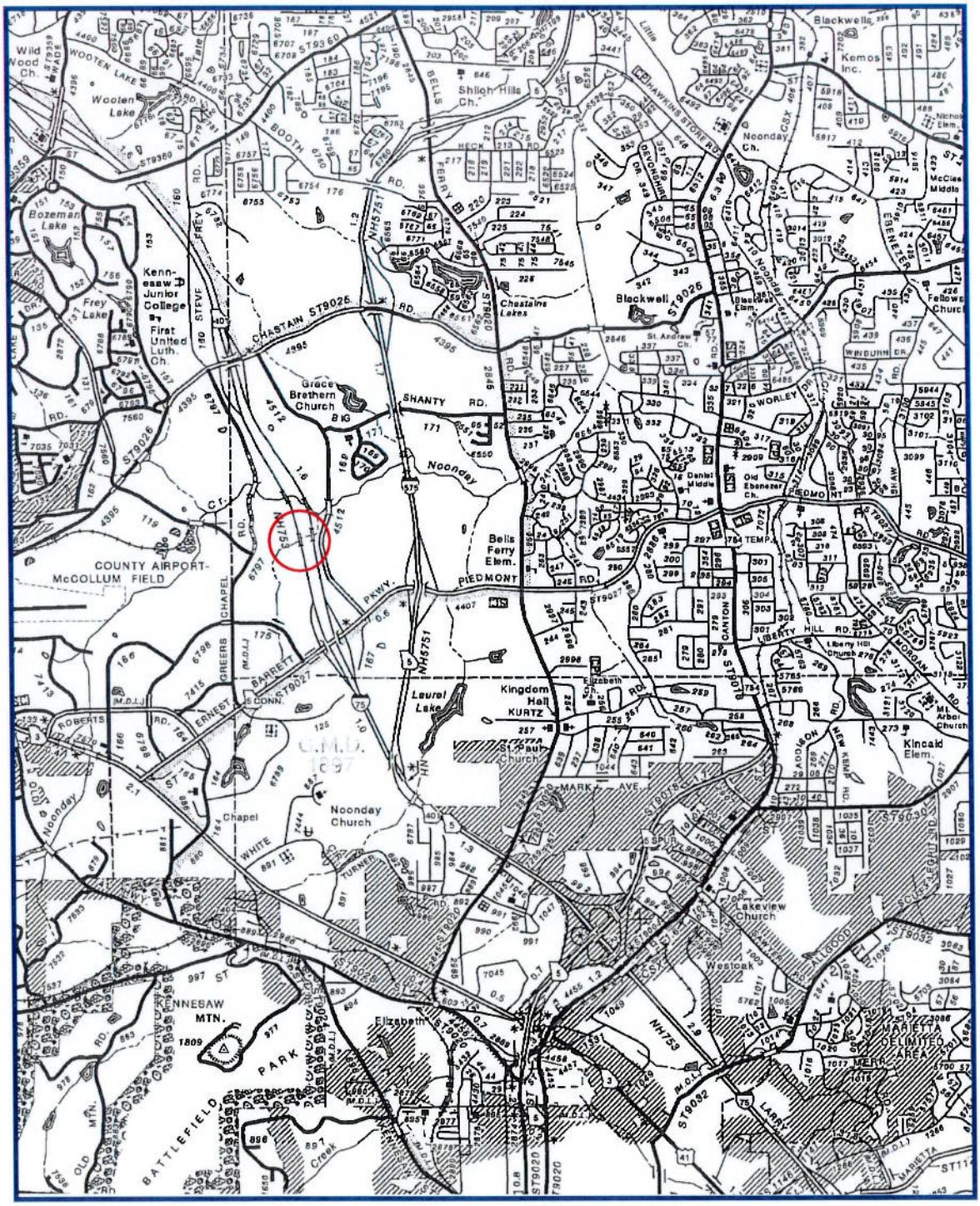
PROPOSED CONDITIONS MODEL
FLOODWAY

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

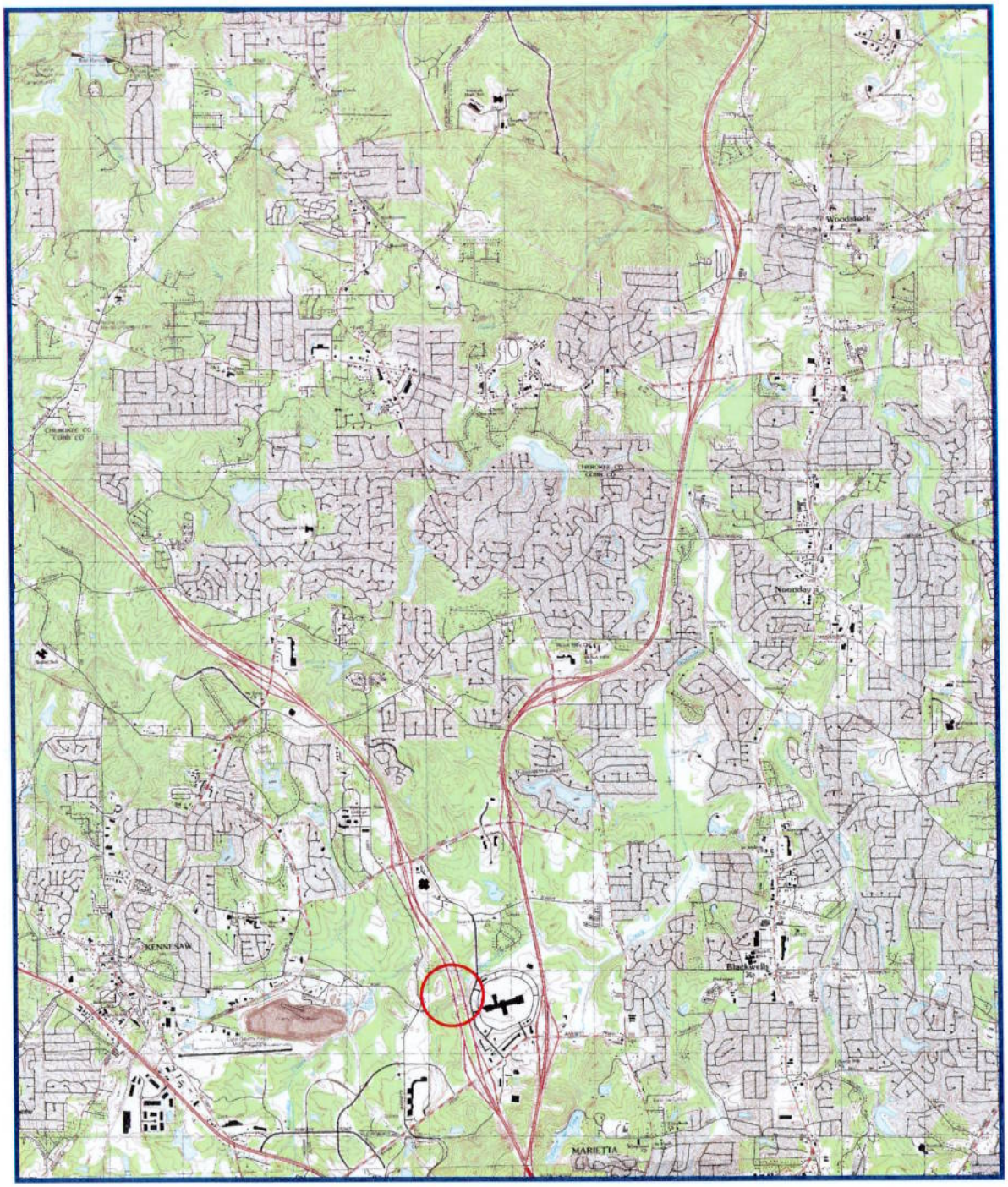
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	-630	100 Yr	Proposed	7483.00	925.00	941.19	935.74	941.76	0.002855	7.25	1811.07	206.69	0.33
1	-630	100 Yr	Proposed FW	7483.00	925.00	943.09	935.77	943.89	0.002855	7.85	1343.92	100.00	0.34
1	0	100 Yr	Proposed	1317.00	931.40	943.15		943.49	0.002109	5.12	340.68	470.55	0.27
1	0	100 Yr	Proposed FW	1317.00	931.40	945.36		945.59	0.001108	4.19	418.15	36.00	0.20
1	127			Culvert									
1	254	100 Yr	Proposed	1317.00	934.20	948.21	938.93	948.36	0.000562	3.20	450.10	358.21	0.15
1	254	100 Yr	Proposed FW	1317.00	934.20	950.46	938.93	950.57	0.000331	2.73	529.04	36.00	0.12
1	376	100 Yr	Proposed	1317.00	934.70	948.26		948.42	0.000630	3.31	434.46	353.03	0.16
1	376	100 Yr	Proposed FW	1317.00	934.70	950.49		950.61	0.000367	2.81	512.62	36.00	0.13
1	513.5			Culvert									
1	651	100 Yr	Proposed	1317.00	935.10	954.24	940.84	954.34	0.000281	2.72	597.78	143.59	0.11
1	651	100 Yr	Proposed FW	1317.00	935.10	956.49	940.86	956.57	0.000188	2.41	676.72	36.00	0.09
1	886	100 Yr	Proposed	1317.00	937.20	954.36	943.45	954.42	0.000276	2.24	1014.51	131.62	0.10
1	886	100 Yr	Proposed FW	1317.00	937.20	956.55	943.45	956.64	0.000381	2.45	582.01	36.00	0.11

Section VII
Appendix

LOCATION MAPS



NH000-0073(242) Cobb County
I-75 over Noonday Creek Tributary No. 6
PI# 714130



NH000-0073(242) Cobb County
I-75 over Noonday Creek Tributary No. 6
PI# 714130

NH000-0073(242) Cobb County
I-75 over Noonday Creek Tributary No. 6
PI# 714130

PROJECT PHOTOGRAPHS

Looking downstream at the upstream side of the northbound alignment of I-75.

Looking north from the south bank of Noonday Creek Trib. #6 just upstream from NBL.

Looking north at floodplain from the south bank.

Looking downstream at the upstream side of the northbound alignment of I-75.

Looking west (upstream) from the upstream side of the northbound alignment of I-75.

Looking west (upstream) at the downstream side of the southbound alignment of I-75.

Looking east (downstream) from the downstream side of the SBL alignment of I-75.

FEMA DATA

TABLE 2 - SUMMARY OF DISCHARGES (continued)

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
				Existing	Future	
NOONDAY CREEK (continued)						
At Ernest Barrett Parkway	1.15	1,849	2,724	3,076	3,076	3,845
At New Salem Road	0.71	1,478	2,202	2,461	2,461	3,006
NOONDAY CREEK TRIBUTARY NO. 1						
Just downstream of Flood Retarding Structure No. 4	1.40	137	210	227	*	254
At Hawkins Store Road	1.00	386	613	669	*	754
Approximately 1,800 feet upstream of Hawkins Store Road Northeast	0.90	346	550	600	*	675
NOONDAY CREEK TRIBUTARY NO. 3						
At confluence with Noonday Creek	3.90	3,762	4,998	5,482	5,979	6,403
At Rock Bridge Road Northeast	3.70	3,762	4,998	5,482	5,979	6,403
At Cedarbrook Drive	3.47	3,985	5,147	5,680	6,238	6,634
At Piedmont Road Northeast	3.30	3,794	4,890	5,364	5,919	6,211
At Kurtz Road Northeast	2.50	3,355	4,247	4,603	5,109	5,290
At Mark Avenue Northeast	1.80	2,851	3,555	3,815	4,156	4,302
Approximately 1,065 feet upstream of U.S. Interstate 75/State Highway 401/5	0.80	1,676	2,101	2,184	2,283	2,291
NOONDAY CREEK TRIBUTARY NO. 4						
At confluence with Noonday Creek	3.10	906	1,804	2,195	*	3,472
About 1,500 feet upstream of mouth	2.99	1,028	2,050	2,482	*	3,900
Just downstream of Laura Lake Dam	2.23	1,374	2,685	3,243	*	5,042
Just upstream of Laura Lake Dam	2.23	1,905	3,115	3,638	*	5,370
NOONDAY CREEK TRIBUTARY NO. 6						
Just upstream of Interstate 75	1.03	339	550	601	*	680
About 1 mile upstream of Interstate 75	0.57	236	408	475	*	459

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Noonday Creek Tributary No. 4								
A	1,340[1]	150	833	2.6	930.1	926.8[3]	927.1	0.3
B	3,770[1]	66	570	4.4	943.3	943.3	943.7	0.4
C	5,250[1]	153	752	3.3	948.5	948.5	949.5	1.0
D	6,615[1]	313	2,137	1.7	976.9	976.9	976.9	0.0
E	8,965[1]	312	1,988	1.8	976.9	976.9	976.9	0.0
F	10,920[1]	101	1,768	2.1	1,002.9	1,002.9	1,002.9	0.0
G	12,640[1]	53	461	7.9	1,014.8	1,014.8	1,015.5	0.7
H	14,415[1]	62	530	6.9	1,044.7	1,044.7	1,045.0	0.3
Noonday Creek Tributary No. 6								
A	0.26[2]	36	208	2.9	947.0	942.9[3]	943.9	1.0
B	0.76[2]	85	200	2.7	961.4	961.4	962.4	1.0
C	1.21[2]	28	123	3.3	981.4	981.4	982.4	1.0
Noonday Creek Tributary No. 7								
A	55[1]	180	884	3.6	953.4	944.9[3]	945.4	0.5
B	1,153[1]	208	855	3.7	953.4	949.9	950.9	1.0
C	2,275[1]	120	445	7.1	960.2	960.2	960.2	0.0
D	3,014[1]	160	1,061	3.0	962.8	962.8	963.7	0.9
E	4,167[1]	55	165	4.3	964.4	964.4	965.1	0.7
F	4,678[1]	65	130	5.4	969.5	969.5	969.5	0.0
G	5,661[1]	90	135	7.0	979.9	979.9	979.9	0.0
H	6,734[1]	33	131	7.3	985.1	985.1	985.6	0.5
I	7,820[1]	30	176	5.4	995.6	995.6	996.2	0.6

[1]Feet above confluence with Noonday Creek
[2]Miles above mouth
[3]Elevation computed without consideration of backwater effects from Noonday Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

COBB COUNTY, GA AND INCORPORATED AREAS

FLOODWAY DATA

NOONDAY CREEK TRIBUTARY NO. 4 – NOONDAY CREEK TRIBUTARY NO. 6 – NOONDAY CREEK TRIBUTARY NO. 7

MISCELLANEOUS PROJECT DATA

McWhorter III, John K

From: Chris Stewart [Chris.Stewart@riskmapcds.com]
Sent: Tuesday, September 22, 2009 1:11 PM
To: McWhorter III, John K
Subject: FIS Data Request Z0904282

John,

Hello this is Chris Stewart from the FEMA Engineering Library; I have processed your request for Clark Creek in Cherokee and Cobb counties and Noonday Creek Tributary 6 in Cobb County. I was unable to locate any data for Noonday Creek Tributary 6 in our library, I also was unable to reference who did the modeling work for this stream as it is not cited in the Cobb County FIS. I was able to locate the original study HEC-2 model for Clark Creek for all portions studied in detailed method in Cherokee County, I was also able to locate a 2007 LOMR revising a portions of Clark Creek containing HEC-RAS modeling. I was unable to locate any data for Clark Creek in Cobb County. If you are still interested in this data please let me know so I can fax the final agreement to pay sheets for the release of this data to you. If you have any questions concerning this data or your case please contact me, thanks.

Chris Stewart
Chris.stewart@riskmapcds.com
703-212-4032

McWhorter III, John K

From: Barbro Westerlind [Barbro.Westerlind@riskmapcds.com]
Sent: Wednesday, September 16, 2009 4:16 PM
To: McWhorter III, John K
Subject: rpt_AckLetter

Zimmerman Associates, Inc.

847 S. Pickett St.
Alexandria, VA 22304

(877) 336-2627
FAX: (703) 212-4090

Wednesday, September 16, 2009

Hatch Mott MacDonald
Mr. John McWhorter, P.E.
2550 Heritage Court, SE Suite 250
Atlanta, GA 30339-

Clark Creek, CHEROKEE, GA 13057C

Dear: Mr. John McWhorter, P.E.

This is in reference to your request that the Federal Emergency Management Agency (FEMA) provide you with Flood Insurance Study data in CHEROKEE, GA. We received your request on 9/16/2009 and have assigned it request number Z0904283.

If you have any questions regarding this matter, please contact me at (877) 336-2627.
You may fax your question to me at (703) 212-4090.

Sincerely,

Unassigned
FEMA Engineering Library
Request Specialist
cc: ZAI Case File

September 2, 2009

Flood Insurance Request Specialist
FEMA Project Library
847 South Pickett Street
Alexandria, VA 22304
FAX: (703) 212-4090

RE: Current FIS Computer Model Requests
HMM Project: I-75 Noonday Creek Tributary No. 6 & Clark Creek in Cobb & Cherokee Counties, Georgia

We request the FIS models listed below. Attached is our initial $270 payment.

Location:	**Cobb County, Georgia**
Flooding Source:	**Noonday Creek Tributary No. 6**
Panel Number:	**13067C0039G**
Effective Date:	**December 16, 2008**

Location:	**Cobb County, Georgia**
Flooding Source:	**Clark Creek**
Panel Number:	**13067C0028G**
Effective Date:	**December 16, 2008**

Location:	**Cherokee County, Georgia**
Flooding Source:	**Clark Creek**
Panel Number:	**13057C0309D**
Effective Date:	**September 29, 2006**

Thank you in advance for your help in this matter.

Sincerely,

John McWhorter, P.E.

John.McWhorter@Hatchmott.com

Hatch Mott MacDonald
2550 Heritage Court, SE
Suite 250
Atlanta, GA 30339

FEDERAL EMERGENCY MANAGEMENT AGENCY

PAYMENT INFORMATION FORM

Community Name: Cobb & Cherokee Counties, Georgia

Project Identifier: I-75 over Noonday Creek Tributary #6 & Clark Creek

THIS FORM MUST BE MAILED, ALONG WITH THE APPROPRIATE FEE, TO THE ADDRESS BELOW OR FAXED TO THE FAX NUMBER BELOW.

Type of Request:

☐ MT-1 application
☐ MT-2 application

FEMA
Fee Charge System Administrator
P.O. Box 22787
Alexandria, VA 22304
FAX (703) 317-3076

☒ EDR application

FEMA Project Library
847 South Pickett St.
Alexandria, VA 22304
FAX (703) 212-4090

Request No.: _____ (if known)

Amount: $270.00

☒ INITIAL FEE* ☐ FINAL FEE ☐ FEE BALANCE** ☐ MASTER CARD ☐ VISA ☒ CHECK ☐ MONEY ORDER

*Note: Check only for EDR and/or Alluvial Fan requests (as appropriate).

**Note: Check only if submitting a corrected fee for an ongoing request.

COMPLETE THIS SECTION ONLY IF PAYING BY CREDIT CARD

CARD NUMBER

				—				—				—			
1	2	3	4		5	6	7	8	9	10	11	12	13	14	15	16

EXP. DATE

		—	
Month			Year

_____ _____

Date Signature

NAME *(AS IT APPEARS ON CARD)*: _____
(please print or type)

ADDRESS: _____
(for your credit card receipt-please print or type) _____

DAYTIME PHONE: _____

From: Crampton, Sam [scrampton@Dewberry.com]
Sent: Tuesday, April 29, 2008 6:09 PM
To: John McWhorter
Subject: RE: Cobb and Cherokee FEMA models

Thanks for the surveys. I will keep them handy for any updates we do. I will take a look at the USGS comments. The problem we find with the regression flows is that they are out of date and do not do well for urbanized area or for future flows. I certainly would not rule out the models over estimating. Unfortunately there has not been the funding for us to revise the hydrology completely on any studies except Pitner Creek and so they are all old HEC1 models that have simply had the curve numbers updated.

The next few weeks is really busy but after that we could meet for lunch.

Sam Crampton
Water Resources Engineer
Dewberry
2872 Woodcock Blvd, Suite 230
Atlanta, Ga 30341
678-530-0022 x203
678-530-0044 (fax)

From: John McWhorter [mailto:jmcwhorter@JBTrimble.com]
Sent: Tuesday, April 29, 2008 2:45 PM
To: Crampton, Sam
Cc: Robbie Frizzell; Beck, Susan
Subject: RE: Cobb and Cherokee FEMA models

Sam,

Here are the recent bridge surveys for the I-575 over Noonday Creek crossings. Hopefully this will be of use to you.

I noticed that there is a large difference between the FEMA discharges and the USGS regression flows. Since we will model the proposed construction with the FEMA model and our own HEC-RAS model using the project survey and our calculated discharges, I'm in the process of trying to resolve this difference. I presented this info to the USGS and asked for guidance. I've attached that email exchange here with hopes that you would read this over and comment as well.

Our May calendar is pretty full but Robbie and I want to take you to lunch soon to talk about projects and to say thanks for all your help over the past year or so.

Thanks again for you help!

John

From: Crampton, Sam [mailto:scrampton@Dewberry.com]
Sent: Friday, April 18, 2008 8:41 AM
To: John McWhorter
Subject: RE: Cobb and Cherokee FEMA models

I hope you got some sleep, I see the email was sent at 2:52AM!

I have the new model for Noonday which will become effective Dec26 08. We have a project in the vicinity of I-575 and 75 on Noonday Creek and will likely be making a FEMA submnittal. I know that the bridge survey in that area is very old and poor quality and really does need to be updated. If you have existing conditions survey for any of them structures around there, please could yo le us with them to update the model.

DEC08 Hydrology	HEC1 model that will become effective for Noonday Creek in DEC 08
DEC08 Model	RAS model for Noonday creek that will become effective in DEC08
Effective 92 Models	These should be the Noonday and Tate models that went effective in 92. Check carefully to ensure that

ıey are the models if you need to use them.
ıcomplete Tate Revisions This model is one that we tried to use (performed by another consultant) but we found problems with and had to stick with the effective data for Tate Creek. We made some changes to this but gave up half way through because it ould have cost too much to redo the model (I think it was mainly hydrology issues). There may be things you could use from this.

ip with these files in can be downloaded from our ftp.
berry.com
ogin: CobbGA
'swd: S4RRWQ

am Crampton
Vater Resources Engineer
)ewberry
872 Woodcock Blvd, Suite 230
ıtlanta, Ga 30341
78-530-0022 x203
78-530-0044 (fax)

From: John McWhorter [mailto:jmcwhorter@JBTrimble.com]
Sent: Friday, April 18, 2008 2:52 AM
To: Crampton, Sam
Cc: Robbie Frizzell
Subject: Cobb and Cherokee FEMA models

Sam,

Once again, I'm coming to you for some FEMA models. We are working on costing plans for a major construction project along I-575 n Cobb and Cherokee Counties. The floodways encountered along this corridor are Noonday Creek, Tate Creek and Little River. I've equested the data through Michael Baker also, but the Cobb County data has an effective date of August 18, 1992. I know there is a preliminary revised DFIRM for Cobb County. We want to get the latest data, especially if the revised effective data is imminent.

Any information you can provide along these streams in Cobb and Cherokee Counties will be much appreciated.

Thanks,

John McWhorter, P.E.
J.B. Trimble, Inc.
770-200-1713 direct
770-952-1022 office
770-952-1041 fax
jmcwhorter@jbtrimble.com

John McWhorter

From: Anthony J Gotvald [agotvald@usgs.gov]
Sent: Monday, April 28, 2008 9:57 AM
To: John McWhorter
Cc: Garrick L. Edwards; Larry Cook; Robbie Frizzell; Curtis, Steven; Beck, Susan
Subject: RE: Noonday Creek Discharges - I-575

John,

Do you know of any websites that explain the FEMA modeling in general. I am not very familiar with the FEMA modeling and would like to learn more. I am more familiar with the HEC modeling, and I would not mind looking at the HEC-1 model if it is not too much trouble to put it on an ftp site. As a rule of thumb, the rural equations can be used for sites that have impervious area less than 10 percent. 10-15% is kind of a grey area, and anything above 15% is definitely affected by urbanization and the urban equations should be used. If there is anyway you can calculate the impervious area for these sites, then I strongly recommend doing so. With the information that is available, I would recommend using the urban equations for both the 12.8 and 43.2 sq. mi sites. The impervious area is more than likely greater than 10 % and is only going to increase, so the urban equations would be more applicable. Of course, the 43.2 sq miles is out of the range of the urban equations, but if the impervious area is above 10% then this site is beyond the limitations of the rural equations as well. We are actually in the process of putting together a proposal to update the urban equations. We plan to use a multi-state approach where we would pool together urban sites from VA, TN, NC, SC, GA, A and FL. This way the ranges in drainage areas would increase for the urban equations. We are finishing up a similar multi-state approach for the rural equations. The new rural equations will be out at the end of the calendar year. As for the 2005 peaks for both 02392975 and 02392950, keep in mind those peaks have an accuracy of +/- 5 percent. So this is the reason for the slight difference (-2 percent). These sites are very close together and there is no major inflows between them, so the values of the two peaks are almost the same value if you consider the 10 percent uncertainty range.

Tony Gotvald, Hydrologist
USGS Georgia Water Science Center
3039 Amwiler Road, Suite 130
Atlanta, GA 30360
(770) 903-9310

"John McWhorter" <jmcwhorter@JBTrimble.com>

04/26/2008 09:57 PM

To "Anthony J Gotvald" <agotvald@usgs.gov>
cc "Garrick L. Edwards" <gledwards@JBTrimble.com>, "Larry Cook" <lcook@JBTrimble.com>, "Robbie Frizzell" <rfrizzell@JBTrimble.com>, "Curtis, Steven" <sacurtis@bechtel.com>, "Bec Susan" <sbeck@dot.ga.gov>
Subject RE: Noonday Creek Discharges - I-575

Thanks Tony. I agree that the FEMA flows seem high for the 12.8 square mile area. Since they are in the regulatory model, we are probably stuck with them for the FEMA modeling. However, for projects that are reviewed by GDOT, we develop a separate HEC-RAS model using the project survey and our calculated discharges.

Using an impervious area of 15% for the Southern Noonday Creek crossing (12.8 sq mi) the Q100 = 7012 cfs, which equates to about 60% of the FEMA flow. For the northern Noonday crossing (43.2 sq mi), the 15% impervious area generates a Q100 = 1623 which is much greater than the FEMA flow. As you know, this drainage area size is outside of the range of use for the urban equations. Although Tim Stamey once told me that the urban equations could be used outside of their recommended range (standard error just won't apply), they may be excessive in this case. The rural equations here produce a Q100 = 9108 cfs.

Based on a 15% impervious area at the Hawkins Store Road gage (02392950), the 2005 event (6470 cfs) produced a 10 year stor

along Noonday Creek (10 yr @ 15% imp = 6674 cfs). An interesting point to note is that the downstream Shallowford Road gage (02392975, DA = 33.6 sq mi) recorded a lower discharge for the same flood event in 2005.

Would you agree that using 15% +/- impervious and the urban equations for the 12.8 square mile site and just the rural equations fo the 43.2 square mile site is a reasonable approach to the discharges for these sites?

There is a HEC-1 model. I can provide this to you if you would like. It's probably too big for email (5 meg) so let me know and I'll pos it to our ftp site.

I really appreciate your help with this. This is a hot project and determining reasonable discharges for these sites is critical. This is particularly the case with the northern Noonday crossing since that bridge will likely be jacked to address a clearance issue.

Thanks again,

John

From: Anthony J Gotvald [mailto:agotvald@usgs.gov]
Sent: Fri 4/25/2008 2:44 PM
To: John McWhorter
Cc: Garrick L. Edwards; Larry Cook; Robbie Frizzell; Curtis, Steven; Beck, Susan
Subject: Re: Noonday Creek Discharges - I-575

John,

The Q100 values of 11,917 and 12,874 cfs at the I-575 crossing seem high for a drainage area of only 12.8 square miles. Are the data used for these FEMA analyses available? It would be interesting to see the data that were used in the analysis. I am a little confused on the study dates you mentioned. Cherokee County had a study done in 1988 and then 2006, and Cobb County had a study done in 1992 and then in 2008. Is this correct? Do any of these recent studies include the large event that occurred in July of 2003? I would estimate that the % impervious area for the Noonday Creek watershed is somewhere between 5-15%. Between the rural and urban equations, the urban equations would serve as a better estimate of the Q100 for this site. However, these FEMA studies may have additional information that would lead to a better estimate of the Q100 for this site.

Tony Gotvald, Hydrologist
USGS Georgia Water Science Center
3039 Amwiler Road, Suite 130
Atlanta, GA 30360
(770) 903-9310

"John McWhorter"
<jmcwhorter@JBTrimble.com>

04/25/2008 11:38 AM

To <agotvald@usgs.gov>
cc "Robbie Frizzell" <rfrizzell@JBTrimble.com>, "Beck, Susan" <sbeck@dot.ga.gov>, "Garrick L. Edwards" <gledwards@JBTrimble.com>, "Larry Cook" <lcook@JBTrimble.com>, "Curtis, Steven" <sacurtis@bechtel.com>
Subject Noonday Creek Discharges - I-575

Tony,

We are working on plans to widen I-575 over two crossings of Noonday Creek, which flows from south to north in Cobb and

Cherokee Counties. The southern crossing is in Cobb County and the northern crossing is in Cherokee county. Since Noonday Creek is a FEMA studied stream, I was comparing discharges between the regression equations and FEMA and due to the large differences, I would like to get your comments.

The Cherokee County FEMA study is dated September 29, 2006. It appears that the discharges used for Noonday Creek in this s[illegible] remain unchanged from the original study done in 1988. There is a "preliminary" study for Cobb County that is slated for a D[illegible]mber 2008 effective date. This study includes new hydrology for Noonday Creek and the discharges are ~2.5 times the rural regression equations. This area is certainly urbanized and the use of the urban regression equations is easily warranted. However, even an impervious area of 100% will not approach the FEMA flows. At the southern (Cobb County) crossing of I-575 over Noonday Creek, the drainage area is 12.8 square miles. The USGS rural Q100 = 4468 cfs and the Dec. '08 FEMA flow is 11917 cfs. With an impervious area of 100%, the USGS urban regression Q100 = 9681cfs. For reference, the previous 100 year FEMA flow from the 1992 study = 12874 cfs.

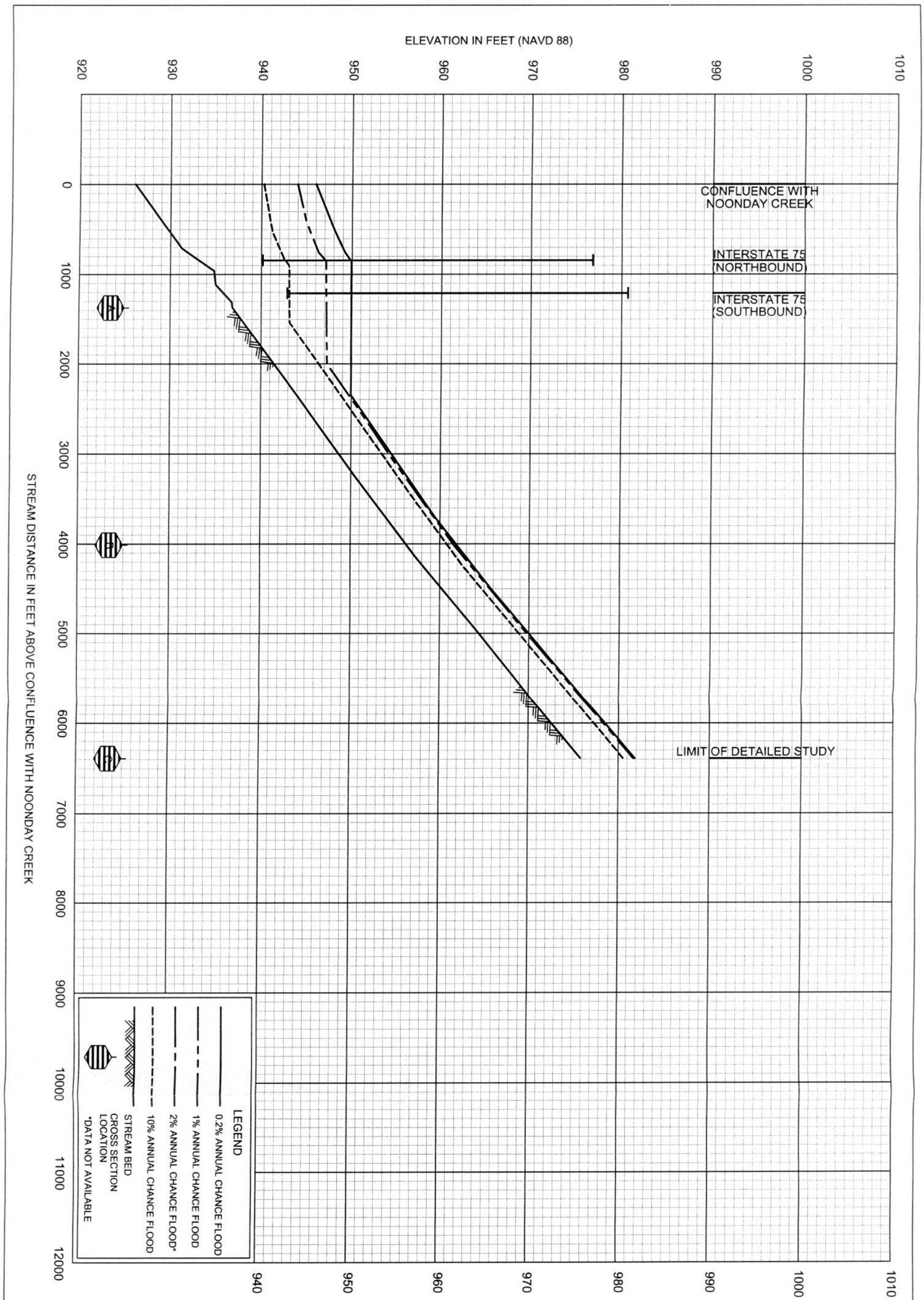
There are gages on Noonday Creek at Shallowford Road (02392975) and Hawkins Store Road (02392950), which are in the area at 33.6 and 24.3 square miles, respectively. However, these gages only have about seven years of record.

The northern I-575 crossing over Noonday Creek in Cherokee County has a drainage area of 43.2 square miles. The current 2006 Flood Insurance Study for Cherokee County has a 100 year discharge of 9372 cfs at the confluence with Little River (drainage area 49.3 square miles). The 100 year rural discharge is 9108 cfs at the bridge site (43.2 sq mi) and 9839 cfs at the confluence (49.2 sq mi). In this case, the discharges correlate fairly well between USGS and FEMA except that some urbanization should be considered

As you can see, the downstream crossing has ~3.4 times the drainage area (43.2 vs. 12.8) and approximately 75% of the discharge based on the FEMA flows. There appears to be some storage available between the two I-575 crossings over Noonday Creek that could partially explain the reduction. If you would, please comment on this issue and provide your recommendations for the discharge calculations for both the north and south crossings of I-575 over Noonday Creek. I've attached an excerpt from the quad map for your use.

Thank you for your time.

J[illegible] McWhorter, P.E.
J.B. Trimble, Inc.
770-200-1713 direct
770-952-1022 office
770-952-1041 fax
jmcwhorter@jbtrimble.com



118P	FEDERAL EMERGENCY MANAGEMENT AGENCY COBB COUNTY, GA AND INCORPORATED AREAS	FLOOD PROFILES NOONDAY CREEK TRIBUTARY NO. 6

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 for this jurisdiction.

The **projection** used in the preparation of this map was NAD 1983 StatePlane Georgia West FIPS 1002 Feet. The **horizontal datum** was GCS North American 1983. 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 http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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

Base map information shown on this FIRM was derived from Cobb County aerial photography produced at a scale of 1:600 from photography dated 2006.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables for Harmony Grove Creek and Noonday Creek Tributary No. 6 in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

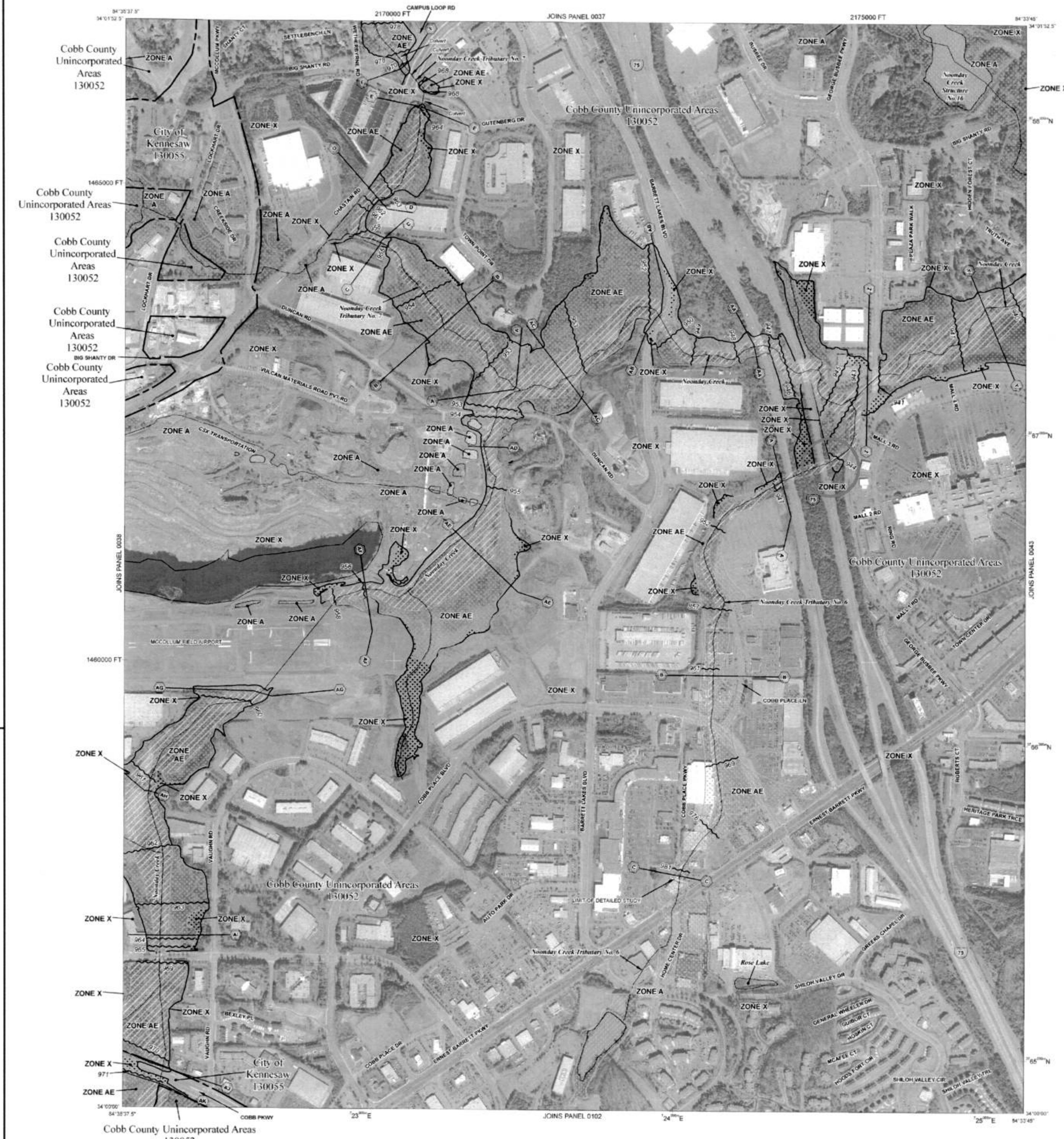
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

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 its website at http://msc.fema.gov.

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 http://www.fema.gov.



LEGEND

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

The 1% annual 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 Area 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 Area Zones and 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
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
76N	1000-meter Universal Transverse Mercator grid values, zone 16
600000 FT	5000-foot grid ticks: Georgia State Plane coordinate system, West zone (FIPSZONE 1002), Transverse Mercator projection
DX5510 ×	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
August 18, 1992

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
December 16, 2008 - to change Base Flood Elevations and Special Flood Hazard Areas

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 0039G

FIRM
FLOOD INSURANCE RATE MAP

COBB COUNTY, GEORGIA
AND INCORPORATED AREAS

PANEL 39 OF 252

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
COBB COUNTY	130052	0039	G
KENNESAW, CITY OF	130055	0039	G

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
13067C0039G

MAP REVISED
DECEMBER 16, 2008

Federal Emergency Management Agency

ROADWAY PLAN AND PROFILE

10/1/2009
USER:22950

W:\TransDesign\IPLOT\colortables\oCE600.tbl
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O:\175\dgn\714130CV01.dgn[0-61, 64, 65]
GRWCOV

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0074-03(242)		

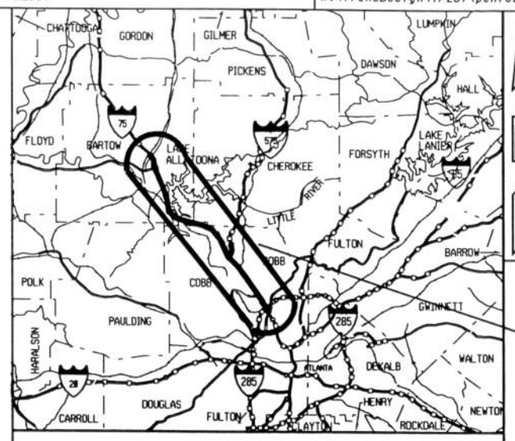
DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

PLAN AND PROFILE OF PROPOSED

I-75 REVERSIBLE LANES
NH000-0073-03(242)
COBB COUNTY

FEDERAL AID PROJECT

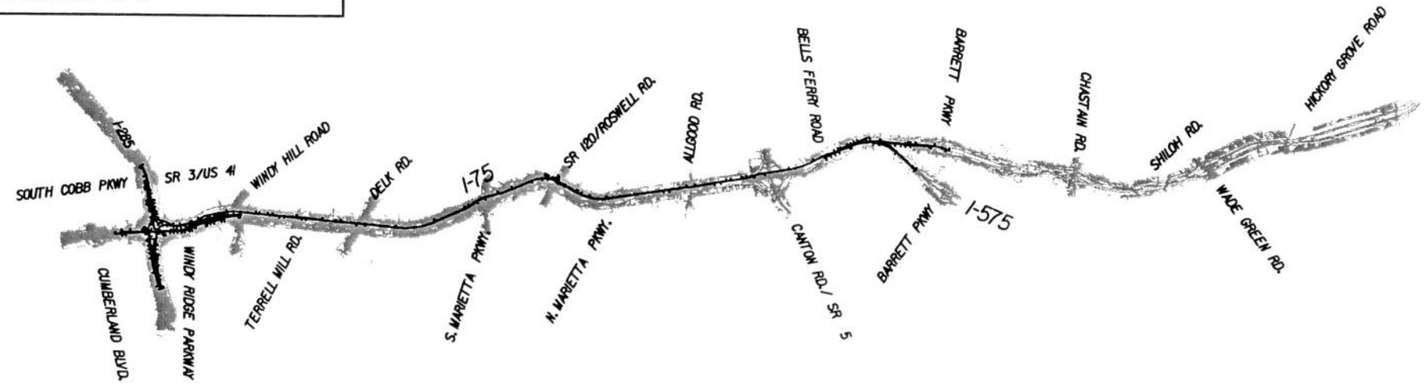
FEDERAL ROUTE * I-75
STATE ROUTE * 417
P.I.NO. 714130



LOCATION SKETCH

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.

DESIGN DATA:
TRAFFIC A.D.T.:
TRAFFIC A.D.T.:
TRAFFIC D.H.V.:
DIRECTIONAL DIST:
% TRUCKS:
24 HR. TRUCKS %:
SPEED DESIGN: 55 MPH



PREPARED BY: _____
DESIGN

RECOMMENDED FOR SUBMISSION BY: _____
DESIGN

SUBMITTED BY: _____
STATE DESIGN ENGINEER

DATE | CHIEF ENGINEER

PLANS COMPLETED

REVISIONS:	REVISED FIRST UTILITY SUBMISSION 9/25/09

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.

PBS&J

GTP GEORGIA TRANSPORTATION PARTNERS

NORTHWEST I-75/I-575 CORRIDOR

SCALE IN FEET
0 5000 10000 20000

LENGTH OF PROJECT	COUNTY No. 067/057 Project No.
	MILES
NET LENGTH OF ROADWAY	
NET LENGTH OF BRIDGES	
NET LENGTH OF PROJECT	
NET LENGTH OF EXCEPTIONS	
GROSS LENGTH OF PROJECT	

LOCATION & DESIGN APPROVAL DATE:

FUNCTIONAL CLASS:
INTERSTATE PRINCIPAL ARTERIAL

THIS PROJECT IS 100% IN COBB COUNTY AND IS:
% IN CONG. DIST. NO. 11 ,
% IN CONG. DIST. NO. 6

PROJECT DESIGNATION: EXEMPT

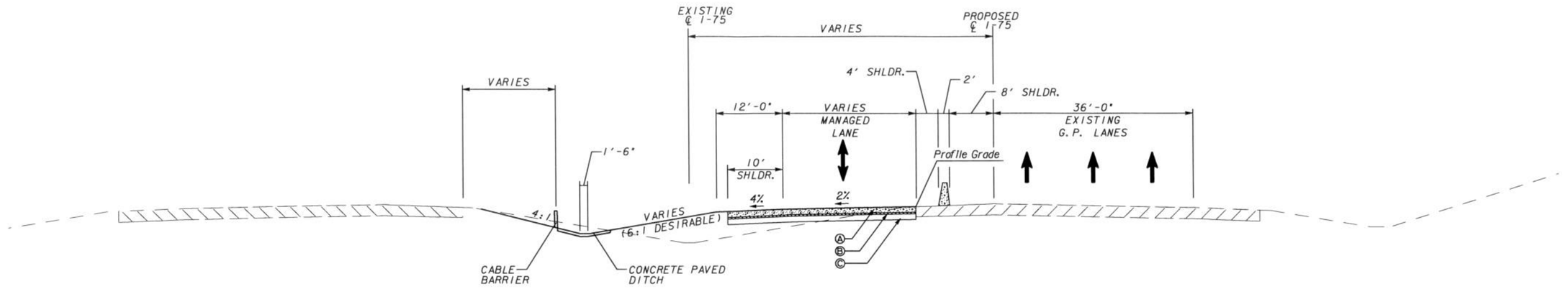
DESIGNED IN ENGLISH UNITS.

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.

3/1/2007

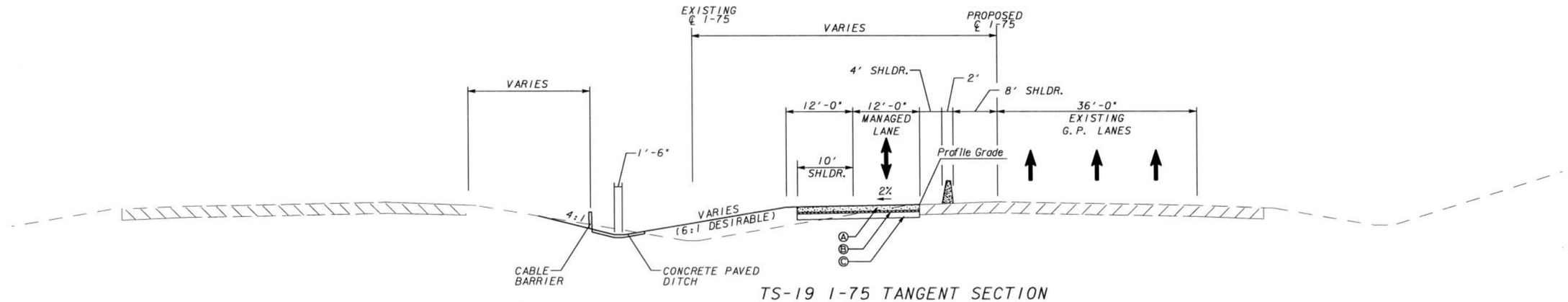
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0073-03(242)		

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.



TS-20 I-75 TANGENT SECTION
ONE-LANE REVERSIBLE
APPLIES TO: STA. 829+05 TO STA. 837+75
APPLIES TO: STA. 882+11 TO STA. 889+05

PAVEMENT MATERIAL SCHEDULE	
Ⓐ	PLAIN PORTLAND CEMENT CONTRETE WITH DOWELS, 12 INCH
Ⓑ	19 MM SUPERPAVE, MIX DESIGN LEVEL A, 330 LBS./SY
Ⓒ	GRADED AGGREGATE BASE, 12 INCH



TS-19 I-75 TANGENT SECTION
ONE-LANE REVERSIBLE
APPLIES TO: STA. 800+00 TO STA. 829+05
APPLIES TO: STA. 889+05 TO STA. 909+59
APPILES TO: STA. 982+18 TO STA. 1008+36

DRAWN BY ____ DATE ____
CHECKED BY ____ DATE ____
SUPERVISOR ____ DATE ____
APPROVED ____ DATE ____

REVISIONS						
NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR

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-75 REVERSIBLE MANAGED LANES

DRAWING No. 05-20

11/23/2009 4:57:58 PM

$FILENAME$

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0073-03(242)		

I-75 SOUTHBOUND

Curve* 81
PI STA - 844+76.91
N- 1463469.03
E- 2174225.01
DELTA - 20°18'23.8" (LT)
DEGREE - 1°28'36.10"
TANGENT - 694.86
LENGTH - 1375.14
RADIUS - 3880.00
SUPER ELEV. RATE- 3.48%
DESIGN SPEED - 55 MPH

Curve* A1
PI STA - 42+12.11
N- 1463202.33
E- 2174226.08
DELTA - 12°55'47.5" (LT)
DEGREE - 1°29'47.55"
TANGENT - 433.83
LENGTH - 863.98
RADIUS - 3828.55
DESIGN SPEED - 55 MPH

APPROXIMATE LOCATION LAND LOT LINE

POB 29+01.82

30+00

35+00

RAMP A CONST ℄

PC 37+78.28

CURVE *A1

CURVE *81

N 12°12'48" W

N11°04'03"W

N 11°23'57" W

826+00.00 MATCH LINE STA.

840+00.00 MATCH LINE STA.

8' 2' 4' 12' 10'

830+00

I-75 REV CONST ℄

I-75 NORTHBOUND

835+00

PI 833+19.88

PI 837+55.32

PC 837+82.05

BEGIN BRIDGE
STA. 839+37.00

LL 578 LL 575 LL 579 LL 574

APPROXIMATE LOCATION LAND LOT LINE

EXIST R/W

EXIST R/W

EXIST R/W

N/F
Cobb Perl Associates
1605740003

N/F
Cobb Place Associates
1605740002

N/F
Schlesinger Family
1605740008

N/F
YH GROUP, INC
1605740004

N/F
KI CHON CHOI
& WOO SUENG
1605740004

℄

℄

℄

SCALE IN FEET
0 50 100 200

N:\TRA\2557\17\Drawings\Civil\Rdy\714130CP46.dgn 02-OCT-2009 09:38

WINDY SANDERS DRAWN BY	9/23/09 DATE	
STEVE LINLEY CHECKED BY	9/23/09 DATE	
STEVE LINLEY SUPERVISOR	9/23/09 DATE	
LARRY COOK APPROVED	9/23/09 DATE	

TRACKING

NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
			MHS	SJL	SJL	LFC
A	6/30/09	PROGRESS DRAWINGS (ROLL PLOTS)	CEC	PCT	MRM	RHM
B	9/25/09	50% SUBMITTAL	MHS	SJL	SJL	LFC

GTP Georgia Transportation Partners

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-75 REVERSIBLE

DRAWING No. 13- 46

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0073-03(242)		

Curve* A2
PI STA - 49+00.49
N- 1463810.38
E- 2173945.04
DELTA - 7°44'07.3" (LT)
DEGREE - 1°30'00.31"
TANGENT - 258.22
LENGTH - 515.66
RADIUS - 3819.50
DESIGN SPEED - 55 MPH

APPROXIMATE LOCATION LAND LOT LINE

I-75 SOUTHBOUND

I-75 NORTHBOUND

RAMP A CONST ℄

CURVE *A1

CURVE *A2

CURVE *B1

PCC 46+42.26

PT 51+57.92

PT 851+57.19

N31°27'45"W

N31°29'41"W

40+00

45+00

50+00

840+00.00

854+00.00

845+00

850+00

MATCH LINE STA. 840+00.00

MATCH LINE STA. 854+00.00

I-75 REV CONST ℄

BEGIN WALL 52
STA. 836+67
37' LT

END BRIDGE
STA. 841+79.25

EXIST R/W

FIELD WIRE FENCE

TREE LINE

SSMH BB-1

SSMH BB-2

SSMH BB-3

SSMH BB-4

18" DIP

DISS*

N/F
Schlesinger Family
1605740008

N/F
DNP Kennesaw LLC
1605070018

N/F
Bright Meyers
1605030006

WINDY SANDERS	****	9/23/09
DRAWN BY		DATE
STEVE LINLEY		9/23/09
CHECKED BY		DATE
STEVE LINLEY		9/23/09
SUPERVISOR		DATE
LARRY COOK		9/23/09
APPROVED		DATE

TRACKING

NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
	****	****	MHS	SJL	SJL	LFC
A	6/30/09	PROGRESS DRAWINGS (ROLL PLOTS)	CEC	PCT	MRN	RHM
B	9/25/09	50% SUBMITTAL	MHS	SJL	SJL	LFC

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-75 REVERSIBLE

DRAWING No. 13-47

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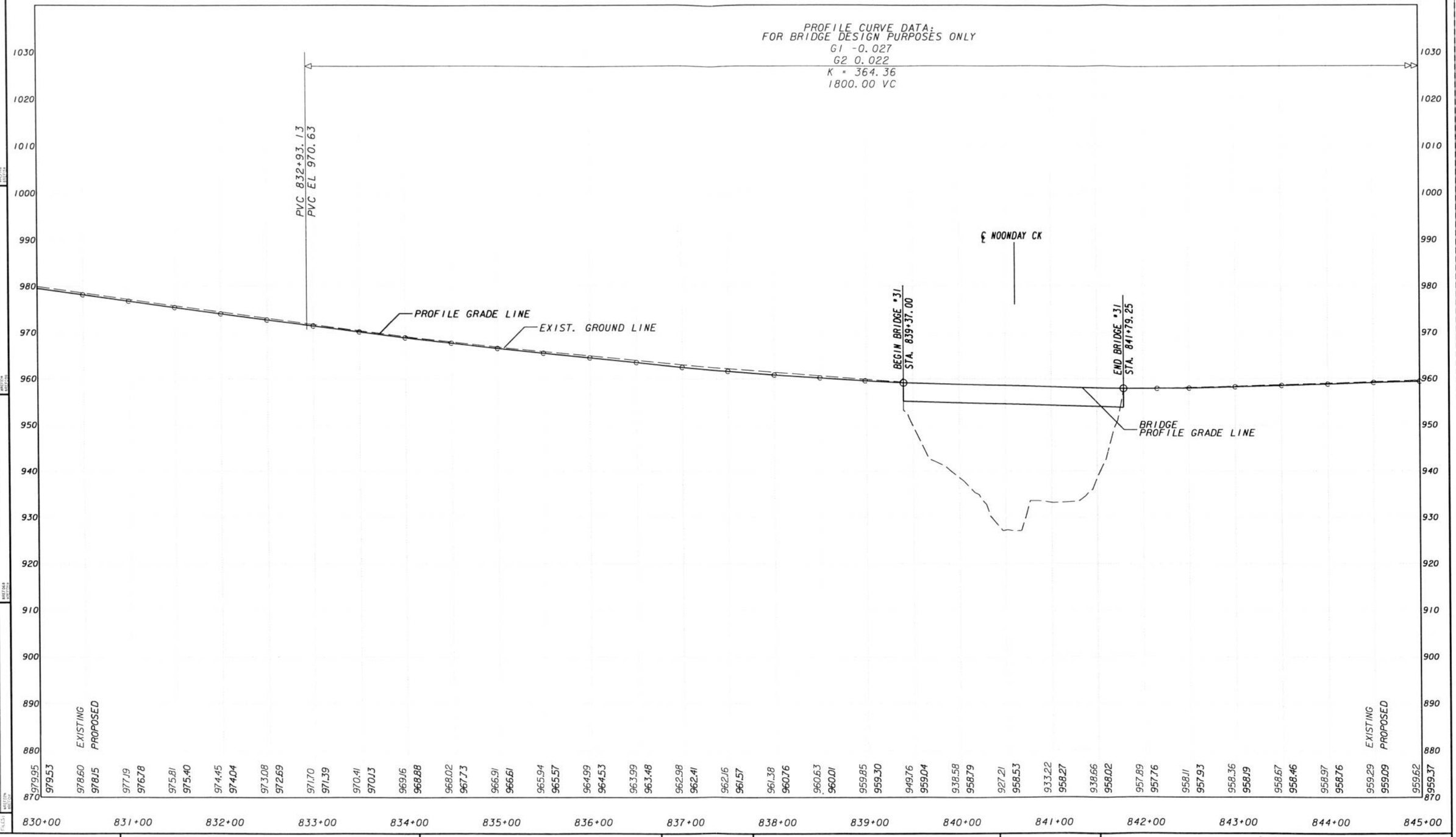
STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0073-03(242)		



REVISIONS						
NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
A	6/30/09	PROGRESS DRAWINGS (ROLL PLOTS)				
B	9/25/09	50% SUBMISSION				

DRAWN BY ____ DATE ____
CHECKED BY ____ DATE ____
SUPERVISOR ____ DATE ____
APPROVED ____ DATE ____

GTP Georgia Transportation Partners

SCALE: 1" = 50' HORIZ.
1" = 10' VERT.

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

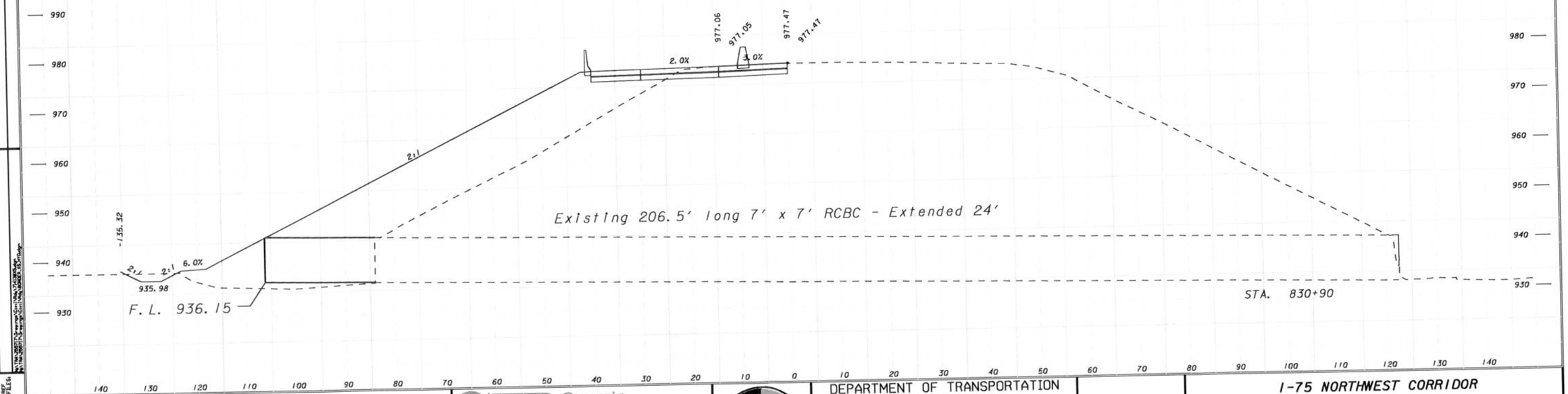
I-75 REVERSIBLE MANAGED LANES

DRAWING No. 15-

$FILENAME$ $DATE$ $TIME$

CULVERT DRAINAGE PROFILE

STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
GA	NH000-0073-03(242)		



REVISIONS						
NO	DATE	DESCRIPTION	ORIG	CHKR	SUPV	APPR
A	11/30/09	ISSUED FOR HYDROLOGY SUBMISSION	WHS	JKW	RLF	LFC

WINDY SANDERS — DRAWN BY — 11/30/09 DATE
JOHN MCMORTER — CHECKED BY — 11/30/09 DATE
ROBBIE FRIZZELL — SUPERVISOR — 11/30/09 DATE
LARRY COOK — APPROVED — 11/30/09 DATE

GTP Georgia Transportation Partners

HORIZ. 0 20 40 60
VERT. 0 10 20 30
(SCALE IN FEET)

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 NORTHWEST CORRIDOR

DRAINAGE PROFILES

I-75 REVERSIBLE LANES

DRAWING No. 22-01

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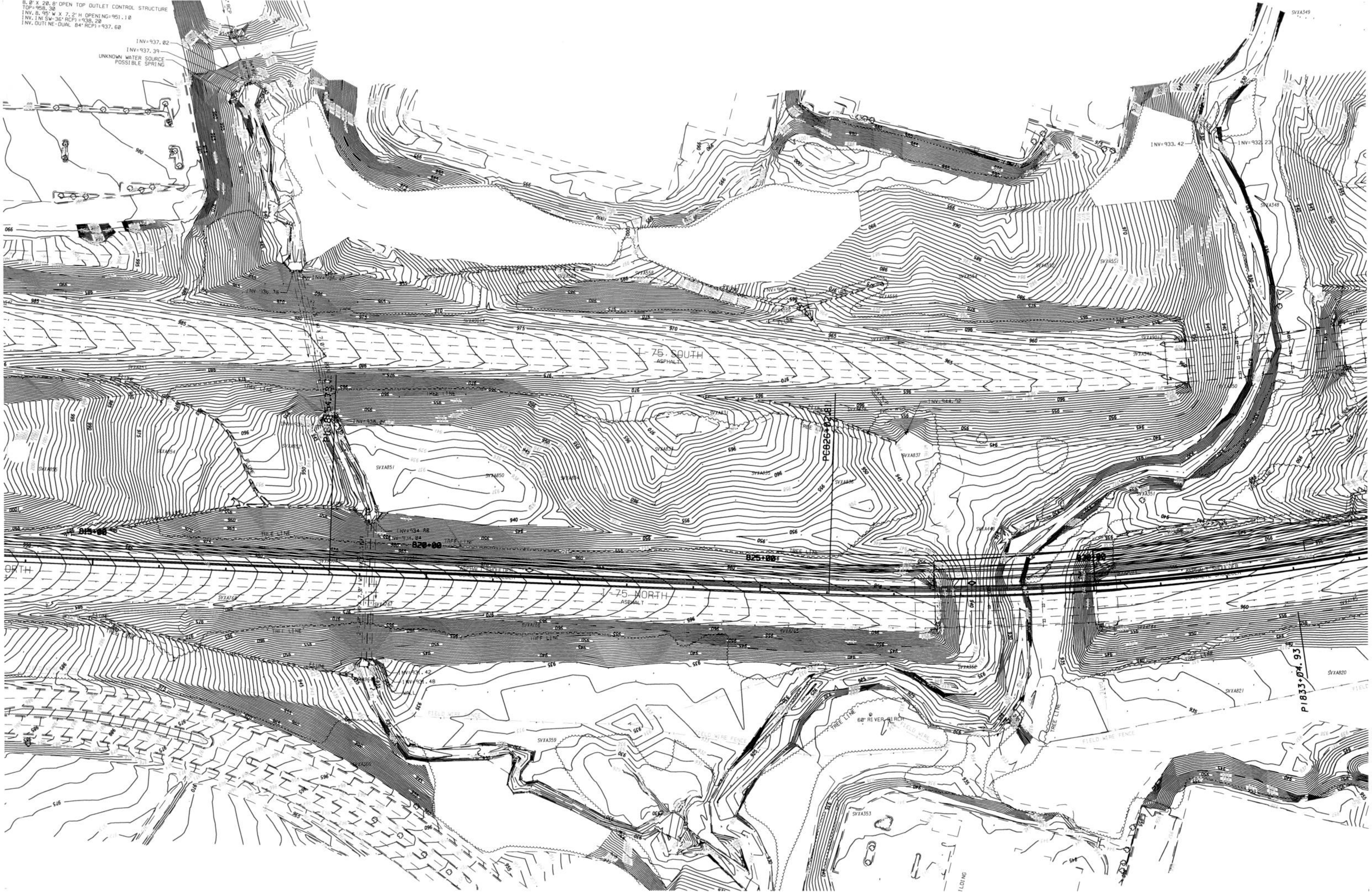
8.0' X 20.8' OPEN TOP OUTLET CONTROL STRUCTURE
TOP=958.30
INV. 8.95' W X 7.2' H OPENING=951.10
INV. IN(SW-36" RCP)=938.20
INV. OUT(NE-DUAL 84" RCP)=937.60
INV=937.02
INV=937.39
UNKNOWN WATER SOURCE
POSSIBLE SPRING
INV=933.42
INV=932.23
I-75 SOUTH
ASPHALT
I-75 NORTH
ASPHALT
815+00
820+00
825+00
830+00
PC826+02.81
PI833+04.93
TREE LINE
FIELD WIRE FENCE
60" RIVER BIRCH
INV=934.88
INV=931.42
INV=931.48
WALL